

Distributed Generation Connection Guide

**A Guide to Connecting
Domestic-Scale Type Tested
Generation to the
Distribution Network
(Typically by Householders)
in a Single Premise that Falls
Under G83 or G98**

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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 Recommendations G83, G98, G59, G99 and the Distribution Code, the Grid Code, the Connection and Use of System Code and the Balancing and Settlement Code.

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Distributed Generation Connection Guide: Information Sheets

The following pages contain a number of information sheets. These bring information that is contained throughout the Guide into a single page. The information sheets include:

- Decision Tree for the Distributed Generation Connection Guide—to help you to identify whether this is the right Guide for you.
- Capacity cut off points—a diagram illustrating the impacts that the generation capacity of your generating equipment has on the requirements and opportunities for your project.
- Provision of Information: DNO websites—a summary of the information you can expect to find on DNO websites.
- Legislative and Regulatory Document Hierarchy—an illustration of document hierarchy, and list of key documents.

You will find the Guide introduction and contents after these information sheets.

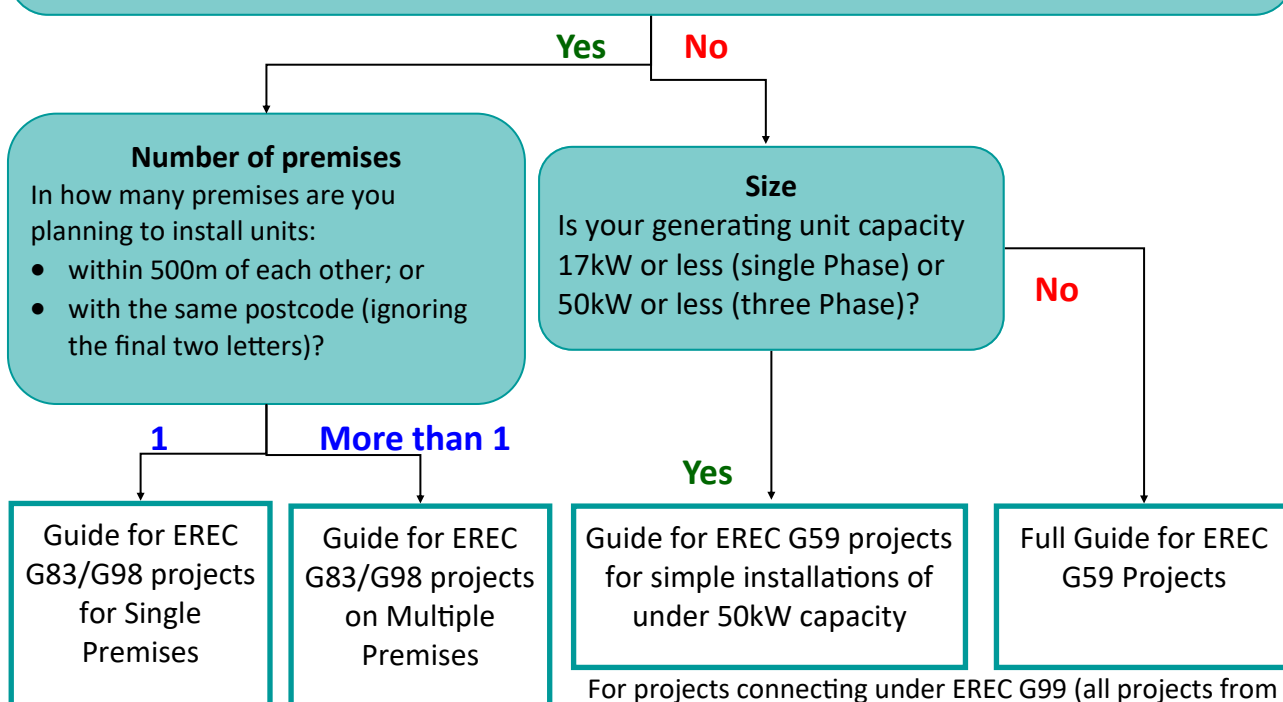
Decision Tree for the Distributed Generation Connection Guide

There are a number of Distributed Generation Connection Guides, each with a corresponding 'Summary' guide. The purpose of the summary guides is to act as a quick check, providing only the most useful information in a condensed format. This flowchart guides you to the most relevant Connection Guide for the Distributed Generation you are planning to install. The Guides can be found on the Distribution Generation section of the [ENA website](#).

Size of your generating unit within any single premises

Does your generating unit and / or storage device (or the aggregation of units if there are more than one) have a capacity of 16A per phase or less, and is it connected at low voltage? In other words:

- Three phase—generation capacity of 11.04kW or smaller and connected at 400V
- Single Phase—generation capacity of 3.68kW or smaller and connected at 230V



For projects connecting under EREC G99 (all projects from 27th April 2019), refer to the EREC G99 Guides, available on the ENA website.

Simplest process

Most complex process

Examples of Distributed Generation that is 16 A per phase or less

PV system: If you are installing solar panels on the roof of your home (or another similar building), it is likely that your project will be less than 16 A per phase, particularly if your array is about 30 m² or less; or about 18 panels or fewer.



Wind: Many small wind turbines are also less than 16 A per phase. For example:

- **QR5 turbine:** Rated 6.5 kW with a rotating section of 5 m height
- **Bergey wind turbine:** Rated 10.0 kW with a diameter of 7 m



Combined Heat and Power (CHP): A micro-CHP plant rated 6 kW (3-phase) (the size of a big dishwasher 0.8 x 1 x 1 m) could have a thermal output of 18 kW.

Provision of Information: DNO Websites

There is a great deal of published information available from your DNO that can be helpful for your project planning. Some of the most useful sources are summarised here, and links to the DNO websites are in the table below.

Long Term Development Statement (LTDS)

Covers the development plans for the network, and other information useful for prospective developers. An introductory chapter is generally available on the DNO's website and DNOs will give access to the full document on request. These documents are updated every six months, and published annually.

Connection Charging Documents

Statements and methodologies will be given for both connection charges and Use of System (UoS) charges. This information may be included in a single document, or in several, and are updated regularly. These are available on DNO websites.

Standards of Performance

Ofgem has set minimum performance standards for connections, both during and after their construction. If your DNO fails to meet these standards, you may be entitled to receive payment. Ofgem has guidance documents about these Standards on their website:

www.ofgem.gov.uk/licences-codes-and-standards/standards/quality-service-guaranteed-standards

Distributed Generation "Work Plan"

The Incentive for Customer Engagement (ICE) exists to encourage DNOs to engage with and respond to the needs of major connections customers (which includes generation customers), and includes a requirement on DNOs to set out plans on what improvements they plan to make in the next regulatory year, consisting of two parts. Part 1 covers plans for improvements for the forthcoming year; and Part 2 reviews the progress in the previous year. Check your DNOs Distributed Generation web pages.

Other Supporting Information Provided by DNOs

In recent years, there have been improvements to the information that DNOs provide, including:

- web portals and decision support tools/application hotline;
- capacity "heat maps", indicating areas that can more readily facilitate connections;
- holding events such as "open surgeries" for Distributed Generation customers; and
- more details provided on outages (historic and planned outages).

Region	DNO	Website
North Scotland, Southern England	SSE Power Distribution	www.ssepd.co.uk
South Scotland, Cheshire, Merseyside and North Wales	SP Energy Networks	www.spenergynetworks.com
North East England and Yorkshire	Northern Powergrid	www.northernpowergrid.com
North West	Electricity North West	www.enwl.co.uk
East Midlands, West Midlands, Southern Wales, South West England	Western Power Distribution	www.westernpower.co.uk
Eastern England, South East England, London	UK Power Networks	www.ukpowernetworks.co.uk

Connection Process: Capacity Cut Off Points

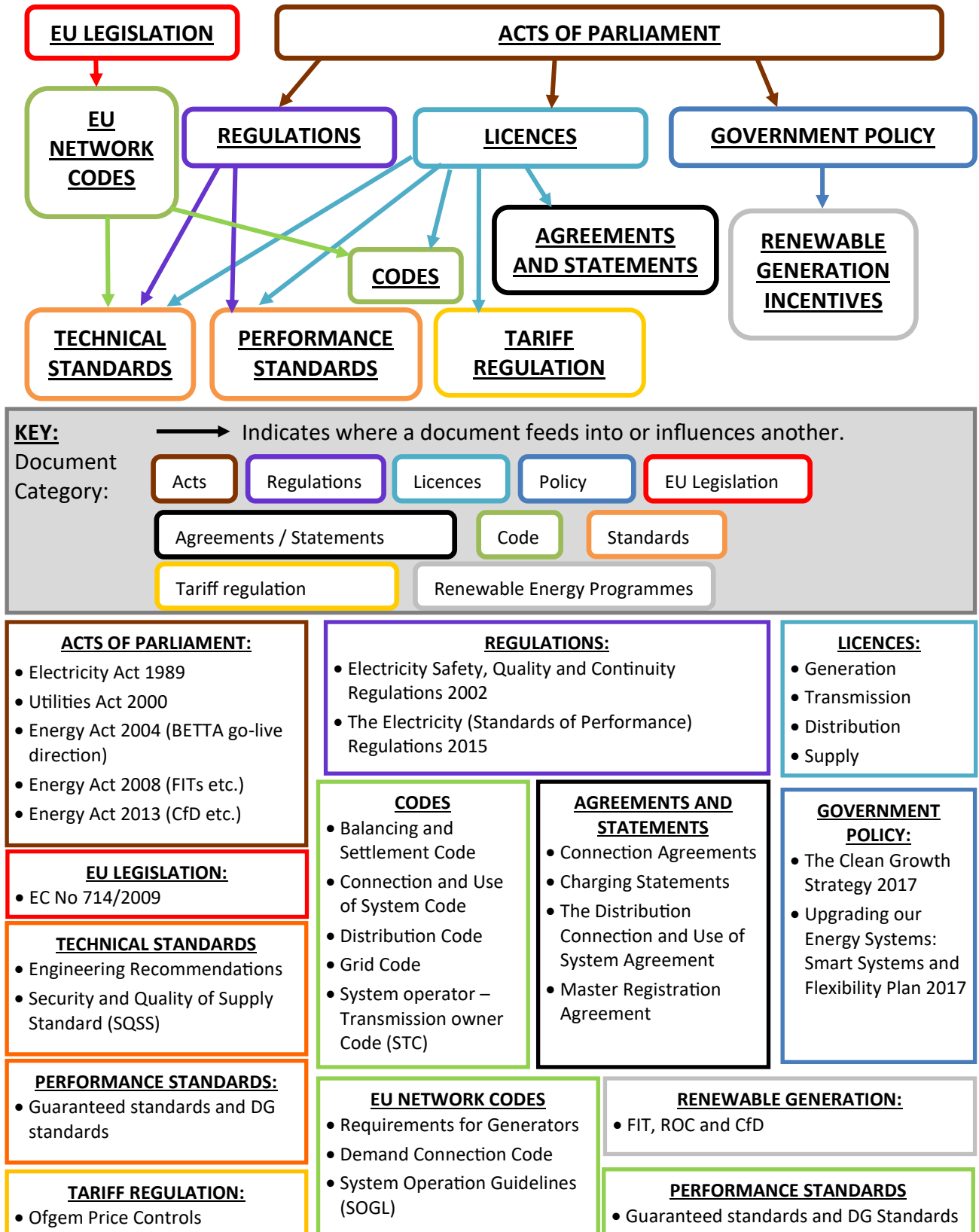
The tasks that you have to undertake to get connected vary with the capacity of the generating plant. In general, the bigger the generator, the more complex the connection requirements.

The table below illustrates some of the impacts that the capacity of your generating units have on the connection process and requirements on you.

Connection Process		Size Definitions			Generation Licencing	Metering	Incentives Schemes
Single Phase	Three Phase	North Scotland	South Scotland	England and Wales			
Covered by G83/G98 if connected at low voltage (230V or 400V) and type tested. Otherwise refer to G59/G99.		Power Generating Facility Power Generating Facility owner may chose to have an agreement with NGET, in order to make use of the transmission system or to participate in the balancing market.			Do not need a generation licence.	Usually will have Non-Half Hourly metering.	FITs (Feed-In Tariffs) if technology is eligible.
Covered by G59/G99 Can use simplified G59 process if type tested.							
Covered by G59/G99 process.							
10MW 30MW		Large Power Station Must hold an agreement with NGET—BEGA or BELLA.		Medium Power Station	Must have Half Hourly metering.	CFD (Contracts for Difference) Projects in the order of several MW	
100MW		Large Power station Must hold a Bilateral Embedded Generation Agreement (BEGA) with NGET.					
Section C		Sections C and D			Section D	Section E	Section F

Legislative and Regulatory Documents Hierarchy

The following diagram shows the legislative and regulatory documents in the power sector. These are grouped by category, and where possible the relationship between documents is illustrated. The documents have been colour coded by document category. The most relevant examples of each documents are included in the boxes below.



Distributed Generation Connection Guide: An Introduction

Who is this Guide for?

This Guide is intended to help you, as a developer or the prospective owner of Distributed Generation, to connect your generating unit to a distribution network in Great Britain. It may also be useful for installers or manufacturers of distributed generation equipment.

The types of generation that most frequently connect to the distribution networks include:

- renewable energy projects;
- waste to energy projects;
- energy storage devices (e.g. batteries); and
- on-site generation and Combined Heat and Power (CHP) projects.

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 project connected to the distribution network. The Guide provides an overview of the connection process, as well as more details on the application stage.

The connection process involves discussions and agreements between you and your Distribution Network Operator (DNO). This process is more likely to be successful if you and the DNO can communicate effectively and understand each other's concerns. So, 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 GB power sector and the role Distributed Generation has to play;
- to describe the main factors affecting connection costs and ongoing charges;

- to highlight your options relating to your connection works, identify different contracts relating to your connection and discuss some day-to-day operational issues; and
- to describe two key financial incentives for Distributed Generation: Feed-in Tariffs (FITs) and Contracts for Difference (CFD).

What is not covered in the Guide?

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

- Designing, installing and operating the generation installation
- Buying and selling electricity (beyond FITs and CFDs)
- Planning the project
- Financing the project
- Resolving local planning issues

These issues are outside the scope of this Guide, but you will need to about these in parallel with the connection process.

Note that this document covers the process for connecting generation to the distribution networks in Great Britain. Northern Ireland has different connection arrangements, for example different versions of Engineering Recommendations G83/G98 and G59/G99 are in use. For more information, refer to the Northern Ireland Electricity website:

www.nie.co.uk

Distributed Generation Connection Guide: An Introduction

The format of the Guide

This Guide has been written and formatted with you, the reader, in mind. In particular we think this Guide will be useful for customers with generation, installers and developers. 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 **bolded** 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.



Though this Guide is intended for the general public and should not require the reader to be technical or familiar with the energy industry, please be aware that the topics covered here are technical and complex. It is therefore necessary to refer to such concepts as voltage and power. Where possible, terms that may be unfamiliar have been explained.

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.

Governance of related Codes and documents

Many of the codes and other documents described in this guide are governed in such a way that any interested and materially affected party can propose a change to the codes and documents. This includes the Connection and Use of System charging arrangements (for both distribution and transmission) and the Distribution and Grid Codes. There are also groups with Distributed Generation community and DNO representation where issues can be raised and discussed which may lead to changes being proposed.

The overarching group to discuss commercial and procedural issues associated with connection is the [ENA DER \(Distributed Energy Resources\) Connections Steering Group](#). Any issues you have for the Group should be raised through trade associations who are represented. Please note that practices between DNOs may be different; for example where the connection requirements are location specific or the connection risks and the network characteristics are different.

Distributed Generation Connection Guide: Is this the right Guide for my project?

The process of connecting Distributed Generation to the electricity distribution network varies depending on the size of the generation to be connected, and the specific technology to be used. In general, the larger the generation capacity, the more complex the process.

The Engineering Recommendations that cover the connection of Distributed Generation to the electrical distribution network are: EREC G83/G98 (for smaller generation capacities) and EREC G59/G99 (for all other projects). These are described further in the information boxes on the following pages.

A number of a Guides have been developed:

- EREC G83/G98 compliant units in a single premises;
- EREC G83/G98 compliant units in multiple premises within a close geographic region;
- A simplified guide for EREC G59 compliant equipment with a capacity of 50kW or less, and which has been type tested; and

- A full guide for all EREC G59 installations.
- Guides for G99 installations

A “summary” version of each Guide, containing the minimum, essential information from each chapter, is also available—refer to the ENA website.

The table on the next page includes a quick check for finding the right Guide for you. Read the information boxes for further explanations of terms that may be unfamiliar to you. Where you are installing multiple generating units, the application process (ie EREC G83/G98 or G59) is based on the total installed capacity of the generating units in each premises, how many premises equipment will be installed in, and whether each unit is type tested. If you are adding new generating units to an existing installation before 27th April 2019, then the total installed capacity should be used to determine the connection process of the new connection application, but only the new equipment needs to comply with the latest EREC G59. Alternatively you can connect new generating units under EREC G99—refer to the G99 Guides.

Important note: If your generation is connected before 27th April 2019, it can be connected under either the new EREC documents (G98 and G99) or the old EREC documents (G83 and G59). This is likely to depend on which document your equipment is compatible with. From 27th April 2019, generation will only be allowed to connect under EREC G98 and G99, with an exception for certain generators. For more information on this transition, refer to “Recent Changes to Regulations” page—just before Chapter A.

Distributed Generation Connection Guide: Is this the right Guide for my project?

Guide	Criteria	
A guide for connecting Distributed Generation that falls under EREC G83/G98 in a single premises	Installation of one or more Distributed Generation units at a single premises.	Distributed Generation is compliant with EREC G83/G98 if: <ul style="list-style-type: none">• It meets the size definition of SSEG / Micro-generator;• It is installed in accordance with EREC G83/G98. Your installer should be familiar with these requirements; and• It has been tested and approved according to the relevant Type Testing Annex in EREC G83/G98.
A guide for connecting Distributed Generation that falls under EREC G83/G98 in multiple premises	Installation of Distributed Generating units at more than one premises within a close geographic region.	
A simplified guide for connecting Distributed Generation that falls under EREC G59 with a capacity of less than 50kW three-phase or 17kW single-phase	<p>This Guide is written for installations where:</p> <ul style="list-style-type: none">• the equipment is covered under G59;• the generating capacity of the generating units is 50 kW or less three phase, or 17 kW or less single phase;• the equipment to be installed is EREC G59 or G83 ‘Type Tested’ <p>In addition, this Guide is aimed at generation projects where the connection requires only a minimum amount of network extension and makes use of the Feed-in Tariff (FITs) scheme (rather than Contracts for Difference or CFDs). For information on network extension and CFDs, refer to the full G59 Guide (below).</p>	
A full guide for connecting Distributed Generation that falls under EREC G59	This guide covers all projects that are covered by EREC G59. If a Distributed Generation project does not meet all of the criteria under EREC G83 then it is covered by EREC G59.	
A guide for connecting Type A Power Generating Modules under EREC G99	<p>This Guide is written for installations where:</p> <ul style="list-style-type: none">• The registered capacity of each Power Generating Module is >16 A/phase, but less than 1 MW; and• The connection point is below 110 kV (in practice in GB this is at 66 kV or below).	
A guide for connecting Type B—D Power Generating Modules under EREC G99	This Guide is written for installations where the registered capacity is at or above 1 MW, or for any generation connected at or above 110 kV (in practice in GB this is at 132 kV or above).	

Distributed Generation Connection Guide: Is this the right Guide for my project?

Engineering Recommendation G83

EREC G83 is called “Recommendations for the Connection of Type Tested Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Low-Voltage Distribution Systems.” It sets out the requirements you must meet before your generating unit can be connected to the network. The capacity threshold refers to the **aggregate generating capacity installed in a single premises**.

The document is aimed at the manufacturers and installers of your generating unit. [EREC G83 is available on the Distribution Code's website](#) for free; all of the Appendices with forms required for applications are also available free of charge. From 27th April 2019 you can no longer connect new generation under G83.

EREC G98 is called “Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019”. It will apply from 27th April 2019, but you can connect under EREC G98 before then, as compliance with EREC G98 ensures compliance with EREC G83. EREC G98 is available free of charge from the ENA or Distribution Code website.

Engineering Recommendation G59

EREC G59 is called “Recommendations for the Connection of Generating Plant to the Distribution Systems of Licensed Distribution Network Operators.” The purpose of the document is to provide guidance to you and to DNOs on all aspects of the connection process.

[EREC G59 is available on the Distribution Code's website](#) for free. From 27th April 2019 you can no longer connect new generation under G59 (unless you meet specific requirements, see grace period note on page 33).

EREC G99 is called “Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019”. It will apply from 27th April 2019, but you can connect under EREC G99 before then, as compliance with EREC G99 ensures compliance with EREC G59. EREC G99 is available free of charge from the ENA or Distribution Code website.

Small-Scale Embedded Generation (SSEG)

SSEG is defined in EREC G83 as “A Generating Unit together with any associated interface equipment, if required (eg Inverter(s)) that can be used independently, rated up to and including 16A per phase, single or multi-phase 230/400V AC and designed to operate in parallel with a public low voltage Distribution System”. This corresponds to **3.68 kW on a single-phase supply and 11.04 kW on a three-phase supply**, and refers to the **aggregate generating capacity (including storage) installed in a single premises**.

SSEG is referred to as a Micro-generator in EREC G98.

Distributed Generation Connection Guide: Is this the right Guide for my project?

Inverters

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 (eg. a Photovoltaic array) to the distribution network, which operates at AC.

The term Micro Inverter is used to describe small inverters which are connected to (multiple) small generating units, such as individual PV panels. This is often done so that if one panel is impaired for any reason, then the output of the others is not affected. As with any installation with more than one generating unit, the application process is dictated by the aggregate capacity of all generating units and not the individual units.

Close Geographic Region

Typically, a Close Geographic Region is one which is fed by the same part of the distribution network, from a single feeder or distribution transformer. Your DNO will be able to advise you as to whether your installation sites are within a close geographic region. A general rule of thumb is that if your installations are within 500 meters of each other, or if the post codes are the same at least up until the last two letters, then they are likely to be within a close geographic region.

Emerging Technology

EREC G98 and G99 have a relaxed set of requirements for generation that is classified as an Emerging Technology. This is because the Requirements for Generators (RfG) allows for this. The Emerging Technology status only applies to Type A generation, which has a generating capacity of 0.8 kW to 1 MW and is connected at less than 110 kV (in practice in Great Britain that is 66 kV or below). The Emerging Technologies are:

- 'Baxi Ecogen' generators (the specific products are the Baxi Ecogen 24/1.0, Baxi Ecogen 24/1.0 LPG and Baxi Ecogen System)
- KD Navien stirling engine m-CHP (Hybrigen SE) (the specific products are the 'NCM-1130HH – 1 kWel' and the 'NCM-2030HH – 2 kWel')
- Pellematic Smart_e
- Dachs Stirling SE Erdgas and Dachs Stirling SE Flussiggas

Distributed Generation Connection Guide: Is this the right Guide for my project?

Type tested equipment

A type tested Small-Scale Embedded Generating unit is defined in EREC G83 as one that “has been tested by the Manufacturer, component manufacturer or supplier, or a third party, to ensure that the design meets the requirements of this Engineering Recommendation”. Type testing applies to the generating equipment or inverter which is connected directly to the electricity network. Using type tested equipment simplifies the connection and commissioning process.

The EREC G83 annexes contain methodologies for testing equipment against a set of test conditions to demonstrate compliance with EREC G83. The manufacturer produces a Type Test Certificate to demonstrate compliance. The following generation types fall under EREC G83, as they have a type testing appendix:

- Domestic Combined Heat and Power (CHP)
- Photovoltaic (PV)
- Fuel Cells
- Hydro
- Wind
- Energy Storage Device

The principles for Type Testing under EREC G98 are the same as above. Instead of annexes for different generating types, there is one type testing annex for inverter connected generation, and one for synchronous generation.

The ENA hosts an online Type Test Verification Report Register. This contains certificate and test documentation for generation products and enables product identification and information sharing. The product manufacturer is responsible for uploading and maintaining data and documentation relating to their products. You can access the register at: www.ena-eng.org/ProductTypeTestRegister/

Recent Changes to Regulations

Requirements for Generators

The European Third Energy Package was adopted in July 2009, and has been law since March 2011. The Third Energy Package refers to a suite of legislation for both Electricity and Gas. It has three key objectives:

1. Enhancing sustainability and helping the European Union meet its decarbonisation obligations;
2. Ensuring security of supply in light of a changing generation mix; and
3. Creating a single European Market for Electricity.

The Third Energy Package requires the development of European Network Codes. The Network Codes cover three areas: grid connection codes; market codes and system operation codes. One of the Codes is called Requirements for Generators (RfG). This sets out requirements which new generators will need to meet.

The RfG, which became a binding EU regulation in May 2016, is available on the [EUR-Lex website](#).

A joint Distribution Code Review Panel (DCRP) and Grid Code Review Panel (GCRP) workgroup was charged with implementing the Requirements for Generators in GB. This included setting parameters that the RfG leaves to national interpretation. The workgroup proposed changes to the Grid Code, Distribution Code and supporting Engineering Recommendations. The revised documents were consulted upon with stakeholders by the GCRP and the DCRP.

This work resulted in the publication of Engineering Recommendations G98 and G99, as well as revisions to the Distribution Code and Grid Code. These new EREC documents apply to generation that is connected from 27th April 2019, unless:

- You have concluded a signed final binding contract by 17th May 2018 for the main plant items, and
- You submit evidence of the above to the DNO before 17th November 2018.

For any generation connecting between May 2018 and 27th April 2019, your generating unit will either be designed to connect under the old EREC documents (G83 and G59) or the new EREC documents (G98 and G99).

Key Terms for EREC G98 and G99

In the process of drafting EREC G98 and G99, the opportunity was taken to align with European terms used (eg from the Requirements for Generators document) and to consolidate terms previously used in GB documents. This means some new terms have been introduced, which are used widely in the documents. The key terms are summarised on this page, and some are explained further in break out boxes throughout the document or in the main text.

Terms that are particularly relevant for EREC G98 are indicated with a *. If you are connecting under EREC G59 these terms will not be so relevant, but if you are connecting under EREC G99 they will be.

Fully Type Tested*	The whole Micro-generator / Power Generating Module is type tested, rather than just part of the Micro-generator / Power Generating Module.
Micro-generator*	A source of electrical energy and all associated interface equipment connected at Low Voltage to the distribution network, with nominal currents up to and including 16 A per phase. This is SSEG (Small Scale
Micro-generating Plant*	An electrical installation with one or more Micro-generators with nominal currents in sum not exceeding 16 A per phase.
Generating Unit	Any apparatus that produces electricity.
Power Generating Module (PGM)	Either a Synchronous Power Generating Module (SPGM) or a Power Park Module (PPM) - see below.
Synchronous Power Generating Module (SPGM)	An indivisible set of Generating Units—ie one or more units which cannot operate independently of each other—which generate electrical energy in
Power Park Module (PPM)	Generating Units that are connected to the network either through power electronics (eg solar PV or electricity storage devices connected through an inverter) or asynchronously (eg some wind turbines are induction or asynchronous generation). They have a single Connection Point to the
Power Generating Facility (PGF)	One or more Power Generating Modules connected to at one or more Connection Points. This is Power Station in EREC G59.
Registered Capacity	The normal full load capacity of a Power Generating Module less the MW consumed when producing the same (ie auxiliary load). For Power Generating Modules connected via an Inverter, the Inverter rating is the
Type A / B / C / D	Classifications of Power Generating Modules by size and connection

A: A Guide to the GB Power Sector

In this section:

- An overview of the commercial structure of the power sector
- An introduction to the GB power sector and how it is changing
- A discussion about the various types of organisations that you may come across while developing your Distributed Generation project
- A discussion on Network Innovation projects
- Guidance on where to find more information

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

Introduction

Understanding a little about the GB power sector may be useful when discussing your Distributed Generation project. This section aims to give some background explanation about the GB power sector and how it is changing to meet the challenges of protecting the environment and changing Government policy.

There are many organisations involved in the GB power sector, which are introduced in this section.

Apart from the physical structure of the power sector, there is also a commercial structure, which is discussed in this section.

The Commercial Structure of the Power Sector

The commercial structure of the electricity industry in Great Britain provides a competitive market in electricity retailing. This enables customers to contract with any one of a number of competing electricity suppliers. The sale of energy is also a competitive market. Note, your Feed-In Tariff level is an indication of the minimum you can expect to be paid for the electricity you generate.

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 trading occurs in advance of the time of use.

The wholesale market is governed by British Electricity Trading Transmission Arrangements (BETTA), which was introduced in 2005.

If you install Distributed Generation you can use the electricity you produce on site to reduce the amount of electricity that you need to buy thus lowering your electricity bills.

You can also sell electricity to customers, suppliers or, depending on the size of the generation, on the wholesale market. You can read more about power trade options in Section F. Selling Electricity.

The Physical Infrastructure of the Power Sector

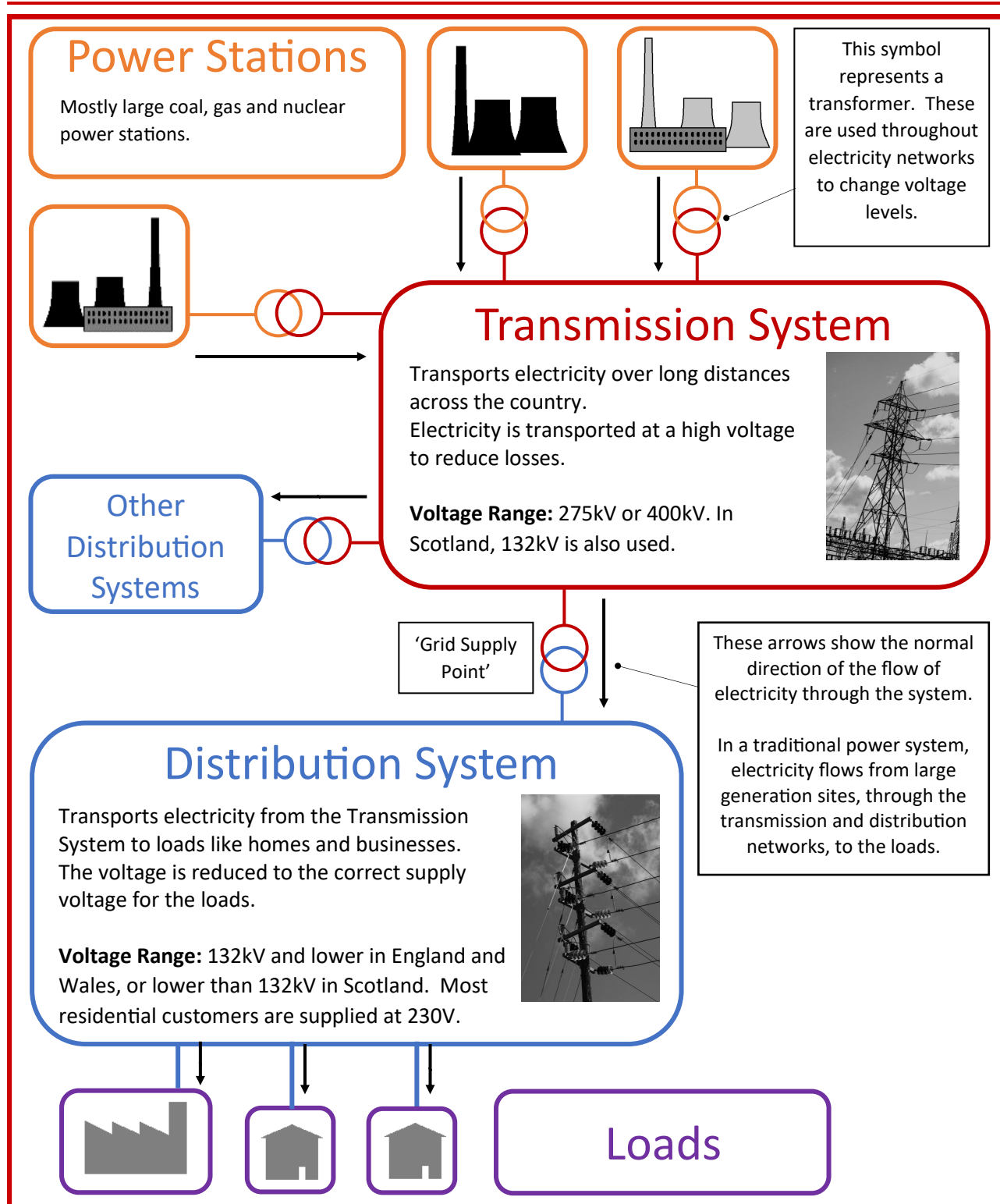
Traditional electricity system

The diagram below illustrates the infrastructure of the traditional power sector.

Large power stations feed into the transmission system, and the electricity is then transported to the distribution system.

The distribution system carries the electricity to loads, such as homes and businesses.

The transmission and distribution systems are also called transmission and distribution networks. Both terms are used in this Guide.



The Physical Infrastructure of the Power Sector

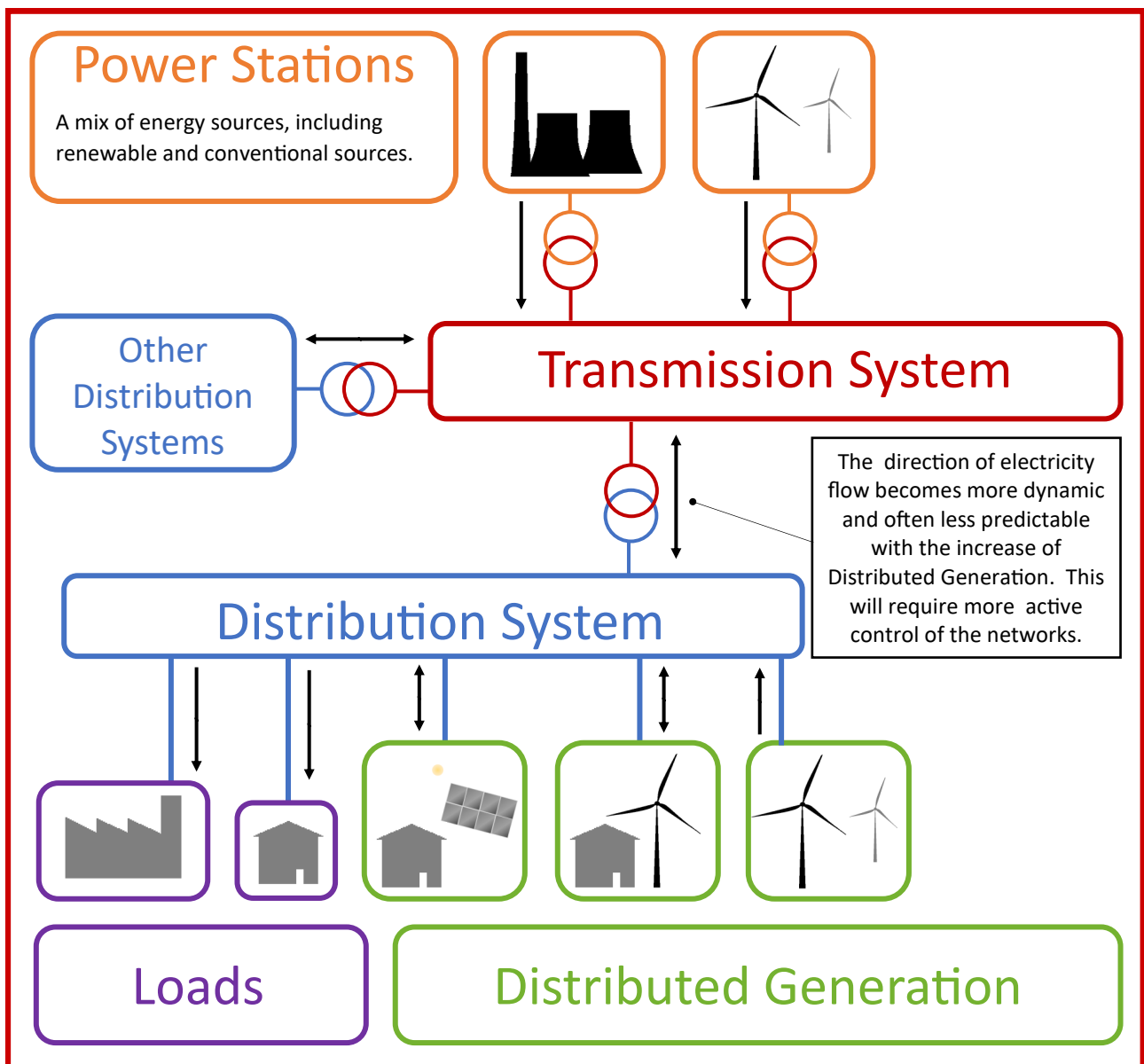
Changing electricity system

In addition to the large power stations connected to the transmission system, an increasing number of small power stations are being developed, often connected to distribution networks. Generation connected to the distribution network is called Distributed Generation. The diagram below illustrates this changing electricity system.

Distributed Generation can result in electricity flows in both directions; from the distribution network to customers, and from customers with Distributed Generation back into the distribution network. The system is no longer a “waterfall” system, with electricity flowing from the large power stations in one direction towards customers. Instead, electricity flows are more unpredictable.

Distributed Generation (DG or ‘Embedded Generation’)

A generation project is classed as Distributed Generation if it operates while electrically connected to the distribution network. Energy generated from Distributed Generation may be used onsite, or some or all of it may be exported to the distribution network.



Key Organisations

The transmission and distribution systems are owned and operated by regulated monopoly businesses. 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.

Distribution Network Operator (DNO)

A DNO owns, operates and maintains public electricity distribution networks in one or more regions in the GB. They must hold a Distribution Network Operator Licence. Under the terms of their licence, each DNO is allowed to distribute electricity both inside and outside its legacy geographic area.

There are six DNOs in Great Britain. The regions where they operate are shown on the map below.

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.

DNOs can form part of a group that undertakes other areas of business as well, e.g. electricity supply. However, these businesses have to be kept separate, and you, as a developer, will have to interface with the network operator business.

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 and residential areas. IDNOs differ from DNOs in that:

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

Electricity Distribution



Map of DNO regions in the UK:

For DNO website details, please see the [membership area](#) of the ENA website.

Key Organisations

If you are connecting your Distributed Generation to an IDNO's network, the process is almost identical to that if you are connecting to a DNO. There are a few exceptions to this, which are discussed in Section C of this Guide.

Transmission Owner (TO)

A TO owns and maintains the high voltage transmission system, known as the National Electricity Transmission System, referred to in this Guide as the transmission system.

Transmission Owners are responsible for making sure that transmission services are available to the System Operator (see explanation later in this section). The Transmission Owners are as follows:

- **National Grid Electricity Transmission (NGET)** in England and Wales
- **SP Energy Networks (SP Transmission plc)**
- **Scottish and Southern Electricity Networks (Scottish Hydro Electric Transmission plc)**

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

Private Networks

Private networks are similar to IDNO networks in that they are extensions of the DNO network which are not owned by the DNO itself. The owners of private networks are distinct from an IDNO because they do not need to be licenced and are unregulated.

For example, private networks can be owned by hospitals, airports, industrial sites, etc. This Guide is not intended to address connections to private networks. If you are connected to a private network, you should discuss your plans with the network owner as soon as possible.

Suppliers

Supply is the retail of electricity. Suppliers buy electricity in bulk from generators, 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.

Aggregators

Aggregators specialise in co-ordinating demand and generation (including storage) to provide demand response and other market services. The Network Operators and Suppliers may buy demand response and other grid balancing services from aggregators.

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, operation and maintenance. There are various models the ESCO can take. ESCOs can work on a performance contract, where they guarantee energy savings and make 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 develop into a household model, to provide energy efficiency savings and small scale generation for home owners, rather than just supplying electricity.

Generators

Generators own, operate and maintain power stations which generate electricity from various energy sources, eg. coal, gas, hydro and nuclear. Newer generation technologies include wind, solar, tidal and wave. See the end of this section for links to more information on generating technologies.

Key Organisations

To identify your DNO or IDNO:

If you already have a meter at your site, find the first two digits of your **MPAN** (Meter Point Administration Number), which is shown on your electricity bill, and may be shown on your meter. This corresponds to your DNO or IDNO, see table below.

Example MPAN, with first two digits indicated

S	00	111	222
	13	1234 5678	345

If you do not have a meter at your site, you can contact the DNO whose geographic area you believe you are in and they will be able to confirm. See the map on page 13.

First 2 MPAN digits	Service Area	Distribution Business
10	Eastern England	UK Power Networks— Eastern England
11	East Midlands	Western Power Distribution (WPD) – East Midlands
12	London	UK Power Networks (UKPN) – London Power Networks (LPN)
13	Cheshire, Merseyside and North Wales	SP Energy Networks – Cheshire, Merseyside and North Wales
14	West Midlands	Western Power Distribution (WPD) –West Midlands
15	North Eastern England	Northern Powergrid (NPG)
16	North Western England	Electricity North West (ENW)
17	Northern Scotland	SSE Power Distribution – Scottish Hydro Electric Power Distribution
18	Southern Scotland	SP Energy Networks
19	South Eastern England	UK Power Networks (UKPN) – South Eastern Power Networks (SPN)
20	Southern England	SSE Power Distribution – Southern Electric Power Distribution
21	Southern Wales	Western Power Distribution (WPD) – South Wales
22	South Western England	Western Power Distribution (WPD) – South West
23	Yorkshire	Northern Powergrid (NPG)
24	No area—IDNO	GTC (Independent Power Networks)
25	No area—IDNO	ESP Electricity Limited
26	No area—IDNO	Energetics Electricity Limited
27	No area—IDNO	GTC (The Electricity Network Company)
31	No area—IDNO	UK Power Distribution Limited
29	No area—IDNO	Harlaxton Energy Networks Limited
Tbc.	No area—IDNO	Utility Assets Limited
Tbc.	No area—IDNO	Energy Assets Power Networks Limited
35	No area—IDNO	Fulcrum Electricity Assets Limited
33	No area—IDNO	G2 Energy IDNO Limited
30	No area—IDNO	Leep Electricity Network Limited
34	No area—IDNO	Murphy Power Distribution Limited
32	No area—IDNO	Energy Assets Networks Ltd
36	No area—IDNO	Vattenfall Network Limited

Key Organisations

System Operator (SO)

Electricity cannot be stored at a large scale and so demand has to be balanced with generation on a second by second basis by the System Operator. The SO makes requests of generators to increase or decrease output from their units, or may ask some large customers to control their demand. NGET is the System Operator in Great Britain.

Following a government consultation on greater separation between the System Operator role performed by National Grid and the rest of the National Grid group, National Grid is establishing a new, legally separate company to carry out the Electricity System Operator function within the National Grid Group, which will be called the National Grid Electricity System Operator (NGESO). This separation will be in place from April 2019.

Balancing Settlement Code company

Elxon is the company that manages the balancing and settlement of electricity trading. They do this by identifying where generators have not generated the amount of electricity they are contracted to produce, and suppliers' customers have not consumed the amount of electricity that was expected. Out of balance parties are charged based on the additional cost to balance supply and demand (often by buying or selling electricity at short notice).

The Balancing and Settlement Code (BSC) governs the operation of this balancing mechanism.

Regulator

The Office of Gas and Electricity Markets (Ofgem) is responsible for:

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

- granting licences for the following activities in the power sector:
 - Generation
 - Transmission (and interconnection, a transmission link with another country)
 - Distribution
 - Supply

Generation licence requirements for Distributed Generation are discussed in Section D. The Connection Application: Generation Licensing.

European organisations

The regulatory arrangements that apply across continental Europe are implemented by National Regulator Authorities (NRA) in each member state of the European Union; Ofgem is the National Regulatory Authority for Great Britain. The regulations are required to comply with policy criteria determined by the European Parliament and implemented through European Directives and Regulations. To assist with this process in relation to electricity networks, a number of bodies have been set up that represent regulators and transmission system operators. National Energy Regulators work with the Agency for the Cooperation of Energy Regulators (ACER) and the Council of European Energy Regulators (CEER) on policy developments in different areas of electricity market liberalisation.

ENTSO-E, the European Network of Transmission System Operators for Electricity, is a membership body for Transmission System Operators (TSO). ENTSO-E promotes cooperation across Europe's TSOs. One of ENTSO-E's roles is drafting the European Network Codes, which includes the Requirements for Generators (RfG).

The UK's membership in these agencies post-Brexit will be subject to negotiations.

Network Innovation and Industry Developments

Innovation Funding

New challenges and applications in energy networks have motivated many projects that aim to develop innovative tools and products to improve the way networks operate and customers are connected.

Ofgem has a number of mechanisms that the DNOs and other organisations can use to fund electricity network innovation. The two main mechanisms for network companies are called the Network Innovation Allowance (NIA) and Network Innovation Competition (NIC), which apply to both electricity and gas distribution and transmission.

- NIA is an allowance each network company receives to fund smaller scale innovation projects which have the potential to deliver benefits to network customers.
- NIC is an annual competition, where network companies compete for funding for development and demonstration of network innovations such as new technologies or novel operating and commercial arrangements.

Learning from these projects is shared amongst all DNOs and TOs for the benefit of the power sector as a whole. Incorporation of the learning into business as usual practices is laid out in the business plans of the individual network companies.

For more information, and details about individual projects, refer to the Smarter Networks Portal, hosted by the Energy Networks Association:

<http://www.smarternetworks.org/>

Electricity Network Innovation Strategy

Following a review of the NIA and NIC, Ofgem proposed a number of changes to the innovation funding schemes. One of these was the requirement on network companies to collaboratively produce an industry wide

innovation strategy. The Electricity Network Innovation Strategy sets out a jointly agreed roadmap which demonstrates how innovation can accommodate future whole-system requirements and lead to benefits. The document was first published on 29th March 2018 and will be reviewed every 2 years at a minimum. Further information is available on the [ENA website](#).

Transmission and Distribution Interfaces

There has been a significant increase in the amount of connected Distributed Generation in the last few years. This has meant that the DNOs, TOs and the SO have to change the way they work together, to maintain an economic and secure network. In order to address these challenges, the Transmission Distribution Interface (TDI) Steering Group was established by ENA and its members. Network companies recognise the need for distribution and transmission companies to work together more closely in order to consider how they can tackle the whole system impact of Distributed Generation and other technologies such as storage.

In January 2017 the Open Networks Project was launched by the Steering Group. The aim of the Open Networks Project is to transform the way electricity networks operate and provide the first step towards creating a smart grid.

The first phase of the project was split into five workstreams which are as follows:

1. Develop improved processes between transmission and distribution, mainly around connection planning and operation (undertaken in 2017)
2. Improve the customer experience
3. Create a more detailed view of the transition from DNO to DSO
4. Consider charging requirements and how to create value for money for

Network Innovation and Industry Development

customers

5. Communicating outputs to the stakeholders

Full details of the work done so far can be found in the [Open Networks Project 2017 report](#).

New technologies

Active Network Management (ANM) schemes, which have been trialled in innovation projects, are now being included as part of Business As Usual Connection Offers. ANM uses control systems to manage Distributed Generation in constrained areas. Note that ANM connections may only be available in selected parts of the network.

Export limiting devices are also coming into use. These devices allow a limit to be set above which the generation will not export. This may allow generation to have a constrained connection, to reduce the need

for reinforcement. If you want to explore the use of these devices, seek guidance from your DNO. ENA has published Engineering Recommendation (EREC) G100, which provides technical guidance on the connection of Customer Export Limiting Schemes that operate in parallel with the distribution systems of licensed DNOs. This is available on:

<http://www.energynetworks.org/electricity/engineering/distributed-generation/engineering-recommendation-g100.html>

Energy storage is becoming increasingly prevalent in distribution networks. For more information on network connected storage (e.g. batteries), refer to Chapter C: Getting Connected—Energy Storage.

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);
- Guidance Note – The Electricity Trading Arrangements: A beginner’s guide; Elexon
www.elexon.co.uk/knowledgebase/about-the-bsc/

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

- Energy Networks Association —the industry body for UK energy transmission and distribution licence holders and operators: www.energynetworks.org
- A list of IDNOs can be found on the Ofgem website:
www.ofgem.gov.uk/Networks/ElecDist/Policy/IDNOs/Pages/IDNOs.aspx
- Ofgem—The Regulator: www.ofgem.gov.uk
- National Grid —The Great Britain Electricity System Operator, and Transmission 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 reference:

- Making ESCOs Work: Guidance and Advice on Setting Up and Delivering an ESCO; London Energy Partnership, which is on the London Energy Partnership website: www.lep.org.uk

The following website gives more information on generation technologies:

- Energy Saving Trust: www.energysavingtrust.org.uk/Generate-your-own-energy

The GB Distribution Code, Annex 1 and Annex 2 documents and the associated GB Distribution Code User Guide can be found in the link below:

- DCode: <http://www.dcode.org.uk/the-gb-distribution-code/>

The GB Grid Code and the associated Guide can be found in the link below:

- GCode: <http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-Code/>

Information about licence exceptions and private networks can be found:

- UK legislation: <http://www.legislation.gov.uk/ukxi/2001/3270/contents/made>

B: The Role of Distributed Generation

In this section:

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

Introduction

As explained in Section A of this Guide, the electricity industry is undergoing changes with increasing amounts of Distributed Generation being connected to the system. There are a number of drivers behind this:

- Environmental issues;
- New Government Policy;
- Security of supply; and

- Technological innovation.

In this section, these drivers are discussed in more detail. We will also introduce some of the benefits and challenges of Distributed Generation.

We refer to some useful documents and reports for further reading on this topic.

What is Driving Distributed Generation?

Environmental concerns

Globally there has been increasing concern over greenhouse gas emissions and the impact that they may be having on the environment.

Most of the electricity in the UK has traditionally been generated by power stations fuelled by fossil fuels, for example coal, gas and oil. The burning of these fuels makes a significant contribution to emissions.

There is therefore a drive to change the mix of generation technologies we have, to include more low-carbon options.

Technological innovation

Technology is developing all the time, and 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 biomass generation.

Although the connection and integration of these newer generating technologies may pose challenges, innovative technical solutions are being sought to overcome these challenges. These are discussed on page 17.

Government policy

The Department for Business, Energy and Industrial Strategy (BEIS) oversees energy policy and climate change mitigation policy. The UK energy supply is one of BEIS's key policy areas. BEIS is developing policy to ensure that in the UK energy supplies are secure, low carbon, and fuelled from a diverse mix of energy supplies. However, BEIS also has to ensure that energy prices are maintained at affordable levels. Relevant pieces of legislation include:

- Climate Change Act 2008
- Energy Act 2008
- Energy Bill

What is Driving Distributed Generation?

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 and the European Third Package, which is driving a set of new European Network Codes.

Security of Supply

The UK increasingly relies on importing fuel, in the form of gas, coal and oil. This introduces a

great deal of uncertainty as the cost and reliability of supply is outside of UK control. It is therefore an advantage to have a diverse mix of energy sources, which would make the UK less vulnerable to a restriction in fuel availability or rise in price.

It is also known that fossil fuels will eventually run out as they are being used much faster than they are being created. As they become more scarce, the prices will rise as the markets become more competitive. Therefore to ensure the security of the energy supply into the future, alternative sources are being encouraged.

Benefits of Distributed Generation

There are a number of benefits that increased Distributed Generation has for the UK and its electricity system. These include:

- **Increased energy mix** —Distributed Generation is often a renewable source of energy, such as solar, wind or biomass, or uses the energy in a more efficient way as with Combined Heat and Power (CHP) projects. Therefore increased Distributed Generation results in a lower carbon mix of energy sources in the electricity system.
- If Distributed Generation is connected close to the point of use, there is a **reduced need for the distribution and transmission infrastructure**. In some cases, this can delay the need for reinforcement, although the TO and the DNO also need to ensure that the network provides adequate security of supply for its users.
- 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.

- The introduction of local generation in businesses and communities can lead to **greater awareness of energy issues**.

There are a variety of commercial benefits to having Distributed Generation, which include:

- **Self Consumption**, where you use the electricity that you generate to avoid importing from the grid, therefore lowering your electricity bills.
- **Selling electricity** that you generate, including gaining Feed In Tariff (FIT) payments and Contracts for Difference (CFD). This is discussed further in Section F: Selling Electricity.
- Climate Change **Levy Exemption Certificates (LECs)** are issued to generators of renewable energy and good quality Combined Heat and Power (CHP). These can be sold to the supplier

Benefits of Distributed Generation

along with the energy generated.

Companies can use LECs to avoid paying the Climate Change Levy tax.

- **Embedded benefits** of the generating unit being connected to the distribution rather than the transmission network, e.g. charge avoidance of Transmission Network Use of System charges and Balancing Services Use of System charges.
- Generators whose equipment has a capacity greater than 3 MW (and/or the ability to deliver in excess of +/- 15 MVar of reactive power) can enter into agreements with NGET to provide **Ancillary Services**, for which they will be paid.
- Generation that is not receiving low carbon support (e.g. Feed-in Tariffs, Renewables Obligation) and does not

have a long-term contract to provide Short Term Operating Reserves (STOR) to National Grid Electricity Transmission could be eligible to enter the **Capacity Market**, and receive payments for delivering energy at times of system stress.

- **EU Emissions Trading System (ETS)** - applies to approximately 10,000 energy intensive users in the UK such as metal industry, paper factories and refineries. These large energy users have been allocated green-house gas allowances for their operations. At the end of each year, they must ensure they have enough allowances to cover their emissions: they can buy additional allowances or sell any surplus allowances generated from reducing their emissions.

Impacts of Distributed Generation

As well as introducing benefits, the increased penetration of Distributed Generation in UK distribution networks also poses challenges. These will depend on a variety of factors, such as the generation technology, the voltage level the Distributed Generation is connected to, the size of the generating unit(s), the level of export to the distribution system, and on the type of network (e.g. urban or rural).

Some examples of the challenges posed to distribution networks by Distributed Generation include:

- Distributed Generation changes the current flows and shape of the load cycle where they are connected. This could cause:
 - **Thermal ratings to be exceeded.**
 - **System voltage to rise** beyond the acceptable limits.
 - **Reverse power flows**, i.e. power flows in the opposite direction to

which the system has been designed.

- Distributed Generation can contribute to **fault level**, which can raise the fault level above the rating of network equipment.
- There are a number of **power quality** limits that can be affected by Distributed Generation, including:
 - **Contributions to harmonics**, particularly if a significant number of inverter controllers are present.
 - **Voltage unbalance** which affects power quality, if there are lots of single-phase generating units.
 - **Voltage fluctuation or flicker**, if the output of the Distributed Generation changes rapidly.

Note: The technical terms used above are defined in the glossary.

Where to Find More Information

The amount of generation connected to distribution networks has increased significantly since 2010. Today there is over 27,000 MW of Distributed Generation in the UK. The benefits and challenges of Distributed Generation are complex, and the industry's understanding of them is evolving as experience increases. For more information on current initiatives in distribution networks, the following documents are useful:

- [The Electricity Networks Innovation Strategy](#); Energy Networks Association; 2018
- [The Open Networks project](#); Energy Networks Association

The following documents are useful if you want more information on Government policy:

- [The Clean Growth Strategy](#); BEIS; 2017
- [Upgrading our energy system: smart systems and flexibility plan](#); BEIS; 2017

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

<https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy>

For more information on Embedded Benefits, the following document is useful:

- [Embedded Generation and Embedded Benefits](#); Elexon; November 2013

C. An Overview of Getting Connected

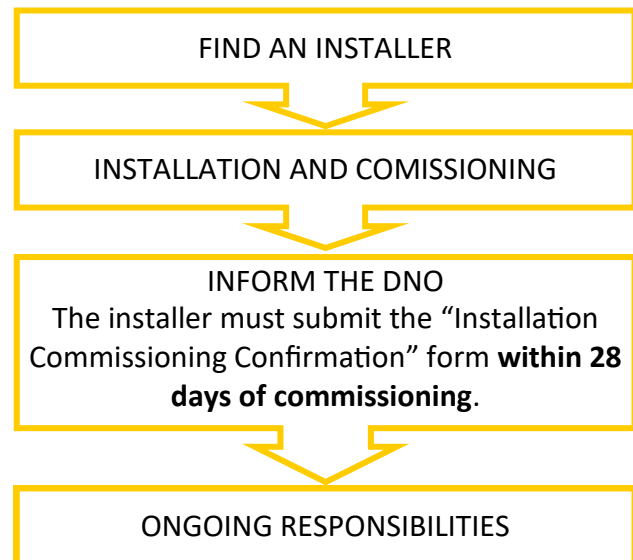
In this section:

- An introduction to getting connected
- The main tasks in the process of connecting one or more units within a single customer's installation, and who can help you
- Guidance on where to find more information

Introduction

In most cases, the installation of small generating units into a single premises will have very little affect on the network. Therefore the connection process is relatively simple, and can be summarised as “fit and inform”.

The diagram opposite presents the key actions that you have to complete to connect one or more units of small-scale generation in a single premises. These tasks are based on the requirements set out in EREC G83/G98 and are described in more detail in this section.



Note that this document covers the process for connecting generation to the distribution networks in Great Britain. Northern Ireland has different connection arrangements, for example different versions of Engineering Recommendations G83/G98 and G59/G99 are in use. See www.nie.co.uk

Grace Period: EREC G98 was introduced in May 2018. It is based on EREC G83, which was revised to take account of a European Network Code called Requirement for Generators. Generation connecting before 27th April 2019 can be connected under either EREC G83 or EREC G98, depending on which document the generating unit was designed to comply with. Generating units connecting from 27th April 2019 must connect under EREC G98.

Getting Connected — Main Tasks

Finding an installer

The first task is to find a competent installer, who is using type tested equipment (see note in “Is this the right Guide for my project?”). Installation must be carried out by installers who are competent and have sufficient skills and training to apply safe methods of work to install a generating unit in compliance with EREC G83/G98. This includes having recognised and approved qualifications relating to the primary energy source and general electrical installations. 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 Business, Energy and Industrial Strategy (BEIS). Your installer must be certified in order for you to claim Feed-in Tariffs, with the exception of hydro and anaerobic digestion projects, which have to go through the ROO-FIT process. There is more information about this in Section F: Selling Electricity - Feed-in Tariffs (FITs).

All Micro-generators connecting under EREC G98 must be Fully Type Tested. This is where the whole Micro-generator (SSEG in EREC G83) is type tested, rather than just part of the Micro-generator.

Installation and Commissioning

Your installer should be aware of the requirements to ensure that installation and commissioning is in line with EREC G83/G98. This includes ensuring that the installation complies with the wiring regulations (BS 7671) and is correctly earthed. Your installer must also ensure, among other things, that:

- No modifications should be made to the equipment;
- Appropriate safety labelling is provided;
- The generating unit will disconnect from the distribution network if your mains power is interrupted; and
- The generating unit is installed in accordance with the manufacturer’s instructions.

During the commissioning, your installer will check that your equipment is working as it should.

Informing the DNO

Once your installation and commissioning is complete, the DNO needs to be made aware of your generating unit(s). This is so that the DNO can take this into account when operating and designing the network. Your installer must notify the DNO **within 28 days** of commissioning the generating unit, and provide them with information on the installation. This is a legal requirement.

The information is captured on an “**installation commissioning confirmation**” form, which is given in [Appendix 3 of EREC G83](#), or the “[Installation Document](#)”, which is Form B in Appendix 3 of EREC G98. These are available on the Energy Networks Association website.

Note: DNOs may have their own installation commissioning confirmation forms on their websites.

Getting Connected — Main Tasks

Ongoing responsibilities

Although the focus of this Guide is to inform you about the process of connecting your generation to the distribution network, you should be aware that once it is connected you have some responsibilities. These include:

- The responsibility to keep it maintained

by someone who is competent to do so;

- Notify your DNO of any operational incidents or failures that affect your compliance with EREC G98; and
- Inform your DNO if you remove or replace your generating unit.

Getting Connected — IDNO's Networks

The process for connecting your Distributed Generation to an IDNO's network follows EREC G83/98 or G59/G99, and is therefore similar to connecting to a DNO's network. IDNOs are licensed entities and are bound by some of the same licence conditions as DNOs, including certain performance standards such as timescales for responding to requests for quotes. The majority of what is included in this guide applies to both DNO and IDNO connections.

However, there are a few key differences for a

Distributed Generation connection to an IDNO network. The most significant of these is that the IDNO has a relationship with their DNO. This relationship will not involve you directly, but may restrict what the IDNO can readily allow to connect to their network. This is not likely to affect a generation project that is compliant with G83/G98.

To determine whether you are connected to a DNO or IDNO network, refer to the guidance on page 15.

Getting Connected — Energy Storage

Storage devices for electrical energy are becoming more prevalent, and can be used as part of Distributed Generation schemes to allow generated electricity to be stored within the premises rather than exported to the distribution network. DNOs treat storage as demand when its importing from the distribution network and generation when its exporting to the distribution network, and need to be aware of storage because of the potential impact on their networks. Therefore storage needs to meet the relevant connection requirements (EREC G83/G98 or G59/G99).

If you are planning to use storage in conjunction with PV (or other technologies) to offset consumption, the total connected generation is likely to be above 16A / phase and G59/G99 applies. However, DNOs have implemented a fast track application process, for domestic scale storage. This typically takes the form of an online application and reduces the time for the DNO to provide confirmation that the connection is acceptable from 45 days to 10 days or less. If the storage is intended to be operated in island mode (during a power outage) the fast track process is not applicable and the standard G59/G99 process applies.

Getting Connected

EREC G98 exceptions

If you are installing a generating unit under EREC G98 then the requirements apply in full in most circumstances. However, if your generating unit is one of the following, some of the technical requirements in EREC G98 do not apply:

- Classified as an Emerging Technology (see Emerging Technology box on page 6)
- An electricity storage device
- Has a registered capacity of < 800 W

The full details of the requirements that do not apply are in EREC G98. If you are installing generating units that are connected via an inverter, the 800 W threshold applies to the **aggregate** installed capacity of generation. So, for example, if you are installing 3 x 500 W solar PV inverters, the aggregate installed capacity exceeds 800 W and EREC G98 applies in full.

However, because storage is one of the exceptions, it does **not** count towards the aggregate capacity when considering the 800 W threshold. For example, if you are installing a 500 W solar PV inverter and a 500 W storage inverter, they are both excepted from certain requirements in EREC G98.

Health and Safety considerations

Safety is very important in the design of generation connections. Some of the safety requirements for Distributed Generation connections are set out in EREC G83/G98. 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 Distributed Generation connections on the following websites:

- The Electrical Safety Council (ESC): www.esc.org.uk
- The Energy Networks Association—Safety, health and environment:
www.energynetworks.org/electricity/she/overview.html

Supply Issues

Your DNO is obligated to maintain the power quality on their network within a set of defined limits. These include maintaining voltage at the required levels. This is so that customer equipment is not damaged. If you have a voltage complaint you should contact your DNO. Your DNO should respond to your complaint within 5 working days, or visit within 7 working days. If work is required to correct the issue, the DNO should complete this within 6 months.

In rare cases, such as where there are many generating units in a small area, the DNO may feel it is necessary to for you to disconnect your generating unit in order to maintain the power quality on the network. This will be a temporary measure until the problem is resolved. As long as your equipment and its installation complies with G83/G98, then the DNO will be responsible for resolving the problem at their own expense. The timescales for this will depend on the nature and complexity of work to be done.

Where to Find More Information

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

- [Engineering Recommendation G98](#): Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019. This can be downloaded free of charge via the [DCode](#) as well as ENA website.
- [Engineering Recommendation G83](#): Recommendations for the Connection of Type Tested Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Low-Voltage Distribution Systems — a technical document, with references to other relevant sources of detailed technical information. This is available to download free of charge via the [DCode](#) as well as ENA website.
- [Electricity Safety, Quality and Continuity Regulations \(ESQCR\) 2002, Section 22](#): Statutory Instrument Number 2665, available free of charge.
- Ofgem's information about [how to get an electricity connection](#) for a new building or site.

Some DNOs have produced their own guidance notes for small scale Distributed Generation connections - check your DNO's website.

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, eg. the DNO, supplier, etc. DNOs have their complaints process set out on their websites. If you still cannot resolve the issue you can contact the Energy Ombudsman:

www.ombudsman-services.org/energy.html

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

D. The Connection Application: Connection Notification

In this section:

- What the installer of your generating unit needs to do to notify the DNO that your generation has been installed and commissioned in accordance with EREC G83/G98
- Details of the information that you will need to provide to the DNO.

Introduction

Under the provisions of the Electricity Safety, Quality and Continuity regulations (ESQCR) you only need to inform the DNO that you have installed your generating unit. You do not need to contact the DNO in advance if the total capacity of all your generating units combined is 16 Amps or less per phase at low

voltage.

This section of the Guide summarises the information which you will need to provide to your DNO and gives information about the forms that are used for providing the necessary technical details.

The Commissioning Pro-forma

You do not need to talk to your DNO before your generation equipment is up and running. Your installer must inform the DNO and provide a number of pieces of information **within 28 days of the date of commissioning**. This information is defined in a Commissioning Pro-forma, which is provided in [Appendix 3 of EREC G83](#), or in an [Installation Document](#), which is provided in Appendix 3 of EREC G98. There forms are available on the [Energy Networks Association website](#).

Your installer should prepare all of the details requested in the Commissioning Pro-forma (or Installation Document, as appropriate) and submit all this with the form to confirm that your equipment has been commissioned.

The information required includes:

- details about the **site** where you are connecting your generating unit, including metering information;
- **contact details** for the owner of the generating unit;
- **technical information** about the generating unit itself, including the generating capacity, type test reference and primary energy source;
- details of the **installer** of the generating unit, including the party's accreditation and qualifications;
- **supporting information**, eg. circuit diagrams; and
- a **signed declaration** as to the compliance of the generating unit with the requirements of EREC G83/G98.

Other Requirements

The declaration that your installer signs on the Commissioning Pro-forma / Installation Document requires them to confirm that they've installed your generating unit in accordance with EREC G83/G98. 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), they should know about these standards and make sure that your installation meets with all the relevant standards. You should check that your installer is aware of all these requirements.

E. Cost and Charges

Use of System Charges

Use of System charges are levied by the DNO to 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.

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 may be negative (ie credits). You can find out more about the Common Distribution Charging Methodology (CDCM) by looking at [Distribution Charging](#) on the Ofgem website, [Distribution Charges Overview](#) 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 equipment is connected to and;
- the type of meter you have.

The boxes below define the voltage level that will apply to EREC G83/G98 compliant equipment (Low Voltage) and the metering arrangements that are likely to apply to this equipment (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)

NHH meters record total energy passing through the meter, but do not record the times the energy is transferred. Typically the recorded data would be collected a few times a year, eg. 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.
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F: Selling Electricity- Feed-in Tariffs (FITs)

In this section:

- An introduction to the Feed-in Tariff Incentive
- Eligibility and Accreditation
- Deployment caps and how they work
- Guidance on where to find more information

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

Introduction

Feed-in Tariffs (FITs) are a financial incentive to support distributed and small-scale renewable energy generation, up to 5 MW.

FITs are available for the following generation technologies:

- Anaerobic digestion
- Hydro
- Solar PV
- Wind

A number of domestic Combined Heat and Power (CHP) units are also supported through FITs under a Micro CHP pilot scheme. The Micro CHP pilot will support up to 30,000 installations with an electrical capacity no greater than 2 kW.

This section will detail the structure of the tariffs and will explain how to get accredited with FITs.

Tariff Structure

There are three sources of financial benefit from a Generation project receiving FITs:

- **Generation tariff (FITs):** A fixed price for each unit of electricity generated.
- **Export tariff:** A guaranteed price for each unit of electricity exported to the grid.
- **Import reduction:** reducing your import from the grid by using your own electricity.

Tariffs are adjusted annually for inflation.

The generation tariffs are published by Ofgem, and you can access them on their webpage:

www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/tariff-tables

The tariff level that you will receive will be the most recent tariff level on the eligibility date of the installation. You will continue to receive this same tariff throughout the eligible lifetime of the project, which for most technologies is 20 years.

Tariff Structure

FITs for PV generation

The FITs for PV are structured in a slightly different way. PV installations are subject to the following criteria:

- Energy efficiency requirements—the building to which the solar PV is attached should achieve an Energy Performance Certificate (EPC) rating of level D or above for installations up to and including 250 kW; and
- Multi-installation tariffs—applies to any solar PV installation where the recipient of the FIT already receives FIT payments from 25 or more other PV installations.

The impact of these criteria on the tariff level received is summarised in Ofgem's tariff tables. Refer to the BEIS or Ofgem websites for the most up to date information.

Metering Requirements

You will need to measure three electrical flows to get the most out of the FIT scheme; import (this is your usual electricity meter), generation and export. For your generation financial stream, each of your generating units must be measured separately.

For your export payments, you may choose to measure your export to the grid via a meter (often called an export meter). However, 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.

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

Export Tariff

The export tariff is a guaranteed price for the export of your generated electricity, and is the same for all installations which are eligible for FITs. At the time of writing, the export tariff is set at 5.03p/kWh, but this is subject to regular reviews. Refer to the BEIS or Ofgem websites for the most up to date information.

FIT Example

The **example** tariff levels are:
Import tariff: 10p/kWh,
Generation tariff: 8.26p/kWh

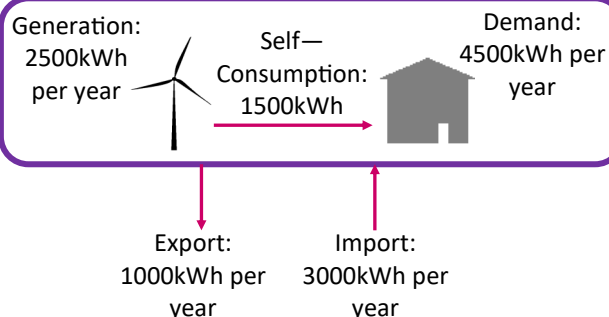
Before Installation



Import: 4500kWh per year

Cost of Import per year:
4500kWh x 10p/kWh = **£450**

After Installation of Distributed Generation



<u>Income per year:</u> Generation: 2500kWh x 8.19p/kWh = £204.75 Export: 1000kWh x 5.03p/kWh = £50.30 This is a total income of £255.05	<u>Cost of Import per year:</u> 3000kWh x 10p/kWh = £300 This is a saving of £150 due to avoided import.
Total net benefit: £255.05 + £150 = £405.05 per year	

Eligibility and Accreditation

Renewable Energy generators 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. For wind or solar PV generation up to and including 50 kW, and for 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 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.

See Ofgem’s website on MCS-FIT accreditation:

www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/applying-feed-tariff/mcs-fit

For anaerobic digestion and hydro generators and for solar PV and wind generation over 50 kW, the following “ROO-FIT” process applies (see information box on page 36):

1. Install your generating unit;
2. Apply for accreditation through Ofgem’s Renewable and CHP register (see ROO-FIT box on page 36);
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.

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 ISO/IEC 17065:2012 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 increase 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

Deployment Caps

Deployment caps were introduced to the FIT scheme in February 2016. A deployment cap is defined as a limit on the capacity that can receive a particular FIT tariff, in a particular tariff period.

Once a deployment cap has been reached, no further installations are eligible to receive the tariff rate applicable for that band, in that tariff period. All the remaining tariff periods will depress by a further 10% (in addition to the default depression). Ofgem will publish a report once the deployment cap has been reached. Indicative queues for each ROO-FIT and Standalone deployment cap can be found on the [Ofgem website](#).

The deployment caps queue is based on the date and time you submit your FIT application to Ofgem. A place in the queue does not guarantee eligibility for a particular tariff or eligibility for support under FITs, as it will depend on the volume of applications ahead of you.

Two examples are given below:

1. A tariff period opens on 1 April 2016 at 00:00:00 and closes on 30 June 2016 at 23:59:59. A standalone PV installation submits an application to Ofgem on 1 June 2016 at 12:20:35. The deployment cap for this technology and tariff band has not been reached and there is sufficient capacity available to accommodate this installation. The tariff rate for this installation is the tariff rate that applies to the tariff period that the application was submitted in.
2. A tariff period opens on 1 April 2016 at 00:00:00 and closes on 30 June 2016 at 23:59:59. A standalone PV installation applies and exceeds the relevant cap for

that tariff period on 1 June 2016 at 12:20:35. The tariff rate for that tariff period is applicable to installations with an application date and time from 1 April 2016 at 00:00:00 to 1 June 2016 at 12:20:34. Applications received on or after 1 June at 12:20:35 are queued for entry into the next available tariff period. The tariff rate applicable for applications submitted after the cap is exceeded will be the tariff rate associated with the next tariff period, with capacity available to accommodate the capacity of the installation. The next tariff period opens on 1 July 2016 at 00:00:00 and there is sufficient capacity to accommodate the capacity of the installation. The installation receives the tariff rate available in that tariff period.

Eligibility and Accreditation

ROO-FIT accreditation arrangements:

Anaerobic Digestion and hydro installations of any size are accredited by the Renewables Obligation (RO) Order Feed-in Tariff ("ROO-FIT") process, rather than the MCS accreditation process ("MCS-FIT"). Wind and solar installations greater than 50 kW are also accredited in this way. 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:

www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/applying-feed-tariff/roo-fit

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.

Community Energy Schemes: The Feed-in Tariffs (Amendment) Order 2015 has introduced an exemption to the definition of the term "site" in the FIT legislation, which is effective from April 2015. The amendment allows two projects to share one grid connection and receive separate tariffs based on their individual generating capacity, provided that at least one project is owned by a community organisation. Both parties sharing the grid connection will be required to seek support under the FITs scheme. In order to enable Ofgem to treat the individually owned sections as separate eligible installations each will be required to register as separate FIT generators and to meter their generation separately.

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/Financial-incentives/Feed-In-Tariffs-scheme-FITs
- Carbon Trust — Initial port of call for information for businesses:
www.carbontrust.com
- Department for Business, Energy and Industrial Strategy (BEIS) — Policy setting
<https://www.gov.uk/feed-in-tariffs>
- Ofgem—FIT administrator
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

Aggregator: An organisation which specialise in co-ordinating demand and generation (including storage) to provide demand response and other market services. Network Operators and suppliers may buy demand response and other grid balancing services from aggregators.

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: NGET has a licence obligation to manage the Transmission System and, and needs to have an arrangement in place for the scenario where more energy is 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 NGET 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 equipment is the maximum power that can be produced if the equipment is running normally at full power.


Capacity Market: A market that aims to ensure security of electricity supply by providing a payment for reliable sources of capacity.

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.

Contracts for Difference (CfD): A Contract for Difference is a contract between a generator and the Low Carbon Contracts Company (LCCC, the CFD counterparty), which is government owned. The Feed-in Tariff with Contracts for Difference is a low-carbon generation incentive mechanism.



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 units 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 with an operating voltage of 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).

Glossary of Terms

Generating Unit: Any apparatus which produces electricity. This is a synonym of a Generation Set as defined in the Distribution Code.

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 project, due to the increase in fault level caused by the connection of generating equipment.

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. In EREC G98 this is referred to as a Micro-generator.

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 Network (System): A system of lines and equipment 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.

Type Tested Equipment: Equipment that has been tested to ensure that it meets the requirements of EREC G83, G98, G59 or G99. Using type tested equipment simplifies the connection and commissioning process.



Glossary of Terms

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 National Grid's website

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

[Engineering Recommendation G59](#), relating to the connection of generating equipment to the distribution systems of licensed Distribution Network Operators—available on the [DCode](#) and ENA websites

[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

[Engineering Recommendation G83](#): Recommendations for the Connection of Type Tested Small-scale Embedded Generators (Up to 16 A per Phase) in Parallel with Low-Voltage Distribution Networks—a technical document, with references to other relevant sources of detailed technical information

[Engineering Recommendation G98](#): Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019— available free of charge on the [DCode](#) and ENA websites

[Engineering Recommendation G99](#): Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019— available free of charge on the [DCode](#) and ENA websites

[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 National Grid's website

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

[Metering Codes of Practice](#)

[Requirements for Generators](#) is available free of charge on the EUR-Lex website

[Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks](#) (BS EN 50438) is available to buy on the BSI website

[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:

Agency for the Cooperation of Energy Regulators (ACER)	www.acer.europa.eu
Association of Meter Operators	www.meteroperators.org.uk
British Hydropower Association	www.british-hydro.org
Renewable UK	http://www.renewableuk.com/
Carbon Trust	www.carbontrust.com
The Council of European Energy Regulators (CEER)	www.ceer.eu
The Association for Decentralised Energy (combined heat and power)	www.theade.co.uk
Department for Business, Energy & Industrial Strategy	https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy
Distribution Connection and Use of System Agreement (DCUSA) website	www.dcusa.co.uk
Electricity Networks Strategy Group	https://www.gov.uk/government/groups/electricity-networks-strategy-group
Elexon	www.elexon.co.uk
Energy Networks Association	www.energynetworks.org
Energy Saving Trust	www.energysavingtrust.org.uk/Generate-your-own-energy
Energy UK	www.energy-uk.org.uk
ENTSO-E	www.entsoe.eu
Lloyds Register	www.lr.org/sectors/utilities/schemes/ners.aspx
Microgeneration Certification Scheme	www.microgenerationcertification.org
National Grid	www.nationalgrid.com/uk/Electricity/
Ofgem	www.ofgem.gov.uk
Renewable Energy Association	www.r-e-a.net

References

Relevant reports and guides:

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

[Embedded Generation and Embedded Benefits](#); Elexon; November 2013

[The Electricity Networks Innovation Strategy](#); Energy Networks Association; 2018

[The Open Networks project](#); Energy Networks Association

[The clean Growth Strategy](#); BEIS; 2017

[Upgrading our energy system: smart systems and flexibility plan](#); BEIS; 2017

Revisions

Version Number	Date	Details of Changes
1.0	May 2018	<p>New Guides for the new Engineering Recommendations G98 and G99, to capture requirements from the European Network Code Requirements for Generators (RfG). During a transition period, there are combined EREC G83 / G98 Guides. New Guides have been produced for G99 Types A and G99 Types B to D. Significant changes include:</p> <ul style="list-style-type: none"> • Definitions of RfG Types A, B, C and D; • Power Park Modules and Synchronous Power Generating Modules; • New and existing (under EREC G59) generation; • Updated connection flow charts • Compliance requirements and associated documents • Notifications (EON, ION, FON)