

March 2014

## **CONNECTION CONSIDERATIONS FOR DISTRIBUTED GENERATION**

### **Western Power Distribution Company Profile:**

Western Power Distribution (WPD) is responsible for electricity distribution in the East & West Midlands, South West of England and South & West Wales.

We hold four distribution licenses:

- Western Power Distribution (East Midlands) plc;
- Western Power Distribution (West Midlands) plc;
- Western Power Distribution (South West) plc;
- Western Power Distribution (South Wales) plc.

As a distribution business we are responsible for the distribution of electricity from 132,000 volts to 230 volts, along overhead wires and through underground cables.

We are responsible for:

- Maintaining the electricity network on a daily basis;
- Repairing the electricity network when faults occur;
- Reinforcing the electricity network to cope with changes in the pattern of demand;
- Extending the electricity network to connect new customers.

We are no longer a retailer of electricity and are not involved in either buying or selling of electricity to the end use customers, which is the responsibility of electricity supply companies.

### **The Connection Process to Western Power Distribution's Network**

The process for making an electricity connection varies according to the size of the generator and the impact it has on the existing distribution system.

If you want to connect a single small scale embedded generator (SSEG) rated up to and including 16A per phase you must inform us about the SSEG installation and ensure all relevant technical details are provided within 28 days of the time of commissioning.

If you want to connect multiple SSEG's in a close geographic area you must contact us at an early planning stage, prior to commissioning the units, so that we can assess the impact they have on our distribution system.

The installation and commissioning of SSEG's is governed by Engineering Recommendation G83/2. Larger generators are governed under Engineering Recommendation G59/2-1 and G59/3.

The planning and connection process for larger generator connections needs careful consideration and can take time so it is extremely important that you contact WPD in the early development stages of a generation project to ensure that your desired connection date can be met. Sufficient time should be allocated to the development stages of a project as it can take up to 12 months from first contact with WPD to energisation of the connection at low voltage. If a connection is required at 11,000 or 33,000 Volts it may take between 12 – 24 months to complete the connection. Large connections at 132,000 Volts may take longer to commission.

If you want a rough estimate of the probable connection charge we can provide you with a budget estimate free of charge. The budget estimate is carried out as a desk top exercise without any electrical studies being undertaken, and therefore is only provided as an indication of the likely costs.

If you want a more accurate evaluation of the likely costs we will need to carry out technical assessments of the impact of the generation on our distribution system before the generating unit can be connected. The staged connection process for larger distributed generation is summarised below:-

### **Feasibility Study**

Studies are carried out to determine the impact of the proposed generation on our existing distribution system. We will give you a more detailed indication of the likely connection charge, which will be subject to further study and a number of conditions. The study will identify connection options/limitations and any requirement for upstream reinforcement, or any associated diversionary works. Note: a charge for carrying out the feasibility study may be payable in advance of it being undertaken.

### **Formal Connection Offer**

An application for a formal offer may be made following completion of a Feasibility Study, or it can be made separately, however a specific site and a fully specified generation application is required from you. We then will undertake detailed design work based on the data you have provided to produce a formal connection offer. Further technical studies including Stability Studies (for large connections, normally over 5MW) are completed as necessary. We will start the process to obtain any necessary planning permissions and/or consents. For larger projects, we will make tender and contract applications for necessary plant, equipment and construction works.

### **Project Completion & Commissioning**

Following acceptance of the connection offer and subject to consents and planning permission, the project will proceed to construction and commissioning to agreed timescales. The customer has the option to carry out contestable work elements. It is possible that some small connections will not require any physical works to be carried out to our distribution system.

All costs incurred by WPD whilst assessing the impact on the distribution system and designing the electricity connection under Stage II will be included in the connection charge made under the connection offer. The applicant may be asked to indemnify WPD against any external costs incurred to cover consultants fees for stability or other technical studies made prior to the work commencing, including any necessary application to National Grid. The indemnification amount will depend on the size, type and location of the proposed generator.

The connection charge will normally be recovered in pre-defined stages which will be set out under the connection offer. If the project does not proceed for whatever reason, you will be asked to settle any abortive costs that we have incurred. For most small connections (typically below 500kW), the process is normally condensed, with Stage I and II combined into one.

*This is only a brief summary of the connection process. You should contact us for further details, including information on contestable and non-contestable works (which allows the customer to carry out certain work elements before they are connected to the distribution system).*

### **Planning Permission and Other Consents**

The types of consents and permissions required for substations, overhead lines and underground cables necessary to make a connection can be summarised as follows.

**Wayleaves/Easements:** Required from private landowners where an overhead line or underground cable is to cross his or her land. Underground cables laid in the public highway only require the consent of the Local Authority.

**Local Authority Consent:** Planning permission is required for new substations of a certain size. However, the substation required for the generator connection would normally be included in the planning application for the whole site. The Local and County Authority must be consulted on new overhead lines and they will make comment to the DECC.

**DECC Consent:** Section 37 consent under the Electricity Act 1989 is required for most new overhead lines from The Department of Energy and Climate Change (DECC). The views of the local planning authority, local people and statutory bodies such as the Environment Agency, Countryside Agency and English Nature/Countryside Council for Wales can be brought into the decision making.

**Environmental Statement:** This must be produced for new overhead lines with a voltage of 132,000 Volts or above and at lower voltages, if called for by the DECC (this is rare however).

**The Infrastructure Planning Commission:** Under the 2008 Planning Act, the IPC will consider applications and grant consent for new (or changes to existing) overhead lines which operate at 132kV or higher. In addition they will grant consent for generating stations >50MW on shore, and >100MW offshore.

Substations and cables constructed in certain area's (e.g. an SSSI or close to a watercourse), will also require the consent of the Environment Agency and English Nature/Countryside Council for Wales.

Other bodies that may have to be consulted or may wish to provide comment (especially on overhead lines) include, English Heritage/Welsh Historic Monuments Executive Agency (CADW), Campaign to Protect Rural England/Campaign for the Protection of Rural Wales, The County Archaeological Officer and local Wildlife Trusts.

## Technical Considerations

The connection of distributed generation to the electricity distribution system will, amongst other factors, affect the power flow, voltage profile and fault level\* within that network. The impact of this is assessed during the early stages of a project's development. In some cases, the impact of the new generator(s) will be adverse and require either reinforcement of the electricity distribution system or operating/output constraints to be enforced at certain times of year or during abnormal network operating conditions.

\* *Fault Level: Can be viewed as the magnitude of energy, which will need to be interrupted by circuit breakers during a failure/fault on the electricity distribution system. Generating plant normally increases the fault level in the electricity distribution system.*

## Connection and Use of system Charges

The customer is required to pay an initial charge for connection and then on-going use of system charges for both import and export energy. For further information regarding the principles for determining both the connection charge and use of system charges please refer to WPD's *Statement of Methodology and Basis of Charges for Connection* and WPD's *Statement of Charges for Use of WPD's Electricity Distribution System*. These Charging Statements are available to view and may be downloaded from the *Use of System Charges* area of our website.

## Typical Connection Sizes & Connection Voltages

The connection voltage for a site can influence the cost of connection and in general the higher the voltage, the higher the cost and this is due to the general increase in size and insulation requirements of plant and equipment as the voltage increases. WPD's distribution system operates at the following three phase voltages: 400V, 11kV (6.6kV in some area's), 33kV (66kV in some area's) and 132kV. As an approximate guide, the size of the generator connection and the likely connection voltage is set out below. Be aware, that there will be some overlap between the voltage boundaries and that many site specific geographical and technical parameters can influence the connection voltage to be used. Occasionally in remote rural locations for example, it may be more feasible, both technically and financially, for a 3MW wind farm to be connected at 33kV, where you would normally expect this size of generation to be connected at 11kV.

Generator Size (3-phase)	Location: Urban or Rural	Typical Connection Voltage
0 – 0.25 MW	Rural	400V
0 – 0.5 MW	Urban	400V
0.25 – 4.0 MW	Rural	11,000V
0.5 – 7.0 MW	Urban	11,000V
4.0 – 20.0 MW	Rural	33,000V
7.0 – 20.0 MW	Urban	33,000V
+ 20.0 MW	Urban + Rural	132,000V

## **Relevant Documentation/ Essential Reading for Prospective Generators:**

The Distribution Code of Licensed Distribution Network Operators of England and Wales: Section DPC7 is particularly relevant for the connection of Embedded or Distributed Generation.

Engineering Recommendation G59/2-1: RECOMMENDATIONS FOR THE CONNECTION OF EMBEDDED GENERATING PLANT TO THE REGIONAL ELECTRICITY COMPANIES' DISTRIBUTION SYSTEMS

Engineering Recommendation G59/3: RECOMMENDATIONS FOR THE CONNECTION OF GENERATING PLANT TO THE DISTRIBUTION SYSTEMS OF LICENSED DISTRIBUTION NETWORK OPERATORS

Engineering Recommendation G83/2: RECOMMENDATIONS FOR THE CONNECTION OF TYPE TESTED SMALL SCALE EMBEDDED GENERATORS (UP TO 16A PER PHASE) IN PARALLEL WITH LOW VOLTAGE DISTRIBUTION SYSTEMS

The Electricity Networks Association has produced a number of informative guides to help prospective generator connectees;

A Guide for connecting generation to the distribution network in a single premises that falls under G83/2;

A Guide for connecting generation to the distribution network in multiple premises that falls under G83/2;

A Guide for connecting generation to the distribution network that falls under G59/2.

G59/2 and G83/2 are available to purchase from the Energy Networks Association, 6<sup>th</sup> Floor, Dean Bradley House, 52 Horseferry Road, London, SW1P 2AF. (Tel: 020 7706 5100). The DG Guides are freely available via the distributed generation section of the Energy Networks website listed below.

## **Useful Websites and Telephone Numbers:**

[www.westernpower.co.uk](http://www.westernpower.co.uk)  
[www.ofgem.gov.uk](http://www.ofgem.gov.uk)  
[www.energynetworks.org](http://www.energynetworks.org)  
[www.decc.gov.uk](http://www.decc.gov.uk)

Western Power Distribution (East Midlands): 0121 623 9007  
Western Power Distribution (West Midlands): 0121 623 9007  
Western Power Distribution (South West): 0845 601 2989  
Western Power Distribution (South Wales): 0845 601 3341