

A Guide to GRID CONNECTED ELECTRICAL GENERATION

For micro-generation and projects below 5MW output

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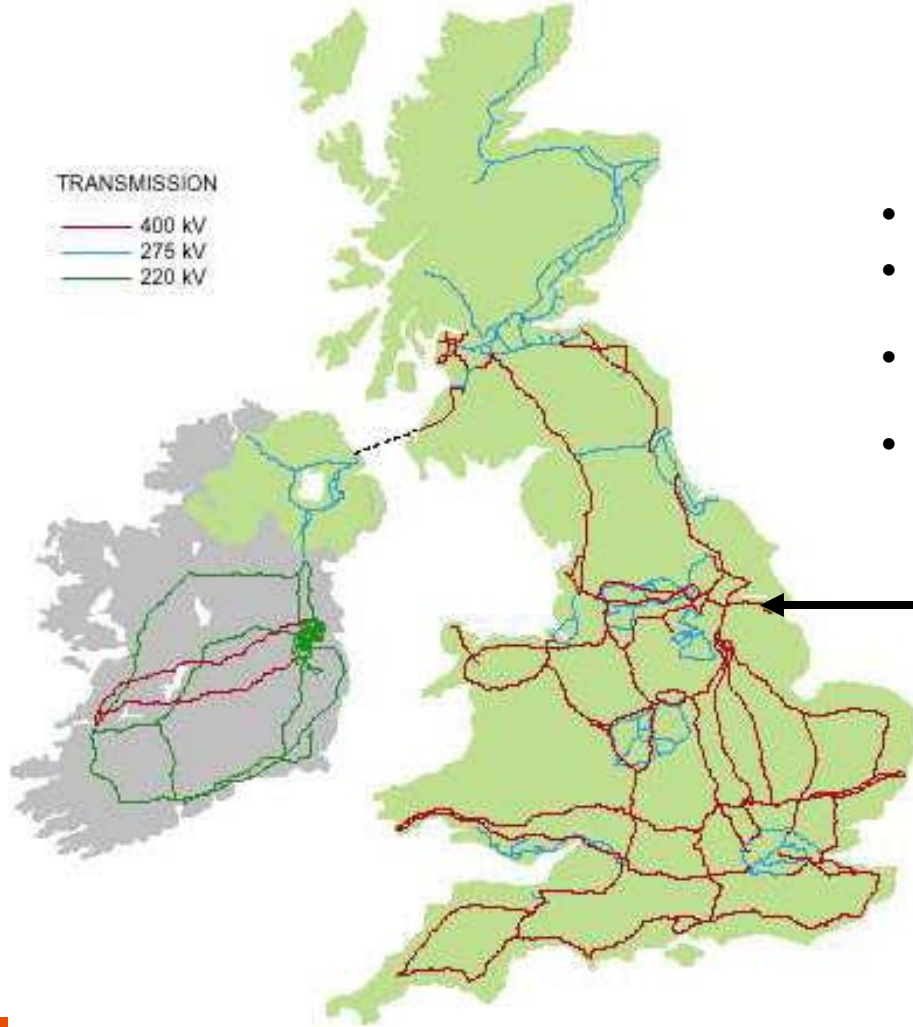
The UK Supply System

Free market overseen by Ofgem the government regulator

Consists of 5 parts

- Generators
- The National Grid (NG)
- Distribution Companies (DNO)
- Energy supply companies
- Consumers

The UK Transmission Network



- Owned and operated by National Grid PLC
- Transmits power at very high Voltages over long distances
- Transfers power to the regional Distribution Networks (DNO)
- Only Power Station generation is connected directly to the Transmission Network.

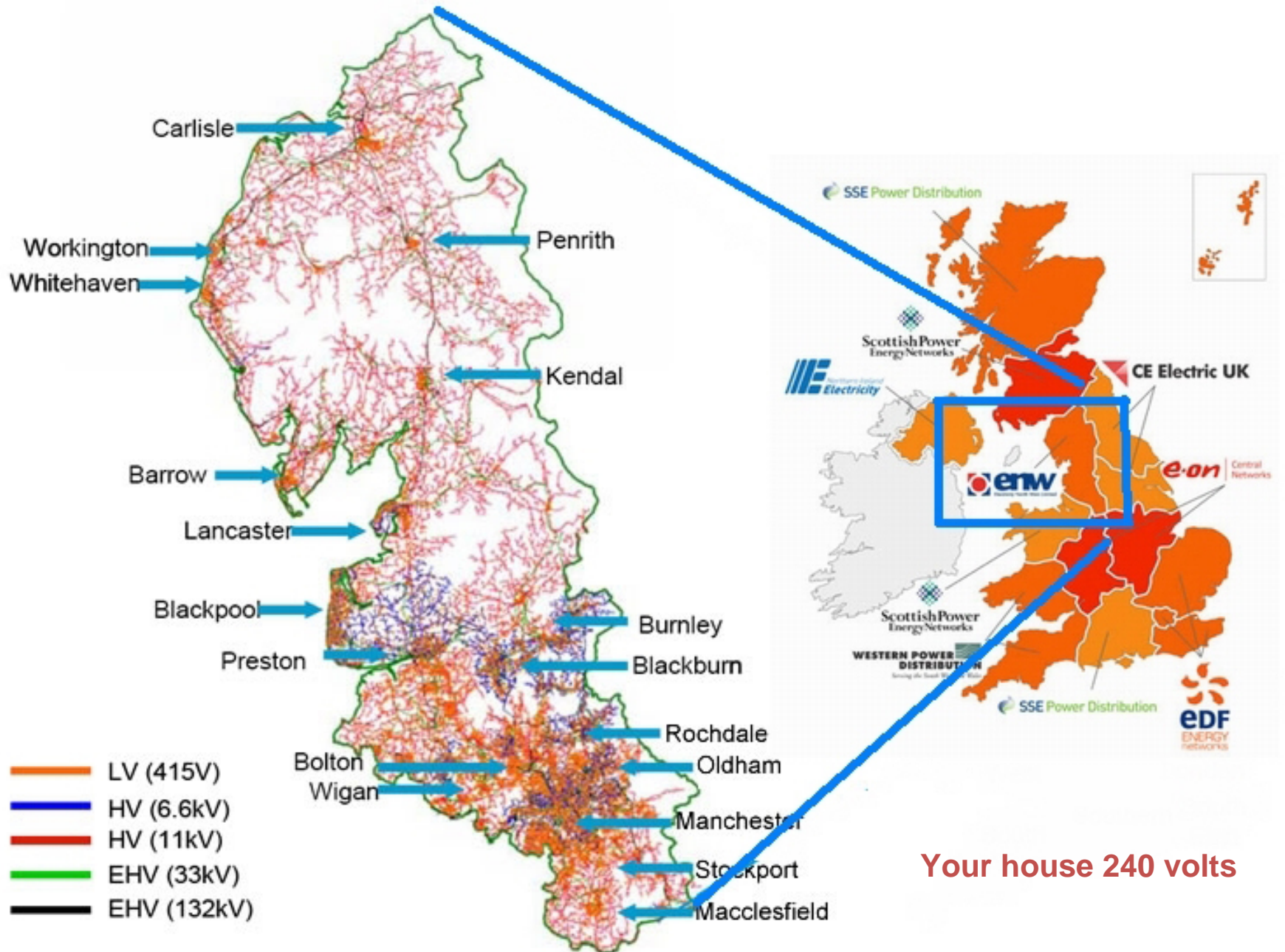
VOLTAGE 400,000

Your house 240 volts

The UK Distribution Networks:

- 8 UK Distribution Networks operating at lower voltages to deliver power to consumers
- The Distribution Network Operators (DNO's) for England's Northwest are:
 - Electricity Northwest (UU)
 - Scottish Power
- Most Renewable Energy generating projects(feed in Tariffs) are connected to the Distribution Network. (DNO)
- Connections are made to the DNO Grid system at different voltages levels

The Distribution Network



Local Electrical substation (1000KVA) Bringing supply to your home



240/415 volts

11,000 volts

Your house 240 volts

27/02/2006

Grid Connectivity Planning

Can I get a network connection?

- **YES subject to DNO connection contract.** The Distribution Networks often have limited spare connection capacity and may require upgraded or modified to allow connection of a Renewable Energy generating project.
- **Micro-generation projects**, also referred to as Small Scale Embedded Generation (SSEG) tend to be connected to the Distribution Network and do not usually give Network connection issues. **(16 amps per phase)**
- **For one project you can go ahead and carry out your installation work.**
- **For several projects in one area you must first write to the DNO for approval.**

Grid Connectivity Planning

What you must have !

For a project to be Grid connected you will need permission for connection and operation, and must:

- Have a Connection Agreement with your DNO
(exception for SSEG micro generation)
- Ensure correct electrical and earth protection for the installation
- Arrange for an import/export meter and supplier contract
- Comply with the Distribution Code for UK Distribution Networks
- To ensure the above you will need a competent and approved Contractor

Grid Connectivity Planning

Documents You must comply with

- Electricity Supply and at Work Regulations
- DNO engineering documents
- **G83** applies to typical micro-generation or SSEG projects
Typically less than 4kW single phase, or 12kW 3-phase,
being generated
No Connection Agreement required but DNO has to be
advised of connection within 30 days
- **G59** applies to projects where less than 5MW is being
generated, and where connection to Distribution Network is
at less than 20kV

Grid Connectivity Planning Voltage connection levels

- Projects might typically be connected to the Distribution Network as follows, so long as there is not a capacity issue:
 - **Micro-generation, or SSEG: (16 amps per phase)**
 - **Single phase up to 4kW, connected to 240V single phase supply**
 - **3-phase up to 12kW, connected to 415V 3-phase supply**
 - Up to 300kW output, connected to 415V or 11kV
 - Up to 7MW output, connected to 11kV or 33kV
- In some instances without a capacity issue the DNO may recommend connection to a higher voltage system that is closer to NG source, as overall connection costs may be lower

Grid Connectivity Planning

To start the process

Connecting **Non-SSEG** projects (micro generation)

- Apply to the DNO for either a **Feasibility Study**, or for a **Contract Offer for Connection**
- Use a competent electrical consultant/designer to assist with this
- The application must include:
 - Full contact details
 - Completed DNO application form
 - Proposed development timescale
 - Details of existing on-site electricity supply
 - Scaled location map/plan
 - Proposed Generator characteristics
 - Intended operational characteristics e.g. 24/7