Hub Guide 5 – The Power Network

Introduction

This Hub guide is an introduction to power networks, which covers the current approach, where the power comes from, how it is regulated, and approaches to connecting your project. It focuses on electricity. A separate network exists for the storage, distribution and consumption of gas, supplied either from UK gas fields, or shipped in from abroad to storage terminals for onward distribution to consumers.

This guide is intended to inform and support local authorities and others who would like to develop projects either consuming or generating power. Separate Hub guides cover related topics such as new approaches to power networks, gaining value from new technologies, and a glossary of some common terminology.

If you have any further enquiries after reading this guide, please refer to the Greater South East Energy Hub website www.energyhub.org.uk or contact info@energyhub.org.uk.

The power network in the UK

The UK power network generally comprises the following principle components:

- Generating stations - ranging from large power plants using nuclear, fossil-fuel, wind and solar, through to micro-generation using various energy sources
- A national transmission network - the part of the network which takes the electricity at high voltage from the large generating stations
- Regional distribution networks – these carry electricity from the transmission network at lower voltages to consumers
- Consumers – the end users, including homes, businesses and other places where electricity is used.

How is the power network regulated?

In the 1980s, the power network and the way in which it operates underwent privatisation to create separate generation, transmission, distribution and retail companies. Some of these companies operate in natural monopolies where they have no competition. The Office of Gas and Electricity Markets (Ofgem) regulates the monopoly companies that run the gas and electricity networks, as well as the retail market.

Power generation

The mix of power sources varies daily and seasonally, depending on a range of factors, including the global energy market and weather conditions. At any time, the mix of generation in the UK can be found by visiting the GridWatch website.

In addition to the generating stations based in this country, we draw power from beyond the UK through electricity interconnectors, which are physical links that allow the transfer of electricity from France, the Netherlands, Northern Ireland and the Republic of Ireland.

Transmission

The National Transmission Network is made up of high voltage electricity wires that extend across Britain and nearby offshore waters. It is owned and maintained by regional transmission companies, while the system is operated by a single organisation called the System Operator. In England and Wales, the system operator is National Grid Electricity Transmission plc (NGET).

Distribution

There are 14 licensed Distribution Network Operators (DNOs) connected to the National Transmission Network in Britain, each responsible for a geographical region of the network. To find out which DNO area applies to a specific location, view the online Electricity Distribution Map provided by the Energy Networks Association (ENA).

Ofgem also allows companies, called Independent Distribution Network Operators (IDNOs), to build and operate small local-electricity networks. These operate at a very local scale within the areas covered by the DNOs. They are mainly extensions to the DNO networks and serve new housing and commercial developments.

Connecting to the network

Distribution Network Operators have a duty to offer new customers a connection to the electricity network. Connection work is termed as either non-contestable or contestable. This depends on whether the activities can only be undertaken by the local DNO, or whether they can be done by either the DNO or another suitably eligible organisation, the latter being either the Independent Network Distribution Operators or Independent Connection Providers (ICPs). For any major connection it is therefore important to establish who can carry out the work.

All connections to the power network are covered by national industry rules set out by Ofgem.
In April 2019, the rules for connecting generation to the distribution network changed. Anyone planning to install new generation, for example solar or wind, must contact their equipment supplier or installer to ensure that they are both aware of the changes and have factored them into equipment specifications.

More information is available from the DNO covering the connection and through the energy network professional body, the Energy Networks Association.

Difficulties in connecting

Parts of the network can experience high demand or have limited capacity. This can be addressed to a certain extent through active network management by the DNO on a day-to-day basis. However, where demands for connecting new generation or consumption exceed the current capacity, there may be a need to reinforce the network, for example by upgrading or installing new sub-stations.

Where improvement work in a specific area of constraint is not part of a planned investment programme agreed between the regulator (Ofgem) and the DNO, the applicant is expected to pay the costs of reinforcement. Reinforcement can be costly to such an extent, that in some cases it could significantly impact on the viability of a development project.

New solutions are coming forward to avoid the need to reinforce the network. These are covered in Hub Guide 6 – Transforming the Power Network and in Hub Guide 7 – Grid Constraint.

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