

Security of Supply

Understanding the options available for customers to enhance the security of supply

Introduction

The electricity industry is undergoing a period of significant change – large fossil fuelled power stations are closing and more and more electricity is provided from renewable sources such as wind and solar. By their very nature, renewable energy sources are intermittent - the phrase 'security of supply' is often used in the context of a greater reliance on these newer energy sources which could cause system regulation (flexibility) and system adequacy (capacity balance) challenges. A move towards electric vehicles and the electrification of heat will increase the demand on electricity networks further fuelling questions such as will there be enough power?

Security of supply can also be used to in the context of customer connections to the network. Banks, data centres and hospitals for example often choose a higher level of security for their connection and there are a number of options available to customers.

Security of Supply

Security of supply refers to the electricity industry providing appropriate electricity system capabilities (such as generation and transmission capacity) to maintain normal supply to consumers.

At the national level, security of supply is governed by Engineering Recommendation P2 published by the Electricity Networks Association (ENA). ENA EREC P2 is a guidance document on system planning and network capacity requirements that details the minimum standards for the security of supply.

All Distribution Network Operators have obligations under their distribution licence to 'plan and develop the [licensee's] distribution system in accordance with a standard not less than that set out in Engineering Recommendation P2'. Doing so generally provides a reliable electricity network which can, in the event of faults / outages, be reconfigured to restore supplies within prescribed timescales. Connections to individual customers are not, however, covered by EREC P2 and it is for the customer themselves to decide on the appropriate level of security for their connection.

On request, network companies are required to provide a quotation for the minimum scheme. The minimum scheme is defined as the scheme with the lowest overall capital cost (as estimated by UK Power Networks / the DNO) solely to provide the required capacity – without any additional or improved level of security. The actual design solution for the minimum cost scheme is largely dependent on the capacity requested.

Connections with intrinsically higher levels of security consist of more assets and cost more money, both to install and operate. This guide looks at security of supply in relation to customer connections and options available to customers to improve, or enhance, their security of supply.

Typical minimum cost schemes

For capacities up to and including 276kVA the minimum cost scheme is typically a single LV service. Domestic properties usually have a service rated at up to 100A (23kVA) although the after diversity maximum demand is much less. Shops, small commercial buildings and block of flats typically have a single service rated at up to 276KVA. . It is unusual for customers fed from a single LV service to request an enhanced security of supply.

For capacities up to 1.5MVA supplies can be derived from a HV/LV transformer and this may be fed by a single circuit.

HV supplies are normally provided for capacities in excess of 1.5MVA, and the minimum cost scheme for capacities in excess of 7MVA would typically involve two circuits.

Customers opting for the minimum cost scheme may do so to reduce initial costs and accept the effects of outages (faults and maintenance). E.g. if the circuit is subject to a fault, the connection will be unavailable for repair time.

However, if that connection is also connected to a constrained network the customer may not have 24/7 availability for its full export or import capacity even when its connection to the network is physically intact.

Options for enhancing security of supply

Where a customer requests an enhanced security the Connection Offer will be subject to an 18% Operating & Maintenance charge.

There are many options available to customers to enhance their security of supply – the most common options are covered below, generally in ascending order in terms of cost. The more costly options seek to provide diversity to avoid outages caused by a single point of failure.

Additional circuit

Usually an additional circuit is requested for capacities in excess of 1.5MVA. There are a number of options available

From the same source supply

In the same trench – this is typically the cheapest option and may still be subject to a single point of failure. Both circuits would be provided in a single trench – the cost to install a second circuit in a trench typically only requires the cost of the cable.

Diverse routing - this is a more expensive option and requires a separate trench for each additional circuit typically doubling the cost of providing the connection assets.

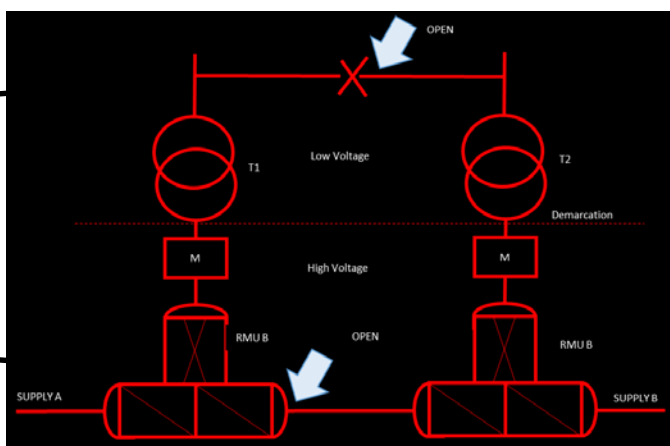
From different sources of supply (typically for multi-MW sites or where continuity of supply is critical)

In part shared trenches – early cable routes would almost certainly be in diverse trenches however closer to the site routing could be combined. Some cost could be saved but the advantage of different sources of supply may be negated by part shared routes. Where different sources of supply are provided they are to be used as alternatives and not in combination, no parallel operation is permitted unless agreed.

Diverse routing – cables routes remain in separate trenches throughout the entire route.

Options for enhancing security of supply cont..

Typical configuration for additional circuit arrangement, HV



Other options (DNO)

The following options could be provided instead of, or in addition, other options listed.

- Deeper cabling
- Mechanical protection of cabling
- Enhanced protection systems

Other options (Customer)

Separate intake positions – customers could decide to provide separate intake positions for each additional circuit. Two or more circuits in the same trench but with separate intake positions provides less diversity than circuits in diverse trenches and separate intake positions.

- On site generation
- On site battery storage

Flexible connections

As the network continues to develop more areas are subject to constraints. Where an area is subject to constraints flexible connections may be offered. These are typically Actively Managed Network (ANM) connections which may limit network access at certain times of day for example.

References

UK Power Networks website: www.ukpowernetworks.co.uk

UK Power Networks design specification (G81) library contains technical information to help you with your works: <http://library.ukpowernetworks.co.uk/library/en/g81/> [e.g.] [EDS 08-1105 Guidance For The Application Of Ena Erec P2 Security Of Supply](#)

Ofgem Website – www.ofgem.gov.uk
[Ofgem - Promoting security of supply](#)

ENA (Energy Networks Association) Website www.energynetworks.gov
ENA Open Networks Project Document - [http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-WS2-Information%20on%20Distribution%20Connection%20options-%20180131%20\(published\).docx.pdf](http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-WS2-Information%20on%20Distribution%20Connection%20options-%20180131%20(published).docx.pdf)