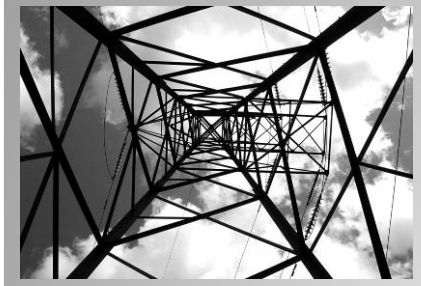



Microgeneration Challenge

Breakout Sessions

Microgeneration - G83 & ≤50kW G59

- What is it?
- Technical Constraints
- The Application Process
- Generator Connection Agreements

What is G83 generation?

- G83 is an industry standard for Small Scale Embedded Generators (SSEGs)
  - Energy Networks Association Engineering Recommendation G83/1-1 *"Recommendations for the Connection of Small–scale Embedded Generators (Up to 16A per Phase) in Parallel with Public Low-Voltage Distribution Networks"*
  - Stage 1 – a single unit within a single customer's installation
  - Stage 2 – multiple units in a "close geographic region, under a planned programme of work"
  - The stage 2 definition is being clarified in the next issue of G83

- Small Scale Embedded Generator (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."*
  - 16A at 230V is 3.68kW
  - Note; that the definition is currently under review and will be included the review of G83.

G83 Stage 1 - Connect and Notify – If using MCS registered contractor

If entire installation is 3.68kW or below per phase

Inform DNO within 28 days using a fully completed G83/1 Appendix 3 form. Must include MPAN

Charges: Nil charge

G83 Stage 2 - Multiple Installations

G83 Multiple Installations (<16 amps per phase, 3.68kW): Must be applied for

Charges: Charges will apply for work required.

What is G59 generation?

- G59 is an industry standard for generators greater than 16A per phase
  - Energy Networks Association Engineering Recommendation G59/2-1 *"Recommendations for the connection of generating plant to the Distribution System of Licensed Distribution Network Operators - Amendment 1"*
- Up to 50kW there is a provision for type tested equipment similar to G83; however
- Applications greater than 17kW per phase must use G59 approved relays unless G59 type tested inverters are available
- G59 applications must be submitted for system studies and associated network reinforcement where necessary prior to connection.

Charges: Charges will apply for work required.

Why is the break point at 16A per phase?

- In UK law the 16A requirement is from the Electricity Safety, Quality and Continuity Regulations – Regulation 22
  - 22.—(1) Without prejudice to regulation 21, no person shall install or operate a source of energy which may be connected in parallel with a distributor's network unless he—
    - (a)has the necessary and appropriate equipment to prevent danger or interference with that network or with the supply to consumers so far as is reasonably practicable;
    - (b)has the necessary and appropriate personnel and procedures to prevent danger so far as is reasonably practicable;
    - (c)where the source of energy is part of a low voltage consumer's installation, complies with British Standard requirements; and
    - (d)agrees specific requirements with the distributor who owns or operates the network.
  - (2) Sub-paragraphs (b) and (d) of paragraph (1) shall not apply to a person who installs or operates a source of energy which may be connected in parallel with a distributor's network provided that sub-paragraphs (a) and (c) of paragraph (1) are complied with; and
    - (a)the source of energy does not produce an electrical output exceeding 16 amperes per phase at low voltage;
    - (b)the source of energy is configured to disconnect itself electrically from the parallel connection when the distributor's equipment disconnects the supply of electricity to the person's installation; and
    - (c)the person installing the source of energy ensures that the distributor is advised of the intention to use the source of energy in parallel with the network before, or at the time of, commissioning the source.

There are a number of basic issues associated with connecting distributed generation to the wider electricity network

Electrical Issues

–Voltage
- Rise & Step

–Protection
- Interface protection is not sufficient to prevent overvoltages – it should protect the generator.
- RoCoF can not always discriminate between loss of mains and system disturbances. For safety it should be slightly trip happy. This becomes an issue with increasing generation penetration.

–Harmonics, Distortion and Unbalance

–Fault level
- Varies by technology and location, but customer has a significant control over their contribution to the issue

–Reverse power flow

–Thermal ratings
- We are now seeing 11kV connected generation exporting to NGET.

Contextual Issues

–Clustering
- Where it is good to develop one renewable generator, due to resources, ease of planning etc, it is normally good to develop others.
- Generator applications cluster, overloading one area, leaving others untouched and leading to commercial queuing issues.

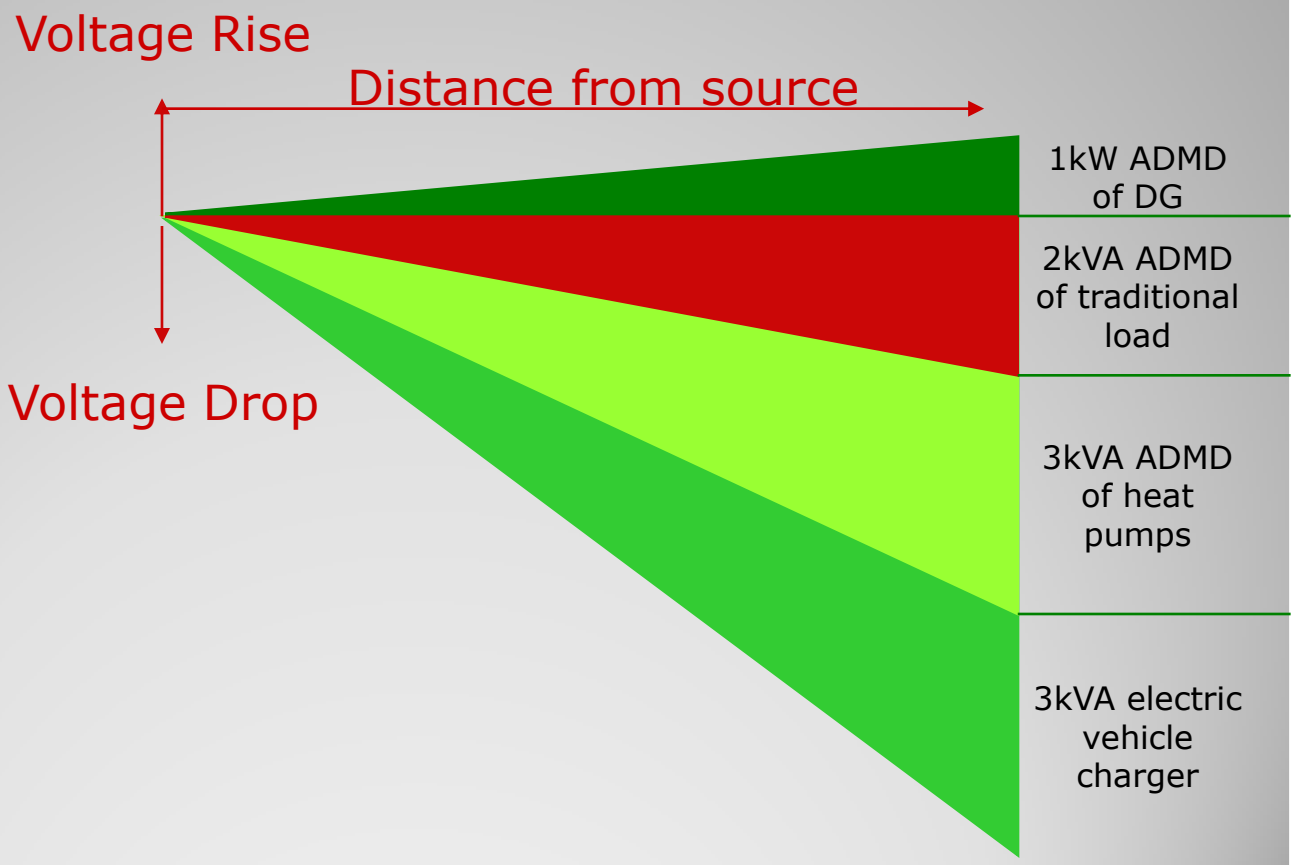
–Planning consents
- Particularly for overhead lines but also for connection point substations

–Land rights
- Wayleaves, easements and statutory rights

–Existing network
- Single phase lines may not be suitable for your generator

The LV system was designed for a thermal rating and voltage drop caused by a domestic load of 2kVA ADMD (after diversity maximum demand)

- Although an individual house might take up to around 18kVA, a hundred houses would only take a maximum of around 200kVA.
- To minimise the costs to customers, the system was traditionally designed such that the maximum length of cable and the minimum cross section were utilised.
- To optimise this the “no-load” voltage was set as high as possible within the statutory limits.



Our network were originally designed to be passive & supply load in one direction, it was not designed for any voltage rise. Cleaner energy is pushing our system beyond their designed parameters.

Questions?