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north west**

Bringing energy to your door



Introduction to EREC G99

Webinar – 12th April 2019

Gill Williamson

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Welcome to our
webinar

Gill Williamson
Strategic Planning



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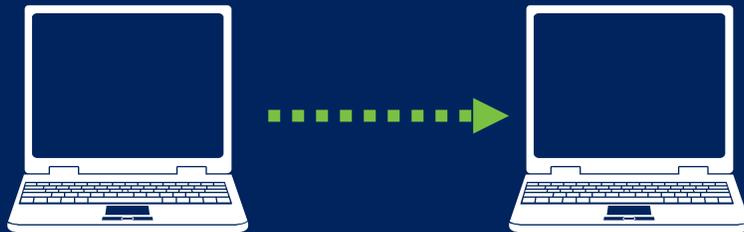
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35 minutes presentation



25 minutes
questions & answers



Please submit written
questions online during the
webinar



**Gillian
Williamson**
Strategic
Planning



**Victoria
Brown**
Energy
Solutions



**Peter
Twomey**
Policy



EREC G99
Terminology



EREC G99
Documents & Forms



Changes to
Connection Process



Roles &
Responsibilities



Connection timeline
under EREC G99

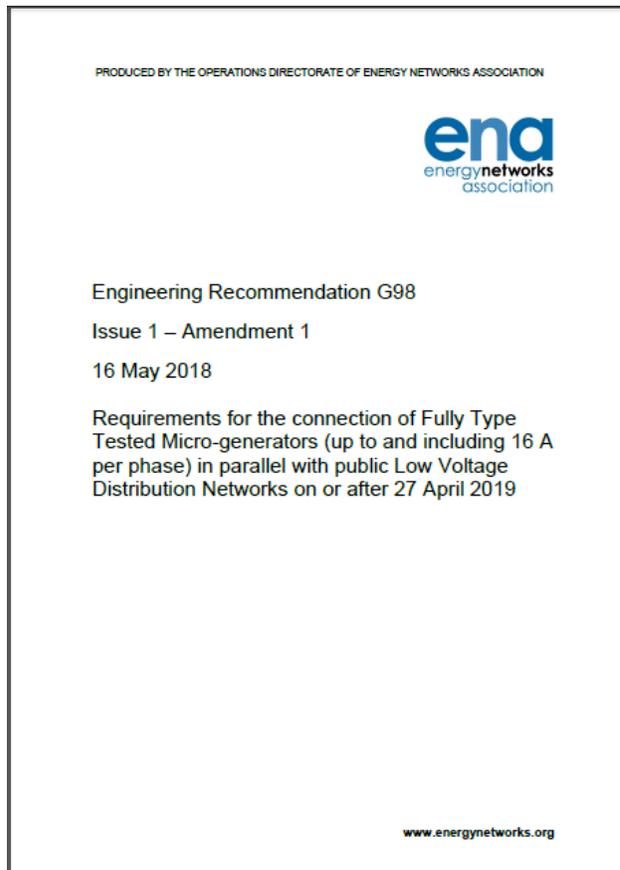


Questions &
Answers



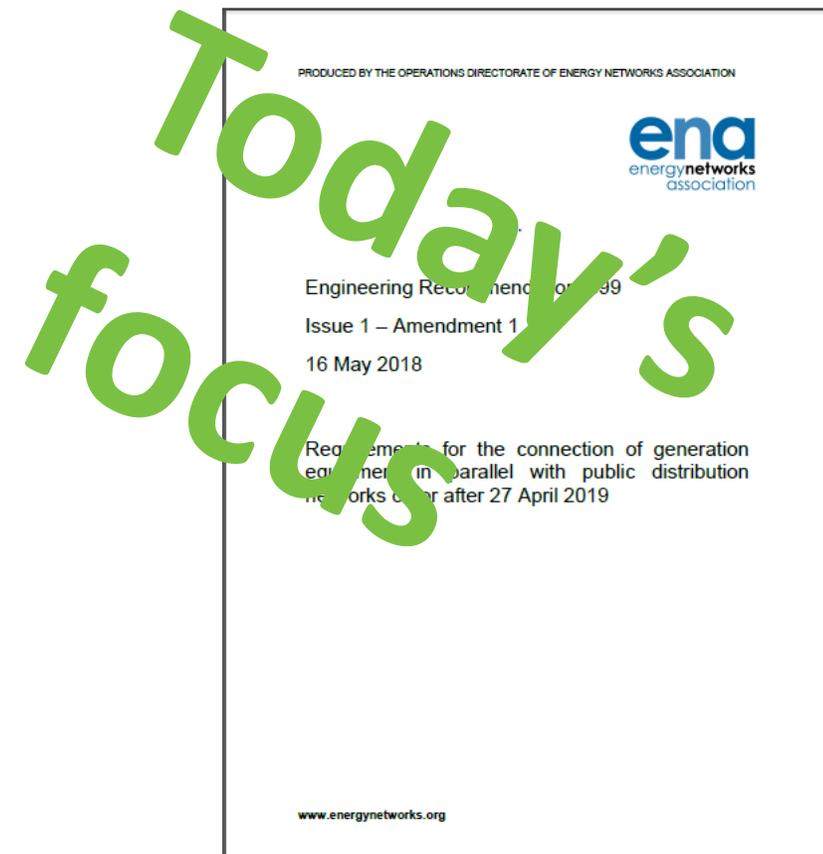
G98:

Requirements for the connection of Fully Type Tested **Micro-generators** (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019



G99:

Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019

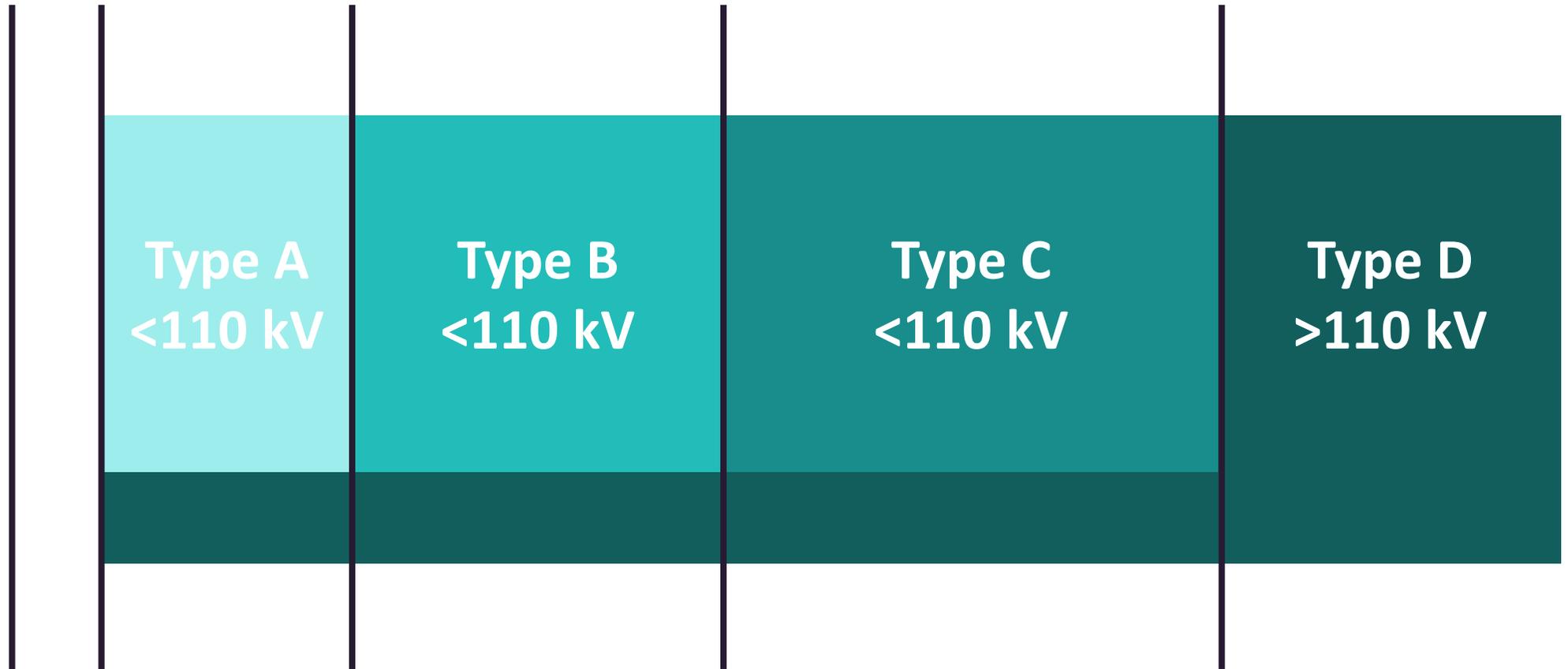


EREC G99 Terminology





- Types affect technical requirements and which forms you use



Power Generating
Module
Registered Capacity

800W

1 MW

10 MW

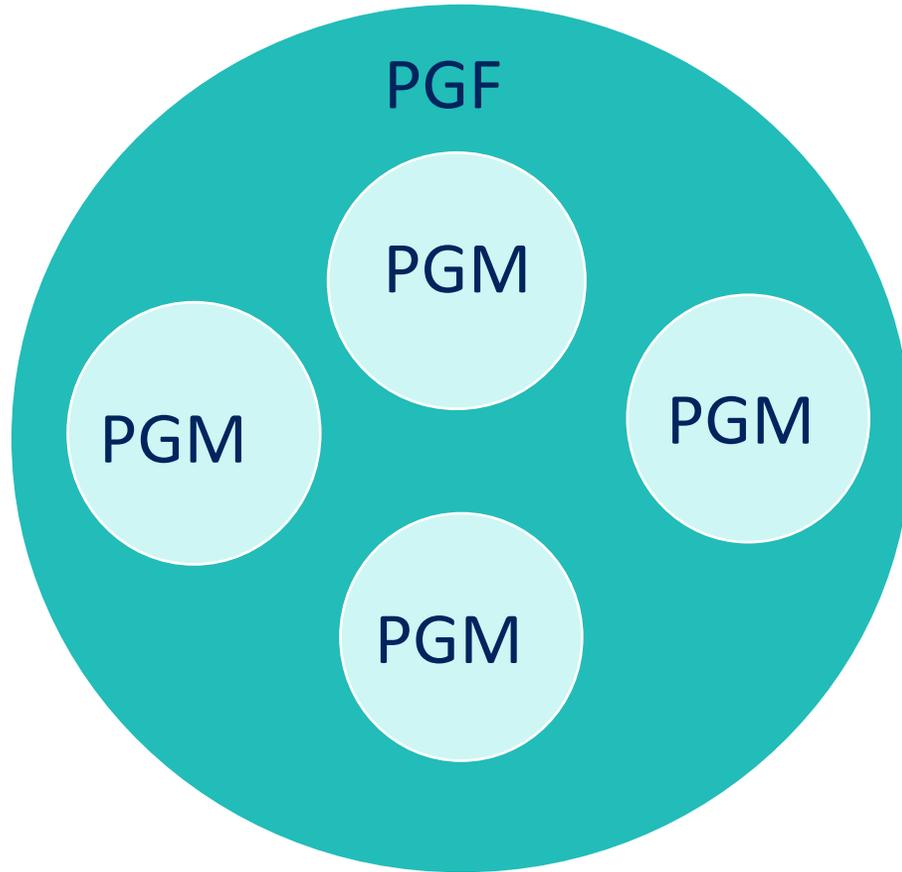
50 MW



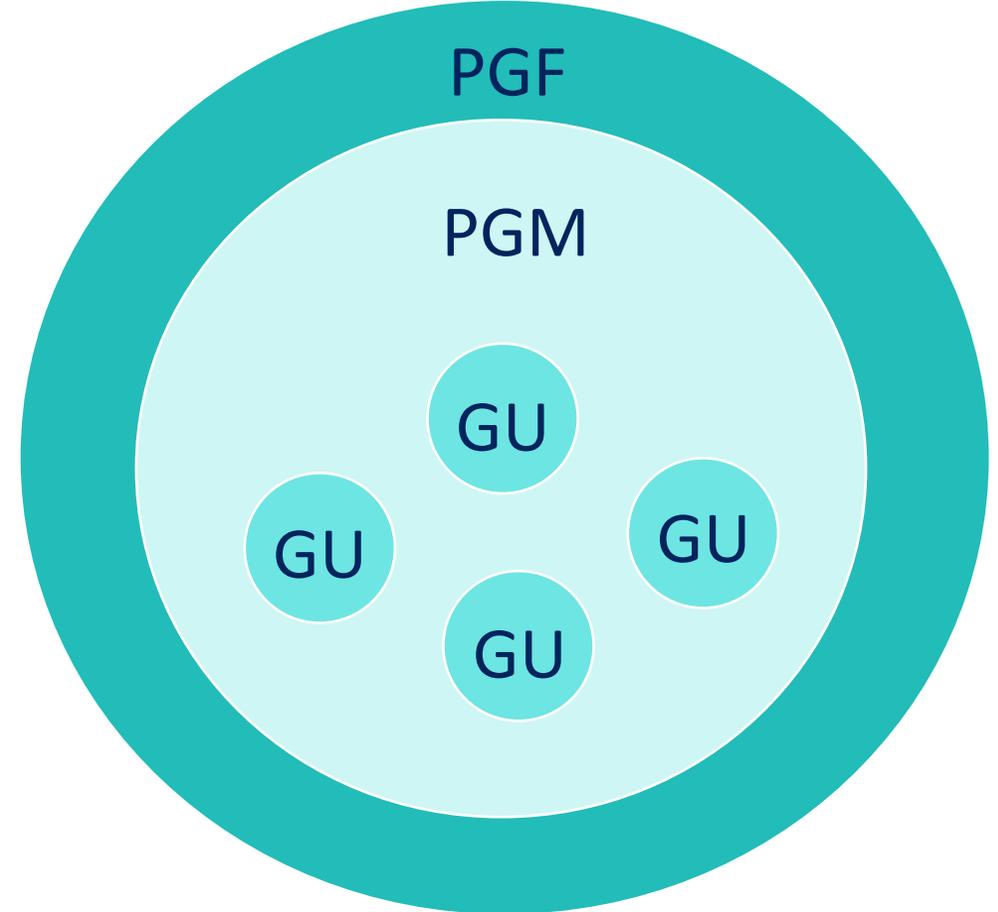
Types depend on PGM capacity

PGM definition depends on whether the technology is synchronous / asynchronous

SYNCHRONOUS SCHEME



ASYNCHRONOUS SCHEME



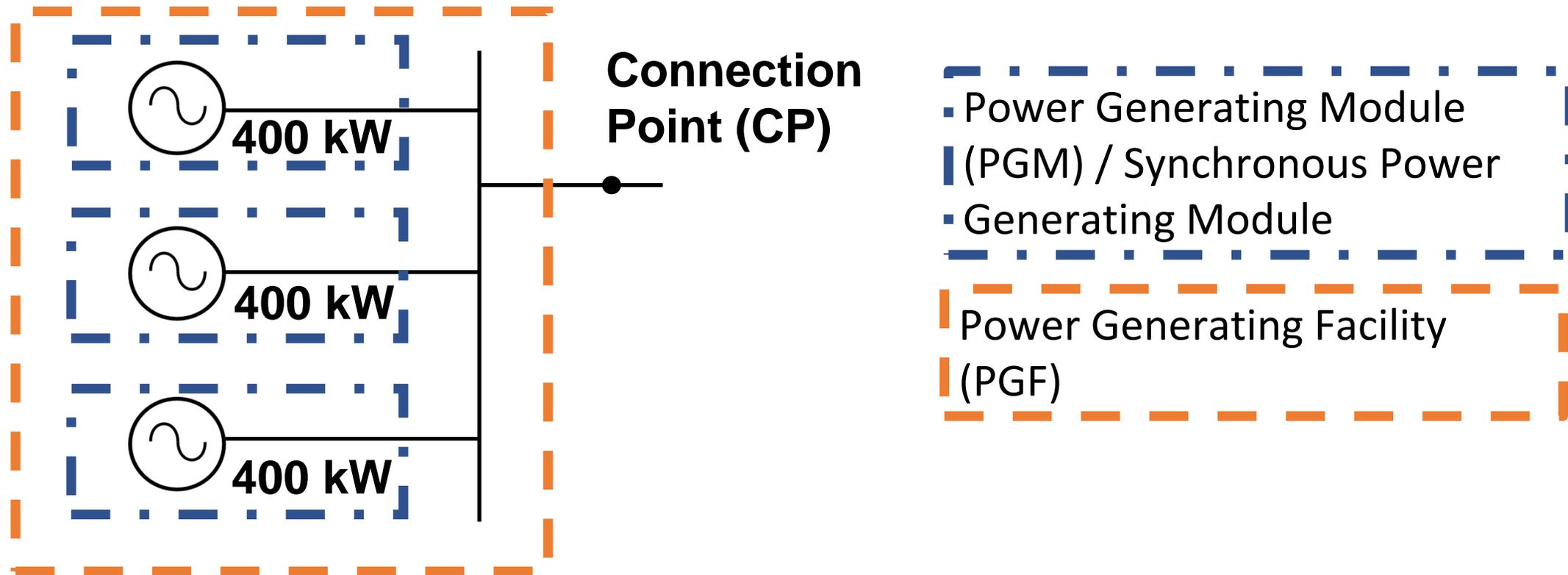
Generating Unit, GU

Power Generating Module, PGM

Power Generating Facility, PGF

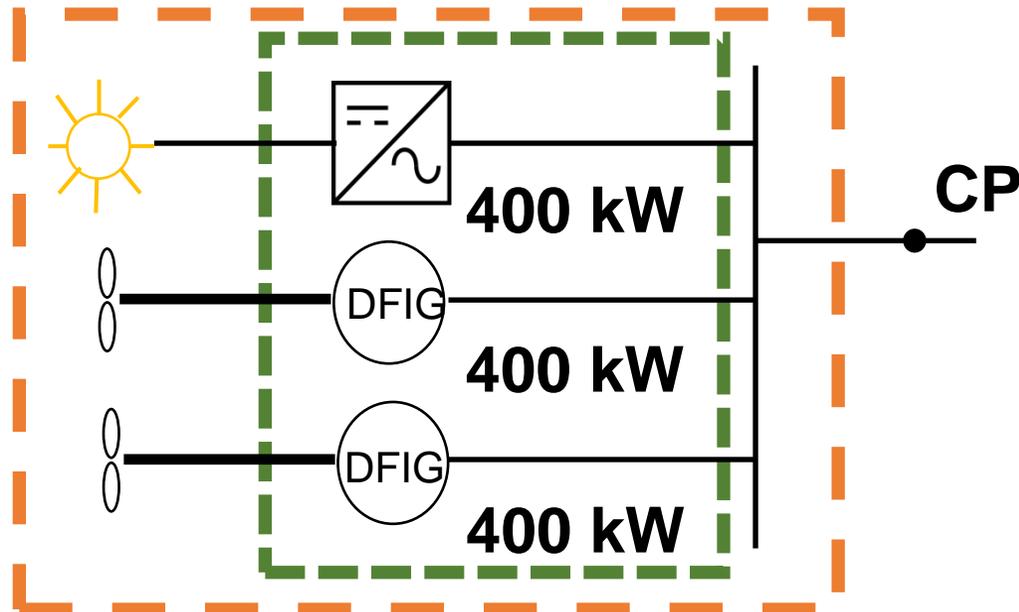


3 x 400 kW Type A Synchronous PGMs = 1.2 MW PGF





1 x 400 kW Inverter connected plus 2 x 400 kW Asynchronous GU
= 1.2 MW Type B PPM = 1.2 MW PGF



Power Generating Module
(PGM) / Power Park Module
(PPM)

Power Generating Facility
(PGF)

EREC G99 – Synchronous and Asynchronous Type B Power Generating Modules in same Power Generating Facility



3 x 4MW Type B synchronous PGMs

2 x 500 kW Inverter connected plus 1 x 500 kW Asynchronous GU = 1.5 MW Type B PPM

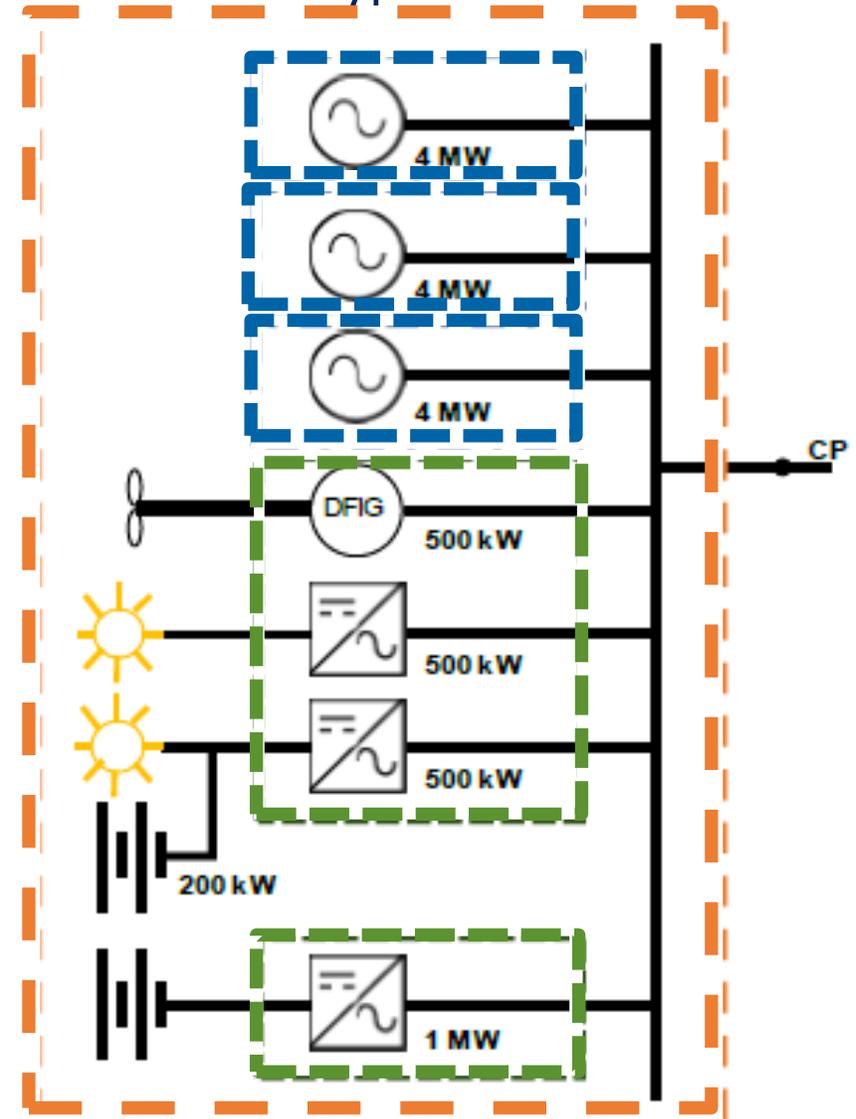
1 x 1MW Energy Storage = 1MW Type B PGM

= 14.5MW PGF

- Power Generating Module (PGM) / Synchronous Power Generating Module

Power Generating Module (PGM) / Power Park Module (PPM)

Power Generating Facility (PGF)



EREC G99 Documents & Forms





Connection of Power Generating Modules to DNO Distribution Networks in accordance with EREC G99

Version 2, January 2019

www.energynetworks.org

Used when wanting to connect a Power Generating Module greater than 16 Amps per phase.

Changes include:-

- Alignment of terminology with G99 (PGM, GU etc)
- Inclusion of storage data
- New technical data
 - Voltage control data
 - Frequency response droop settings
- Type C & D only:
 - Governor and prime mover model
 - AVR and excitation model
 - Short circuit ratio

Can be accessed from our website: <https://www.enwl.co.uk/get-connected/new-connection/generation-connection/over-200kw/>



B.2 Power Generating Module Document Type B

Form B2-1 Power Generating Module Document for Type B Power Generating Modules	
Compliance Statement	
This document shall be completed by the Generator	
<p>Power Generating Module (PGM)</p> <p>PGM Name:</p> <p>Compliance Contact (name/tel/email):</p>	<p>Distribution Network Operator (DNO):</p> <p>DNO Name: ABC electricity distribution</p> <p>Compliance Contact (name/tel/email):</p>
<p>Key to Submission Stage</p> <p>A – Application: Submission of the Standard Application Form.</p> <p>IS – Initial Submission: The programme of initial compliance document submission to be agreed between the Generator and the DNO as soon as possible after acceptance of a Connection Offer. Initial Submission of this Power Generating Module Document to be completed at least 28 days before the Generator wishes to synchronise its Power Generating Module for the first time.</p> <p>FONS – Final Operational Notification Submission: The Generator shall submit post energisation verification test documents to obtain Final Operational Notification from the DNO.</p>	
<p>Key to evidence requested</p> <p>S - Indicates that DNO would expect to see the results of a simulation study</p> <p>P - Generating Unit or Power Generating Module design data</p> <p>MI - Manufacturers' Information, generic data or test results as appropriate</p> <p>D - Copies of correspondence or other documents confirming that a requirement has been met</p> <p>T - Indicates that the DNO would expect to see results of, and/or witness, tests or monitoring which demonstrates compliance</p> <p>TV - Indicates Type Test reports (if Generator pursues this compliance option)</p>	<p>Key to Compliance</p> <p>Y = Yes (Compliant),</p> <p>O = Outstanding (outstanding submission)</p> <p>UR= Unresolved issue</p> <p>N = No (Non-Compliant)</p>

= Compliance Statement

Type B – form B2-1 (appendix B of EREC G99)

Type C & D – form C2-1 (appendix C of EREC G99)



Notifications issued by the DNO to a Generator

Final Operational Notification (FON)

Types B,C&D: Issued when the relevant requirements of EREC G99 are complied with allowing operation of the PGM in parallel with the distribution network.

Limited Operational Notification (FON)

Type D only: Issued to a generator who had previously attained FON status but is temporarily not fully compliant

Energisation Operational Notification (EON)

Type D only: Issued prior to energisation of a generator's internal network.

Interim Operational Notification (ION)

Type D only: Issued to permit time limited synchronisation when there are outstanding compliance issues.



Manufacturers' Information is the generic term for information that the **Generator needs**. It can include type testing information, but also other relevant information that does not necessarily come from type tests, e.g. simulation studies etc.

The information is supplied by the manufacturer to the customer, who should send it to the **DNO**. The suitability of the information is agreed between the generator and the DNO – although a three way discussion involving the manufacturer might well be appropriate in some cases.

A manufacturer might have posted this information on the **ENA database**, in which case it will have an ID reference. The generator can use the ID reference in compliance forms.

Changes to the connection process





Applies to:-

New generator connections >800W

Electricity Storage, but some technical requirements do not apply

All types of electrical conversion machines and equipment

Generators significantly revised or replaced after 27 April 2019

Exempt:-

Generators connected before 27 April 2019

Plant procured before May '18 and notified to DNO before Nov. '18

EREC G99 - What part of the connection process is changing?

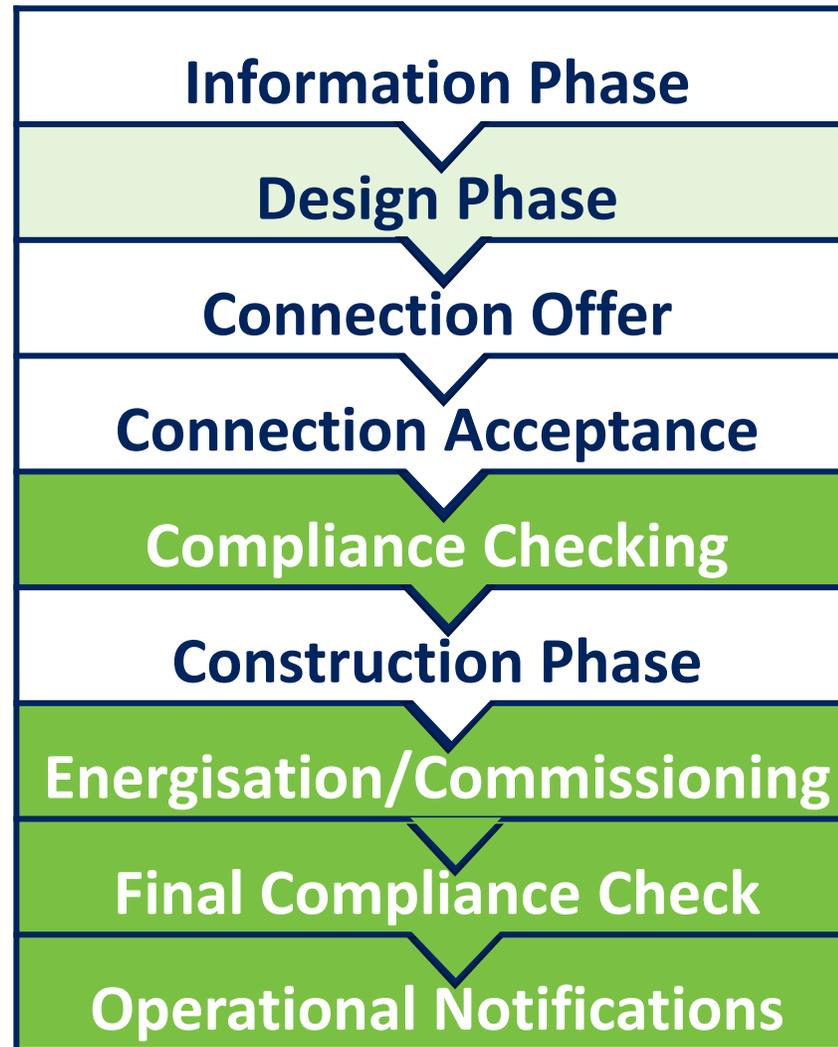


Now



From Generator Concept to Connection

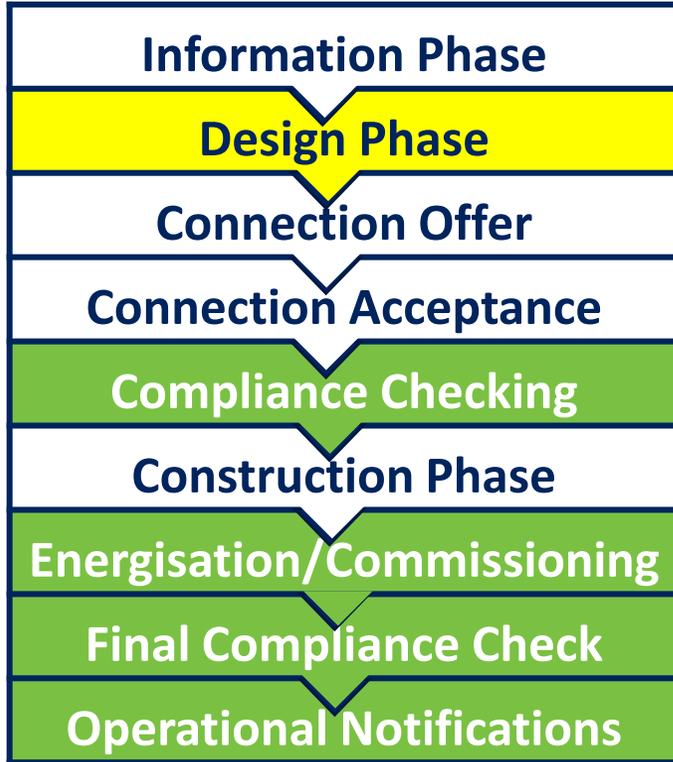
After 27 April 2019



Changing



Connection Process



Timeline

Offer issued after submission in accordance with GSOP timescales



Design Phase Modified Activities

➤ Generator submits SAF



Design Phase G99 Documents

- Standard Application Form

EREC G99 Connection Process

Design Phase – Submission of SAF

- *Form A1-1 for Type A fully type tested <50kW 3-phase (17kW 1-phase)*
- **SAF >50kW 3-phase**
 - *Different parts submitted at different times*
 - *Different parts for different technologies*

Part 1 Contact details, location and operational information
Part 1a Supplementary contact details
Part 2 Power Generating Facility general data
Part 3 Power Generating Module model data

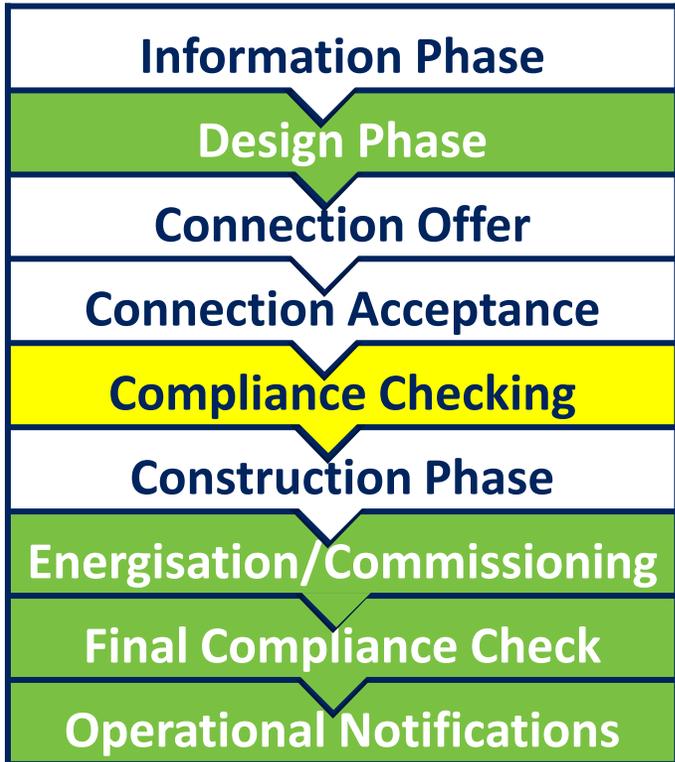
Initial Submission

Part 4a Synchronous Power Generating Modules
Part 4b Power Park Module model data: Fixed speed induction Generating Units
Part 4c Power Park Module model data: Doubly fed induction Generating Units
Part 4d Power Park Module model data: Series inverter connected Generating Units
Part 4e Power Park Module model data: Electricity Storage plant
Part 4f Transformer information
Part 5 Additional data which may be required by the DNO

Prior to Synchronising



Connection Process



Timeline

From time of acceptance to prior to energisation



Compliance Checking Activities

- Generator & DNO agree compliance submission programme
- Generator iteratively submits their PGMD & associated evidence
- DNO reviews & responds / repeat



Compliance Checking Documents

- Power Generating Module Document
- Generator's compliance evidence (Simulation reports, Manufacturers Information, Type Testing reports)



Technical requirements
vary with Type

Generators can choose
how they demonstrate
compliance

Compliance is tracked in
the PGMD

Incl. manufacturer info,
type testing, simulation
and site commissioning

DNO approval is required

EREC G99 Connection Process Compliance Checking– use of the PGMD

- *Record of compliance evidence*
- *PGMD is likely to be iterative as the generator submits evidence of compliance and the DNO reviews it.*

Page 1 PGM and DNO basic information

Page 2 PGMD version control / PGM details

General information

Pages 3 – 7 Synchronous Power Generating Module compliance requirements

Pages 3-4 submitted at Initial Submission

Pages 5-7 submitted at FONs – post energisation verification test documents

Part 1 for Synchronous

Pages 8 – 12 Power Park Module compliance requirements

Pages 8-10 submitted at Initial Submission

Pages 11-12 submitted at FONs – post energisation verification test documents

Part 2 for Asynchronous



Connection Process



Timeline

Immediately before
operation



Energisation / Commissioning Activities

- Generator undertakes site commissioning
- DNO may witness tests including remaining compliance requirements



Energisation / Commissioning Documents

- Commissioning forms (A2-1, A2-2, A2-3, B2-2 & C2-2)
- Installation forms (A3-1, A3-2, B3 & C3)

EREC G99 Connection Process

Compliance forms – Type A



- *For Type A, the form depends on the use of type testing*

Type A	Manufacturer's Information	Site Tests
Fully Type Tested	No specific form Reference is made in the installation form to the registration on ENA website	Form A2-4 completed if site compliance tests are being undertaken for some or all of Type A generator Interface Protection where it is not Type Tested
Partially Type Tested	Form A2-1 Synchronous PGM $\leq 50\text{kW}$ Form A2-2 Synchronous PGM $> 50\text{kW}$ Form A2-3 Inverter connected PGMs	Installation forms: Form A3-1 Type A PGMs Form A3-2 Integrated micro generation and storage

EREC G99 Connection Process Compliance check – Commissioning form



• *B2-2 & C2-2 : completed if site compliance tests are being undertaken in the absence of other evidence for Types B, (C&D) respectively.*

Page 1
PGM basic information
Summary table indicating compliance by
Manufacturers Information or commissioning tests

Information

Pages 2 – 5
Results tables for each type of test

Results

ENA Engineering Recommendation G99
Issue 1 Amendment 3 2018
Page 272

Site Compliance and Commissioning test requirements for Type B Power Generating Modules

Form B2-2: Site Compliance and Commissioning test requirements for Type C and D Power Generating Modules

This form should be completed if site compliance tests are being undertaken for some or all of the Interface Protection where it is not Type Tested and for other compliance tests that are being undertaken on site.

Generator Details:

Generator (name) _____

Installation details:

Address _____

Post Code _____

Date of commissioning _____

Requirement	Compliance by provision of Manufacturers' Information or test reports. Reference number should be detailed and Manufacturers' Information attached.	Compliance by commissioning tests. Tick if true and complete relevant sections of form below.
Over and under voltage protection HV – calibration test		
Over and under voltage protection HV – stability test		
Over and Under Frequency protection – calibration test		
Over and Under Frequency protection - stability test		
Loss of mains protection - calibration test		
Loss of mains protection - stability test		

✓

✓

EREC G99 Connection Process Compliance check – Installation form



ENA Engineering Recommendation G99
Issue 1 Amendment 3 2018
Page 272

Site Compliance and Commissioning test requirements for Type B and C Power Generating Modules Form B2-2: Site Compliance and Commissioning test requirements for Type B and C Power Generating Modules

This form should be completed if site compliance tests are being undertaken for some or all of the Interface Protection where it is not Type Tested and for other compliance tests that are being undertaken on site.

Generator Details:

Generator (name)

Installation details:

Address

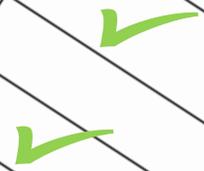
Post Code

Date of commissioning

Requirement

Compliance by provision of **Manufacturers' Information** or type test reports.
Reference number should be detailed and **Manufacturers' Information** attached.

Compliance by commissioning tests.
Tick if true and complete relevant sections of form below.



Part 1
Installer
Installation details
PGF commissioning information
Per PGF

Part 2
PGM commissioning information
Per PGM

Generator Declaration
DNO Declaration
Declarations



Connection Process



Timeline

Immediately before operation



Final Compliance Check Activities

- Generator submits final PGMD, Installation & Commissioning forms to DNO



Energisation / Commissioning Documents

- PGMD
- Commissioning forms (B2-2 & C2-2)
- Installation forms (B3 & C3)



Connection Process



Timeline

At time of operation



Operational Notification Activities

- DNO confirms all commissioning tests completed and data submitted
- DNO issues FON
- PGM is allowed to operate using the distribution network



Operational Notification Documents

- FON

Electricity North West's Next Steps





FAQs on
website



Webinar on
EREC G99
Compliance
30th April 2019



Individual
surgery
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<https://www.enwl.co.uk/about-us/engaging-with-our-stakeholders/stakeholder-engagement-events-calendar/>



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Electricity North West Website

<https://www.enwl.co.uk/get-connected/new-connection/generation-connection/engineering-recommendation-g99>

ENA Website

<http://www.energynetworks.org/electricity/engineering/distributed-generation/engineering-recommendation-g59.html>

DG Connection Guides

<http://www.energynetworks.org/electricity/engineering/distributed-generation/dg-connection-guides.html>

Distribution Code DPC7

covers requirements for embedded generator including G99

<http://www.dcode.org.uk/>



Sign up to our distribution list by emailing us at ice@enwl.co.uk



ICE@enwl.co.uk



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Webinar slides will be circulated to all registered delegates



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and engagement!**