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Distributed Generation Low Voltage Workshop

September 2021

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Agenda

Start & Agenda

- Meet the Team

G99 Example form

- Application
- Post acceptance

Q2 ICE Update

DSO Update

- Introduction to Active Network Management
- Flexibility Services
- Accelerated Loss of Mains Change Program

Questions

Wrap up & close

Meet the Team

Ami Mathieson

Incentive on Connections Engagement Manager

Hannah Sharratt

Stakeholder Engagement & Regulatory Manager

Lottie Wheatcroft

Incentive on Connections Engagement Manager

Gill Williamson

Strategic Planning Manager

Keith Evans

DSO Transition and Smart Grid Engineering Manager

Simon Taylor

Customer Relationship and Performance Manager

Martin Edmundson

Head of Business Connections

Brian Hoy

Head of Market Regulation

G99 Example forms

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Introduction

- Last year we took away an ICE action to provide further support on the G98/G99 application process to our customers.
- This included a presentation outlining the process for G98/G99 (Type A) applications and explaining where to get the required info:

We will provide support to our customers to help with the G98/G99 application process.	**We will publish example application forms for common scenario G98/G99 applications as a reference guide to help customers complete application forms.**

- Following this, we have prepared a example form for an 9.9kVA solar application to run through the required info. We would like feedback from this presentation on whether this meets your requirements on how best to display / provide info to yourselves.

Types of generation at LV

- Photovoltaic (PV)
- Battery Storage
- Combined Heat and Power (CHP)

Summary of forms

Summary of G98 and G99 Forms

	Single premises Up to and including 16 A per phase	Multiple premises Up to and including 16 A per phase	Less than 50kW	Integrated Micro-generation & storage (each up to & including 16 A per phase)	Greater than 50kW & less than 1MW Type A	1MW to less than 10MW Type B	10MW to less than 50MW Type C	Greater than or equal to 50MW or >110kV Type D
Applicable Standard	G98	G98	G99	G99	G99	G99	G99	
Application		Form A	Form A1-1	Form A1-2	SAF*	SAF*	SAF*	
Notification	Form B	Form B	Form A3-1	Form A3-2	Form A3-1			
Evidence	If fully type tested but not registered with the ENA- **Form C**	If fully type tested but not registered with the ENA- **Form C**	If not type tested – **Form A2-1** synchronous <50kW, **Form A2-2** synchronous >50kW or **Form A2-3** inverter connected gen	If not type tested – **Form A2-1** synchronous <50kW, **Form A2-2** synchronous >50kW or **Form A2-3** inverter connected gen	If not type tested- **Form A2-2** synchronous **Form A2-3** inverter connected gen	**PGMD**** **Form B2-1**	**PGMD**** **Form C2-1**	
Site Compliance and Commissioning Checks					**Form A2-4** if the Interface Protection is not Type Tested or for other site compliance tests	**Form B2-2** if the Interface Protection is not Type Tested or for other site compliance tests	**Form C2-2** if the Interface Protection is not Type Tested or for other site compliance tests	
Installation						**Form B3**	**Form C3**	

*Standard Application Form

**Power Generating Module Document

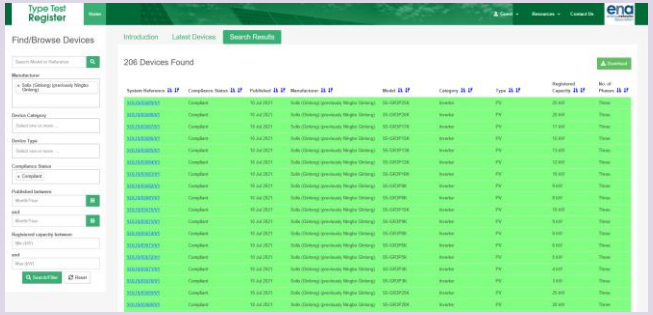
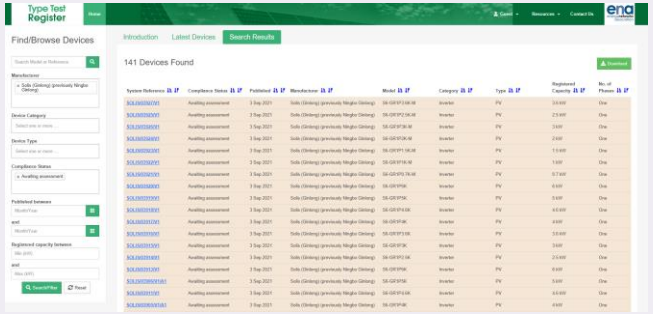
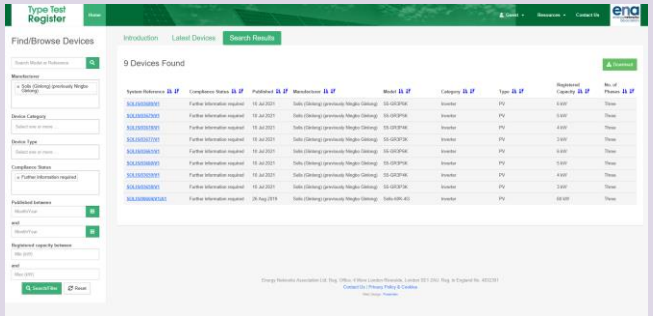
Recurring errors

- Having the generator on your initial application helps us model the generation effectively, hence giving you a more accurate study and quotation

- Wrong forms submitted – please refer to slide 12 to make sure you utilise the correct form for each stage

- Not filling out the Manufacturer's Reference Number in the application form – providing this really helps speed up the process as we can confirm compliance faster – please refer to slides 17 & 18 for guidance on providing this

Compliant vs. Awaiting assessment/Further information required

ENA	Status	Comment
	Compliant	• Proof of compliance helps fast track your application as it has been ENA approved for G98/99 compliance (relevant evidence form will already be completed on the website) • Reduces the amount of information to provide
	Awaiting assessment	Although the equipment has been type tested (i.e. not green on the ENA database) you will need to provide further evidence in the form of: • Generator operating parameters (generator owner should be able to provide this) • Complete evidence documents (A2-1, A2-2, A2-3 etc.) at your own expense with a suitable certified technician/engineer • You will need to add extra time for these steps in advance of energisation
	Further information required	

Application

APPLICATION: Guide to completing G99 Form A1-1

- Engineering Recommendation G99 Form A1-1 is submitted to the DNO during the application stage
- This is for single phase systems up to and including 17kW, and for three phase systems up to and including 50kW
- Completed by the applicant or installer
- Latest version available on the ENA website must be used
- Submitted to connectionapplications@enwl.co.uk

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Form A1-1 : Application for connection of Power Generating Module(s) with Total Aggregate Capacity <50 kW 3-phase or 17 kW single phase

For **Power Generating Modules** with an aggregate capacity < 50 kW 3-phase or 17 kW single-phase, this simplified application form can be used. For **Power Generating Modules** with an aggregate capacity > 50 kW 3-phase, the connection application should be made using the Standard Application Form (generally available from the DNO website).

If the **Power Generating Module** is **Fully Type Tested** and registered in the ENA Type Test Verification Report Register, this application form should include the **Manufacturer**'s reference number (the Product ID).

If part of the **Power Generating Module** is **Type Tested** and registered with the ENA Type Test Verification Report Register, this application form should include the **Manufacturer**'s reference number (the Product ID) and Form A2-1 or A2-2 or A2-3 (as appropriate) should be submitted to the **DNO** with this form.

If the **Power Generating Module** is neither **Fully Type Tested** or **Type Tested** then and Form A2-1 or A2-2 or A2-3 should be submitted to the **DNO** with this form. Alternatively the Standard Application Form should be submitted instead of this form.

To ABC electricity distribution DNO

99 West St, Imaginary Town, ZZ99 9AA abced@wxyz.com

Generator Details:	
Generator (name)	
Address	
Post Code	
Contact person (if different from Generator)	
Telephone number	
E-mail address	
MPAN(s)	
Installer Details:	
Installer	
Accreditation / Qualification	
Address	

Generator owner's contact details

Installers details including accreditation

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Post Code	
Contact person	
Telephone Number	
E-mail address	
Installation details:	
Address	
Post Code	
MPAN(s)	

Details of Existing PGMs – where applicable:

Manufacturer	Approximate Date of Installation	Technology Type	**Manufacturer's** Ref No. where available	**PGM Registered Capacity** (kW)				
				3-phase units	Single Phase Units			**Power Factor**
					PH1	PH2	PH3	

Details of Proposed Additional Generating Unit(s):

Manufacturer	Approximate Date of Installation	Technology Type	**Manufacturer's** Ref No. where available	**Generating Unit** Capacity (kW)				
				3-phase units	Single Phase Units			**Power Factor**
					PH1	PH2	PH3	

Balance of Multiple Single Phase Generating Units – where applicable

I confirm that design of the **Generator's Installation** has been carried out to limit output power imbalance to below 16A/phase, as required by EREC G99.

Signed :	Date :

Use continuation sheet where required.

Record **Power Generating Module Registered Capacity** kW at 230 AC, to one decimal place, under PH1 for single phase supplies and under the relevant phase for two and three phase supplies.
Detail on a separate sheet if there are any proposals to limit export to a lower figure than the aggregate **Registered Capacity** of all the **Power Generating Modules** in the **Power Generating Facility**.

Details about the site where the generator is to be connected

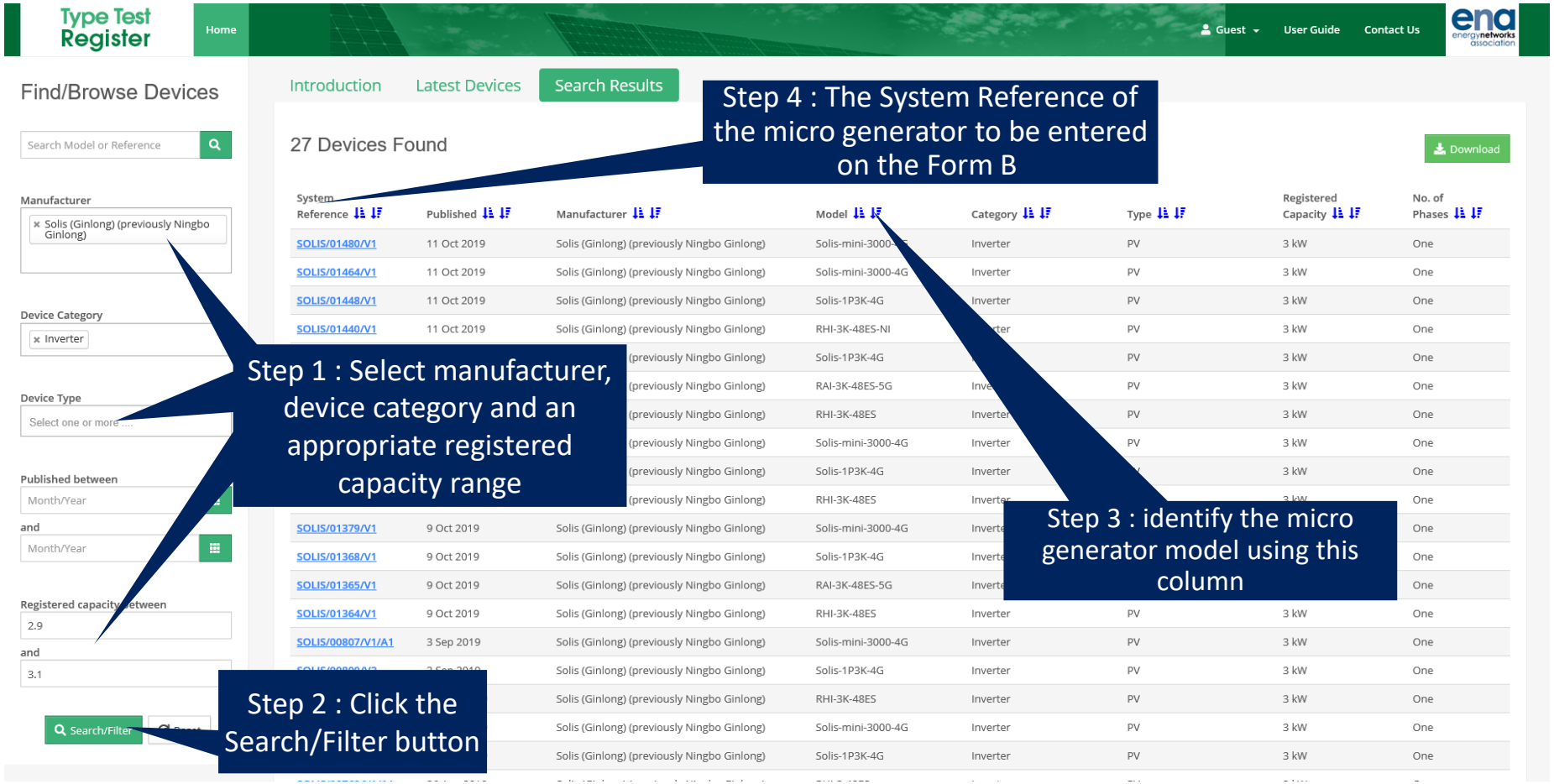
Technical details of existing generation (see overleaf for guidance on the Manufacture's Reference No.)

Technical details of proposed additional generation (see overleaf for guidance on the Manufacture's Reference No.)

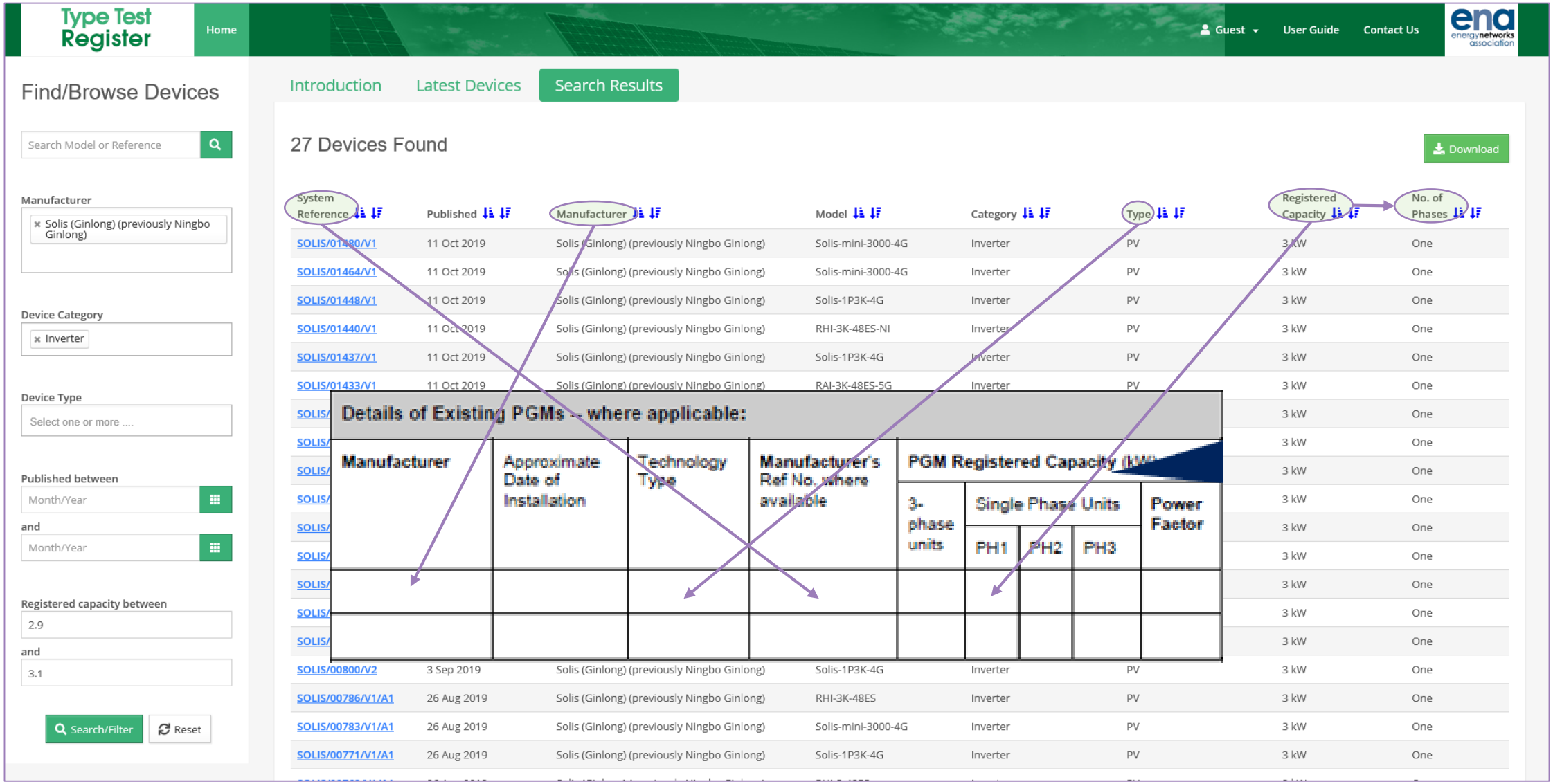
Signed declaration of compliance with EREC G99

ENA Type Test Register

- It is vitally important to get the Manufacturer's Reference Number entered on the application form correct as Electricity North West cannot check compliance without it
- Manufacturer's Reference Number is obtained from the ENA Type Test Register website
- http://www.ena-eng.org/gen-ttr/



ENA Type Test Register



Details of Existing PGMs – where applicable:

Manufacturer	Approximate Date of Installation	Technology Type	Manufacturer's Ref No. where available	PGM Registered Capacity (kW)				
				3-phase units	Single Phase Units			Power Factor
					PH1	PH2	PH3	

Post- Acceptance

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NOTIFICATION: Guide to completing G99 Form A3-1

- Engineering Recommendation G99 Form A3-1 is submitted to the DNO during the notification stage for generation less than 50kW
- Completed by the applicant or installer – ***to be completed prior to site commissioning/witness test***
- Used as a chance to make sure all information is submitted and accounted for
- Latest version available on the ENA website must be used
- Submitted to connectionapplications@enwl.co.uk

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Form A3-1 : Installation Document for Type A Power Generating Modules

Please complete and provide this document for every **Power Generating Facility**.

Part 1 should be completed for the **Power Generating Facility**.

Part 2 should be completed for each of the **Power Generating Modules** being commissioned. Where the installation is phased the form should be completed on a per **Generating Unit** basis as each part of the installation is completed in accordance with EREC G99 paragraph 15.3.3. For phased installations reference to **PGM** in this form should be read as reference to **Generating Units**.

Form A3-1 Part 1

To ABC electricity distribution **DNO**
99 West St, Imaginary Town, ZZ99 9AA abced@wxyz.com

Generator Details:	
Generator (name)	
Address	
Post Code	
Contact person (if different from **Generator**)	
Telephone number	
E-mail address	
MPAN(s)	
Generator signature	
Installer Details:	
Installer	
Accreditation / Qualification	
Address	

Generator manufacturer details

Installer details

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Post Code	
Contact person	
Telephone Number	
E-mail address	
Installer signature	
Installation details	
Address	
Post code	
Location within **Generator's Installation**	
Location of Lockable Isolation Switch	

Summary details of Power Generating Modules - where multiple **Power Generating Modules** will exist within one **Generator's Installation**.

Manufacturer / Reference	Date of Installation	Technology Type	**Manufacturers** Ref No. (Product ID) or Reference to Form A2-1/2/3 or combination of above as applicable	**Power Generating Module Registered Capacity** in kW				
				3-Phase Units	Single Phase Units			**Power Factor**
					PH 1	PH 2	PH 3	

Emerging technology classification (if applicable).

Commissioning Checks.

Description	**Confirmation**
Generator's Installation satisfies the requirements of BS7671 (IET Wiring Regulations).	Yes / No*

Site of installation details

Technical details of proposed additional generation (see overleaf for guidance on the Manufacture's Reference No.)

Commissioning checks

NOTIFICATION: Guide to completing G99 Form A3-1

- Engineering Recommendation G99 Form A3-1 is submitted to the DNO during the notification stage for generation less than 50kW
- Completed by the applicant or installer – ***to be completed prior to site commissioning/witness test***
- Used as a chance to make sure all information is submitted and accounted for
- Latest version available on the ENA website must be used
- Submitted to connectionapplications@enwl.co.uk

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Suitable lockable points of isolation have been provided between the **PGMs** and the rest of the **Generator's Installation**.	Yes / No*
Labels have been installed at all points of isolation in accordance with EREC G99.	Yes / No*
Interlocking that prevents **PGMs** being connected in parallel with the **DNO's Distribution Network** (without synchronising) is in place and operates correctly.	Yes / No*
Balance of Multiple Single Phase **PGMs**. Confirm that design of the **Generator's Installation** has been carried out to limit output power imbalance to below 16 A per phase, as required by EREC G99.	Yes / No*
Form A3-1 Part 2	
Power Generating Module reference or name	
Information to be enclosed.	
Description	Confirmation*
Schedule of protection settings (may be included in circuit diagram)	Yes / No*
As installed Standard Application Form data, unless already provided.	Yes / No*
Final copy of circuit diagram	Yes / No*
Commissioning Checks.	
The **Interface Protection** settings have been checked and comply with EREC G99.	Yes / No / N/A (**Type Tested**)*
The **PGM** successfully synchronises with the **DNO's Distribution Network** without causing significant voltage disturbance.	Yes / No*
The **PGM** successfully runs in parallel with the **DNO's Distribution Network** without tripping and without causing significant voltage disturbances.	Yes / No*
The **PGM** successfully disconnects without causing a significant voltage disturbance, when it is shut down.	Yes / No*
Interface Protection operates and disconnects the **DNO's Distribution Network** quickly (within 1 s) when a suitably rated switch, located between the **PGM** and the **DNO's** incoming connection, is opened.	Yes / No*
The **PGM** remains disconnected for at least 20 s after switch is reclosed.	Yes / No*
Loss of tripping and auxiliary supplies. Where applicable, loss of supplies to tripping and protection relays results in either **PGM** forced trip or an alarm to a 24 hour manned control centre.	Yes / No*

Commissioning checks

Information to be enclosed and provided to the DNO

Commissioning checks

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*Circle as appropriate. If "No" is selected the **Power Generating Facility** is deemed to have failed the commissioning tests and the **Power Generating Module** shall not be put in service.	
Additional comments / observations:	
Declaration – to be completed by Generator or Generator's Appointed Technical Representative.	
I declare that for the **Type A Power Generating Module** within the scope of this EREC G99, and the installation: 1. Compliance with the requirements of EREC G99 is achieved. 2. The commissioning checks detailed in Form A2-4 have been successfully completed*. 3. The commissioning checks detailed in this Form A3-1 have been successfully completed. *delete if not applicable ie if the **Interface Protection** and ride through capabilities are **Type Tested**	
Name:	
Signature:	Date:
Company Name:	
Position:	
Declaration – to be completed by DNO Witnessing Representative if applicable. Delete if not witnessed by the DNO.	
I confirm that I have witnessed: 1. The commissioning checks detailed in Form A2-4 *; 2. The commissioning checks detailed in this Form A3-1 on behalf of and that the results are an accurate record of the checks. *delete if not applicable ie if the **Interface Protection** and ride through capabilities are **Type Tested**	
Name:	
Signature:	Date:
Company Name:	

To be filled in if 'No' is circled in the of the previous questions

Declaration from the generator or generators approved technical representative

Used to confirm that the generator will operate within proposed operating parameters and all relevant information has been provided to the DNO

To be completed by the DNO for the witness test stage

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Cover Sheet*

Form A2-3: Compliance Verification Report for Type A Inverter Connected Power Generating Modules

This form should be used by the **Manufacturer** to demonstrate and declare compliance with the requirements of EREC G99. The form can be used in a variety of ways as detailed below:

1. To obtain **Fully Type Tested** status

   The **Manufacturer** can use this form to obtain **Fully Type Tested** status for a **Power Generating Module** by registering this completed form with the Energy Networks Association (ENA) Type Test Verification Report Register.

2. To obtain **Type Tested** status for a product

   This form can be used by the **Manufacturer** to obtain **Type Tested** status for a product which is used in a **Power Generating Module** by registering this form with the relevant parts completed with the Energy Networks Association (ENA) Type Test Verification Report Register.
   Where the **Manufacturer** is seeking to obtain **Type Tested** status for an **Interface Protection** device the appropriate section of Form A2-4 should be used.

3. One-off Installation

   This form can be used by the **Manufacturer** or **Installer** to confirm that the **Power Generating Module** has been tested to satisfy all or part of the requirements of this EREC G99. This form shall be submitted to the **DNO** as part of the application.

A combination of (2) and (3) can be used as required, together with Form A2-4 where compliance of the **Interface Protection** is to be demonstrated on site.

Note:

Within this Form A2-3 the term **Power Park Module** will be used but its meaning can be interpreted within Form A2-3 to mean **Power Park Module**, **Generating Unit or Inverter** as appropriate for the context. However, note that compliance shall be demonstrated at the **Power Park Module** level.

If the **Power Generating Module** is **Fully Type Tested** and registered with the Energy Networks Association (ENA) Type Test Verification Report Register, the Installation Document (Form A3-1 or A3-2) should include the **Manufacturer's** reference number (the Product ID), and this form does not need to be submitted.

Where the **Power Generating Module** is not registered with the ENA Type Test Verification Report Register or is not **Fully Type Tested** this form (all or in parts as applicable) needs to be completed and provided to the **DNO**, to confirm that the **Power Generating Module** has been tested to satisfy all or part of the requirements of this EREC G99.

PGM technology		Name of technology	
Manufacturer name		Name of manufacturer	
Address		Address of Manufacturer	
Tel	Number of Manufacturer	Web site	Website of Manufacturer
E:mail	Email of Manufacturer		
Registered Capacity		9.9kVA	

Technical details of proposed generation (see slides 7 & 8 for guidance on the Manufacture's Reference No.)

Manufacture's details

- If your generation/inverter is type test compliant on the ENA Database, this form will already be completed
- If it is awaiting assessment you may have to provide information in the generator/inverters operating performance (this can be provided by our generator manufacturer)
- If the generation/inverter is a one-off build you may have to complete the evidence documents (A2-1, A2-2, A2-3 etc.) at your own expense with a suitable certified technician/engineer
- You will need to add extra time for these steps in advance of energisation

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Testing conducted*

There are four options for Testing: (1) **Fully Type Tested**, (2) Partially **Type Tested**, (3) one-off installation, (4) tested on site at time of commissioning. The check box below indicates which tests in this Form have been completed for each of the options. With the exception of **Fully Type Tested PGMs** tests may be carried out at the time of commissioning (Form A4).
Insert Document reference(s) for **Manufacturers' Information**

Tested option:	**1. Fully Type Tested**	**2. Partially Type Tested**	**3. One-off Manufacturers'. Info.**	**4. Tested on Site at time of Commissioning**
0. **Fully Type Tested** - all tests detailed below completed and evidence attached to this submission		**N/A**	**N/A**	**N/A**
1. Operating Range	**N/A**			
2. PQ – Harmonics				
3. PQ – Voltage Fluctuation and Flicker				
4. PQ – DC Injection (**Power Park Modules** only)				
5. **Power Factor** (PF)				
6. Frequency protection trip and ride through tests				
7. Voltage protection trip and ride through tests				
8. Protection – Loss of Mains Test, Vector Shift and RoCoF Stability Test				
9. **LFSM-O** Test				
10. Protection – Reconnection Timer				
11. Fault Level Contribution				

There are four options for Testing: (1) **Fully Type Tested**, (2) Partially **Type Tested**, (3) one-off installation, (4) tested on site at time of commissioning. The check box below indicates which tests in this Form have been completed for each of the options. With the exception of **Fully Type Tested PGMs** tests may be carried out at the time of commissioning (Form A4).
Insert Document reference(s) for **Manufacturers' Information**

Tested option:	**1. Fully Type Tested**	**2. Partially Type Tested**	**3. One-off Manufacturers'. Info.**	**4. Tested on Site at time of Commissioning**
12. Self-monitoring Solid State Switch				
13. Wiring functional tests if required by para 15.2.1 (attach relevant schedule of tests)				
14. Logic Interface (input port)				

Manufacturer compliance declaration. - I certify that all products supplied by the company with the above **Type Tested Manufacturer**'s reference number will be manufactured and tested to ensure that they perform as stated in this document, prior to shipment to site and that no site **Modifications** are required to ensure that the product meets all the requirements of EREC G99.

Signed	Sign-off from Manufacturer	On behalf of	Manufacturer

Note that testing can be done by the **Manufacturer** of an individual component or by an external test house.

Where parts of the testing are carried out by persons or organisations other than the **Manufacturer** then that person or organisation shall keep copies of all test records and results supplied to them to verify that the testing has been carried out by people with sufficient technical competency to carry out the tests.

- This provides an overview of the tests required to prove compliance
- Some of the tests are completed on-site and some are provided by the manufacturer
- The manufacturer or someone with sufficient technical competence on behalf of the manufacturer will need to sign-off this sheet

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Operating Range*

A2-3 Compliance Verification Report –Tests for Type A Inverter Connected Power Generating Modules – test record	
1. Operating Range: Five tests should be carried with the **Power Generating Module** operating at **Registered Capacity** and connected to a suitable test supply or grid simulation set. The power supplied by the primary source shall be kept stable within ± 5 % of the apparent power value set for the entire duration of each test sequence. Frequency, voltage and **Active Power** measurements at the output terminals of the **Power Generating Module** shall be recorded every second. The tests will verify that the **Power Generating Module** can operate within the required ranges for the specified period of time. The **Interface Protection** shall be disabled during the tests. In case of a PV **Power Park Module** the PV primary source may be replaced by a DC source. In case of a full converter **Power Park Module** (eg wind) the primary source and the prime mover **Inverter**/rectifier may be replaced by a DC source.	
Test 1 Voltage = 85% of nominal (195.5 V), Frequency = 47 Hz, **Power Factor** = 1, Period of test 20 s	Tested with the specified conditions, in the 20 seconds period, the inverters operate normally
Test 2 Voltage = 85% of nominal (195.5 V), Frequency = 47.5 Hz, **Power Factor** = 1, Period of test 90 minutes	Tested with the specified conditions, in the 90 minutes period, the inverters operate normally
Test 3 Voltage = 110% of nominal (253 V)., Frequency = 51.5 Hz, **Power Factor** = 1, Period of test 90 minutes	Tested with the specified conditions, in the 90 minutes period, the inverters operate normally
Test 4 Voltage = 110% of nominal (253 V), Frequency = 52.0 Hz, **Power Factor** = 1, Period of test 15 minutes	Tested with the specified conditions, in the 15 minutes period, the inverters operate normally
Test 5 RoCoF withstand Confirm that the **Power Generating Module** is capable of staying connected to the **Distribution Network** and operate at rates of change of frequency up to 1 Hzs^{-1} as measured over a period of 500 ms. Note that this is not expected to be demonstrated on site.	Tested with the specified conditions, the inverters operate normally

This test confirms compliance with 11.2.2

ENA Type Test compliance is provided on the understanding that:

- Tests are up-to-date and in accordance with the most recent amendment of G99.
- Confirmation is provided that the device operates correctly under each test conditions;
- Evidence is provided of operation (graphical or tabular).

  - *11.2.1 Under abnormal conditions automatic low-frequency load-shedding provides for load reduction down to 47 Hz. In exceptional circumstances, the frequency of the **DNO's Distribution Network** could rise above 50.5 Hz. Therefore all **Power Generating Module**s should be capable of continuing to operate in parallel with the **Distribution Network** in accordance with the following:*

    (d) 47 Hz – 47.5 Hz Operation for a period of at least 20 s is required each time the frequency is within this range.

    (e) 47.5 Hz – 49.0 Hz Operation for a period of at least 90 minutes is required each time the frequency is within this range.

    *(f) 49.0 Hz – 51.0 Hz Continuous operation of the **Power Generating Module** is required.*

    (g) 51.0 Hz –51.5 Hz Operation for a period of at least 90 minutes is required each time the frequency is within this range.

    (h) 51.5 Hz – 52 Hz Operation for a period of at least 15 minutes is required each time the frequency is within this range.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Harmonics*

2. Power Quality – Harmonics:

For **Power Generating Modules** of **Registered Capacity** of less than 75 A per phase (ie 50 kW) the test requirements are specified in Annex A.7.1.5. These tests should be carried out as specified in BS EN 61000-3-12 The results need to comply with the limits of Table 2 of BS EN 61000-3-12 for single phase equipment and Table 3 of BS EN 610000-3-12 for three phase equipment.

For **Power Generating Modules** of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation shall be designed in accordance with EREC G5.

Power Generating Module tested to BS EN 61000-3-12

Power Generating Module rating per phase (rpp)			3	kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Harmonic	At 45-55% of **Registered Capacity**		100% of **Registered Capacity**		Limit in BS EN 61000-3	
	Measured Value MV in Amps	%	Measured Value MV in Amps	%	1 phase	3 phase
2	0.0723	0.5543	0.0187	0.1434	8%	8%
3	0.1554	1.1914	0.1036	0.7943	21.6%	Not stated
4	0.0832	0.6379	0.0623	0.4776	4%	4%
5	0.6321	4.8461	0.4735	3.6302	10.7%	10.7%
6	0.0215	0.1648	0.0964	0.7391	2.67%	2.67%
7	0.1836	1.4076	0.2285	1.7518	7.2%	7.2%
8	0.0512	0.3925	0.0128	0.0981	2%	2%
9	0.1703	1.3056	0.1564	1.1991	3.8%	Not stated
10	0.1145	0.8778	0.0426	0.3266	1.6%	1.6%
11	0.0302	0.2315	0.0713	0.5466	3.1%	3.1%
12	0.0157	0.1204	0.0232	0.1779	1.33%	1.33%
13	0.0494	0.3787	0.0865	0.6632	2%	2%
THD[17]	---	5.52	---	4.48	23%	13%
PWHD[18]	---	7.23	---	6.37	23%	22%

These are the limits the generator needs to remain within – from looking at the highlighted results it is clear that this is compliant

A.7.1.4.1 The tests should be carried out as specified in BS EN 61000-3-12 and can be undertaken with a fixed source of energy at two power levels firstly between 45 and 55% and at 100% of **Registered Capacity**

- Ensure rating of device (per phase) is provided at the top of the table.
- Ensure tests limits are in accordance with BS EN 61000-3-12 and harmonics #2 - #13 are provided.
- It is a requirement that, for single and 3-phase devices, all harmonic data is provided. If device is 3-phase, ensure harmonic data for each phase is included (only one phase of three shown in this example)
- Ensure that THD and PWHD values are provided.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Power Quality*

3. Power Quality – Voltage fluctuations and Flicker:

For **Power Generating Modules** of **Registered Capacity** of less than 75 A per phase (ie 50 kW) these tests should be undertaken in accordance with Annex A.7.1.4.3. Results should be normalised to a standard source impedance, or if this results in figures above the limits set in BS EN 61000-3-11 to a suitable Maximum Impedance.

For **Power Generating Modules** of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation shall be designed in accordance with EREC P28.

	Starting			Stopping			Running	
	d max	d c	d(t)	d max	d c	d(t)	P st	P lt 2 hours
Measured Values at test impedance	0.27%	0.17%	0	0.26%	0.18%	0	0.07	0.08
Normalised to standard impedance	0.27%	0.17%	0	0.26%	0.18%	0	0.07	0.08
Normalised to required maximum impedance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-11	4%	3.3%	3.3%	4%	3.3%	3.3%	1.0	0.65

Test Impedance	R	0.24	Ω	XI	0.15	Ω
Standard Impedance	R	0.24 * 0.4 ^	Ω	XI	0.15 * 0.25 ^	Ω
Maximum Impedance	R	N/A	Ω	XI	N/A	Ω

* Applies to three phase and split single phase **Power Generating Modules**.

^ Applies to single phase **Power Generating Module** and **Power Generating Modules** using two phases on a three phase system

For voltage change and flicker measurements the following formula is to be used to convert the measured values to the normalised values where the **Power Factor** of the generation output is 0.98 or above.

Normalised value = Measured value x reference source resistance/measured source resistance at test point

Single phase units reference source resistance is 0.4 Ω

Two phase units in a three phase system reference source resistance is 0.4 Ω

Two phase units in a split phase system reference source resistance is 0.24 Ω

Three phase units reference source resistance is 0.24 Ω

Where the **Power Factor** of the output is under 0.98 then the XI to R ratio of the test impedance should be close to that of the Standard Impedance.

The stopping test should be a trip from full load operation.

The duration of these tests need to comply with the particular requirements set out in the testing notes for the technology under test. Dates and location of the test need to be noted below

Test start date	Insert Date	Test end date	Insert Date
Test location	Insert Location		

*A.7.1.4.3 The voltage fluctuations and flicker emissions from the **Power Park Module** shall be measured in accordance with BS EN 61000-3-11 and the technology specific Annex A.7.3. The required maximum supply impedance should be calculated and recorded in the relevant part of Compliance Verification Report in Form A2-3 (Annex A.2).*

- Ensure test & standard impedance is filled in on the form.
- If testing single phase device, test impedance is 0.4Ω
- If testing 3-phase device, test impedance is 0.24Ω
- If a different test impedance is used (*measured impedance)*, it must be normalised to the standard impedance
  - E.g. for measured impedance of 0.5Ω and D_{max} value = 0.6 (3 phase device):
    - D_{max} Normalised value: $\frac{Standard\ impedance}{Measured\ impedance} \times Measured\ value$
    - D_{max} Normalised value = $\frac{0.24}{0.5} \times 0.6 = 0.288$

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Power Quality + Power Factor*

*A.7.1.4.4 The level of **DC** injection from the **Power Park Module** - connected prime mover in to the **DNO**'s **Distribution Network** shall not exceed the levels specified in 9.4.6 when measured during operation at three levels, 10%, 55% and 100% of rating with a tolerance of ±5%.*

*The DC injection requirements can be satisfied by the installation of an isolation transformer on the AC side of an **Inverter**-connected **Power Park Module**. A declaration that an isolating transformer is fitted can be made in lieu of the tests noted above.*

4. Power quality – DC injection: The tests should be carried out on a single **Generating Unit**. Tests are to be carried out at three defined power levels ±5%. At 230 V a 50 kW three phase **Inverter** has a current output of 217 A so DC limit is 543 mA. These tests should be undertaken in accordance with Annex A.7.1.4.4.

Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded value in Amps	11.2	11.6	12.5	13.4	17.3	17.6	17.8	20.4	22.9
as % of rated AC current	0.086	0.089	0.096	0.103	0.133	0.135	0.137	0.157	0.176
Limit	0.25%			0.25%			0.25%		

- Perform at 3 Test power levels (10%, 55% & 100%)
- Correct calculation for "as % of rated AC current":
  - $\boldsymbol{Base\ current} = \frac{Registered\ Capacity\ (W)}{230}$
  - $\%\ \boldsymbol{DC\ injection} = \frac{Recorded\ DC\ value\ (A)}{Base\ current\ (A)}$
- **Note:** calculation is the same for 1 phase and 3 phase devices

5. Power Factor: The tests should be carried out on a single **Power Generating Module**. Tests are to be carried out at three voltage levels and at **Registered Capacity**. Voltage to be maintained within ±1.5% of the stated level during the test. These tests should be undertaken in accordance with Annex A.7.1.4.2.

Voltage	0.94 pu (216.2 V)	1 pu (230 V)	1.1 pu (253 V)
Measured value	0.9983	0.9978	0.9988
Power Factor Limit	>0.95	>0.95	>0.95

- Perform tests to the 3 voltages: (216.2V/0.94pu, 230V/1pu & 253V/1.1pu)
- Ensure power factor is > 0.95pu.

  - *11.1.5 When operating at **Registered Capacity** the **Power Generating Module** shall be capable of operating at a **Power Factor** within the range 0.95 lagging to 0.95 leading relative to the voltage waveform unless otherwise agreed with the **DNO**.*

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Protection*

6. Protection – Frequency tests: These tests should be carried out in accordance with the Annex A.7.1.2.3.

Function	Setting		Trip test		"No trip tests"	
	Frequency	Time delay	Frequency	Time delay	Frequency /time	Confirm no trip
U/F stage 1	47.5 Hz	20 s	47.52Hz	20.039s	47.7 Hz 30 s	Yes
U/F stage 2	47 Hz	0.5 s	46.96Hz	0.537s	47.2 Hz 19.5 s	Yes
					46.8 Hz 0.45 s	Yes
O/F	52 Hz	0.5 s	52.03Hz	0.543s	51.8 Hz 120.0 s	Yes
					52.2 Hz 0.45 s	Yes

Note. For frequency trip tests the frequency required to trip is the setting ± 0.1 Hz. In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The "No trip tests" need to be carried out at the setting ± 0.2 Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

- Ensure trip/no-trip times are up-to-date and in accordance with **most recent amendment** of EREC G99.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Protection - Voltage tests*

7. Protection – Voltage tests: These tests should be carried out in accordance with Annex A.7.1.2.2.						
Function	Setting		Trip test		"No trip tests"	
U/V	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
L1-N	0.8 pu (184 V)	2.5 s	183.2V	2.544s	188 V 5.0 s	Yes
L2-N			183.7V	2.538s		Yes
L3-N			182.9V	2.536s		Yes
					180 V 2.45 s	Yes
O/V stage 1	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
L1-N	1.14 pu (262.2 V)	1.0 s	262.5V	1.042s	258.2 V 5.0 s	Yes
L2-N			262.9V	1.035s		Yes
L3-N			263.0V	1.038s		Yes
O/V stage 2	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
L1-N	1.19 pu (273.7 V)	0.5 s	274.6V	0.537s	269.7 V 0.95 s	Yes
L2-N			273.9V	0.546s		Yes
L3-N			274.1V	0.543s		Yes
					277.7 V 0.45 s	Yes
Note for Voltage tests the Voltage required to trip is the setting ±3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ±4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

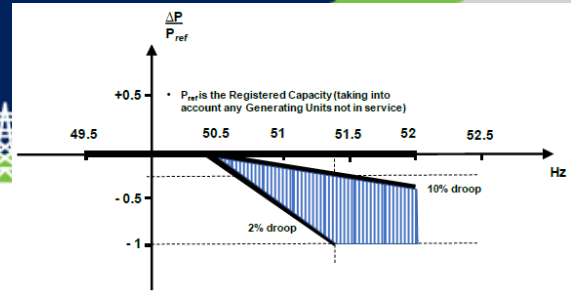
- Ensure trip/no-trip times are up-to-date and in accordance with **most recent amendment** of EREC G99.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Protection – Loss of Mains test*

8.Protection – Loss of Mains test: These tests should be carried out in accordance with BS EN 62116. Annex A.7.1.2.4.						
The following sub set of tests should be recorded in the following table.						
Test Power and imbalance	33% -5% Q Test 22	66% -5% Q Test 12	100% -5% P Test 5	33% +5% Q Test 31	66% +5% Q Test 21	100% +5% P Test 10
Trip time. Limit is 0.5s	0.33s	0.22s	0.21s	0.31s	0.34s	0.20s
Loss of Mains Protection, Vector Shift Stability test. This test should be carried out in accordance with Annex A.7.1.2.6.						
	Start Frequency	Change	Confirm no trip			
Positive Vector Shift	49.5 Hz	+50 degrees	Yes			
Negative Vector Shift	50.5 Hz	- 50 degrees	Yes			
Loss of Mains Protection, RoCoF Stability test: This test should be carried out in accordance with Annex A.7.1.2.6.						
Ramp range	Test frequency ramp:	Test Duration	Confirm no trip			
49.0 Hz to 51.0 Hz	+0.95 Hzs^{-1}	2.1 s	Yes			
51.0 Hz to 49.0 Hz	-0.95 Hzs^{-1}	2.1 s	Yes			

- **Protection – Loss of Mains Test**
  - **Non-PV Inverter:** Complete with test power at 10, 55 & 100% for +/- 5% of Registered Capacity (first test) - ensure trip time is within limit of 0.5s (unless additional shut down time is included, limit = 1s) – in accordance with BS EN 50438.
  - **Multi-phase Micro-generators:** Same as above but for all phases – ensure trip time is within limit of 0.5s (unless additional shut down time is included, limit = 1s).
  - **PV Inverter:** Complete test power and imbalance (Test 22, 12, 5, 31, 21 & 10) – ensure trip time is within limit of 0.5s in accordance with BS EN 62116.
- **Protection – Frequency Change, Vector Shift Stability Test:**
  - Confirm device does not trip under positive/negative vector shift.
- **Protection – Frequency change, RoCoF Stability Test:**
  - Confirm device does not trip in either the ramp up/ramp down test duration.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Over frequency test*



9. Limited Frequency Sensitive Mode – Over frequency test: The test should be carried out using the specific threshold frequency of 50.4 Hz and Droop of 10%. This test should be carried out in accordance with Annex A.7.1.3.	
Active Power response to rising frequency/time plots are attached if frequency injection tests are undertaken in accordance with Annex A.7.2.4.	**Y/N**
Alternatively, test results should be noted below:	

Test sequence at **Registered Capacity** >80%	Measured **Active Power** Output	Frequency	Primary Power Source	**Active Power** Gradient
Step a) 50.00Hz ±0.01Hz	9141W	50.00Hz	9237W	-
Step b) 50.45Hz ±0.05Hz	9018W	50.45Hz		-
Step c) 50.70Hz ±0.10Hz	7991W	50.70Hz		-
Step d) 51.15Hz ±0.05Hz	6227W	51.15Hz		-
Step e) 50.70Hz ±0.10Hz	8021W	50.70Hz		-
Step f) 50.45Hz ±0.05Hz	8994W	50.45Hz		-
Step g) 50.00Hz ±0.01Hz	9158W	50.00Hz		54kW/min

Test sequence at **Registered Capacity** 40% - 60%	Measured **Active Power** Output	Frequency	Primary Power Source	**Active Power** Gradient
Step a) 50.00Hz ±0.01Hz	4725W	50.00Hz	4821W	-
Step b) 50.45Hz ±0.05Hz	4470W	50.45Hz		-
Step c) 50.70Hz ±0.10Hz	3514W	50.70Hz		-
Step d) 51.15Hz ±0.05Hz	1757W	51.15Hz		-
Step e) 50.70Hz ±0.10Hz	3496W	50.70Hz		-
Step f) 50.45Hz ±0.05Hz	4508W	50.45Hz	9327W	0kW/min
Step g) 50.00Hz ±0.01Hz	9204W	50.00Hz	9327W	54kW/min

- Ensure that measured active power output provides a droop less than 10% (tolerance band **of 8.5% to 12.8%**).
  - 11.2.4.1 Each **Power Generating Module** shall be capable of reducing **Active Power** output in response to the frequency on the **Total System** when this rises above 50.4 Hz. The **Power Generating Module** shall be capable of operating stably during **LFSM-O** operation. If a **Power Generating Module** has been contracted to operate in **Frequency Sensitive Mode** the requirements of **LFSM-O** shall apply when the frequency exceeds 50.5 Hz.
    - (a) The rate of change of **Active Power** output shall be at a minimum a rate of 2% of output per 0.1 Hz deviation of system frequency above 50.4 Hz (i.e. a **Droop** of 10%) as shown in Figure 11.2. For the avoidance of doubt, this would not preclude a **Generator** from designing the **Power Generating Module** with a **Droop** of less than 10%, but in all cases the **Droop** should be 2% or greater.
    - (b) The **Power Generating Module** shall be capable of initiating a power frequency response with an initial delay that is as short as possible. If the initial delay exceeds 2 s the **Generator** shall justify the delay, providing technical evidence to the **DNO**, who will pass this evidence to the **NETSO**.
    - (c) For deviations in frequency up to 50.9 Hz at least half of the proportional reduction in **Active Power** output shall be achieved within 10 s of the time of the frequency increase above 50.4 Hz.
    - (d) For deviations in frequency beyond 50.9 Hz the measured rate of change of **Active Power** reduction shall exceed 0.5% s-1 of the initial output.
    - (e) The **LFMS-O** response shall be reduced when the frequency subsequently falls again and, when to a value less than 50.4 Hz, at least half the proportional increase in **Active Power** shall be achieved in 10 s. For a frequency excursion returning from beyond 50.9 Hz the measured rate of change of **Active Power** increase shall t exceed 0.5% s-1.
  - If the reduction in **Active Power** is such that the **Power Generation Module** reaches its **Minimum Stable Operating Level**, it shall continue to operate stably at this level.

$$1^{st}\ Droop\ \% = \frac{\left(\frac{Step\ D\ freq - Step\ B\ freq}{50}\right)}{\left(\frac{Step\ B\ power - Step\ D\ power}{Step\ B\ power}\right)} \times 100$$

$$2^{nd}\ Droop\ \% = \frac{\left(\frac{Step\ D\ freq - Step\ F\ freq}{50}\right)}{\left(\frac{Step\ F\ power - Step\ D\ power}{Step\ F\ power}\right)} \times 100$$

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Re-connection timer + Fault level contribution*

10. Protection – Re-connection timer.					
Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 10.1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
30s	45.6s	At 1.16 pu (266.2 V)	At 0.78 pu (180.0 V)	At 47.4 Hz	At 52.1 Hz
Confirmation that the **Power Generating Module** does not re-connect.		Yes	Yes	Yes	Yes

11. Fault level contribution: These tests shall be carried out in accordance with EREC G99 Annex A.7.1.5.		
For **Inverter** output		
Time after fault	Volts	Amps
20ms	53.2V	16.25A
100ms	53.0V	0A
250ms	52.8V	0A
500ms	52.8V	0A
Time to trip	0.055s	In seconds

- Provide both the time delay and measured delay settings – both should be greater than 20s.
- Provide confirmation that device does **not** reconnect at 266.2V, 180V, 47.4Hz & 52.1Hz.

- Ensure correct fault level contribution is provided for the correct type of device.

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Self-Monitoring solid state switching + Wiring functional tests*

12. Self-Monitoring solid state switching: No specified test requirements. Refer to Annex A.7.1.7.	
It has been verified that in the event of the solid state switching device failing to disconnect the **Power Park Module**, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.	N/A (Solid state switch means electronic switch, Solis inverter uses mechanical dual relay protection with relay checks, which drops the voltage below 50V in 0.5s)

13. Wiring functional tests: If required by para 15.2.1.	
Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)	N/A(Not applicable. Refer to 15.2.1, inverter is using special connector for wiring)

- Declare Yes **or** N/A – not both

EVIDENCE: A2-3 Form: 9.9kVA Solar Installation – *Logic interface + Additional comments*

14. Logic interface (input port).	
Confirm that an input port is provided and can be used to shut down the module.	Yes (Logic interface is marked as "DRM" either on inverter or on external DRM device depending on inverter model. Please see inverter or external DRM device manual for detail.

Additional comments.

Section for additional comments at the bottom of the form – unless using non-standard configuration this box can be left blank like in this example

- Confirmation of the presence of a logic interface must be provided.

  - ***11.1.3 Power Generating Module**s connected to the **DNO**'s **Distribution Network** shall be equipped wit**h** a logic interface (input port) in order to cease **Active Power** output within 5 s **following** an instruction being received at the input port*

Is there any further guidance we could provide that would support you during the application process?

2021-22 ICE Workplan Update

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ICE 2021-22 Workplan Performance

➢ We will continue to target high **customer satisfaction** (85% overall satisfaction)	➢ On target
➢ Target of 22 working days on average for **Time to Quote** timescales for DG LV quotations	➢ 21 days YTD
➢ We will provide updates on activity to support the transition to **green energy** and the wider green economy	➢ On target ➢ Update provided in July workshop
➢ We will provide support to our customers to help with the **G98/G99 application process**.	➢ Initial presentation delivered in July's workshop ➢ Example of forms update delivered today
➢ We will keep stakeholders informed on the transition of Distribution Network Operators (DNO) to carrying out enhanced **Distribution System Operation (DSO)** functionality	➢ DSO Strategies updated and published following 2020 consultation (April 2021) - Here ➢ Draft ED2 DSO Transition Plan published (June 2021) - Here ➢ Update provided in todays session
➢ We will provide stakeholders with the opportunity to receive detailed briefings on industry level changes to charges through Ofgem's **significant code review.**	➢ Briefing provided in August

ICE 2021-22 Workplan Performance

➢ We will engage with **community & local energy** stakeholders hosting a minimum of three engagement opportunities and issue quarterly news letters.	➢ On target ➢ First event held in June ➢ Powering our Community launch
➢ We will continue to offer a minimum of three **engagement opportunities** for stakeholders. We will also provide **surgery session** targeting all are held within 10 working days.	➢ On target ➢ First workshop's delivered July and September ➢ Third workshop planned January ➢ Plus additional opportunities via webinars
➢ We will continue to communicate with our stakeholders	➢ Via planned workshops and quarterly newsletters

We would love to hear your feedback, please get in touch with either Lottie or Hannah should you have anything to discuss after the session.
Feel free to add any comments in today's chat or email us ice@enwl.co.uk

Powering our Communities Fund Launch

Register for the online event via our website

10am on 17th September 2021

- The Powering our Communities fund supports community and local energy groups to develop and grow.
- This event will launch this year's fund and provide details of how to apply. It will also feature previous fund winners who will talk about how they have used their grant.
- This event is for community energy groups, community organisations, local authorities or anyone working with their community on energy issues, climate change and how to reach net-zero.

DSO Update

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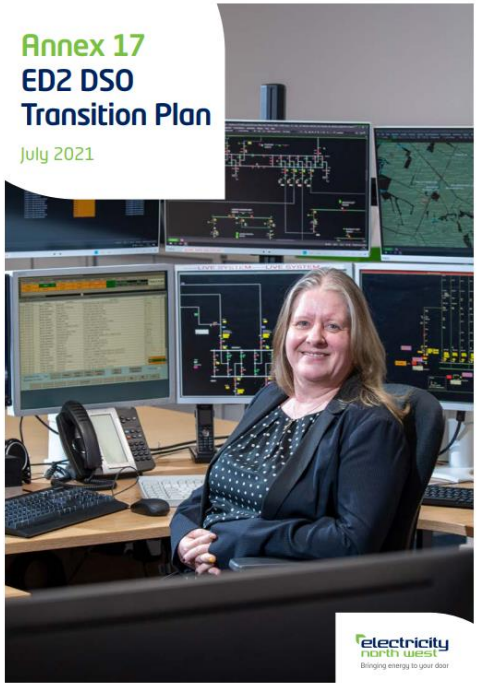
Headlines

[Draft ED2 DSO Transition Plan]

We share the draft plans of our transition to distribution system operation, specifically across the ED2 price control period from 2023 to 2028.



[DSO Strategy]

Describes the progress we have made since publishing our first strategy document in 2018 and the next steps on our DSO and net zero carbon journey

Introduction to Active Network Management

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Introduction to Active Network Management

- Active Network Management (ANM) connects separate components of a smart grid such as generators, storage devices, controllable demands etc., by implementing software to monitor and control the operation of these devices.

- Under this scheme, sites with flexible connections can be instructed, via automated controls, to limit their power input or output thus avoiding too much energy being put onto or being drawn from the network that could otherwise cause outages and system faults.

- Currently the ENWL ANM scheme is due to go live towards the beginning of 2023

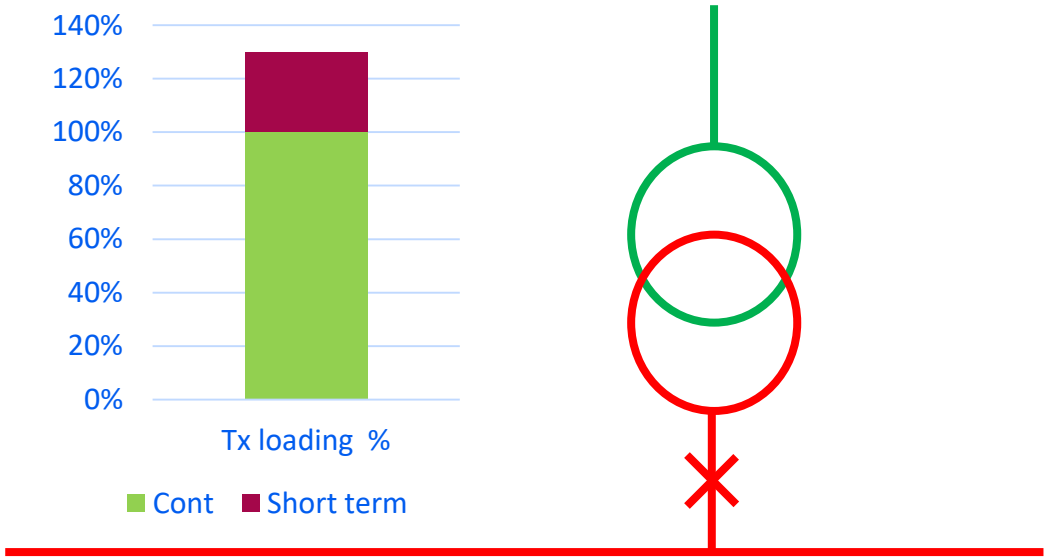
- We are currently in the final stages of implementing a new network management system which facilitates ANM to be integrated.

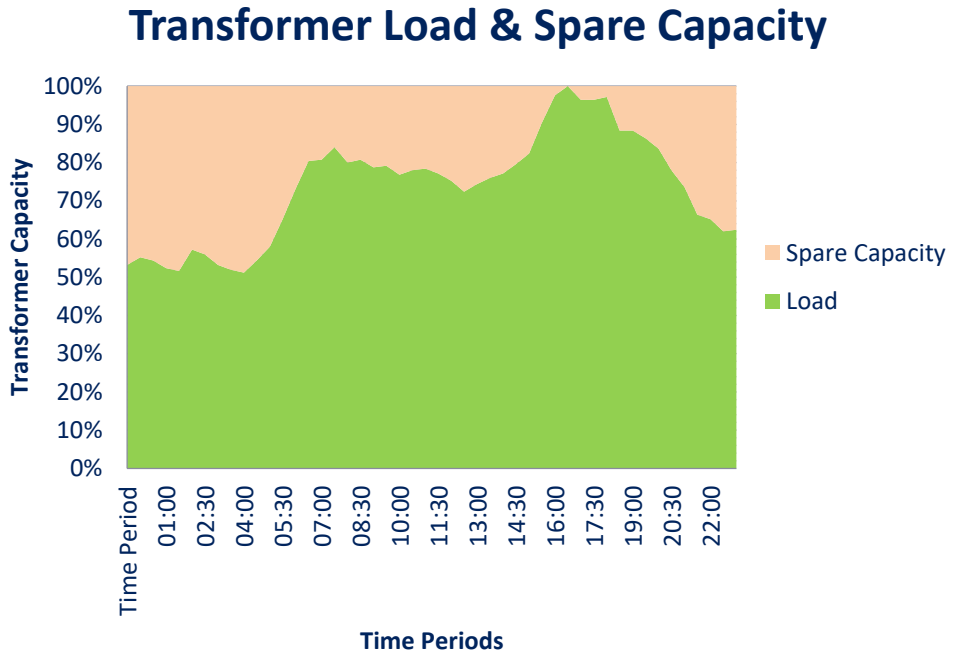
- In order to ensure that the system works to its maximum potential from Day 1 we are currently working to develop and integrate a range of new flexible connections into business as usual – we will update you on these once they are further developed.

The ANM system will offer the following benefits:

- Allows faster connections – incorporating less network reinforcement
- Potentially cheaper connection costs – using existing capacity of the network
- Increase the amount of time generators can remain on supply – This may result in periods where generators are curtailed, however not completely disconnected
- Increase network utilisation (get more out of the same assets)
- Decrease the need for system reinforcement - resulting in financial savings, as well as less embodied carbon
- Facilitating the utilisation of flexible services– offering financial opportunities for network users to provide services to the grid
- Facilitates a market to be established for users to trade energy – Particularly good for community and local energy groups/partnerships
- Increased network security of supplies by increasing speed of automated switching, resulting in less network overloads and increase speeds of restoration following a fault

ANM Overview – Typical primary transformer

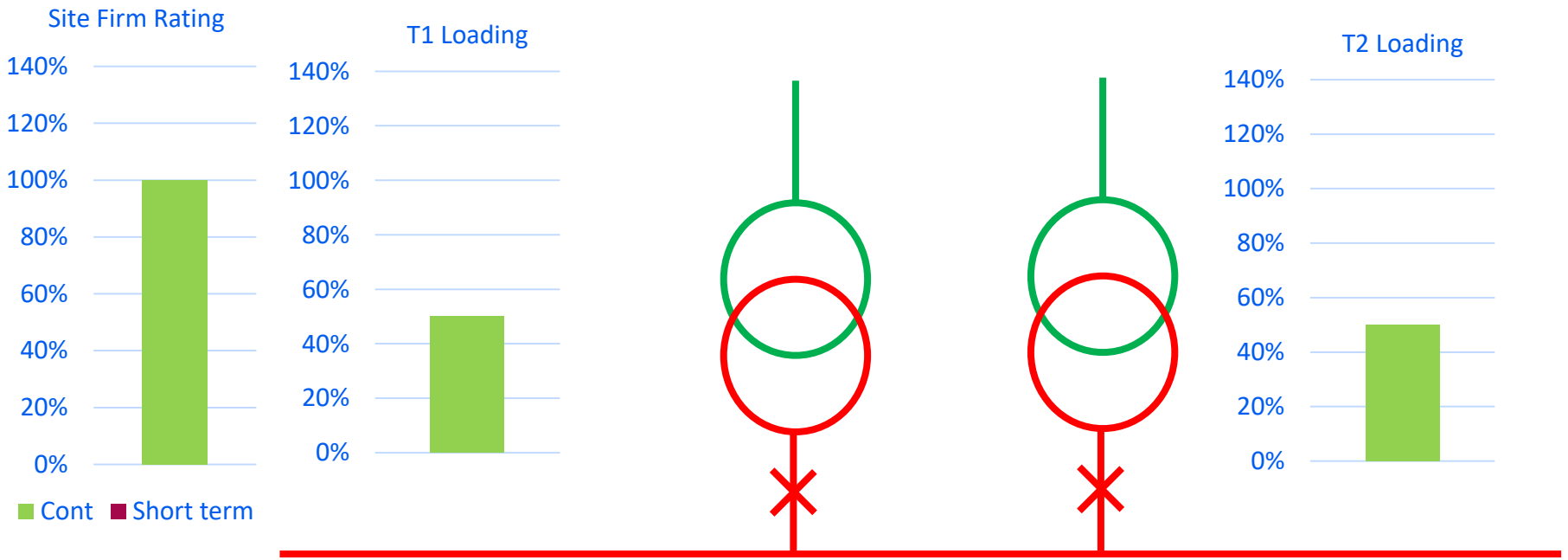




- A Transformer is rated to run continuously at 100%
- Cyclic ratings are used for short term loading (Typically 100%-130%)
- Emergency ratings for very short term situations. E.g. Faults

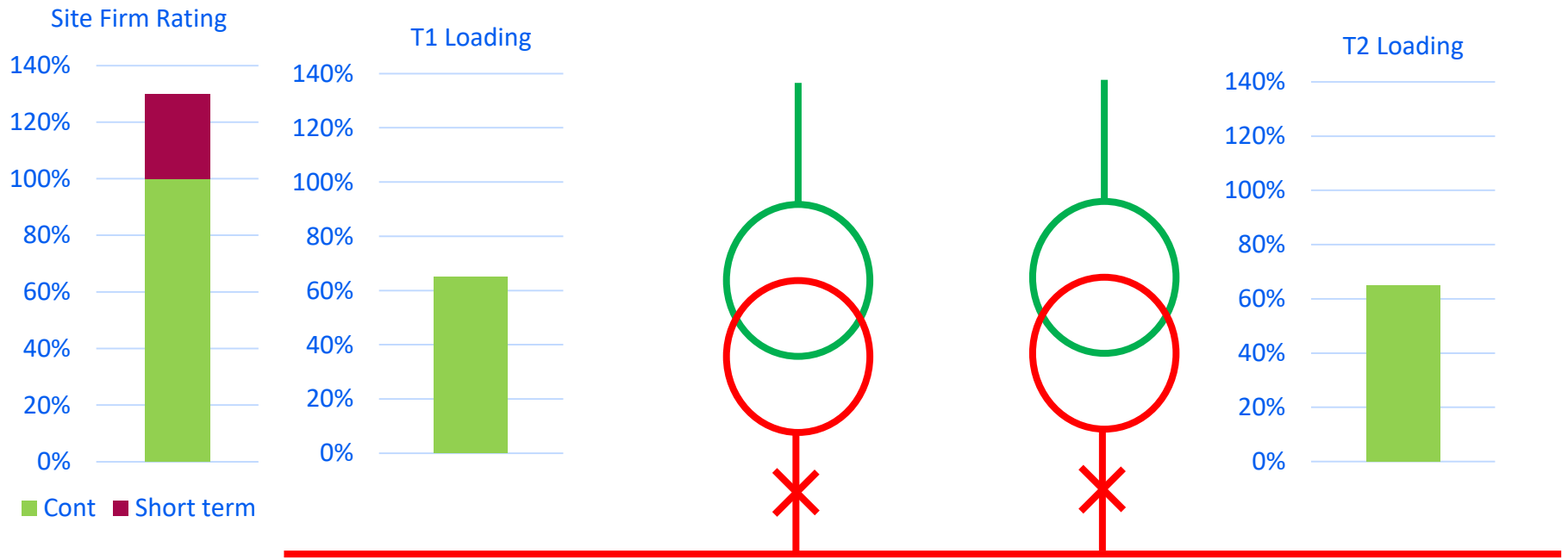
Typical primary substation current (without ANM)

With 2 transformers the substation total load can be shared



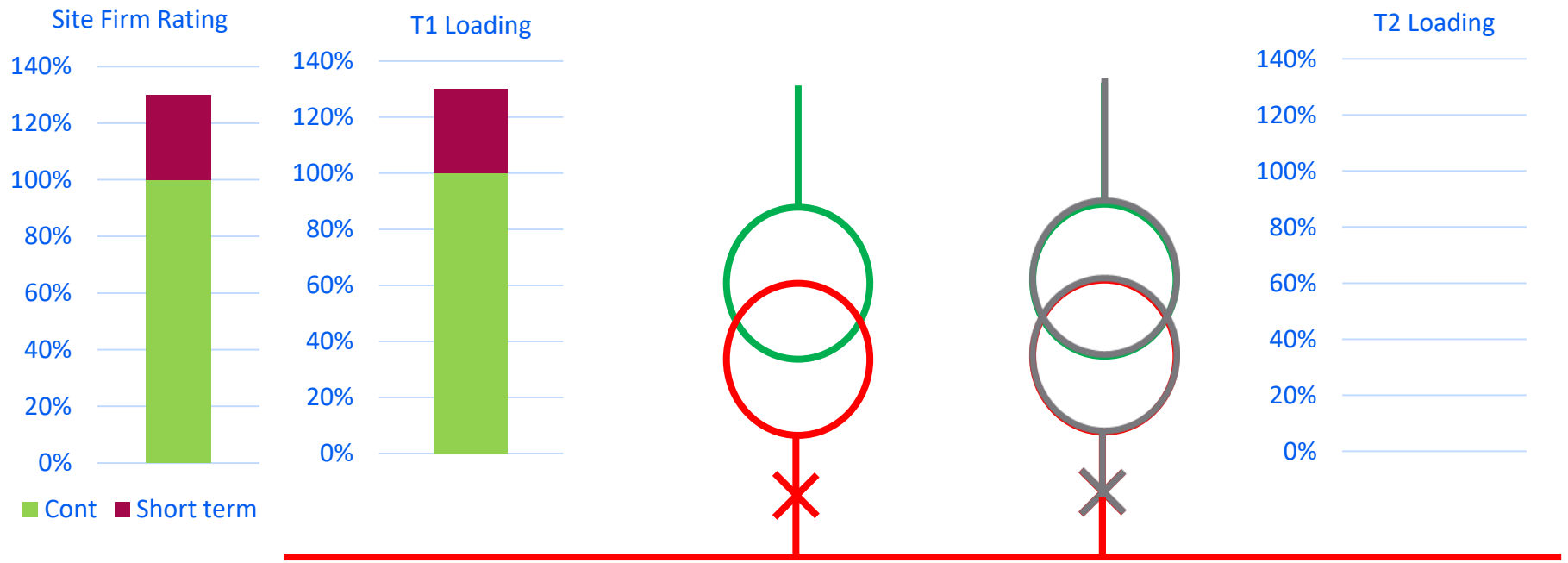
- 100% of the total substation load can be shared, so 50% loading on each transformer

Typical primary substation (with ANM)



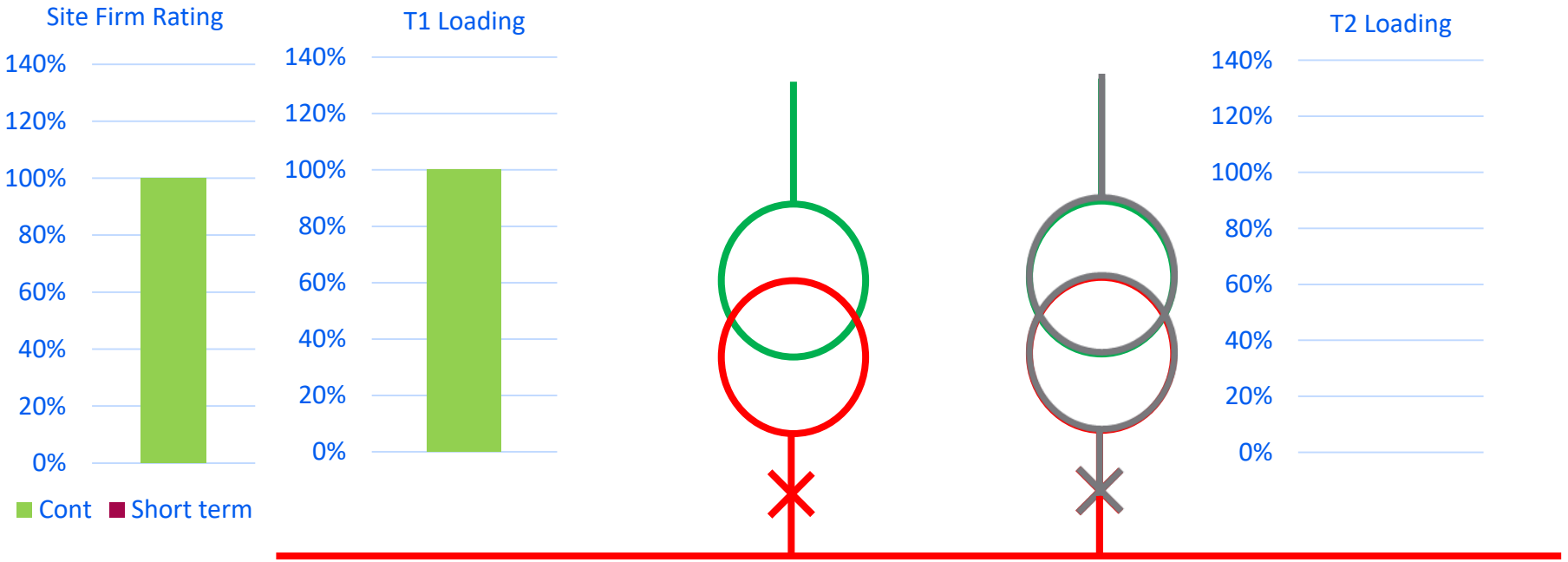
- Neither transformer is overloaded during normal running both operating at 65% of firm rating
- The substation is in exceedance of its continuous operating rating, without ANM this would not normally be allowed resulting in reinforcement

Typical primary substation – Network fault



- T2 Transformer faults, if fully loaded the 130% appears on T1
- This is within the cyclic rating of T1, however only for a short duration before permanent damage is experienced

ANM Resolves Constraint



- The ANM system will detect that the transformer is overloaded and will dispatch flexible services or trigger constraints.
- This example has shown how we can get 30% more capacity out of a standard double primary substation. This same logic is scaled up across the entire network of 13,000 km of overhead power lines and more than 44,000 km of underground electricity cables, and more than 35,000 substations

- If you are interested to know more about the Active Network Management system and user interactions, we are happy to discuss this in more detail contact us for more information.

Flexibility Services

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Introduction

The UK is embracing a **zero carbon future**, and the way energy is generated, stored and consumed is changing rapidly

The uptake in **Low Carbon Technologies (LCTs)** such as electric vehicles and heat pumps has lead to more demand being placed on our network

As we move towards **Distribution System Operation (DSO)** and more local network management, Flexible Services can balance supply and demand– helping to decarbonise our electricity supply while ensuring that our network remains resilient and reliable

What are Flexible Services?

When the demand for electricity in an area is greater than the amount that we are capable of providing, we can utilise companies or individual customers known as Distributed Energy Resources (DERs) to alleviate constraints

This ensures a safe and reliable supply of energy

There are lots of things that can cause an increase in the demand for electricity, leading to network constraints

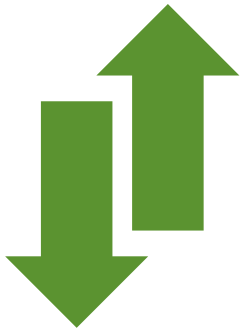
Electric heating in Winter

Air conditioning in the Summer

Big televised events

The uptake of LCTs

These DERs can be generators, consumers, and electricity storage connected to our networks that can increase exports (generate more) or reduce imports (consume less) when instructed



In return for providing Flexible Services, DERs will receive payment £

Who can take part?

To participate in our tenders and receive payment in return for providing flexible services to our network, you need to:

- ✓ Have an asset in one of our requirement areas
- ✓ Be capable of adjusting how much electricity you consume or generate
- ✓ and provide a minimum of 50kW either individually or via an aggregator

Flexibility requirements map

Our flexibility map displays the locations within our distribution area where we are currently seeking Flexible Services, or may have a requirement in the future.

The icons next to each location name relate to the response type that we are looking for:

- Sustain
- Restore
- Dynamic
- Secure

Get in touch

Email

For all queries relating to this event, or flexibility services, please contact our team at flexible.contracts@enwl.co.uk

Register asset

You can register your asset(s) on our website to be notified when we have a requirement in your area

Surgery appointments

We offer 1-2-1 surgery appointments to assist with any queries relating to the process of providing flexibility

Book here

Sign up

Sign up to our distribution list to receive our newsletters, tender information and event invites

Accelerated Loss of Mains Change Program (ALoMCP)

electricity north west
Bringing energy to your door

Background

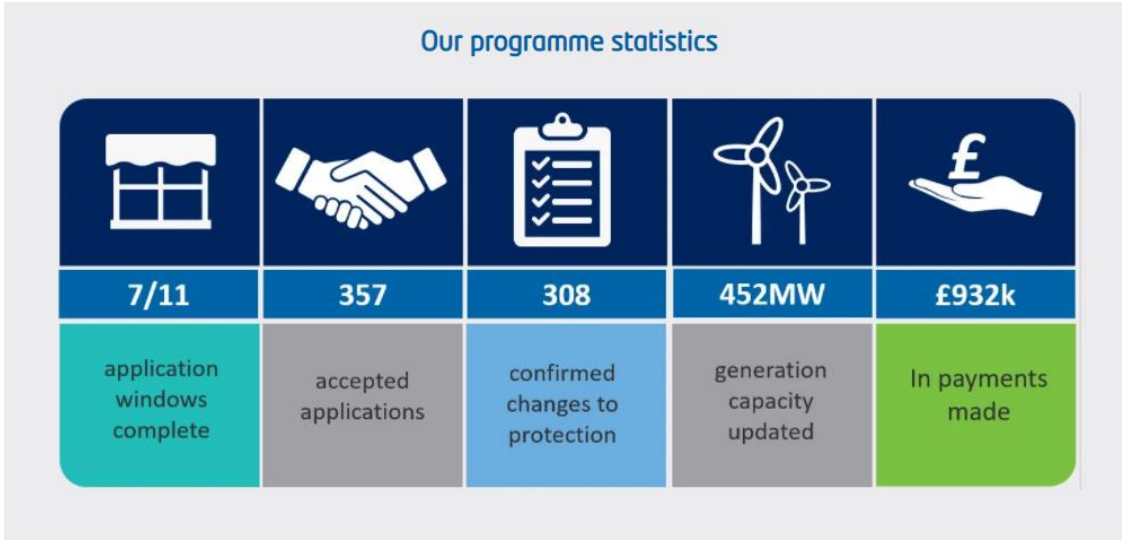
G59 requires UK Generation owners to install loss of mains (LoM) protection at their generation sites. This is to ensure that, following a fault that isolates sections of the distribution system to which they are connected from the rest of the electricity system, distributed generation does not form an autonomous power island with the remaining local demand.

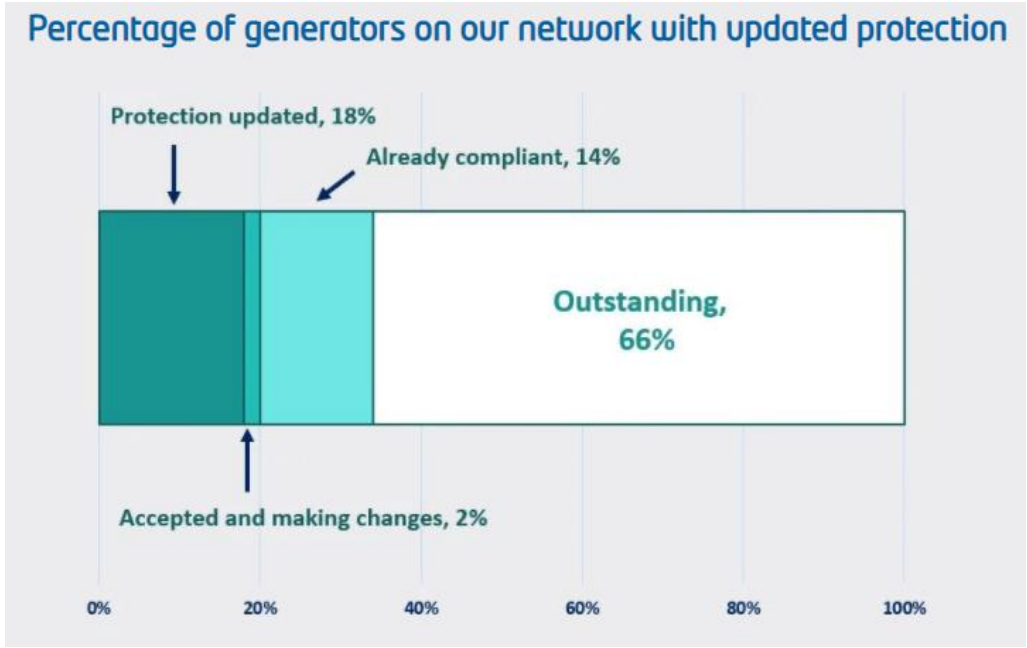
The two most commons forms of LoM protection are rate of change of frequency (RoCoF) relays and vector shift (VS) relays.

By September 2022 to comply with the latest requirements, it will be necessary to revise the LoM protection settings for all the existing embedded generation fleet (installed Pre-February 2018) to:

- Ensure that where rate of change of frequency (RoCoF) protection relays are used, as part of Loss of Mains protection, the applied setting should be 1Hz/s with a definite time delay of 500ms.
- Ensure that vector shift (VS) protection technique should be removed where it is in use as Loss of Mains protection.
- Remove LoM protection from all generation except synchronous and DFIG where a suitable RoCoF setting cannot be made without additional investment.

Accelerated Loss of Mains – 1 year left





All changes must be made before September 2022

Applications can be made at:

https://www.ena-eng.org/ALoMCP/

For help and assistance please contact:

ALoMCP@enwl.co.uk

Further information can be found at:

https://www.enwl.co.uk/get-connected/network-information/accelerated-loss-of-mains-change-programme/

- Funding available:
  - £4000 (Exc VAT) per relay change
  - £1500 (Exc VAT) for first setting change + £500 (Exc VAT) for an additional 5 setting changes.

Any questions?

Wrap Up & Close

- Please give us your honest feedback either email ICE or leave your feedback in the chat

- Presentation slides will be available via our website shortly.

- Future events, including webinars are available here

- Don't forget to get in touch with us at ICE@enwl.co.uk

- Thank you for your attendance.