Accelerated Loss of Mains Change Programme

Technical Frequently Asked Questions

1 Power Electronic Converters and Inverters

1.1 I have converters/inverters on the site – do they need to be adjusted etc?

Some converters/inverters do have settings that need to be adjusted, some do not. The programme is working with converters/inverter manufacturers to try to provide more accessible and relevant information on this – the current information that the Programme has from manufacturers is contained in the knowledge base on the ALoMCP portal here.

The following table summarises how converters/inverters should be treated in the Programme, with and without protection relays on site.

	Type of LoM settings in the converter/inverter			Frequency protection settings in converters/inverters
	VS or Non-compliant RoCoF	Non-RoCoF/VS LoM (eg frequency shift)	None at all	
Protection Relay on site	In preferred order: 1. Set compliant RoCoF* 2. Disable	Nothing to do	Nothing to do	In preferred order: 1. Disable 2. Set wider than G59 3. Set to G59 or G99§
No protection relay (ie "type tested" converters/inverters)	In preferred order 1. Set compliant RoCoF* 2. Disable	Nothing to do	This combination should not exist	Set as G59 or G99§

* Note VS must not be set: VS is not allowed.
§ If manufacturers are supplying new firmware or settings, for simplicity manufacturers should adopt G99 settings to cater for all situations with and without relays.

1.2 How do I change the settings in the converters/inverters?

You will need to get this guidance from the manufacturer, supplier or installer of your converters/inverters. The programme hopes that manufacturers will publish this information so that owners and DNOs can refer to it without it being provided separately to owners in each case.

1.3 Do I need to reset the under/over voltage and under/over frequency protection?

Not necessarily – it is not mandatory to change or reset these providing they are compliant with the current or historic versions of G59, for example if U/F is erroneously set at 49.0Hz then this is non-compliant and will need to be changed. If the under and over frequency protection is capable of being set to the current version of G59/3 then the opportunity to apply these settings should be taken. If the underfrequency protection only has a single stage, then this should be set to 47.0Hz (0.5s definite time delay) or as low a setting as possible if the range does not extend to 47.0Hz.

1.4 What if I have converters/inverters and protection relays?

If you have protection relays and converters/inverters with protection settings, then the protection in the converters/inverters ideally should be set as in the table of Q1.1 above.

If in doubt, please discuss with the DNO.

1.5 What if I can't change the settings?

All settings need to conform to G59. If you believe that the settings cannot be changed, please discuss the details with the DNO.

1.6 My converters/inverters do not have settings. What do I need to do?

If the DNO confirms/agrees that your converters/inverters do not have relevant protection settings, then there is nothing that you have to do.

1.7 How do I disable the RoCoF or VS settings?

You will need to get this guidance from the manufacturer, supplier or installer of your converters/inverters. The programme hopes that manufacturers will publish this information so that owners and DNOs can refer to it without it being provided separately to owners in each case.

1.8 Can I disable the under/over voltage and under/over frequency protection?

If there is a protection relay on site, this is the preferred approach. But otherwise no. In the latter case these must be retained with the correct/relevant settings.

1.9 How do I test the settings in the converters/inverter?

The programme is working with converters/inverter manufacturers to try to provide more accessible and relevant information on this – and the programme will try to make this available as soon as possible. In the meantime the manufacturers themselves, or the installer of your converters/inverters, is probably the best place to seek out this information.

In the cases where the manufacturer will have to provide the new settings either in software or firmware, the manufacturer will need to provide you with evidence that the new settings/firmware are/is compliant. The programme hopes that manufacturers will publish this information so that owners and DNOs can refer to it without it being provided in detail in each case.

1.10 What evidence will be required to show my converters/inverters are compliant?

The appropriate evidence will vary between installations dependent on the converters/inverter types. In addition to completing the 'Pro-forma record of Loss of Mains Change Service' the following should be submitted (where possible):

- time-stamped photographs of before and after settings (where the settings are physically displayed on the converters/inverters);
- print outs and/or screen shots
- of the before and after settings where this can be done from a manufacturer's app or setting program;
- confirmation of the before and after firmware/software employed in the converters/inverters.
- completed test documentation and certificates (as per G59 appendix 3)

The programme is aiming to work with manufacturers to improve/elaborate on this advice.

In the cases where the manufacturer will have to provide the new settings either in software or firmware, the manufacturer will need to provide you with evidence that the new settings/firmware are/is compliant. The programme hopes that manufacturers will publish this information so that owners and DNOs can refer to it without it being provided in detail in each case.

1.11 What do I do if I cannot contact the manufacturer of my converters/inverter(s)

The Programme recognises that some manufacturers are difficult to engage with, or in some cases have ceased trading completely. In these cases it is maybe difficult to establish if the equipment is compliant, or how to modify it to become compliant.

Ultimately the responsibility for obsolete and non-compliant equipment rests with its owner who must take any necessary steps to achieve compliance by the September 2022 deadline. The Programme will continue to try to engage with manufacturers, and DNOs will try to support owners with appropriate advice in individual cases, particularly as the deadline approaches.

1.12 Where do I send the evidence?

To the relevant DNO whose network your installation is connected to.

1.13 I need to change the settings in all my converters/inverters. What will I be paid?

Converters/inverter settings changes are paid for as £1500 for the first converters/inverter; £500 for the next five converters/inverters. Payment for the site is capped at £4000. If a site has more than six converters/inverters, all must have their settings changed but the total payment for the site will remain at £4000.

1.14 I need to disable the RoCoF (or VS) in all my converters/inverters. What will I be paid?

Converters/inverter settings changes are paid for as £1500 for the first converters/inverter; £500 for the next five converters/inverters. Payment for the site is capped at £4000. If a site has more than six converters/inverters, all must have their settings changed but the total payment for the site will remain at £4000 Note that if there are also protection relay setting changes (or disablement) to make on the site, the total payment for all setting changes, ie converters/inverter and relay setting changes together, is still limited to £4000.

1.15 I need to change my converters/inverters. What will I be paid?

The programme does not pay to physically change converters/inverters.

1.16 Can I use G99 settings rather than G59 settings in my converters/inverters?

Yes. If there is a firmware change from the manufacturer necessary to achieve compliance, this is the preferred approach.

1.17 My wind turbines have synchronous generators couple through electronic converters. Are they to be classed as synchronous?

No. The description synchronous or non-synchronous refers to what is actually connected to the grid – in this case the connexion is through an electronic converter, ie an non-synchronous device. In this case the presence of a synchronous machine on the turbine side of the converter is irrelevant.

2 Protection Relays

2.1 How do I know what my protection is?

If you are unable to identify your protection equipment yourself, you will need to employ a competent contractor to identify your protection, and ideally then to make changes if any are needed.

2.2 How do I find out what the settings are?

If you are unable to identify your protection settings yourself, you will need to employ a competent contractor to identify your protection, and ideally then to make changes if any are needed.

2.3 What protection tests do I need to do and why?

If you are changing a protection relay or relays, then the full commissioning tests, as per appendix 3 of G59 will be required.

Any changed settings shall be proved to be effective by testing in accordance with the current issue of appendix 3 of G59/3.

Any device that had its Vector Shift and/or RoCoF protection deactivated shall be proved to be stable by testing in accordance with the current issue of G59/3 where it is feasible to conduct such tests. Where testing is not feasible, a statement of why such tests were not conducted should be provided.

2.4 Do I need to reset the under/over voltage and under/over frequency protection?

Not necessarily – it is not mandatory to change or reset these providing they are compliant with the current or historic versions of G59, for example if U/F is erroneously set at 49.0Hz then this is non-compliant and will need to be changed. If the frequency protection is included in a new relay and/or the under and over frequency protection is capable of being set to the current version of G59/3 then the opportunity to apply these settings should be taken. If the underfrequency protection only has a single stage, then this should be set to 47.0Hz (0.5s definite time delay) or as low a setting as possible if the range does not extend to 47.0Hz.

2.5 What if I have converters/inverters and protection relays?

Both the converters/inverters and the protection relays need to comply with the protection setting requirements of G59 – so potentially you will have to be changing settings in both.

2.6 What if I can't reset under/over frequency protection?

There is no compulsion to change frequency settings provided the settings are compliant with the version of G59 that was current when the generation was commissioned. All the programme requires is the applied settings being recorded and submitted with your evidence of other protection changes and/or via the portal

2.7 How do I disable RoCoF or VS protection?

There is no single answer to this – it will depend on the protection fitted in your site. Some protection relays will enable RoCoF or VS to be simply switched off. In some cases it might be necessary to physically disconnect the protection relay. Note that however RoCoF or VS is disabled, the under and over frequency and voltage protection must be left fully working, and ideally with the frequency settings set to the current G59 requirements (see 2.4 above).

2.8 Can I disable the under/over voltage and under/over frequency protection?

No – it is essential that these protection functions are retained, and ideally with the frequency settings set to the current G59 requirements (see 2.4 above).

2.9 What evidence will be required to show my protection is compliant?

The appropriate evidence will vary between installations dependent on the protection installations and protection relay types employed before and after the change. One or more of the following should be submitted:

- Time-stamped photographs of before and after settings (where the settings are physically displayed on the relays);

- print outs and/or screenshots of the before and after settings where this can be done from a relay manufacturer's app or setting program;
- Time-stamped photographs of any necessary physical work on site (eg disconnected tripping circuits etc)
- completed test documentation and certificates (as per G59 appendix 3)

2.10 Where do I send the evidence?

To the relevant DNO whose network your installation is connected to.

2.11 I need to change the settings in my protection. What will I be paid?

For the first set of protection relays on site, £1500. For the next five protection installations on site £500 per installation. The maximum payment per site is £4000. If there are more than six protection installations on site, all will need to have their settings made compliant with G59, but the maximum payment will be £4000. Note that if there are also setting changes (or disablement) to make in any converters/inverters on the site, the total payment for all setting changes, ie converters/inverter and relay setting changes together, is still limited to £4000.

2.12 I need to disable the RoCoF (or VS) functionality in all my relays. What will I be paid?

For the first set of protection relays on site, £1500. For the next five protection installations on site £500 per installation. The maximum payment per site is £4000. If there are more than six protection installations on site, all will need to have their settings made compliant with the current issue of G59, but the maximum payment will be £4000.

2.13 Can I claim for relay changes for replacing obsolete/non-compliant relays?

The Programme will only pay for relay changes associated with synchronous or double fed induction generators. Owners of other generation types can, of course, choose to change the relay to achieve compliance (as opposed to disabling the loss of mains capability), but the Programme will only pay for the setting change/LoM disablement.

2.14 Can I use G99 settings rather than G59 settings

Yes.

2.15 Can all relays be reset to the new RoCoF settings?

The required settings for RoCoF is $1Hzs^{-1}$, 500ms definite time delay. No other setting is permitted without explicit DNO agreement in writing.

In the main we would expect that most existing relays that have the correct range of settings can be reset to be compliant. However note that some relays historically used for vector shift cannot be used for RoCoF (even if it appears that they can) because they do not comply with the technical details regarding the implement of the 500ms definite time. Relays that use the mains waveform cycles as a timer are not compliant – see note ¶ in 10.5.7.1 in the current issue of G59. If in doubt consult the relay manufacturer.

Compliant RoCoF settings must include a definite time delay of 500ms. DNOs accept that for some relay types the operating time will be slightly longer than 500ms, which can result in overall disconnection times in excess of 1 second.

DNOs will therefore accept overall disconnection times up to a typical maximum of 1.2s. DNOs will propose a change to G59/3-7 along these lines at the first opportunity.

3 Recognized Contractor

3.1 Do I need to use a recognized contractor?

No – there is no compulsion to use a contractor, recognized or not. A recognized contractor is one who is "recognized" by the DNO for having appropriate experience and skills to undertake the work of the programme without direct scrutiny by the DNO. This enables a recognized contractor to plan site works independent of the need to arrange a suitable time/date for the DNO to witness the works.

3.2 How do I know who recognized contractors are?

A recognized contractor will be able to tell you their status. If in doubt you can confirm with the DNO your installation is connected to.

3.3 How do I become a recognized contractor?

Each DNO has its own scheme for recognizing competent contractors – contact the relevant DNO for details of their requirements.

3.4 How do I know a contractor is competent?

Ultimately if you are employing a contractor to undertake work for you, you will need to employ due diligence in selecting and contracting. There is no formal industry scheme for accreditation etc for the type of work the programme requires.

3.5 I have several sites connected to different DNOs' networks – can I use the same contractor for them all?

Possibly – but the contractor will have to have made arrangements with each of the DNOs to be recognized – there is no national recognition scheme.

4 Witnessing by DNOs

4.1 Why do DNOs need to witness the changes?

Compliance with G59 is essential for the safe and secure operation of electricity networks. DNOs have legal and licence obligations to ensure that G59 and the Distribution Code are properly implemented.

4.2 How will this be organized? Will the DNO contact me?

The DNOs will determine if the works at your installation need to be witnessed or not, and will do so by engaging with you once you have submitted your application for funding.

4.3 Do I have to agree a date with the DNO?

Yes – the DNO will liaise with you to find a mutually acceptable date.

4.4 What happens if the DNO states there is something wrong?

If the DNO determines that there is something amiss in your installation you will need to rectify it. If the problem affects the completion of LoM protection changes, then the problem will need to be rectified and the change complete before the contractual last possible date (which you agreed to when accepting the Contractual Terms). Any costs, including fees for re-witnessing, will need to be borne by you.

If LoM protection changes cannot be completed before the contractual last possible date, then there will be no payment made. However you will be able to apply for payment in future application windows (with the status of your site as "already completed") when your subsequent application will be re-assessed with the other applications in that future window.

4.5 What do I do if I cannot agree with the DNO?

In the first instance, as provided for in Section 9 of the Contractual Terms, you should negotiate in good faith with the DNO. Although there is no formal route, the ALoMCP Steering Group can be consulted if necessary. The Steering Group includes representatives of generation owners and Ofgem.

4.6 Do I have to change the date my work will be done to suit the DNO?

The DNO should liaise with you to find a mutually acceptable date. Circumstances can change for both you and the DNO and both parties should be free to renegotiate dates etc to accommodate changes.

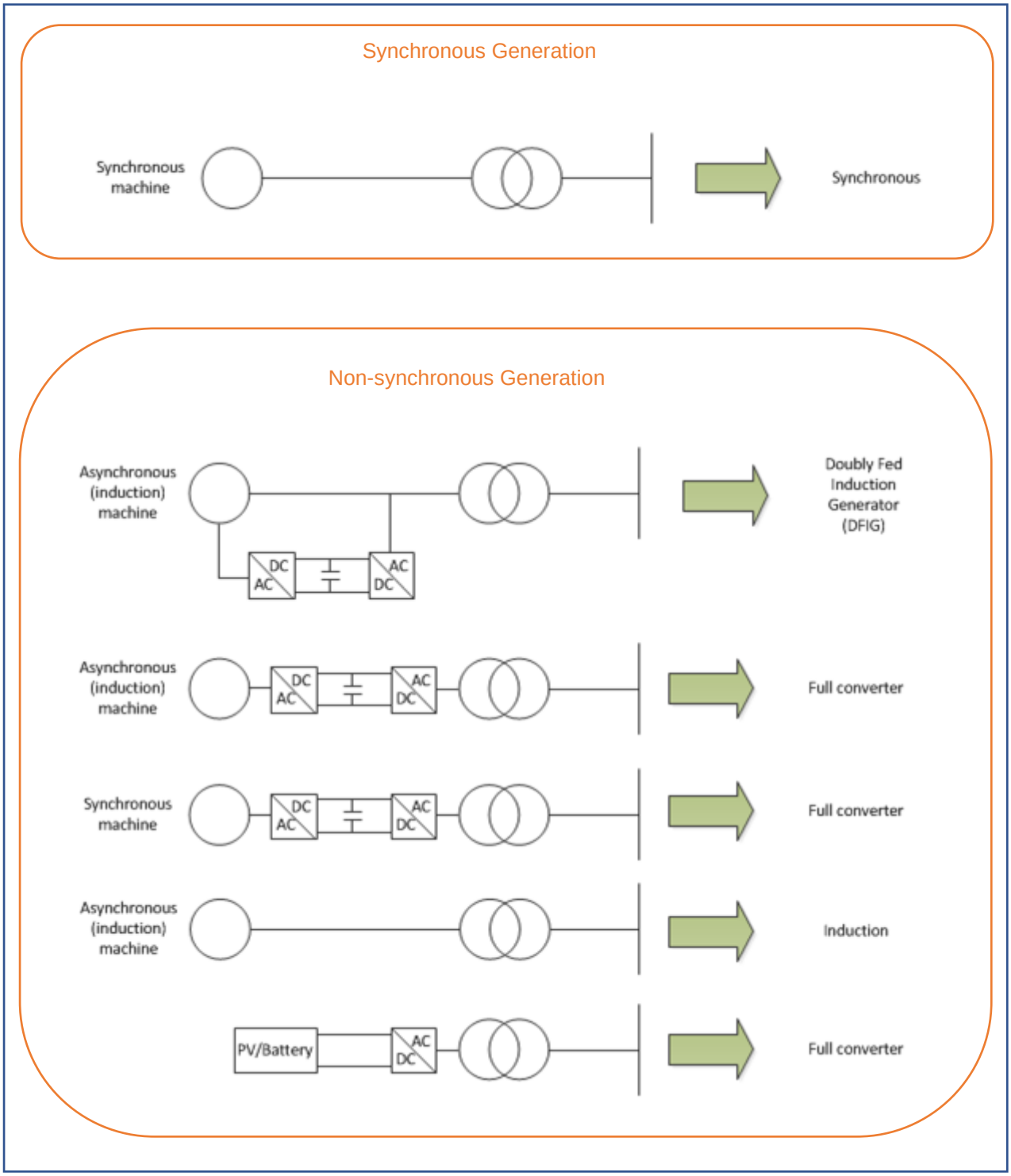
4.7 What if the works at my site are spread over a number of days?

This is best resolved by liaison with the DNO. You will be able to agree what part of your work is critical for the DNO to witness, and when that will be undertaken.

5 Application to Generation Types

5.1 How do I know if my generation is synchronous or non-synchronous?

The diagram below attempts to lay this out for all generation types.



5.2 Is there an upper limit of eligibility?

Yes. Formally the Programme is only open to Small Power Stations, ie generation sites of less than 50MW capacity in England and Wales, less than 30MW capacity in the south of Scotland, and 10MW in the north of Scotland.

Update History

21 January 2020	First published
03 February 2020	1.4 updated (was 1.3) for removal of inverter settings when relays present; 1.13 and 2.11 updated to clarify that the £4k limit for changes/disablements is per site.
07 February 2020	Link to information received from inverter manufacturers added.
24 February 2020	1.1 updated to add table describing how to deal with inverters 1.4 updated to align with the revised 1.1 A comment made that the programme hopes inverter manufacturers will provide appropriate information – 1.2, 1.7 A comment raising the question re how firmware or manufacturer provided setting change can be assured to be compliant 1.9, 1.10 1.15 – expanded 1.16 new paragraph dealing with synchronous generation connected through a converter.
04 March 2020	1.1 – minor clarifications to table. 2.13 – correction of “these generation” to “other generation”
11 May 2020	New section 2.15 on compliant protection relays New section 5 to explain synchronous and non-synchronous generation, and the upper limit of eligibility
22 May 2020	Reference to the inverter manufacturer knowledge base updated in Q1.1
06 July 2020	New 1.11 added dealing with obsolete inverters; subsequent section 1 paragraphs renumbered. 2.15 Clarified for overall disconnexion time
27 July 2020	Simplification to FAQ 1.4 to align more directly with FAQ 1.1. “Asynchronous” replaced with “non-synchronous” throughout.
24/05/2021	Minor clarification re frequency settings to 2.4 and 2.6. Clarification that requirements apply to all power electronic converters and inverters.