

Accelerated Loss of Mains Change Programme

Request for Feedback

This request for feedback outlines how National Grid Electricity System Operator (NGESO) and network operators (including both distribution network operators and independent distribution network operators) propose to accelerate loss of mains protection changes required by the Distribution Code.

We are sharing this draft document and requesting feedback ahead of final publication to ensure that the industry has an opportunity to comment on our approach and highlight potential areas for improvement.

This request for feedback is split into three sections:

1. Background and Requirement
2. Payment Process Specification
3. Procurement Methodology

Section one, explains the background, process, programme, delivery team and how industry parties can get involved in the programme.

Section two, the Payment Process Specification, explains the process we intend to use to pay owners of distributed generation who are willing and able to make loss of mains protection changes quickly and within a defined period.

The purpose of section three, the Procurement Methodology, is to increase transparency of the specific approach proposed for procuring accelerated loss of mains protection changes. Publication of this methodology will help those parties paying balancing services use of system charge (BSUoS) to understand how NGESO and network operators are ensuring that their money is being spent economically and efficiently in order to reduce their future ongoing costs. It will also help those who apply to provide the service to understand the rationale behind the decision made on their application.

We welcome your feedback on the Payment Process Specification, the Procurement Methodology, and any other area where these could be improved. We would also appreciate views on how you would like us to engage with you during the process and whether there is more information you would like to see.

Please send your feedback to us at Lossofmain@energynetworks.org no later than 10 May 2019.

Section One

- Background

LOSS OF MAINS PROTECTION

Generation owners are required by the Distribution Code to install loss of mains (LoM) protection at distributed 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. Other faults elsewhere on the GB electricity system should not result in the operation of LoM protection.

The two most common forms of LoM protection are rate of change of frequency (RoCoF) relays and vector shift (VS) relays. Other forms of LoM protection, eg direct intertripping, are also available.

It was identified that RoCoF relays and VS relays could inadvertently operate and trip distributed generation following events that do not result in islanding. This resulting loss of generation could cause a significant system disturbance and a widespread loss of supply. The cost of managing such risk, incurred by NGENSO and funded by BSUoS charge payers, in 2018 exceeded £100m.

SETTING CHANGE REQUIREMENT

To fully resolve the risk of inadvertent operation of LoM relays, a series of modifications have been made to the Distribution Code to change the requirements on LoM relays. To comply with the most recent Distribution Code requirements, it will be necessary to;

- Ensure that where RoCoF relays are used as means of LoM protection the applied setting should be 1Hzs^{-1} with a definite time delay of 500ms;
- Ensure that VS relays are no longer used as means of LoM protection;
- Remove/disable LoM protection from distributed generation sites, other than synchronous units and doubly fed induction generator (DFIG) units, where a suitable RoCoF setting cannot be made without additional investment e.g. where a new protection relay would otherwise be required.

Distributed generation sites affected by this modification are sites that

- operate in long-term parallel mode with the distribution network,
- have been connected prior to February 2018 and either
- have their LoM protection provided by
 - o VS relays; or
 - o RoCoF relays which have settings that are more sensitive than the settings required by the Distribution Code.

It is expected that other sites already comply with the new requirements.

Generation owners are responsible for compliance with the Distribution Code in order to fulfil the terms under which they connect to the distribution network and therefore will be required to review and

make changes to their protection settings by no later than April 2022 as specified in the latest Distribution Code modification.

THE PROGRAMME

Due to the significant risk imposed by the inadvertent operation of LoM relays, and the significant costs of managing such risks, it is beneficial to accelerate compliance with the new requirements. Therefore, NGENSO and all network operators in GB are working in partnership on this Accelerated Loss of Mains Protection Change Programme that aims to facilitate that all distributed generation sites achieving compliance with the new requirements sooner than the deadline specified in the Distribution Code.

We envisage that this programme will run for multiple years. Given the scale of the exercise and the uncertainties involved, regular decision points will be built in, together with the ability to flex the approach depending on performance and programme timing.

The core of the programme is made up of a payment scheme, an assistance scheme and an enforcement scheme. This document focusses on the payment scheme as we believe there is a strong case to have this up and running at the start of the programme. Assistance will be initially provided by making available a list of contractors¹ whom could be appointed by generation owners to complete the works required. The need for, and extent of, any further assistance, will be kept under review in light of progress made, information and feedback received. Similarly, the approach to enforcement will be finalised in light of progress made and information received.

The partnership between NGENSO and network operators provides an expedient, economic, and efficient way to deliver of this Payment Programme as it avoids the time and cost required for NGENSO to build up its capability to interact directly with thousands of distributed generation sites and, instead, uses the established capability of networks operators.

DELIVERY TEAM

This programme will be managed by a Steering Group and delivered through a project team with four workstreams to cover stakeholder engagement, customer support, delivery assurance, and value assurance.

Further information regarding the constitutions and the objectives of the Steering Group and the four workstreams will be published. Parties interested in participation in the project should express interest by emailing [Mark to provide].

¹ Note that this is just a list of self-declared competent contractors. No endorsement or warranty is provided by NGENSO, the network operators or the ENA. Generation owners will still need to undertake their own due diligence in appointing competent contractors.

GETTING INVOLVED

There are several parties that could get involved in this project:

Generation Owners and Site Operators:

Generation owners and site operators are expected to;

- check the types and the settings for their LoM protection against the new Distribution Code requirements;
- undertake any necessary works to bring this protection in-line with the new requirements.

Generation owners and site operators are encouraged to;

- check whether their site is covered by the scope of this project; and
- submit an application, if eligible, to receive the payment.

Generation owners will be able to submit their applications via an online portal that will be accessible from the websites of network operators, NGENSO, and the Energy Networks Association. The process is outlined in Figure 1, with further detail provided in Annex 1 of this document.

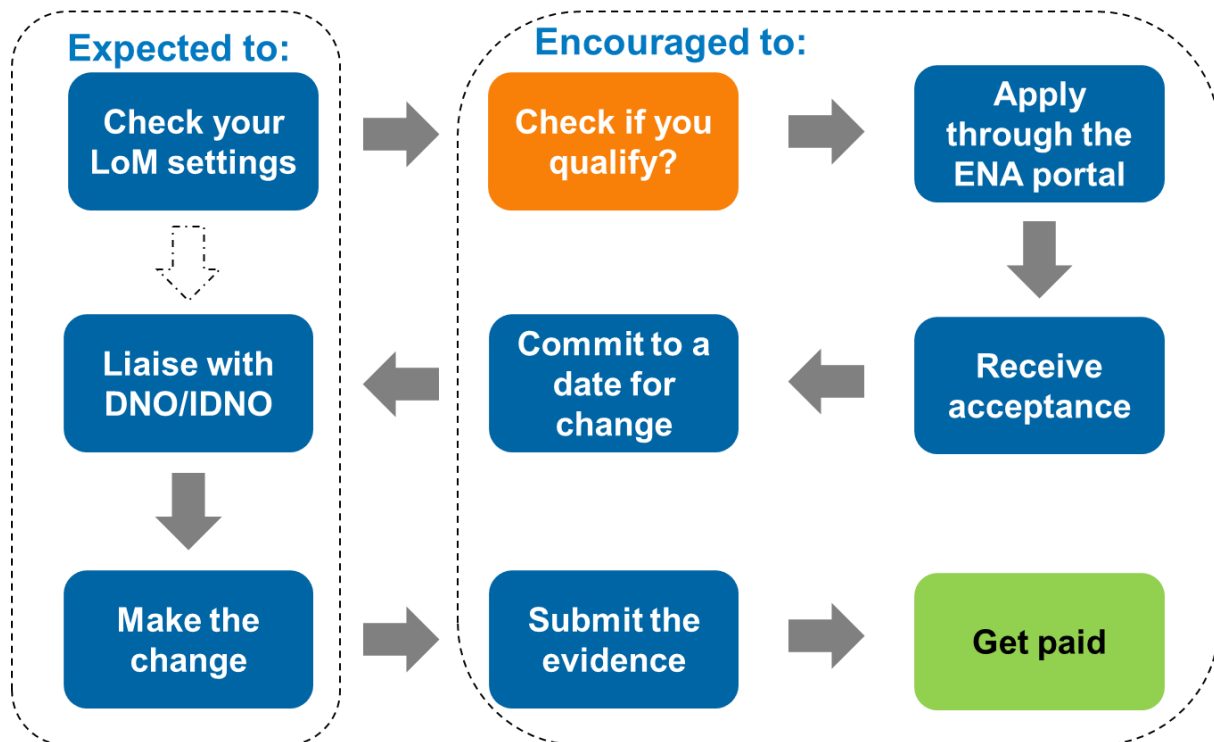


Figure 1: Getting involved - Generation Owners and Site Operators

Qualified businesses

If you or your business have the competence, the experience, and the qualification necessary to undertake the works required on behalf of generation owners/site operators, and if you wish that your contact details are made available to interested parties, please express interest by filling the form available on [the ENA website](#) and submit the filled form to Lossofmain@energynetworks.org.

Trade Associations and other Distributed Generation Stakeholders:

We encourage you to take actions to ensure that parties represented by yourself are aware of the new requirements and of the payment scheme. This is to facilitate that they;

- remain compliant with the Distribution Code,
- take advantage of the payment scheme while it is open, and
- are not at risk of having actions taken against them for non-compliance,

All interested parties:

All interested parties are invited to

- provide feedback, raise any concerns, offer suggestions. This could be submitted to Lossofmain@energynetworks.org;
- attend a series of stakeholder events that will be held throughout the project to allow them to monitor delivery on the objectives set out and compliance with the methodology publicised; and
- volunteer to actively participate in the delivery of the project by joining the Project Steering Group or one of the project's workstreams. Interest could be expressed by emailing Lossofmain@energynetworks.org.

Section Two

- Payment Process Specification

PAYMENT SCHEME

The Payment Scheme aims to pay generation owners who are willing and able to comply with the new requirement of the Distribution Code sooner. It is a major, but not the only part of, the Accelerated Loss of Mains Protection Change Programme. We recognise it will help many, but not all, affected parties and welcome feedback on how to make it appropriately inclusive and on potential alternatives which could supplement it, and can be demonstrated to be economic and efficient.

In order to qualify for the payment, generation owners will have to submit an application via an online portal. The applications will be verified then assessed in accordance with the procurement methodology. Once an application has been accepted, the generation owner will be required to implement the changes prior to an agreed deadline to qualify for payment.

The Payment Scheme will be open for a limited period. Applications will be assessed quarterly based on their contribution towards the overall risk reduction and the consequent reduction in BSUoS charge. The earlier an application is submitted, the higher the likelihood that application will be accepted as it will be assessed alongside the applications received in that quarter against a budget for the whole application period.

Generation owners who may choose to complete the works ahead of submitting an application are still eligible to apply for payment, and their application will be evaluated on the same grounds as any other applicants.

PAYMENT SUM

Generation owners will receive a fixed payment sum. Two levels of payment will be offered with generation owners required to replace their existing LoM relays receiving a payment higher than those who are required to either just modify the settings of their existing LoM relays or disable the LoM functionality. The appropriate level of payment is currently being assessed and will be publicised ahead of the first call for applications.

The payment sum will be chosen to achieve a balance between the cost of the programme to the electricity consumer and the success of the programme. The choice will be guided by a bottom up assessment of the costs required to undertake the works required. The indicative ranges for payment are as follows;

- between £1000 and £1500 for a change of settings or disabling a relay; and
- between £2500 and £4000 for a replacement of an existing relay.

A similar payment approach was used in Summer 2018 to accelerate changes away from vector shift at high-risk sites in the south of England. This exercise proved successful. Further information on this

programme is available online at <https://www.nationalgrideso.com/balancing-services/system-security-services/transmission-constraint-management?market-information>

WITNESS TESTING AND ASSURANCE

In some cases we will need to confirm that the correct changes have been made. Network operators will witness the recommissioning of LoM protection as per the table below. We are working to develop the process required to identify “Certified Contractors”. There will be a need to audit a certain number of installations after changes are made as well.

Scope of Works	Baseline Approach	Approach for a “Certified Contractor”
Replacing an existing relay with a new relay	Network operator witnesses testing	Self-certification
Disable an existing relay	Network operator witnesses testing	Self-certification
Change settings on an existing relay	Self-certification with a proportion subject to post change sample check on site	Self-certification

There will be no charge for a successful witness test.

Self certification will be possible via the provision of suitable evidence (eg photographic evidence). A proforma will be provided which must be used, and which must be accompanied by supporting information appropriate to the work done.

PROCESS

Generation owners whose sites meet the qualification criteria are entitled to apply for payment. The payment process comprises an application process and an implementation process. The application process will run quarterly with time windows for different actions. The implementation process will run independently for each distributed generation site. However, the implementation deadlines will be chosen to ensure that all implementation processes are synchronised.

The steps required for the application process and the implementation process are as follows:

1. At any time following the first call for application up until closure of the payment scheme interested parties can apply through a dedicated web portal. The application will require the provision of contact details and of the technical information necessary to assess the application. This includes:
 - a. Capacity
 - b. Generation type
 - c. Number of LoM relays

- d. Current LoM relay type(s) and setting(s)
 - e. Network operator
 - f. Lead time for change
 - g. MPAN²
2. Once submitted, an e-mail will be sent out to the generator to acknowledge that the application has been received and the following actions will be undertaken by the deadlines specified:

Action	Deadline
a) The relevant network operator will verify that the application meets the qualification criteria and that any information provided is consistent. Once verified, the network operator will submit the application, via the portal, to NGESO for assessment	Before the end of the first “verify” window following confirmation of receipt of the application.
b) NGESO will assess the application in accordance with the procurement methodology and, if successful, specify an implementation deadline that takes into account the “lead time for change” submitted by the generation owner and approve the application.	Before the end of the first “assess” window following the network operator submission of an application to NGESO for assessment.
c) If successful, the generation owner will be notified of their acceptance by means of an email that is automatically generated by the portal and sent on behalf of the network operator. The email will include the implementation deadline and sufficient information about the next steps.	Before the end of the first “accept” window following NGESO approval of an application.
d) The generation owner will populate, via the portal, the date when the change is likely to be made.	Within two weeks of receiving the acceptance email.
e) If the network operator requires to witness testing, the network operator will contact the generation owner to agree the dates after the generation owner provides the	Before the date advised by the generation owner.

² Meter Point Administration Number, also known as the Supply Number

firm proposed date when the changes will be made.	
f) The generation owner (or the owner's contractor etc) will undertake the works required and submit the evidence to the network operator.	By the implementation deadline.
g) The network operator will review the evidence submitted by the generation owner and, if acceptable, reasonably endeavour to pay ³ the generation owner. Some sites may be selected for a sample check of work done.	Within 6 weeks from the relevant implementation deadline

Applications that could not be verified by the network operator - If reasonable, network operators can work with generation owners to resolve issues that hinders the verification of the application.

Applications that are not accepted by NGESO - Verified applications that are not accepted in any "assess" window, will be automatically reassessed in the following window.

Works not complete by the implementation deadline –Generation owners failing to complete the works by the implementation deadline will be disqualified. If they wish, they may reapply for payment but will not be automatically accepted.

Independent auditing – Further site visits may be required for the purpose of independent auditing.

The payment process timeline is shown in Figure 2 from a generation owner perspective and in Figure 3 from a network operator and NGESO perspective. The detailed process timeline including all actions is in Annex 2 to this document.

³ Whereas network operators will endeavour to pay the generation owner within the timescales specified, there could be cases when it is not feasible to do so.

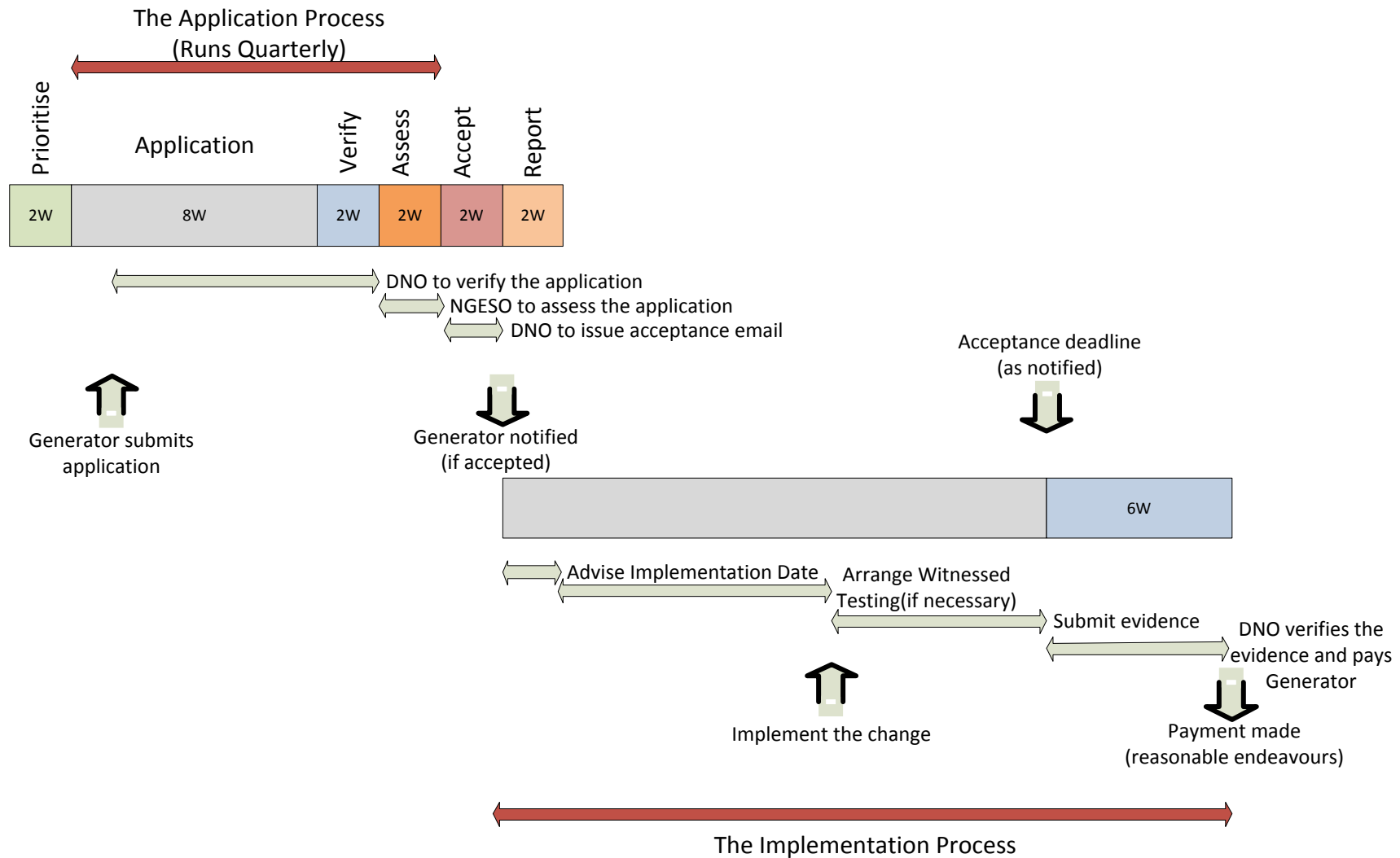


Figure 2: Payment Process Timeline - Generation Owner Perspective

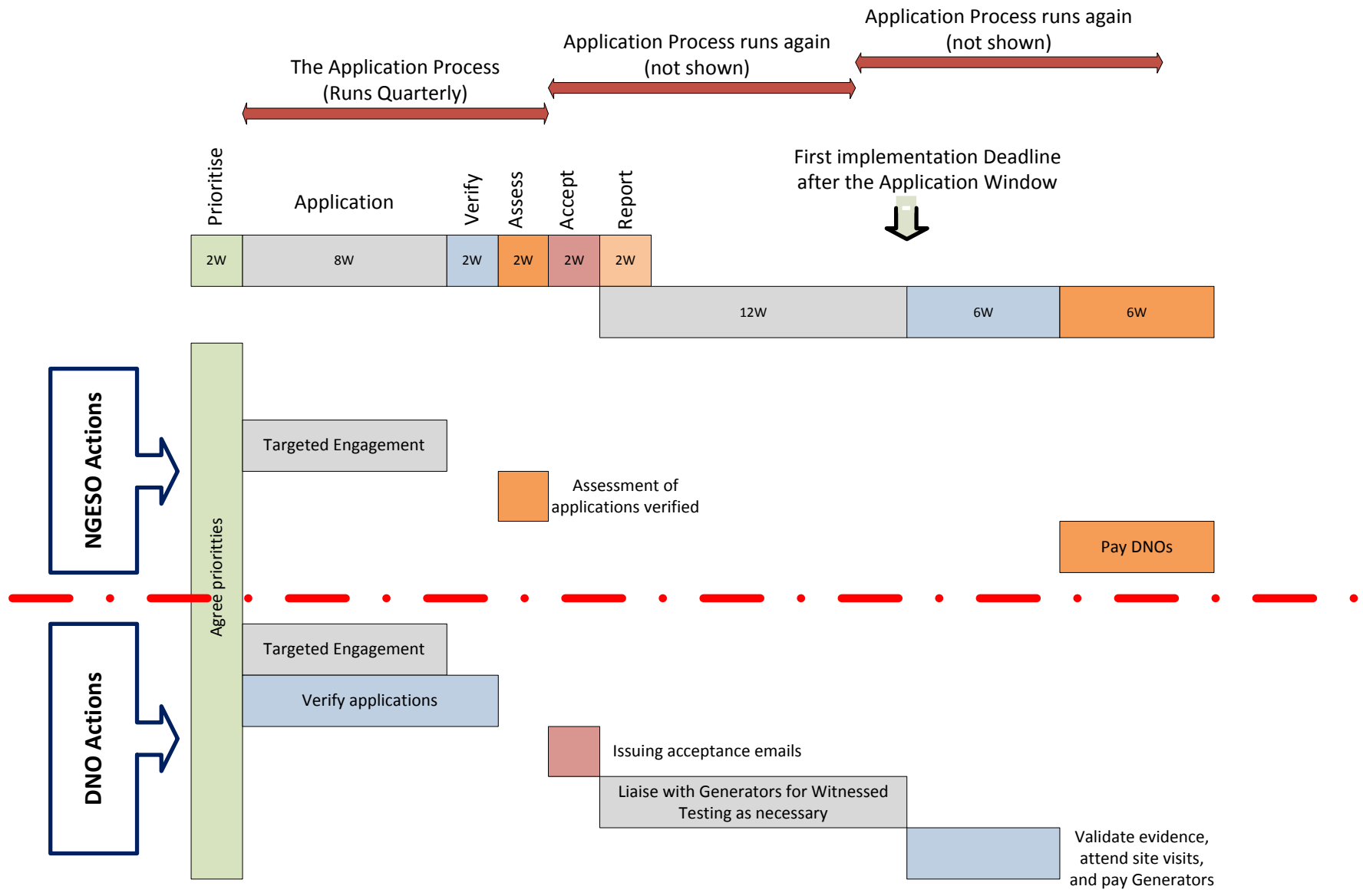


Figure 3: Payment Process Timeline (NGESO and network operator perspective)

Section Three

- Procurement Methodology

BACKGROUND

The delivery of accelerated changes to protection settings procured through the Accelerated Loss of Mains Protection Change Programme is a constraint management service for stability provided by distributed generation via network operators.

This service will be procured in line with the over-arching procurement guidelines as prescribed in Standard Licence Condition C16 of NGENSO's Transmission Licence. The detailed arrangements for the procurement of this service are set out here.

The procurement methodology is made up of the following parts:

1. Procurement principles,
2. Procurement process,
3. Procurement assessment, and
4. Market information

This procurement methodology will remain under review throughout the procurement period and will be updated where improvements to the approach are identified.

TECHNICAL REQUIREMENT

To ensure that

1. the security of supply is not reduced due to inadvertent tripping of LoM protection relays;
2. the costs incurred to facilitate the provision of such level of security of supply are reasonable; and
3. the system remains operable with the connection of greater volumes of asynchronous generation and large demand or generation connections;

it is necessary to change the LoM protection at a significant number of existing distributed generation sites to bring it in-line with the new requirements of the Distribution Code. This requires

1. Ensuring that where RoCoF protection relays are used, as part of LoM protection, the applied setting should be 1Hz s^{-1} with a definite time delay of 500ms;
2. Ensuring that VS protection technique is removed where it is in use as LoM protection; and
3. Remove/disable LoM protection from distributed generation sites, other than synchronous units and DFIG units, where a suitable RoCoF setting cannot be made without additional investment eg where a new protection relay would be required.

This obligation, pending approval by Ofgem, will come into force in April 2022. However, to maximise the value delivered, it is necessary to accelerate the implementation of these changes. To achieve this, NGENSO will procure, through network operators, that generation owners adopt the new settings at their distributed generation sites ahead of the deadline in exchange for a payment sum. Generation owners will have the opportunity to apply for this payment. These applications will be assessed and prioritised based on the assessment factors included in this document.

Should you require any further information on this technical requirement please refer to the DC0079 workgroup “Report to The Authority” available online <http://www.dcode.org.uk/the-gb-distribution-code-review-panel.html> – February 2019 Distribution Code Review Panel meeting.

QUALIFICATION CRITERIA

Generation owners must meet the following minimum criteria to be eligible to apply for this payment:

- operate in long-term parallel mode with the distribution network,
- have been connected prior to February 2018,
- have not received any previous payment to modify their LoM protection either as a part of this Programme or any other similar programmes; and
- have their LoM protection provided by either
 - o VS relays; or
 - o RoCoF relays which have settings that are more sensitive than the settings required by the Distribution Code.

PROCUREMENT PRINCIPLES

When procuring this service, the Procurement Methodology will align to the following principles:

- A clear and transparent requirement
- Enabling competition where appropriate
- Not to unduly discriminate against technology type

Clear and Transparent requirement

The technical requirement, as described earlier in this document, has been developed and reviewed by the Distribution Code workgroup DC0079 and consulted on with the wider industry.

The total number of sites and the sum of the MW capacity which need to be accelerated will depend on which generation owners apply and are accepted during the procurement process. To ensure this is transparent, progress will be published on a quarterly basis.

Enabling competition where appropriate

The simple structure of the payment scheme, with two fixed payment sums one for relay change and one for setting change, makes the payment due clear to any potential applicant and simplifies the process.

Payment will be offered through a competitive prioritisation process where each application will be considered based on its own merit as defined by a set of technical parameters and the delivery timescales according to the methodology described in the assessment section. Payment will only be made available until it is no longer economic to pay for any further change. Remaining sites will have to comply with the new requirement at their own cost.

Not to unduly discriminate against technology type

The completion of the protection modification works at any specific distributed generation site will contribute towards the reduction of the risk resulting from inadvertent tripping of LoM protection relays. This contribution is largely dependent on the output of that specific site at periods of high risk with plant which output is highly correlated with the risk being most effective.

For this programme, the correlation of the output of any specific distributed generation site and the risk of inadvertent tripping of LoM protection will be based on generation technology. Should any generation owner believe that this assumption will unduly discriminate against them they should highlight this in their application and explain any alternative factors which should be considered to determine this correlation.

PROCUREMENT PROCESS

The procurement process, as described in the Payment Process Specification, will commence as soon as practicable and continue until payment for acceleration of settings changes becomes uneconomic compared with the alternative operational tools. Generation owners interested in receiving such payment in return for accelerating their compliance with the new requirements will be invited to submit their applications to their network operator via a web portal. On a quarterly basis, applications received and verified by network operators will be assessed using the methodology in this document. If an application is successful, payment will be made to the generator subject to the completion of the works required and demonstration of compliance by the deadline specified.

On a quarterly basis, each network operator will report to NGENSO on sites that have successfully demonstrated compliance and received their payment. NGENSO will reimburse the network operator to cover the money paid for generation owners and costs reasonably incurred by the network operator in managing the process and any assurance activities.

On a quarterly basis, NGENSO will use the data provided by the network operators to review operational policy. As the volume at risk decreases the number of periods where action is required to curtail the largest loss or increase inertia in operational timescales will decrease. Reducing these actions will offer long term savings to BSUoS costs.

Throughout the process, an audit will perform checks at a range of sites to provide assurance that those sites are compliant with the new settings changes.

PROCUREMENT ASSESSMENT

The main objective is to maintain the balance of the electricity system in an efficient, economic and co-ordinated manner. Therefore, in deciding whether to accept an application, NGENSO will assess whether the cost of accepting that application is likely to be less or greater than the cost of the alternative.

For example, the cost of an application will be influenced by:

- **Number of relays per site:** the more relays per site, the greater the cost of the tender
- **Type of relay change:** changing settings of an existing relay has a lower cost than replacing an old relay with a new relay
- **The requirement of witnessing the change:** The costs required to cover a network operator's representative attending to site to witness the change will increase the overall cost of the change.

While the cost of alternatives may be made up of one or more of the following:

- **Accepting another application:** The cost of accepting an alternative application of the exactly the same merit.
- **Frequency response:** the cost of purchasing additional frequency response services to balance the additional loss caused by the inadvertent tripping of this specific distributed generation site.
- **Increasing inertia:** the cost of accepting offers in the Balancing Mechanism to allow synchronising additional synchronous plants such that the total system inertia is increased to a level that ensures that following any secured event, the rate of change of frequency remains within limits.
- **Curtailling the largest loss:** the cost of accepting bids in the Balancing Mechanism to reduce the size of the largest secured generation or demand loss such, if this loss is to occur, that the rate of change of frequency remains within limits.
- **Additional bids/offers:** the cost of accepting any additional bids/offers in the Balancing Mechanism that are required to facilitate any of the above actions while maintaining generation and demand balance.
- Any other feasible alternative.

In addition, the following factors will be taken in to account during the assessment. The order in which the factors are listed is not an indication of the relative importance of each to the others:

- **Protection type:** RoCoF and VS relays will be assessed independently due to the different nature of their operation. Subject to receiving sufficient applications related to each type, a minimum number of each type will be guaranteed to be accepted in each round to ensure both risks are mitigated simultaneously.
- **Protection setting:** For RoCoF relays only, the more sensitive a relay is, the higher its susceptibility to inadvertent operation, and the higher the value that would be delivered by changing it early in the programme.
- **Timescale to implement change:** the sooner the change, the greater the potential benefit of the application.
- **Capacity:** the higher the capacity of a power station is, the greater the reduction in risk per relay change would be.
- **Location:** for VS relays only, the closer the proximity of a power station to a large potential generation loss on the network, the worse the implications of an inadvertent tripping would be.
- **Load factor during risk periods:** the higher the output of a power station at the risk period, the greater the reduction in risk per relay change. This will be assigned based on the fuel type of the unit

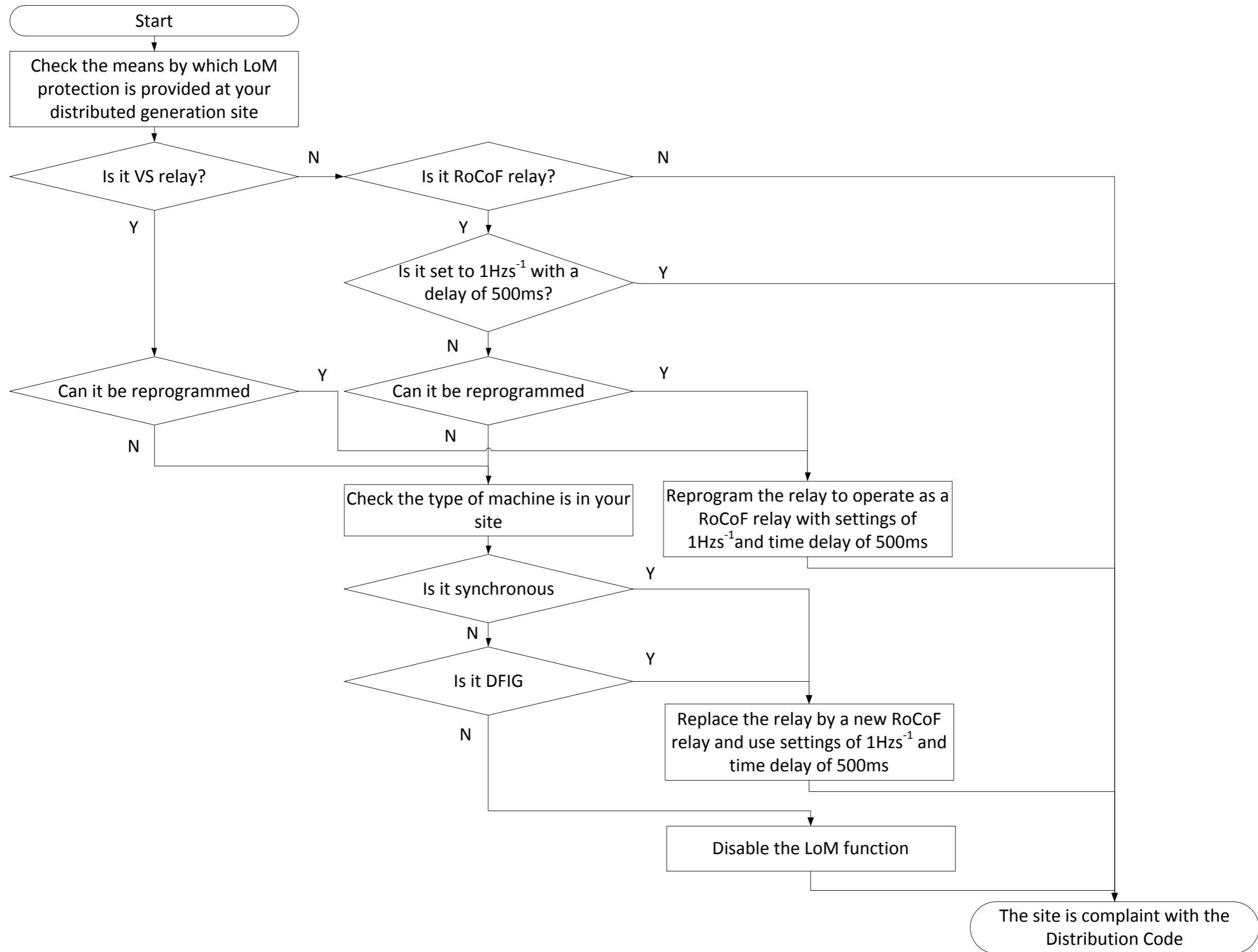
And any other factors that, in NGESO's reasonable opinion, are relevant in appraising the viability of any individual application or collection of applications submitted

MARKET INFORMATION

To provide transparency of the progress of this Programme we will publish market information on a regular basis via the NGESO website:

- Each quarter we will publish the total number of generation owners and capacity (MW) which applied and the total number of generation owners and volume accepted by each network operator.
- Each quarter we will publish the cost of the programme.
- An audit will take place to determine the extent to which loss of mains protection changes have been implemented. A summary of this audit will be published on an annual basis.

Annex 1: Determination of the Scope of Works Required for Compliance



Annex 2: Payment Process Detailed Timeline

