

# Window One Report

## Accelerated Loss of Mains Change Programme

The Accelerated Loss of Mains Change Programme (ALoMCP) is an industry led project to accelerate compliance with the new loss of mains protection requirements in the Distribution Code. It is delivered by National Grid ESO (NGESO), distribution network operators, independent distribution network operators and the Energy Networks Association (ENA) The purpose of this report is to provide a summary of the programme status following completion of the first window.

### Headlines

Good progress has been made. A total of 1933 applications were approved for window one, for a capacity of 4352MW at a cost of approximately £6m in payments to distributed generator owners.

If all approved applications are completed and proceed through the programme assurance process, there is the potential to save up to £10m in 2020/21 and in each subsequent year. There is more to do as the approved applications are just under 20% of the total number of sites believed to be in scope of the change. Further information on costs and benefits will be provided following each window.

Applications with lead time beyond 18 months were not accepted in window one. For the coming windows, applications intending to complete the works by spring 2021 will be prioritised.

Sites undertaking changes will have to ensure that any device with RoCoF/VS protection function on the site is set appropriately. This covers protection relays, any inverter controller, and any other device that is in service.

From the 1<sup>st</sup> of February onwards, the process will change for applications to physically replace a protection relay. Applications on the basis of a protection settings change or Loss of Mains (LoM) protection function deactivation are unaffected, but applications to physically replace a protection relay will only be progressed for sites with synchronous generation and doubly fed induction generation (DFIG).

Sites required to undertake the change are encouraged to take the opportunity to review all protection settings on the site, and modify them if necessary, to ensure compliance with G59/3. This precludes the Low Frequency setting of 49Hz which was observed to have affected some generation during the system incident of 9 August 2019.

Parties who submitted an application on or before 12 November 2019 should have been contacted directly to confirm the results of their individual application(s). If you have not had a response, please contact your relevant DNO/IDNO.

### Timeline

The ALoMCP portal went live on 2 October 2019. The timeline for the first application window is summarised on Table 1. The portal remained open for applications after the closing day for window one. Applications received after that date will be progressed on or before the closing day for window two.

*Table 1 – Window one timeline*

Opening Day	02.10.2019
Closing Day	12.11.2019
Pre-qualification Day	26.11.2019
Distributor Results Day	10.12.2019
Provider Results Day	24.12.2019

### Process performance

Table 2 shows the number of applications progressing at each of the process milestones. Each application included a lead time by which the changes could be made, and this has been used to give an indicative projection of when the changes accepted in window one will be completed.

Not all applications received by the DNOs/IDNOs were passed to NGENSO as some of them could not be progressed due to inconsistencies in the application.

Some DNOs/IDNOs had the capacity to process a small number of applications received between the closing day and the pre-qualification day which meant that the number of applications received by NGENSO and reported in Table 2 below were above the number of applications submitted before the window closing day.

*Table 2: Summary of results*

Window one		
Applications submitted to DNOs by the window closing day	No of applications	2031
	Total MW	5484
Applications received by NGENSO by the pre-qualification day	No of applications	2039 <sup>1</sup>
	Total MW	5315 <sup>2</sup>
Applications approved	No of applications	1933 <sup>3</sup>
	Total MW	4352

The engagement level during the 6 weeks of window one was satisfactory. Applications approved so far account for approximately 17% of the capacity required. There is still a significant number of sites which need to make these changes and the programme will continue to encourage owners of these sites to submit applications via the application portal for window 2.

61 sites have been rejected and 45 sites have been provisionally accepted subject to minor clarifications with the DNOs, the IDNOs, and the site owner. These include:

- Sites indicating that their settings are already compliant with new requirements yet claiming they require additional works to achieve that.
- Sites that should have been made compliant by the previous programme (5MW or above with RoCoF relays).

<sup>1</sup> Some DNOs/IDNOs had enough capacity to process applications received between the window closing day and the pre-qualification day

<sup>2</sup> The total capacity of applications received before window one closing day that have not been put forward by DNOs/IDNOs exceeded the capacity of applications covered by footnote 1.

<sup>3</sup> There are an additional 45 applications with a total capacity of 88MW that have been provisionally approved pending confirming some details with the DNOs/IDNOs and generation owners.

- Applications in relation to an embedded medium/large power station.
- Applications in relation to transmission connected sites.
- Sites indicating that they do not run as a long-term parallel to the system.
- Applications with no clear protection settings.
- Applications withdrawn.
- Applications that have RoCoF settings above 1Hz/s but no delay time.
- Applications with a lead time of more than 18 months.
- Applications where the number of protection devices were higher than expected for the site capacity.

The three sites where protection changes could not be completed within an 18-month period (three-year lead time was advised) were rejected with a view that they will be reconsidered if they shorten their delivery lead time. We will continue to review the number of applications we receive but we are minded to reject offers during the assessment of applications received in window two where changes cannot be made before spring 2021. Applications which can deliver before spring 2021 will be prioritised based on how soon the changes can be made.

### Value delivery

The estimates of total generation capacity currently at risk of tripping due to inadvertent operation of LoM protection is summarised in Table 3. These are informed by the standard planning data provided by DNOs on Week 24 under the Grid Code and some significant assumptions to cover for the uncertainty associated with legacy sites. These will be revised in the future to account for sites completed and of knowledge gained through the process.

*Table 3: Underlying risk estimates*

Window one		
Risk estimate (high)	Total (GW)	24
	VS component (GW)	22
	RoCoF component (GW)	2
Risk estimate (low)	Total (GW)	20
	VS component (GW)	10
	RoCoF component (GW)	10

Table 4 shows how the volume at risk of disconnection due to rate of change of frequency (RoCoF) and vector shift (VS) protection will reduce as the sites accepted during window one implement the changes required.

*Table 4: Projected risk reduction*

Delivery Milestone		Dec 19 to Mar 20	Mar 20 to Jun 20	Jun 20 to Sep 20	Sep 20 to Dec 20
	Projected RoCoF risk reduction (MW)	N/A	178.0	46.8	8.9
Projected VS risk reduction (MW)	N/A	1744.1	2018.3	179.7	85.2
Projected total risk (MW)	N/A	1922.1	2065.1	188.6	95.3

The value of the changes will be delivered in both the short and long term in the way NGESO manages the risks associated with activation of the LoM protections.

The projected short-term reduction in VS risk is expected to significantly reduce the occasions when NGESO needs to take an action to increase the system inertia to ensure that the loss of generation due to the operation of VS protection<sup>4</sup> does not trigger further generation loss due to RoCoF relays. The projected cost of such actions prior to any change in VS relays is currently within the range of £10m per annum. The projected cost after the completion of all VS changes approved in window one will drop to zero.

The projected short-term reduction in RoCoF risk following the completion of works at all sites approved in window one is not yet sufficient to influence the actions NGESO takes to manage the risk.

The targeted long-term reduction in RoCoF risk is expected to eliminate the need to take actions to ensure that RoCoF relays are not inadvertently activated. The cost of such actions in 2018/2019 was £150m. As further risk reduction is expected to be achieved in future windows, NGESO will be able to take alternative actions which will reduce these costs.

The targeted long-term reduction in VS risk is expected to further improve the reliability of supply by removing the risk altogether.

### Cost reporting

The projections of site-related costs are shown in

Table 5. These projections cover both the costs associated with the implementation, determined based on the data provided in the applications and estimates of the costs required to cover delivery assurance activities. The numbers assume timely completion of the works, completion of delivery assurance activities, and payment.

*Table 5: Projections of site-related costs*

Delivery stage	Dec 19	Dec 19 to Mar 20	Mar 20 to Jun 20	Jun 20 to Sep 20	Sep 20 to Dec 20	Dec 20 to Mar 21
No of sites completed	N/A	1066	723	84	60	
No of sites witnessed	N/A	150	95	17	12	
No of sites sampled	N/A		183	126	14	10
No of sites self-certified	N/A	733	502	53	38	
Provider payment (£m)	N/A	3.72	2.47	0.34	0.26	0.01
DNO cost (£m)	N/A	0.15	0.28	0.14	0.03	0.01
<b>Total site related cost</b>	N/A	<b>3.87</b>	<b>2.75</b>	<b>0.48</b>	<b>0.29</b>	<b>0.02</b>

### Issues to address

The percentage of applications received for a LoM protection replacement rather than reset or disablement was higher than anticipated. Concerns have been raised and noted that there is a risk that unnecessary replacement costs are being incurred at non-synchronous/non-Doubly-Fed-

<sup>4</sup> This does not cover occasions when the VS loss is compounded with other generation loss.

Induction-Generation (DFIG) sites. Based on a request from the ALoMCP steering group, the application process and the assessment process will be modified to ensure that only synchronous/DFIG sites are able to apply to replace their LoM protection. These modifications are expected to be implemented by the end of January 2020.

It has also been observed that there is some uncertainty over the need to address RoCoF and VS LoM functionality which is built-in to generation equipment (e.g. in inverter protection and/or control settings). These settings need to be modified and we are working with inverter manufacturers to explore ways of making this easier for generation owners. We will also take forward process changes to clarify requirements.

The self-certification proforma that was circulated to accepted applicants included some modifications to include the following:

- A record of all over voltage, under voltage, over frequency, under frequency, and LoM settings. This is to prompt a review of any erroneous settings on site, including the setting of 49Hz which was evidenced during the system incident of 9 August 2019.
- A field to inform the DNO/IDNO with any known issue that affects the ability of any generating unit on site to continue generation in response to a change in the system voltage or frequency.
- A requirement to list the number of devices that provide LoM protection function on site whether these are protection relays, inverter control systems, or anything else and explicitly state the number of each of these devices that required any specific change or did not require change at all.
- A checklist that requires that the provider confirms that they have completed all the works on relays, inverters, and any other device that provides LoM protection function.

### Window two

Applications can now be submitted for window two via the online portal (<http://www.ena-eng.org/ALoMCP>). Window two closing day is the 11 February 2020. Applications received afterwards will be processed within window three.

The report for window two will be published in April 2020.