Window 8 Report

Accelerated Loss of Mains Change Programme (ALoMCP)

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

Key messages

Sites representing 71% of the generation capacity within scope have either declared their compliance with G59/3-Ammendement 7 or are progressing through the ALoMCP to achieve compliance.

The remaining capacity at loss of main risk within the scope of the programme has fallen during this reporting period from 9.077 GW (05 July 2021) to 7.838 GW (29 September 2021).

The Programme has identified that the total generation capacity with VS relays was underestimated and has revised the VS base line to increase it by approximately 50%. However, we note that the increase in real time VS risk was not affected significantly by this increase as the models regularly factored in system events as part of their calibration.

Improved site protection data gathered by the programme and loss of mains changes delivered with programme support changes are already saving consumers £20m per annum. From 07 October 2021 onwards, ESO has reduced trading to the RoCoF trigger and this has become a fallback position (for example if a Dynamic Containment[1] auction fails) rather than policy. We expect to see a reduction in the ESO actions required to manage Rate of Change of Frequency (RoCoF) risk from 7.4 TWh to 0.2 TWh per year[2].

To counteract the trend of falling applications the programme has instigated additional communications and engagement activities to reach the 29% of installed generation capacity that has not yet responded to the programme. This has included increasing the urgency to act by highlighting less than twelve months remaining for generation sites to comply with G59/3-7. The programme's customer support teams have also implemented new actions to attempt to reach sites with an installed capacity of 1MW up to 50MW that have yet to respond to the programme.

The Distribution Code Review Panel has consulted on the proposed enforcement approach to be adopted once the G59/3-7 compliance deadline of 01 September 2022 has been reached and this is expected to be ratified in early 2022. The details of this will be communicated to generators that are yet to act to try and ensure compliance is achieved by the deadline.

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[1] https://www.nationalgrideso.com/balancing-services/frequency-response-services/dynamic-containment

[2] 2021-22 Mid-Year Report Executive Summary https://www.nationalgrideso.com/document/215876/download and Evidence Report: https://www.nationalgrideso.com/document/215871/download

Summary

- A total of 588 applications were approved in window 8, for a capacity of 582 MW at a cost of £1.75m in payments to distributed generation owners.
- This brings the cumulative total approved applications to 8,222 sites, for a capacity of 13,740 MW at a cost of £27.290 m in payments to distributed generation owners. Some approved applications have not proceeded through accepting the Programme's terms and conditions or have withdrawn. This attrition is illustrated in Table 2, leaving 7,065 sites with 11,973 MW capacity proceeding through the programme.
- 6,109 sites have declared completion of works at sites with a combined capacity of 10,556 MW. DNOs have validated completion of site works for 5,379 sites (8,582 MW) and 4,847 sites have now received payment[3].
- The Vector Shift baseline was recalculated in September, increasing from 12.5GW to 18.2GW. This increase was expected as there is a reverse correlation with the RoCoF baseline which was reviewed in January and has since been dropping. The 18.2GW level reflects the improved knowledge of the embedded generation fleet as a result of programme delivery and includes a margin to cover uncertainty. As further knowledge is gained, and as uncertainty drops, the level is likely to fall. The programme has delivered 7.905GW reduction in Vector Shift risk, with 10.3GW remaining at risk. Peak Vector Shift risk is now 578 MW.
- For 0.125 Hz/s RoCoF risk, over the last quarter since the window 7 reporting period, the total capacity remaining at risk has reduced by 93MW from 840 MW to 747MW. Peak risk has fallen 77MW from 476MW to 399MW.
- For 0.2 Hz/s RoCoF risk, over the last quarter since the window 7 reporting period, the total capacity remaining at risk has fallen by 154MW from 865MW to 711MW. Peak risk has fallen by 97MW from 461MW to 364MW.
- The Future Proof Your Power communications campaign, launched in spring 2021, has continued to raise awareness of the programme and in particular help owners of smaller generation sites up to 1 MW capacity to understand what action they need to take to report their existing compliance or, where necessary, to apply for support to make the required changes to Loss of Mains protection.
- 74% of all sites with a generation capacity of 5 MW up to less than 50 MW at Loss of Mains risk have applied to the programme or declared their compliance to G59/3-7.
- 968 sites with a combined capacity of 5,895 MW have self-declared their compliance without Programme funding. The Programme has launched additional functionality on its online portal that provides a convenient and consistent format for these generators to provide details of their compliant protection settings.
- Window 9 opened for applications 11 August 2021 and closed on 09 November 2021.

[3] Progress data to 29 September 2021

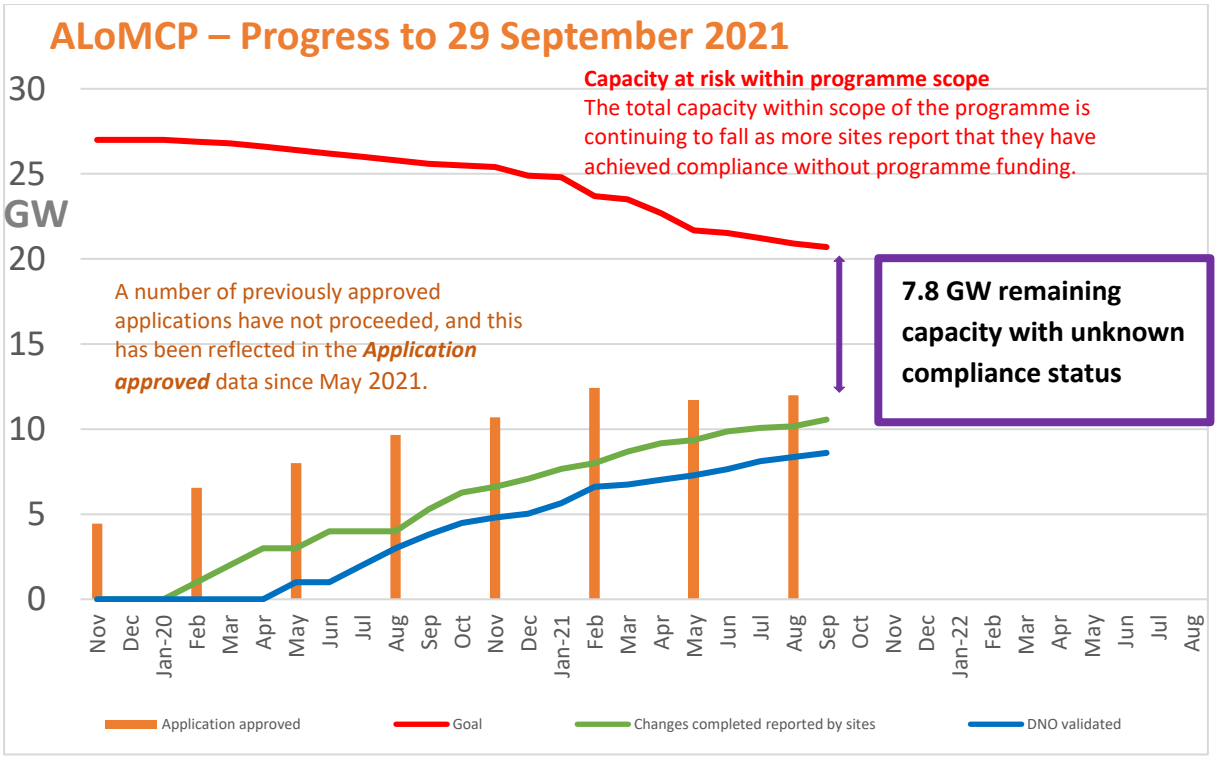

Figure 1: The progress of approved applications towards compliance by 01 September 2022 (Data at 29 September 2021)

Timeline

The schedule for window 8 is presented in Table 1. The application portal remained open for applications after the closing day for window 8. Applications received after that date will be progressed on or before the closing day for window 9.

Table 1 – Key dates for window 8

Opening Day	12.05.2021	Distributor Results Day	08.09.2021
Closing Day	10.08.2021	Provider Results Day	22.09.2021
Pre-qualification Day	24.08.2021		

Process performance

Table 2 shows the number of applications and their assessment outcome for each completed assessment window. For successful applications, it also shows their progress through each stage of the Programme. The data demonstrates at 29 September that 6,109 sites (10.56 GW) have reported completion and have submitted evidence of their site changes. This evidence has been reviewed for 5,379 sites (8.58 GW) and payment made to 4,847 sites.

The number of sites and their combined capacity applying to the programme reduced in window 8, although the number of sites and generation capacity reporting to the programme that their equipment was already compliant increased in the same period. The remaining capacity at loss of main risk has fallen from 9.077 GW to 7.838 GW in the last period.

773 applications were submitted during window 8 and 649 of these applications passed initial screening by the DNOs for formal assessment by ESO, resulting in 588 applications being accepted for a total capacity of 582 MW (Table 2).

Table 2: Summary of applications by sites, capacity, process stage and assessment window, 29 September 2021

Window		One	Two	Three	Four	Five	Six	Seven	Eight
Applications submitted to DNOs by the window closing day	Sites	2,031	1,403	1,011	793	818	1,394	1,039	773
	Total MW	5,484	3,383	2,774	2,752	2,160	2,615	1,725	908
Applications received by NGESO by the pre-qualification day	Sites	2,039	1,306	998	775	786	1,324	874	649
	Total MW	5,315	2,846	2,368	2,269	1,713	2,354	1,373	647
Applications approved	Sites	1,978	1,261	943	710	702	1,262	778	588
	Total MW	4,440	2,105	1,457	1,662	1,037	1,723	735	582
Sites accepting contractual terms	Sites	1,682	1,026	851	578	563	999	623	314
	Total MW	3,978	1,750	1,146	1,269	791	1,565	590	269
Sites self-reporting completion	Sites	1,679	1,022	848	574	550	867	460	109
	Total MW	3,977	1,712	1,141	1,267	714	1298	371	76
Evidence of completion verified by DNO / iDNO	Sites	1,660	938	792	536	470	679	264	40
	Total MW	3,835	1,328	905	1,178	538	656	124	16
Sites paid	Sites	1,614	897	750	495	405	504	172	10
	Total MW	3,716	1,203	799	1,086	384	370	96	1

Window 8 assessment led to 61 applications being rejected. The reasons for rejection and the number of instances of each were:

- Unclear LoM type / unclear RoCoF settings (47)
- Sites that do not pose any operational risk with RoCoF settings greater than or equal to 1 Hz/s, delay greater than or equal to 0.5s (12)
- Sites with a capacity of 5MW or above that failed to comply with GC0035 recommendations but are not an immediate risk (non-synchronous with RoCoF greater than or equal to 0.2 Hz/s, synchronous with RoCoF above 0.2Hz/s but below 0.5Hz/s) (2)

No eligible applications sought a lead time to complete changes beyond the compliance deadline of 01 September 2022.

The Programme's delivery assurance workstream activities are designed to provide some insight on how the changes required are being implemented. So far, 5,379 sites (8,582 MW) have had their site changes verified by their DNO/IDNO and no major issues have been identified. Some minor issues were identified by DNOs when validating the evidence provided by customers and payments were withheld whilst the minor issues identified are rectified.

DNOs/IDNOs have undertaken 528 sample site visits and witnessed 315 protection changes. The majority of the changes witnessed, i.e. to validate the Loss of Mains protection changes made, have been observed remotely due to the pandemic. A small number of minor observations have been made through this process for sites to correct, but no substantial issues have materialised.

Value delivery

Table 3 shows the estimate of the total generation capacity that requires a change in their protection settings through the ALoMCP.

The initial estimate was informed by the standard planning data provided by DNOs (known as week 24 submissions) under the Grid Code, and some significant assumptions to cover for the uncertainty associated with legacy sites.

As programme delivery proceeds it has been possible to revise the estimates drawing on data from both applications to the programme and also from the knowledge gained through engagement with sites that require no change to their LoM protection through the programme. This resulted in:

- a reduction in the difference between the high estimate and the low estimate for the total risk, and
- a reduction in the high estimate for each of the two risk components.

The figures will be reviewed as more knowledge is gained.

Table 3: Estimates of total generation capacity at risk of tripping due to inadvertent operation of LoM

		Original estimates	Revised (Oct '20)	Revised (Jan'21)	Revised (Mar'21)	Revised (July'21)	Revised (Oct'21)
High estimate	Total (GW)	24	24	25.3	23.7	21.4	20.7
	VS component (GW)	22	21	21.8	20.0	18.1	17.7
	RoCoF component (GW)	2	3	3.5	3.8	3.3	3.0
Low estimate	Total (GW)	20	22	23	21.9	20.1	19.7
	VS component (GW)	10	14.5	15.2	14.8	14.2	15.3
	RoCoF component (GW)	10	7.5	7.9	7.2	5.9	4.4

The RoCoF estimates in Table 3 include all generation capacity with existing RoCoF protection that requires updating. Some of these sites will have low RoCoF settings, e.g. 0.125Hz/s and 0.2Hz/s, that

require that their risk of tripping is managed in real time. Others will have higher RoCoF settings, e.g. 0.5Hz/s. Our estimates for the most critical RoCoF risk are shown in Table 4.

Table 4: Estimates of generation capacity with RoCoF protection at risk of inadvertent operation of LoM

	MW	Original Programme estimate	04/01/2021 estimate	05/04/2021 estimate	01/06/2021 estimate	13/10/2021 estimate
Generation tripping for RoCoF exceeding 0.125Hz/s but remaining below 0.2Hz/s	Total generation capacity	1714	1328	1183	1059	1034
	Peak risk	755	865	687	627	602
	Risk prevailing 50% of the time	349	321	286	258	248
Generation tripping for RoCoF exceeding 0.2Hz/s but remaining below 0.5Hz/s	Total generation capacity	1286	997	1093	1121	1043
	Peak risk	566	649	592	606	556
	Risk prevailing 50% of the time	262	241	238	246	225

Table 5 shows how the volume at risk of disconnection due to RoCoF and Vector Shift (VS) protection will reduce as the sites with applications approved through each window implement the changes required.

Table 5: Projected RoCoF and VS risk reduction[4]

Window	Delivery Milestone Risk reduction	Dec 2019 - 23Jun 2020	24Jun 2020 - 22Sep 2020	23Sep 2020 - 22Dec 2020	23Dec 2020 - 10Mar 2021	11Mar 2021 – 22Jun 2021	23Jun 2021 – 21Sep 2021	22Sep 2021 – 21Dec 2021	22Dec 2021 – 22Mar 2022	23Mar 2022 – 21Jun 2022	22Jun 2022 - 31Aug 2022
Previous windows	Projected RoCoF risk reduction (MW)	366.1	68.4	158.9	88.1	331.1	183.4	81.0	41.4	11.2	0.0
	Projected VS risk reduction (MW)	4,520.1	1,319.7	1,620.1	1,596.8	551.4	823.1	105.7	105.9	161.0	43.2
	Projected total risk reduction (MW)	4,885.2	1,388.2	1,778.9	1,717.1	960.7	1,174.8	248.0	295.4	180.0	43.5
Window Eight	Projected RoCoF risk reduction (MW)							68.3	1.1	0.5	0.0
	Projected VS risk reduction (MW)							349.2	23.0	39.3	16.6
	Projected total risk reduction (MW)							498.1	25.3	41.7	16.7
Overall	Projected RoCoF risk reduction (MW)	366.1	68.4	158.9	88.1	331.1	183.4	149.3	42.5	11.7	0.0
	Projected VS risk reduction (MW)	4,520.1	1,319.7	1,620.1	1,596.8	551.4	823.1	454.9	128.9	200.3	59.8
	Projected total risk reduction (MW)	4,885.2	1,388.2	1,778.9	1,717.1	960.7	1,174.8	746.1	320.7	221.7	60.2

[4] Original forecast timing of the delivery of changes, prior to any time extensions agreed as a result of the Covid-19 pandemic response

With many sites indicating completion of the works and progressing through the delivery assurance process, NGESO is modelling the risk reduction delivered by the Programme when securing the system in operational timescales. The assumed risk reduction values are shown in Table 6. These values will continue to increase as more sites indicate completion of the works and as the delivery assurance activities progress.

Table 6: Assumed RoCoF and VS risk reduction

Delivery Milestone	July 20	Sept 20	Jan 21	Mar 21	Jun 21	Oct 21
RoCoF risk reduction (MW)	82	124	216	814	1,055	1,230
VS risk reduction (MW)	1,847	3,789	4,885	5,555	6,520	7,905

The Vector Shift baseline was recalculated in September, increasing from 12.5GW to 18.2GW. This increase was expected as there is a reverse correlation with the RoCoF baseline which was reviewed in January and has since been dropping. The 18.2GW level reflects the improved knowledge of the embedded generation fleet and includes a margin to cover uncertainty.

The programme estimates that 7.905GW reduction in Vector Shift risk has been achieved, through validation of reported site protection changes and modelling for the uncertainty associated with reported completion of required works. As a result, 10.312GW is remaining at risk of tripping due to Vector Shift events as presented in Table 7. Peak Vector Shift risk is now 578 MW.

The effect of the revised baseline given in Tables 3 and 4 and risk reduction that has been achieved through the programme mean that the estimate for real time VS risk and the most critical RoCoF risk have been progressively falling as shown in Table 7. An exception to this progressive reduction is the most recent estimate for the VS risk which is attributed to the revised baseline. As further knowledge is gained, and as uncertainty drops, the level is likely to drop.

Table 7: Real time Vector Shift and the most critical RoCoF risk

	GW	Original estimate	Jan 2021 estimate	Apr 2021 estimate	Jun 2021 estimate	Oct 2021 estimate
Generation tripping for RoCoF exceeding 0.125Hz/s but remaining below 0.2Hz/s	Total generation capacity	1,714	1,116	991	840	747
	Peak risk	755	734	553	476	399
	Risk prevailing 50% of the time	349	280	243	212	173
Generation tripping for RoCoF exceeding 0.2Hz/s but remaining below 0.5Hz/s	Total generation capacity	1,286	837	931	865	711
	Peak risk	566	551	492	461	364
	Risk prevailing 50% of the time	262	210	202	190	155

Continued overleaf

	GW	Original estimate	Jan 2021 estimate	Apr 2021 estimate	Jun 2021 estimate	Oct 2021 estimate
Highest VS Only risk	Total generation capacity	12,510	7,696	7,024	6,208	10,312
	Peak risk	1,197	618	501	477	578
	Risk prevailing 50% of the time	353	280	261	237	261

The costs of delivering the programme to reduce Loss of Mains risks are significantly lower than the cost of managing LoM through other system actions that ESO takes. The cost of managing LoM risk was £144m in 2018-19 and £201m in 2019-20. In 2020-21 the cost was £345m as a result of high levels of asynchronous renewable generation, low levels of inertia and the impact of the Covid-19 pandemic response on electricity demand. Once the Programme is complete, the commercial cost of managing the issue will be removed, saving hundreds of millions per year for the end consumer.

The original forecast cost of the Programme is £100m, which will be charged through BSUoS over the relevant timeframe. The cost is included within our BSUoS forecasts alongside the cost of the balancing actions which are expected to be taken to manage this issue before it is resolved. To date, Programme costs include £27.3m allocated to approved applications from embedded electricity generators to make LoM protection changes and £3.5m expenditure in programme administration and delivery.

Since the end of 2020, the changes that the programme is making to Loss of Mains protection for 'Vector Shift only loss' risk are sufficient so that these risks are fully covered by ESO's minimum inertia policy. This has eliminated the risk of Rate of Change of Frequency (RoCoF) protection being triggered due to a Vector Shift loss alone so ESO does not anticipate the need to take actions to manage this. We have been calibrating VS risk forecast tools against the outcomes of VS events to confirm the percentage of generation tripping following an event. A recalibration of the tool confirmed that the increase in the Vector Shift risk baseline reported here is accompanied by a decrease in the percentage of generation tripping. Hence, no review of operational policies and procedures will be required as a consequence of the increase in VS baseline. The projected saving in the balancing costs is £20.0m per annum.

Compliance reported from sites without Programme support

A summary of the progress in identifying generation capacity that has self-reported its compliance with the LoM protection requirements in G59/3 amendment 7 without support from the Programme is shown in Table 8. This demonstrates that engagement activity to raise awareness of the programme and encourage applications for support to make LoM protection changes continues to provide increased visibility of sites that believe that they are already compliant. The Programme is developing a sampling approach to verify the compliance status of these sites.

Table 8: Sites self-reporting compliance without Programme support

	Pre-existing compliance – cumulative					
	July 2020	Oct 2020	Jan 2021	Mar 2021	June 2021	Sept 2021
Sites identified	34	97	223	429	634	968
MW	450	1,422	2,782	3,846	4,698	5,895

Fast-Track Scheme

A Fast-Track scheme operated from summer 2020 until 28 May 2021 to incentivise sites of capacity from 500kW to <5,000kW (initially and then extended above 5,000kW provided that other criteria were met) and with sensitive RoCoF protection (up to and including 0.2Hz/s) to complete the necessary protection changes within four weeks of acceptance by the programme. Sites meeting these criteria are paid an additional £5,000 once successful validation of evidence of completion of eligible works. Table 9 presents the scale of participation in Fast Track during its period of operation.

Table 9: Fast Track applications and completed works

	Fast Track participation – cumulative				
		Nov 2020	Jan 2021	Mar 2021	June 2021
Approved applications	Sites	35	49	72	103
	MW	51	71	199	293
Reported completion	Sites	35	45	63	103
	MW	56	64	116	293

Cost reporting

The projections of site-related costs are shown in Table 10. These projections cover the costs associated with the implementation of site changes (based on the data provided in the applications) and estimates of the costs required to cover delivery assurance activities. The table forecasts timely completion of the works, completion of delivery assurance activities, and payment.

Table 10: Projections of site-related costs

Delivery stage	Dec 2019 - 24Mar 2020	25Mar 2020 - 23Jun 2020	24Jun 2020 - 22Sep 2020	23Sep 2020 - 22Dec 2020	23Dec 2020 - 10Mar 2021	11Mar 2021 – 22Jun 2021	23Jun 2021 – 21Sep 2021	22Sep 2021 – 21Dec 2021	22Dec 2021 – 22Mar 2022	23Mar 2022 – 21Jun 2022	22Jun 2022 – 31Aug 2022	Total
No of sites completed	1,066	1,298	1,272	930	857	1,011	825	544	215	147	13	8,178
No of sites witnessed	150	95	17	75	69	81	30	42	16	12	1	588
No of sites sampled	0	183	241	251	171	158	110	100	30	25	3	1272
No of sites self-certified	733	962	1004	684	630	744	600	500	169	110	9	6145
Provider payment (£m)	3.72	5.23	4.34	3.51	3.0	2.59	2.0	1.8	0.7	0.4	0.0	27.29
DNO cost (£m)	0.15	0.22	0.21	0.26	0.19	0.12	0.06	0.02	0.02	0.02	0.01	1.28
Total site related cost (£m)	**3.87**	**5.45**	**4.55**	**3.77**	**3.19**	**2.71**	**2.06**	**1.82**	**0.72**	**0.42**	**0.01**	**28.57**
Cumulative site related cost (£m)	**3.87**	**9.32**	**13.87**	**17.64**	**20.83**	**23.54**	**25.60**	**27.42**	**28.14**	**28.56**	**28.57**	

The actual numbers of sites declaring completion, witnessed, sampled, and self-certified are given in Table 11 alongside programme costs. Programme costs are presented as DNO administration costs and site-related costs. Site costs include payments to electricity generators (providers) successfully completing approved changes through the Programme as well as DNO costs witnessing changes and undertaking sample site visits.

Table 11: Actual costs and progress to date

Delivery stage	Dec 19	Dec 2019 - 24Mar 2020	25Mar 2020 - 23Jun 2020	24Jun 2020 - 22Sep 2020	23Sep 2020 - 22Dec 2020	23Dec 2020 - 10Mar 2021	11Mar 2021 - 22Jun 2021	23Jun 2021 - 28Sept 2021	Total Cost (£m)
No of sites completed	77	1,079	817	1,382	703	602	857	592	
No of sites witnessed		108	21	88	39	12	17	30	
No of sites sampled		0	85	109	97	77	94	66	
No of sites self-certified		548	282	949	669	1426	788	717	
Provider payments (£m)	0	0.05	1.43	3.32	3.60	2.96	2.25	1.76	15.37
DNO costs (£m)	0	0.01	0.02	0.09	0.08	0.05	0.06	0.03	0.34
Total site-related costs (£m)	**0**	**0.06**	**1.45**	**3.41**	**3.68**	**3.00**	**2.32**	**1.79**	**15.70**
DNO administration costs	0.04	0.11	0.41	0.57	0.39	0.53	0.66	**0.45**	**3.17**
DNO costs not yet categorised	0	0	0.12	0.08	-0.10	0.34	0	**0**	**0.44**
TOTAL by Quarter (£m)	**0.04**	**0.17**	**1.98**	**4.06**	**3.97**	**3.87**	**2.98**	**2.24**	
TOTAL cumulative (£m)	**0.04**	**0.21**	**2.20**	**6.26**	**10.22**	**14.10**	**17.08**	**19.32**	**19.32**

Most of the site owners used recognised contractors to undertake the site works. Therefore, the number of sites where DNOs undertook witness testing of the LoM protection following the completion of the works continues to be below the projected estimates.

Total invoiced costs to the end of September 2021 totalled £19.315m. This is comprised of:

- £15.365m in payments to providers that have implemented changes at their sites.
- £0.337m for witness testing and sample site visits.
- £3.170m in DNO programme administration and delivery costs.
- £0.443m in costs not yet classified into the three categories above.

Forecast site-related costs to September 2021 (£25.6m) were £10m greater than actual site-related costs (£15.4m). The reasons for this variance include:

- A time-lag between completion of works (used to forecast the timing of costs) and the actual costs being logged. For actual costs to be recorded in Table 11, generators must have completed works; submitted evidence of completion to their DNO; the DNO to have reviewed and assured the evidence; the generator to have invoiced their DNO for the agreed costs and the DNO to have invoiced ESO for reimbursement of these costs.
- Some approved applications have been registered within the programme's forecast costs but have subsequently not proceeded through agreeing the programme's terms and conditions and delivery the required changes.

Communication and engagement

The programme continues to review, refine and deliver communications and engagement activity to reach those sites that have yet to apply or declare their compliance.

The programme received less applications than we'd have liked, particularly as this window coincided with the availability of a new digital platform aimed at supporting customers' applications. This further emphasises the importance of continuing to raise awareness of the programme to eligible customers whilst funding is still available and before 01 September 2022 when sites must be compliant with G59/3-7.

Communication and engagement activity also sought to encourage compliant sites to notify their DNO and provide details of their protection settings. This activity was particularly successful with a 50% increase in the total number of sites to have self-declared their compliance to the programme during this period, for an additional capacity of 1.2GW.

The programme's communication and engagement strategy continues to focus on two themes:

1. direct engagement by DNO customer support teams', particularly for customers with an installed capacity of 1 MW up to <50 MW, and

2. to deliver a multichannel communication campaign to reach sites with an installed capacity up to 1MW.

Highlights of each of these activity areas are presented below.

Direct engagement

Distribution Network Operators (DNOs) customer support teams continue to directly contact customer sites with an installed capacity from 1 MW up to 50 MW to encourage participation in the programme or to provide details of their existing compliance to G59/3-7.

Over 3,200 sites fall within this capacity range. 57% of these sites have now applied, with a further 12% declaring that their sites are compliant. It is estimated that almost 986 sites with a capacity of 1-50 MW are still to confirm their compliance status.

The latest baseline capacity at risk within these sites is 24.182 GW. 49% (11.853 GW) of this capacity has applied to make changes through the Programme and a further 24% (5.85 GW) has declared compliance without Programme support. 6.479 GW of capacity within 1-50 MW generation capacity sites has yet to advise the Programme of their compliance status.

DNOs Customer Support Teams' have continued to contact these remaining sites directly through email, letters and telephone as well as working with colleagues within other business functions to reach out to those customers that have not yet engaged with the programme. The Programme has implemented an additional initiative to share best practice and insight across Licensees within the Programme to reach the most challenging sites (where no response has been received despite multiple attempts). This engagement has also identified where lack of information on what action is required is delaying customer action. For example, it is taking a significant amount of time for the Programme to clarify the loss of mains protection status of specific wind turbines from the manufacturers.

Communications campaign

Our analysis shows that 1.4GW of installed capacity within tens of thousands of electricity generators with site capacities below 1MW are still to apply to the Programme or report their existing compliance. This represents 5% of the original total baseline of capacity within scope of the Programme. This represents a particular challenge as the smaller the generator the higher the likelihood that the owner is not a specialist electricity generator. Many of these sites, for example, are owned by farmers, local authorities, universities, healthcare, waste, water and other commercial and industrial organisations.

We have continued to deliver the refreshed communication campaign, with support from the agency Greenhouse PR with the objective of driving both more applications for funding into the Programme and also to encourage declaration of compliance and submission of evidence for those sites believing themselves to be already compliant.

On the user-friendly landing page (www.futureproofyourpower.co.uk), information about the ALoMCP is explained in a simple way. Customers can go to the application portal, sign up to receive a step-by-step guide for application by email and read through the FAQs about the programme. They can now also find out if they are compliant and how to submit details of this using the website. This tool will prove invaluable to helping us to identify the risk that remains.

Digital communications have included social media messaging and adverts; advertising on relevant internet search terms; and advertising on relevant websites. Messaging in early September 2021 highlighted that there was now less than one year remaining for generators to achieve compliance.

The team continues to review opportunities to reach different audience types to raise as much awareness as possible and drive generators engagement with the programme. This will include attending sector-specific conferences and exhibitions and developing ownership-sector-specific materials and messages.

To help raise more awareness about that fact we need site owners to declare their compliance status, ESO worked with Energy UK to host a webinar targeting suppliers. The programme team worked with suppliers to help raise awareness of the programme, and we provide communication tools they can use to advise their generation customers of the Programme. A newsletter for suppliers was also provided in Window 8.

We continue to publish articles too. In July, an article was published in the British Hydro Association's magazine 'Spotlight' to engage hydropower generators. In July, the project was referenced in an article on Utility Week. This highlighted a milestone the project reached during Window 8 – 10GW of sites having made the required loss of mains protection changes.

Focus Areas

The number of applications is now sufficiently high to allow us to infer the baseline RoCoF risk with an adequate degree of confidence. This will allow the actions taken by the ESO to reflect the actual level of risk on the network. Risk baseline reviews have been undertaken throughout 2021 to reflect any change in the applications and any information gathered from sites that are found to be compliant outside of the ALoMCP.

The programme continues to focus on addressing the additional risks that were identified over the last 18 months this includes:

- Approving applications to change the 0.125Hz/s and 0.2Hz/s settings at sites with capacity of 5MW or above.
- Engaging with inverter manufacturers to gather information on the inverter based LoM protection and how to update it to ensure compliance. This information is published on the ALoMCP portal. For approximately ten inverter manufacturers where the compliance status cannot be determined (e.g. where the manufacturer has ceased trading and the required information cannot be found) the Programme is considering how generators can be supported to change LoM protection to equipment that is known to be compliant.
- Engaging with wind turbine manufacturers and some generators with large site portfolios to assess the extent of the risks and the scope of the works required to identify and address any risk associated with protection installed within individual turbines. Details have been confirmed with several manufacturers and guidance published on the Programme portal. However other manufacturers have not yet confirmed the required actions for their entire turbine portfolio. The Programme continues to engage these manufacturers and impress the urgency to resolve this to ensure generators have sufficient time to achieve compliance by 31 August 2022.

The current priority is to maximise the capacity of generation that achieve compliance with the new requirements ahead of the September 2022 deadline. To achieve this, DNOs are currently focusing on direct engagement with the almost 1,000 remaining sites with capacities of 1MW up to 50MW to either establish their compliance or invite them to apply to the programme. These sites are estimated to hold 85% of the remaining capacity that is yet to engage and, if successful, will reduce the RoCoF baseline risk, increase the confidence in its value, and establish a realistic timeline to alleviate the majority of it.

A significant number of sites have achieved compliance with the new protection requirements outside of the ALoMCP. The Programme previously collated this information through direct engagement and has now improved this by providing an opportunity for generators to declare their compliance via the programme's online portal. This approach requires sites to provide the data and the evidence required for their DNO to confirm this compliance. The Programme intends to apply an assurance process to these self-declarations to increase our confidence in the data provided.

As detailed within the Communications and Engagement section, the Programme is focussed in the remaining 12 months before the compliance deadline on engaging the 29% of generation capacity within scope of the Programme that has yet to apply or confirm their compliance. With time running out Programme messaging is increasingly emphasising urgency. The Distribution Code Review Panel is also consulting on an enforcement process and once the outcome of this is clarified we will communicate this to the remaining generators who are yet to act.

As summarised earlier in this section, we continue to seek manufacturer confirmation on whether their products provide LoM protection functionality or not, the type of protection (if it exists) and how their equipment would need to be reprogrammed to meet the requirements. We are also engaging with manufacturers we have identified that have products with other forms of protection, e.g. under frequency protection that could cause unnecessary tripping of generation. The Programme's online application portal includes a knowledge base of inverter manufacturer information[5], where this has been provided and it also highlights where relevant information is still outstanding. Additional information has been secured since the last report from inverter manufacturers, though it is disappointing that several manufacturers are yet to provide a satisfactory response despite the Programme's efforts. The requested information will enable owners of inverter-based generation to understand what action they need to take in order to achieve compliance. The Programme will continue to pursue this information and will consider what further action may be required.

The programme is currently focusing on the options to address any non-compliance that remains after the September 2022 deadline. This will include the development of different scenarios with various degrees of non-compliance and the operational risks and costs associated with these scenarios. This is to allow effective prioritisation and coordinated implementation of the enforcement plan of DNOs.

[5] https://www.ena-eng.org/ALoMCP/mankb

Future applications

Applications can continue to be submitted for assessment via the registration portal (**http://www.ena-eng.org/ALoMCP**). The schedule of closing dates for application windows beyond window 8 is presented in Table 12.

Table 12: Schedule for final application windows

Application window	Closing date for applications
9	09 November 2021
10	08 February 2022
11	10 May 2022 Final closing date

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