Question No.	Proforma section	Criteria	Topic	Question	Date question asked	Date response required	Date received	Follow up to Question #	Confidential (y/n)
1	n/a	e) Partners and ext. funding,		Please provide further details on Manchester University's DTR app. How does it avoid drift if there are no thermal sensors?	23 August 2016	25 August 2016	25 August 2016		n
2	3.2	(b) value for money		With relation to Method 2 - how does increased consumer visibility of LV network alone increase their buying power?	23 August 2016	25 August 2016	25 August 2016		n
3	3.2	(b) value for money		With relation to Method 2 -how has the estimate of a 10% reduction in consumer bills via increased buying power been calculated / what assumptions were made in order for this to be realised?	23 August 2016	25 August 2016	25 August 2016		n
4	2.2	(c) Generates new knowledge		Why are trials in method 1, 2 and 3 being run on separate OpenLV platforms?	23 August 2016	25 August 2016	25 August 2016		n
5	2.2	(c) Generates new knowledge		How do Trials (in method 1, 2 or 3) demonstrate the platform's ability to run multiple apps	23 August 2016	25 August 2016	25 August 2016		n
6	Appendix J	(c) Generates new knowledge		What learning from FALCON project has been fed into OpenLV?	23 August 2016	25 August 2016	25 August 2016		n
7	Appendix J	(c) Generates new knowledge		Given that FALCON proved that combining RTTR with network meshing provides additional capacity, why are the benefits of Method 1 calculated as an alternative to network reinforcement, not an alternative to another method of network meshing based on RTTR?	23 August 2016	25 August 2016	25 August 2016		n
8	2.3.2	a) Low Carbon/ enironment and net financial benefits		Is the cost of installation of actuators included in the cost / benefits of Method 1?	23 August 2016	25 August 2016	25 August 2016		n
9	2.3.2	a) Low Carbon/ enironment and net financial benefits		How will circuits suitable for meshing be identified, and ensure that there are no overloading issues due to meshing? This would need to be done in order to select sites for installation of actuators and will likely be a manual intensive process – what process will be put in place to make this practical for wide implementation?	23 August 2016		25 August 2016		n
10	2.3.2	a) Low Carbon/ enironment and net financial benefits		What protection mechanisms will be built into the app to prevent rapid triggering of meshing and un-meshing?	23 August 2016	25 August 2016	25 August 2016		n
11	n/a	b) Value for money		The Full Submission Guidance states 'Enough information should be included in this [NPV] summary so that it can be used in conjunction with the data in the Full Submission Spreadsheet to enable the Panel to independently calculate the Net Present Value of each Method.' Please direct us to where you have provided this information in your submission.	25 August 2016	30 August 2016	30 August 2016		n
12	2.2.4	Mulitple		Section 2.2.4 mentions being able to offer "the data / platform up to third parties" but is not clear what this may involve. Please provide further details of what this will involve and how it will be managed. Will there be an agreed ceiling on licencing costs? Does this including licencing costs for hardware manufacture.	08 September 2016	13 September 2016	13 September 2016		n
13	n/a	Mulitple		Who will administer the Cloud Based Hosted Platform and is that a transferrable service that can be re-tendered occasionally? Is the platform proprietary?	08 September 2016	13 September 2016	13 September 2016		n
14	n/a	e) Partners and ext. funding		Who will be carrying out the App Store administration and is downloading the app on the specific LV-CAP device part of this service?	08 September 2016	13 September 2016	13 September 2016		n
15	n/a	Mulitple		Please provide a breakdown of background IP and its ownership that will be used by the project.	08 September 2016	13 September 2016	13 September 2016		n
16	n/a	Mulitple		Please provide a breakdown of the foreground IP that will be developed during the project and its ownership (including IP funded and developed by partners).	08 September 2016	13 September 2016	13 September 2016		n
17	n/a	Mulitple		Please indicate which items of background and foreground IP will be required to rollout the solution.	08 September 2016	13 September 2016	13 September 2016		n
18	n/a	Mulitple		What existing IP is the solution based on that will incur licence costs / fees against this project and future users?	08 September 2016	13 September 2016	13 September 2016		n
19	n/a	Mulitple		How will the IP be managed in the future, e.g. is it EATL's intention to remain the sole provider of the hardware and software (including existing IP) or will it be licenced to others?	08 September 2016	13 September 2016	13 September 2016		n
20	n/a	Mulitple		Please explain the proposed architecture of the hardware and software and in particular: o where the data gathered by the hardware platform will reside (local servers, Cloud, etc) o similarly, where will the apps reside, ie. will the apps reside on all the devices (or on some) or will they reside on a central server or somewhere else o if third parties are given signals to turn on/off devices (load and generation), where is it proposed that these are sent from (local hardware with point-to-point comms or via the web, etc) and how will they be received by the device's owner/operator	08 September 2016	13 September 2016	13 September 2016		n
21	n/a	g) Robust methodology/ready to implement		How will the privacy and rights of device owners be addressed when it comes to automated switching of their equipment?	08 September 2016	13 September 2016	13 September 2016		n
22	n/a	e) Partners and ext. funding		Please confirm the value of funding that will be spent on each project partner (incl labour and equipment costs).	08 September 2016	15 September 2016	15 September 2016		y
23	n/a	e) Partners and ext. funding		Please provide an estimation of potential benefits to project partners in the event of rollout on the GB scale as presented in the benefits estimation in appendix A.	08 September 2016	15 September 2016	15 September 2016		y
24	n/a	e) Partners and ext. funding		Please provide a justification of the level of contribution to the project from each project partner. The response should consider partner cost to the project and the potential to benefit post project.	08 September 2016	15 September 2016	15 September 2016		y
25	Multiple	b) Value for money	Direct Benefits	At various points within the Full Submission, benefits to the DNO from Methods 1 and 3 are mentioned (e.g. pp. 19, 34, Appendix A4). Please explain why you have not identified any Direct Benefits in your submission.	13 September 2016	15 September 2016	15 September 2016		n
26	2.3.2	g) Robust methodology/ready to implement	Sample size	Please expand on the rationale for trialling 60 devices for Method 1. What impact on the robustness of the learning could decreasing or increasing this number have?	13 September 2016	15 September 2016	15 September 2016		n
27	9	g) Robust methodology/ready to implement	SDRCs	The guidance states that SDRCs should be at least annual. In your resubmission, please consider an appropriate SDRC to report in the gap between SDRCs 3 and 4.	13 September 2016	N/A - resubmission	n/a		n

28	Appendix A4	a) Enviro+consumer bens	Asset life	Is the technology expected to function for 30 years without replacement/repair? Figure 1 in Appendix A4 suggest a 10-year life but it is unclear if this assumption underlies the figures.	13 September 2016	20 September 2016	20 September 2016		n
29	Appendix A1	b) Value for money	Costs	Please provide more detail on the data presented in A1 on the types of costs (fixed, transitional, recurring) and benefits.	13 September 2016	20 September 2016	20 September 2016		y
30	Appendix A1	b) Value for money	Costs	Please provide more detail on the assumptions and the derivation of the £2.5m 4-year cost for Method 1 in Appendix A1.	13 September 2016	20 September 2016	20 September 2016		y
31	3.2	a) Enviro+consumer bens		Method 1: Please clarify how the risk of failure (technology not functioning as expected) has been taken into account.	13 September 2016	20 September 2016	20 September 2016		n
32	3.2	a) Enviro+consumer bens		Given the low customer engagement in the retail market what is the rationale for non-linear increase in community engagement at the wholesale level.	13 September 2016	20 September 2016	20 September 2016		n
33	n/a	b) Value for money		During the Expert Panel session, a request was made to provide a break-even analysis.	n/a	n/a	15 September 2016		n
34	n/a	a) Enviro+consumer bens		How much of the capacity and carbon savings are truly NET ADDITIONAL to GB?	20 September 2016	22 September 2016	22 September 2016		n
35	n/a	a) Enviro+consumer bens		Will there be a provision integral to all the agreements with communities that where the thermal limit of the system is exceeded, WPD retains the right to disconnect the demand? What about vulnerable/priority customers?	27 September 2016	29 September 2016	29 September 2016		n
36	n/a	b) Value for money		During the Expert Panel session, a request was made to provide a break-even analysis, split by Method.	n/a	n/a	07 October 2016		y

Electricity Network Innovation Competition Full Submission

Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	001
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please provide further details on Manchester University's DTR app. How does it avoid drift if there are no thermal sensors?		
Notes on question	N/A		
Answer	Manchester University's DTR App has been developed by running and monitoring an LV transformer in a laboratory environment. This laboratory testing utilised temperature probes. The laboratory testing has enabled Manchester Univerisity to develop a DTR algorithm that predicts the internal temperature of the oil within the transformer based on an external temperature sensor. The results of this ongoing work have not yet been published, however we are able to provide additional information on the approach if required. For the OpenLV Solution temperature sensors will be utilised that measure the surface temperature of the transformer casing as outlined in Appendix H: "Transformer temp. sensor: Measures the surface temperature of the transformer casing". We therefore do not anticipate any issues with drift.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	002
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	3.2		
Topic	N/A		
Question	With relation to Method 2 - how does increased consumer visibility of LV network alone increase their buying power?		
Notes on question	N/A		
Answer	At the current time, neither consumers or suppliers have any visibility of aggregate demand at a local LV substation or the profile of this demand. Having visibility of the aggregate demand and the timing of this aggregate demand will enable both consumers and suppliers to assess the potential value of the "buying power" for communities. Providing the data will enable consumers, should they so wish, to determine cost savings that could be made by grouping together to seek prices from Suppliers. For example, in a situation where there is significant local demand at times of low national demand, why should those customers pay average national rates? Method 2 will therefore will enable the degree to which increased consumer visibility of LV network will increase their buying power to be quantified.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
<u>*Supplementary Answer Form*</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	003
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	3.2		
Topic	N/A		
Question	With relation to Method 2 -how has the estimate of a 10% reduction in consumer bills via increased buying power been calculated / what assumptions were made in order for this to be realised?		
Notes on question	N/A		
Answer	The estimate of a 10% is based on a fraction of the typical savings that can already be achieved through community switching programmes and aggregate purchase schemes. An example of such a scheme can be found here: https://communityenergyswitch.org.uk/frequently-asked-questions/. Typical customer savings are quoted as £300 a year - using aggregated demand alone. It is expected that Method 2 would enable further savings by using local balancing to further reduce energy supply costs and DUoS charges. The benefit has therefore been based on a conservative estimate and Method 2 will enable the degree to which increased consumer visibility of LV network will deliver savings to be quantified.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	004
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	2.2		
Topic	N/A		
Question	Why are trials in method 1, 2 and 3 being run on separate OpenLV platforms?		
Notes on question	N/A		
Answer	The OpenLV platform is common to all Methods, with only the deployed Apps differing at each site i.e. there will be a common intelligent substation device (hardware) and common LV-CAP Operating System (Software) deployed in each location. In answering this question, we have therefore assumed that by "separate OpenLV platforms", the questioner is referring to the separate substation locations for each method. At the time of writing, we cannot be confident that the locations that are identified as suitable for Method 1 will also be suitable for Method 2 or Method 3; in fact, it is highly likely that the locations will be different. We have therefore made provision to deploy the platform at separate locations to ensure maximum learning from all three Methods.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	005
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	2.2		
Topic	N/A		
Question	How do Trials (in method 1, 2 or 3) demonstrate the platform's ability to run multiple apps		
Notes on question	N/A		
Answer	As part of Method 1 the following Apps will run on the platform: 1) WeatherSense (DTR App), 2) LoadSense (App to respond to outputs from WeatherSense and network load), 3) Switch Control App (to communicate with the actuators to control mashing of the network, 4) Nortech Communications App and 5) Lucy Electric Communications App. Therefore five Apps will be deployed on each intelligent substation device as part of Method 1.

Methods 2 and 3 will specifically focus on the needs of individual communities or organisations i.e. a single App to serve a specific need. As part of Method 2 and Method 3 the following Apps will be deployed: 1) Specific App for the community or organisation, 2) Nortech Communications App to manage the device through the Application Deployment Server and 3) Lucy Electric Communications App to provide data back to the Cloud Based Hosted Platform. Additional Apps may be deployed if required, for example, if a 3rd Party App requires network load data then LoadSense will be deployed to provide the required data to the 3rd Party App. Therefore a minimum of three Apps will be deployed on each intelligent substation device as part of Methods 2 and 3.

We believe that the above approach will demonstrate the platform's ability to run multiple Apps. | | |

Attachments	N/A

Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	006
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	Appendix J		
Topic	N/A		
Question	What learning from FALCON project has been fed into OpenLV?		
Notes on question	N/A		
Answer	The EATL team has had dialogue with the team responsible for the delivery of the engineering trials to further understand the work undertaken by FALCON and discuss the learnings in relation to the installation, testing and trialling of the techniques (meshing/RTTR). With regard to meshing/RTTR, it is important to note that FALCON simulated the potential benefits of dynamic asset ratings and meshed networks on the HV network, not the LV network. Not only are the load profiles on an LV network very different (leading to significant differences in benefit), but also the relative cost of conventional reinforcement is different to that for HV. A key aim of Method 1 is to take learning from FALCON and ensure the the techniques established at HV can be cost-effectively applied to LV networks.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	007
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	Appendix J		
Topic	N/A		
Question	Given that FALCON proved that combining RTTR with network meshing provides additional capacity, why are the benefits of Method 1 calculated as an alternative to network reinforcement, not an alternative to another method of network meshing based on RTTR?		
Notes on question	N/A		
Answer	During FALCON, the SIM was run to combine techiques on an "open basis" so that the best result was produced. Many combinations were of course possible and these simulations indicated that combining RTTR with meshing could provide additional capacity on the HV network. The physical trial did not include this combination and additional tests are required before this solution can be considered as proven for HV. FALCON did not assess whether such techniques are cost effective on LV networks: not only are the load profiles and interconnection arrangements on an LV network very different (leading to significant differences in benefit), but also the relative cost of conventional reinforcement is different to that for HV. As a result, RTTR/meshing soultions are not yet generally available or widely deployed at LV. We believe it is therefore appropriate to measure the benefits of Method 1 against the reinforcement options that are currently available to DNOs. OpenLV Method 1 focusses on bringing the techniques described in FACLON to the LV network at a cost that is competitive with conventional LV reinforcement and to generate the learning required to fully assess the		

	potential benefits of this approach to the LV network.
Attachments	N/A

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	008
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	2.3.2		
Topic	N/A		
Question	Is the cost of installation of actuators included in the cost / benefits of Method 1?		
Notes on question	N/A		
Answer	Yes the costs for both the equipment and installation of the actuators is included in the project costs.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	009
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	2.3.2		
Topic	N/A		
Question	How will circuits suitable for meshing be identified, and ensure that there are no overloading issues due to meshing? This would need to be done in order to select sites for installation of actuators and will likely be a manual intensive process – what process will be put in place to make this practical for wide implementation?		
Notes on question	N/A		
Answer	For OpenLV, the suitable circuits will be initially identified using learning generated from the LV Network Templates project (as outlined in Appendix G). Data collated as part of the FALCON and LV Network Templates projects will be made available to identify potential trial sites for the OpenLV project. This data includes network demand data in South Wales and Milton Keynes and will be used together with local knowledge. The questioner is correct in identifying that this is likely to be a manual intensive process and provision has been made for this activity under Task 81 of the project plan. At the current time it is not possible to say what process will be put in place beyond the end of the project to enable wider implementation. However, it is expected that learning generated by the project and published as part of SDRC-5 will provide the valuable information that is needed to enable a more efficient process to be devised.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	010
Question date	23/08/16	Answer date	25/08/16
Submission section question relates to	2.3.2		
Topic	N/A		
Question	What protection mechanisms will be built into the app to prevent rapid triggering of meshing and un-meshing?		
Notes on question	N/A		
Answer	The LoadSense App will monitor the load on the network for each of the paired substations. This App will incorporate the necessary protection mechanisms identified by the questioner and will be developed with input from relevant WPD staff on the OpenLV project. The development of the LoadSense App will result in foreground IP generated by the OpenLV project and will therefore be published and available for inspection by other UK DNOs. This should providethe necessary level of confidence that all necessary protection mechanisms have been incorporated.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	011
Question date	25/08/16	Answer date	30/08/16
Submission section question relates to	N/A		
Topic	N/A		
Question	The Full Submission Guidance states 'Enough information should be included in this [NPV] summary so that it can be used in conjunction with the data in the Full Submission Spreadsheet to enable the Panel to independently calculate the Net Present Value of each Method.' Please direct us to where you have provided this information in your submission.		
Notes on question	N/A		
Answer	The baseline assumptions used in the calculation of the NPV of each Method are stated in Section 3.2 and the NPV of each Method was calculated using Transform Model® runs. The model parameters used are shown in Figure 1 of Appendix A4. The summary results of these runs are shown in Tables 1 & 2 of Section 4, in the form of forecast uptake numbers and associated capacity release. These numbers were then used to determine the NPV of each Method. The Transform Model® is used to help network operators, regulators and policy makers to understand the levels of investment required in order to meet the challenges of customers adopting new technologies. However, given the complexity and size of the model, we have not provided a full copy of the model via the FSP submission process. If required, we would be willing to provide you with a copy of the full model used so that you can arrange to perform your own runs of the model.		

Attachments	N/A

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	012
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	2.2.4		
Topic	N/A		
Question	Section 2.2.4 mentions being able to offer "the data / platform up to third parties" but is not clear what this may involve. Please provide further details of what this will involve and how it will be managed. Will there be an agreed ceiling on licencing costs? Does this including licencing costs for hardware manufacture.		
Notes on question	N/A		
Answer	This data will include: • Current substation loading • Currently available substation capacity Additional details of how this data will be used by the Project can be found in sections 2.3.2, 2.3.3 & 2.3.4 of the Full Submission Proforma. We expect this data to be owned and managed by the host DNO. There is no agreed ceiling for licencing costs for access to this data, however we expect this will be kept as low as possible in order to encourage App development on the LV-CAP platform. There are no licencing costs for the hardware manufacturer within the project. However, we expect OEM licences to be available beyond the end of the project to enable the platform to be bundled with substation hardware. Any costs relating to 3rd party applications and charges for the data produced by them will be additional to the costs of the platform and hardware.		

| Attachments | N/A |

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	013
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Who will administer the Cloud Based Hosted Platform and is that a transferrable service that can be re-tendered occasionally? Is the platform proprietary?		
Notes on question	N/A		
Answer	During the project the Cloud Based Hosted Platform (as defined in Appendix H) will be managed by EA Technology and supported by the relevant technology provider. For the OpenLV project, this service is being provided by Lucy Gridkey. Beyond the project it is envisaged that this platform will be managed by the host DNO with the option to subcontract the services as required. The platform deployed by the project is proprietary. However, the Cloud Based Hosted Platform is defined by the communications container deployed to LV-CAP. It is therefore replaceable and can be provided by any supplier that complies with the API specification. We therefore expect other third party solutions to emerge, post-project, as the market requires.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	014
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Who will be carrying out the App Store administration and is downloading the app on the specific LV-CAP device part of this service?		
Notes on question	N/A		
Answer	During the project, all app deployment will be managed by EA Technology. This includes hosting the applications and downloading to specific LV-CAP devices. Post project, we expect the market to provide additional options for DNO procurement.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	015
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please provide a breakdown of background IP and its ownership that will be used by the project.		
Notes on question	N/A		
Answer	The breakdown of background IP and ownership is available in the Full Submission Proforma, in Section 5.3, Table 6, on page 32. The background IP is detailed in items IP001 – IP007.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	016
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please provide a breakdown of the foreground IP that will be developed during the project and its ownership (including IP funded and developed by partners).		
Notes on question	N/A		
Answer	The breakdown of foreground IP and ownership is available in the Full Submission Proforma, in Section 5.3, Table 6, on page 32. The foreground IP is detailed in items IP008 – IP010.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	017
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please indicate which items of background and foreground IP will be required to rollout the solution.		
Notes on question	N/A		
Answer	The OpenLV solution (as defined in Section 2.1.3) requires the minimum following IP for rollout (as defined in Section 5.3, Table 6): - Background IP in IP001, IP002 - Foreground IP in IP010 In addition, background IP003 – IP004 (or a 3rd party equivalent) will be required to enable containers to be deployed and communicated with. Alternative solutions to IP003 and IP004 with equivalent functionality could be sourced from the market if required.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	018
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	What existing IP is the solution based on that will incur licence costs / fees against this project and future users?		
Notes on question	N/A		
Answer	Within the project, licensing costs are payable for IP001 through to IP006 (as defined in Section 5.3, Table 6). Beyond the project, licensing costs will be incurred as a minimum against items IP001 and IP002. Further licensing costs would be incurred for items IP003 and IP004, unless an alternative 3rd party equivalent is sourced from the market. The required foreground IP in IP010 will be made available in accordance with the default IP arrangements for NIC projects.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	019
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	How will the IP be managed in the future, e.g. is it EATL's intention to remain the sole provider of the hardware and software (including existing IP) or will it be licenced to others?		
Notes on question	N/A		
Answer	As described in Appendix L of the bid document, EA Technology expects the hardware platform to be provided by a range of parties (including OEMs). EA Technology and Nortech would license the minimum requirements of the OpenLV Solution software (IP001 & IP002 as defined in Section 5.3, Table 6) to 3rd parties as required. We would expect any additional required functionality (and IP) to be provided by the market.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	020
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please explain the proposed architecture of the hardware and software and in particular: o where the data gathered by the hardware platform will reside (local servers, Cloud, etc) o similarly, where will the apps reside, ie. will the apps reside on all the devices (or on some) or will they reside on a central server or somewhere else o if third parties are given signals to turn on/off devices (load and generation), where is it proposed that these are sent from (local hardware with point-to-point comms or via the web, etc) and how will they be received by the device's owner/operator		
Notes on question	N/A		
Answer	The data gathered by the hardware platform will reside locally on the device and will be communicated remotely to the cloud. The 'running copies' of Apps will reside only on the devices where they are deployed. The 'master copies' of all Apps will reside on the Application Deployment Server. Where necessary, the platform may communicate directly with local switching hardware via the appropriate App. However, we expect the majority of such control to be carried out by external hardware responding to messages sent from the appropriate App on the LV-CAP platform, either via point-to-point communications or via the cloud.		

	The most appropriate mechanism will be determined on an application-by-application basis.
Attachments	N/A

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	021
Question date	08/09/16	Answer date	13/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	How will the privacy and rights of device owners be addressed when it comes to automated switching of their equipment?		
Notes on question	N/A		
Answer	The LV-CAP platform is designed to be open and enable market mechanisms to determine the best approach. OpenLV does not mandate any mechanism for this process. We will engage with device owners as required and where appropriate under Methods 2 and 3 to determine acceptable mechanisms. Building on the learning from this project, we expect the market to determine the most appropriate manner to manage this issue.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	022
Question date	08/09/16	Answer date	15/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please confirm the value of funding that will be spent on each project partner (incl labour and equipment costs).		
Notes on question	N/A		
Answer	**Please note that this response is confidential and should not be published.** In answering this question, we have assumed that value of funding that will be spent is the NIC Funding Request plus the Network Licensee Compulsory Contribution, representing a total of £5.4m. The figures below, detailed by Partner and Ofgem Category, therefore exclude the External Funding to the Project made by EA Technology. The following funding will be spent on project partners: **WPD** - Labour - ▮▮▮▮▮▮ - Travel & Expenses - ▮▮▮▮▮▮ **EA Technology** - Contractors - Labour - ▮▮▮▮▮▮ - Travel & Expenses - ▮▮▮▮▮▮ - Equipment - ▮▮▮▮▮ - IT - ▮▮▮▮▮ - Decommissioning - ▮▮▮▮		
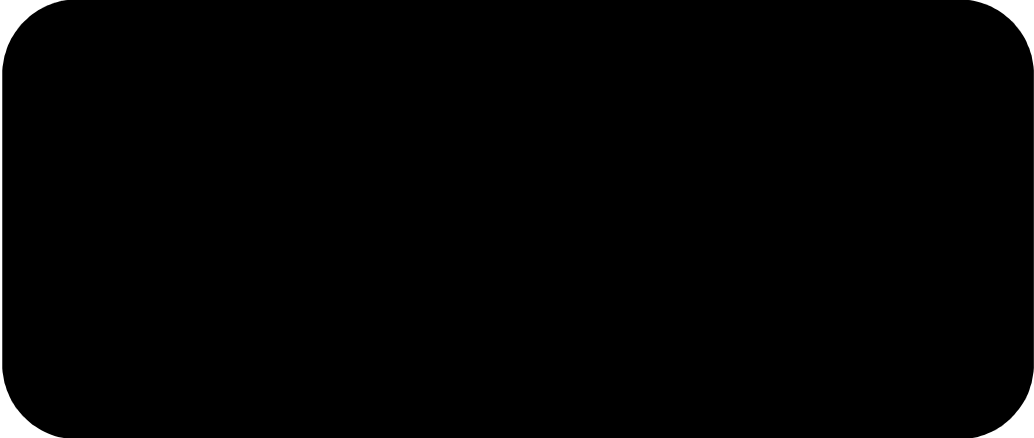
	In addition, the following funding will be spent on project suppliers:
	Nortech
	• Equipment - ▮▮▮▮▮▮
	Lucy Electric
	• Equipment - ▮▮▮▮▮▮
	Marketing, PR & Dissemination supplier to be tendered
	• Contractors - ▮▮▮▮▮▮
	Community Engagement Specialist to be tendered
	• Contractors - ▮▮▮▮▮▮
	System Security Specialist supplier to be tendered
	• Contractors - ▮▮▮▮▮▮
	LV-Cap™ Hardware Provider to be tendered
	• Equipment - ▮▮▮▮▮▮
	All partners or suppliers as required
	• Contingency - ▮▮▮▮▮▮
Attachments	N/A

Electricity Network Innovation Competition Full Submission
<u>*Supplementary Answer Form*</u>

Project: OpenLV

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	023
Question date	08/09/16	Answer date	15/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please provide an estimation of potential benefits to project partners in the event of rollout on the GB scale as presented in the benefits estimation in appendix A.		
Notes on question	N/A		
Answer	The benefit to EA Technology of the rollout of LV CAP devices in line with the levels described in Appendix A is to deliver a revenue of £▮▮▮▮ by 2050. This is calculated from a licensing revenue for the IP for each deployed LV CAP device, as per the projections, and also revenue for deploying the components of the 'Uplift' solution which is being trialled in Method 1. It should be noted that the expected breakeven point for EA Technology is ▮▮▮▮ i.e. a ▮▮▮▮ year period, with the majority of these benefits accruing beyond 2040 The following chart shows a break-even analysis indicating the net benefit to EA Technology through to 2033.		

	No other project partners are named in the bid.
Attachments	N/A

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	024
Question date	08/09/16	Answer date	15/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Please provide a justification of the level of contribution to the project from each project partner. The response should consider partner cost to the project and the potential to benefit post project.		
Notes on question	N/A		
Answer	EA Technology is contributing £462,610 towards the project cost and is expected to recover this cost through licensing of IP arising from LV CAP deployments by ▇▇▇▇, i.e a ▇▇▇▇ period as illustrated in the response to Question Number 023. The total EA Technology cost to the project is £▇▇▇ meaning that this constitutes a contribution of ▇▇▇ %. EA Technology is an established SME with a turnover of approximately £20m and a track record in delivery of projects such as this. It has already invested some of its own funds to enable the initial development of LV CAP via an InnovateUK project. For the avoidance of doubt, this additional investment is not included in the £462,610 project contribution. EA Technology believes that its level of contribution is commensurate with the anticipated project cost, benefits and timescales.		

Attachments	N/A

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	025
Question date	13/09/16	Answer date	15/09/16
Submission section question relates to	Multiple		
Topic	Direct Benefits		
Question	At various points within the Full Submission, benefits to the DNO from Methods 1 and 3 are mentioned (e.g. pp. 19, 34, Appendix A4). Please explain why you have not identified any Direct Benefits in your submission.		
Notes on question	N/A		
Answer	The benefits identified to the DNO in the submission are all post-project. WPD have stated that they will not be installing the OpenLV system on any networks currently due for reinforcement/upgrade within the project period. If any such networks are identified during the selection process, they will be rejected. Until OpenLV is proven through Method 1 to release extra capacity, WPD believe it would not be prudent to use it. We therefore expect no Direct Benefits to WPD during the project.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	026
Question date	13/09/16	Answer date	15/09/16
Submission section question relates to	2.3.2		
Topic	Sample size		
Question	Please expand on the rationale for trialling 60 devices for Method 1. What impact on the robustness of the learning could decreasing or increasing this number have?		
Notes on question	N/A		
Answer	In determining the number of devices to be trialled, we have drawn on learning from previous LCN Fund projects, notably WPD's LV Network Templates.		
	This work identified that LV networks could be classified as one of ten types. The OpenLV project will seek to test Method 1 on eight of these types. The two that were deemed unsuitable were feeders supplying 'lighting' and 'industrial flats'. Further explanation of this rationale can be found in Appendix G.		
	In order to test sufficient numbers and allow for variability between networks to ensure replicability across GB, Method 1 will test three of each type (which will account for 24 circuits) and have a reserve of 20% (i.e. another 6 circuits) to provide the necessary level of contingency and resilience to ensure the SDRC-2 and SDRC-4 output criteria can be met. Each circuit requires two LV CAP deployments, making a total of 60 devices.		

	Reducing this number would significantly increase the risk that SDRC-2 and SDRC-4 could not be delivered and potentially reduce the project's ability to ensure replicability across GB. Increasing the number will add greater statistical significance at additional cost. However, this would not add any extra learning to the project. It was therefore determined that 60 devices constitutes an appropriate balance between project cost and quality of learning outputs.
Attachments	N/A

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	027
Question date	13/09/16	Answer date	N/A
Submission section question relates to	9		
Topic	SDRCs		
Question	The guidance states that SDRCs should be at least annual. In your resubmission, please consider an appropriate SDRC to report in the gap between SDRCs 3 and 4.		
Notes on question	N/A		
Answer	Noted and amended, in the re-submitted bid document, to ensure SDRCs are scheduled annually.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	028
Question date	13/09/16	Answer date	20/09/16
Submission section question relates to	Appendix A4		
Topic	Asset life		
Question	Is the technology expected to function for 30 years without replacement/repair? Figure 1 in Appendix A4 suggest a 10-year life but it is unclear if this assumption underlies the figures.		
Notes on question	N/A		
Answer	The technology is assumed to have a 10-year life. By way of further explanation, the Transform Model® modelling process tests for the continued applicability of the solution at the end of its expected life. This recognises that solution deployment may be only temporary, e.g. managing increasing load through Method 1 may defer replacement for as long as possible, but not indefinitely. Therefore, the solution is re-assessed after 10 years and re-deployed only if it continues to represent the most cost effective solution. This assumption is included in the Transform Model® modelling parameters and underlies the figures.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	029
Question date	13/09/16	Answer date	20/09/16
Submission section question relates to	Appendix A1		
Topic	Costs		
Question	Please provide more detail on the data presented in A1 on the types of costs (fixed, transitional, recurring) and benefits.		
Notes on question	N/A		
Answer	For all Methods, we have assumed that each deployment of the LV-CAP platform costs £ ▓▓▓▓ per substation. Details of the Method 1 solution are provided in Appendix A4, which show that it has a total capital cost of £ ▓▓▓▓. This means it requires an additional capital outlay of £ ▓▓▓▓ for the installation, together with an annual operating cost of £ ▓▓▓▓. For Method 2, we have assumed that any costs relating to the deployment are integral to the community scheme and that these costs are factored in to the net benefit returned to the community. Therefore there are no additional costs in the model. For Method 3, the additional costs are for the provision of the associated apps. For the purposes of modelling, we have assumed this to be a single app at a cost of £ ▓▓▓▓.		

| | In order to determine the benefits for Method 1, it is necessary to consider the difference in two investment outcomes: one without Method 1 and one with. The Transform modelling used for the first option assumes that network operators have access to *all* conventional solutions (such as new cable and substations) and *all* smart solutions (such as storage and demand response), with the exception of the solution being trialled in Method 1. The model then selects the most economically efficient solution (from a range of approximately 80) to solve network problems as they arise. Each solution has a capital cost and an operating cost that varies in accordance with the projected cost of each solution.

This analysis determined the total investment necessary (in totex terms) on the network without Method 1. It was then re-run with the only difference being that the solution of Method 1 was also available in the range of solution options. The difference in total investment between the first run and the second run showed the benefit that accrues as a result of Method 1 over the period to 2050.

Method 2 is concerned purely with the benefits accruing to customers as a result of being able to use collective purchasing power to reduce electricity bills. The benefits accrue directly to customers through a reduction in energy bills, as described in Section 3.2 of the bid document.

For Method 3, the benefit is calculated against the cost of deploying bespoke solutions into substations, which is assumed to be £█████. Using a similar approach to that described for Method 1, multiple Transform Model® runs were used to evaluate this benefit.

If required, we would be willing to provide you with a copy of the full Transform Models used so that you can arrange to perform your own runs of the model. |
| Attachments | N/A |

Electricity Network Innovation Competition Full Submission

<u>*Supplementary Answer Form*</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	030
Question date	13/09/16	Answer date	20/09/16
Submission section question relates to	Appendix A1		
Topic	Costs		
Question	Please provide more detail on the assumptions and the derivation of the £ ▉▉▉ m 4-year cost for Method 1 in Appendix A1.		
Notes on question	N/A		
Answer	The £ ▉▉▉ 4-year cost for Method 1 in Appendix A1 is derived from the Project budget calculations developed to produce the 'Full Submission Spreadsheet.' Each line item within the project plan was assigned to either one of the three methods, or determined to be an 'enabling' activity, necessary for the project as a whole to be delivered. The £ ▉▉▉ 4-year cost is determined by the cost for all Method 1 activities, and 1/3rd of the cost of all enabling activity. In the interest of completeness, the values are also included for methods 2 and 3. |	Method Costs	Redistribution of enabling activites | |---|---|---| | **Enabling activities** | £ ▉▉▉ | £ ▉▉▉ | | **Method 1** | £ ▉▉▉ | £ ▉▉▉ | | **Method 2** | £ ▉▉▉ | £ ▉▉▉ | | **Method 3** | £ ▉▉▉ | £ ▉▉▉ | | **Total** | £ 5,445,598.33 | £ 5,445,598.33 | The details, mapped against the task lines within the 'Full Submission Spreadsheet' are available within the Annex titled " ▉▉▉ ".		

| Attachments | N/A |

Electricity Network Innovation Competition Full Submission
Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	031
Question date	13/09/16	Answer date	20/09/16
Submission section question relates to	3.2		
Topic			
Question	Method 1: Please clarify how the risk of failure (technology not functioning as expected) has been taken into account.		
Notes on question	N/A		
Answer	Method 1 incorporates several elements of technology: • the LV-CAP platform, • an app to dynamically rate the transformer, • an app to control switching, • the devices to switch the network and • communications links. Various risks have been identified and documented in the Risk Register (Appendix D) and the mitigation for technology failure is briefly described as follows. The LV-CAP platform has been fully end-to-end tested in a laboratory setting to demonstrate that it can take in inputs, process them and issue outputs using the communications container that will be used in the project. The app to dynamically rate the transformer is currently in development and a schedule of contact with the team responsible has been set up to ensure it		

	remains on track in line with the necessary timescales. Any issues will be immediately flagged to the project team.

The app to control switching is being developed as part of the project and this work will begin as soon as possible and will involve key stakeholders from WPD to ensure the design and operation of the app is in line with the requirements of the distribution network.

The devices to switch the network have been used elsewhere on the distribution network and are therefore proven.

The communciations links will be robustly tested as part of the site selection process. As previously stated, end-to-end testing of LV-CAP has already been performed and hence the communications links of particular note here are those between the LV-CAP platform and the switching devices.

In terms of ensuring that any failure of the technology shall not lead to a safety issue arising, mitigation techniques including having the overall design of the system reviewed and approved by WPD are in place.

Further detail can be found in Risks 001 – 004, 006 – 009 and 021 of the Risk Register. |
| Attachments | N/A |

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	032
Question date	13/09/16	Answer date	20/09/16
Submission section question relates to	3.2		
Topic			
Question	Given the low customer engagement in the retail market what is the rationale for non-linear increase in community engagement at the wholesale level.		
Notes on question	N/A		
Answer	We understand this question relates to the uptake scenario described for Method 2, i.e. Community Engagement. In this answer, we have therefore provided the data and assumptions used to derive our forecast for the takeup of Method 2.		
	We forecast the initial uptake of this scenario to reach 1,000 sites by 2030. This is based on a conservative assumption derived from WPD's experience of being approached by over 500 community groups already – illustrating the current level of interest from community groups within WPD's area.		
	From 2030, we make the assumption that the national framework for Method 2 is fully established and available to all interested communities.		

	For the forecast beyond 2030, we used the UK Government 2014 Community Energy Strategy[1], which identified that 40% of people '…would be interested in joining a collective switching or purchasing scheme'. Based on this, we took a conservative estimate that, by 2050, one tenth of those expressing interest in community schemes would opt for a community scheme addressed via Method 2 (representing 4% of the GB population). This would represent an uptake of 23,160 sites nationwide, which was then rounded down to 20,000 sites. This subsequent uptake was modelled as a linear progression from 1,000 sites in 2030 through to 20,000 sites by 2050.
Attachments	N/A

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[1]
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/275163/20140126Community_Energy_Strategy.pdf

Electricity Network Innovation Competition Full Submission

Supplementary Answer Form

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	33
Question date	06/09/16	Answer date	15/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	During the Expert Panel session, a request was made to provide a break-even analysis.		
Notes on question	N/A		
Answer	The total net benefit of the project for all methods over the period to 2050, as calculated in line with the assumptions and methods set out in Appendix A, is £589.9m. It should be noted that the expected break-even point for the project is 2023, i.e. a 6 year period from project commencement. The following chart shows a break-even analysis indicating the net benefit of the project through to 2026.		

	Net benefit £20,000,000 £15,000,000 £10,000,000 £5,000,000 £0 FY17 FY18 FY19 FY20 FY21 FY22 FY23 FY24 FY25 FY26 -£5,000,000 -£10,000,000
Attachments	N/A

Electricity Network Innovation Competition Full Submission
<u>Supplementary Answer Form</u>

Project: OpenLV_____

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	034
Question date	20/09/16	Answer date	22/09/16
Submission section question relates to	N/A		
Topic			
Question	How much of the capacity and carbon savings are truly NET ADDITIONAL to GB?		
Notes on question	N/A		
Answer	As described in section 3.2 of the FSP, the Transform Model for Great Britain was used to establish the number of LV circuits requiring intervention and therefore the likely scale of uptake of the LV-CAP platform in GB. This analysis then underpins many of the calculations used in deriving the net additional benefits.		

The Transform Model is a DNO tool, endorsed by Ofgem for use in formulating RIIO-ED1 investment decisions and strategy.

Calculation of the Capacity Benefit

For Method 1, the process for calculating the capacity benefit is detailed in Appendix A4 of the FSP, and determines the net additional benefit to GB believed to be achievable from the deployment of the Method 1 solution, in-line with the assumptions also detailed in Appendix A4.

For Method 2, no capacity benefit has been claimed.

For Method 3, precise determination of likely benefits is more challenging as it will be determined by multiple factors that cannot be accurately predicted. These factors include the capacity benefit to individual networks as a result of the deployment of a range of solutions which are facilitated by the LV-CAP

| | platform. Consequently, the Method 3 capacity benefit of 10% per feeder is provided as a relatively conservative estimate as, in many cases, it is likely that the solutions deployed will deliver greater benefit. This is stated as a net benefit to GB as, without the LV-CAP platform, there will be less incentive for DNOs to make use of such technology and it therefore provides a comparison against the more 'passive' approach to LV network management that is currently adopted.

Calculation of Carbon Benefit

For Methods 1, 2 and 3, the process for calculating the carbon benefit is detailed in Appendix A4, and shows the net additional benefit to GB determined to be achievable from the deployment of LV-CAP, in-line with the assumptions also detailed in Appendix A4. |
|---|---|
| Attachments | N/A |

Project: OpenLV_____
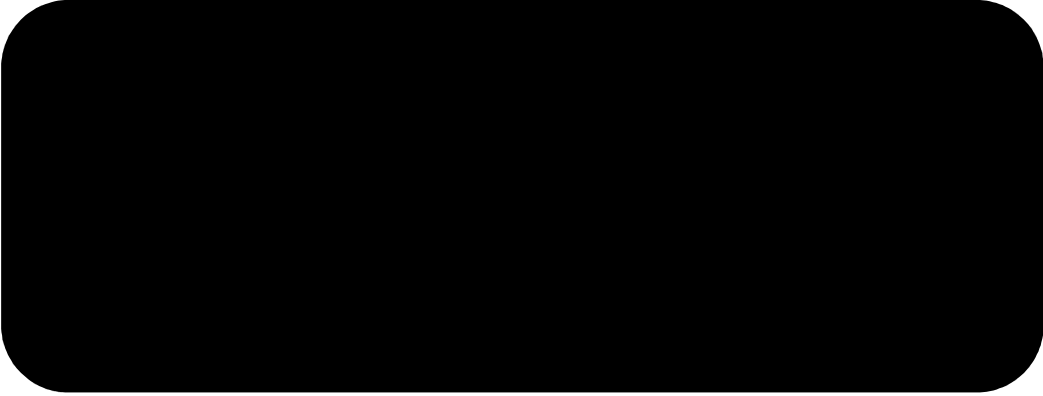
Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	035
Question date	27/09/16	Answer date	29/09/16
Submission section question relates to	N/A		
Topic	N/A		
Question	Will there be a provision integral to all the agreements with communities that where the thermal limit of the system is exceeded, WPD retains the right to disconnect the demand? What about vulnerable/priority customers?		
Notes on question	N/A		
Answer	The overarching aim of Method 2 is to determine the use cases that best enable community groups to achieve their objectives. Based on preliminary discussions, we expect that these will flatten demand, reducing peaks and thereby reducing cost to the community, rather than increasing demand and consequently placing network assets at greater risk. With this in mind, we do not envisage there being any likelihood of overloading a system and therefore requiring the need to disconnect any customers under this Method. WPD has a licence obligation to ensure a safe, secure and compliant network for all connected parties including vulnerable and priority customers. The introduction of LV-CAP to the network does not detract from this core responsibility.		
Attachments	N/A		

Electricity Network Innovation Competition Full Submission
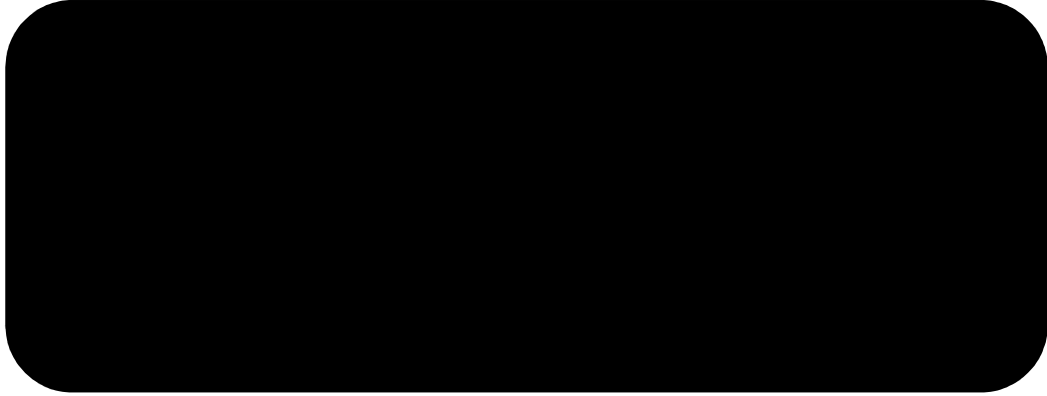## *Supplementary Answer Form*

Project: OpenLV

Tick if this answer has been provided verbally: ☐

Project code	WPD/EN/NIC/02	Question Number	36
Question date	04/10/16	Answer date	07/10/16
Submission section question relates to	N/A		
Topic	N/A		
Question	During the Expert Panel session, a request was made to provide a break-even analysis, split by Method.		
Notes on question	N/A		
Answer	The following chart shows a break-even analysis for Method 1, indicating the net benefit of the project through to █████ and illustrating the expected break-even point for this Method is █████. ████████████████████████████████████		

	The following chart shows a break-even analysis for Method 2, indicating the net benefit of the project through to ███████ and illustrating the expected break-even point for this Method is ████████. ███████████████████████████████ The following chart shows a break-even analysis for Method 3, indicating the net benefit of the project through to ████████ and illustrating the expected break-even point for this Method is ████████. ███████████████████████████████
Attachments	N/A