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OPEN LV

OPENING UP THE SMART GRID

Community Learning Specialist: Deliverable 1

Market Assessment Report

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RIIO NIC NETWORK INNOVATION COMPETITION

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Contents

1 Executive summary

The OpenLV project's aim is to trial an open, flexible platform that could be deployed in every low voltage (LV) substation in Great Britain, as well as to demonstrate the platform's ability to provide benefits to the network, customers, commercial entities and research organisations.

This report is part of Method 2 – Community Engagement, which aims to demonstrate the value of providing LV network data and an 'open platform' to communities, who want to be part of a smarter grid, to better understand their electricity use (and generation).

The first phase of work conducted by the Community Engagement Specialist, the Centre for Sustainable Energy (CSE), has been to establish whether there is a market for community-based use of LV data and what the range of applications might be.

The purpose of this report is to provide an independent view on CSE's conclusions. This includes reviewing the level of interest from community groups in accessing LV network data, reviewing the ideas being put forward by groups on how they could use the data and providing an initial assessment of whether the ideas have potential.

1.1 Key findings

- Overall, the level of interest from communities was good with over 50 responses to the survey in just a two-week period. This suggests that there is considerable interest in LV substation data;
- There was strong support for the app ideas suggested by CSE in the survey and an additional 45 ideas suggested by the groups;
- The ideas for using LV substation data presented by the groups shows a good breadth and range of objectives, from connecting new renewable projects to informing local plans and policies. Therefore, suggesting that LV substation data has the potential to provide multiple benefits for communities;
- Overall, our assessment is that almost half (22) of the ideas have a high degree of potential relevance for further development in the trial; and
- A range of seven different sources of value were identified at this early stage, which provides some confidence that it will be possible to identify viable and replicable business models for community apps for LV substation data. Each of the 22 ideas had at least one potential source of value associated with it, as show in Table 1.

Table 1. Sources of value mapped against ideas

Idea	Sources of value					
	Price time shifting	Reduced electricity consumption	Customer recruitment for supplier	Flexibility contract or payment for avoided reinforce-ment	Lower connection costs	Grant/public funding
Matching demand with local generation	✓		✓	✓	✓	✓
Business case for local energy market e.g. private wire, peer-to-peer, virtual private wire	✓		✓		✓	✓
DSR to match demand with local generation for balancing	✓		✓	✓		✓
DSR for managed electric vehicle charging	✓		✓	✓		✓
Data to inform group on most effective energy reduction measures		✓		✓		✓
Competition between communities to reduce consumption		✓		✓		✓
Business case for investing in storage	✓			✓		✓
Rewards for avoiding peak demand times	✓		✓	✓		
Community alerts to request reduction or increase/decrease in electricity usage	✓		✓	✓		
Automated electricity storage control to reduce local peak	✓			✓		✓
Community information apps to understand community energy use		✓				✓
Displays in local community to raise awareness of energy issues		✓				✓

Idea	Price time shifting	Reduced electricity consumption	Customer recruitment for supplier	Flexibility contract or payment for avoided reinforce-ment	Lower connection costs	Grant/public funding
Business case for alternative connection to the network					✓	✓
Understanding local capacity to help specify low carbon technologies					✓	✓
Community alerts when electricity is cheaper	✓		✓			
Business case for bulk buying electricity, particularly for ToUT	✓		✓			
Automated appliances to switch on and off depending on generation on network	✓			✓		
Understanding the gross before/after impact of large-scale retrofit schemes		✓				✓
Data to determine how much local generation/storage is required to make the community self sufficient						✓
Providing a baseline against which to set targets and measure progress						✓
Predict future energy demand to inform policy and network management						✓
Neighbourhood Plan development						✓

The report also provides a high-level assessment of the potential barriers, issues and risks to wider roll-out of the app ideas:

- There are technical barriers that limit where community apps can be trialled, including the exclusion of pole mounted transformers that tend to be located in rural areas, as well as areas with poor network coverage and app ideas that require a large number of substations;
- Consideration will also need to be given to commercial issues, such as the cost of new technologies and whether new markets will emerge within the required timescale; and
- Ideas will need to be assessed against criteria related to public acceptance and policy traction to test if they are likely to come up against political or community resistance.

Table 2 provides an initial assessment of the ideas against some of these key considerations. This does not rank the ideas or identify the ones with the most potential at this early stage, because the different considerations have not been weighted.

Table 2. Initial assessment of ideas against key considerations

Objective	Idea	Number sources of value	Short term / ongoing use of data	Number units required	New commer-cial markets	New techs	Customer engage-ment	Policy traction	Replic-able
Encouraging behaviour change to reduce carbon emissions	Matching demand with local generation	5	Ongoing	1+	Yes	Possibly	Yes	Yes	Yes widely
	Data to inform group on most effective energy reduction measures	3	Short term	1+	Possibly	Possibly	No	Possibly	Yes
	Competition between communities to reduce consumption	3	Ongoing	>2	Possibly	No	Yes	Possibly	Yes widely
	Community information apps to understand community energy use	2	Ongoing	1+	No	No	Yes	Possibly	Yes widely
	Displays in local community to raise awareness of energy issues	2	Ongoing	1+	No	No	No	Possibly	Yes widely
Connecting low carbon generation to the LV grid	Business case for investing in storage	3	Short term	1	Possibly	Yes	No	Yes	Yes
	Business case for alternative connection to the network	2	Short term	1	No	No	No	Yes	Yes
	Understanding local capacity to help specify low carbon technologies (size, technology etc.)	2	Short term	1+	No	Possibly	No	Yes	Yes
	Data to determine how much local generation/storage is required to make the community self sufficient	1	Short term	1+	No	Yes	No	Yes	Yes
Saving money on bills	Business case for local energy market e.g. private wire, peer-to-peer, virtual private wire	4	Short term	1+	Yes	Yes	Yes	Possibly	Yes

	Rewards for avoiding peak demand times e.g. Kudos energy challenge	3	Ongoing	>2	Yes	Possibly	Yes	Yes	Yes
	Community alerts when electricity is cheaper	2	Ongoing	1+	Yes	No	Yes	Yes	Yes
	Business case for bulk buying electricity, particularly for ToUT	2	Short term	>2	Yes	Possibly	Yes	Yes	Yes
Managing network constraints	DSR to match demand with local generation for balancing	4	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	DSR for managed electric vehicle charging	4	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	Community alerts to request reduction or increase/decrease in electricity usage	3	Ongoing	>2	Yes	Possibly	Yes	Yes	Yes
	Automated electricity storage control to reduce local peak	3	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	Automated appliances to switch on and off depending on generation on network	2	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
Informing plans and policies	Understanding the gross before/after impact of large-scale retrofit on social housing	2	Short term	1	No	No	No	No	Yes
	Providing a baseline against which to set targets and measure progress in local strategies	1	Short term	>2	No	No	No	No	Yes
	Drawing on usage data to make predictions about future energy demand that can inform policy	1	Short term	1+	No	No	No	Possibly	Yes
	Neighbourhood Plan development - possibly link with national database to benchmark and predict impact	1	Short term	>2	No	No	No	No	Yes

1.2 Key areas of risk

The report identifies a number of potential barriers and risks (see section 5). The key areas of risk for the next stage of the trial are:

- Maintaining momentum and engagement with communities over a long project. It is essential that groups are kept well informed and that expectations on both sides are made clear;
- Managing relationships with a wide range of communities and stakeholders, some of whom may not be taken forward to trial;
- Ensuring that the OpenLV Platform functionality and selected LV substations can in fact support trials. It is important that the limitations of the technology are made clear to groups upfront so that they do not waste time and resource developing ideas if their local substation is not suitable or they require multiple substations; and
- Ensuring the apps have a realistic business plan that takes into account risks around uncertain revenue streams and public acceptance. This is important for considering the potential replicability and wider roll-out of apps in the future.

1.3 Recommendations

Priorities for next phase relate to the community engagement process, the selection critieria and the scope of the trial:

- Ensuring the recommendations from this paper are taken on board in the Community Engagement Plan;
- Targeting stakeholders that did not respond to the first round of engagement, such as local authorities and Housing Associations, to encourage a wider range of responses;
- Developing clear assessment criteria for reviewing app ideas that take into account the barriers, issues and risks set out in this report;
- Ensuring there is a clear process for the development of ideas by groups with technical and commercial limitations clearly articulated and sufficient support provided;
- Quickly getting to the detailed definition of ideas so that they are trial-ready. We suggest including mock-up ideas in the next round of engagement to help groups understand what is possible;
- Asking groups to identify beneficiaries and specific value streams to form the basis of their business case in their response to the Expression of Interest. This may require some guidance and support from CSE; and
- Considering using a single platform to prove multiple apps, for example, by using OpenLV Platforms that are being deployed under a different Method, and considering extending the trial time period to enable apps to collect a full year's worth of data, if required.

2 Introduction

The OpenLV project's aim is to trial an open, flexible platform that could be deployed in every low voltage (LV) substation in Great Britain, as well as to demonstrate the platform's ability to provide benefits to the network, customers, commercial entities and research organisations.

The OpenLV Platform consists of a ruggedised PC with a Linux based operating system running the Low Voltage-Common Application Platform (LV-CAP™). This platform receives, stores and processes data from external LV monitoring equipment. These devices have sufficient computational power to store and run multiple apps and can provide relevant information out via a communications link to centralised server(s).

There are three work streams, or Methods, in the trial:

Method 1 - Network Capacity Uplift: Will demonstrate how the OpenLV platform can be utilised to increase the capacity of the LV network. Importantly, this Method will seek to prove how network control can be carried out, effectively and securely, via a highly decentralised architecture. This will enable costly and disruptive network reinforcement costs to be deferred or avoided.

Method 2 - Community Engagement: Will demonstrate the value of providing LV network data and an 'open platform' to communities, who want to be part of a smarter grid, to better understand their electricity use (and generation). This will enable communities to take action, for example, to reduce their impact on the environment, energy use and energy costs or to deploy innovative Apps on the intelligent substation devices.

Method 3 - OpenLV Extensibility: Will demonstrate the benefits of providing an 'open platform' that will enable academics, companies (including non-energy companies) and communities to develop innovative algorithms and Apps that could be deployed on intelligent substation monitoring devices to improve network performance, facilitate non-traditional business models and support the uptake of Low Carbon Technologies (LCTs) like electric vehicles, localised generation / energy storage, etc.

This report is part of Method 2 – Community Engagement. Regen has been appointed as the Community Learning Specialist to act in an independent reviewer capacity to the Centre for Sustainable Energy (CSE), which has been engaged to fulfil the role of Community Engagement Specialist.

The first phase of work conducted by the Community Engagement Specialist has been to establish whether there is a market for community-based use of LV data and what the range of applications might be. CSE carried out an online survey to assess the level of interest from community groups. The survey received 51 responses, the findings from which are presented in CSE's report *Establishing the market for community-based substation data apps*.

Regen's role is to provide an independent view on CSE's conclusions. This includes reviewing the level of interest from community groups in accessing LV network data, reviewing the ideas being put forward by groups on how they could use the data and providing an initial assessment of whether the ideas have potential. The outcome of this assessment will help determine whether further resource is allocated to the Method 2.

This market assessment report takes the findings from the survey and:

- Reviews the types of communities that engaged with the survey and assesses whether they were representative of the communities in the WPD area as a whole;
- Assesses the ideas put forward in the survey and provides an initial assessment on whether the ideas have value potential;
- Identifies potential barriers, issues and risks associated with the ideas; and
- Makes recommendations for the next phase of the trial.

3 Review of communities engaged

CSE carried out an online survey between 27 June and 10 July 2017 to investigate the market for community interest in the OpenLV project. The survey link was sent directly via email to 447 individual contacts and a further nine umbrella groups to promote to their memberships. The survey received 60 responses, of which 51 were substantially complete. The full methodology and findings can be found in CSE's report, *Establishing the market for community-based substation data apps*.

This section reviews the level of community engagement and participation and assesses:

- The level of interest and support - based on the number of responses;
- The range of communities engaged - based on the types of groups and the areas they serve;
- The suitability of the groups - based on the capacity of the groups to develop apps and the size of the area served, which is an indicator of whether they have a suitable substation; and
- Whether the groups are representative of the wider WPD area - based on the classification of communities and types of groups that may be missing from the respondents.

The key findings:

Overall, the level of interest was good with a greater level of interest being shown by the community energy sector, as well as the more affluent areas, and in the south west and east Midlands.

The suitability of the groups will need to be assessed on an individual basis, as there was a mix of level of skill between the different groups and some groups are located in rural areas that may not have a suitable substation. But the majority of respondents are likely to have a suitable urban area to trial their app idea.

The communities that responded to the survey were mainly from urban towns or cities, which is to be expected because a larger proportion of the population live in urban areas. Although this does mean that the responding groups do not exactly match the overall WPD demographic, this is less of an issue as urban areas are more suited to participating in the OpenLV trial.

There are other types of organisations/communities that could be targeted in the community engagement strategy, which would help increase the diversity and representativeness of the communities engaged in the project. A list is suggested in section 3.4.2.

3.1 Level of interest and support

A broad range of community organisations were directly invited to participate in the survey. Emails were sent to 447 individuals in the following organisations:

- 290 Parish councils and/or community regeneration charities;
- 121 Community energy groups;
- 23 Local authorities; and
- 13 Housing associations.

The survey was also sent to nine umbrella groups to be passed on to their networks via newsletters. Therefore, it is not clear how many individuals were made aware of the survey overall, but CSE estimate it could be in the region of an additional 500 individuals. Therefore we can estimate that there was a response rate of between 5 and 10 percent to the survey. The response rate was very good for the community energy groups, the key target group for the survey, and acceptable overall, especially bearing in mind the short time period and the nature of the survey being information gathering.

The types of groups that responded to the survey are shown in Figure 1.

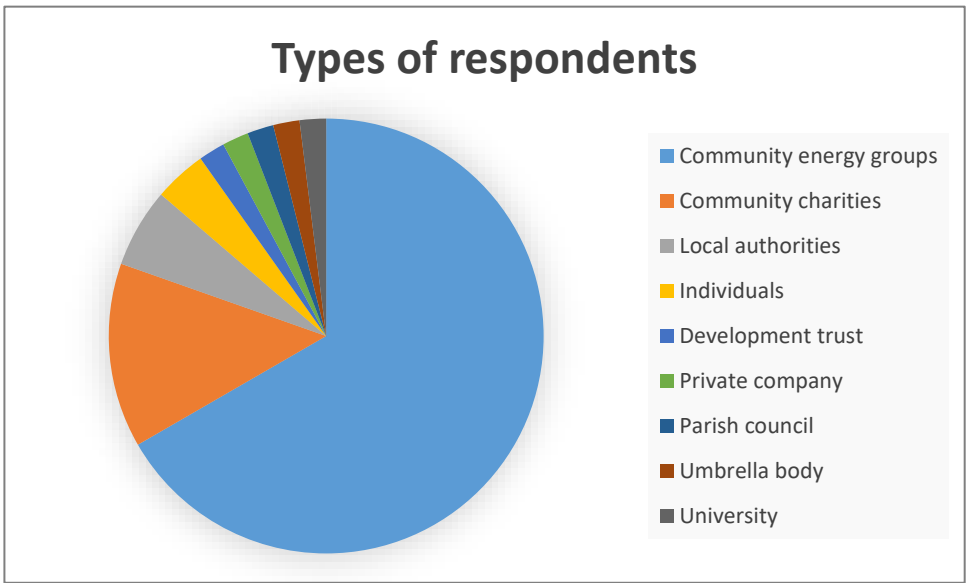

Figure 1. Types of respondents that responded to the survey

Two thirds of the responses came from community energy groups when they made up 27 percent of the groups contacted directly. This suggests that community energy groups have a greater interest in LV substation data and/or are best placed to develop energy related apps with their local community.

Three local authorities and one parish council responded. A large proportion of the survey publicity was targeted at local authorities, so this suggests a low response rate. Similarly, no housing associations responded when 13 were contacted directly. It is possible that they would respond more positively to workshops or face-to-face meetings.

Overall, the level of interest was good with a greater level of interest being shown by the community energy sector. In the next phase it will be important to maintain engagement momentum and to engage directly with Local Authorities, Housing Associations and other stakeholders who did not respond to the initial survey.

3.2 Range of communities engaged via the survey

CSE carried out an analysis of the types of groups that responded to the survey, as well as the area they serve, their capacity and relevant activities. Table 3 is a summary taken from the CSE report.

As stated in section 3.1, the majority of responses were from community energy groups, as well as a number of community charities and local authorities. Overall, the groups cover a range of different area types, with the majority covering urban areas.

Only one group explicitly stated that they covered an area with low incomes and high benefit reliance, with the majority working in generally affluent areas (as shown in Table 3).

The map in Figure 2 shows the location of each community group (the corresponding name of the group is shown in Table 4), the type of group they are and whether they represent a community that is large enough to have a viable substation (see section 3.3.2 for more information).

Table 3. Range of communities that responded[1]

Type of Group		Legal structure of group		Area type*		Socio-economic characteristics		Energy activities currently carried out by group		Capacity - resources		Capacity - skills	
Community Charity	**7**	Charity	**6**	Market town	**16**	Most on middle to low incomes	**6**	Owns generating assets	**22**	No paid staff	**20**	App development	**Yes: 5** **No: 36** **Some: 10**
Community Energy Group	**34**	Company ltd by shares or guarantee	**9**	City/dense urban	**12**	Very affluent	**2**	Gives advice on energy use or fuel poverty	**33**	1-5 paid staff	**9**	Data manipulation	**Yes: 18** **No: 11** **Some: 22**
Dev'ment Trust	**1***	Community Interest Company	**6**	Village	**16**	Generally affluent, but pockets of deprivation	**30**	Owns or promotes electric vehicles	**15**	5+ paid staff	**6**	Electrical engineering	**Yes: 13** **No: 15** **Some: 23**
Individual	**2**	Registered Society	**14**	Sparse hamlets and farmsteads	**10**	Generally low incomes with high benefit reliance	**1**			No volunteers	**4***	Business modelling	**Yes: 22** **No: 12** **Some: 17**
Local authority	**3**	Unincorporated	**12**	Mixed settlements over a larger geographical area	**9**					1-5 volunteers	**14**	Grant funding applications	**Yes: 33** **No: 3** **Some: 9**
Private company	**1**	Statutory body	**4**	University campus	**1**					5+ volunteers	**25**		
Parish Council	**1**												
Umbrella body	**1**												
University	**1**												

[1] Taken from the CSE report, *Establishing the market for community-based substation data apps*. With the exception of the first two columns, respondents were able to either skip the question, or chose more than one option, or both, hence the totals do not always sum to 51.

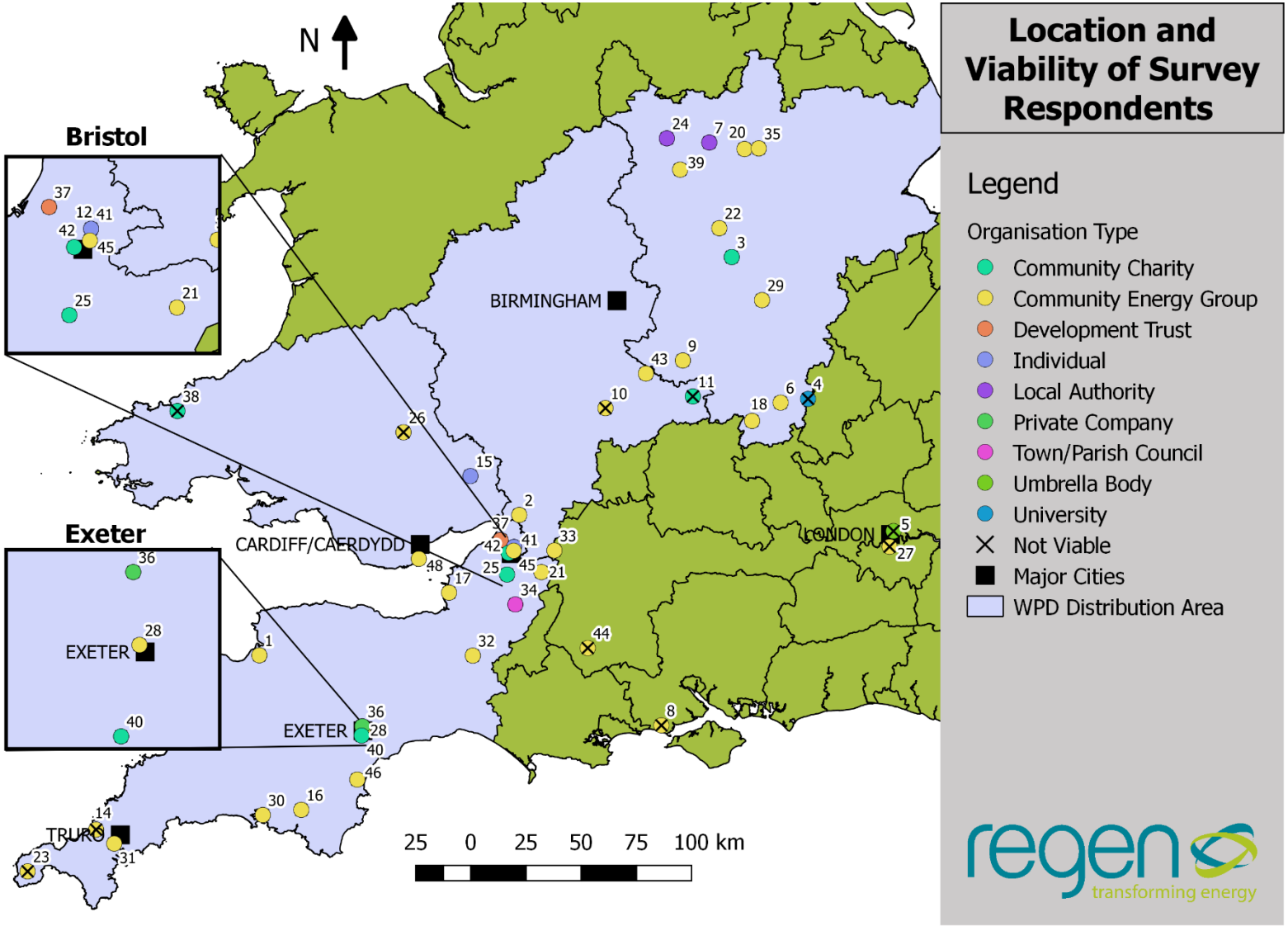

Figure 2. Location and viability of survey respondents

The group numbers shown on the map correspond to the following names:

Table 4. Group names and numbers

Number	Group Name	Number	Group Name
1	Atlantic Community Energy	25	West of England Rural Network
2	Sustainable Thornbury	26	Talybont on Usk Energy
3	RCC (Leicestershire & Rutland)	27	Brixton Energy
4	Cranfield University	28	ECOE
5	Locality	29	Harborough Energy
6	Wolverton Community Energy Ltd	30	Plymouth Energy Community
7	Ashfield District Council	31	Fal Energy Partnership
8	West Solent Solar Cooperative	32	Transition Langport
9	Harbury Energy Initiative	33	Marshfield Energy Project
10	Sedgeberrow Sustainable and Manageable Energy	34	Emborough Parish Meeting
11	The Michael Hardinge Trust	35	Hockerton Housing Project
12	Individual	36	The Time Cheese Company Ltd
13	Bury Community Hydro	37	Ambition Lawrence Weston
14	Community Power Cornwall	38	Cilgwyn Community Group
15	Fuel Poverty Volunteer	39	Transition Belper, Amber & Derwent Valley Community Energy
16	South Dartmoor Community Energy	40	Exeter Community Forum
17	Verdant Community Energy CIC	41	Individual
18	Gawcott Fields Community Solar Project CIC	42	Bristol Friends of the Earth
19	Islington Council	43	Community Energy Warwickshire Limited
20	Synergy Southwell	44	Nadder Community Energy Ltd
21	Bath & West Community Energy	45	Owen Square Community Energy
22	Transition Loughborough	46	Teign Energy Communities Ltd.
23	Sennen Cove Energy Collective	47	Energy4All
24	Derbyshire County Council	48	Cardiff Community Energy

Considerably more groups are located in the south west and east Midlands, with a cluster in the Bristol area. There were fewer respondents from the west Midlands, most likely due to there being less community energy groups in the area, and south Wales, where there are more groups but many of which are currently focussed on delivering projects funded by the Welsh government. Five of the groups are located outside the WPD licence area (four are shown on the map and another is located in Barrow-in-Furness), and therefore cannot be included in the trial. It is important that these groups are able to benefit from the learning from this project if they are interested in being kept informed.

Overall, there was a greater level of interest being shown by the community energy sector, as well as the more affluent areas, and in the south west and east Midlands.

3.3 Suitability of the groups

The groups that are selected to develop apps for the trial will ideally have the capacity and skills to develop app ideas, they will have a good reputation and ability to persuade people to engage with the app, and will have a suitable LV substation(s) that can host the OpenLV platform. The following sections assess the suitability of the groups.

3.3.1 Capacity of the groups

3.3.1.1 Skills and capability

Having the skills and capability to develop and deliver an app will be an important part of the selection process.

Of those that responded to the question about employees, 43 percent stated that they have some paid staff, and 90 percent responded that they have capacity from volunteers. Having a number of volunteers means that the groups often have access to a range of different skills and knowledge. There are also risks associated with relying on volunteer time, such as their capacity and time available, and considerations that need to be taken into account, such as the times of day that volunteers are able to have meetings, which may have to revolve around their day job.

The range of skills is reflected in the survey findings with many stating they have experience of funding applications, business modelling and data manipulation. However, six of the groups stated that they had no knowledge of three out of the five skill areas and a further 12 had no knowledge of two out of the five. A summary of the capacity of the groups is included in Table 3.

A good measure of the capacity of a group is whether they have developed and built their own generation projects, which requires a high level of commitment and gives them experience of fundraising, business modelling and managing an ongoing income stream. 23 of the groups stated that they own generation, of which five are of a large scale (over a megawatt).

There is a mix of level of skill between the different groups and each group will need to be assessed individually when being selected for the trial. The project should be prepared to offer additional support for groups that may have very good ideas but not the capability to develop apps themselves.

3.3.1.2 Capacity to influence change

Regen carried out a high-level assessment on the groups' potential to reach a wide audience and influence change, which included the geographical area they covered, the number of members they had and their reputation. The groups were categorised using the size of area they cover and statements they have made about their membership and reputation. The results are shown in

Table 5.

Table 5. High level assessment of groups' reach and influence

Reach	Count
Minimal	4
Small	29
Medium	11
Large	6

Those with minimal reach tended to be individuals or small companies. The organisations with a large reach either covered a national area or were a local authority or university. The community groups fell into either the small or medium category depending on the area they covered, how long they had been established for and how many members they had.

Nearly all the groups have the potential to engage with their local community, which will be essential for groups that would like to use apps to influence change. Not all the app ideas require behaviour change in the wider community, therefore, the capacity of each group to influence change will need to be reviewed individually alongside their idea.

3.3.2 Size of area served by groups

The size of the area served by the group provides a good indicator for whether the community is suitable for the trial or not. This is because rural areas with pole mounted transformers have been excluded (see section 5.1.1 for more information). When asked what size of area your group serves, the answers were as follows.

Table 6. Size of area served by group

	Number	Percent
National	2	4%
County	14	29%
Town/city	17	35%
Village/ward	12	25%
University campus	1	2%
Individual property	2	4%

The individual properties are unlikely to be suitable, as will some of the villages, if they are not large enough. But most of the villages and all the towns/cities are likely to be suitable. The national and county-wide groups will also be suitable as they will be able to identify urban locations, as they will have more choice on where to locate the OpenLV Platform to host the app.

Community groups in rural areas will need to be assessed for the suitability of their local substation. But the majority of respondents are likely to have a suitable urban area to trial their app idea.

3.4 Are the communities and groups representative?

If the community groups that responded to the survey are representative of the whole of WPD's area, it provides an indication that the app ideas will be replicated by other, similar communities or groups. However, it is worth noting that there may be app ideas that are relatively generic and can be adopted in a variety of different types of communities.

3.4.1 Types of communities

Every community is different, however, categorising the communities can be useful for comparing them with the wider area. The communities were categorised into the Rural-Urban Classification (RUC), as determined by the Office for National Statistics,[2] and compared with the total number of settlements in the WPD licence area, as well as in England and Wales.

Table 7. Rural-Urban Classification of OpenLV groups compared to wider area

Rural-Urban Classification	OpenLV groups[3]		WPD area		England & Wales	
	Number	Percent	Number	Percent	Number	Percent
Rural town and fringe	5	12.2%	521	26.9%	1615	27.8%
Rural town and fringe in a sparse setting	1	2.4%	46	2.4%	116	2.0%
Rural village and dispersed	5	12.2%	1031	53.2%	3068	52.8%
Rural village and dispersed in a sparse setting	1	2.4%	123	6.3%	302	5.2%
Urban city and town	28	68.3%	204	10.5%	654	11.3%
Urban city and town in a sparse setting	0	0.0%	5	0.3%	11	0.2%
Urban major conurbation	1	2.4%	6	0.3%	36	0.6%
Urban minor conurbation	0	0.0%	3	0.2%	11	0.2%

The WPD area is representative of the rest of England and Wales, with over half of settlements being classified as 'rural village and dispersed', and just over a quarter as 'rural town and fringe'.

Two thirds of the groups that responded to the OpenLV survey are located in areas classified as 'urban city and town'. This is not surprising, as a greater proportion of the population live in urban areas. In England, 83 percent of the population live in urban areas (44 percent in 'urban cities and towns') and 17 percent in rural areas.[4] Anecdotal evidence suggests that the average age of community energy group members tends to be lower in more urban areas, which may link with a greater interest in data and app development.

Approximately a quarter of the groups that responded represented a larger area, such as a county, which would include many rural towns and villages, but they were classified based on the settlement that their main office was located in.

The majority of settlements in the WPD area are classified as rural villages or towns. The communities that responded to the survey were mainly from urban towns or cities. This is less of a problem because groups in urban areas are more suited to participating in the OpenLV trial.

[2] The Rural-Urban Classification (RUC) was categorised by identifying which LSOA (Lower Super Output Area) the Built-Up Area (BUA) falls within through QGIS and then adopting the RUC from that LSOA. For details on how the RUC was calculated for the LSOAs visit https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239478/RUC11user_guide_28_Aug.pdf

[3] Groups that responded to the online survey that are within the WPD boundary

[4] https://www.gov.uk/government/publications/rural-population-and-migration/rural-population-201415

3.4.2 Types of groups

As stated in section 3.2, the majority of the groups that responded to the survey were community energy groups. This is understandable because these groups are energy focused and the OpenLV Platform is offering energy data. However, there are other types of communities that will also have an interest in energy, such as:

- Schools and colleges
- Community centres, e.g. youth clubs, children's' centres, sport centres
- Estate holders e.g. National Trust
- Museums and galleries
- Religious buildings e.g. churches
- Shop collectives
- Social housing providers.

These buildings/centres tend to have a 'community' that is closely located to it. This may provide a good geographical match with a small number of local LV substations. **It may be possible to identify networks of energy managers for these types of organisations that could be targeted in the community engagement strategy. This would help increase the diversity and representativeness of participating groups.**

4 Assessment of ideas and value potential

The survey asked respondents to provide information on app ideas for using LV substation data. This section assesses the ideas put forward by looking at:

- The breadth and range of ideas - based on an assessment and rationalisation of the ideas put forward in the survey; and
- The value potential of the ideas - based on an initial assessment of the different sources of value available mapped against the rationalised list of ideas.

This is an early, broad look at the ideas coming forward. It is worth noting that there was limited information provided on the ideas at this early stage of the project, as respondents were not asked to provide detailed ideas but general concepts and identify potential use of LV data.

The key findings:

There were 45 ideas put forward by respondents in the survey. The list of ideas shows a good breadth and range, which suggests that LV substation data has the potential to provide multiple benefits for communities.

The range of potential sources of value provides some confidence that it will be possible to identify viable and replicable business models for community apps for LV substation data.

Overall, it is positive that each of the ideas has at least one potential source of value. However, a more detailed examination is required for each specific idea and a cost benefit analysis carried out to determine how viable it is.

4.1 Breadth and range of ideas

4.1.1 Ideas identified in the survey

The survey asked respondents to firstly, state whether they were interested in six different suggested app ideas, and secondly, whether they had any other ideas for using the data or creating apps.

Of the suggested app ideas, there was most interest in understanding community energy demand and connecting low carbon technologies to the grid, as shown in Figure 3.

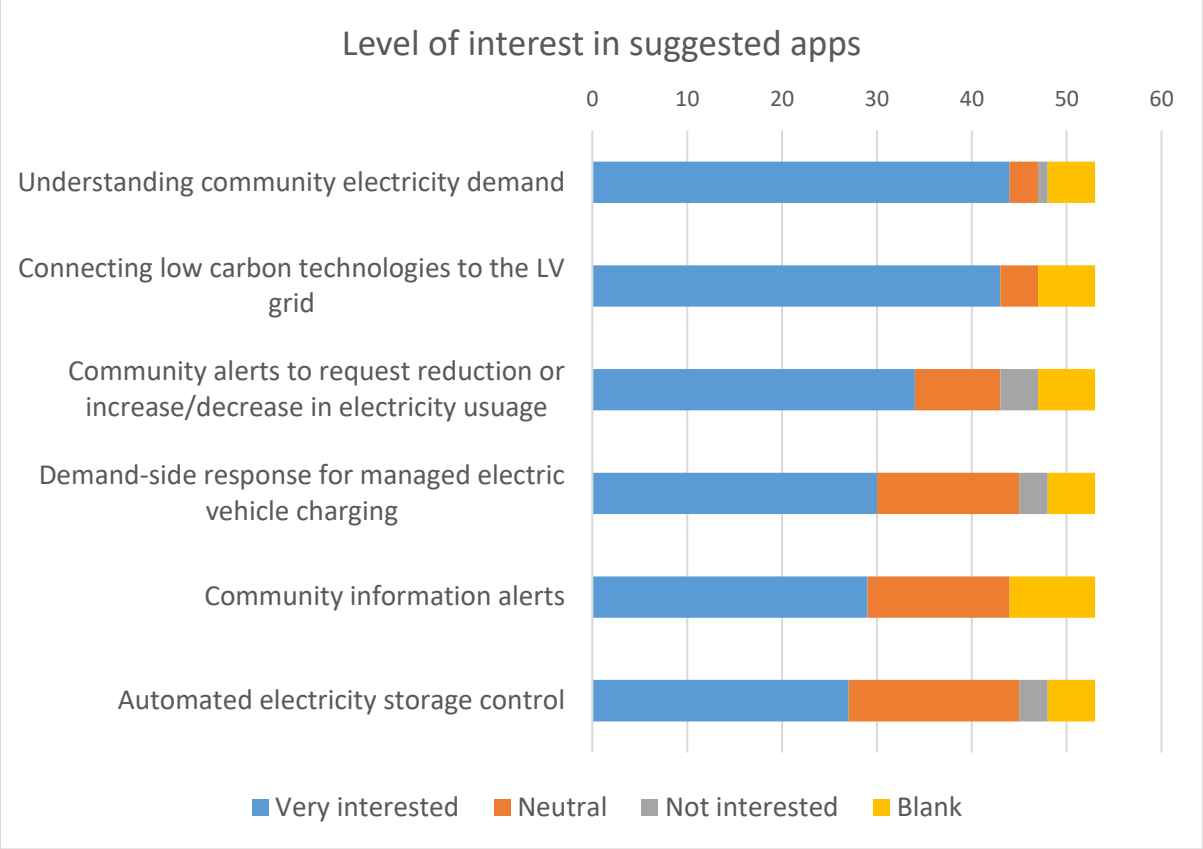

Figure 3. Level of interest in suggested apps

The suggested apps were positively endorsed and then reflected in the ideas put forward by the respondents. Of the 45 ideas for using the data or creating apps, 17 related to understanding the community's electricity demand. The overall objective of understanding demand varied between the different ideas in this category from encouraging behaviour change, to informing plans and policies and managing network constraints.

Four of the ideas put forward related to connecting low carbon technology to the LV grid. One idea related to community alerts and three to connecting storage. In total, there were 20 new ideas put forward by the respondents that didn't relate to the suggested apps, many of which were variations on similar themes. A full list of ideas is included in Appendix A: Full list of ideas put forward by respondents.

A number of high level objectives were drawn out from the ideas put forward by the respondents and the app ideas suggested by CSE. These are:

- Encouraging behaviour change to reduce carbon emissions;
- Connecting low carbon generation to the LV network;
- Saving money on energy bills;
- Managing network constraints; and
- Informing local plans and policies.

4.1.2 Rationalised list of ideas

As stated above, many of the suggested app ideas are variations on similar themes or duplicates. There are also just over a quarter of the ideas that are not a strong match with the OpenLV Platform functionality. Therefore, we rationalised the ideas into a shorter list of those with a higher degree of potential. This reduced the list from 45 to 22 ideas.

In reviewing the ideas, we have not tried to assess the detailed match or fit to the proposed OpenLV Platform functionality but we have considered the likely data and functionality that could be provided. The OpenLV Platform device produces real-time data at LV substation level on:

- Voltage;
- Direction of flow;
- Current;
- Temperature/thermal capacity;
- Power factor; and
- Active and reactive power flow.

In some cases, this data either did not enable the group to meet its objective or there was a more appropriate source of data available. For example, one group wanted to separate commercial from domestic demand data, which would not be possible using substation data. However, the majority of the ideas presented by groups would benefit from accessing LV substation data.

At this stage we would not rule out any idea that was proposed. However, there were a good proportion that had a higher degree of potential. Therefore, the list of ideas was condensed down to those with a good fit with the functionality of the OpenLV Platform, duplicates removed and a few new suggestions added. This left a list of 22 ideas, which were mapped against the high-level objectives, as shown in Table 8.

Table 8. Ideas mapped against high level objectives

Objective	Idea
Encouraging behaviour change to reduce carbon emissions	Community information apps to understand community energy use
	Displays in local community to raise awareness of energy issues
	Data to inform group on most effective energy reduction measures
	Competition between communities to reduce consumption
	Matching demand with local generation
Connecting low carbon generation to the LV network	Business case for alternative/flexible connection to the network
	Understanding local capacity to help specify low carbon technologies (size, technology etc.)
	Data to determine how much local generation/storage is required to make the community self sufficient
	Business case for investing in storage
Saving money on energy bills	Community alerts when electricity is cheaper
	Business case for bulk buying electricity, particularly for time of use tariffs (ToUT)
	Rewards for avoiding peak demand times e.g. Kudos energy challenge

	Business case for local energy market e.g. private wire, peer-to-peer, virtual private wire
Managing network constraints	Community alerts to request reduction or increase/decrease in electricity usage
	Demand side response (DSR) to match demand with local generation for balancing
	DSR for managed electric vehicle charging
	Automated electricity storage control to reduce local peak
	Automated appliances to switch on and off depending on generation on network
Informing local plans and policies	Providing a baseline against which to set targets and measure progress in local strategies
	Understanding the gross before/after impact of large-scale retrofit schemes
	Predict future energy demand to inform policy and network management
	Neighbourhood Plan development - possibly link with national database to benchmark and predict impact of policies

This list shows a good breadth and range of ideas. Therefore, suggesting that LV substation data has the potential to provide multiple benefits for communities. It also provides a good starting point from which to identify ideas that have the most potential to be financially viable and replicable.

4.2 Value potential of ideas

The app ideas must be financially viable if they are to be replicated by other communities. This means that either a potential revenue stream or financial saving needs to be identified to cover the cost of the app development and operation.

A number of financial benefits may be available to communities wishing to use LV substation data. These benefits may, for example, result from:

- The community changing its electricity consumption behaviour;
- A community group using its position as a trusted intermediary to negotiate and promote opportunities; and
- A community generator having better information to avoid or reduce network connection costs.

4.2.1 Sources of value

The value assessment has focused on identifying potential areas of value rather than specific or quantified value streams. Seven sources of value have been identified at this early stage with the potential for further sources to become apparent as app ideas are developed further. Each source of value is described and illustrated in the following sections.

4.2.1.1 Price time-shifting

Households can shift the time that they either generate or consume power according to market prices. For example, they can be offered a Time of Use Tariff (ToUT) that reflects wholesale prices and use of system charges and shift consumption into the cheaper times. This can result in a reduction in their bill.

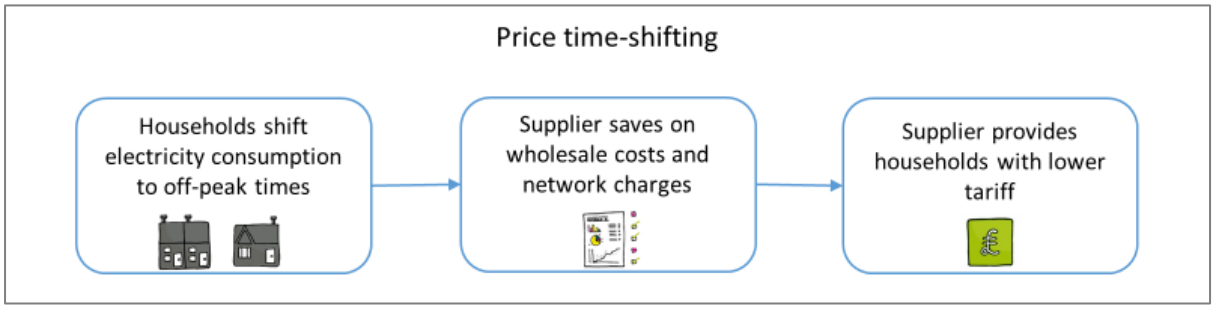

Figure 4. Price time-shifting

4.2.1.2 Reduced electricity consumption

The community group can facilitate a community-wide reduction in electricity consumption. This could be achieved by installing energy efficiency measures, through awareness raising campaigns or competitions between streets, for example. This results in households using less electricity and saving money on their bills.

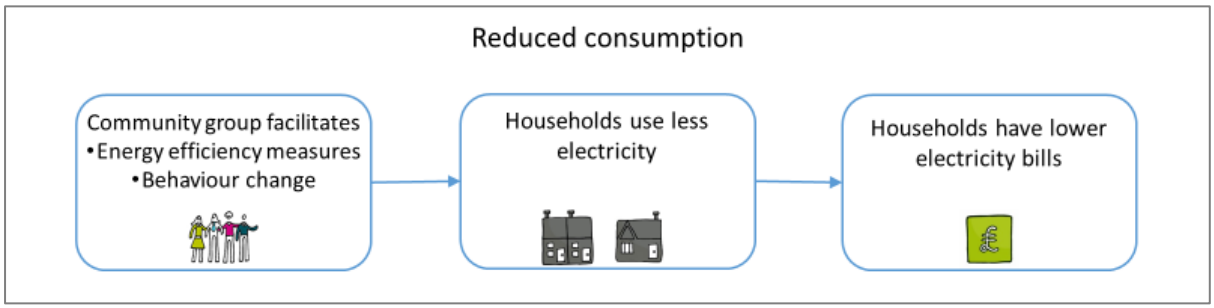

Figure 5. Reduced electricity consumption

4.2.1.3 Customer recruitment for a supplier

Energy supply companies are currently locked into a competitive strategy that is to offer very low (unprofitable) introductory tariffs for the first year and then hope that the majority of customers are retained and automatically put onto a higher variable or standard tariff.

One way to break this cycle is for energy supply companies to forge a new and different relationship with customers. This can be achieved with the support of a trusted local community group, who can provide information and persuade households to switch to a better tariff. Their role as a trusted intermediary gives the community group power to negotiate a better deal with the supplier.

Evidence suggests that a partnership between a supplier and a community does have value to a supplier. For example, fairerpower, which was set up by East Cheshire Council in partnership with OVO Communities, was recruiting customers 19 times faster in 2015 than the standard OVO business model. At that time, OVO Energy valued customer recruitment at £50 per household.

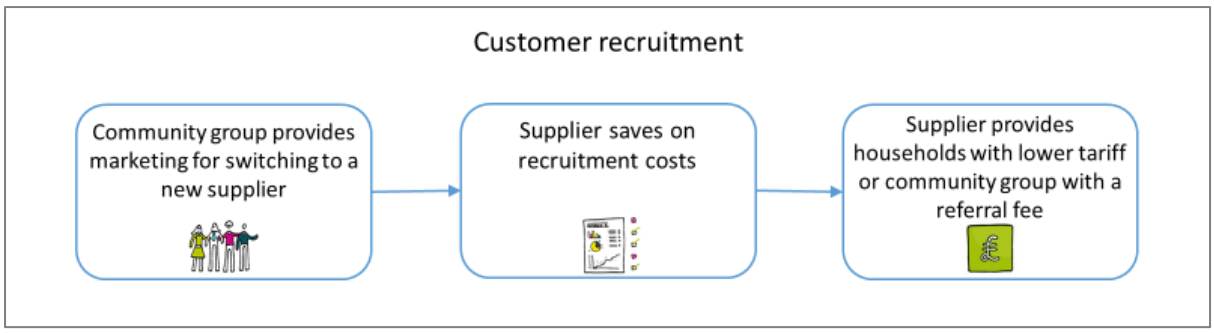

Figure 6. Customer recruitment for a supplier

4.2.1.4 Flexibility contracts

Flexibility is the turning up or down of either generation or demand to help balance the networks. This type of flexibility tends to be contracted by the System Operator and provides an income stream for either a generator, supplier or aggregator, which can then be reflected in the bills paid by consumers.

Flexibility contracts are currently only widely available to large-scale demand or generation. However, it is likely that smaller scale flexibility markets will develop with the move from Distribution Network Operators (DNO) to Distribution System Operators (DSO). Department for Business, Energy and Industrial Strategy (BEIS) and the regulator Ofgem suggest the following as an example:

> *DSOs or independent local market platform operator(s) could collect bids and offers for flexibility actions from distribution-connected providers in local areas (including from third parties such as aggregators or community energy providers). These bids and offers would then be used at a local level to manage constraint and system requirements within the distribution zone.*[5]

Bids and offers may be provided by local suppliers through aggregating Demand Side Response (DSR) request(s) from their customers. DSR may be incentivised by a ToUT or automated by the supplier or third party. This could provide an income stream to the supplier or aggregator, which could be reflected in lower bills for the customer.

There is general agreement that these markets will emerge, but uncertainty about the exact form they will take. If an app idea identifies a flexibility contract as a potential source of income, the risk of this income stream not materialising will need to be considered when assessing the financial viability and replicability of the idea.

5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf

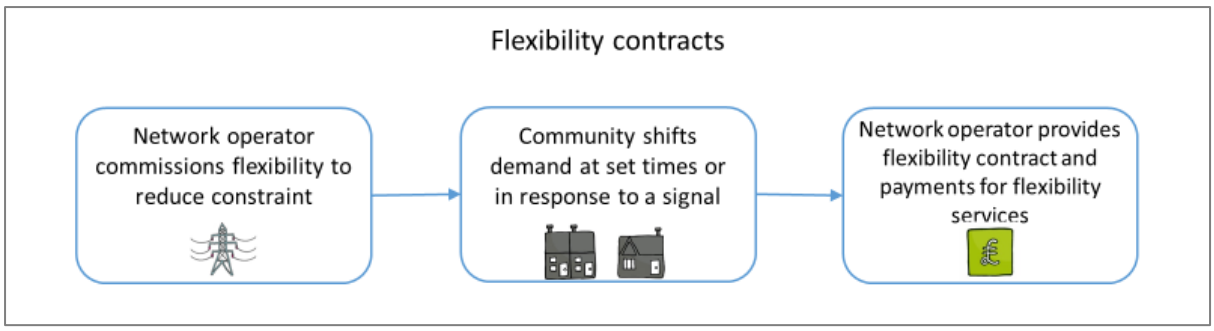

Figure 7. Flexibility contracts

4.2.1.5 DNO payment for avoided network reinforcement

The balancing of generation and supply at a local level can reduce pressure further up the network by increasing demand at times when the network is at capacity. This can enable the network operator to either defer or avoid investing in network reinforcement to relieve constraints. This saving could be passed onto those providing local balancing.

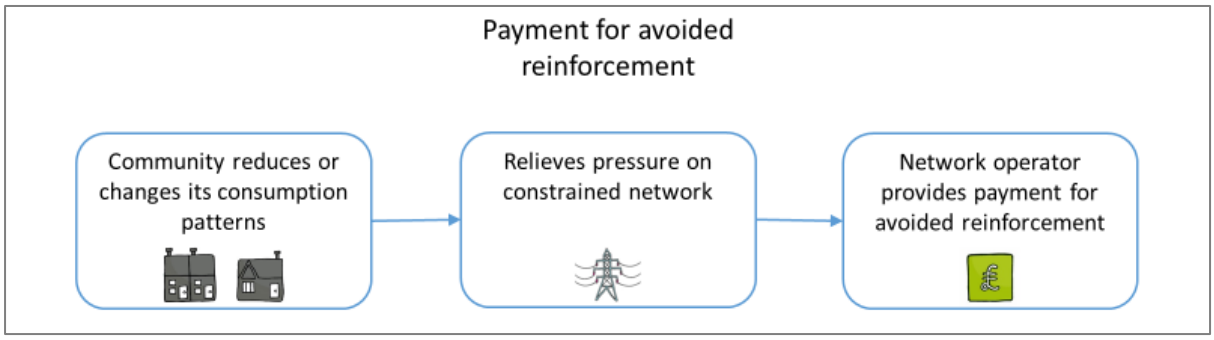

Figure 8. DNO payment for avoided reinforcement

It is likely that those providing flexibility will either receive a flexibility contract or a payment for avoided reinforcement, rather than both, as they are two ways of achieving similar objectives. DNOs are likely to choose one route or the other.

4.2.1.6 Lower network connection costs

Connecting new distributed generation to the network has a cost. When there are constraints on the network, this cost can increase significantly to cover the necessary reinforcement work. This is particularly challenging for community-owned developers because, unlike commercial developers, they are unable to move around the country to areas where there is spare network capacity.

Better information about the local network could support community developers to either:

- Specify the size and technology of the generation, based on the level of capacity available;
- Create a business case for an alternative/flexible connection to the network. For example, Western Power Distribution trialled an offset connection agreement which enabled the local community to increase its demand at times of generation using the Sunshine Tariff; and
- Identify opportunities for a private wire and potentially avoiding connecting to the public network.

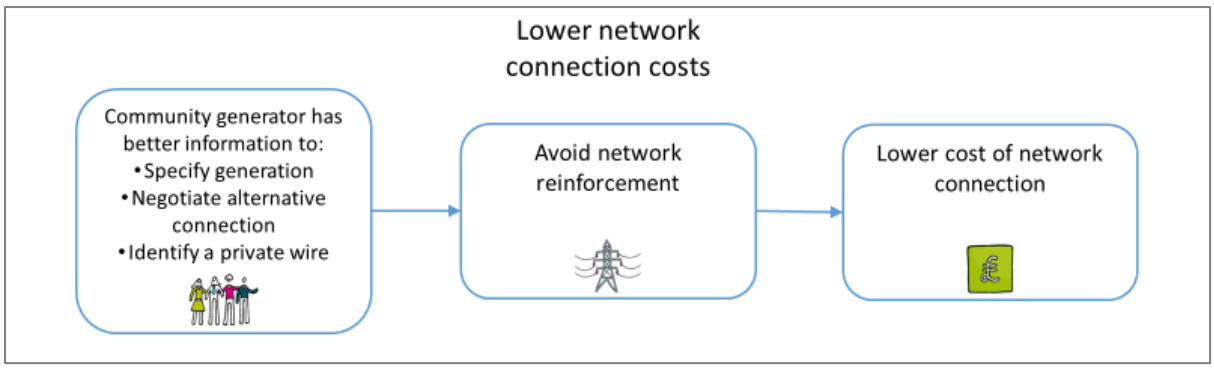

Figure 9. Lower network connection costs

4.2.1.7 Grant funding

When there are clear environmental and social benefits of a community initiative that uses LV substation data, there may be grant funding available to pay for the development and operation of the app.

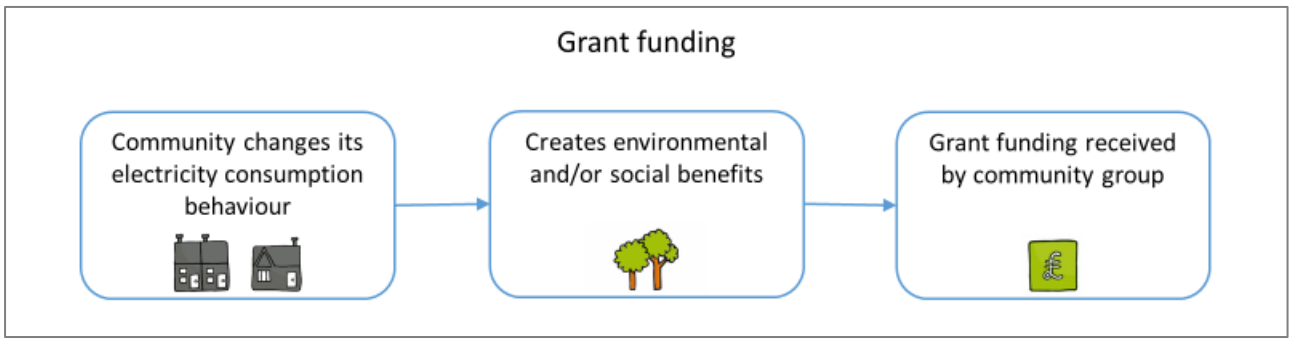

Figure 10. Grant funding

The range of potential sources of value provides some confidence that it will be possible to identify viable and replicable business models for community apps for LV substation data. However, there is still uncertainty about whether a community will be able to secure the income or saving, especially in relation to local flexibility markets, which do not exist yet.

4.2.2 Value potential of ideas

The 22 ideas set out in section 0 were mapped against the sources of value in an initial assessment of their financial viability. All the ideas had at least one potential source of value with some having three or more, as shown in Table 9.

Table 9. Sources of value mapped against ideas

Idea	Sources of value					
	Price time shifting	Reduced electricity consumption	Customer recruitment for supplier	Flexibility contract or payment for avoided reinforce-ment	Lower connection costs	Grant/public funding
Matching demand with local generation	✓		✓	✓	✓	✓
Business case for local energy market e.g. private wire, peer-to-peer, virtual private wire	✓		✓		✓	✓
DSR to match demand with local generation for balancing	✓		✓	✓		✓
DSR for managed electric vehicle charging	✓		✓	✓		✓
Data to inform group on most effective energy reduction measures		✓		✓		✓
Competition between communities to reduce consumption		✓		✓		✓
Business case for investing in storage	✓			✓		✓
Rewards for avoiding peak demand times	✓		✓	✓		
Community alerts to request reduction or increase/decrease in electricity usage	✓		✓	✓		
Automated electricity storage control to reduce local peak	✓			✓		✓
Community information apps to understand community energy use		✓				✓
Displays in local community to raise awareness of energy issues		✓				✓

Idea	Price time shifting	Reduced electricity consumption	Customer recruitment for supplier	Flexibility contract or payment for avoided reinforce-ment	Lower connection costs	Grant/public funding
Business case for alternative connection to the network					✓	✓
Understanding local capacity to help specify low carbon technologies					✓	✓
Community alerts when electricity is cheaper	✓		✓			
Business case for bulk buying electricity, particularly for ToUT	✓		✓			
Automated appliances to switch on and off depending on generation on network	✓			✓		
Understanding the gross before/after impact of large-scale retrofit schemes		✓				✓
Data to determine how much local generation/storage is required to make the community self sufficient						✓
Providing a baseline against which to set targets and measure progress						✓
Predict future energy demand to inform policy and network management						✓
Neighbourhood Plan development						✓

All the ideas related to managing network constraints have the potential to realise value from price time-shifting, assuming that the community can negotiate a time of use tariff, as well as either a flexibility contract or payment from the DNO for avoided reinforcement in return for changing their behaviour in order to relieve network constraints.

All the ideas related to informing local plans and policies may qualify for grant funding, for example from developers, the local authority or trusts/foundations that are empowered to make grants for charitable purposes.

The ideas relating to reducing carbon emissions and connecting low carbon generation are more mixed in the potential sources of funding they could access and depend very much on the specific idea.

Examples of ideas that have a strong chance of securing either a saving or revenue stream are:

- Matching demand with local generation – local balancing could be rewarded by the DNO through a flexibility contract, payment for avoided reinforcement or lower connection costs. Demand customers could benefit from lower bills through price time-shifting or customer recruitment. Plus, the scheme might qualify for some grant funding due to greater use of low carbon technology
- Business case for local energy market (e.g. private wire, peer-to-peer, virtual private wire) – if the community could set up a local energy market it could potentially: lower household electricity bills from negotiating a better local tariff; get a referral fee from a supplier if able to organise a bulk switch to a local tariff; and reduce the cost of connecting new generation if associated with local balancing.

Overall, it is positive that each idea identified above has a potential source of value. However, because ideas are still at a concept stage, it has not been possible to identify and quantify specific value streams for the ideas proposed. A more detailed examination is required for each specific idea and a cost benefit analysis carried out to determine how viable it is.

5 Barriers, issues and risks

The following high-level assessment of the potential barriers, issues and risks should be taken into account when designing the community engagement strategy and selection criteria for apps to be taken forward to the trial stage.

The key findings:

There are a number of issues to be considered for the community engagement strategy and agreeing the selection criteria for app ideas:

- The size of the settlement in which the community group operates, as an indicator of whether they have a suitable substation
- The network coverage in the local area to ensure that the app will be able to function
- Whether there will be a limit on the number of substations per community
- Whether there will be a preference between apps that use real-time or historical data, and if it is worth extending the trial period if a number of ideas require more time to collect historical data
- Confidence in new value streams becoming available, such as flexibility contracts and innovative supply models, and cost of technologies coming down, such as batteries, electric vehicles and smart appliances
- How much public resistance there is likely be to new schemes, based on how widely recognised and understood it is and whether the community group is trusted and respected locally. Also, to consider whether getting households to sign up to something or change their behaviour is fundamental to its success
- If the app requires the remote control of electrical load or access to consumers' data, how secure it is from cyber-attacks
- The barriers to developing community-owned generation should be taken into account when considering the viability of app ideas that involve developing new generation projects
- The lag between policy commitments and actual change may have an impact on business models despite there being policy traction
- Maintaining momentum throughout the engagement process.

5.1 Technical issues

There are some technical limitations of the OpenLV Platform device that are essential to take into account when selecting communities to work with in the trial and to better understand how widely replicable an idea may be. The limitations are set out in the following sections.

5.1.1 Pole mounted transformers

Not all LV substations are ideal for housing the OpenLV Platform device, specifically Pole Mounted Transformers (PMT). It is technically possible to install the device in a PMT, but it is more costly than installation in a Ground Mounted Transformer (GMT) and carries greater risk. Therefore, they have been excluded from the OpenLV trial.

An initial assessment by CSE suggests that the distribution of GMTs almost exactly matches OS definitions of urban areas. Therefore, groups in rural areas should be checked before the community invests any time in developing ideas.

Access to a GMT should be an important consideration in the community engagement strategy going forward to discourage unsuitable community groups from applying.

5.1.2 Telecommunication problems

Telecommunication coverage across the UK is not yet consistently good. The OpenLV Platform provides an IP communications link to the outside world, which apps will use to upload and download data using the Wide Area Communication Network. If this network coverage is intermittent, this will cause problems for the functionality of the app, especially if real-time data is required.

EA Technology will be testing the network coverage before installing OpenLV Platform technology to ensure it is suitable.

It is recommended that poor network coverage is highlighted as a potential barrier to community groups participating in the trial early in the engagement process.

5.1.3 Location of substations and communities

The location of substations does not necessarily relate well to the geography of communities. The LV substations in WPD's area are rated between 5 and 2,000 kVA. An approximate kVA required per domestic property is 15 kVA. Therefore, the LV substations can feed anything from one property to approximately 130. The average kVA of WPD's LV substations is 219, which would feed approximately 15 homes. However, it is possible that more substations of a lower rating are required in rural areas, which skews the average rating, and that urban substations have a higher rating than the average.

A 500-1,000 kVA substation may relate well to a small neighbourhood, a social housing estate or small university campus. However, most community groups represent a larger population, such as a village or town. Therefore, it is very unlikely that a community app would run off one OpenLV Platform device in one substation.

For example, the village of Ipplepen in Devon has a population of just over 2,000 people in 900 households. It has 10 LV substations rated between 200 and 1,000 kVA.

The project team will need to clarify if there is a limit on the number of substations per community early in the project. This is important for managing groups' expectations through the engagement process and, in particular, when they are developing app ideas.

5.1.4 Data provided by the OpenLV Platform

The OpenLV Platform device produces real-time data at LV substation level on:

- Voltage;
- Direction of flow;
- Current;
- Temperature/thermal capacity;
- Power factor; and
- Active and reactive power flow.

The OpenLV Platform is able to store and retrieve data. The exact amount of storage available will depend on the number of feeders required per community.

Therefore a data sizing exercise will need to be completed for each potential idea. There is also the ability to take data off the platform(s) within the trial period if additional storage space is required.

Not all the ideas required real-time[6] data with some only requiring historical data. Of the rationalised list of ideas, half would benefit from using real-time substation data and the other half would benefit from historical data, for example, for supporting a business case for investment or for establishing a baseline from which to measure change. In this case, it may be possible to create a generic app that could collect substation data over a limited period of time, to then be removed and potentially installed in another substation.

The need for historical data may have implications for the trial deployment timetable, as well as future business models if successful apps are to be replicated after the project.

For instance, if 12 months' worth of data is required for a baseline or business case, this would not be suitable for the OpenLV trial unless the trial period is extended.

Project partners should consider if they have a preference between apps that use real-time or historical data, and to consider extending the trial period if a number of ideas require more time to collect historical data. The functionality of the OpenLV Platform and data limitations must be made clear to communities at an early stage in the engagement process. This will help focus ideas towards solutions that are achievable.

5.2 Commercial issues

Approximately half of the potential sources of value identified in section 4.2 are based on commercial models still in development, which creates uncertainty around the viability of some of the ideas. This does not mean that the idea should not be selected for the trial, but that the level of uncertainty should be taken into account when assessing the replicability of the app idea. The following sections identify where there is uncertainty or issues to be aware of.

5.2.1 Flexibility markets

Flexibility markets have existed for some time at the transmission network level with National Grid commissioning reserve and response services to balance generation and supply. BEIS and Ofgem have stated that DNOs will also become more active in managing their networks as a system—implementing innovative techniques and exploring market-based solutions as alternatives to network reinforcement.[7] However, they have not specified what mechanisms or commercial models will be used and have asked industry to test different approaches.

WPDs approach, as set out in its DSO Transition Strategy,[8] is to commission its own flexibility and reserve products and for customers to offer their services in return for payment. They expect these to include:

[6] Electrical measurements will be published every 60 seconds and temperature data will be published every 10 seconds.

[7] https://www.ofgem.gov.uk/system/files/docs/2017/07/upgrading_our_energy_system_-_smart_systems_and_flexibility_plan.pdf

[8] https://www.westernpower.co.uk/docs/About-us/Our-business/Our-network/Strategic-network-investment/DSO-Strategy/DSO-Transition-Strategy.aspx

- DSO reserve products
- DSO outage management – Demand Turn Up (DTU) and Distributed Generation (DG)
- Coordination and sharing of DSR with the System Operator (SO)
- Development of constraint visibility platforms.

WPD will take a top-down approach, initially focussing on the Extra High Voltage (EHV) networks and incrementally working down to the lower voltage networks based on need. They plan to facilitate neutral markets that are technology agnostic and accessible to all, including communities, which they predict will generally contract on a wholesale basis through suppliers or other intermediaries.

An alternative to a flexibility contract is a one-off payment from the DNO for avoided network reinforcement. This has been used in trials where a community has permanently reduced its peak demand through installing energy efficiency measures in return for a payment from the DNO. However, this approach has not become business as usual.

Although flexibility markets are certain to emerge in the next five years, it is not clear how easy it will be for the domestic and community sectors to engage. Therefore, this source of potential value may not materialise in the timescale of the trial and will need to be factored into the assessment of the idea's viability and replicability.

5.2.2 Electricity supply markets

The electricity supply market is changing: There is increasing competition with exponential growth in the number of licensed suppliers; there is the roll-out of smart meters and the move towards half hourly (HH) settlement for all customers; and growing interest in more innovative and local approaches to supply.

These changes should help customers' access sources of value through greater choice in tariffs, such as time of use tariffs (ToUTs) and the incentive to match their demand to times of local generation. There is also the potential for community groups to work with licensed suppliers to sell a particular tariff to local people, which gives them negotiating power and potentially a source of revenue.

However, these new models of supply are still in trial stages and are yet to become mainstream. Therefore, there is uncertainty about if and when these sources of value will be easily accessible to communities.

5.2.3 Technology costs

Trials to date[9] strongly suggest that demand customers are more able to provide a DSR if they have both some flexible load, such as a battery or Electric Vehicle (EV), and some automation, such as smart switches or appliances. The cost of these technologies is still high and may prevent communities from accessing value through price time-shifting or flexibility contracts.

The domestic energy storage market in the UK is at an early stage of development, and the business case is not yet compelling, with payback periods of ten years plus.

[9] Such as the Sunshine Tariff. For further information see https://www.regensw.co.uk/sunshine-tariff

But as global lithium-ion battery prices continue to fall through larger scale manufacturing and innovation in system design, it is expected that the UK domestic storage market will expand, led by new technologies, such as the Tesla Powerwall, Powervault, Maslow, Sonnen and Wattstor.

Regen ran scenarios for WPD to analyse the potential growth in domestic and community scale storage up to 2030.[10] The results ranged from 0.2 percent of properties in the 'no progression' scenario to 2.2 percent in the 'consumer power' scenario.

Growth in electric vehicle purchases has been exponential in the UK, but still remains low. Registrations through the national plug-in grant scheme increased from 3,500 in 2013 to more than 107,000 by July 2017.[11] However, this represents just under 0.3 percent of the total number of vehicles licensed for use on roads in Great Britain.

But electric vehicle costs have fallen and continue to fall considerably as battery prices come down. In addition, Chinese vehicles are entering the global market, at very low costs, driving down prices. According to Bloomberg New Energy Finance, electric vehicles will be cheaper to own than conventional cars by 2025, based largely on falling battery prices.[12] The National Grid's 2016 Future Energy Scenarios predicts the number of electric vehicles in Great Britain will grow to approximately 5,814,000 in 2030.

Smart appliances, such as washing machines and dishwashers that are DSR-enabled, are becoming available on the market. It is likely that adoption will happen gradually over time as customers replace old appliances. Juniper Research predicts that the number of connected home appliance shipments is set to reach 202 million globally by 2021, rising from just 17 million in 2016.[13]

The cost of technologies, such as batteries, electric vehicles and smart appliances, which enable communities to access certain sources of value, will need to come down further in order for some commercial models to work, especially in relation to community DSR. Predictions suggest that this is likely to happen in the next decade.

5.3 Public acceptance issues

The majority of ideas put forward by communities on how they could use LV substation data involve engaging their local communities and changing their behaviour. This raises issues around public acceptance and interest, without which, many of the app ideas would not be possible. The following sections set out some of the consumer-side considerations when selecting and developing app ideas.

[10] https://www.regensw.co.uk/the-future-of-network-infrastructure-studies

[11] Society of Motor Manufacturers and Traders - https://www.smmt.co.uk/2017/08/july-2017-ev-registrations/

[12] https://www.bloomberg.com/news/articles/2017-05-26/electric-cars-seen-cheaper-than-gasoline-models-within-a-decade

[13] https://www.juniperresearch.com/press/press-releases/connected-appliance-shipments-to-pass-200m

5.3.1 Recruitment challenges

Recruiting customers to switch to a new supply offer or to sign up to a DSR aggregation scheme is essential to its success. However, Ofgem research found that 45 percent of customers do not recall ever switching energy supplier.[14] This is despite the fact that consumers who have never switched could save around £200 per year on their energy bills.

The Competition and Markets Authority suggested that one of the contributing factors to lower than optimal levels of market engagement through switching is the lack of trust in the energy sector. A customer survey revealed that consumers' trust in their own energy supplier is far higher at 62 percent than their level of trust in other energy suppliers at only 27 percent, which may be a barrier to change for those who are uncertain about the benefits of switching.[15]

This makes it challenging when introducing new models that will require customers to switch or change their behaviour and potentially engage with new tariffs and technology.

Regen's experience of recruitment for the Sunshine Tariff trial was that the role of a trusted intermediary, in this case the local community energy group WREN, was very important. Almost three quarters of the households that signed up for the trial were members of WREN, suggesting that those with an interest in energy issues and who trusted WREN's advice were more likely to switch. Evidence from other trials, such as SoLa Bristol, suggests that people require a number of reasons to engage. The monetary incentive is important but is often not the sole factor. Wanting to save energy, be part of a wider community project and to learn more about energy play an important role, as demonstrated by both of these trials.

It is important to consider the following when assessing the potential app ideas:

- **How widely recognised and understood is the scheme that people are being asked to sign up to?**
- **What percentage of the local population is required to sign up for the business model to work? Is this realistic?**
- **Is the community group trusted and respected within its community? And does it have a good reach through its networks?**

5.3.2 Behaviour change

Many of the app ideas require a degree of behaviour change, such as installing energy efficiency measures, reducing electricity consumption, shifting consumption to different times of day or adopting smart technologies and services.

Some aspects of behaviour change are more publicly acceptable than others, such as being more energy efficient, due to the length of time information campaigns have been run. However, shifting consumption and adopting smart technologies and services are newer and may be more challenging.

For example, government research showed that half of respondents would take up a smart tariff if their supplier offered one to them now.

[14] https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

[15] GfK NOP, 2015, Energy Market Investigation

For those who were not interested, scepticism and uncertainty over the impact of a smart tariff on energy costs was the most common reason for a lack of interest. Respondents also said they were concerned about loss of control and that it would not fit their lifestyle.[16]

Trials to date suggest that smart technologies can be very helpful for shifting consumption to benefit from a smart tariff or payment for DSR. For example, the Sunshine Tariff trial showed that customers with automation control technology were much more likely to benefit from the time of use tariff than those without, as were those with larger flexible loads such as a hot water immersion system or an electric vehicle. Similarly, Frontier Economics report that smart tariffs with automation and/or direct control can deliver peak energy demand reductions of between 60-200% greater than smart tariffs without.[17]

This requires customers to adopt smart appliances, such as heating, white goods and energy storage systems that are demand response enabled, which will happen gradually over time as customers replace old appliances. Government will be exploring ways to address deployment barriers, including ensuring interoperability, data protection and grid security.[18]

As with the recruitment challenges, it is important to consider what behaviour change will be required for the app's business model to stack up and how much resistance it is likely to have in the local community.

5.3.3 Consumer protection

There needs to be adequate protection against miss-selling and putting consumers at risk when introducing new schemes. This could happen in a number of ways:

- Lack of clarity around how new technologies or services will be paid for (for example, energy efficiency measures) and what the responsibilities are of individual households
- Complex or difficult to understand payment systems for rewarding behaviour change
- Changes in tariff structures may have a negative impact on some customers. For example, some types of customers will not be suited to time of use tariffs, such as a disabled consumer who might rely on use of power during peak time
- It is important to ensure that customers do not get trapped on a particular tariff or scheme
- Privacy and data protection are another concern. Protection measures are in place. However, consideration must be given to how these issues are communicated with customers so that they feel safe and informed.

[16] DECC Smart Energy Research: Summary Report (2016).

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/467024/rpt-frontier-DECC_DSR_phase_2_report-rev3-PDF- 021015.pdf

[18] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf

Consumer protection risks can be mitigated through careful design of the app and consideration given to how the offer is communicated to the local community. The CES could play a role in advising the community groups on how best to do this.

5.3.4 Cyber security

Some of the app ideas will require the adoption of smart technologies and services. As control systems become smarter and use of information and communication technology increases, so does the risk of a cyber-attack. BEIS and Ofgem categorise cyber-attacks as follows:

- Data theft from government, utilities, financial institutions or individuals
- Attacks on IT systems leading to disruption of services
- Attacks on physical infrastructure through Supervisory Control and Data Acquisition (SCADA) systems or domestic controllers.[19]

As the sector develops, government will consider whether mandated security standards are required.

If the app requires the remote control of electrical load or access to consumers' data, consideration will need to be given to how secure it is from cyber-attacks.

5.4 Regulatory and policy issues

Some app ideas will have more policy traction than others, such as those that link with the move towards a smart and flexible energy system. Similarly, some ideas will have more regulatory and policy barriers. The following sections set out some of the potential issues and barriers.

5.4.1 Connecting new generation

A number of the ideas put forward in the survey related to connecting new generation to the network. This remains a goal for many community energy groups and local authorities. However, a number of barriers exist due to changes in policy over recent years.

Government significantly reduced the subsidies for renewables, such as the feed-in tariff, and removed the tax relief for community energy projects, which impacted on the financial viability of new projects and made it difficult for them to go ahead. As the cost of renewable technologies come down, we are starting to see large-scale subsidy-free projects being developed. However, it will be some time until the smaller projects are viable.

The cost of getting a network connection is also a barrier. This is due to the increased capacity of distributed generation projects now connected rather than a change in regulation or policy. However, it could be argued that not enough is being done by government to enable more affordable connections, especially for community energy groups who are at a disadvantage due to being geographically constrained.

19 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf

The barriers to developing community-owned generation should be taken into account when considering the viability of app ideas that involve developing new generation projects.

5.4.2 New electricity supply models

Some of the app ideas involve DSR, smart tariffs or local energy markets. These are all new, innovative models of electricity supply. These models have policy traction, but are in the early stages of development and we will see a lag between policy commitments and actual change. For example:

- Smart meters are essential for new supply models that have a time of use element to them. They are being rolled-out with the goal of every property having a smart meter installed by the end of 2020. However, as of 31 March 2017, 3.46 million smart electricity meters had been rolled out (out of 26 million)[20];
- Half hourly (HH) settlement enables a supplier to reflect its wholesale and use of system charges in its tariffs. Elective HH settlement of domestic customers is not yet widespread. However, suppliers have been encouraged by government to move towards HH settlement and Ofgem is considering whether to mandate this approach if suppliers do not adopt it voluntarily; and
- Local flexibility markets could provide a revenue stream for community DSR. Government is encouraging the development of these markets, however, it is not yet clear what form they will take or how accessible they will be. See section 5.2.1 for more information.

There is also considerable uncertainty around how the use of system charges for the networks will change in the future. Government has announced that it is carrying out a Targeted Charging Review and proposes a number of changes, namely instigating a Significant Code Review, which Ofgem describes as "…a vehicle for Ofgem to initiate wide-ranging and holistic change".[21] This will impact on the tariffs that suppliers charge and may change local supply business models.

Despite the policy traction of new innovative supply models, it is important to consider the lag between policy commitments and actual change and the impact this will have on business models when selecting app ideas for the trial.

5.4.3 Local authority funding

Four of the app ideas related to informing local plans and policies and to enable the reduction of local carbon emissions. These ideas are likely to require grant funding and local authority support, as there is not an obvious revenue stream associated with them.

However, local authorities have seen their budgets cut significantly in recent years.

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[20] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/615057/2017_Q1_Smart_Meters_Report_final.pdf

[21] https://www.ofgem.gov.uk/ofgem-publications/112590

Data published by the Department for Communities and Local Government suggests that local authority revenue has fallen by almost 10 percent between 2010/11 and 2016/17, and the proportion of centrally distributed income has fallen from 76 percent in 2010/11 to 57 percent in 2016/17.[22]

This inevitably results in less support for non-core services, such as reducing carbon emissions and addressing climate change.

Local authority cuts are an important consideration when assessing app ideas that relate to informing local plans and policies.

5.5 Engagement issues

The overall timetable for Method 2 is long: initial contact was made with community groups in June 2017 and the trial period does not begin until September 2018. Therefore, there is a risk that those who initially engaged may lose interest unless the process is carefully managed. There is a need to manage expectations of the groups and to provide them with regular updates to maintain momentum.

It is important to continue to proactively reach out to a broad range of community groups that may not have the capacity and experience to engage. Different approaches may be required to encourage a response from a wider range of groups. For instance, housing associations and local authorities may respond better to a workshop or face-to-face meetings, and groups with less knowledge of energy issues will require more hand-holding.

When developing the engagement strategy, it is important to consider how to maintain momentum and whether different types of groups require different approaches.

[22] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/532932/RA_Budget_2016-17_Statistical_Release.pdf

6 Summary of market assessment

Overall, the level of interest from communities was good with over 50 responses to the survey in just a two-week period. This suggests that there is considerable interest in LV substation data.

There was a greater response to the survey from groups with a focus on energy, groups in more affluent areas, those in the south west and east Midlands and more urban areas. However, it is to be expected that groups with a clear interest in energy are more likely to respond, as are groups with more resources and access to a larger population or membership base.

There was strong support for the app ideas suggested by CSE in the survey and an additional 45 ideas suggested by the groups. The ideas for using LV substation data presented by the groups shows a good breadth and range of objectives, from connecting new renewable projects to informing local plans and policies. Therefore, suggesting that LV substation data has the potential to provide multiple benefits for communities. It also provides a good starting point from which to identify ideas that have the most potential to be financially viable and replicable.

Overall, our assessment is that almost half (22) of the ideas have a high degree of potential relevance for further development in the trial. The next phase of engagement with community groups will show which ideas are of greatest interest. We are also likely to see new ideas coming forward as community groups are further engaged and better understand the functionality of the OpenLV Platform and scope of the trial.

A range of seven different sources of value were identified at this early stage, which provides some confidence that it will be possible to identify viable and replicable business models for community apps for LV substation data. Each of the 22 ideas had at least one potential source of value associated with it. However, there is still uncertainty about whether a community will be able to secure the income or saving, especially in relation to local flexibility markets and innovative models of supply, many of which do not exist yet. Individual ideas will need to be assessed for their potential risks, costs and benefits.

There are potential technical, commercial, public acceptance, regulatory and policy barriers to developing community apps for LV substation data. There are technical barriers that limit where community apps can be trialled, including the exclusion of pole mounted transformers that tend to be located in rural areas, as well as areas with poor network coverage and app ideas that require a large number of substations.

Consideration will also need to be given to commercial issues, such as the cost of new technologies and whether new markets will emerge within the required timescale. Furthermore, ideas will need to be assessed against criteria related to public acceptance and policy traction to test if they are likely to come up against political or community resistance.

Table 10 provides an initial assessment of the ideas against some of these key considerations. This does not rank the ideas or identify the ones with the most potential at this early stage, because the different considerations have not been weighted.

Table 10. Initial assessment of ideas against key considerations

Objective	Idea	Number sources of value	Short term / ongoing use of data	Number units required	New commer-cial markets	New techs	Customer engage-ment	Policy traction	Replic-able
Encouraging behaviour change to reduce carbon emissions	Matching demand with local generation	5	Ongoing	1+	Yes	Possibly	Yes	Yes	Yes widely
	Data to inform group on most effective energy reduction measures	3	Short term	1+	Possibly	Possibly	No	Possibly	Yes
	Competition between communities to reduce consumption	3	Ongoing	>2	Possibly	No	Yes	Possibly	Yes widely
	Community information apps to understand community energy use	2	Ongoing	1+	No	No	Yes	Possibly	Yes widely
	Displays in local community to raise awareness of energy issues	2	Ongoing	1+	No	No	No	Possibly	Yes widely
Connecting low carbon generation to the LV grid	Business case for investing in storage	3	Short term	1	Possibly	Yes	No	Yes	Yes
	Business case for alternative connection to the network	2	Short term	1	No	No	No	Yes	Yes
	Understanding local capacity to help specify low carbon technologies (size, technology etc.)	2	Short term	1+	No	Possibly	No	Yes	Yes
	Data to determine how much local generation/storage is required to make the community self sufficient	1	Short term	1+	No	Yes	No	Yes	Yes
Saving money on bills	Business case for local energy market e.g. private wire, peer-to-peer, virtual private wire	4	Short term	1+	Yes	Yes	Yes	Possibly	Yes

	Rewards for avoiding peak demand times e.g. Kudos energy challenge	3	Ongoing	>2	Yes	Possibly	Yes	Yes	Yes
	Community alerts when electricity is cheaper	2	Ongoing	1+	Yes	No	Yes	Yes	Yes
	Business case for bulk buying electricity, particularly for ToUT	2	Short term	>2	Yes	Possibly	Yes	Yes	Yes
Managing network constraints	DSR to match demand with local generation for balancing	4	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	DSR for managed electric vehicle charging	4	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	Community alerts to request reduction or increase/decrease in electricity usage	3	Ongoing	>2	Yes	Possibly	Yes	Yes	Yes
	Automated electricity storage control to reduce local peak	3	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
	Automated appliances to switch on and off depending on generation on network	2	Ongoing	1+	Yes	Yes	Yes	Yes	Yes
Informing plans and policies	Understanding the gross before/after impact of large-scale retrofit on social housing	2	Short term	1	No	No	No	No	Yes
	Providing a baseline against which to set targets and measure progress in local strategies	1	Short term	>2	No	No	No	No	Yes
	Drawing on usage data to make predictions about future energy demand that can inform policy	1	Short term	1+	No	No	No	Possibly	Yes
	Neighbourhood Plan development - possibly link with national database to benchmark and predict impact	1	Short term	>2	No	No	No	No	Yes

Often an idea is strong in one area and weak in another, which makes it difficult to identify any frontrunners. For instance, any idea that is likely to have policy traction often relies on new commercial markets and technology, which creates a certain amount of risk. Or it will require just one OpenLV Platform unit, but will not be widely replicable.

There are three ideas that may work with just one substation: business case for an alternative connection to the network; business case for investing in storage; and understanding the impact of a retrofit scheme. They all have at least two potential sources of value and could be considered lower risk as they are not likely to require new commercial markets, new technologies or extensive customer engagement. However, they are not likely to be widely replicable.

The ideas with at least four potential sources of value and good policy traction are: matching demand with local generation; business case for local energy market; DSR for local balancing; and DSR for managed electric vehicle charging. However, they are all likely to rely on new commercial models, new technologies and customer engagement to be successful, which creates uncertainty in the business model.

Agreeing and communicating the selection criteria upfront will help both interested groups and the project partners identify the most promising app ideas.

7 Recommendations

This market assessment report has identified a number of considerations and recommendations for the project going forward. These can be broken into: the community engagement process; the selection process for app ideas; and the scope of the trial.

7.1 Community engagement

The publicity for the online survey directly reached over 400 individuals from a range of different types of organisations, as well as being publicised by nine umbrella organisations. However, the responses were predominantly from community energy groups, the majority of which were in two out of the four licence areas.

The community engagement for the next stage of the trial could benefit from targeting a wider range of groups (see section 3.4.2 for a list), with more publicity in Wales and the west Midlands. Different approaches may be required to encourage a response from a wider range of groups. For instance, housing associations and local authorities may respond better to a workshop or face-to-face meetings, and groups with less knowledge of energy issues will require more hand-holding.

There is a need to manage expectations of the groups and to provide them with regular updates to maintain momentum. The overall timetable for Method 2 is long. Therefore, there is a risk that those who initially engaged may lose interest unless the process is carefully managed.

Clarity in the messaging is essential for managing expectations and not wasting peoples' time. For example, it should be made clear that groups will be expected to fundraise in order to cover the cost of the app development.

There are a number of technical issues that need to be made clear to community groups upfront, in order to avoid them spending time on ideas that will not be feasible. These should include, but will not be limited to:

- A description of the data available through the OpenLV Platform that highlights that individual property demand or site generation will not be available;
- The requirement for the substation to be ground mounted and a description of the types of areas likely to be excluded;
- If there is a limit to the number of substations per community (to be decided by project team);
- Project partners should consider if they have a preference between apps that use real-time or historical data and make this clear upfront; and
- The limited timescale of the trial period should also be made clear.

Consideration will also need to be given to what happens to groups and their ideas if they are not taken through to the trial stage. Ideas that have merit – but do not provide a good match to the OpenLV Platform functionality or do not make it through to trial – should not be lost but could form the basis of future work or links provided to other forms of support.

The next stage of Method 2 will be to invite community groups to apply to an Expression of Interest (EOI) with their app idea.

This will require quickly getting to a more detailed definition of the idea and its potential, including how the app will function and what revenue streams are available. This will be challenging for most groups. Therefore, we suggest providing five mock-up apps in the EOI so that groups can either adopt, modify or learn from them.

7.2 App selection criteria

The criteria for selecting app ideas to be developed further will need to be identified upfront by partners and made clear to the community groups through the engagement process. In addition to the technical issues identified above, partners will need to consider:

- Whether the idea must have a potential source of value associated with it and whether future revenue streams (e.g. flexibility contracts) are acceptable or not;
- How to assess if public acceptance could be a potential barrier, which could include whether customer sign up or behaviour change is required, as well as consumer protection issues and cyber security; and
- Whether the idea has policy traction or is likely to come across policy or regulatory barriers.

It is important that the criteria are weighted, as often a benefit is directly related to a risk. For example, an idea that has multiple sources of potential value often relies on new commercial markets and technology, which creates a certain amount of risk.

It will be difficult to provide a fair assessment of an app idea without a degree of exploring and developing it. This will require time from the groups and support from CSE, which will need to be factored into the strategy.

It will be necessary to explore the value potential when assessing the long-list of app ideas. This will require identifying value streams and beneficiaries, as well as costs. See Appendix B: Proforma for app ideas for the range of information we suggest is collected in the next stage to assist in the selection process and to enable Regen to provide an economic analysis to assess the potential benefits and the degree of replicability to communities in Great Britain.

7.3 Scope of the trial

In total 10 OpenLV Platform devices will be deployed as part of Method 2. This does not mean the project will sign up 10 communities, because the LV network is unlikely to map to the geography of community groups. Therefore, more than one unit will need to be deployed per community. This is likely to limit the trial to two or three community app ideas. However, there is the possibility that we can use a single platform to prove multiple apps, for example, by using OpenLV Platforms that are being deployed under a different Method.

The trial period for Method 2 is designed to run between September 2018 and June 2019. Community ideas that require historical data to establish a baseline or evidence for a business case may require a full year's worth of substation data, due to the fluctuations seen in demand over the different seasons. Therefore, it may be beneficial to extend the trial period.

Appendix A: Full list of ideas put forward by respondents

Theme	Idea from survey (as entered by respondent)
Connecting renewables to the LV grid	Spare capacity for new generation (say 30 kWp)
	We have explored setting up an energy co-operative that foundered on lack of grid capacity
	Some of our members may be interested in data that helps them to inform their feasibility/fundraising plans
	Finding electricity consumption data easily for commercial sites, so we can quickly produce estimates of the size of PV systems required and revenue generated from a PPA
Demand management	Behaviour influencing through displays in town
	being able to remotely switch appliances, heating etc. on/off if local demand gets too high
	district/city/area wide app to help communities work together to reduce energy consumption
	As above, we are interested in using energy data to make predictions of demand that can inform decision-making
	Trying to suggest ways of minimising use
	Analyse the data to determine how much local generation/storage is required to make the community self-sufficient and use this as a goal for the community to aim
	If we could link it to fuel poverty and energy efficiency projects to show that consumption has reduced that would be very useful. Also, to find out how much our area uses and spends, identifying patterns of usage - because community solar energy projects need a consumer as selling to the grid not viable at the moment. Pitting communities against each other in challenges to reduce their consumption the most!
	Separating domestic versus commercial, pareto large users, possibly by postcode area
	Usage patterns over a day compared to the weather and renewable generation
	Informing the public
	Data from a wider area (e.g. Bristol urban area) would also be useful just to raise awareness in a more concrete way and ideally compare with renewable generation in the area for public display in centre for example
	Demand by street or postcode
	CO2 energy production - when is it best to use low CO2 energy?
	Would be interested in information that would suggest low cost methods of heating and supplying energy to large rural buildings such as churches, community halls etc.
	Allow people to understand how their household and their community uses energy is an important first step in changing behaviour and demand reduction
	We are about to begin a large (1,000 homes) community engagement piece on reducing domestic energy use. We are looking at how to give longevity to this programme. Anything that that adds a local/community element to this would be of great benefit - even something as simple as real-time energy use within a defined community. We also run Data Play sessions in Plymouth where we actively encourage communities to use and manipulate data in ways which can benefit those communities
	Provide online real-time data on our website for a number of apps

Local economic resilience	Something to reduce fuel poverty - alerts when electricity is cheaper? Or allowing residents to pool together and buy electricity at a lower unit cost?
Managing risks on the network	It would be helpful to see the quality of electricity at our substation i.e. power factor and voltage variations
	Indicator of local high demand rather than just general high demand. We would like to prioritise this
	We know that there are distribution constraints at some substations e.g. at times of peak demand in winter. We would like to understand what financial incentives are available for either local generation or local demand reduction to relieve constraints
	Possibly know about grid wide renewables surges and shortages
	Mapping distributed energy resources with substation constraints
Matching demand & renewable supply	Website showing percentage of local demand met by the community solar farm on a real-time basis. Local energy market and VPP models in future
	Provide information on balance between local generation and demand
	We are intending to develop a 1 MW solar farm in the village of Drayton Parslow. We would like to implement a variation of the Energy Local idea where local residents are 'matched' to output from the farm and are able to buy the energy that is produced locally. Our app development will be about managing and matching the supply and demand, and also customer billing services
	It would be interesting to be able to correlate with wholesale prices, i.e. how much effect renewable generation is having on wholesale and triad prices
	We have installed 414 kW of rooftop PV in our community and are interested in knowing how its output hour by hour relates to demand in our agricultural area
	We're keen to mount a cool graphics display in the village which shows current power use relative to % generated locally by our various hydro & solar which is currently ~20%. This would attract interest, stimulate discussion & motivate new generators to increase our renewable percentage to 50% or more!
Policy, planning, research	Having electricity demand data would be useful for baselining "carbon reduction strategies" and "energy descent plans" and then comparing actual demand to required reductions in the area
	We are interested in drawing on community energy usage data to make predictions about future energy demand that can inform policy and network management. An open platform with a variety of apps presenting diverse data could be invaluable for energy research. An app which can not only display information on energy usage but also predict demand could be used to inform decision-making at government, community or individual level
	Building a case to persuade residential developers to adopt define and adopt sustainable, reliable, renewable, lower-cost, domestic energy & heat supply for new home developments then refurbs. 2. Identify options & Build economic case for social housing near-EnerPHit-type-refurb
	Currently beginning a neighbourhood development plan & think the information would inform our look at infrastructure/planning
	Neighbourhood planning; measuring data to drive low carbon city/carbon reduction, addressing fuel poverty
Promoting existing	We produce devices and can produce apps to indicate TOU parameters - data could be used to inform devices such as the Time Cheese. Raising awareness of time of use shifting for suppliers/end users

proprietary devices	'Business Service' IT design to allow easy integration into other IT applications and platforms/uses - e.g. 'Open Utility' - an open data approach making data available for other users to find uses for.
	See here -> http://www.cepro.co.uk/2014/06/kudos-energy-challenges/ - Community rewards for avoiding peak times.
Retrofit programmes	Could be useful to understand the gross before/after impact of large-scale retrofit on social housing blocks/estates where these are served by a dedicated substation perhaps (all electric blocks)?
Storage	When is peak and off-peak demand locally to make use of low demand energy and install storage facilities
	As we develop our renewable assets, we are developing our strategies around both heat and electricity. We know that there is a powerful opportunity for storage that will soon become viable and we want to optimise this, and will need good data
	Demand storage investment

Appendix B: Proforma for app ideas

The purpose of this proforma is to aid the collection of information for Method 2 of the OpenLV project. It is to be completed by Regen and CSE, working with community groups, and will inform the selection of apps to be taken forward to trial stage.

1. Name/short description of idea

Short description of the idea/app

2. More detailed description of idea concept, including how it will use OpenLV Platform data and who would use the idea (App)

More detailed description (but still high level/conceptual) covering, for example: • Outline concept/functionality/usage • How the LV-Cap data might be used • Who would use the app • What the idea/app might be used for • Possibly how the idea/app relates to other ideas

3. List the community groups interested in and supporting this idea

Which community group(s) have proposed this idea/app - for both new ideas and gauging interest in the pre-prepared ideas

4. Indicate who may benefit from this idea and specify how

Beneficiary	Do they benefit?	How would they benefit / access value
Consumers	☐	Click here to enter text.
Community group	☐	Click here to enter text.
DNO	☐	Click here to enter text.
Generator(s)	☐	Click here to enter text.
Supplier	☐	Click here to enter text.
Aggregator	☐	Click here to enter text.
Wider society	☐	Click here to enter text.
Other: Please specify	☐	Click here to enter text.

5. Sources of value and potential revenue streams, along with an estimation of annual benefit (please provide a quantitative measure of benefit, e.g. ££ savings per household, % in bill reduction, kWh saved etc.)

Source of value Examples below	Qualitative – identify potential revenue stream / saving / avoided cost	Quantitative estimated value or benefit Include ref if available*.
Energy efficiency	Click here to enter text.	Click here to enter text.
Price time shifting	Click here to enter text.	Click here to enter text.
Lower electricity tariffs	Click here to enter text.	Click here to enter text.

Use of power onsite	Click here to enter text.	Click here to enter text.
Reduced network losses	Click here to enter text.	Click here to enter text.
Avoided network costs	Click here to enter text.	Click here to enter text.
Ability to connect to constrained network	Click here to enter text.	Click here to enter text.
Avoided curtailment of generation	Click here to enter text.	Click here to enter text.
Price arbitrage	Click here to enter text.	Click here to enter text.
Providing flexibility services, e.g. DSR	Click here to enter text.	Click here to enter text.
Community marketing	Click here to enter text.	Click here to enter text.
Increased RE generation capacity	Click here to enter text.	Click here to enter text.
Increased generation revenue	Click here to enter text.	Click here to enter text.
Other: Please specify	Click here to enter text.	Click here to enter text.
Other: Please specify	Click here to enter text.	Click here to enter text.

6. Please estimate the costs of development and delivery of the app.(It is unlikely and not expected that this cost section will be completed at this stage)

	Capex		**Opex**	
	Estimate / actual	**Cost**	**Estimate / actual**	**Cost p.a.**
Development of the idea/app	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Building the app	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Technology and hardware	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Maintenance of the app	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Marketing, recruitment and retention of users	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Other: Please specify	Choose an item.	£Click here to enter cost.	Choose an item.	£Click here to enter cost.
Other: Please specify	Click here to enter text.	Click here to enter number of days.	Choose an item.	£Click here to enter cost.

7. Identification of risks and barriers e.g. regulatory, technical, behavioural, commercial

Risk or barriers identified	High/Med/Low Critical

8. Notes on viability and replicability

Based on the above is the idea likely to be viable as a commercial proposition:

- Is there an identified beneficiary and value proposition?
- Could this value proposition be monetised – even if not currently
- Does the idea/app have a wide application evidenced by community support

If not are their other non-monetary/societal benefits which could support development via another funding mechanism?

- If possible identify possible funding sources

9. Notes on suitability for inclusion in trial – ensuring the potential to provide relevant learning to assess whether this type of approach could be used by Distribution Network Operator (DNO) Engineers to aid managing and/or planning the Low Voltage (LV) network.

Is the idea/app suitable for a LV-Cap trial?

- Would it be deliverable within the trial period
- Would the results/outcome be measurable
- Does the idea/app have synergies with other ideas in Method 2 or Method 1?
- Would the idea have the potential to provide relevant learning which could be used to aid managing and/or planning the LV network?

If not is there another way this idea/app could be developed?

10. Overall idea/app assessment

Basis of assessment	Summary Notes	Score 1- 5*
Community support for the idea		
Identified beneficiaries		
Value and benefit potential		
Cost (if identified)		
Risk and barriers		
Suitability for inclusion in trial		
Viability and replicability		

Score zero if idea/app completely fails the criteria – this would normally preclude for inclusion in the trial