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OPENING UP THE SMART GRID

Community Learning Specialist: Deliverable 7

Value and benefits assessment

ea technology

RIIO NIC NETWORK INNOVATION COMPETITION

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Contents

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1 Executive summary

The OpenLV project trialled an open, flexible platform that could be deployed in every low voltage (LV) substation in Great Britain. The project looked 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', where the project looked to demonstrate the value of providing LV network data and an 'open platform' to communities. The project worked with seven communities (five community energy organisations and two housing associations) who wanted to be part of a smarter grid and to better understand their electricity use and the impact of local generation.

The purpose of this report is to provide an independent view of the value and benefits that were demonstrated by the community projects involved in the study. The report attempts, where possible, to quantify these benefits.

This report is Deliverable 7 for Regen. A further guidebook for communities that are looking to engage using OpenLV data (Deliverable 8) is also being produced to help share learning outside the project.

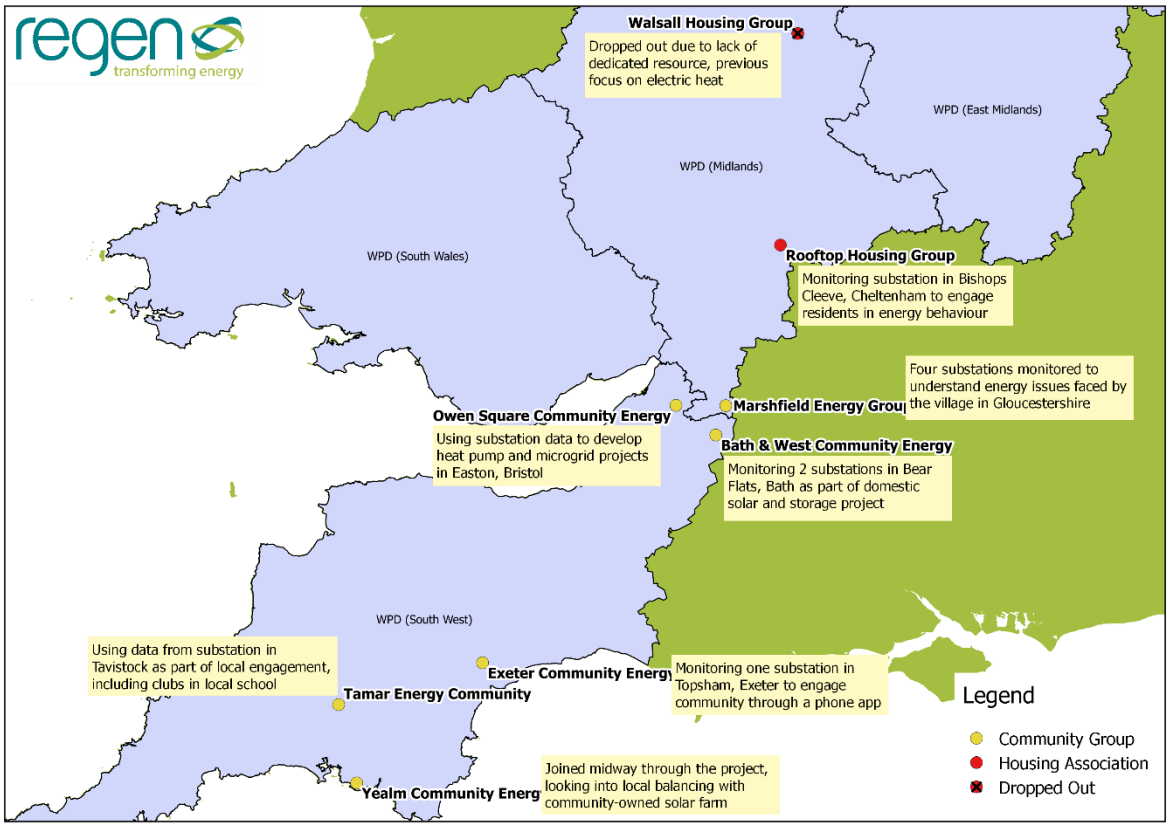

Figure 1: Map of Method 2 community trials

1.1 Community use cases and key findings

OpenLV and substation data provide unique information to support local communities understanding of energy and local electricity needs. The OpenLV trials and units combine information about community and shared infrastructure (the local electricity network and which users are connected where) with data on how much a community collectively uses.

The seven Method 2 community trials[1] explored how this information provided value to communities including as a 'hook' to engage people in wider energy messaging. A summary of the projects and their focus areas are shown in Figure 1. The projects delivered a number of learnings about how communities might utilise the data provided. This learning has been developed into three community 'use cases' which are explored in more detail in this report. These use cases are:

1. **Transparency value** – Communities having access to OpenLV data means they can identify opportunities, assess and evaluate plans for distribution connected projects and investments.

   The trials found that sophisticated community groups, such as Owen Square, and commercial organisations, such as developers and housing associations, benefitted from having greater transparency of substation data which they used to help plan new developments or local projects. To support this value case the OpenLV data needs to be supplemented more granular information, which can be provided by DNOs, on network constraints and capacity in local areas.

2. **Engagement value** – OpenLV data helps build community knowledge on energy use and energy infrastructure.

   OpenLV was used in a number of the trials to support local engagement by providing important context and community level information on energy. Trial communities Tamar Energy Community, Yealm Community Energy and Rooftop Housing Group used the data to engage local communities in various ways. In the final interviews it was noted that communities would value an evolution of the existing App into an engaging smart phone application. They might also value a communications toolkit to enhance what community groups are able to achieve with limited resources.

3. **Flexibility value** – OpenLV data and functionality supports community level aggregation and coordination of community level demand-side response.

   Though these flexibility use cases are not yet commercially viable, community groups were keen to develop these opportunities and recognised the potential for OpenLV to facilitate community level aggregated services. Further trials would need to be done to fully understand the potential of the technology in this area to support local flexibility. Both Bath and West Community Energy (BWCE) and WHG had hoped their projects would work to change local usage that would be measurable by the OpenLV unit at the substation. However due to delays and restructures, these projects were

[1] Seven projects started the trial including WHG housing association. Due to staff changes this project was halted in April 2019 and WHG replaced by Yealm Community Energy.

not able to test their impacts nor the potential for OpenLV to send alerts to communities to shift usage.

Community	Substation monitored	Primary value cases	Secondary value cases
Marshfield Village (Marshfield)	4 substations in Marshfield	**Transparency value** Developing local energy strategy	**Engagement value** Residents understanding their substation
Rooftop Housing Group (Rooftop)	Bishop's Cleeve, Harpfield Close	**Engagement value** Engaging residents in energy saving	**Transparency value** Data on location of new housing developments
Tamar Energy Community (TEC)	Tavistock, Meavy Way	**Engagement value** Engaging residents through a school in energy messaging	**Flexibility value** Keen to explore local time-of-use-tariffs
Exeter Community Energy (ECOE)	Topsham, Exeter	**Engagement value** Using information to develop smart phone application	
Bath and West Community Energy (BWCE)	Elm Place & Bloomfield Avenue	**Engagement value** Used data to interest households in solar streets technology	**Flexibility value** Testing domestic solar and battery configurations
Owen Square Community Energy (Owen Square)	Owen Square, Kilburn Street	**Transparency value** Supporting funding bids for low-carbon technology	
Yealm Community Energy (YCE)		**Engagement value** Raise profile of community energy in advance of share offer for solar farm	**Flexibility value** Balancing with community owned solar farm
Walsall Housing Group (WHG) **(Note: project halted)**	Little London House, West Bromwich Street	**Flexibility value** Engaging electrically heated residents in energy saving	

Table 1: Community trials and summary value-cases

2 Introduction

The OpenLV project's aim was 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 were three work streams, or Methods, in the trial:

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

Method 2 - Community Engagement: This was looking 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 aim was it would enable communities to act, 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: This was looking to 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 was appointed as the Community Learning Specialist working with the Centre for Sustainable Energy (CSE), which was the Community Engagement Specialist directly supporting the work of the communities.

The Community Learning Specialist's role has been to collate learnings from the Method 2 project and to understand the value and benefits that can be achieved from community-based use of LV data and what the range of uses might be.

2.1 Trial overview

Following an application process to host an OpenLV monitoring unit, seven OpenLV Method 2 projects were selected following an application process in spring 2018. The successful projects consisted of five community energy organisations and two housing associations. These communities had OpenLV substation monitoring units installed over the summer of 2018.

Four out of the seven of the projects hoped to have an impact on changing an individual's awareness and/or understanding of local energy networks, local generation and energy use through using the OpenLV substation data.

Activities in three of the seven trials were also looking to have an impact on the peak demand or usage profiles which could be monitored through the unit in the substation.

Two projects were focussed on using the data to help build their understanding of substation usage and anticipated that this would then help the organisation plan for future investment.

2.1.1 Key changes in the project

The Method 2 project scope originally anticipated that the communities involved in the trial would themselves develop applications that processed the information being collected by the OpenLV units. However, it became evident in the early stages of the trial that these volunteer and community organisations did not possess either the time or requisite technical skills to develop Apps for the units.

It was subsequently agreed by project partners EA Technology and Western Power Distribution (WPD) that CSE could develop a configurable application (CSE App) to be used by all the Method 2 participants to visualise and process information from the units. The community organisations then were able to focus their project activities on using this information for business cases or engagement events.

The App developed by CSE was launched in January 2019 and updates to the functionality requested by the communities continued throughout the trial period to end October 2019.

A further key change was that one community trial participant was replaced during the trial. This occurred due to a restructure at the housing association, Walsall Housing Group (WHG). The project manager left the organisation and no replacement for the project lead was subsequently arranged by WHG. It was agreed that the WHG trial would be halted in April 2019. WHG was then replaced in the Method 2 trial by Yealm Community Energy (YCE).

3 Methodology

The information within this report synthesises and summarises the learnings that have been gathered through the OpenLV project in order to identify the value and benefits that communities may get from using OpenLV data.

Developing use-cases

Regen, working with CSE and EA Technology, developed three community use cases for the substation data. These were developed at a workshop in September 2019 where project partners on Method 2 trials worked to agree a structure to synthesise and present the key value cases and benefits revealed in the learnings collected from the Method 2 process and projects.

These use cases were presented and then tested with the participating communities within the final interviews conducted in September and October 2019.

Final project interviews

All seven community groups took part in an end of project interview with Regen and CSE. These interviews were held in September and October 2019 and the interviews took around 1.5 hours. The discussions were recorded on Zoom webinar technology but Regen and CSE also noted discussions.

Following the interviews, Regen collated key points and summaries from the value and benefit assessment related questions into a short document. This was circulated to the groups for approval in October 2019.

- The final interviews had seven questions. The interview questions can be seen in Appendix 1.
- The first part of the interview was run by Regen. In questions 1-4, Regen asked communities about the value cases and then tested some statements relating to the use cases on a 1-5 scale.
- Questions 5 and 6 were run by CSE where the communities were asked specifically about their projects progress through the trial and about their use of CSE's App during the project.
- The final question 7 was asked by Regen to obtain learnings for the OpenLV project.
- The recorded points from value and benefit interviews are included in Appendix 2

Collation of learning from previous deliverables and mid-trial reports

Additional information for this value and benefit assessment has been collected from six previous Regen reports. These reports are detailed in the Figure 2.

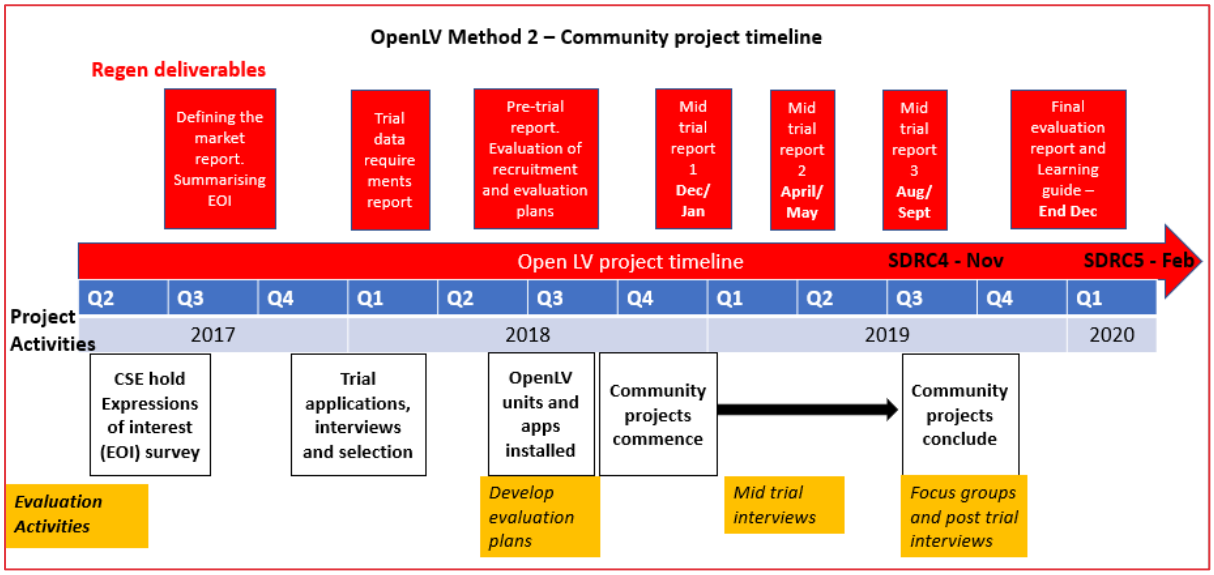

Figure 2: Regen deliverables and timeline

4 Community use cases

4.1 Background

There is an increasing need for all electricity users, and particularly households, to have a more active understanding both about their level of electricity use, and the profile and timing of that usage. Managing and shifting electricity usage will become progressively more important as the UK moves along the pathway of higher renewable generation and electrification of transport and heating.

New and significant household demand loads from heat and transport will need to be managed through smart technology in order to avoid large peaks, and significant investment in increasing the capacity of the distribution network. More predictable and movable demand loads will also help absorb excess renewable energy and help decarbonise the energy system.

However, a key barrier to managing electricity demand at a domestic level (domestic demand side response or DSR), either by personal action or through installing smart technologies, is that it requires people to actively participate in shifting their electricity demand. For this to happen people first need to be actively interested in energy (and/or in reducing costs or carbon) and to have an appreciation of how and when appliances use the most electricity and how that usage relates to the wider use and network.

Currently energy and domestic DSR remains a niche interest of select engaged consumers. A number of communities on the trial saw the opportunity provided by substation data within the OpenLV Method 2 trial, to support a shift in understanding and engagement within households about demand response and flexibility.

4.2 Community use cases for substation data

This report explores the value and benefits that communities might be able to achieve using substation data. It is anticipated that the OpenLV platform would have multiple use cases including providing value to network companies and other organisations. This report looks specifically at areas where this data might add value to community activities, or where it has the potential to help a local organisation develop new plans or sources of revenue.

It is clearly important that this community value is larger than the resources or cost it may take to obtain the data, and to process and use the information being provided.

The report explores the value related to three community use cases which were demonstrated or explored by projects during the Method 2 trials. These were:

1. **Transparency value** – Communities having access to OpenLV data means they can identify opportunities, assess and evaluate plans for distribution connected projects and investments.
2. **Engagement value** - OpenLV data helps build community knowledge on energy use and energy infrastructure.
3. **Flexibility value** – OpenLV data and functionality supports community level aggregation and coordination of community level demand-side response.

These use cases were developed by Regen in conjunction with CSE and EA Technology to understand the different opportunities for communities in using OpenLV. The third use case

on flexibility is not yet commercially viable but is of high interest to the community energy groups involved.

These use cases highlight where communities have identified value from substation data. These community sources of value are separate and in most cases would be in addition to the network benefits that the OpenLV unit and data might provide to the DNO, where benefits would be seen by all customers within licence areas benefitting from lower Distribution Use of System (DUOS) charges.

It must be noted that the CSE App developed for communities within the trial was able to include data sources which were available externally to the OpenLV unit, e.g. Application Program Interfaces (APIs) from local generators or usage from individual households were accessed in order for information to be shown alongside OpenLV data or used to calculate additional information such as carbon emissions.

As a result these use cases have sought to identify where substation data on electricity use provides value **over and above** electricity usage data that might be available through different means or at different levels, such as at individual household or generator level, or where information is available nationally, for example UK carbon intensity.

Therefore, how the communities might have been able to use the CSE App (for example there is a functionality which helps them estimate solar generation within the community) does not necessarily align with the use cases explored in this report which focuses only on the community's use of the substation data.

4.2.1 Trial replicability

The trial consistently showed that community energy groups were the primary community level audience for OpenLV data. They made up the majority (80%) of the applications for the trial, 5 out of 7 of the original trial participants as well as dominated the responses to the expressions of interest process.

With many hundreds of community energy organisations in Great Britain there is a high potential for replicability of these use cases in the community energy sector. The UK government in 2013 estimated there was 5,000 community energy organisations in the UK[2]. The UKERC more recently estimated that at least 300 community organisations are involved in energy generation with many more looking at demand[3].

Housing associations were also involved in the trials with two of the seven original projects. With responsibility for large numbers of homes and often with fuel poor tenants, housing associations are likely to be an important secondary audience. With over 1,700 social housing providers registered at present[4] there is good potential for further housing associations being interested in accessing and using local substation data. Many housing associations like trial participant Rooftop, are investing in energy efficiency or fuel poverty alleviation and would benefit from additional local information to focus their activities and make energy saving or switching messages more tangible.

Though no Parish Councils or Local Authorities were directly involved in the OpenLV trials, if the business case related to OpenLV aggregation and flexibility is proven to raise revenue for communities and create community cohesion, then the potential audience might be widened to include most communities in the UK.

[2] https://www.gov.uk/guidance/community-energy (Accessed 12.11.19)
[3] http://www.ukerc.ac.uk/news/community-energy-has-grown.html (Accessed 12.11.19)
[4] https://www.gov.uk/government/publications/current-registered-providers-of-social-housing (Accessed 12.11.19)

5 Transparency value

Communities having access to OpenLV data means they can identify opportunities, assess and evaluate plans for distribution connected projects and investments.

5.1 Description of value

Two communities (Owen Square and Marshfield) had anticipated using the data as a planning tool for new demand or generation in their communities. Both organisations have on-going work plans that extend beyond the trial period. However, they have both made progress through the trial and have used the data to inform future plans.

The trials have therefore successfully demonstrated that, for the more sophisticated community or commercial organisations, the OpenLV data provided an important insight into the functioning of the local electricity network. They reported that an appreciation of the data meant they were better able to understand the local network and where there might be potential to invest, for example in new homes, EV chargers or renewable energy.

Owen Square felt that by making this information transparent for their substation (and others) it would help them avoid playing 'battleships' with WPD on identifying where network capacity might support their plans to increase electrification of heat. This value case implies a cost saving for both community energy organisations (who would avoid work in areas that were not suitable), and for WPD who would avoid having to responding to requests about unsuitable areas.

Although primarily interested in engaging their residents, housing association Rooftop, felt that the information from substations would be increasingly useful to make decisions about where to put new homes and which technologies they would install in new housing developments. Rooftop are, where possible, looking to electrify heat in new homes and include EV charging points. They noted they would also welcome a tool to identify where there was more substation capacity available to build additional housing on their existing estates or to build higher density housing.

BWCE community energy also felt the information from OpenLV provided some value for where they might be able to locate new generation assets but cautioned that there also needed to be more detailed contextual information available about constraints, substation capacity and network availability at the lower voltage levels. They noted that the WPD website currently had this information but only at 33kV voltage level and not at 11kV or the substation level explored in the OpenLV trial.

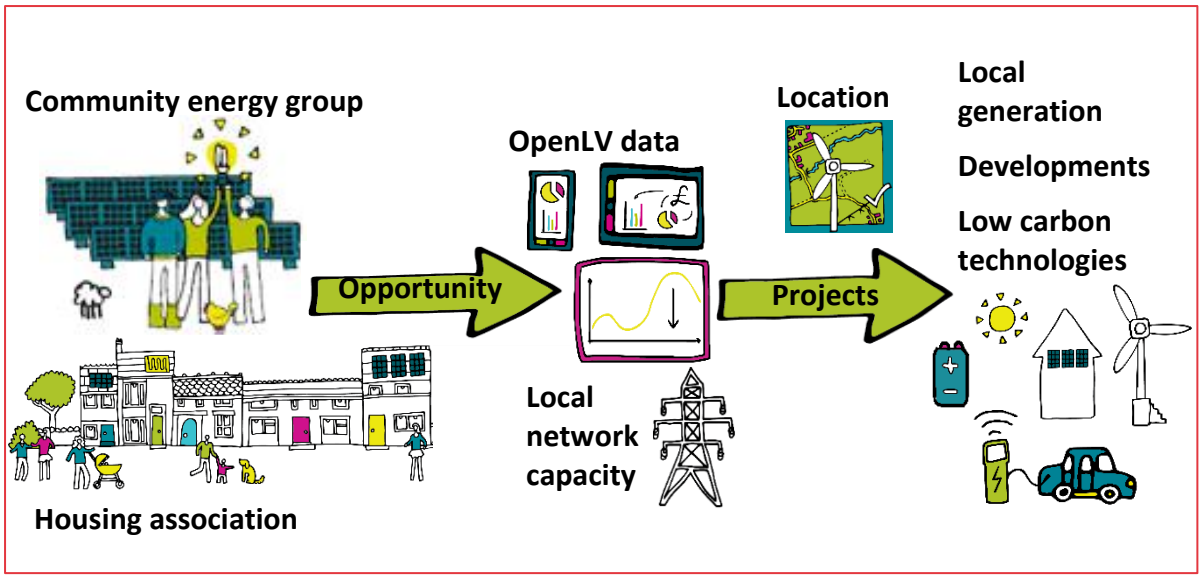

Figure 3: Transparency value from substation data

5.2 Summary of final interviews

The seven trial participants were asked to rate a series of statements between 1 (strongly disagree) and 5 (completely agree) and give reasons for their responses. The results to the questions about the transparency value case are shown in Table 2.

Transparency value case	Average score (1-5)
Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	4.3
The data (from one or more substations) can help communities plan where to locate future demand or generation	2.9
Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3.4

Table 2: Average scores on transparency value

The interviews showed that most communities agreed that OpenLV provided important background information about local electricity networks. However, the responses were more split when asked specifically about how OpenLV could help them plan future for demand or generation.

In their responses this score reflected that the OpenLV data was only one, albeit important, element of the information they needed to make a siting or technology investment decision.

The results also showed that communities felt they needed a level of support from DNOs or project partners to understand what the data was telling them. It was noted that in many communities the level of support needed will vary depending on the skills and experience of the volunteers. The participants agreed that most communities would require basic support to understand the information they were being given and how to process it.

5.3 Quantifying the value

The Energy Data Taskforce[5] has noted that energy data, such as provided by OpenLV, is key to unlocking system and consumer benefits from decarbonisation and managing the transition to a low carbon economy.

The value to communities and other organisations from having access to new information and data is however very hard to quantify. The OpenLV information about substations and local network information is likely to unlock value from a number of different activities in communities across the UK including being able to identify opportunities, assess and evaluate plans for distribution connected projects and investments. Key value streams would likely be related to longer term project or development planning and therefore were not fully explored in these trials due to the short timeframe and limited number of units.

All the communities agreed that there was significant value in allowing communities and organisations further information about substations and particularly spare capacity at low-voltage level and at substations.

This substation level information would be expected to provide a saving to community organisations or commercial organisations when planning where best to locate potential assets as information on constraints is currently only provided at higher network levels[6]. As a result, the value would be mainly related to an investment case or a development plan and developers may be willing to pay for OpenLV information as part of project development costs.

It would also likely provide a cost saving for DNOs who would avoid the administrative cost of responding to individual requests for information and by only having to respond to more credible connection requests.

The OpenLV information however does not support this value case in isolation. The communities were asked in the interviews about additional information that they have used or needed to realise the value from this use case. All felt that the OpenLV data needed to be supplemented with additional information that would make it clear which substations are constrained for demand, generation or both. They also noted the value of having a substation network maps which included detail on individual feeders, as well as information about network hierarchy.

Therefore, the benefits of this transparency would need to be balanced with the cost of WPD providing this more detailed information at 11kV and substation level across the licence area.

Community groups noted in the interviews that they would be unlikely to be able to pay for OpenLV information directly to help their understanding of the local network, but there could be potential for value sharing where commercial organisations could provide the data to other users including community groups.

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[5] https://www.gov.uk/government/groups/energy-data-taskforce (Accessed 12.11.19)

[6] https://www.westernpower.co.uk/our-network/network-capacity-map (Accessed 12.11.19)

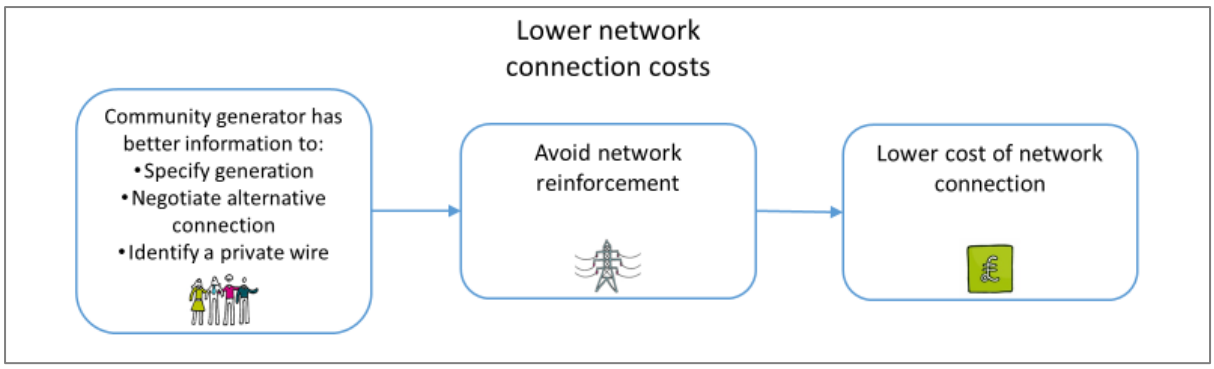

Figure 5-4. Lower network connection costs

5.4 Possible next steps

The main barrier to realising the value from this use case is the ability of DNOs to provide OpenLV or substation data to all users in all areas. This would need to be in addition to low voltage network information including network maps and calculations of substation spare capacity. This data is likely to be increasingly valuable as decarbonisation and electrification progresses.

In order to deliver this service to communities, learnings from the trial suggest the following points would be important considerations:

- Development of an easy to access platform and process for requesting the information or for a monitoring unit.
- Legal aspects and data sharing agreements including confidentiality and the capacity of volunteer and community organisations to agree and respond.
- How much a DNO might charge to provide the information or what information may be provided for a fee and to whom
- Installing substation monitoring and how access is provided to OpenLV information (e.g. via the CSE App or another format)
- The format of substation information – about each substation, available capacity and constraints. Additional traffic light systems for thermal and cable ratings would help non-expert users understand the information being provided.
- Providing ongoing support for information users who would have variable knowledge levels.

6 Engagement value

OpenLV data helps build community knowledge on energy use and energy infrastructure.

6.1 Description of value

The trials successfully demonstrated the potential for substation data to provide locally relevant and engaging information for communities on electricity use and network. The data was found to be particularly valuable to community energy groups, because it shows people how they are connected as a community and how people share the local electricity network assets. Marshfield noted that what attracted most interest from their community was the substation feeder map, as people were naturally interested in where they fitted into the network[7].

The OpenLV data differs from much of the existing information about electricity and energy use which provides either information about national trends or about individual households. This community level information therefore has significant potential to be used to interest and engage people who are naturally interested in their local community, but not specifically interested in energy.

For community energy organisations, using this information as part of their engagement toolkits provided them with a source of valuable information including local profiles of usage (when a peak might occur) and facts about the community (who is connected to which substation) that they felt made conversations with households easier, more productive and potentially less time consuming.

Tamar Energy Community (TEC) noted in their final interview that the information was a useful conversation starter for households (though further conversations could still be difficult) but that being able to show local peaks helped people understand the idea of time-of-use-tariff and, by implication, the need for smart charging or other appliances.

An unexpected benefit to TEC was the project and data also helped build a more sophisticated understanding of local electricity networks within the community organisation itself. It has been consistently proven that having a community group as a messenger of information gets a significantly higher response. It is therefore inherently valuable for these community energy organisations to have a more detailed knowledge of the challenges of the energy transition and implications for local infrastructure.

Furthermore, the idea that people can take energy actions in order to help their local community has been found to be more effective in encouraging people to change behaviour than other motivators. For example, the Scottish and Southern Electricity Network's (SSEN) Solent Achieving Value from Energy Efficiency (SAVE) project tested energy efficiency, demand reduction and shifting with Time-of-use-tariffs to defer network upgrades. They found that community engagement with the message of being part of a caring, connected community, rather than saving money or the planet, led to a reduction in peak demand on the local substation. [8]

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[7] http://marshfieldclt.org/wp-content/uploads/2019/03/Marshfield-Village-Substation-and-Feeder-Map.pdf (Accessed 24.10.19)

[8] SSEN, SAVE project, (Accessed 14.10.19)

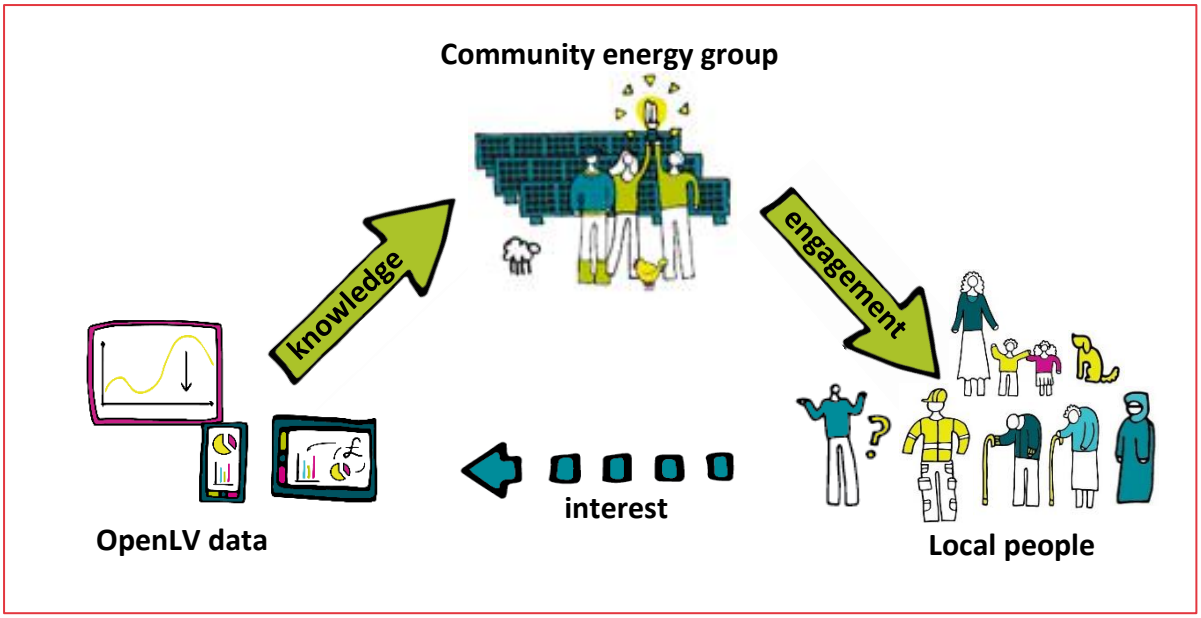

Figure 6-1: Community energy organisations using OpenLV as an engagement tool

6.2 Summary of final interviews

In the final interview, the seven trial projects were asked to rate a series of statements between 1 (strongly disagree) and 5 (completely agree) and give reasons for their responses. These results to the questions about the engagement value case are shown in Table 3.

Engagement value case	Average score (1-5)
Local substation data is an important source of information for community energy organisations	4.1
Local substation data helps people understand broader climate and energy issues – low carbon transitions	3.8
Local substation data helps people understand the needs of the local electricity infrastructure and network	4.1
Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	3.1
Encourages people to switch to the time-of-use tariff	3.9

Table 3: Average scores engagement value

The responses showed that communities all agreed that the OpenLV information was valuable for them and noted that it was particularly useful for engagement because the information was locally relevant and tangible.

They felt that this helped people understand the needs of the local network and in some instances, helped conversations about responding to climate change.

Rooftop noted that the data itself doesn't communicate directly and so any OpenLV data for residents or communities will need to be supplemented with a robust engagement strategy as it was the use and context of the data in messaging, meetings or house calls – that changed understanding or encouraged actions such as switching or changing use profiles.

6.3 Quantifying the value

The projects felt that OpenLV data provided significant value for community engagement. They noted that the ability to see real-time data about the electricity that their community was using, and how that changed over the day or seasons, was an important engagement hook, particularly for individuals with some existing level of interest or analytical understanding.

Though the OpenLV data is not sufficient on its own to engage people, it provides significant added value to community organisations who engage locally with energy issues, electricity usage, energy efficiency, switching suppliers or renewable energy installations.

The value of this data directly for communities is hard to estimate. Studies estimate that people having access to information about energy use through a smart meter can deliver energy saving of around 5% on energy bills[9]. OpenLV provides a similar type of information but at a community level. However, the exact saving and behaviour change this might induce was not explored in these short trials. It is clear however that higher engagement and understanding of energy is likely to feed indirectly into many other future use cases.

Another consideration for future value is that many communities are likely to want more than one OpenLV unit. A substation may relate well to a small neighbourhood, a social housing estate or small university campus. However, most communities cover more than one substation. This was explored in Marshfield where the trial required monitoring of four substations to cover what was traditionally conceived of as a community. With data from more than one substation it is likely that there would be further opportunities to engage people with comparisons between areas or community-wide targets etc.

For example, in a recent Piclo trial it was found that despite large interest in providing flexibility services around three quarters of the flexibility value was not matched with providers[10]. Potentially a more universal understanding of electricity and balancing needs across could help with facilitation of flexibility auctions in constrained areas.

Better understanding of energy by householders and communities can provide significant social and environmental benefits for communities potentially helping people save money on bills or investing in energy efficiency to save both money and carbon.

Community energy organisations have frequently pushed these messages and found that as well as delivering benefits to individuals their activities also promoted community cohesion and wider change such as investing in community energy assets. For example, SSEN's SAVE project found there was a transformational impact in trial area Shirley Warren which surpassed the projects expectations.

*"The SAVE Project has totally transformed Shirley Warren – it has been the catalyst for action – bringing together local people to deliver positive change in their own community as well as achieve reductions in peak demand. A real win/win. We're so glad we got involved." — **Jenny Elliot**, Minister at Shirley Warren Action Church[11].*

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[9] https://theconversation.com/linky-do-smart-meters-actually-help-reduce-electricity-consumption-99395 (Accessed 12.11.19)

[10] Piclo flexibility and visibility report, 2019

[11] https://save-project.co.uk/quotes/ (Accessed 24.10.19)

For organisations wishing to conduct these sort of engagement projects, grant funding is the main source of revenue to conduct basic household engagement on energy efficiency and fuel poverty. This funding can be used to develop resources and pay for staff or volunteers time. In theory this might also include installation of OpenLV and use of App data.

The availability of grant funding would vary by area and the types of households that are being engaged. In some areas new generation projects (such as offshore wind developments or Hinkley Point) have provided significant grants to support local community engagement around energy. This source of funding has increased from £800,000 accessed in 2017 to £1.8m in 2018.[12] For example, in June 2016, the Big Lottery Fund awarded Plymouth Energy Community £500,000 for a four year project to help people living with disabilities and illness in Plymouth stay warm and well.[13]

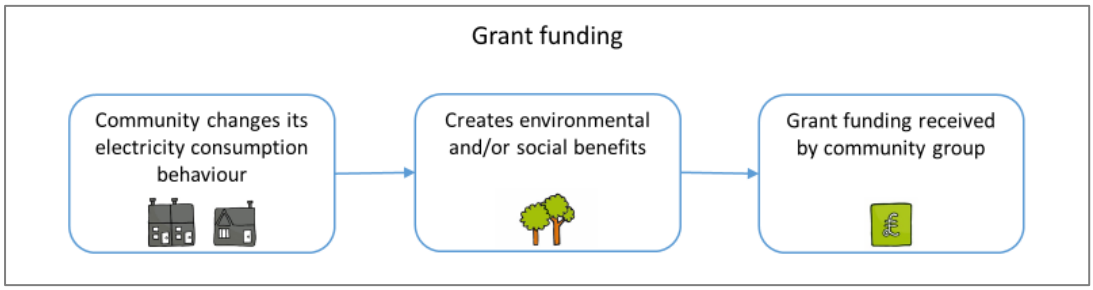

Figure 6-2. Grant funding

6.4 Possible next steps

The community groups showed there was significant value in communities having access to local substation data and information. However, BWCE said they were given the role of OpenLV 'translator' without necessarily having the business skills or time required to so.

Both Rooftop and BWCE reported in their final interview that engaging the communities in substation information had been harder than anticipated. The time and organisational effort required to engage individual householders about energy was felt to be considerable.

Rooftop noted that the key issue for their project was that many of their residents didn't have smart phones or an internet connection which meant online information did not work. Their residents mainly used pre-payment meters, many by choice, to manage electricity bills. Rooftop felt that their residents would benefit first from basic energy education about switching and energy efficiency before they could process the more sophisticated messages about network needs or time-of-use.

Therefore, although substation data would aid the process of engagement of local communities, it will clearly not replace the face-to-face and organisational time required to interest people and raise their knowledge and understanding of energy challenges. For volunteer organisations such as Community Energy Groups, this resource requirement presents a significant barrier, particularly where projects are not funded and rely solely on volunteers.

There are two potential follow-on tasks that would allow the value from substation data to be fully realised.

[12] Community Energy England, State of the Sector report 2019
[13] Plymouth Energy Community, Warm and Well, (Accessed 24.10.19)

- **Develop an engaging and easy to use smart phone App interface for the CSE App which could be shown directly to some householders**. This would save community energy organisations significant time and effort in 'translating' the technical data.

At present most of the groups, including ECoE and TEC, stated they would be unwilling to pay directly to use the existing CSE App. However, both ECoE and BWCE felt there was a clear need for something like a 'smart phone' application where the information from the OpenLV unit was designed to be engaging and shared directly with non-expert members of the local community.

This would likely need to be in addition to the more technical 'back-end' application developed by CSE for the trial.

An example of where this has been used successfully is the Northern Powergrid trial, Activating Community Engagement (ACE). This found that gamifying demand side response was a cost-effective way of accessing domestic flexibility. The trial offered £350 in prizes each month, equalling a 44p incentive per DSR event, 20 times cheaper than non-gamified methods.[14] The trial built on a basic use of notifications through an app to use a game with the opportunity for greater rewards. The key learning was that by making it fun and easy to use, network data can be a cost effective way of engaging consumers in energy behaviour.

It is worth noting however that the housing association participants would find less value in smart phone applications. Rooftop noted in their final interview that many of their residents did not have access to smart phones or the internet. Therefore, a very different engagement approach would be needed in these more deprived areas though the individual benefits of helping people switch or save cost might be significantly higher.

- **Produce a toolkit of adaptable resources for engaging householders with electricity network information**. This would provide support for volunteer organisations looking to engage communities in energy.

Useful resources might include:

a. Adaptable leaflets and information guides about the electricity network local to the community
b. Substation maps of communities
c. Local/regional carbon data
d. Engagement approaches and lessons from the trial (e.g. using and training community champions) as well as information about the best messaging from different audiences.

[14] Northern Powergrid, Activating Community Engagement

7 Flexibility value

OpenLV data and functionality supports community level aggregation and coordination of community level demand-side response.

7.1 Description of value

OpenLV could enable communities to realise value (e.g. payments from DNO) from taking collective community level action to changing the profile of electricity usage at a substation or a combination of substations. This third value case for communities is an area which remains, at present, not commercially viable.

The OpenLV information and functionality opens up significant potential for the substation to act as a community aggregator and to remotely prompt actions by users under a particular substation. This would be with the objective to change or manipulate their aggregated usage in response to local network conditions.

Bath and West Community Energy used OpenLV data as part of their Solar Streets project and aimed to measure the impact of domestic PV and battery installations on the local substation. They also wanted to use it to build a business case for further installations and understand what flexibility services the community might be able to provide.

As part of their trial they hoped to run two demand reduction and shifting campaign months. Unfortunately, due to installation delays with the solar and battery systems these campaigns were not run before the end of the official OpenLV trial period in October 2019.

The WHG trial (which was discontinued due to staff changes) was also expected to show a community impact on the substation. All housing association residents were connected to electric storage heaters in one tower block. The OpenLV monitoring data showed a very significant 2am usage peak in the winter due to storage heaters turning on to benefit from the economy 7 tariff. Figure 3 shows a peak electrical load on this substation which is around four times higher than typical non-heating day. As a result, it is clear that the profile of electrical heat will have a clear and recognisable impact on a local substation.

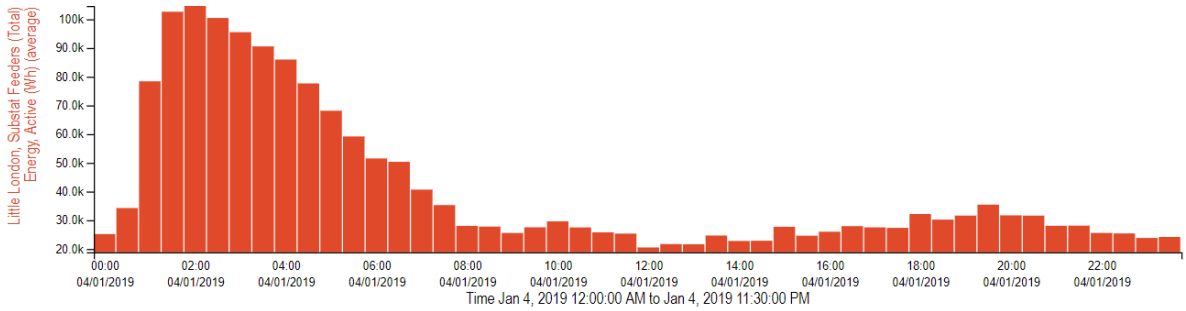

Figure 3: Energy use displayed on CSE App, WHG Little London House - 4 January 2019

7.1.1 Substation level flexibility value to networks

Some communities connected to a substation, particularly those with larger flexible loads such as EVs, batteries or electric heating will be able to change their substation profile to a greater or lesser extent either through coordinated household action or automated smart technologies. This could open several potential sources of value for communities where

investment maybe avoided or delayed in a local substation or network for which the DSO may be willing (in the future) to make a payment. It needs to be noted however that this value is not necessarily new value but would instead be redistribution to communities of existing value created by savings assumed through contracting flexibility instead of more costly network investment.

The balancing of generation and supply at a local level has the potential to reduce pressure further up the network by increasing or reducing demand at times when the network is under stress. This will become more important as the levels of disruptive demand from heating and transport increase along with further growth in distribution renewable generation as the UK transitions towards net-zero. Two flexibility payment examples are explored in Figure 4.

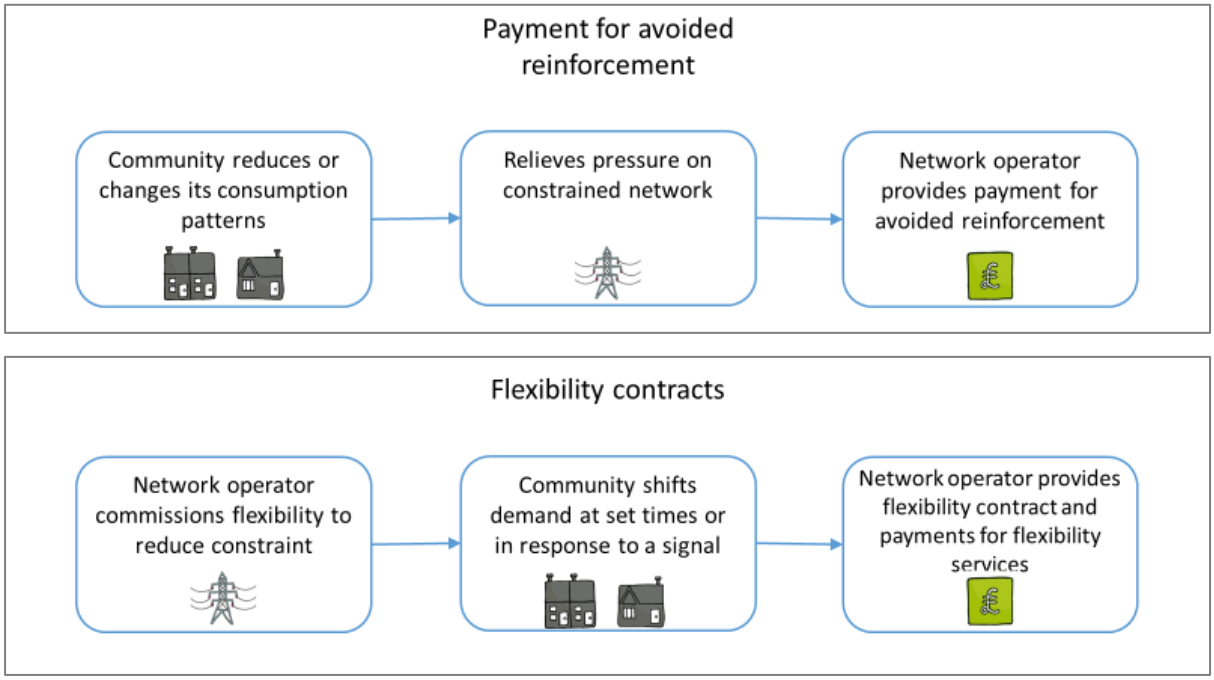

Figure 4. DNO payment potential for community flexibility

7.1.2 Cost saving aggregation model

A further benefit of community aggregation would be cost saving against typical aggregation models. Aggregators are already exploring the potential for domestic demand response which involves each household having an individual contract and smart monitoring. However, monitoring substations instead of individual households could involve significantly less administration costs and lower barriers to participation. Those households wanting to participate on a basic level could just shift in response to signals, they would not need to switch suppliers, share data or require any administrative effort or investment.

This community DSR model would instead require both contracts and payments to be made at a community or substation level. By implication, this means payments would in part or in whole benefit a community fund or community organisation rather than the participating households.

The SAVE project suggests that this community element could in some cases provide a much higher motivation for households than individual payments. Where individual household payments may be relatively small, collectively across a substation they could provide a useful source of additional of revenue for community organisations, schools etc.

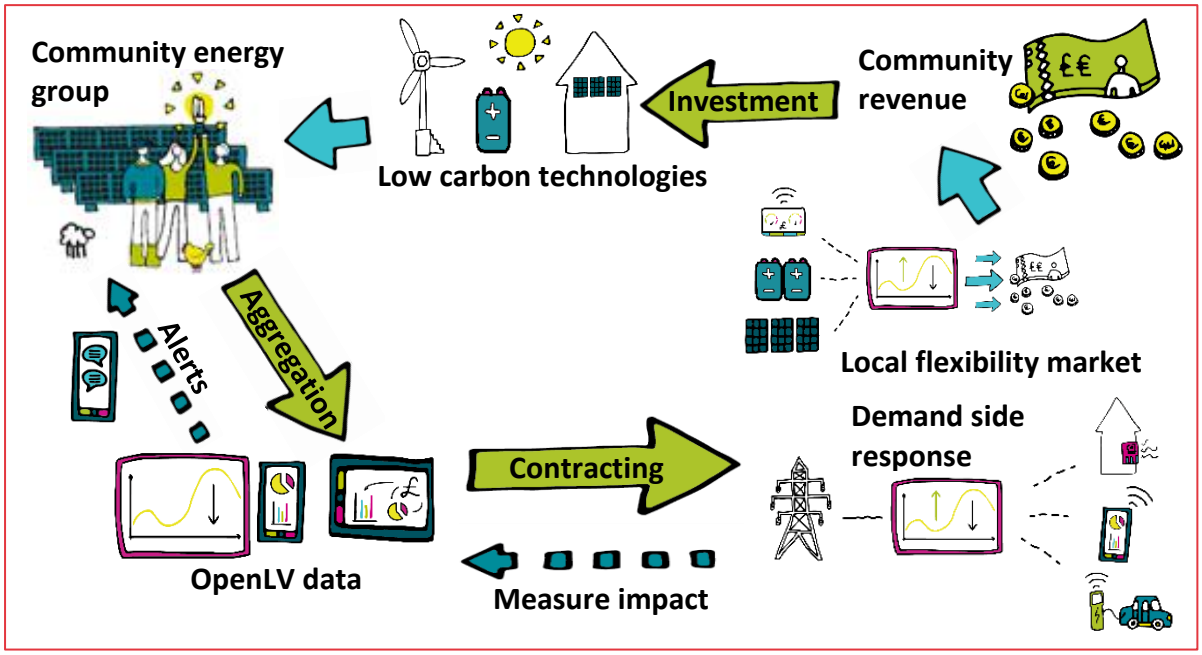

Figure 5: Flexibility value for local communities

7.2 Summary of final interviews

In the final interview the seven trial projects were asked to rate a series of statements between 1 (strongly disagree) and 5 (completely agree) and give reasons for their responses. These scores relating to the transparency value case are shown in Table 4.

All the community energy organisations noted that they would be interested in developing demand side response or flexibility business models when the regulatory or network conditions allowed.

Flexibility services provided to DNOs were the most popular and recognised as the closest to market.

Housing association Rooftop, however, felt that these business cases only related to more affluent areas with existing community energy organisations. However, they also noted that they were keen to sell their solar power to residents, but they understood the regulations did not allow this at present.

Flexibility value case	Average score (1-5)
Accessing revenues by providing local network services to DNO	4.4
Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	4
Work with a new renewable generation project to share access to the network (creating cheaper connection charges)	3.8
Create a local electricity market contracts with local generation – local tariffs etc.	3.5

Table 4: Average scores from flexibility value

7.3 Quantifying the value

In the final interviews, the trial participants were presented four types of value cases for community DSR. The value and requirements of these are summarised in Table 5.

Value case	Description of value	Requirements to achieve value	Technology requirements
a) Accessing revenues by providing local network services to DNO	Flexibility revenues to DNOs already available but not currently contracted at community level. Examples of existing DNO contracts are shown in Table 6	Flexibility contracts being contracted at sub-station or community / whole town level.	To have sufficient levels of flexibility to meet contract requirements and community is likely to require a high level of automation and smart technologies as well as high loads (transport, hot water and heat)
b) Switch timing of electricity demand to maximise use of local renewable generation	The primary value is in avoided curtailment cost to the generator who may or may not be community owned.	This value assumes curtailment conditions could be related directly to substation/s conditions or aggregated demand.	
c) Work with a new renewable generation project to share access to the network.	The value would be in cheaper network charges for new generator who may or may not be community owned.	Would need 'shared access' option which has been suggested in the Ofgem's network charging review being developed and delivered in 2021/2.	
d) Create a local electricity market. E.g. communities contracting directly with local generation.	The value of local balancing for the network would be a combination of avoided network investment or cost and reduced line losses. Value may also be available in delivering higher purchase price for generation but lower purchase price for demand.	To achieve this would need some sort of virtual private wire situation and removal of regulatory barriers on supply licences.	

Table 5: Potential flexibility value cases

7.3.1 Flexibility value a) existing DNO flexibility contracts

DNOs are already contracting for flexibility services to help manage the network, referred to as local flexibility markets, as they are location specific in constrained zones of the distribution network. WPD provides fixed payments for flexibility in their Constraint Managed Zones (CMZs), indicating that participants can make between £1,500 and £6,000 per MW of flexible capacity they make available over the course of a year. Though to note that value would not be available long-term as it may only delay rather than avoid reinforcement.[15] The following table details types of flexibility and indicative payments on offer from each DNO.

Network Operator	Types of service	Illustrative Payments	Minimum flexible capacity
WESTERN POWER DISTRIBUTION *Serving the Midlands, South West and Wales*	Secure Dynamic Restore	£175/MWh £300/MWh £600/MWh	None
NORTHERN POWERGRID	Unspecified	Inviting the market to bid	200 kW, aggregated from assets 100 kW minimum
Scottish & Southern Electricity Networks	CMZ Prevent CMZ Prepare CMZ Respond CMZ Restore	Combination of availability and utilization payments, typically ~ £300/MWh	None
SP ENERGY NETWORKS	Post fault Post fault or planned outage Post fault during planned outage	Not published	Details on Piclo when locations released
UK Power Networks	Active power Demand turn down Generation turn up	2019 auction: 18.1 MW of flexibility bought for £450,000	50 kW, can be aggregated from smaller assets
electricity north west	Restore Sustain Continuous	Bidder to state an availability and utilization price	200 kW, aggregated from assets 100 kW minimum

Table 6: Summary of flexibility services being procured by each GB DNO

Although some of these markets do not have a minimum capacity threshold to participate, individual households may not meet the minimum technical requirements, would have a smaller impact and are unlikely to have enough flexible demand to make participating financially attractive. However, community groups or housing associations could aggregate their flexibility to substation level, reducing individual costs of participation and benefitting from economies of scale.

[15] WPD, Flexible Power Value Calculator,(accessed 24.10.19)

Example value: Domestic immersion heaters to provide flexibility services

A community organisation is in a network area with constraints. The DNO is procuring flexibility in the area which could be provided by demand being turned down or turned up. The community are looking to provide this flexibility service through controlling 600 domestic immersion heaters.

These heaters are connected to substations which are constrained at peak times, monitored by OpenLV, with the response aggregated to substation level. The 3 kW heaters can only be switched on or off to provide flexibility. If a signal is given to switch them off, then of course they need to have been 'on' first. Inevitably, some of the heaters would not be in the state they need to be at the start of the provision.

To ensure there are enough heaters ready to respond, only a proportion of the total pool of heaters is included in the flexibility service. For this example, 400 of the 600 heaters are guaranteed to be able to respond, giving a 1.2 MW response. OpenLV data allows both the DNO and the community to measure the level of flexibility provided by these flexible household technologies, with payments reflecting the contracted flexibility services provided.

Illustrative potential revenues:

Priced from £0.5/MWh and varies according to precise location, but with 1 MW the community or housing association could expect £1,000 - £8,000 /yr.

7.4 Possible next steps

Despite the interest by communities, the potential explored in the flexibility value case is not yet commercially viable. However, as more heat and transport is electrified over the next decade there will be increasing potential in community and domestic DSR to deliver value to local networks, providing flexibility or deferring investment.

There is potential to explore further whether the OpenLV facilitated community aggregation could provide an administrative saving and higher response rate from households than traditional aggregation model that requires individual contracts and household monitoring.

A project could look to test:

- The best contractual approach for communities and DSO contracts based on a substation profile
- How would flexibility work when contracted at community level covering multiple substations?
- The use of open data platform to alert individuals or automate domestic or commercial response
- The community engagement approach that works best
- The penetration of individuals or technologies that would be required to see a measurable impact on the substation

7.4.1 The role of a community aggregator

Though there is potential value in community flexibility, the substation community aggregation model implies a significant role, and therefore cost, for a community energy organisation or community aggregator in administration of any scheme.

The role of a community aggregator would include:

- **Organising the project, including getting households or businesses signed up**

Recruiting customers to sign up to a DSR aggregation scheme is essential to its success and would rely on the level of engagement in energy being relatively high. DSR services would require customers to switch or change their behaviour, and potentially engage with new tariffs and technology. This would be a natural follow on from the engagement value case.

The role of a trusted intermediary is very important to overcome possible mistrust. Both SAVE and Regen's Sunshine Tariff recommended a strong role for community organisations. 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 all play an important role.

At the end of the contract period the organisation would also need to be in charge of any distribution of funds and set up a governance process for the allocation.

- **Bid for and win contract from DNO**

Implied in the community aggregation model is that the community group or actor would need to organise, bid for and administrate the contract processes. There were lessons within the OpenLV trial about how processes could be made more accessible for volunteers and community groups but it is clear that if community energy groups want to access these

revenues they would also need to commercialise to some extent. For example, some of the volunteer organisations had issues signing a data sharing and security agreement for OpenLV data with WPD due to the legal nature of the documentation required. If services are being provided to the DNO then there would need to be community organisational structures able to take on these sorts of documentation.

Increasingly as more data is shared and more smart technologies and services are adopted there will be further control systems, protocols and agreements in place to deliver legal contracts and avoid security issues. However, any administration still needs to be appropriate and proportionate to enable community groups of various configurations to participate.

- **Encourage or administrate installation of open data platform along with automation and smart technologies including controllable high loads (transport, hot water and heat)**

Trials to date[16] strongly suggest that demand customers are more able to provide a DSR and win contracts for flexibility if they have both a good level of flexible loads, such as a batteries or Electric Vehicles (EV), as well as some level of automation to ensure there is sufficient response to meet various contractual obligations, such as smart switches or smart appliances.

In most communities this will require new installations in households. The administration cost of working directly with households can be high and therefore the simplicity of the offer is important. For example, BWCE reported that householders found the complexity of the ownership structure for their batteries off-putting. The solar streets trial batteries are owned by Moixa[17] and operated remotely by the community energy group.

The cost of technologies such as batteries and EVs remain high at present although are likely to reduce over time and as installations increase communities will increasingly be able to participate in local flexibility. Currently, home batteries are financially attractive for households with rooftop PV who can maximise self-use of generation, while current payments for DSR from flexibility markets do not in themselves provide a business case for investing in storage.[18] However this is starting to change with new schemes, such as battery manufacturer Powervault are offering discounted storage units to consumers who own solar PV as part of a partnership with EDF to build a portfolio of aggregated domestic batteries providing DSR[19]. Growth in electric vehicle purchases has been low to date but this is expected to be exponential in the UK over the next decade.

Similarly, smart enabled 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.[20]

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

[17] Moixa, https://www.solarguide.co.uk/solar-batteries/moixa#/

[18] Regen, Power to participate: a specification for community energy to participate in a flexible energy system

[19] Current News, EDF Energy makes storage offer to homeowners in pursuit of flexible capacity

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

8 Appendix A: Final interview structure

SECTION 1: A COMMUNITY BUSINESS CASE FOR OPENLV

The OpenLV method 2 project was set up to understand what benefits communities might get from DNO's providing substation level information about electricity use. (Note: separate from network benefits). This involved seeing an App developed and deployed that showed this information.

As the trial draws to a close - we believe the projects have provided evidence that there are three key areas where this information provides additional value to communities.

- Community engagement tool.
- Transparency helps local planning.
- Facilitate community level flexibility.

Question 1: Do you agree with this assessment? – is there something that doesn't fit in here?

Question 2: We would like to get your views about Using the OpenLV data as [part of] an engagement plan. To what extent do you agree with the following statements on a scale of 1-5 (1 = not at all, 5 = completely agree)

Engagement value case	Average score (1-5)
Local substation data is an important source of information for community energy organisations	4.1
Local substation data helps people understand broader climate and energy issues – low carbon transitions	3.8
Local substation data helps people understand the needs of the local electricity infrastructure and network	4.1
Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	3.1
Encourages people to switch to the time-of-use tariff	3.9

Supplementary question for communities that undertook engagement:

- Was there any particular type of person or household who responded or didn't?
- Any lessons we could take from that about how best to engage with this information?

Question 3: On the value of the transparency of the data for local planning.
To what extent do you agree with the following statements on a scale of 1-5 (1 = not at all, 5 = completely agree)

Transparency value case	Average score (1-5)
Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	4.3
The data (from one or more substations) can help communities plan where to locate future demand or generation	2.9
Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3.4

Supplementary question: What additional information do you think you would need to make the OpenLV information more valuable for communities?

Question 4: We believe that OpenLV might help facilitate community level activity (mainly demand or storage) to create value for individuals or communities. To what extent do you agree with the following statements on a scale of 1-5 (1 = not at all, 5 = completely agree)

Flexibility value case	Average score (1-5)
Accessing revenues by providing local network services to DNO	4.4
Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	4
Work with a new renewable generation project to share access to the network (creating cheaper connection charges)	3.8
Create a local electricity market contracts with local generation – local tariffs etc.	3.5

SECTION 4: ABOUT THE OPENLV PROJECT (note this was asked at the end of the interview but collated by Regen)

This section is to capture views of the overall project and what it was like being involved as a community. This will be used as learning points for any innovation project involved community or volunteer organisations?

Question 7: Overall project delivery and lessons learned

- What was done well by the project? Or what did you most value?
- What could we have improved? Were there any barriers to your project or engagement that the project could have removed?
- Is there anything that you have improved if you did it again?
- Do you have any other comments, learning or feedback to share?

SECTION 2: ABOUT YOUR PROJECT (This section was noted and collated by CSE)

You will have been sent a summary of the progress captured from your project – along with your initial logic model and evaluation plan.

In this section we want to collect the final information about your project to complete the case study.

Question 5:

- Did you have any changes or addition or new information that we can record in the case study document?
- What do you consider to be the main achievements / benefits of your project? Are these consistent with your original logic model?
- Did any achievements exceed expectations (or fall flat)? Are there any measures or evidence to demonstrate this? (Evaluation data?)
- Were any wider or unexpected outcomes realised?
- How particularly did the OpenLV data contribute to this project? Do you feel the project could have achieved similar results without the substation data?

SECTION 3: ABOUT THE CSE WEB APP (this section was collated and noted by CSE)

A key part of the project was CSE developing a web app to help communities' access and view the data from the OpenLV unit in an accessible way. If the units are rolled out more widely there will need to be an App that helps communities access the information.

Question 6*:* On a scale of 1-5 (1 = not at all, 5 = a lot) how useful have you found the following features of the web app?

	App functionality	Score
a	Line and bar graphs	
b	Smileys	
c	Data tables and export	
d	Embedding graphs in your own website	
e	View individual substations usage	
f	View grid carbon intensity data	
g	View renewable energy generation data (from an actual installation)	
h	Setting up Tariffs	
i	Sending alerts about substation conditions	
j	Accessing data via API	
k	Estimating solar PV data	
l	Amalgamating data from multiple sources	

- What features of the web app were most / least useful?
- Did you feel you had enough input into the development of the web app?
- Did you have enough time and support to understand how to use the App, for example configuring the different settings (for graphs, alerts, tariffs etc.) to meet your projects' needs?
- In the future could you see your community being interested in /able to develop your own App or software to displaying the information.

9 Appendix B: Community responses collated by Regen

9.1 Bath & West Community Energy (BWCE)

Question 1: Do you agree with the three use cases assessment?

- BWCE used the data as an engagement tool for their installation offer and to raise awareness of local electricity demand
- Found people were interested in seeing their street's electricity use
- Don't think they will ever make use of case 2
- BWCE hope at some point to be able to use the data for flexibility, by amalgamating it with local battery data, demonstrating the value and encouraging demand shifting
- Carbon intensity data is useful to supplement OpenLV data for engagement, but could be improved if it were more local and shown across 24 hours.

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	4 – that's the potential, but not been able to explore it much
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	4 – similarly, the potential to do this
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	3 – If on its own. It needs context and information around it to help explain. Potential for the data vs the form it's in, clear value, but the way it's presented is not accessible
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	3 – when put in context, data doesn't speak for itself, 4 in an ideal world
e	Encourages people to switch to the time-of-use tariff	3 – Would like to explain that TOUTs will likely be coming in, and compare standards tariffs with TOUTs. Again, the potential use case would be 4 ideally.

Which people responded best to the data?

- People already engaged with energy responded most to the data
- Internet savvy people were receptive, some older people were resistant to going online, but not enough engagement done to see detailed patterns
- Format is dry and requires a level of data literacy
- Energy literacy is fundamental, to give transparency where the data seems opaque
- The value of different bits of the data changes depending on type of consumer and how data is presented, project hasn't properly explored how people respond to data
- The data needs to be presented in accessible format to right people, engagement use cases could all be 4/5 if this were the case
- Sharing best practices and experience with other communities to see how they've used the data would have been helpful
- Need for a separate project with a structured approach which takes a focus group and test aspects of the data to get feedback, tests what types of data work for different types of people and what format it should be in
- Needs a follow-on resource to do this.

Question 3: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	4
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	N/A - Have not looked at it in that way
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	4.5 Significant input needed

What additional information is valuable for communities?

- Network capacity maps at 11kv and below, currently you can approximate the data through temperature, but it's very vague
- Substation capacity headroom

Question 4: Flexibility value

	Value case	1 (not at all) to 5 (completely agree)
a	Accessing revenues by providing local network services to DNO	5
b	Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	5
c	Work with a new renewable generation project to share access to the network (creating cheaper connection charges	5 – yes, as there are grid capacity constraints in the area
d	Create a local electricity market contracts with local generation – local tariffs etc...	5

Question 7: Overall project delivery and lessons learned

- Communication with other communities and events, such as the Exeter one, were useful
- Some participant workshops were quite technical, more sessions on engagement issues, sharing learnings and comparing findings with other communities would have helped, to see what messages and data presentation worked for them
- Need a more effective way of sharing information between communities and hearing from other methods – business and academia learnings
- Overall support from CSE was good and app development process was helpful
- Flexibility from project partners was helpful
- Human in way it was dealt with
- EA Technology were helpful when responding to technical issues
- Data was at the core of the project
- Accessibility of data was an issue as BWCE felt like translators, when they were learning as much as everyone else – more help on communicating data would have been helpful
- Engagement with WPD has been less than expected, making it difficult to know what they DNO wants to get out of the project and help communities understand their role in the system
- Project timescales were problematic, especially with installation delays
- BWCE could have structured their engagement differently to better suit the project, so enthusiasm doesn't peak at the start and then wane
- Continuing access to the data is important moving forward.

9.2 Exeter Community Energy (ECOE)

Question 1: Do you agree with the three use cases assessment?

- Agree on assessment of the business cases
- Not everyone is going to be interested in substations they will be aware that with a lot of EVs etc. they are going to have to make the substation bigger/need investment.
- The third business case is key - can the community be engaged and respond. Interested to know if this is possible.

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	3 – yes but is a bit niche interest
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	5
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	5
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	2 - Feel it is probably too much of a jump.
e	Encourages people to switch to the time-of-use tariff	4 – Most people will change with the motivation of money saving - decarbonisation and benefitting the community would be additional

Which people responded best to the data?

Generally people who were already engaged, either had PV, renewables at home or work in energy.

Question 3: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	3 – more of an idea of thermal issues
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	1 – If data on all substations in Exeter – if broader. Doesn't cover transmission level – not clear.
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3 - Need relative data – contextualising

What additional information is valuable for communities?

- Important to have contextualising information like temperature
- But most important is that data is high quality and relevant to the community.
- Feeder maps are needed to know who is connected and needs to be available to a recognised community area – so more than one substation on most instances.

Question 4: Flexibility value

- As long as there is a saving or value to be made these are possible but very unlikely to do these for altruistic reasons.
- Market is mainly people who value community energy and happen to be located under a particular bit of (constrained network infrastructure)
- Any value proposition needs to be as simple as possible – ideally automated.

Question 7: Overall project delivery and lessons learned

- Felt that the project events were useful including the one at Exeter Castle.
- Would have liked to put more resource into the project – for volunteer organisations the resource to work on these projects is limited and so could have done with some funding enable the organisation to do more
- They premise of the project is still very valid and also that it had the added bonus of up skilling communities and stakeholders involved.
- For Exeter they got some value from the focus group and learning about development of a smart phone app
- Had some issues about the quality of the data – didn't think that the temperature data was correct for example and that could have been improved.

9.3 Marshfield village

Question 1: Do you agree with the three use cases assessment?

- Agree on the local level vs national grid communication. OpenLV allows electricity to be seen at a community level.
- Interest in decarbonisation is increases and it forces people to look at how it fits into the distribution network.
- What attracted most interest from the community so far is the feeder map and understand where they fit into the network.
- Haven't done much public engagement but feel it has been influential, partly as a catalyst for other activity – such as Sustainable Marshfield (which had a wide remit Inc. biodiversity)

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	4 - Yes – they felt it was very important to see profile and amount
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	2 – A low score was given because they felt it gives part of the information but not all
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	3 – Felt that this background info was definitely useful
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	3 – Felt that smart isn't a big enough reason to make people install new technology and so they would only expect minimal response in this area
e	Encourages people to switch to the time-of-use tariff	4 - Yes – being able to show them the profile is a useful illustration and should encourage people to take TOUT if it will make savings.

Which people responded best to the data?

Marshfield noted that some people found the information interesting but response was quite low. Plan to do future engagement in village hall.

Question 3: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	4
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	1. Marshfield felt the proximity of the generation was main factor in where they would locate as their substations all had quite high headroom.
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3 – Marshfield felt had a relatively good grasp once the information and App was explained. Other parts of the data – phase etc. were not required for their purposes and so didn't need to understand those

What additional information is valuable for communities?

- Feeder map
- Capacities and limit of each substation – and the context such as oil temperature proxy for loading etc.
- Importantly needed to make sure that all the data was there as they had problems receiving data for 2 out of 4 substations. This meant they were unable to comprehensively monitor for the year they had intended.

Question 4: Flexibility value

	Value case	1 (not at all) to 5 (completely agree)
a	Accessing revenues by providing local network services to DNO	3 – Yes if available
b	Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	3 – It would be one piece of information needed for this to happen along with information of when PV was generating. Possibly but difficult.
c	Work with a new renewable generation project to share access to the network (creating cheaper connection charges	2. Can see the logic and it fits with aspiration, but this is some years away.
d	Create a local electricity market contracts with local generation – local tariffs etc...	2. The need to change suppliers does seem to fit with this now - but again it would be a longer term ambition to link renewables, battery and the village needs.

- Felt to achieve these you would need to set up a Community benefit organisation in the first instance to access revenues.
- Recognise that the value is quite site specific – e.g. about constrained areas
- Would welcome if these could help make a business case for local renewables post FIT.

Question 7: Overall project delivery and lessons learned

- Was valuable to have CSE as a key contact and Regen's input but felt arm's length from the rest of the project partners EAT and WPD.
- Had a sense community engagement was an add-on to project WPD were doing and their needs weren't always considered fully. For example the data protection agreement which was 'over the top'.
- Forum for all communities to share experience would've been useful, feel they've been working in isolation and would have benefits in learning from others.
- Some key things for the group such as new WPD area manager relationship (through parish council) and support from CSE/Regen were achieved separately to the OpenLV project.
- The project had a small impact on the creation of Sustainable Marshfield – which is a new dedicated volunteer group looking at energy but also wider issues. Might have been useful to have a specific organisation at the beginning.

9.4 Owen Square Community Energy (OSCE)

Question 1: Do you agree with the three use cases assessment?

- Agree overall.
- By engaging people with local information, it allows you to engage on something tangible.
- Supports addition of new generation – EVs, heat pumps and PV mainly – without the DNO worrying about substation. You can now see substation capacity headroom, where it was previously like playing battleships.
- You need to know the collective impact of dispatchable renewables, like EV batteries or heat pumps orchestrated at a substation level, OpenLV data is more valuable than individual data for that.

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	5 Agree
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	4
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	5 - Agree
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	4.5 - Smart appliances mainly, smart meters not as useful, OpenLV is more useful
e	Encourages people to switch to the time-of-use tariff	3 - This is a bit of a leap, there's a gap between seeing substation data and personalising that to households for action. Not an advocate of TOUTs.

Question 3: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	5
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	5
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3 - Require significant help, but not necessarily from DNOs.

What additional information is valuable for communities?

- Substation headroom data.
- Business case for transformer sizing from DNOs. How much is it to upgrade to a 10MW transformer? Would like to know as it feeds into what the value the community can provide is.
- WPD's GIS system to see feeder maps so you know what's on each substation.

Question 4: Flexibility value

	Value case	1 (not at all) to 5 (completely agree)
a	Accessing revenues by providing local network services to DNO	5 - It's an ambition if there were a contract for capacity management of substation, also interested in energy arbitrage.
b	Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	3 - They could shift hot water heating times to off-peak. A community with demand turn-up availability and a solar farm being curtailed under same Virtual Power Plant (VPP) is a difficult option but people are working on making it happen.
c	Work with a new renewable generation project to share access to the network (creating cheaper connection charges	4 - In theory more achievable and useful if they can connect to the same substation, but would need 'OpenHV' if it were under a primary substation, enabling you to connect a larger generator than you could without demand turn-up being available on same substation

d	Create a local electricity market contracts with local generation – local tariffs etc...	2 - Not worth doing it bilaterally when people are working on getting VPPs developed which would be more generic at doing the same thing. VPP misses large chunk of value and doesn't help generators with curtailment, as you need a permissive piece for extra capacity for the generator, OpenLV allows more generators to participate and demand turn up to access more value.

- It was hoped that the first case (network services) might be useful, but WPD are not forthcoming with cash for communities to do this.
- Generation and demand on the same substation within shared access agreement is imminently achievable, enabled by OpenLV data. Without needing to create a market, you can have a single vendor and app. This can be scaled up to the primary substation.
- Case B and D sound like the same thing.

Question 7: Overall project delivery and lessons learned

- OpenLV itself is what we need for decarbonisation by 2050, underlying basic concept is essential and highly valuable.
- Want OpenLV rolled out across all licence areas.
- Metering at secondary substation level is a tech fix needed for the grid right now.
- It's hard to work actively on these projects on volunteer basis.
- Funding issues for community groups makes it difficult to engage, they need to be valued.
- It's a waste opportunity to do OpenLV without funding available to the community from the core project, or an alternative funding competition exclusively for communities.
- The time Damon put into the project came from Bristol Energy Group, worth up to £4,000.
- It would be better to include 4-5 substations in OpenLV and give them £25,000 each.
- If each community had someone working full time on the project for 9 months, much more could've been achieved, as seen with some groups with funding from elsewhere achieved things.
- It's useful to have intermediaries facilitating access.
- A very well-resourced community group could have engaged directly with WPD.

9.5 Rooftop Housing Association

Question 1: Do you agree with the three use cases assessment?

- Definitely agree on the use cases but noted that the data itself doesn't communicate directly and so any OpenLV data for residents or communities will need to be supplemented with a robust engagement strategy.
- Agree that it also has a value for more sophisticated users and citizens**.** Very interesting to be able to see it on a local level – atomises a problem.
- Personally, the project manager found that the App information useful but for other user could be made a bit simpler.
- Noted that smiley faces were a bit subjective and might be better to have a scale or a A-G rating similar to that used for houses or products.
- Key issue for the project in getting engagement directly with residents was a level of IT poverty that hadn't been anticipated. Many of the residents didn't have smart phones or an internet connection. Work cannot be done over the internet.
- However, they can see there is significant opportunity for professionals using the information. For example in the housing association itself where they are looking at planning for new housing but have found that the local network doesn't have the capacity in that area. Would be benefit to them and WPD to have access to that information at an early planning stage.
- For example new houses will have vehicle charging points and it would be useful to have a tool that could identify if the local substation can take the capacity.

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	Think it has theoretical value of a 5 – but the project experience is a 2.
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	3 - This might be a benefit for some but for the HA residents it isn't. They are worrying about today not tomorrow.
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	3 - it is going to be useful for general education but would not anticipate putting the tool in front of people
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	This proved to be an issue for the HA. Their residents were generally resistant to new technologies.

		They felt that the middle classes might have the IT skills and education to use gadgets and benefit from the Octopus tariff, but it is harder work getting that across to their residents. Would need higher general energy knowledge before you could have that conversation with their residents.
e	Encourages people to switch to the time-of-use tariff	Theory would give this a 5. Saving money is a better message for residents than environment – as many have bigger day to day problems. At present a bigger issue is that they are reluctant to switch and like to manage electricity simply using a pre-payment meter.

Which people responded best to the data?

- They found that the older residents were more likely to engage with the issue but their biggest hard to reach group was younger families. These residents hadn't yet bought into the concept of managing energy. Therefore the OpenLV information and messaging was far ahead of where they were.
- Overall – in addition to changing staff etc. they under-estimated the labour intensity of the project. They had expected a relatively receptive group but this was not the case. As a housing association committed to environmental action they hadn't realised that their messaging had not go through to residents in that area.
- Rooftop recognised that they needed significantly more resources on the project which would have involved a significant level of education and behaviour change project.

Question 3: Transparency value (note: completed as a housing association)

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	5 agree. Very detailed information about how much energy is used at peak times and seasonal usage. Could be used to identify areas of HA where there is very high usage and need for investments.
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	4 – Currently knocking down 25 houses and putting up 48. Useful data to know where those houses can be connected and what the capacity of the substation is. Hoping to move away from gas to electricity – and so will need this data to understand where this is possible at least cost.
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	3 - The project manager found it helpful to have a session with CSE in Bishops Cleve – spending time looking through the data and the App. After that was able to navigate intuitively.

		Assuming they are technologically literate most users need a bit of basic guidance and perhaps some direct support at the beginning in order to start using the information.

What additional information is valuable for communities?

- Rooftop found the information on the App useful including the additional information about Time of Use Tariffs and Carbon intensity.

Question 4: Flexibility value

- Noted that the HA is involved in a wider regeneration project in Bishops Cleve which includes energy efficiency and public space and they had anticipated that engagement around OpenLV would be fairly straight forward.
- However, the community targeted was not particularly well gelled and didn't have a common bond.
- They realise that to achieve this there needed to be much more time spent and that there isn't a one size fits all engagement strategy. For example using things like slow cookers are a good suggestion but they need to be communicated properly.
- Also noted that the community has a band C rating which means they have relatively good thermal comfort and so energy is less of an issue than it would be in poorly insulated homes.
- The housing association have been investing in solar panels and would like to sell this cheaper electricity to tenants now there is no FIT. Recognised they needed to be an electricity company for this but is a business model they would be interested in.

Question 7: Overall project delivery and lessons learned

- Kate had enjoyed being involved in the App development and the project.
- Being involved in the project fitted their corporate objectives of trying to save money and carbon.
- Key lesson for others would be not to underestimate the time needed to engage residents. As a HA their residents are not already engaged and it requires significant time and effort.
- Didn't require money from the OpenLV project to do this but feel they might have wanted to recruit volunteers in the community (community champions) to run the project which could have provided that direct engagement.

9.6 Tamar Energy Community (TEC)

Question 1: Do you agree with the three use cases assessment?

- Agree overall with the points.
- You could go bigger with case 3, it would be useful to go country or county wide.
- The data links to flexibility, as it helps explain the benefits of DERs to communities, it has helped with the Power in Your Hands project, as data can help illustrate value.
- The data helps see how to make better use of the south west's renewable generation.
- The data has made them question the UK's strategy, as storage tech will create further losses and surges.
- First volunteer project for some community members, which has provided a different perspective and was valued.
- It's enabled more detailed thinking, such as the challenges of phase imbalance, and whether it helps WPD if we put more LCTs onto substation.
- The project has been a catalyst for TEC having long and detailed interactions with WPD, improving the community's relationship with their DNO.

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	5 - Been useful in engagement we've had and has given us wider local electricity knowledge.
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	5 - We were surprised by the carbon intensity data and how much local generation there is
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	5 - Agree, we know more about the wider network and we have significantly more generation than previously thought.
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	2 - Data helps start conversations but still difficult. Problems with smart meters prevents them giving positive messages. Many people have security concerns. Lots of education is needed. Explaining peaks helps people look into time shifting.
e	Encourages people to switch to the time-of-use tariff	4 - Data can explain it, but unsure if people are incentivised by this. They've found it easier to change kids' minds, then they talk to adults. Problem that some data is too national, it more

		data were local it would encourage shifting charging times, etc., with people more engaged, making it a tool for taking action on climate change.

Which people responded best to the data?

- Hard to predict who'll be interested and who won't
- Local councils very responsive to OpenLV data

Question 2: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	5 if you can get to the data 0 as the app is not good as a tool for getting the data Data helps, but more clarity on how WPD thinks would be useful.
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	3 - Construction projects in Tavistock could make use of it, but none taken interest in OpenLV data. Combination of OpenLV data and network maps would be useful for this.
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	4 / 5 Depends on skills and expertise of group and what you're looking for. You need a good relationship with WPD, TEC lucky they have this with local WPD staff

Useful additional information

- Capacity maps
- Feeder maps
- The data on a phone app
- Data from other local substations to get the full picture
- More localised carbon intensity data to understand what's happening locally (as opposed to regional carbon intensity data on the app), local supply point carbon data.

Question 4: Flexibility value

	Value case	1 (not at all) to 5 (completely agree)
a	Accessing revenues by providing local network services to DNO	5 - As an aggregator, if it's commercially viable, likely to look for this kind of value, but unsure whether there's enough value in Flexible Power.
b	Switch timing of electricity demand to maximise use of local renewable generation (this would reduce carbon and/ or avoid curtailment)	5 - Very interested
c	Work with a new renewable generation project to share access to the network (creating cheaper connection charges	3 - Explored this already. If local generation is fed in at certain times, it would have value of 1000s of household batteries, but there's not the regulatory framework for this at present. There has to be an equitable relationship between the volunteer organisation and the commercial organisation.
d	Create a local electricity market contracts with local generation – local tariffs etc...	5 - Interested and so are local people. Requirement for suppliers to offer TOUTs would help. People aren't incentivised enough currently. People need to be able to use data and understand it. Want to become more self-sufficient using renewable generation and storage with people on local TOUTs.

Question 7: Overall project delivery and lessons learned

- Opportunities to all come together are useful, but not always enough engagement between the communities.
- Concerned that each community project is 'reinventing the wheel', so a mechanism to exchange information, for WPD and EAT to be more accessible, and innovation to be shared would be useful.
- Would have liked to have met EA Tech and other projects partners towards the start of the project.
- App could have been more co-designed.
- Funding for communities' time would have helped.
- In hindsight, the group would have chosen a different substation.
- They appreciate the opportunity to have participated in the project, it's enabled them to develop a whole new understanding of how the energy system works, locally and globally
- Major disappointments in how the data has been presented.
- The project has had additional unexpected impacts from the thinking it has stimulated, could have positive impacts for their town.
- Helped them think more about the need for smart technologies, demand side response and the need for regulatory changes for the smart meter rollout.
- They know future electricity system challenges they were previously unaware of.
- They want input into the architecture of new LV CAP units.
- They want the opportunity to meet with Ofgem and discuss what they've learned.
- There is a role for this data in the planning system.
- The OpenLV project has had a great reach.

9.7 Yealm Community Energy (YCE)

Question 1: Do you agree with the three use cases assessment?

- Agree on point 1 in particular, which the group has been focussed on.
- Noted that using OpenLV as a community engagement tool is much easier with a community who already have an interest, with data providing further information.
- Starting engagement with a general audience using this information is difficult.
- Local information is useful for getting people thinking generally about energy use and changes in the energy system such as electric vehicles (EVs).
- Very useful for community energy group looking to raise its profile

Question 2: Engagement value

	Value case	1 (not at all) to 5 (completely agree)
a	Local substation data is an important source of information for community energy organisations	4.5
b	Local substation data helps people understand broader climate and energy issues – low carbon transitions	3.5 - More useful when combined with other data, such as carbon intensity, substation feeds, solar panel generation. This gives more value to end user
C	Local substation data helps people understand the needs of the local electricity infrastructure and network	5 Agree
d	Local substation data helps people accept the need for smart appliances (including smart meters and smart EV charging)	3.5 - Certainly helps and provides a good talking point. Showed some data at the Yealmpton Show, a small number of people were engaged but it passed many by at this early stage. It's a leap to go from seeing the data to understanding why you should get an EV because of it.
e	Encourages people to switch to the time-of-use tariff	3.5 - Using tariff information rather than raw energy data would've helped get the point across. Personal/household data would be more useful In future, people will understand and it will be useful to illustrate why it's helpful.

Which people responded best to the data?

Reported that there was not a big enough sample to say there's a pattern. Generally, it was people already interested in electricity supply in general.

People who were engaged already had a level of understanding.

Question 3: Transparency value

	Value case	1 (not at all) to 5 (completely agree)
a	Using the data from the OpenLV unit (accessed via the OpenLV app) makes it easier to understand how the local electricity infrastructure is set up and how much electricity is used.	4 – agree
b	The data (from one or more substations) can help communities plan where to locate future demand or generation	3 / 4 – don't have that flexibility, need more freedom in planning. Could change in the future, with EVs and charging times, and if you could see that a substation was in danger of being overloaded, it might influence a decision on where to put rooftop PV.
c	Community energy organisations will require support from DNOs to fully understand what the OpenLV data is revealing	2 / 3 – depending on the skills within a community as you need a level of expertise to know what you're using it for. Deciding which substation you wanted monitoring stimulated thoughts on how whole local grid is set up, leading to digging deeper to look for more information.

What additional information is valuable for communities?

- Data such as feeder maps should be more accessible
- A talk or workshop from a WPD member of staff to the community
- Data from other nearby substations
- A list of local generators
- A list of three phase connections

Question 4: Flexibility value

	Value case	1 (not at all) to 5 (completely agree)
a	Accessing revenues by providing local network services to DNO	3 / 5 Especially for the local solar farm, and there's a potential for aggregation, but depends who holds the contract. Awareness raising from the project can get people to sign up. YCE would be interested in, installing battery next to solar farm and doing DSR with that, but not currently enough money in it to fund the battery.
b	Switch timing of electricity demand to maximise use of local renewable generation (this would reduce	Not likely in the short term but it could be interesting. It would take a lot of persuasion and explanation to get people to agree.

	carbon and/ or avoid curtailment)	
c	Work with a new renewable generation project to share access to the network (creating cheaper connection charges	5 In theory, provided that it would be the community-owned solar farm
d	Create a local electricity market contracts with local generation – local tariffs etc...	3 / 4 Not quite sure how it would work but would be keen

Question 7: Overall project delivery and lessons learned

- It would've been beneficial to have a more streamlined way of accessing minute-by-minute data, rather than once a month,
- Would try a different method of procuring data loggers and accessing solar farm data – corporate processes like staff restructuring slowed both things down.
- Exeter workshop was missed, so more face-to-face engagement opportunities would've helped to gain a better understanding of what other communities were doing.
- Feedback from WPD on what they wanted to get out of the project would be useful.
- WPD should share open source substation data with all communities, more value for them here as communities could make educated decisions and approach WPD with solutions.
- The data would be useful for future generation projects and for flexibility schemes, if it costs £100 to get the data it would be worth it for this, but community on its own unlikely to pay for it as it's not their problem if the substation is constrained.
- The value to WPD of the substation not going down is much greater than what communities would pay.