Local Energy Accelerating Net Zero

Report Title: Data Workshop Report

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Context

The UK Government has legislated to reduce its carbon emissions to net zero by 2050. Meeting this target will require significant decarbonisation and an increased demand upon the electricity network. Traditionally an increase in demand on the network would require network reinforcement. However, technology and the ability to balance demand on the system at different periods provides opportunities for new markets to be created, and new demand to be accommodated through a smarter, secure and more flexible network.

The future energy market offers the opportunity to create a decentralised energy system, supporting local renewable energy sources, and new markets that everyone can benefit from through providing flexibility services. To accommodate this change, Distribution Network Operators (DNOs) are changing to become Distribution System Operators (DSOs).

Project Local Energy Oxfordshire (LEO) is an important step in understanding how new markets can work and improving customer engagement. Project LEO is part funded via the Industrial Strategy Challenge Fund (ISCF) who set up a fund in 2018 of £102.5m for UK industry and research to develop systems that can support the global move to renewable energy called: Prospering From the Energy Revolution (PFER).

Project LEO is one of the most ambitious, wide-ranging, innovative, and holistic smart grid trials ever conducted in the UK. LEO will improve our understanding of how opportunities can be maximised and unlocked from the transition to a smarter, flexible electricity system and how households, businesses and communities can realise the benefits. The increase in small-scale renewables and low-carbon technologies is creating opportunities for consumers to generate and sell electricity, store electricity using batteries, and even for electric vehicles (EVs) to alleviate demand on the electricity system. To ensure the benefits of this are realised, Distribution Network Operators (DNO) like Scottish and Southern Electricity Networks (SSEN) are becoming Distribution System Operators (DSO).

Project LEO seeks to create the conditions that replicate the electricity system of the future to better understand these relationships and grow an evidence base that can inform how we manage the transition to a smarter electricity system. It will inform how DSOs function in the future, show how markets can be unlocked and supported, create new investment models for community engagement, and support the development of a skilled community positioned to thrive and benefit from a smarter, responsive and flexible electricity network.

Project LEO brings together an exceptional group of stakeholders as Partners to deliver a common goal of creating a sustainable local energy system. This partnership represents the entire energy value chain in a compact and focused consortium and is further enhanced through global leading energy systems research brought by the University of Oxford and Oxford Brookes University consolidating multiple data sources and analysis tools to deliver a model for future local energy system mapping across all energy vectors.

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Summary

The annual LEO Data Workshop (the 2nd of 3 Project LEO Data Workshops) was held virtually on July 7th and was hosted by the University of Oxford (UoO), Oxford Brookes University (OBC) and the Oxfordshire County Council (OCC). This workshop was held to determine the main data and tool gaps within Project LEO, including the main stakeholder needs in relation to the Integrated Land Use Mapping tool.

Beginning at 9:00 with introductions given by David Wallom (UoO), roughly 54 participants from 26 organizations attended the day's sessions on data management within LEO. Engaging discussions were led by Project LEO partners on pertinent concepts of data management and utilization, with specific focus given to the Integrated Land Use Mapping tool. A significant portion of the day's activities was spent in virtual breakout sessions for the aforementioned mapping tool and also around data management discussions for the LEO **MVS**s (**M**inimum **V**iable **S**ystems). Attendees and moderators worked through key questions around the data requirements and services for each of these core elements of LEO's data. The day closed at 14:45 and saw a successful virtual meeting which has been concisely summarized into the report that follows.

Participating Organizations

Internal
EDF, Low Carbon Hub, Oxfordshire County Council, Oxford City Council, Oxford Brookes University, Piclo, SSEN, University of Oxford

External
BEIS, Connected Energy Ltd, Energy System Catapult, Energyhub, EnergyREV, Engie, ERIS, Heriot Watt University, Keele University, New Resource Partners, Ofgem, Opus One Solutions, West Oxfordshire District Council, Pure Leapfrog, Regen, SMP Networks, South and Vale District Councils, Winchester City Council

The following report has been curated by
David Wallom, Masaō Ashtine and Victoria Grant

The following sections provide a summary of the key sessions from the day's activities, bringing together salient high-level discussion points around the management of LEO's data and the feedback from internal and external stakeholders. Each page's footer (where appropriate) will have a Key Learnings bubble that will summarize the main points from each of the sessions' discussions. All workshop presentations can be found here.

Recap of Project LEO (*David Wallom, UoO*) - 9:10

Largely geared to the external participants of LEO, this session gave a brief overview of the wider goals of Project LEO and the learnings from Year 1's activities. LEO's activities were also placed in the context of the work also being done by other fast-followers and there was discussion around the future activities currently being planned within the project.

Data Sharing Agreement: Challenges and Learnings (*David Wallom, UoO*) - 9:30

What is LEO's Data Sharing Agreement? How is this Agreement managed? What were the main challenges, including those that persist, with organizing project agreements such as this? These questions were all addressed in this session and Project LEO's Data Sharing Agreement (DSA) was briefly discussed in terms of the main component involved and some of the key learnings coming out of its organization.

Questions were asked around the availability of LEO's programming scripts where clarification was given that these will be made publicly available through an appropriate data repository in later stages of the project. Data availability was inquired on and participants were told that data will become open-source though some spatial data may have particular licensing around their use.

Key Learnings:
Project LEO is continuing work with MVS trials and data management is becoming increasingly more important; Data and documentation should be as openly accessible as possible to external stakeholders

Data Survey, Log and Cleaning Methodology (*Masaō Ashtine, UoO*) - 9:45

How data are captured, logged and cleaned were discussed by the UoO through this session, including the data capture through the first iteration of the Data Survey in 2019. Project LEO's data, both Background and Foreground, are captured and uploaded through an online form. Data are then scraped for their metadata, and moved into a secure MongoDB cloud service for programmatic access by all LEO Data Coordinators. This session provided more detail on why certain methods were chosen for managing LEO's data, and the current tools being used to clean the data from their raw state for further analysis. UoO gave a run through of the main steps in dataset capture through an MVS example, guiding participants through the processes of data capture, logging and collection of associated metadata, and data cleaning during post-processing stages.

Some discussion points were raised around the specific tools being used for data visualization and cleaning, and clarification was given by UoO, also noting that these tools will become publicly available in the course of their development.

Demo of the Integrated Land Use Map (*Anitha Sampath & Inga Doherty*) - 10:15

Here, we gave participants insight to the functionality, and current work being done with the Integrated Land Use Map which will be core to LEO's spatial mapping activities. Key features and incorporated datasets were explored within this session, raising many questions and discussions from participants.

Discussion points were raised on mechanisms for data updating, indexing data within the mapping platform, overlaying SSEN constraint data, usage of APIs for more advanced data queries, the bringing together of spatial and temporal data, and how fast-followers can streamline the mapping tool work into their projects. Capacity data is not currently integrated into the map but plans are underway for this functionality (as well as the inclusion of temporal datasets). The City and County Councils also noted the use of external tools to improve functionality as well as using the first iteration of the mapping tool to help guide fast-followers.

Key Learnings:
Data tools should be widely shared once fully developed; The 1st iteration of the mapping tool has potential to help influence fast-followers; Spatial and temporal data should be worked into the map; Constraint data integration will help the map's utility

Review of Local Energy Mapping Tools (*Rajat Gupta, OBU*) - 10:40

Oxford Brookes University gave a comprehensive review of the currently available local energy mapping tools and platforms that can be used for local energy system planning and analysis. Various online and desktop software tools were shown, providing various functionality and aspects that can be incorporated into LEO's current mapping tool. However, a key learning was that many of these services were no longer available/supported by the developer after the project came to a close. Discussion points were once again raised around incorporating temporal and spatial data. The full presentation, as with all other session presentations, can be found through the link on page 2.

Breakout Sessions *(Moderator Led)*

Two sessions ran within the workshop, one of the Mapping Tool (11:20 - 11:50) and the other on MVS data collection and management (13:25 - 13:55). After each session, all participants regrouped on the official group call to discuss the main findings.

Each Breakout session was split into 3 'rooms' each focusing on a specific question as shown in the table below. Each question used two virtual rooms where groups were led by LEO moderators.

	Mapping Tool (11:20 - 11:50)	MVS (13:25 - 13:55)
Q1	What are the spatial energy data needs of different stakeholders?	Are we providing the right services for compiling and accessing MVS Data Packages?
Q2	What kinds of local energy tools would be useful for different stakeholders?	What data requirements are needed to ensure effective validation of LEO MVS trials?
Q3	What are the various ways of bringing together spatial and temporal data to support Project LEO?	What are the key missing data/data tools within LEO?

The following page summarizes the high-level discussion points that were gained from discussions in these Breakout Sessions. For a bit more detail on particular points from each group and session, please refer to the slide decks hyperlinked above (page 2).

Mapping Tool Session

The accuracy and updating of data should be as automated as possible and having as many levels of the network and assets as possible will add greater functionality and better inform fast-followers.

Utilising open standard APIs and the consumption of open data formats will mean that the integration of energy and non-energy related data streams will become significantly easier. Furthermore, modelling and scenario planning capabilities could significantly increase user base and utility.

Participants also highlighted the that there should be data extraction as well as importation APIs available. Moving through spatial scales on the map should also allow data to be smoothly aggregated as that translation is occurring.

Essential that LEO considers the business model for sustainability for the system, making sure that we are answering real user questions

MVS Data Session

Data need to be properly understood in terms of their access, lifetime and cataloguing. MVS data in particular should be disseminated more broadly outside of the project.

Data baselining will be essential within LEO with tools and data management around this aspect being crucial to validating MVS trials.

LEO's data tools should be made available at later stages of their development, having clear documentation and access. Other tools can be incorporated (such as PowerBI). Different users will require different data visualization tools for instance, and various tools being used by other groups can be incorporated into LEO to help represent this diversity.

LEO can work at demonstrating the business case around flexibility services through MVS data, helping other projects and partners to understand the costs and financing driving these flex events.

5 Key Data Workshop Takeaways

- LEO's data, data tools and documentation will have maximum impact in easily accessible and open-access data repositories. Fast-followers and external stakeholders need greater access and dissemination.

- The Integrated Land Use Mapping tool provides a lot of useful energy insights and further work should aim to incorporate more temporal datasets. More levels of the network, LEO assets and plug-in projects will better facilitate data access and improve the map's utility. These improvements should also include more tools and APIs which improve the overall map's use, data access, and data queries within the platform.

- MVS data and learnings can be disseminated more broadly to external partners and interested parties. Data access can also be improved through potential API workflows for external organizations.

- Projects and organizations outside of the LEO consortium have a range of temporal and spatial tools which can be incorporated into LEO to increase data utility, visualization tools, and data access.

- Baselining is an important aspect in MVS trial and data validations, thus steps must be taken to ensure that the necessary data requirements are met. This should also be complemented by more dissemination around the business use-cases for flexibility services within LEO.

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