December 2021 | Version 1

Data Workshop Report

Masaō Ashtine

Report Title:	Data Workshop Report
Author(s):	Masaō Ashtine
Organisation(s):	University of Oxford, Oxford Brookes University, Oxfordshire County Council

Version:	2.0	Date:	16/12/2021
Workpack*:	WP4	Deliverable:	D4.21
Reviewed by:	David Wallom, Rajat Gupta, Inga Doherty		
Date:	16/12/2021		
Signed off by:	David Wallom		
Date:	16/12/2021		

Can be shared (Y/N):	Internally	Y	Publicly	Y

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.

Table of Contents

Summary

The annual LEO Data Workshop (the 3rd of four Project LEO Data Workshops) was held in-person at the Christchurch Research Centre on November 25th (2021) and was hosted by the University of Oxford (UoO), Oxford Brookes University (OBC) and the Oxfordshire County Council (OCC). This workshop was held to highlight the current progress with the LEO data and mapping tools, seeking guidance and recommendations for further work through structured breakout sessions within the workshop. The agenda and presentation slides for the day can be found *here[1]*.

Beginning at 9:30 am with introductions given by Malcolm McCulloch (UoO), roughly 30 participants from 14 organisations 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 utilisation, within three main breakout sessions: Planning, Operations, Validation. A significant portion of the day's activities was spent in these breakout sessions where 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 2:30 pm and saw a successful in-person meeting which has been concisely summarised into the report that follows.

Workshop attendees at the Christ Church Research Centre, November 25th, 2021

Internal Participants
EDF, Low Carbon Hub (LCH), Oxfordshire County Council (OCC), Oxford City Council (OCityC), Oxford Brookes University (OBU), Piclo, SSE/SSEN, University of Oxford (UoO), Origami

External Participants
Energy System Catapult, EnergyREV, Ofgem

---

[1] For printed version: https://tinyurl.com/59mk5uew

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 summarise the main points from each of the sessions' discussions. All workshop presentations can be found here[2].

Recap of Project LEO (*Malcolm McCulloch, UoO*)

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 2's activities as we move into the Market Trials in LEO. LEO's activities were also placed in the context of the need for workshops like these at this crucial stage and there was discussion around the future activities currently being planned within the project.

Data Tools Demo (*Masaō Ashtine, UoO*)

How data are captured, logged, and cleaned were discussed by the UoO through this session, with focus being given to the current tools being developed in the project for both internal and external stakeholders. 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 the LEO SharePoint (managed by SSEN) to provide access to all LEO partners. This session provided a demonstration of the current tools being used to clean the data from their raw state for further analysis and there was also a demonstration of LEO's new Power BI Database where a lot more information on LEO's data and management can be found. It is important to note that these tools have been developed with both internal and external stakeholders in mind. Tools will be made available as open-access resources at the end of LEO and will serve as model of data management tool within smart local energy systems.

Some discussion points were raised around the specific tools being used for data visualisation and cleaning, and clarification was given by UoO, also noting that most of these tools will become publicly available in early 2022.

Key Learnings:

In Project LEO, data management is becoming increasingly more important; Data and documentation are being made more openly accessible as possible to external stakeholders and they are being developed with fast-followers in mind (including considerations of costs, accessibility, utility, and development resources).

Review of LEO Mapping Tools and Progress (*Rajat Gupta & Inga Doherty*)

Here, we gave participants insight to the functionality, and current work being done with the Integrated Land Use Map (for strategic scale energy planning) and LEMAP (for planning smart and fair neighbourhoods) which are core to LEO's spatial mapping activities. Key features and incorporated datasets were explored within this session, raising many questions and discussions from participants. This presentation gave a comprehensive update on work done since the previous year's data workshop and the mapping tools were demonstrated by the OBU and OCC team, highlighting the spatial and temporal datasets behind the platforms. LEMAP, which provides property-level energy data, was a new addition to this year's workshop discussion and many participants were very interested in the functionality and information that this tool provides. There were many questions at the end around details of the data and features shown and some had questions about access and dissemination of these tools. The full presentation, as with all other session presentations, can be found through the link on page 4.

Breakout Tables *(Moderator Led)*

Three sessions ran within the workshop covering three main themes in LEO's current scope, Planning, Operations, and Validation. After all sessions (post-lunch), all participants regrouped to discuss the main findings.

Each Breakout Session was split into six 'breakout tables' (there were six tables of five participants each in total for the workshop) with two tables focusing on a specific question as shown in the table on the following page. Each table was led by a LEO moderator.

Key Learnings:
The mapping tools have come a long way and many participants were very interested in the demonstrations given; Questions were raised around the use of these tools amongst a variety of stakeholders, and around access and the current data management.

		Breakout Session Questions
Planning	Q1	What are the spatial energy data needs of different flex stakeholders? Are we missing stakeholders?
	Q2	How does mapping (specifically data and layers) support the planning of future flexibility services?
	Q3	What licencing, access and cost aspects need to be taken into consideration for future use of mapping tools and data?
Operations	Q1	Are current data tools helpful in supporting participating partners in LEO? Is more needed?
	Q2	What key data are needed from MVS and Market trials to support the scheduling and running of flexibility services?
	Q3	What data are needed from MVS and Market trials to convince and inform fast followers?
Validation	Q1	What are key analysis streams and their associated data needed to validate the impact of services in LEO?
	Q2	What data are essential for effective baselining and what are some issues that may arise in analysis/settlement?
	Q3	What nonenergy (weather, bidding outcomes, internal and external market forces) data are necessary for evaluating baselining and settlement in Market trials?

The following page summarises the high-level discussion points that were gained from discussions in these Breakout Sessions. For a bit more detail on points (guiding sub-questions) from each group and session, please refer to the slide decks hyperlinked above (page 4). The information provided below has been collated and summarised from all tables for each session.

Planning Breakout Session

The mapping tools are great, and some participants felt that they can be further improved by having functionality that disseminates the information differently depending on user preferences and categories (triaging the user needs before information is displayed). For instance, a user may simply want to know their carbon impact from the LEMAP tool but may not be able to understand graphical output of carbon intensities at the property level.

Some participants recognised that there need to be procedures in place for updating data in the mapping tools, as well as giving clear information to users so that they understand the temporal windows of underlying datasets and whether more updated information is available. Some also mentioned the importance of making the data decision criteria available within the mapping tools and others mentioned the need for usage data from the maps to better understand stakeholder needs.

Discussions were had on how the mapping tools will be managed post-LEO. Data coordinators, database storage and access, data updating etc. are all aspects that need to be considered for driving impact beyond LEO. Will local authorities hold the data, or should it be outsourced? This an example question that needs to be addressed.

There was a question raised around replicability for fast-followers. There was also a discussion on how to cope with boundaries and the potential mismatch between technical systems and social areas. E.g., Banbury is in Oxfordshire but under WPD. Who runs the map for this area and how can regulators (fast-followers) account for these learnings?

Where licencing is concerned there was a suggestion that the licencing issue disappears if the mapping tool is only used for demonstrating publicly accessible data. However, a question was raised around the appropriate level of aggregation that would allow sharing data without exposing personal data. Furthermore, how can the mapping tools be improved to give maximum value to users who share their data, for instance, EV data in LEMAP.

As with previous workshops, there was a discussion around mapping temporal data in the LEO mapping tools to aid in flexibility planning.

Key Learnings:
Further work is needed on how data are presented within the mapping tools to account for varying stakeholder needs; Data within the tools need to have proper updating protocols implemented to optimise impact both during and after LEO; Understanding the 'backend' of the mapping tools is also important for users, particularly with data decision criteria are concerned.

Operations Breakout Session

Where the data tools are concerned, most participants found them useful, but some said that tools geared towards understanding how flex ready assets are would be also useful to include at this stage in the project. There was a clear agreement that having a 'Flex Scan' tool to better inform asset owners of their value in participating in a flexibility market will be a very needed tool. Where the data cleaning tool was concerned, points around the handling of outliers (not always bad) as well as the automation/manual cleaning (cleaning is not always necessary) of the data were raised. Currently, project partners can rely on the Origami Data Template to support their preprocessing of data for the market trials, and additional tools will help support these cleaning resources.

There were points raised around understanding the live network so there is more visibility of what is connected. This information will also feed into a better understanding of the size of flexibility market, but external data will also be needed to complement these efforts. Different asset types coming into the project will also aid in the diversity of asset profiles, allowing LEO to better inform asset owners on the value they can hold through entering the market.

An interesting point was discussed around the question of what happens when people move in and out of smart and fair neighbourhoods, and how to engage new occupants, including the management of their data. Where fast-followers are concerned, discussions centered around who exactly will be these fast-followers and how can information be disseminated to them effectively.

Further points were raised around using data to better engage with people on the flexibility market. How do people engage with flexibility and will they? How do we get over the 'can't be bothered' threshold to participate/economics to make people enter the market? A stated point to the latter questions is that open data could encourage others to participate.

A question was raised on can the sharing of operational data (bidding strategies, market price points etc.) help accelerate participation (speed up the learning process) or does that work against the 'real' nature of market operation? Where SSEN are concerned, they will require knowledge of asset parameters (liquidity of an area, when they are available, volume of flexibility etc.) and do they need data to learn about behaviours, for instance, directly asking why service providers made certain decisions or will those reasons be entirely inferred from behaviour.

Key Learnings:
A lot of useful information around data and value was gained in this session; LEO needs to assess who are potential fast-followers and how can they be supported; We need to look further at how data can support entry and operations within flex markets; Having a 'Flex Scan' tool to tell asset owners about their potential flex value will be a great addition to the project's resources.

Validation Breakout Session

Where baselining is concerned, there was a general consensus around the continued improvement of methods for baselining assets within flexibility services to ensure fair and accurate assessments for both the DSO and service providers. Further learnings need to continuously be incorporated from the balancing markets where data from Ofgem and Elexon can help support LEO's work.

A point was raised on the question of can baselining be used to measure the amount of uncertainty in the market and therefore inform DSO decisions such as over-procurement etc.

There was a lot of discussion around the 'honour system' in the Nominated Baseline approach that service providers can take, and how this method can be validated while allowing freedom of choice within baselining. There was recognition that we need knowledge of previous behaviour that might influence a baseline as well as methods for automatically flagging untrustworthy behaviour.

Events outside of flexibility service windows also need to be accounted for. Periods of work shift patterns, maintenance schedules, event data, anomalous weather events etc. can all affect how baselining is calculated and the uncertainty of the result.

Points were also raised around baselining methods for a portfolio of assets and flexibility services run in this manner. This scenario is yet to be explored in LEO and will be something that should be taken into consideration, particularly where flex services from multiple EV chargers, or homes within smart and fair neighbourhoods are concerned.

Baselining considerations also need to be made where demand-side response is concerned in buildings. The recommissioning of buildings is often necessary for providing flex services and building operators may have a lot of uncertainty in predicted flexibility (nominated) depending on bidding requirements.

Key Learnings:

Learnings in this session largely centred around the baselining methods and the requirements needed to make validation and settlement fair and accurate; Different assets will have varying needs where baselining is concerned; Understanding how service providers can game/cheat the system to their advantage is a consideration that must be explored in LEO.

5 Key Data Workshop Takeaways

- LEO's mapping tools, and progress with their development, were well received. However, further work is needed to improve functionality and accessibility, maintain data and documentation, gain user insight and metrics, and improve how information is disseminated to different stakeholders. A plot of carbon intensity may be easily digestible to an SSEN engineer for instance, but this may not be the case for the average resident if proper context is missing.

- As LEO enters the final stages of the project, more consideration needs to be had on where data will sit post-LEO. Are local authorities the appropriate home for data and tools or will they need to rely on outsourcing these resources? What data will LEO benefit the most from in sharing and how can commercially sensitive data be protected? Will licencing and storage limit access? These, and many more, are questions that need continuous exploration.

- Having a variety of data tools in the project will aid project partners throughout LEO as well as serve as data management models for fast-followers and external stakeholders. Having a tool that helps partners understand the value of their assets within a flexibility market was shown to be a very useful resource to develop.

- Many stakeholders have different data needs and how these data can be used to further drive participation in flex markets needs to be an ongoing conversation in LEO. From opening data to encourage fast followers, to assessing nontemporal data coming from market trials to understand the 'behaviour' of service providers in flexibility services, data and its access will play a key role.

- Baselining is an important aspect in trial, service validations, and settlement. Thus, steps must be taken to ensure that the necessary data requirements are met, and that dynamic and robust methods are used for fair and accurate settlement. Varying asset types will need careful baselining considerations, and uncertainty will need to be treated effectively to lower risk for all relevant stakeholders.

All icons have been openly accessed from Flaticon