



Local Energy **Oxfordshire**



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Barriers & Opportunities Report Implementing Trial Phase 1

Sarah Darby



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Author(s):	Sarah Darby
Organisation(s):	Environmental Change Institute, University of Oxford

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1 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 and generation on the network would likely require network reinforcement. However, technology and the ability to balance demand on the system at different periods provide opportunities for new markets to be created, and new demand and generation 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 low carbon technologies, and new markets that everyone can benefit from through using energy flexibly, including provision of 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.

2 Introduction

Project LEO considers markets and platforms that can unlock the value of energy flexibility services to be necessary for making the most of renewable technologies and flexible energy solutions at the scale needed to create an electricity system compatible with Net Zero targets. Information on what is meant by energy flexibility services can be found on the Project LEO website [here](#). LEO is undertaking several trials to explore the potential of different types of Distributed Energy Resources (DERs) and communities to deliver flexible energy services.

The trials referenced here are

- testing new markets, approaches and platforms that facilitate the buying and selling of flexible energy services to the Distributions System Operator (DSO) and also facilitate DSO-enabled services such as grid connection capacity
- for companies and organisations in the same local area to trade grid connection capacity between each other.

These are helping us to understand how to unlock the value of flexible energy, in commercial, environmental and social terms.

This briefing does not seek to provide full details of the market trials and the services being tested – far more information can be found on both the LEO website [here](#) and on the SSEN [TRANSITION](#) website. Instead, it focusses on lessons from the first phase of TRANSITION trials (TP1), which ran from November 2021 to February 2022.

TP1 concentrated on the fundamentals of running a flexibility market, looking at recruitment of flexibility providers, building relationships in Oxfordshire, and at how DER and people behave within a market environment. In order to test these relationships, the concepts of *forecast events* (to test integration of Power System Analysis into the project) and *scheduled events* (to test market behaviour) were developed. Although TP1 only tested scheduled events, there has been a great deal of learning in relation to forecasting, and further work includes developing forecasts from weather data, enabling greater accuracy as constraints move nearer to real time.

The trial participants providing flexibility services were all LEO partners during this first phase. They offered flexibility DERs including solar photovoltaic panels, batteries, run-of-river hydro and vehicle-to-grid (V2G). There was varying success with signing up participants. They had different levels of understanding of the energy industry, and the learning curve has been huge. Contracts for flexibility were explored, with the ENA Flexibility Services Agreement (FSA) a starting point.

The main technologies and time periods tested were battery and Vehicle to Grid (V2G) in the Sustain Peak Management week-ahead market, with 540kWh dispatched over 17 weeks. The trial participants all gave feedback about their experiences of taking part. This highlighted several difficulties to be overcome before flexibility services can be normalised and streamlined; however, it is worth remembering that these are very early days in the process of developing flexibility markets for small-scale DERs.

3 Potential barriers to developing a market for flexibility services

Recruitment poses its own challenges, as shown [here](#), and some of the concerns shown by prospective providers were reflected in the trial itself.

Unfamiliarity

Many potential flex providers are likely not to have energy as their first concern – as was the case with most participants in this first trial – and need to learn the basic logic behind flexibility trading, as well as methods for taking part. Providers who are responsible for energy services on a daily basis, such as building managers, are likely to be far more familiar with energy efficiency and managing overall demand than with flexibility.

Complexity

The legal and administrative process of contracting to supply flexibility was time- and effort-consuming, with all partners finding the Flexibility Services Agreement (FSA) lengthy (55 pages long), relatively complex (especially for new market entrants), and unclear in places. Some of these difficulties were also experienced in relation to peer-to-peer trading term-sheets, the Neutral Market Facilitator (NMF) platform terms and conditions, and the Temporary Capacity Variation Notice to increase either the maximum import or export capacity of a site. This complexity risks turning off potential participants at an early stage; most will not have the time, patience or expertise to grapple with lengthy documentation. Organisations without legal resources either took a risk-adjusted view and reviewed contracts internally or outsourced the legal review (at substantial cost). The table below illustrates where participants found difficulties (orange colouring) with the four contractual documents used in the trials,

Contractual barrier	FSA	P2P Term-sheet	TCVN	NMF Platform T&Cs
Length of document / process	Orange	Grey	Orange	Grey
Complexity	Orange	Grey	Grey	Grey
Issues with specific terms of contract	Orange	Orange	Grey	Orange
Lack of visibility	Orange	Orange	Grey	Grey
Unclear how contracts relate to one another	Orange	Orange	Orange	Orange

Financial considerations

The market for the LEO partners in the trial had limited participation with prices at £300/MWh, so prices are to be increased for the next trial period.

The trials showed that enabling demand side response in assets such as buildings, and making inflexible sources such as solar, is relatively expensive, technically demanding and resource-heavy for short duration contracts.

The FSA requires liability of the income from available charges or £250,000, whichever is the lower, and there is an audit burden for organisations that have DERs with low levels of flexibility.

Social considerations

The trials showed mixed attitudes to risk and innovation; negative views can stand in the way of participation but can presumably be overcome in time if the benefits of flexibility can be demonstrated effectively. Social considerations also mean that it is unrealistic to expect 100% reliable responses from individuals or businesses, who will at times wish to override flexibility provision.

4 Opportunities

While partners had struggled with the complexities of the legal documents, there were signs that efforts to make them concise, clear and comprehensive had been appreciated:

Positive Feedback	FSA	P2P Term-sheet	TCVN	NMF Platform T&Cs
Easily understood through simple language		YES		
Concise document		YES		
Comprehensive coverage of terms	YES			YES
Key information communicated to participants	YES	YES	YES	YES
Applies to DSO-Procured and DSO-Enabled services				YES

The LEO ‘explainer’ animations and ‘plain English’ approach were useful and there is scope to develop these further. As a priority, there is a need to simplify the contractual and any related documents, and to shorten them where possible (especially the FSA), without compromising their legal accuracy.

It may be possible to enrol for a Market Stimuli Package – designed to be a simple route into flex provision – without having to sign an FSA first.

Modelling of constraints is becoming more accurate with improved weather forecasting and visibility of the network.

Relatively small businesses, such as specialist demand aggregators, appeared keener to participate in flex markets than large suppliers. However, this finding comes from a trial with small-scale participation: it is not clear how widely applicable it may be.

While the small sample of vehicles providing V2G services in the trials was only able to offer flexibility erratically, the signs are that larger numbers would be able to provide a reliable service, by evening out fluctuations caused by individual driver preferences and activities.

The provision of a central neutral market platform, managed by the DSO, with satellite platforms providing interfaces to customers was successful; multiple platforms could be used in future as customer interfaces, with one acting as the site for auctions.

There are potential roles for a new kind of energy practitioner, one who will act as intermediary between customers/flex providers and the DSO to guide them through the processes of getting their DERs flex-ready in technical terms, registering them and operating them effectively.

There are also opportunities to improve training in relation to the NMF platform, drawing on expert users to address specific needs that they are likely to be able to express more effectively than platform developers.



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