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# Net Zero Rose Hill Local Roadmap Report

Rose Hill Smart and Fair Neighbourhood Steering Group



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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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# 1 Introduction

## 1.1 Background

Project LEO is predicated on the hypothesis that a decentralised, or local energy solution, focused on balancing energy use at the grid edge will be the most desirable approach to accelerating our transition to a zero carbon energy system. The ‘grid edge’ is the point at which electricity reaches homes and businesses. Achieving energy equity is both a key aim, and a key driver, of this transition. As a result, enhancing our understanding of what constitutes equity in an energy context, and how to achieve it, is key to the successful delivery of Project LEO. The Smart and Fair Neighbourhood (SFN) trials, which includes Rose Hill, aim to do just that.

Rose Hill SFN's steering group, made up of community representatives and facilitated by the Rose Hill SFN Project Manager, set out three key areas of exploration in its Specification, one of which was how a better understanding of local energy systems and the role of flexibility services can support a community in developing a zero-carbon roadmap. The approach set out in the Specification was to:

*“Use the online LEMAP tool being developed through EnergyRev to test how to develop a roadmap for becoming a zero carbon community, including those with least flexibility potential.” (RHSFN Specification, p.4)*

## 1.2 Purpose of report

This report focuses just on the key question of developing a local roadmap for Rose Hill. It does not set out to provide an evaluation of the whole SFN.

This report is split into several sections. Firstly, it sets out the approach taken through Project LEO to the design of a net zero roadmap using LEMAP. It then documents the progress made with this by setting out the roadmap as a “snapshot” of the current status of Rose Hill in the energy transition. The report then concludes with an evaluation discussing to what extent the key question has been answered, with respect specifically to the community’s experience, using the methods proposed in the SFN Specification.

# 2 Approach

## 2.1 Concepts

The SFN Specification wanted to take a longer term and strategic perspective by working on a “tailor-made roadmap” (or set of options) for the Rose Hill community to reach net zero, taking into account the broad range of energy assets that could potentially be deployed locally. The concept was to pull together relevant information about the local area which was already available (by trialling the LEMAP tool being developed by Oxford Brookes University), as well as translating the city-wide roadmap which had just been published, into something local and relevant to the Rose Hill community.

The SFN specification perceived community collaboration as central to this work, with information and learning from other trials and thought experiments feeding into the roadmap. It was also important that as a result of the SFN roadmap activity, the community understands more about what steps they can take to achieve net zero both individually and collectively. This understanding of actions required also needs to result in active and effective participation in local and city-wide work to achieve net zero.

## 2.2 Method

The SFN Specification expressed a clear plan to use Oxford Brookes University’s new LEMAP tool as part of the method to answer the key question. This was developed alongside, and tested with, the Rose Hill SFN community. This report does not seek to give a full account of its development or the datasets it contains – this can be found separately in the report: [Spatial analysis of a Smart and Fair Neighbourhood in Oxfordshire](#).

In summary, the LEMAP tool brings together public and private data on energy demand, energy resources, building characteristics, socio-demographics, fuel poverty and electricity networks, and maps them onto an interactive map. This can be examined to understand energy information in Rose Hill, what properties might be suitable for certain low carbon technologies, and to forecast energy demands. It then supplements this using “participatory mapping” to generate crowd-sourced data – the SFN Steering Group and Rose Hill and Iffley Low Carbon (RHILC) supported the roll out of a questionnaire to gather this information.

However, a starting point was required to form a basic roadmap. [The Zero Carbon Oxford Partnership](#) (ZCOP) has recently published a comprehensive science-based [roadmap](#) that sets out the actions required to get the city of Oxford as a whole to net zero by 2040. It was decided to review the roadmaps presented in this and to translate them (where possible) on a pro-rata basis to be applicable to the Rose Hill scale. The assumptions made around this approach are discussed in Section 3. A key piece of information to enable this was the count of houses from LEMAP for the Rose Hill area, which allowed the translation to be achieved. The translation of the ZCOP roadmap is referred to as the “local roadmap” in this report.

The data in LEMAP created a baseline to show what Rose Hill has already achieved against the local roadmap. It also allowed an analysis of the potential for the local area to achieve the targets set out in the local roadmap – highlighting where some elements of the pro-rata’d local roadmap may either be unachievable for various reasons, or where Rose Hill may be able to excel.

## 3 Roadmaps

### 3.1 Local roadmap creation

Pro-rata’ing the milestones in the ZCOP domestic sector roadmap to a local level for Rose Hill, using the number of dwellings as the factor to pro-rata against, is a very basic, straightforward and easily understandable approach to the creation of a local roadmap as required by the Rose Hill SFN Specification. From LEMAP data, there are 1480 dwellings within the Rose Hill SFN boundary. The

ZCOP roadmap has been produced on the basis of 55,000 dwellings in the whole of Oxford. This means that Rose Hill SFN contains 2.69% of Oxford’s dwellings, and this is the basis on which the ZCOP Roadmap was translated down to create a possible starting point for a local Rose Hill roadmap (Table 1).

However, it is a blunt approach. It does not account for any local variation within the city – essentially assuming all areas of the city are equally capable of (and by implication, equally responsible for) delivering “their share” of the milestones in the ZCOP roadmap. It doesn’t incorporate information from the local community as to whether the pro rata’d milestones are considered achievable. The pro rata’d milestones for a possible local Rose Hill Roadmap is displayed overleaf in Table 1.

**Table 1: A Local Rose Hill Roadmap, showing ZCOP roadmap milestone and pro-rata'd Rose Hill milestone.**

This is based on Rose Hill having 2.69% of Oxford's homes. An empty cell indicates there is no milestone for that year in the ZCOP roadmap.

Milestone from the ZCOP roadmap – in % of homes	2025		2030		2035		2040	
	ZCOP roadmap	Rose Hill – no. of homes	ZCOP roadmap	Rose Hill	ZCOP roadmap	Rose Hill	ZCOP roadmap	Rose Hill
Heat pumps installed in % of all homes	27%	400	30%	444	55%	814	68%	1006
Rooftop solar on new build homes	40%	No data	75%	No data	75%	No data	-	No data
Rooftop solar on existing homes	20%	296	30%	444	40%	592	55%	814
Off street (home) EV charging	3502 (6.4% of Oxford homes)	94	8341 (15.2% of Oxford homes)	225	12,779 (23.2% of Oxford homes)	344	13,057 (23.7% of Oxford homes)	351
New builds EPC A	100%	No data	-		-		-	
Recycling rate (overall percentage recycled)	60%	60%	75%	75%	-		-	
Homes on heat networks	-	-	3%	44	-		10%	148
Homes retrofitted with at least one energy efficiency measure	-	-	19,600 (35.6%)	527	40,600 (73.8%)	1,093	51,200 (93.1%)	1378
Double glazing installed	-		25,903 (47%)	696	-	-	-	-
Loft insulation installed	-	-	33,574 (61%)	903	-	-	-	-
Solid wall insulation installed	-	-	11,418 (21%)	311	-	-	-	-
Cavity wall insulation installed	-	-	18,728 (34%)	503	-	-	-	-
Energy supply	-	-	Gas grid blended with 2% biogas and 20% hydrogen		-	-	-	-
Boiler replacements	-	-	-	-	16,108 (29%)	429	-	-
LED lighting installed	-	-	-	-	30,952 (56%)	829	-	-



The LEMAP tool was helpful in terms of calculating the number of homes within the SFN area, and as can be seen from Table 1, most milestones in the ZCOP roadmap can be translated down to a local level using the number of homes as the factor to pro-rata against. The exception was for criteria relating to new build homes, where there was no data which could be used to quantify how many homes that would constitute in Rose Hill.

Only the domestic sector roadmap from ZCOP has been used to try and create a local Rose Hill roadmap, as a primarily residential area it was felt that this was the most relevant, where the community collectively has the most control and influence, and where the biggest impact could be made - action people can take in their own homes to contribute towards a net zero Rose Hill. There was also the view that the other ZCOP sectors (commercial, industrial, institutional and transport) were harder to influence at the community level as the milestones couldn't be quite as clearly encapsulated within the Rose Hill SFN boundary, and are likely better addressed at city level. For example, the ZCOP transport roadmap has a milestone to convert HGVs to run on biofuel – and it's unclear how this could firstly be apportioned to Rose Hill, and secondly how realistic it would be for the local area to influence.

### 3.2 Tailoring the roadmap

The approach set out in the Rose Hill SFN Specification was to:

*“Use the online LEMAP tool being developed through EnergyRev to test how to develop a roadmap for becoming a zero carbon community, including those with least flexibility potential”. (RHSFN Specification, p.4)*

The next step to test local roadmap development was to use the publicly available baseline data available in LEMAP, and the data crowdsourced from the Rose Hill community from the LEMAP participatory mapping survey, to understand:

- 1) Where Rose Hill currently is in relation to meeting the local milestones – i.e. the current technology baseline.
- 2) Whether Rose Hill is “capable” of reaching these local milestones – i.e. technology potential.

The data from LEMAP which corresponds to these queries from a *technical* standpoint, is shown in Table 2. The community survey was helpful for this in terms of improving the national datasets used, to make them more locally applicable.

However, for many of the milestones, the community was unable to identify data in LEMAP to inform the baseline or to indicate if homes in Rose Hill are suitable (from a technical perspective) for the various retrofit measures proposed (refer to table 2 below for a list of milestones and availability of data in LEMAP). LEMAP will need to remain updated over the longer term to be useful and our understanding is that this is the intention. Where LEMAP has been the most helpful is in relation to heat pumps, solar PV and EV charging. For these technologies, LEMAP indicates that Rose Hill in theory would be able to achieve most of the milestones through to 2040, based on an assessment by

LEMAP of whether homes in Rose Hill are considered *technically* suitable for retrofit of these technologies. These *technically* achievable milestones are shown in green.

**Table 2: Local Roadmap with information from LEMAP.**

Green shaded cells indicate that LEMAP forecasts that a sufficient number of Rose Hill domestic properties are *technically* suitable (have potential) to retrofit low carbon technologies to accommodate the 5-yearly targets. The 5 yearly targets are aligned with the ZCOP five yearly targets as set out in Table 1. LEMAP Baseline numbers highlighted in grey are based on information from the survey, those not highlighted grey are from other datasets in LEMAP.

Milestone – in % of homes or number of homes	2022 LEMAP Baseline	LEMAP Potential	2025 local target	2030 local target	2035 local target	2040 local target
Heatpumps installed in homes (number of homes)	4	640 (ASHP) 580 (GSHP) 1220 (total)	400	444	814	1006
Rooftop solar on new build homes	No data	No data	No data	No data	No data	No data
Rooftop solar on existing homes	69	790	296	444	592	814
Off street (home) EV charging	7	790	94	225	344	351
New builds EPC A	No data	No data	No data			
Recycling rate (overall percentage recycled)	No data	No data	60%	75%		
Homes on heat networks	No data	No data	-	44		148
Homes retrofitted with at least one energy efficiency measure	No data	No data	-	527	1,093	1378
Double glazing installed (number of homes)	77	No data		696	-	-
Loft insulation installed (number of homes)	57	No data	-	903	-	-
Solid wall insulation installed	No data	No data	-	311	-	-
Cavity wall insulation installed	No data	No data	-	503	-	-
Energy supply	No data	No data	-	Grid 2% biogas/ 20% hydrogen	-	-
Boiler replacements	No data	No data	-	-	429	-
LED lighting installed	No data	No data	-	-	829	-

To develop a roadmap there is a clear need for an evidence basis to create an accurate ‘baseline’ against which to measure progress. However, presenting data to a community is an exercise that requires careful communication of potentially technical or methodological complexity. It is also potentially a hugely sensitive exercise as residents often don’t realise how much data there is about where they live. Finally, data is inevitably not perfect and the people best placed to spot this are residents. While the participative data attempts to address this, there is a concern that the LEMAP baseline figures shown in Table 2 are an underestimation for two reasons. Firstly, the baseline data in LEMAP for rooftop solar on existing homes was derived from Project ERIC datasets dating from 2015. However, it is known locally that there are more than 69 domestic solar PV installations within the SFN boundary; the community found it difficult to add local knowledge to LEMAP, beyond that gathered by the crowd-sourcing survey. Secondly, the baseline information for some milestones used the crowdsourced/survey data – because only 101 homes responded, these numbers are likely to be underestimated. On the other hand, trying to scale up this information to create an estimate for the whole SFN area may not have resulted in a robust baseline figure, as only 101 households responded to the survey.

The next step was to use data available in LEMAP to understand whether Rose Hill is in theory capable from a *socio-financial* viewpoint of achieving the local milestones. LEMAP provides information on:

- digital capability (the level of use and engagement with technology such as computers, internet and smartphones, but not specifically low carbon technologies)
- financial capability (a household’s ability to invest in low carbon technology)
- social capability (a household’s level of interest and knowledge about low carbon technology)

The capability information is designed to “*show how likely households are to adopt different low carbon technologies, based on socio economic parameters, to spot those who can really cope with new technologies and those who could be left behind*”<sup>1</sup>. The community found it hard to identify the sources informing the capability profile tabs, looking at the tool and user guide. The baselining, targeting and forecasting sections of LEMAP are much clearer on the origins of the datasets used, and the assumptions or parameters used to make assessments of technical suitability.

The capability profiling also does not provide any forecast of how this capability may be set to change in the future and should therefore be read as a snapshot of the community’s current capability. It does not account for the current context of rising inflation and spiralling energy costs, which have become increasingly impactful over 2022.

The capability information is displayed by postcode, as well as by individual dwelling. However, as far as the community could see, LEMAP used alone in its current form does not allow capability profile information to be overlaid on one screen with baselining information. This, combined with the perceived lack of clarity on how capability has been calculated, has meant that with current resources in the Rose Hill SFN it has not been possible to quantify and add to the Roadmap in Table 2 if the homes which are *technically* capable of installing the low carbon technologies set out in the local roadmap, are also likely to be able to do so from a *socio-financial* perspective.

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<sup>1</sup> LEMAP, Version 3.0 – User guide – Technical Elements, Rose Hill. p8. <https://www.lemap.net/blank-1-1>

Where the capability information is likely to have the most use, is where there are activities which target individual streets or postcodes, which is out of the scope of this roadmap report (as it covers Rose Hill as a whole).

## 4 Evaluation of the Rose Hill SFN Objectives

The key area of exploration set out in the original RHSFN Specification was to:

*“Use the online LEMAP tool being developed through EnergyRev to test how to develop a roadmap for becoming a zero carbon community, including those with least flexibility potential”.* (RHSFN Specification, p.4)

Whilst the LEMAP tool provides data which could be useful at a local level to inform individual projects (e.g. loft insulation or double glazing retrofit, events on time-of-use tariffs), it does not provide basic interpretation of what this data means, or any scenario building functionality, in order to create a *“roadmap for becoming a zero carbon community”*. This makes the impact of the tool limited at the community level because it would require further specialist input (e.g. consultancy support) to interpret the information and undertake further modelling in order to create a local roadmap. There are no resources within the RHSFN to provide this specialist input. Requiring a second step of specialist interpretation reduces the agency of the local community to come to their own conclusions of what their roadmap should be.

However, an attempt was made to interpret the information above utilising the ZCOP Roadmap as a starting point, because it was the most locally applicable roadmap available at this point in time. There were challenges translating this down to a very local level as some of the milestones within it (especially for the commercial, industrial, institutional and transport roadmaps) were difficult to clearly address within Rose Hill’s boundary and may be better addressed at city scale. Therefore only the domestic sector roadmap was used, as Rose Hill is primarily a residential area and it was felt that this was the most relevant – but this was also limited.

Of the milestones from the domestic ZCOP roadmap shown in Table 2, LEMAP forecasting data does show that in theory there are a sufficient number of properties to accommodate the 5 yearly targets for EV charging, heat pumps and solar PV – i.e. they are considered *“technically”* suitable and could meet Rose Hill’s *“share”* of the city target for these categories. However, this is a very blunt approach as it does not consider other factors such as social and financial capability, or policy changes, or the local community’s view on whether they feel the targets are realistic.

LEMAP also does not link any of the information to carbon emissions within its forecasting, so it’s not possible to show the community where the largest emissions are being generated, which would be helpful to target local action. Similarly, LEMAP does not make any linkage with energy flexibility, as it was designed to assess the potential of low carbon technologies and not their flexibility potential, meaning that the last part of the original question (*“including those with least flexibility potential”*) is not addressed. Finally, unless the datasets in LEMAP are periodically updated (which we understand is the intention), it could be difficult to measure progress against the local roadmap and there were

questions raised around the accuracy of the current baseline data. Undertaking regular surveys to update the participatory mapping data would be resource intensive and may not be practical.

However, if the key question is set aside of whether LEMAP can support the creation of a local roadmap to net zero carbon emissions, then LEMAP did deliver other benefits for the local community. Firstly, the participatory mapping survey did reach a good number of local residents (101 households, of which 78 were happy to share their data with Project LEO stakeholders, including the community) in Rose Hill. This created a good level of engagement and discussion about energy efficiency, retrofit and energy flexibility in the local community. It was felt that this was positive, as improving local understanding of these issues would help support retrofit and net zero activities over the longer term.

Secondly, the participatory mapping did provide a useful dataset of households (those who agreed to share their data) to RHILC and the Low Carbon Hub where property improvements could be made, or where there was interest in other energy related matters (such as EV uptake or time-of-use tariffs). This would be useful to plan future engagement events or target retrofit schemes to specific properties.

## 5 Conclusion

LEMAP has been a useful tool to generate engagement about energy systems issues such as retrofit, energy flexibility and energy efficiency – especially through the participatory mapping element. It has also provided datasets which are potentially useful for future non-roadmap activities. However, it is clear that in its current form, its functionality is too limited to fully assist the local community in producing a local roadmap without further specialist support. There have been some successes in terms of forecasting technical ability for domestic properties for EVs, solar PV and heat pumps. But a roadmap which fully charts what Rose Hill would need to achieve to play its part in the net zero transition would require a far more comprehensive approach than LEMAP can provide at present.

In terms of the key area of exploration: *“Use the online LEMAP tool being developed through EnergyRev to test how to develop a roadmap for becoming a zero carbon community, including those with least flexibility potential”*, the community feels that LEMAP has only been able to support development of a local roadmap in a limited way, as the benefits it has generated for the community are not roadmap-related.

## 6 Glossary of Terms

Project LEO has a comprehensive glossary of terms available [here](#). For ease, some are below:

**DNO:** Distribution Network Operator (old term) - responsible for owning, operating, and maintaining the electrical network.

**DSO:** Distribution System Operators (new term) - plays a key role in coordinating and managing the operation of the distribution electricity system.

**Flexibility services:** making temporary changes in the way we use, generate, or store electricity to help the energy network or system to be used more efficiently.

**Grid edge:** the point at which we connect to the network and at which electricity reaches our homes and businesses.

**LEMAP:** Local Energy Mapping project, led by Oxford Brookes University. More information on the LEMAP [here](#).

**Project ERIC:** Project ERIC (Energy Resources for Integrated Communities) was an innovation project concluding in 2015, that aimed to tackle fuel poverty in Rose Hill by installing domestic solar PV and batteries, and helping residents optimize their use. Read more [here](#).

**SFN:** Smart and Fair Neighborhood – more information available on Project LEO’s website [here](#).

**ZCOP:** Zero Carbon  
more information  
website [here](#).

Oxford Partnership –  
available on ZCOP’s



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