Delivered by
Innovate UK and EPSRC

Prospering from the Energy Revolution

Energy Superhub Oxford (ESO)

Project fact sheet

Europe's most powerful charging hub was installed in Oxford as part of the ESO project.

The Prospering from the Energy Revolution challenge programme ran from 2018 to 2023.
For more in-depth information on the programme and the projects see:
https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/prospering-from-the-energy-revolution/

8279.0223

Energy Superhub Oxford (ESO)

Dates:
April 2019 – March 2023

UKRI funding:
£11.3m

Link:
https://energysuperhuboxford.org/

Project partners:
EDF Renewables (lead)
(formerly Pivot Power)
Habitat Energy
Invinity Energy Systems
Kensa Contracting
Oxford City Council
University of Oxford

SLES components:
Battery storage
EV charging
Fleet management
Domestic heat
Energy optimisation

What is the project?

A holistic, wide ranging smart grid trial which has demonstrated an integrated link between local and national energy systems. ESO has delivered a grid scale hybrid battery, 10 MW private wire, and Europe's most powerful EV charging hub. It has electrified part of Oxford City Council's vehicle fleet and heat demand in social housing properties.

What has been delivered? What has been successful?

- ✓ 52 MW hybrid lithium ion / vanadium flow battery directly connected to the transmission network.
- ✓ EV charging 'superhub' with 42 fast to ultra-rapid chargers.
- ✓ 40 electric vehicles delivered into Oxford City Council's fleet and supported 22 fully electric black cabs into the city's taxi fleet.
- ✓ Heating in 62 social housing properties converted to ground source heat pumps supplied from shared loop arrays.
- ✓ ESO took advantage of an opportunity to connect Oxford Bus Company's depot to the private wire, facilitating decarbonisation of up to 104 buses.

Barriers encountered and outcomes

Barrier	Ofgem proposed changes to network charging rules which were inappropriately designed for small scale transmission connected demand that would have increased costs and made the ESO model financially unviable.
Outcome	ESO along with the Prospering from the Energy Revolution programme and other Smart local energy system (SLES) projects provided evidence of the negative impact of proposed changes, leading to a revised final decision that reduced impact.
Barrier	Cost, time, and resource implications of developing new business models and technical designs.
Outcome	New forms of contractual arrangements, partnership working, and technical designs which have facilitated, for example, multiple charge point operators at a single charging hub; Great Britain's first transmission connected battery and EV charging facility; development of large scale private wire electricity network.
Barrier	Lack of data and understanding of baseline vehicle fleet activity and evolving future electrification strategy for EV fleet.
Outcome	Vehicle telematics has supported greater understanding of the operation of vehicles and informed a clear forward-looking strategy. This and other decisions resulted in the loss of a project element: connection of vehicle depot to the private wire.

Impacts

Forecast GHG savings in 2032:	91.3% (Range: 88.2% to 93.4%)
Forecast energy and network savings in 2032:	£0.26m (Range: £0.24m to £0.27m)
Estimated national CO2 savings from the battery in year 1:	25 kTonnes CO_2
Match funding:	£10.8m

Top lessons learnt

1. Regulatory impact across all areas of the project was significant in terms of the ability to realise value streams. Future projects need to be attuned to and willing to challenge the shifting regulatory landscape.
2. Access to skills and expertise is critical, particularly within local authority planning, yet they are central to the strategic development of SLES. This includes legal, commercial, delivery, investment and technical energy system knowledge areas.
3. Strategic planning and decision making is important early in a project to fix the parameters for SLES delivery. For example, a clear, well planned strategy for vehicle-fleets including depot planning defines the infrastructure needs and availability that the wider SLES can utilise.

What's next?

- EDF Renewables has connection agreements for 40 transmission connected batteries across GB and is now investing in 5 more sites (2 in construction).
- Kensa will market its 'shoe box heat pump' with smart controls and productise integrated heat battery.
- Opportunity to expand EV charging at Redbridge Park & Ride to 10 MW.
- Deliver charging to Oxford City Bus Company on delivery of 104 electric buses.

*Cost and carbon forecasts for 2023 are based on heat and transport decarbonisation but exclude impact of the grid-scale battery. The carbon impact of the grid scale battery is the project's own estimate of its impact on carbon emissions from the national electricity system during its first full year of operation. The calculation is against a counterfactual of gas or electric storage heating and petrol / diesel vehicles. For more information on the methodology used to estimate carbon and cost impacts see https://es.catapult.org.uk/report/bills-and-carbon-impact-of-smart-local-energy-systems/