

Flexible Urban Networks Low Voltage

Funding mechanism:

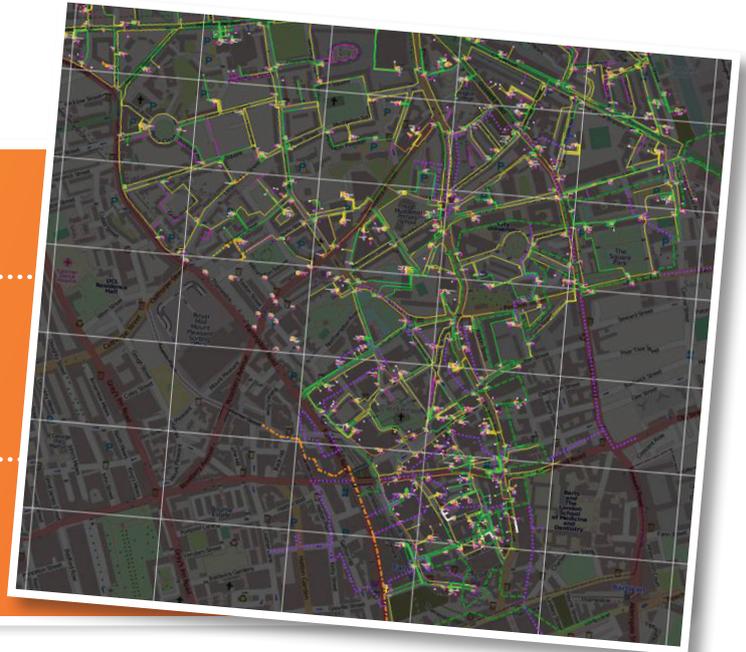
LCNF Tier 2

Project budget:

LCNF: £6.53m
UK Power Networks: £1.83m
Partners: £0.5m
Overall: £8.86m

Status:

Live
Start date: January 2014
End date: December 2016



Project concept/overview/challenge

Efforts to decarbonise energy generation, heat and transport will place increasing demands on distribution networks. This is particularly so for the low voltage (LV) networks where distribution network operators (DNOs) are legally obligation to supply electricity to customers within tightly defined voltage limits and at a sufficient quality (harmonics, sags, swells and flicker). Analysis carried out by Imperial College London to support our RIIO-ED1 business plan predicted an increasing trend of voltage issues and demand rises that could potentially overload transformers and underground cables, requiring significant investment if reinforced by conventional means.

Aim

The overarching aim of this project is to explore how the use of power electronics can enable us to defer reinforcement and facilitate the connection of low carbon technologies and distributed generation in urban areas, by meshing existing networks which are not meshed, and by breaking down boundaries within existing meshed networks. The project will demonstrate this and will provide the necessary models and templates to enable other DNOs to replicate the work.

The three core objectives of the project are to:

1. **Optimise capacity on the low voltage network** closest to customers to accommodate the forecasted growth in demand for electricity by making the network more flexible and resilient through capacity sharing between substations.
2. **Improve connection offers** (time & cost) in urban areas by knowing where best to connect, and by managing voltage, power flows and fault current through the use of power electronics.

3. **Advance the future network architecture debate** through the evaluation and dissemination of financial learning, benefits and architecture of the power electronics applications on different network architectures and by providing network configuration control in combination with remote switching.

How we'll achieve this

The project will:

- Monitor candidate LV networks and identify network issues
- Assess how these networks would conventionally have been reinforced to resolve these issues
- Identify where power electronics solutions can be used to resolve these issues
- Deploy and evaluate power electronics applications on LV networks, compared to conventional reinforcement

The project will evaluate the relative benefits that the various functions of power electronics can provide, including:

- Acting as 'soft open points' (SOPs) between distribution substations for capacity sharing and which, like a tap, can be fully open, fully closed, or at a setting between these limits
- Controlling voltage on LV networks
- Controlling fault levels

Partners



