



# INNOVATION STRATEGY CLOSE-OUT REPORT

PROJECT TITLE	Planning Future LV Networks for Electrified Heat & Transport
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INTERNAL DOCUMENT NO	DOC-161019 -FEY
VERSION	1.1
DATE	4 <sup>th</sup> October 2019

## BRIEF OVERVIEW OF PROJECT & EXPECTED BENEFITS

This project aimed to provide a comprehensive review and critique of our existing LV planning approaches which will feed in to our LV design. Our existing planning approaches are founded on evidence-based assumptions of the energy consumption of our existing flat tariff connected customers who could be treated as a homogenous group. However, the emergence of new low carbon technologies (LCTs) such as electric vehicles (EVs), heat pumps and PV based generation is challenging these assumptions. Furthermore, the requirement for customer flexibility either internally (storing locally generated electricity) and externally (ancillary services DS3 enabled by aggregators) also challenges these assumptions.

The project sought to deliver the following: -

- Comprehensive evaluation of existing values for ADMD's etc. for planning and design purposes in the context of best relevant practice worldwide.
- How many and which ADMDs/profiles/metrics are necessary to appropriately cater for future LV planning and design.
- New metrics and values to provide for LV design.

The project leveraged data from existing projects such as ESB Network's Smart Meter trial and other projects' data from trials and pilots conducted by ESB Networks. In addition, data and studies from other DSOs and academia were used to inform the outputs of this project.

## RESULTS

New planning metrics were developed for LV design which is being implemented in ESB Networks LV design and planning.

An internal report detailing the methods, analysis and robust conclusions regarding the evolution of LV planning in ESB Networks was developed.

Conference paper, titled *Review of LV network development and design for electrified domestic heat and transport* published as part of the 3<sup>rd</sup> E-mobility Power System Integration Symposium, Dublin 2019, 14<sup>th</sup> October 2019.

## LEARNINGS

ESB Networks' increased value for ADMD in LV design will ensure that our customers will have an LV network that should cater for the operation of heat pumps under '1 in 20' winter conditions and also provide capability to support charging for large numbers of EVs within the LV network. The research demonstrated that our approach will result in lower design demand for equal numbers of homes in comparison with the UK DNOs.

Work within ESB Networks has found that the incremental cost of the increase in ADMD from 2.5kW to 5.5kW in our new LV networks for urban housing schemes is relatively small as there are economies of scale in substation sizing.

Larger trials and LV monitoring over longer periods of time will provide additional data which can be used to build more robust models of future load and enable more precise methods for estimating design demand and volt drop in future LV networks. These models will enable more cost effective and reliable long-term planning of LV networks.

Engagement activities: -

1. Innovating to support the decarbonisation of Ireland's energy infrastructure – Presentation - Nordic-Irish Partnership for Smart Cities - -14/05/19
2. Future LV – Presentation – Department of Communications, Climate Action and Environment – 21/03/2019
3. Innovating to support the decarbonisation of Irish heat and transport – Lecture - Engineers Ireland 03/10/2018 (External)
4. Overview of ESB Networks Activities to Support the Electrification of Heat and Transport – Presentation – ESB Networks Demand Planning – 23/08/18 (Internal)
5. Overview of ESB Networks Activities to Support the Electrification of Transport – Presentation - Distribution Code Review Panel – 27/06/18 (External)
6. Overview of ESB Networks Activities to Support the Electrification of Transport – International Energy Agency (IEA) Implementing Agreement for co-operation on Hybrid and Electric Vehicle Technologies and Programmes (IA-HEV) – 11/04/18 (External)

#### BENEFITS REALISED/VALIDATED

- Reducing the risk of costly reinforcement in the future
- Economically enabling LCTs
- Developed and proven methodology to move project from innovation trial to business as usual. This can be used to implement future LV design innovations.

#### NEXT STEPS – BAU, TRANSFER OF OWNERSHIP

The findings and learnings from this project are being used to support the Future LV Design project within ESB Networks which will put the revised ADMD into practice and implement associated processes, tools and documents to support this and other changes.

#### FINAL TIMELINES (REASONS FOR ANY DELAYS IF THEY (OCCURRED)

None to report.

#### FINAL COSTS

No CAPEX costs. Time and expenses for ESB Networks Staff.