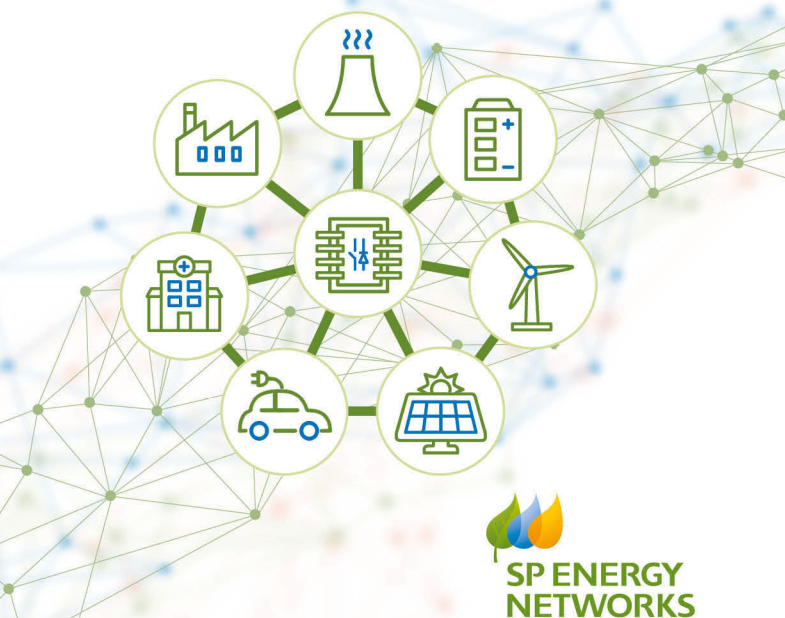




LV ENGINE



WHO ARE WE?

We are SP Energy Networks, part of the Iberdrola Group, leaders in sustainable innovation. As a Distribution and Transmission Network Operator we keep electricity flowing to homes and businesses throughout Central and Southern Scotland, North Wales, Merseyside, Cheshire and North Shropshire.

We do this through the network of overhead lines and underground cables which we own and maintain.

Our three regulated electricity licences are:

SP Transmission (SPT)

SP Distribution (SPD)

SP Manweb (SPM)

Our aim is to deliver a safe and reliable electricity supply **24 hours a day, 365 days a year** whilst providing exceptional value for money.



LV ENGINE

We are changing the way we generate, distribute and use electricity. SP Energy Networks recognises the need to facilitate the uptake of Low Carbon Technologies (LCTs) such as, electric vehicles, heat pumps, photovoltaics.



LV Engine is a flagship £8.3m innovation project funded via Ofgem's Network Innovation Competition (NIC). The project will carry out a globally innovative network trial of Smart Transformers to facilitate the connection of LCTs whilst representing value for money for our customers. This innovation is in line with the UK Government's CO2 reduction targets which are driving the increase in electrification of both heat and transport.



Conventionally, electricity networks provide an alternating current (AC) supply. However, many LCTs operate on a direct current (DC) voltage which requires conversion from AC.

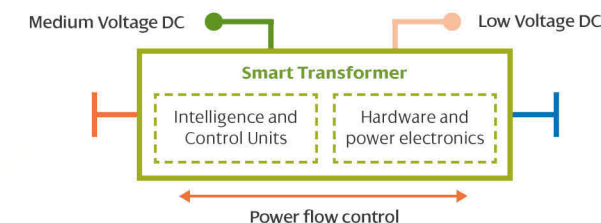
LV Engine intends to design a Smart Transformer which can provide a LV DC supply to our customers for the first time whilst maximising the use of our existing AC network.

These will bring a number of valuable functionalities to the 11kV and Low Voltage (LV) networks allowing us to maximise the use of our existing assets.

SMART TRANSFORMER

A Smart Transformer (ST) - also known as a Solid State Transformer (SST) due to the use of power electronic switches - works as a digitally controlled power electronics converter. It provides multiple functionalities over and above the standard voltage conversion of conventional 11kV/0.4kV transformers

These functionalities allow the Distribution System Operator (DSO) to operate the distribution network more efficiently by improving power quality and maximising the use of existing



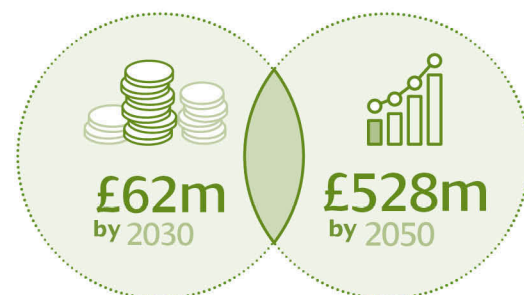
The functionalities provided by a Smart Transformer include:

- Intelligent LV feeder voltage regulation
- Power flow control and transformer load sharing
- Active harmonic filtering
- Reactive power compensation to the 11kV network
- Access to a low voltage DC customer supply.

BENEFITS FOR CUSTOMERS

- We are working to keep costs low and stable for customers. The successful rollout of LV Engine in Great Britain is expected to represent a saving of £62m by 2030 and £528m by 2050.
- The introduction of innovative Smart Transformers on the distribution network will pave the way for a low carbon future for customers.
- Deliver significant financial savings if deployed across all electricity networks.
- Demonstrate a low voltage Direct Current (DC) connection for low carbon technologies including Electric Vehicles (EV).
- The project will stimulate a competitive marketplace for power electronics and Smart Transformers, contributing to improving productivity within the economy.

A POTENTIAL SAVING OF



TIMESCALE

Technical requirements

We are creating an understanding of the technical requirements for Smart Transformer Design. This includes the requirements of functionalities such as voltage regulation, power flow control and harmonic filtering.



Test in network integration facilities

The prototype Smart Transformers will be tested within a network integration facility to acquire network integration certificate and confirm that the Smart Transformer can be reliably used on the Great British (GB) Grid without risking customer supply.

Develop the best operational practice

We are going to develop the best operational practice and best policy documents which can be used as guidance for selecting appropriate cost effective LV Transformers. We are enabling the development of a road map for Business as Usual (BaU) adoption throughout GB.



January 2018

Select manufacturing partner and technical design

We will be selecting our Manufacturing Partner through a competitive tender process, all project partners will work alongside the selected manufacturer to design a fit-for-purpose Smart Transformer. Health and Safety matters to us, so we will be testing and manufacturing the Smart Transformer in a laboratory to ensure it meets all the health and safety requirements as well as the technical.

Trial in our Electricity Network

We will undertake live trials at 6 different locations within both our SP Manweb and SP Distribution licence areas. Here we will record performance data at various sites under different network conditions. We will then be able to compare LV Engine Smart Transformers to the conventional transformers so we can complete an evaluation and identify the benefits LV Engine will bring to customers.



December 2022

Dissemination

We will be effectively disseminating our knowledge of the lessons learnt from LV Engine to other DNO's to ensure we can create smarter, flexible networks for all customers. This will allow efficient replication of LV Engine in all locations and help the UK achieve its targets as together we make the move to a low carbon economy.

CONTACT US

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