

BENEFITS FOR CUSTOMERS

- Lower substation build and modernisation cost. There will be a 10% reduction of substation new-build and replacement costs.
- Reduced outage time and constraints.
- Improved safety for both our customers and members of staff.
- Reduced environmental impact. FITNESS will represent carbon savings through reduction in constraints for the connection of renewable generation and the reduced use of copper in substations.
- Improved customer service as FITNESS will lead to a 4-5% reduction of constraint payments through reduced outage requirements.
- Greater operational flexibility leading to more efficient use of assets.

10%
REDUCTION OF
SUBSTATION
NEW-BUILD AND
REPLACEMENT
COSTS



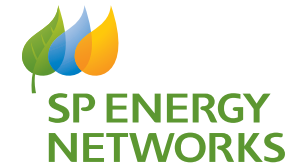
PROJECT PARTNERS

Project Partners	ABB Ltd GE Ltd Synaptec
	The University of Manchester
Project Supporters	NGET SSEN



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FITNESS

Future Intelligent Transmission
Network Substation



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.

FITNESS

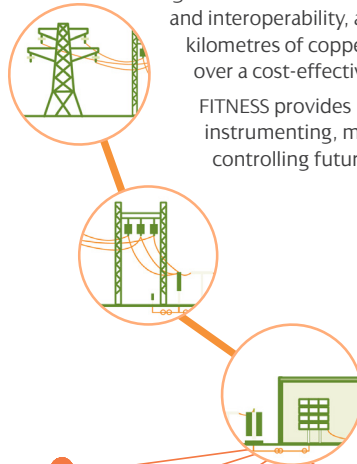
FITNESS (Future Intelligent Transmission Network Substation) aims to deliver an efficient and effective digital substation of the future for a new energy landscape.

Its use of digital technology offers a range of significant benefits to both customers and operators, from improved safety to lower costs.

The goal of FITNESS is to enable GB Transmission Owners (TOs) and Distribution Network Owners (DNOs) to apply a digital substation design approach to future load and non-load related investment.

Digital substations are based on concepts of standardisation and interoperability, and enable replacement of many kilometres of copper wiring with digital measurements over a cost-effective fibre communications network.

FITNESS provides much greater flexibility in building, instrumenting, maintaining, modernising and controlling future substations.



PROJECT OBJECTIVES

Digital Communications

Digital substations are designed with digital communications over fibre optic links instead of analogue signals over copper wires from switchyard to control building. The method relies on the recent International Electrotechnical Commission (IEC) 61850 9-2 'Process Bus' standard for publishing digital SVs. The project trials the fitness-for-purpose of the standard and interoperability of products and integrated systems designed to this standard.

Measurement

The process bus standard enables integration of smaller, lighter and higher quality sensors. The project is intended to prove that NCITs can be integrated with protection, monitoring and control, and that the data quality is sufficient to fulfil the functions of multiple conventional transformers, while reducing footprint and using environmentally benign materials. Trials include substation NCITs fulfilling protection needs (with a voltage NCIT released in 2015), novel distributed sensors applicable to hybrid overhead/underground lines. It has been trialled by remote and local measurements integrated using IEC 61850 9-2, and

conventional transformers via merging units to achieve a practical roadmap for introducing the process bus architecture.

Protection

With only digital communications and no analogue hardwiring, protection devices are smaller and can be replaced or reconfigured without any changes to wiring in the switchyard, avoiding circuit outages. The reliability and availability of protection in the new architecture in a live substation is a key outcome, as is the interoperability between multi-vendor protections based on IEC 61850-8-1 and 9-2 standards.

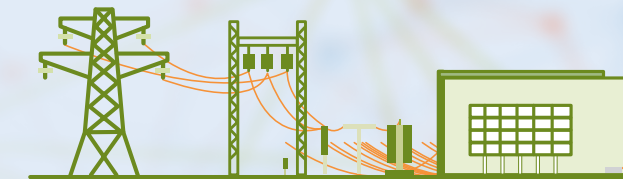
Control

Substation control processes applied in the IEC 61850-8-1 based substation design.

Substation management

The project intends to prove that multi-vendor equipment is interoperable and can be managed in an integrated system and is cyber secure.

CONVENTIONAL SUBSTATION



FITNESS' DIGITAL SUBSTATION

