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UK Power Networks
Delivering your electricity

Flexible Plug and Play

Funding mechanism: LCNF Tier 2

Funding amount: LCNF: £6.7m
UK Power Networks: £2m
Partners: £1m
Overall: £9.7m

Status: Live
Start date: January 2012
End date: December 2014

Project concept/overview/challenge

Flexible Plug and Play aims to enable faster and cheaper integration of distributed generation, such as wind power or solar, into the electricity distribution network by trialling new technologies and commercial solutions.

Key deliverables include:

- Development of 'interruptible' connection agreements to distributed generation developers.
- Installation of smart technologies (Dynamic Line Rating, Active Voltage Control, Remote Terminal Units enabled with IEC 61850 and an Active Network Management system) that will maximise the use of the existing electricity network and allow real-time management of network constraints.
- Installation of the first 33kV Quadrature-booster in the world onto the distribution network; this is a mature technology that is currently used on the transmission network, but will be trialled for the first time on the 33kV distribution network to control active power flow on parallel lines.

Stakeholder benefits

- Enable a cheaper and faster alternative connection choice to connect distribution generation to constrained parts of the network.
- The new technologies and commercial arrangements will be integrated into the business by Q2 2015.
- Enabling platform for integration of low carbon technologies onto the network.
- Simplifies technical solutions into concepts that distributed generation project funders can incorporate into their business models.
- Applicable to other DNO networks with significant distributed generation activity.

What we are doing/deliverables

Our customers

We engage with our customers that have suitable projects in the trial area so they can participate, get a Flexible Plug and Play connection offer and benefit from the novel solutions developed.

Commercial Arrangements

- First interruptible connection agreements.
- Mar-Oct 2013: 15 'Interruptible' connection offers were issued to customers.
- Jun-Jul 2013: The first two customers accepted their 'interruptible' connection offer.
- Summer 2014: Generation connections will be live using the new smart technologies.

Smart technologies

We have installed the following technologies:

- Mar 2013: New telecommunications platform installed that will allow the smart devices used in the project to 'talk' to each other using the data protocol IEC 61850.
- Jul 2013: First Quadrature-booster in the world to operate at 33kV that will be used to control active power on parallel lines.
- Sept 2013: New smart control and monitoring technologies have been installed that will maximise the use of the existing network.

Sharing Knowledge
(all available at ukpowernetworks.co.uk/innovation)

- We have produced 5 learning reports:

- We have hosted 2 learning events. These have been filmed and are available to watch at ukpowernetworks.co.uk/innovation

Findings

Key learning: Stakeholder Engagement

- Transparency and engagement with customers helped to develop the 'interruptible' connection agreements.
- Important to have the appropriate skill set to provide the right customer service to explain curtailment.

Key learning: Commercial Arrangements

- Customers are comfortable with the expected levels of curtailment ranging from a 3-5% reduction in expected annual output.

Key learning: Telecommunications Platform

- Communications solutions can be flexibly deployed within short timescales.
- New knowledge generated and experience gained on how to implement open standards such as IEC 61850 over wireless networks.

Key learning: Quadrature-booster

- How to design and install and protect a 33kV Quadrature-booster (first in the world).

Key learning: Technical Architecture and Solution

- Use of open standards such as IEC 61850 for the overall integration of Active Network Management and the Flexible Plug and Play smart technologies, and especially as these have not been used before in this application before.

Next steps

- **Customers:** Continue to engage and sign up more distributed generation developers to the Flexible Plug and Play project to provide faster and cheaper connections.
- **Business integration:** UK Power Networks has committed that the Flexible Plug and Play connection offer will be available to customers by 2015.
- **Trials:** Extensive trials of the overall system integration.
- **Knowledge Dissemination:** Continue to share knowledge via learning events, academic papers, learning reports and attending conferences.

Partners

ALSTOM
FUNDAMENTALS
GE
GL Garrad Hassan
IET The Institution of Engineering and Technology
Imperial College London
SilverSpring NETWORKS
smarter grid solutions
UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group
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