

# Low Voltage Current Sensor Technology Evaluation

**Funding mechanism:** LCNF Tier 1

**Project budget:** £500,000 (split 50:50 between UK Power Networks and Western Power Distribution)

**Status:** Completed  
Start date: December 2011  
End date: June 2013



## Project concept/overview/challenge

Monitoring of our low voltage network is currently limited. To maintain reliable power supplies in the future, we need to better understand the impact of an increase in both electricity demand and the amount of renewable generation that is connected to our network.

UK Power Networks and Western Power Distribution (WPD) collaborated to evaluate low voltage monitoring solutions in a laboratory and on live electricity networks. Sensors from seven manufacturers were fitted at 28 substations across London and the WPD area.

## Stakeholder benefits

The project was developed to conduct a detailed assessment and comparison of the current sensors available in the market and inform the wider DNO community of their benefits and limitations. This knowledge would support the wider roll-out of monitoring to facilitate activities associated with a low carbon future.

## What we are doing/deliverables

- Evaluation and comparison of LV current sensors from seven manufacturers.
- Assessment of each sensor's accuracy in a controlled laboratory environment at NPL.
- Field trials on the distribution system of both UK Power Networks and Western Power Distribution to understand actual installation requirements and to test each product's reliability.
- Assessment of a range of current sensors and voltage measurement techniques.

- Development of a non-invasive, safe practice to facilitate the installation of the current sensors and voltage measurement products without disrupting existing customers.
- Summarised report detailing the results of individual tests and the comparative assessments.

## Findings

- The assessment of several voltage measurement techniques and products resulted in a hierarchy of preferred voltage measurement methods being developed.
- An installation policy that enabled LV monitoring equipment to be installed safely, without the need for any customer interruptions, was developed.
- All the current sensors had good or satisfactory scores in the laboratory accuracy assessment, which has increased our confidence in the sensors. This process also identified some useful generic results for different types of sensor.
- The field and laboratory trials allowed detailed feedback to be provided to participating manufacturers, which is leading to improved products being developed.
- A comparison table has been produced rating each of the sensors tested, see overleaf.
- The data collected confirmed that LV monitoring could provide useful information to facilitate a low carbon future.
- The current sensor products and their installation costs were achieved at below initial estimates. However, a cost benefit analysis does not currently justify a universal roll-out of secondary substation monitoring, favouring instead a targeted deployment.
- UK Power Networks has revised the Remote Terminal Unit specification for secondary substations following the project.

Manufacturer	Overall Rating	NPL Test	Ease of installation	Installation time per site (Mins)	Relative Cost	Positive	Negative	Monitoring type
GMC i-Prosys	Excellent	Average	Easy	35-45	£	Plug and Play	Bulky metrology unit	Advanced
Sentec/Selex (Gridkey)	Excellent	Good	Easy	40-50	£	Plug and Play	Hard to access internal electronics	Advanced
Current	Good	Good	Easy	45-60	£££	Plug and Play	Case not fully weather proof	Advanced
PowerSense	Good	Average	Medium	60-90	££	Back up, battery, robust case	Time consuming sensor connection	Advanced
Ambient	Good	Good	Easy	45-60	£££	Plug and Play	No commissioning indicators. One unit per feeder	Advanced
Haysys	Satisfactory	Average	Hard	90-100	£	Large sensor aperture	Time consuming sensor connection	Basic
Locamation	Satisfactory	Good	Easy	45-60	££	Plug and Play	Electronics prone to failure	Advanced

### Next steps

Variations between substation sites identified some sensor product limitations. A number of potential solutions for these particular issues have been proposed and are under consideration. Further installation trials will be necessary to prove these.

Discussions with manufacturers will continue to improve the product design and reduce both the equipment and installation costs.

### Partners

