LCPDelta

Switching up the smart system: How the smart system can transform energy resilience

Executive summary

A project for CALISEN

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Foreword

The time is now for Great Britain to harness the full potential of its smart metering system. Our smart meters can do so much more than just track our energy use. This important report from LCP Delta shows just how powerful a fully realised smart meter system could be: strengthening Great Britain's energy grid resilience, better identifying vulnerable consumers and – crucially – saving money for households and businesses.

The report opens up a range of possibilities for smarter use of our smart energy system. We at Calisen are committed to playing our part in maximising this potential through ever-improving data and analytics, and building stronger connections across the system to drive innovation, efficiency and progress.

Catherine O'Kelly, CEO, Calisen

As we become increasingly dependent on electricity to meet our energy needs, we need to transition to a more modern, resilient and affordable energy system.

But without accurate and timely data, we often end up paying more than necessary for our energy - this imposes unnecessary burdens on our aging energy system and wastes valuable resources.

Smart meters are a key technology in providing that data, capturing and communicating energy flows. In this report we look at some of the potential use cases where smart meters can ensure a more resilient energy system and at the same time deliver more affordable energy to consumers.

Tom Veli, Partner, LCP Delta

A taxonomy of grid resilience

Resilience definition

Technical resilience
Ability of assets, networks and systems to anticipate, absorb, adapt to and/or rapidly recover from a disruptive event

Operational resilience
Maintaining and avoiding failure of supply of the system under **normal** operating conditions

Societal resilience
The protection of consumers and communities, particularly vulnerable groups, ensuring equitable outcomes

Economic resilience
Strategic planning of the energy system to deliver energy economically despite financial shocks

Current approaches for delivering resilience

Traditional infrastructure investments

Microgrids
Smart meters play a vital role in the efficient operation and management of microgrids

Non-infrastructure solutions
Smart meters provide key real time data for detection of issues, supporting planning and enabling demand-side flexibility

Black Start
Smart meters provide critical support functions that speed up restoration during Black Start events

Components of Resilience

Detection and response
Smart meters enable operators to move from reactive fault-finding to proactive network management

Flexibility and adaptability
Smart meters enable millions of consumers to participate in demand-side flexibility, helping to balance supply and demand

Operational continuity
Smart meters enable utilities to anticipate issues and maintain service without interruption

Data-driven planning
Smart meters enable utilities to move to dynamic, risk-based strategies for investment

Cyber and physical security
Smart meters enhance situational awareness and provide a secure, distributed sensing layer

Summary

Our research identifies specific use cases where smart meters can deliver more benefits for Great Britain. The report analyses these opportunities using evidence from real-world trials and modelling to demonstrate the benefits and associated policy requirements. It highlights the role smart meters can play in enhancing grid resilience, optimising the energy system, and delivering operational savings.

Voltage Control

The management of voltage levels across the low voltage (LV) electricity network to keep them within statutory limits

System Optimisation

Via flexibility; the ability to dynamically balance fluctuations in supply and demand under varying conditions

Operational Savings

Reduce the time, cost, and resources needed to manage the electricity system and consumer accounts, including social returns

Use case

Voltage Control	System Optimisation	Operational Savings
Smart meter-enabled voltage control improves energy efficiency and grid resilience by providing visibility of voltage levels beyond substations. Trials show that optimising voltage using smart meter data can reduce consumption, lower bills, and cut carbon.	Smart meters enable consumer-led flexibility by providing near real-time data, allowing consumers to shift usage and support grid stability. Smart meters enable services such as the Demand Flexibility Service (DFS) which can reward households for reducing demand.	Smart meters replace manual readings with automated, half-hourly data, reducing costs, potential errors, and enabling more accurate settlement and billing. They also help identify and support vulnerable customers more effectively.

Potential gross benefit across GB consumers

The research models base case and best case scenarios e.g. current rollout versus 100% rollout

£572-770m from Conservation Voltage Reduction (CVR) voltage control	**£103-139m** from avoided overvoltage	**£1-1.5m** from Winter DFS	**£415-560m** from excess energy to customers enabled by smart meters	**£312-420m** from operational savings of the full smart meter rollout	**£185-250m** of social return from using smart meters to identify vulnerable households

Total annual gross benefits of £1.9bn at 100% rollout

Lifetime benefit

Next steps for industry

Voltage Control

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	Voltage Control	System Optimisation	Operational Savings
Opportunity for industry	Develop new hardware or services to supply networks with accurate, near real-time voltage measurement data.	Enable automated flexibility by supporting the rollout of smart meter features like Auxiliary Proportional Controller (APC) to allow devices to be controlled remotely.	Industry needs to collaborate to complete the rollout by addressing hard to reach consumers and complex metering arrangements
Policy asks	1. Real-time voltage measurement data at grid-edge for DNOs. 2. Timely access for network operators to smart meter voltage data.	1. Improve smart meter operation to ensure half-hourly data is available for all installed meters. 2. Expanding access to the DCC-controlled smart meter signals beyond just suppliers.	1. Streamline and improve data access to individual household smart meter data in the use case of identifying Priority Service Register eligible customers. 2. Mandate the installation of smart meters in all newbuilds to accelerate rollout and futureproof new housing developments.

Contact us

For further information please contact our team.

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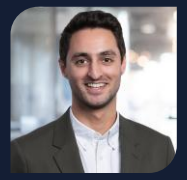

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