

Unlocking Value from Smart Meter Data

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Contents

- 1. Executive summary 3**
- 2. Introduction 3**
- 3. Background 4**
- 4. Progress made this year 4**
- 5. Smart meter data adaptor 4**
- 6. Benefits of smart meter data 5**
- 7. Current smart meter data use cases 6**
 - 7.1 Faults and network events 6
 - 7.2 Voltage insights 7
 - 7.3 Consumption and demand 7
 - 7.4 Flexibility services 7
 - 7.5 Innovation trials 8
- 8. Case studies 8**
 - 8.1 Faults 8
 - 8.2 Voltage 9
 - 8.3 Consumption 9
- 9. Current network visibility position 10**
- 10. The future as smart meter coverage grows 10**
- 11. Our journey and direction of travel 11**

1. Executive summary

Smart meter data is rapidly becoming a transformative asset for how SP Electricity North West and other distribution network operators (DNOs) plan, operate, and manage the electricity network. As rollout continues to expand, the data already strengthens planning activities, improves operational visibility, and supports more informed decision-making across the business. With continued improvements in communications performance, data quality, and system capability, smart meters will play an increasingly critical role in delivering a more efficient, resilient, and customer-focused network.

The smart meter rollout in the North West has historically faced challenges due to communications limitations and building-type constraints, influencing the pace and distribution of smart meter installation. Even so, significant progress has been made this year to build the foundations needed for smart meter data to be used at scale, including system upgrades, process improvements, new reporting capabilities, and early analytical use cases that demonstrate measurable operational value.

A key development has been the transition to a new smart meter data adaptor, deployed through a phased and well-governed approach to ensure stability and scalability. This approach aligns with industry best practice and lessons learned across the DNO community, allowing the organisation to ramp up activity safely while protecting network operations. The rollout prepares the business for future growth from today's 1.5 million meters to an anticipated 2.4 million.

Moreover, smart meter data is already delivering meaningful benefits across the organisation. It enhances monitoring of the low voltage (LV) network, strengthens forecasting and modelling, enables earlier identification of power issues, and supports decarbonisation through better understanding of low carbon technology (LCT) behaviour.

Smart meter data also improves resilience by providing faster insight into faults and outages, helping customers be restored more rapidly during power cuts. Access to this data helps to locate faults more precisely, reduce unnecessary field investigations, and accelerate customer restoration. Voltage insights derived from smart meter data are reducing the need for physical monitoring equipment and improving diagnostic accuracy.

Consumption data trials are shaping future investment in analytical tooling and structured data-mining processes. Smart meter data is also becoming integral to the verification of flexibility services and supports innovation trials across GB, reducing resource requirements and improving the robustness of findings.

Today, smart meter data adds an essential layer to the organisation's LV visibility strategy, complementing fixed monitoring to provide granular, property-level insight. While coverage is not yet universal and some device-specific limitations remain, the combination of multiple data sources strengthens network insight and supports faster, more accurate decision-making.

Overall, the work underway is laying strong foundations for a smarter, data-driven network. As capabilities mature, the organisation is well-positioned to unlock significant future benefits, from more precise investment targeting to improved network operation and faster customer restoration, ensuring that smart meter data becomes a core asset in supporting the energy system of the future.

2. Introduction

Smart meter data is transforming how we understand and operate our electricity network. As rollout continues to grow, the data these devices provide is already strengthening our planning, improving operational visibility, and supporting more informed decision-making across the

business. With the right foundations in place and continued progress on data quality and system capability, smart meters will be an increasingly powerful tool for us in the years ahead.

While there are still some improvements that need to be made, such as the communications performance, coverage levels and the broader industry environment – the direction of travel is extremely positive. As adoption increases and our ability to access and analyse this data matures, the potential value becomes far greater.

Looking ahead, smart meter data will help us target investment more precisely, ensuring we reinforce the network only where it is truly needed. It will support ever-better operational decision-making, giving us clearer visibility of voltage performance, consumption patterns and emerging constraints. And critically, it will help restore customers more quickly during power cuts, providing earlier, more accurate insight into who is affected and how faults are progressing.

3. Background

Smart meter rollout in the North West began later than in many other regions, largely because early communications challenges made installation and commissioning more difficult. The area also contains a high number of property types that continue to pose practical barriers to smart metering, either because the building structure affects signal strength or because the physical space available cannot safely accommodate newer smart-meter models, which are larger than some legacy devices. These factors have shaped the pace and pattern of rollout across the region and continue to influence how and where smart meter data can be used today.

4. Progress made this year

Over the last year, we have focused on establishing the foundations required to use smart meter data at scale. This has involved upgrading our systems, improving our processes, and testing early use cases to show how the data can add value.

Summary of what we have delivered this year

- We have built a skilled team to lead investigations and data mining, which will help us to understand usage patterns in relation to energy consumption.
- A new smart adapter system is now in place to support this planned increase in voltage and consumption data mining. Its bespoke features make data collection easier and support corrective work on inventory records.
- The system also enables fast, large-scale ad-hoc data mining to support our operational teams investigating voltage issues across both import and export meter points.
- New reporting has been developed to support ongoing smart data projects and to keep internal teams informed about smart meter rollouts and the status of our smart meter infrastructure.

5. Smart meter data adaptor

This year we transitioned to a new smart meter adaptor. The change brought some short-term operational challenges, but it is an essential step toward scalable, automated access to smart meter data in the future.

Our previous adapter had reached the limits of what it could support and would have required significant investment to keep pace with growing demand. After reviewing the options, we

concluded that moving to a cloud-based solution offered the best value for money, reduced the need for ongoing system management, and aligned our technology with modern cloud standards.

Our deployment approach follows recommendations from the Data Communications Company (DCC), the national organisation responsible for operating the secure communications network that connects smart meters to energy suppliers and network operators.

A phased, well-governed rollout

We are introducing the new adapter in a phased and well-governed way which adheres to best practice, giving us stronger oversight of performance and allowing us to refine scheduling parameters as we go. The rollout prioritises the meter groups most likely to respond successfully, and our initial operating profile targets routine data retrieval from around 250,000 devices. Early activity focuses on the second generation of smart meters, SMETS2, to build a strong and consistent performance baseline.

The way we are scaling activity also reflects wider industry learning. DCC encourages a measured, forecast-led rollout to protect network stability, and we are deliberately increasing demand gradually to avoid overloading the system or disrupting critical functions such as pings, outage alerts and restoration messages. Insights shared across DNO working groups have shaped our strategy, drawing on lessons learned, trial and error experiences and DCC endorsed best practice to shape optimal request patterns. Overall, we are taking a cautious, evidence-based approach, establishing robust processes first, limiting exposure if issues arise, correcting quickly, and only then expanding to full demand.

The initial target of 250,000 devices does not represent a long-term limit. It reflects a deliberate decision not to begin with full-network mining from day one. Some DNOs attempted an immediate uplift to their full meter base, with mixed levels of success. Our approach is intentionally different, starting with a stable, well-governed cohort, validating performance, and then scaling progressively until all relevant meters are included. This clarification helps manage expectations and makes clear that full coverage remains the end goal.

Taking this step now is essential for our future capability. A controlled rollout allows us to adjust configurations safely, embed lessons learned early, and refine the most effective scheduling windows and device groupings for bulk operations. It also ensures that increases in load are introduced in a way that properly stress-tests both the DCC network and our internal systems without creating unnecessary risk. Most importantly, this approach gives us a scalable framework that can grow with the network as smart-meter volumes rise from today's 1.5 million devices to an expected 2.4 million.

6. Benefits of smart meter data

Smart meter data is already delivering several benefits that sit alongside our traditional network monitoring. Even at today's roll-out levels, it provides additional insight and helps strengthen our evidence base. It also gives us access to detailed voltage, demand and generation information that can be used to validate and improve our network models, ensuring planning decisions are based on real-world behaviour rather than assumptions.

Key benefits

- Supports and enhances existing monitoring of the LV network, providing granular insight into consumption and voltage.
- Enables earlier identification of emerging constraints, power quality issues and areas of load growth by cross-referencing alert data with voltage and consumption information. This will support more accurate planning of reinforcement, maintenance, and investment.

- Strengthens system resilience by helping detect abnormal patterns, outages or voltage deviations more quickly.
- Supports proactive rather than reactive network management.
- Provides a foundation for improved forecasting and modelling, as high-resolution data enhances load forecasting, distributed energy resource (DER) modelling and scenario analysis, and strengthens evidence for future planning and regulatory submissions.
- Supports decarbonisation and flexibility by helping us understand the real-world impact of LCTs such as electric vehicles, heat pumps and solar generation.
- Gives designers and planners access to real voltage, demand and generation data, allowing them to validate and refine network models. This reduces the risk of under- or over-reinforcement and ensures network development is targeted where it is genuinely needed, avoiding unnecessary build time and cost for customers.
- Can be layered with substation monitoring to provide a clearer picture of network losses and support the detection of potential energy theft, strengthening both operational insight and system integrity.

7. Current smart meter data use cases

Smart meter data is already being explored across several practical use cases, demonstrating both its immediate value and its potential as coverage increases.

7.1 Faults and network events

Smart meter data can support improved understanding of faults and network events, particularly where traditional monitoring is limited.

Power-loss and restoration alerts from smart meters are now used by network management teams to flag potential outages for investigation. Voltage alerts – including extreme over- and under-voltage events – are being captured and analysed to identify recurring issues, and these alerts are mapped to substations and LV feeders to distinguish between property-specific problems and wider network concerns.

By combining alert data with mined voltage information, we can assess maximum and minimum voltages, identify outliers and highlight unusual demand patterns. This provides earlier visibility of potential faults, helps us spot recurring voltage problems before they escalate, and improves localisation of issues so operational resources can be deployed more efficiently. Smart meter outage alerts also mean customers no longer need to call to report a loss of supply, allowing us to identify issues sooner and speed up the mobilisation of resources.

When a network fault occurs, faults teams can use smart-meter off-supply information and ping capability to narrow down the likely fault location and focus efforts on restoring supply and supporting affected customers. During storm events, where multiple HV and LV faults may occur in the same area, smart meter pings allow us to confirm which customers remain off supply after HV restoration, avoiding the need to call customers individually or visit each property to verify their status. More accurate visibility of restoration times also reduces reliance on manual recording by field staff, helping ensure customer minutes lost (CML) performance is based on precise data rather than human estimation.

Current limitations

Some limitations remain, as only 70% of the network is currently linked to a smart meter and full roll-out relies on factors beyond our control (e.g. supplier deployment plans, customer uptake, and migration from legacy radio networks to 4G).

Additionally, some smart meters still produce inaccurate voltage alerts because of device faults, which means the data needs careful validation before it can be relied on. In other cases, the information that links alerts to specific substations or feeders is missing or incomplete, making it harder to pinpoint the exact location of an issue. A further challenge is that some meters have intermittent or ongoing communication problems, and resolving these often requires replacement or remedial work that sits outside our direct control.

7.2 Voltage insights

Voltage monitoring is another area where smart meter data is proving valuable.

Voltage devices with a high number of alerts are being used to identify potential issues, and operational teams can request smart meter data for a secondary substation to reveal voltage trends through key performance metrics and visualisations, enabling earlier triage where a customer believes their voltage is falling outside of statutory limits.

This helps determine whether an issue is isolated to a single property or affecting a wider section of the feeder. In some cases, smart meter data may reduce the need for physical voltage recorders and temporary precision power quality metering, offering cost savings and better use of resources. Historically, an operational colleague would have to visit the customer's property, install a monitor for several weeks, return to remove it, and then download and process the data – a process with significant cost and resourcing implications.

Smart meter data complements existing monitoring by providing visibility in areas without physical LV monitors, offering more granular diagnostics at property level, improving localisation of issues and enhancing reporting by adding an additional, independent data source, strengthening overall network analytics and improving confidence in assessments. The granular nature of the data allows us to see how persistent voltage issues are (e.g. 1 minute and 10 minutes). This also supports earlier detection of abnormal voltage patterns or demand behaviours that may not yet trigger alarms on physical monitoring devices.

7.3 Consumption and demand

Consumption data from smart meters is also beginning to support a better understanding of demand and customer behaviour. We have collected and reviewed consumption data across a sample of substations to build early insight into how the data behaves and what value it can provide.

Initial testing has shown variability in the success rate of retrieving consumption data, with identical requests made on different days sometimes returning different levels of response. Granularity is important to help understand patterns closer to the point of origin, but this must be balanced carefully with data-privacy requirements. These early findings highlight the need for thoughtful planning to ensure data requests are both operationally useful and compliant.

The work has strengthened our understanding of consumption data as an analytical tool and highlighted the need for a structured approach to mapping and mining data. We now have a clearer view of how smart meters respond to consumption requests and how to schedule these requests to achieve more consistent and optimal retrieval.

All insights have been fed into the wider consumption project to ensure the final solution is robust, scalable and not hindered by early issues

7.4 Flexibility services

Smart meter data is increasingly supporting the delivery and verification of flexibility services. Aggregators use smart meter consumption data to establish baselines and verify customer responses to requests from the National Energy Systems Operator (NESO), DNOs, energy retailers and peer-to-peer platforms. Where SP ENW has a contract with an aggregator, the flexibility service provider (FSP) is responsible for supplying the metering data used for

settlement. By accessing smart meter data for the aggregated portfolio, we are able to cross-check the accuracy of the information provided and ensure that reported performance is consistent with actual behaviour. This improves confidence in settlement outcomes and reduces the risk of inaccurate submissions.

Smart meter data also lowers the cost and complexity of customer participation in flexibility services by removing the need for additional sub-metering equipment. Time-of-use tariffs already encourage customers to shift demand away from peak periods, reducing loading on the network and supporting more efficient use of renewable generation. As participation grows, smart meter data provides a consistent source of truth for both retailers and system operators, enabling service stacking and helping ensure that the same performance signals can be used across multiple markets.

All DNOs and NESO have agreed to accept smart meter data for verifying delivery from aggregated domestic portfolios. This creates a minimum level of standardisation across the industry and ensures that data used for performance verification meets regulated accuracy and security requirements.

7.5 Innovation trials

Smart meter data is also being used to support a range of innovation trials across the industry. SP ENW has contributed to several DNO and NESO projects – including RetroMeter, CoolDown and CrowdFlex – where smart meter data has been used to monitor changes in customer consumption patterns and assess the impact of trial interventions.

Using smart meter data reduces the need to install temporary monitoring equipment in customers' homes, making trials quicker, less resource-intensive and less disruptive for participants. Access to historical data enables baselines to be established rapidly and allows counterfactual groups to be created from the wider customer base, reducing recruitment effort and improving the statistical robustness of findings. Because smart meter specifications are standard across the UK, trial insights can be applied more easily to business-as-usual operations and transferred to other networks, a key requirement for Ofgem- and Innovate UK-funded trials.

In many cases, trusted third-party intermediaries already hold or manage the relevant data. This allows trial partners to process smart meter data without requiring SP ENW to handle it directly, ensuring a single, consistent source of information and simplifying data-sharing processes. This approach supports efficient project mobilisation and strengthens confidence in the results produced.

8. Case studies

8.1 Faults

Scenario

Front-line agents routinely use pings to check for outages or possible faults at a customer's property, but they often do not know whether the meter is actually smart. As a result, pings were being sent to non-smart meters unnecessarily, slowing down response times and creating avoidable system traffic. During high-pressure events such as storms, this added delay made it harder to confirm supply status quickly, affecting customer service and internal performance standards.

How smart meter data was used

Smart meter inventory data held within the new adapter was extracted and made accessible to operational teams. A user-friendly dashboard was developed showing all active smart meters enrolled on the network, allowing agents to check the meter point administration number (MPAN)

before sending a ping. This meant colleagues could instantly see whether a meter supported smart functionality and avoid unnecessary requests.

Outcome

Front-line agents now have clear visibility of which meters can be interacted with, enabling more accurate and efficient decision-making. Unnecessary ping attempts have reduced, improving system efficiency and speeding up operational response. During urgent events, agents can confirm supply status more quickly, supporting better customer service.

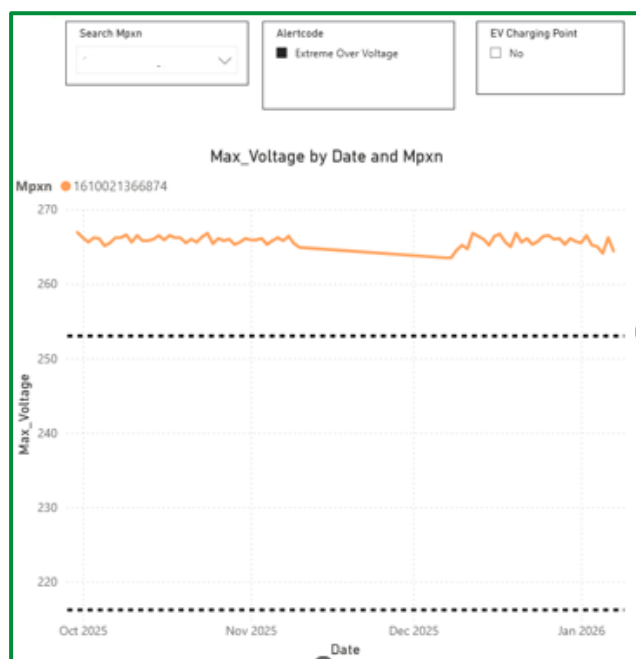
8.2 Voltage

Scenario

A customer's MPAN was identified as having unusually high voltage levels, prompting further investigation.

How smart meter data was used

Voltage alert data was reviewed to confirm the affected MPAN and identify its associated LV feeder and secondary substation. The data showed that only one smart meter on that feeder was generating alerts, helping narrow the focus of the investigation. Several months of voltage data was then requested for the meter, revealing consistently high maximum voltages above 260V. These findings were visualised, making the abnormal voltage trend clear and easy to interpret. The issue was then escalated to our operations team for on-site assessment and remediation.



Outcome

Operations confirmed the findings of high voltages. Further testing confirmed that a transformer exchange would be required to bring voltages back within safe limits.

8.3 Consumption

Scenario

This year Greater Manchester Combined Authority (GMCA) and the Be Net Zero Group sought data to identify industrial parks with high energy demand.

How smart meter data was used

We shared PRESense LV monitoring data showing headroom and demand across the secondary substations serving these locations, alongside aggregated smart meter data to illustrate combined demand patterns and energy trends (e.g. day/night peaks), helping identify decarbonisation and flexibility potential.

This targeted dataset was generated alongside publishing a new LV visibility dataset combining smart meter and PRESense data across 40 datasets—88 million records, 12 months of time-series data, and load-duration curves for ~6,000 substations, covering over 60% of connected customers.

Outcome

GMCA used this combined dataset to target industrial and commercial businesses in prioritised areas with decarbonisation support.

9. Current network visibility position

Smart meter data broadens our overall LV network visibility.

Traditional monitoring provides a view from the substation to the feeder, while smart meter data offers property-level insight that helps narrow the diagnostic field and improve localisation of issues. This is increasingly important as more LCTs connect to the network, because accurate voltage information helps ensure statutory limits are maintained and prevents customer equipment or LCTs from tripping. However, because smart meter coverage is not universal the data cannot yet provide a complete network view.

Today, full network visibility is achieved through a combination of data sources. Smart meter data plays an important role, but it works best when used alongside our existing monitoring tools, such as PRESense. We are actively assessing how smart meter data can help fill gaps in areas that do not currently have active visibility but do have strong smart-meter coverage.

Using multiple data sources strengthen the accuracy and reliability of network insights, enables earlier detection of potential faults and supports cross-validation of anomalies. This layered approach improves network resilience and enables issues to be resolved more quickly and cost-effectively.

Smart meter readings are also not time-synchronised, meaning aggregated demand reflects an average rather than true instantaneous load, and the data is accessed retrospectively rather than in real time. For this reason, smart meter data supplements rather than replaces DNO monitoring, which continues to provide real-time insight and detect power-quality issues.

Even so, smart meters add unique value. They reveal very localised outages before customers report them, help identify undeclared LCTs, support customer participation in flexibility services, and improve billing accuracy. In theory, full coverage would also allow losses and potential energy theft to be identified, though this is not yet achievable.

10. The future as smart meter coverage grows

As smart meter coverage increases, the value of the data grows with it. Greater coverage enhances the granularity and completeness of LV network insight, reducing blind spots and enabling more representative analysis across all feeder types and geographies. As the dataset expands, it becomes statistically stronger and more operationally reliable, supporting more confident decision-making at scale.

In the future, smart meter data and fixed monitoring will operate as complementary layers of the same visibility framework. Fixed monitoring will continue to provide continuous, high-resolution signals at substation level, while smart meter data will supply distributed, property-level context. Together, they will form an integrated dataset that supports cross-validation, improves diagnostic accuracy and enables more precise localisation of emerging issues.

Over time, this combined data environment will unlock advanced capabilities such as predictive fault analytics, more accurate modelling of LCT uptake, dynamic load management and increasingly targeted reinforcement strategies. It also lays the foundation for future flexibility services and more sophisticated operational automation as data maturity increases.

11. Our journey and direction of travel

We are on a journey to embed smart meter data into our core processes. While capability will continue to evolve, the direction of travel is clear.

We are building towards a fully integrated, data-driven visibility platform that combines smart meter data, fixed monitoring and advanced analytics to deliver comprehensive, real-time insight across the entire LV network. This includes developing a comprehensive view of consumption and voltage that strengthens network resilience and supports more informed planning, enabled through both scheduled and ad-hoc data collection. Over time, this integrated approach will support increasingly proactive network management, facilitate the transition to higher volumes of LCTs, and establish the operational foundation for a more flexible, resilient, and efficient future energy system.

We will also draw on wider business insights – such as vulnerable-customer data and LCT information – to understand which consumers are supported by smart metering and to cross-reference this with our network data. This will help prioritise resources where they are needed most. For example, during storms, understanding the number of vulnerable or at-risk customers in an affected area can inform decisions such as deferring DCC maintenance when network availability is most critical.

Our immediate priorities include working closely with internal stakeholders to refine and validate our business requirements, ensuring the development of a comprehensive and adaptable data set that supports informed decision-making across future phases. This includes developing reporting to meet emerging operational and regulatory needs and preparing datasets for publication through the open data portal to support wider stakeholder engagement. As our understanding of smart meter data matures, it strengthens our broader analytical capability and enables us to apply these insights more effectively across other operational areas and future use cases.

The work underway now is creating the solid foundations we need. By maturing our understanding of smart meter data and improving the quality of our insights, we are enabling a shift towards more proactive, data-driven decision-making that will better support the network's future operational and planning needs.