

Market facilitator – Metering Expertise

Summary

In its consultation on the market facilitator, one of the functions Ofgem foresees for the role is a market coordination function, where one of the activities will be “to develop and publish a delivery plan and implementation timetable, identifying the deliverables required for standardised, transparent, and coordinated local flexibility markets and for alignment with transmission flexibility market arrangements.”

Elexon believes that an important element in such a plan is a section on metering. To ensure security of supply, that constraints are managed effectively and protect the consumer, it is crucial to have confidence in the data used to demonstrate delivery of a balancing or flexibility service. Confidence and traceability must come from metering, whether read directly or baselining historical data from the device. Indeed, in Ofgem’s recent Call for Input on Smoothing the Journey: engaging domestic consumers in energy flexibility, it called out several metering issues as barriers to flexibility.

As such, bringing more transparency to the roles that various organisations play, as well as collective taking of a progress status via a periodic update, will bring more clarity, can help identify bottlenecks and assign responsibility for finding a solution, in a timely and transparent manner.

This discussion paper outlines key areas that will be critical to analyse and keep coordinated. It proposes a number of actions under the auspices of market coordinator that could contribute to more clarity for market participants and those institutions involved in setting technical requirements.

The paper outlines Elexon’s experience and immediate suitability for a leading, coordinating role, through transferable skills that fit naturally with requirements of the market facilitator. Our culture of inclusivity, listening, continuous improvement and technical expertise allows us to understand the needs of industry, protect data integrity and the consumer, ensuring we produce solutions that balance risk appetite with costs, practicality, and in alignment with current technical developments.

The paper provides examples that demonstrate the delivery of projects based on the design principles outlined for the market facilitator role: Inclusive and Collaborative, Agile, Expert. The paper also outlines what Elexon views as the key challenges for market facilitator and details our approach for managing these, through stakeholder engagement, agile change, risk, assurance, continuous improvement and metering technology.

Context

Elexon currently manages the Balancing and Settlement Code (BSC) Metering Codes of Practice (CoP) that underpin the Balancing Mechanism. They are used for the over 100kW market and profile class 5 to 8 AMR sites in the Supplier Volume Allocation arrangements; and for generation, large industrial sites, Grid Supply Points and Interconnectors in the Central Volume Allocation arrangements; and for Asset Metering Systems for behind the Boundary Point applications. For Asset Metering Systems we created CoP11 that defined the technical requirements for these behind the Boundary Point Metering Systems.

We developed CoP11 in a flexible, inclusive approach to meet the needs of stakeholders and this resulted in the use of existing technologies and methods of metering used in other areas to be able to participate. This approach to building on and including techniques that are already in use will be essential for the market facilitator, to balance the need for rigorous metering and data requirements, against the need to grow flexibility services. An understanding of risk appetite is crucial to strike this balance. We discuss our approach to risk management later in the Paper.

We have also developed the metering arrangements for the Capacity Market and in Contracts for Difference for the Department of Energy Security and Net Zero (formerly Department of Energy and Climate Change). In addition, other schemes point to our CoPs for the metering requirements in their own schemes, such as the ESO Demand Flexibility Service (DFS) allowing the use of sub-meters where they adhere to Elexon's CoP11.

Challenges

When aggregators engage with Elexon they raise the issue of the complexities, and in some cases, barriers to entry that they face. The ideal for them is to have a consistent GB wide set of technical requirements to create a level playing field across different schemes. We see this as a major challenge for the market facilitator role and one we have experience of resolving and delivering on.

Elexon has broad metering experience in a variety of markets, ranging from domestic metering, up through all Distribution System connected voltage levels, up to Transmission System connected sites. We engage with a broad range of stakeholders involved in setting metering standards. We strongly believe access to these stakeholders will be critical for the market facilitator to gain the necessary inputs, and to disseminate outputs promptly.

For metering there are 10 key areas that would be critical:

Key Areas	Considerations
Analysis of existing technical requirements, controls and assurance	What are the requirements now? What works? What needs to be adapted? What needs to be developed?
Risk appetite of stakeholders	Balance the differing attitude to risk between ESO/DSOs and flexibility providers. Key drivers to achieve consensus and develop requirements fit for all
Accuracy of Metering Equipment	What level of accuracy should the Meters and, if applicable, instrument transformers be to balance the needs of operational requirements for security of supply versus cost to provide?
Accuracy of operational data	What data do we need for ESO/DSO to manage their networks (accuracy, frequency, latency)?

Data	What data do we need to manage any assurance, profiling, and baselining methodologies developed? Where do we get it from?
Controls	What process controls are put in place to ensure good industry practice?
Assurance	How to determine that a flexibility service has been delivered and provides the right level of confidence to stakeholders?
Grandfathering	Develop techniques that are inclusive and avoid stranded assets where possible. Plan for transition to standardisation.
Overarching legislation	Analyse interactions with current legislation, such as the Measuring Instruments Regulations (MIR), and any amendments/new legislation that may impact flexibility services
Communication and guidance	Provide clear, in-depth guidance to stakeholders on technical requirements and processes that are bite size, flexible and fit for purpose, such as documents, webinars, podcasts etc.

Practice and developments to date

Elxon is at the centre of developments in the industry, for metering. Our core skills stakeholder engagement have enabled us to develop a wide range of Modifications, which have allowed wider access to the Balancing Mechanism and the wholesale market. It has allowed aggregators and flexibility service providers a way into the market. We have introduced new metering arrangements and baselining into the BSC. Our core principles of delivery and how they are crucial to market facilitator are discussed in this section.

a) Engage with a broad range of stakeholders

Elxon is at the forefront of metering developments in the industry and is continuously considering the 5-10 year roadmap of industry changes on the horizon. We interact with a wide range of stakeholders on policy, legislation and new technologies. This enables us to be ahead of the curve, ensure we are able to respond quickly, and facilitate new market opportunities. Stakeholders include:

- Standards bodies (e.g., BSI and IEC)
- Government and Regulators
- National laboratories (NPL, NMI)
- DSOs
- TSOs
- Generators
- Suppliers
- Aggregators providing flexibility services
- Manufacturers (Meters and Instrument Transformers)
- Trade associations
- Industry agents (Data Collectors, Metering Operators).

Our collaborative and inclusive approach brings a wealth of knowledge and opportunity to participate in new innovative work streams and develop new opportunities for stakeholders. Given our close relationships with suppliers, generators and DSOs//TSOs, we understand the complexities of innovative and dynamic tariffs being offered by suppliers, as a route to

provide flexibility through market pricing signals, and the need for the DSO/TSO to manage the network, using flexibility services for security of supply and consumer benefit. Enabling coordination between these two groups will be a critical activity for the market facilitator.

b) Apply an agile delivery approach

As part of our culture of continuous improvement, Elexon has a track record of reviewing long-standing requirements and updating these quickly. An example of this is the review of the BSC Metering CoPs ([Issue 93](#)), which was the first BSC Issue Group to be conducted using agile ways of working.

Historically, BSC Issue Work Groups (WGs) have been run using a “Waterfall” approach, meaning the review has specific stages of criteria that must be met before starting the next stage. This also means the recommendations/solutions proposed, are not progressed until the closure of the Issue and WG meetings. This can often mean that it can take months before the implementation of any recommendations.

Adopting an agile approach has enabled significant benefits throughout the process of progressing the Issue. Issue 93’s scope covered many specific topics to review and propose recommendations, and Elexon created a product backlog, assigning each topic an “Aspect identifier”, and conducting a prioritisation exercise for each aspect in the product backlog, using the MOSCoW¹ technique. This enabled the WG to focus on delivering solutions to the highest impacting aspects early in the lifecycle of Issue 93, whilst deprioritising or descoping aspects that were deemed to provide little or no value.

Adopting an agile approach has encouraged the WG to proactively reprioritise aspects in response to changing industry concerns and opinions on the value of each aspect.

Focusing on specific prioritised aspects allowed Elexon and the WG to progress the recommendations to aspects, and confirm as Modifications or Change Proposals (CP). For efficiency, particular aspects were bundled together to deliver change at pace. To date we have delivered one Modification and eight CPs from Issue 93 covering 11 aspects

This method of continuous smaller delivery of recommendations (as opposed to one large delivery) is more aligned with agile principles of project delivery.

c) Risk Appetite

As a company that is well established in risk management, we have developed robust controls and trained all staff on risk so they can embed risk methodology into day-to-day operational activities. This is applied to local working instructions and processes to develop robust processes and controls. A key part of delivering solutions for flexibility services is understanding the risk appetite of stakeholders, developing those controls and assurance techniques, that will give industry confidence.

An assessment of the level of controls needed to be balanced against the cost of delivery to mitigate those risks is an essential role for the market facilitator. Elexon’s deep understanding of markets, metering arrangements, and data submission across all levels, puts us in an ideal place to develop these processes. An example of this is CoP11, and the associated processes, that were developed for [P375](#) (‘Settlement of Secondary BM Units using metering behind the site Boundary Point’), discussed in more detail below.

¹ Must Have, Should Have, Could Have and Won’t Have;
<https://www.agilebusiness.org/dsdm-project-framework/moscow-prioritisation.html>

d) Change management of all corresponding metering arrangements

There are efficiencies in one provider managing the change processes across the spectrum of metering products. The high-level of expertise Elexon has in metering has given us the opportunity to engage with a diverse group of stakeholders, giving us early insight of technological developments in metering.

Where a new technology has been identified we can investigate and develop solutions to allow industry to design and build new types of sites. Below we highlight a project to create a solution using Direct Current metering for a new site design for co-located PV and battery. Analysing methodologies and developing solutions at pace will be a key function for the market facilitator.

e) Creating a feedback loop and increased level of transparency

With the unprecedented, rapid rate of change in the industry it is vital that there is open communication between the market facilitator, flexibility providers, ESO/DSOs, Ofgem and Government.

Change must be transparent, open and efficient. As part of our change processes, Elexon provides clear rationale for decision making and allows for challenge. Our agile change process allows stakeholders to raise issues quickly, that may not be covered by current requirements. An open process, where any stakeholder can submit a change proposal, that can be analysed and progressed, is vital for the evolution of flexibility services. The market facilitator must take the lead in this area, and Elexon has the experience to do so. Any change implemented must be monitored to give confidence. Establishing a feedback loop at the start of the process, through implementation and monitoring supports this, and allows for improvement.

An example of this approach is the introduction of baselining in the BSC through Modification [P376](#) ('Utilising a Baselining Methodology to set Physical Notifications for Settlement of Applicable Balancing Services') - an important topic in the industry is the accuracy of baselining and the factors that should be considered. This area requires constant monitoring, and assessment of new methodologies or amendments.

The market facilitator will need to lead assessing baseline methodologies, profiling techniques, developing the processes to manage the assessment, and developing the controls and assurance.

Major milestones for metering arrangements

As part of our current role, Elexon has a track record of delivering major innovative industry projects to meet challenging timescales. A recent example is aggregators having challenges with demonstrating the delivery of a Balancing Service using the Boundary Point Metering System. In response, Elexon developed the concept of Asset Metering in the Balancing Mechanism (BM) via BSC Modification [P375](#) ('Settlement of Secondary BM Units using metering behind the site Boundary Point').

We developed [Code of Practice \(CoP\) 11](#) that sets the minimum technical requirements for Asset Metering Systems in the BM.

Our deep knowledge of existing schemes and markets (e.g. Capacity Market and ESO Balancing Services, such as Short-Term Operating Reserve (STOR)) allowed us to design CoP11 in a way that was reasonable and gave a level of equivalence to these schemes. We developed sub-categories within CoP11, based on the level of energy on the circuit, to

provide a level playing field for a range of consumers ranging from domestic, up to large Distribution System connected sites.

These sub-categories set the accuracy requirements for the Metering Equipment and have received positive feedback from industry. Industry participants of the [ESO Power Responsive](#) group recommend making CoP11 the standard for accuracy requirements in Demand Side Response (DSR) and flexibility services metering.

Future development for Flexibility Services

Given industry feedback, we see the accuracy requirements in CoP11 as the benchmark for flexibility services. There is precedent for other services to point to the accuracy class requirements developed by Elexon rather than develop their own (e.g. the [ESO Demand Flexibility Service for Winter 23/24](#) allows the use of sub meters where they adhere to Elexon's CoP11).

The development of CoP11 utilised the key elements of Elexon's approach to development, namely:

- Listening to stakeholders
- Balancing risk appetite with cost
- Technical expertise in metering
- Knowledge of markets.

Stakeholder engagement gave us the insight to develop the overarching requirements of CoP11. The aim was to both protect and provide benefit to the consumer, and provide a reliable dataset for security of supply. CoP11 set a standard that was inclusive and allowed existing installations to be used as Asset Metering Systems, preventing stranded assets. It introduced new metering concepts into the BM, these being the use of operational metering and metering devices embedded within a product (e.g. an EV charging unit). This complements our existing requirements for half-hourly integral outstation Meters used under the other [BSC Metering CoPs](#) that rely on the IEC 62053-## and 50470-3 suite of standards that can also be used as Asset Meters but the use of which may be cost prohibitive at smaller sites.



We have a deep understanding of risk and how to mitigate it through controls and assurance processes. We have both the metering expertise, and the ability to develop detailed processes for industry to follow, thus protecting the consumer and enabling a level playing field to ensure there is fair, standardised industry practice. The approach we take is flexible and tailored in design to meet the needs of multiple stakeholders and their risk appetite for a scheme. An example is designing the processes for Asset Metering Systems to meet the needs of the workgroup. This covered installation of Metering Systems, commissioning, record keeping, registration and appointment of agents. [BSCP603](#) ('Meter Operations and Data Collection for Asset Metering Systems') gives industry the clear guidelines to follow for Asset Metering Systems.

Another control Elexon uses is compliance testing of Meters and protocol approval of Data Collectors. We do this via our [BSCP601](#) ('Metering Protocol Approval and Compliance Testing') process that gives industry the confidence to use Meters for the relevant CoP, and assurance that Data Collectors can submit accurate data, and other requirements such as monitoring alarm flags, into Settlement. We provide data transparency of this testing so that any participants are able to track this readily available information.

We provide visibility of these approved products and agents through our [CoP Compliance and Protocol Approvals](#) list published on the Elexon website, and updates and new approvals are notified to industry via our weekly [Newscast](#).

The compliance testing process is carried out by an accredited laboratory to confirm that a Meter is compliant with the relevant CoP. As market facilitator there can be an assessment of balancing the costs of assurance versus the risk. For example, compliance testing could be a desk-based exercise confirming accuracy class, specification of data outputs, and compliance with a recognized international standard. Where no standard is applicable (e.g. metering devices embedded within EV charging units), a product type test at an accredited laboratory could be used. A key part of the role will be taking the existing requirements and assessing them against the risk appetite and gaining consensus for any amendments. This is a role Elexon fulfils today as part of our assurance and change management processes.

Protocol approval is an assessment of the head-end systems ability to extract data and monitor the performance of the Meter. It is a self-assessment by the Data Collector that they are compliant, and the report produced is validated by Elexon followed by witness testing. This is easily transferable to a flexibility services system and would be a key recommendation as part of an overall assurance approach.

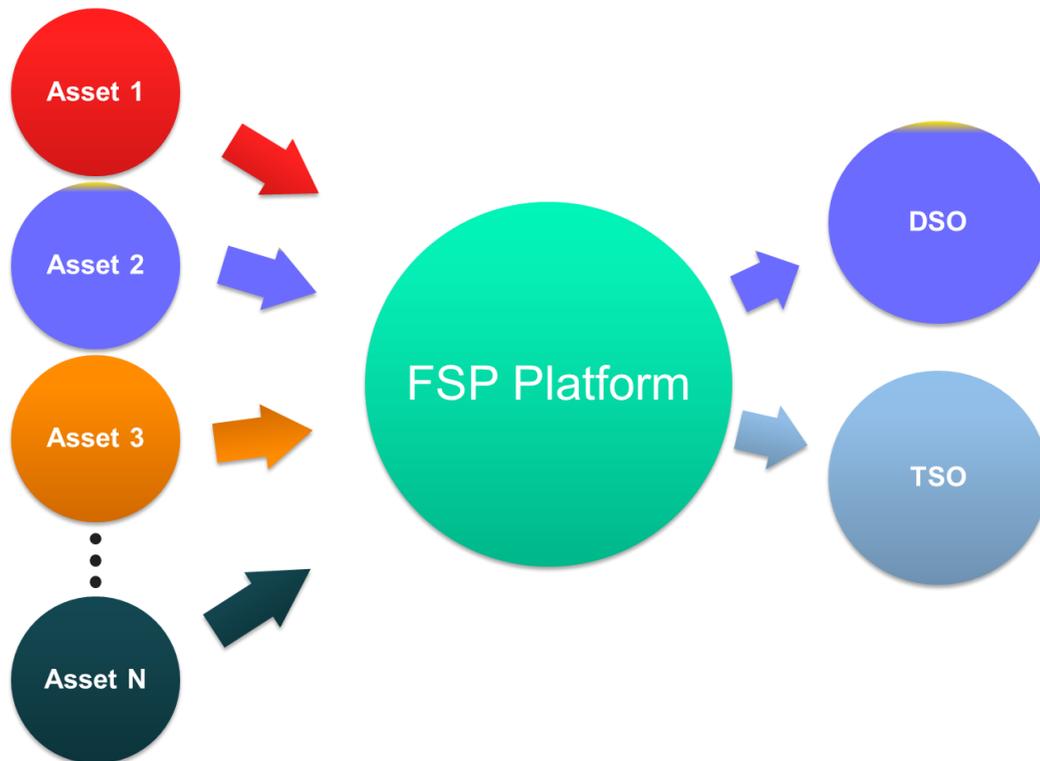
The trust in the data submitted is vital for the credibility of the service and ensuring security of supply to manage the network, both at Transmission and Distribution levels. Another key element is matching the accuracy of the Metering Equipment to the needs of the operational data stream that the DSOs and ESO require.

The traditional model for a large industrial and commercial site or a large generator is to have an operational metering system with the same level of accuracy as the Settlement Metering System, in some cases it is an output from the Settlement Metering System. This high accuracy Metering System is capable of giving the required output for operational data in terms of read frequency (e.g., once per second), measurement accuracy (e.g., +/- 1%) and maximum latency (e.g., < 5 seconds). It is not cost prohibitive to install this level of metering at a large site for a one to one asset to control room relationship.

However, for the <100kW market where a large number of sites are being aggregated high accuracy Metering Systems are cost prohibitive and not commercially viable. The approach taken in CoP11 was to take an equivalent level of accuracy for Meters on <100kW circuits,

which would +/- 2.0% for the Meter with an overall accuracy on site of between +2.0% to - 3.5%. This doesn't meet the operational metering accuracy required for the control room to manage the network.

A key consideration for the market facilitator role is to develop processes to manage the many to one relationship to a level of accuracy and confidence to work operationally.



For each asset to provide the level of accuracy, frequency and latency required, it isn't viable for the aggregation of sites. A methodical process needs to be established to give confidence that the method a flexibility service provider uses to aggregate data and provide the aggregated information to the DSO/ESO is credible, reliable and accurate.

We see a number of factors that must be considered:

- Asset availability
- Type(s) of Assets being aggregated
- Typical accuracy of the Asset Meter (probability distribution for specific types)
- Read frequency
- Latency
- Asset speed of response (i.e. ramp rate)
- Polling or profiling algorithm.

Any mathematical model developed to derive an output to the DSO/TSO to the requirements needed for security of supply should be assessed and approved before use. Elexon has experience of baselining, profiling and protocol approval that are transferrable for this purpose.

A clear step by step process should be created for this:

1. Application process for new methodology submitted for analysis that would include metering details including accuracy, algorithm, and any test evidence;
2. Assessment stage by market facilitator including engagement with ESO/DSOs;
3. Limited trial carried out using methodology;
4. Assessment of trial performance data against other data source (e.g., Boundary point Metering System half-hourly data, where available, or cumulative energy register/profile data from Asset Meter). Could include witness testing of head end system;
5. Final approval decision by market facilitator including engagement with ESO/DSOs;
6. Follow up assurance activity to monitor performance and make recommendations;
7. Process in place to manage amendments to the methodology.

Elexon provides access to experts in their fields and provides in-depth guidance documents and webinars to help industry. This is a particularly focused activity for any significant new Modification. The market facilitator will need to provide these same resources to stakeholders.

Future Developments – Wider Metering applications

A recent example of our expertise being recognised would be our representation as part of the expert group working with the Cigre group² developing a technical publication investigating digital substations and new metering methods. We also contribute to the new digital revenue meter technical specification being developed by the IEC.

This type of early engagement in a revolutionary change in metering puts us on the front foot to develop a change and engage with Government at the early stages to ensure any solution is compliant with overarching national legislation. This is vital to ensure compliance with the Electricity Act 1989 and the Measuring Instruments Regulations (MIR). Compliance with MIR and any requirements it places on non-Settlement and billing Meters for flexibility services will be an issue for the market facilitator to manage.

Digital substations have a smaller footprint that will reduce costs to developers, particularly offshore, have a reduced environmental impact and ultimately produce a benefit to consumers in reduced costs. The focus of awareness of market development should be the benefit to the consumer, and improving the customer experience of industry stakeholders. Another example of reacting at pace with market developments would be co-location where we have worked with developers on process improvements to simplify the process they have to complete and work on ways to use innovative metering solutions to bring a product to market.

We have worked with a Generator to develop an innovative Direct Current (DC) Metering System solution using CoP11 and Secondary BMUs for a DC-coupled PV and Battery Energy Storage System that allows them to participate in Contracts for Difference. Crucial to this work was our links with the Department for Business and Trade Office of Product Safety and Standards (OPSS) and Low Carbon Contracts Company to develop a solution that is within the current scope of current regulations and relevant contracts.

² B5.76 - 'Architecture, Standards and Specification for metering systems in a Digital Substation and Protection, Automation and Control (PACS) environment'

Change Management Processes

We touched on our agile delivery approach to change and in particular Issue 93 that reviewed the Metering Codes of Practice. The changes developed highlighted the technical expertise of Elexon and our ability to engage with industry to deliver change at pace. The eight Change Proposals and one Modification that have been delivered to date are:

- [P453](#) ('Metering Dispensation process improvements and clarification to the CoPs');
- [CP1550](#) ('Updates to monitoring of voltage failure alarms requirements');
- [CP1553](#) ('Tightening the requirements for the minimum accuracy classes for Meters and Current Transformers in the CoPs');
- [CP1554](#) ('Future proofing the measurement transformer standards');
- [CP1571](#) ('Clarify the number of Meter measuring elements and measurement transformers');
- [CP1572](#) ('Specifying the requirements to provide SLDs for HV and EHV sites');
- [CP1586](#) ('Defining the requirements for Minimum Burden and CT ratios');
- [CP1587](#) ('Obsolete Metering Equipment');
- [CP1588](#) ('Mandating Calibration Checks for Main and Check Meters').

Monitoring the market and engaging with stakeholders allows us to take action quickly to mitigate risk or provide customer benefit.

When an issue was identified with Central Volume Allocation (CVA) Metering Systems at Grid Supply Points (GSP) we quickly established an interim process to engage with Registrants to confirm data accuracy. This led to the enduring solution [CP1566](#) ('Introducing the CVA Commissioning End to End Check (CEEC) process') which mitigated a risk to Settlement.

We not only make changes solely for the benefit of Settlement but for wider industry. An example of this is [CP1575](#) ('Permitting the use of busbar voltage transformers within metering Codes of Practice 1 and 2') which was primarily aimed at offshore wind farms who were experiencing an issue meeting the conditions of a Contract for Difference that had a phased agreement. In some cases this required metering at string level rather than at power park module level. This increase in the number of Metering Systems resulted in a significant cost increase with the additional space required for the metering increasing the footprint of the offshore substation. This CP reduced developer costs significantly while maintaining the controls necessary to maintain the integrity of Settlement.

Conclusions

If Elexon is appointed, we would be able to incorporate processes and run change assessment in an agile manner, and where applicable for cross code/scheme changes alongside the BSC changes, achieve efficiency in engagement. This would be achieved through discussing connected issues under various codes during existing engagement forums, and clustering and progressing related changes to central systems in batches, to achieve faster overall turnaround on enabling modifications, and providing technical expertise.

If NESO is appointed as market facilitator, Elexon is fully committed to working with NESO, and taking ownership of the processes that naturally sit under Elexon governance. We will seek to work together with NESO and Ofgem, to design an efficient delivery framework that will allocate specific responsibilities and obligations to the centre of existing expertise, supporting to avoid duplication of costs, inefficiencies on industry-wide coordination, and provide consistency for stakeholders.