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ESO Response to Flexibility Market Asset Registration consultation.

Dear Euan,

Thank you for the opportunity to respond to your consultation on Flexibility Market Asset Registration (FMAR).

Who we are

As the Electricity System Operator (ESO) for Great Britain, we are at the heart of the energy system, balancing electricity supply and demand second by second.

Our mission, as the UK moves towards its 2050 net zero target, is to drive the transformation to a fully decarbonised electricity system, which is reliable, affordable, and fair for all. To do so we will consider the energy generation mix, the network infrastructure and the markets frameworks needed to deliver the ambition to achieve clean power by 2030, as well as looking further to the strategic plans leading onward to 2050. We play a central role in driving Great Britain's path to net zero and use our unique perspective and independent position to facilitate network and market-based solutions to the challenges posed by the energy trilemma.

As National Energy System Operator (NESO) we will continue to build on the ESO's position at the heart of the energy industry, acting as an enabler for greater industry collaboration and alignment. We will unlock value for current and future consumers through more effective strategic planning, management, and coordination across the whole energy system.

Our key points

We have captured four key points which we have expanded upon in our response:

- Focused policy intervention:** The intervention should focus on providing the infrastructure and processes to ensure simple flexibility asset registration, asset use in flexibility markets, and a common infrastructure for communicating asset data. Other interventions are already addressing the market processes required to increase flexibility.
- Responsibilities:** We do not have a strong preference for which delivery body is chosen for the FMAR solution. However, we suggest it is chosen via a commercial procurement process. ESO does not view itself as the correct organisation to own the FMAR. We agree that the Market Facilitator could be an appropriate body for coordinating the FMAR solution. However, we would encourage Open Networks to begin this work in the interim.
- Timescales:** Timing is key. The rate at which assets are being added to the network is increasing. We recommend that i) the existing projects and data sources be utilised where possible and ii) working groups convene immediately under the Open Networks Programme, with the option of commissioning

a commercial company to design the data model and infrastructure. This can start immediately, with a payment mechanism which disincentivises late delivery.

4. **Data decoupling and data currency**¹: To ensure the solution is developed rapidly, it's important to decouple the separate entities (asset, consumer, markets etc) and focus on defining the relationships. The detailed data models need to be extensible. To be of value to users, the data will need to be a combination of 'static' and 'dynamic'.

¹ **Data Currency**: the degree to which the data is current with the world it models. **Entity type**: a concept about which information is stored. **Extensible**: designed to allow the addition of new capabilities and functionality.

Executive Summary

Context

ESO advises on the design of GB's energy markets and operates ESO Markets. We procure ancillary and balancing services to ensure that supply meets demand in real time. More widely, we support the development of the whole electricity network that is needed to operate GB's electricity system at all voltage levels.

Our objective is to operate a zero-carbon electricity system for short periods by 2025 and a fully decarbonised electricity system by the Government's 2030 target, at the most economically effective cost and whilst ensuring security of supply.

A decarbonised electricity system requires liquid and competitive markets, that encourage flexible assets to provide system services for ESO and distribution system operators (DSOs). Flexible assets such as electric vehicles, home batteries and heat pumps are increasingly being connected to the distribution network. We need to unlock the value of these assets to decarbonise our energy system at the lowest cost to the consumer.

To increase market liquidity and increase the use of flexibility, we are removing barriers to entry in our ESO markets. We are aware of the challenges for below 1MW Flexibility Service Providers (FSPs) to participate in ESO and DSO Markets. We recognise the challenges with multiple registration processes for FSPs and welcome Ofgem's consultation to promote a robust Flexibility Market Asset Registration (FMAR) solution.

Consultation section 1: Flexibility Digital Infrastructure (FDI)

See our responses to questions 1-3 in Appendix 1 for more detail.

Q1. Policy intervention for FMAR

ESO believes that the problem statement [3.1] correctly captures one challenge. However, for clarity, the problem could be re-stated as 'Many assets are not being registered and the data about the assets that are registered is stored in multiple locations'. The key problem for ESO is that FSPs have to access multiple markets through separate processes [3.2]; how do we get maximum value from a single interaction?

Focused policy intervention: This should focus on providing the infrastructure and processes to ensure simple flexibility asset registration, asset use in flexibility markets, and a common infrastructure for communicating the asset data. Other interventions are already addressing the market processes required to increase flexibility.

- Focused policy intervention is needed to deliver FMAR so that assets can be registered, visible and sharable.
- Policy intervention should encourage the use of the existing knowledge gained from the investments in the Flexibility Market Unlocked (FMU) and Automatic Asset Registration (AAR) projects to accelerate the development of FMAR, with validation from the Market Facilitator and stakeholders.
- Policy intervention needs to be light-touch to ensure that solutions are market-driven. It must clarify the interaction between Data Sharing Infrastructure (DSI) and FMAR, particularly governance roles and responsibilities. It should avoid defining the technical solution.
- Different levels of policy intervention are required across the FMAR solution, with the focus of intervention being registers (systems) rather than registration (process).

Q2-3. General FDI policy

We agree that for other FDI outcomes, policy intervention is not needed at this stage, although:

- Industry progress should continue to be monitored to identify whether future policy intervention is required.
- Each FDI initiative should be aligned to long-term FDI objectives, irrespective of who is the delivery body.
- FMAR and FDI must be aligned to other policy and industry developments, especially the DSI, to ensure that all digital infrastructure developments can be efficiently embedded into the GB electricity system.

- The current Consumer Consent consultation focuses on energy data. However, suppliers, FSPs, DNOs, ESO and others would want permission to access data about Low Carbon Technologies (LCTs) to facilitate network planning and operational visibility and access.
- FMAR is closely connected but not dependent on other flexibility-related work, for example, alignment across ESO-DSOs and revenue stacking; network related activities such as forecasting and reinforcement planning, and operational activities such as primacy and general coordination.

Consultation section 2: FMAR – aims, scope, and approach

See our responses to questions 4-6 in Appendix 1 for more detail.

Q4: Scope for markets, assets, and data

To ensure the FMAR is not constrained around our current view of flexibility, we believe it's important to 'decouple' assets, markets and users:

- FMAR needs to be decoupled from current market offerings as far as possible. Otherwise, the solution will only satisfy current requirements and will need to be modified to meet new service requirements as market design and market participants evolve. This risks delays in the development of new services.
- We agree with Ofgem's view that the FMAR should focus on both ESO and DSO markets.
- As ESO and DSO markets require different levels of FSP registration and qualification, a tiered user and asset registration approach should be adopted to reduce the need for multiple and unnecessary data entry.
- ESO market changes need to comply with requirements including under our licence conditions and Article 18 of the guideline on Electricity Balancing; they cannot be easily or quickly changed.
- Most current ESO markets do not use <1MW assets directly. However, our need for detailed asset data will increase in the future as markets and systems evolve.
- The focus on a prioritised approach to the registration of <1MW assets is sensible given the lack of visibility and the highest registration burden today, and the existing availability of data for assets >1MW, such as the Embedded Capacity Registers.
- ESO (and DSOs) would gain value from the ability to coordinate the use of flexibility assets. Most of these assets are >1MW. We see no reason why the FMAR should not be expanded to cover assets >1MW in the future to drive further benefits of greater flexibility participation.
- There are additional complexities with specific asset set-ups that need to be considered by the FMAR solution.
- There also needs to be consideration of the process for aggregators to 'acquire' or 'transfer' assets and data.
- Data about assets that may not be directly involved in flexibility, such as solar PV, is important for planning and forecasting. We recommend that the scope therefore includes all LCT assets.
- The 'static' or 'dynamic' way of characterising different data types in the consultation needs a more robust definition; both are required. Temporal aspects of data are key to both value and cost of acquisition, meaning it could be better to define the data by time (temporally) or events rather than as static or dynamic.
- Data currency: although asset data may appear to be 'static' it could be considered 'dynamic' in specific circumstances.
- Data quality needs greater focus, including verification and rectification; rectification of poor data is generally more expensive than error-free collection
- Scalability needs to be properly considered. For example, there could be c30 million assets.
- Extensibility: the extent of future datasets is unknown, so the solution needs to have the capability to be extensible without too much administration or cost.
- Processes that support the data lifecycle (creation, updating, etc) also need to be considered, as they may affect the required solution design.

Q5-6: Functional outcomes and design principles

- The list in Table 1 is a useful starting point. We would view these as functional *outputs* rather than functional *outcomes*. Additional detail would be helpful. We have included some suggestions in Appendix 1.
- We should use learnings from the functions and governance of existing registration processes, avoiding complex governance that risks slow progress.
- We agree with the high-level design principles set out in the consultation; we have provided a few suggestions for improvement in Appendix 1 under Question 6.

Consultation section 3: FMAR – activities and delivery

See our responses to questions 7-9 in Appendix 1 for more detail.

Q7: Enablers and design activities by the Market Facilitator

- We agree with the enablers and design activities. Decoupling the asset data from current ESO and DSO markets will allow the FMAR solution to proceed faster.
- We recommend that i) the existing projects and data sources be utilised where possible and ii) working groups convene immediately under the Open Networks Programme, with the option of commissioning a commercial company to design the data model and infrastructure (with the working groups acting as user groups). This can start immediately, with penalties for late delivery.
- The roles and responsibilities of the Market Facilitator, DSI Coordinator and FMAR delivery body should be clearly defined to prevent duplication.
- The Open Networks Programme has a strong track record of coordinating networks and collating information, as seen in the development of the Embedded Capacity Registers, and these skills could be utilised to enable timely delivery. The Market Facilitator could operate as the Chair for these groups to ensure coordination with its wider strategic development of the Market Facilitator role and its priorities.
- We are also supportive of commissioning another organisation to deliver the design work, so as not to delay progress while waiting for the Market Facilitator delivery body to be stood up.

Q8: Delivery body options

We do not have a strong preference for which delivery body is chosen for the FMAR solution. ESO does not view itself as the correct organisation to own or operate the FMAR.

- Ideally, the platform would be run independently on a commercial basis by an organisation with the required capabilities under an appropriate contract with Service Level Agreements (SLA).
- We believe the Market Facilitator is an appropriate delivery body as it will be responsible for overseeing the design of the solution and related processes. However, several organisations with aligned capabilities such as Electralink or the Smart DCC could also be considered and avoid overloading the Market Facilitator, as a focused scope has been recommended by industry stakeholders in assuring the delivery of specific Market Facilitation activities.
- ESO's Single Markets Platform (SMP) is primarily a procurement platform for ESO balancing services (focused on onboarding, pre-qualification and post-auction contracting). It would require significant investment and time to evolve it into a FMAR solution. A profile of the SMP is provided in Appendix 2.
- Data verification, validation and maintenance will be a key role to be undertaken by the delivery body. The chosen party should have sufficient capabilities and controls in place to maintain data security and integrity. The ESO does not have the ability to verify asset information for distributed connected assets currently and would be dependent on suppliers, DNOs or the AAR to provide this information.

Q9: Proposed timelines

We are concerned about the potential extended timescales for both the design and build of the FMAR:

- The FMAR solution needs to be implemented as soon as possible; 2025-2026 ahead of Market-wide Half Hourly Settlement (MHHS) is the priority period for delivery.

- With a focus on assets <1MW, the volumes of assets that would be included within the register will be substantial. Predicted volumes of EVs and Heat Pumps from 2023 Distribution Future Energy Scenarios (DFES) publications by DNOs estimates an additional 7 million assets by 2026, rising to 9.5 million by 2027. Any delays to the initial design and capture of this information will increase the size of the backlog and may prevent these assets from meaningfully participating in flexibility services across all markets.
- We believe timescales can be expedited through the Open Networks Programme, which successfully delivered projects such as the Embedded Capacity Register in previous years.
- Both ESO and DNOs are incentivised through RIIO-ED2 and BP2/3 to share information to aid coordination. The progression of the FMAR supports these incentives and encourages a coordinated approach, preventing siloed developments in the interim.
- Other options for expediting the design phase could include revisiting the work undertaken by IBM in the initial Flexibility Digital Infrastructure consultation, and similarly commission a detailed design of data requirements and systems through a commercial procurement process.
- Timescales could also be expedited by collecting, cleansing and sharing data from existing registers in parallel with designing the FMAR solution.

Consultation section 4: General asset visibility

See our responses to questions 10-12 in Appendix 1 for more detail.

Q10-11: Asset visibility policy levers and use cases

There is a range of policy levers available to improve asset visibility.

- It is important that these are explored in parallel to the development of the FMAR solution.
- 'Static' asset data will fully or partially enable all 177 use cases identified through ESO's Distributed Energy Resource (DER) Visibility programme.
- Modelling and forecasting, and network planning, are the priority use cases which will support real-time network operation activities across ESO-DSO, including the dispatch of flexibility, required to secure the network.
- While Embedded Capacity Registers produced by DNOs provide much of this information for assets >50kW, data accuracy and completeness are varied and these static datasets are not fit for operational use.
- Only 40% of LCTs installed at the domestic level are known to DNOs when compared to the Feed-in-Tariff databases. Options for the sharing of this comprehensive data set should be explored to provide a retrospective viewpoint.

Q12: Cost-benefit analysis for asset registration solutions

We have summarised a few of the potential costs and benefits of the FMAR, based on a future scope aligned with our response:

- A key benefit of the FMAR solution is increased flexibility capacity made available across the transmission-distribution boundary through an effective and efficient asset registration process.
- Increased use of Consumer Energy Resource (CER) assets for flexibility should enable a net reduction in carbon emissions during use. For example, from turn up when renewable resources are available or demand reduction when supply carbon intensity is high.
- Improved quality and up-to-date asset data will reduce the cost of rectifying poor data and ensure more assets are available for flexibility.
- Consumers will benefit from an easier customer journey if their assets are already registered, and they simply need to provide permission to receive the benefits of participating in flexibility.
- Other benefits include:
- Better asset visibility leads to improved forecasting and reduced costs in planning and operating networks.

- Improved asset registration data, enabling other flexibility-related work, for example, alignment across ESO-DSOs, resolving conflicts through primacy rules, and increasing revenue stacking opportunities.
- Identifying vulnerabilities and improved cyber security.
- There needs to be careful consideration of the cost of the solution, including both direct and indirect costs. Including, for example, the time and costs of stakeholder engagement in the design process and the cost of data migration and cleansing from other registers.
- From an ESO perspective, we envisage some services will require additional asset and supplier data beyond the capabilities of the FMAR. But these would be for assets with a capability >1MW.
- The commercial model or method of cost recovery should also be considered; we need to ensure there are incentives for registration, not costs.

Appendix 1 Consultation Question Responses

Question 1: Do you agree that policy intervention is needed to deliver common Flexibility Market Asset Registration?

ESO believes that the problem statement [3.1] correctly captures the challenge. However, for clarity, the problem could be re-stated as ‘Many assets are not being registered and data about the assets that are registered is being stored in multiple locations’. This is in addition to, and distinct from, the problem of FSPs having to access multiple markets through separate processes [3.2].

Focused policy intervention is needed to deliver FMAR so that assets can be registered, visible and sharable. Whilst industry developments across a range of projects and organisations are solving parts of the problem of FMAR, policy intervention is now needed to bring together the range of parties to develop an agreed, holistic view of the solution.

Policy intervention should encourage use of the existing knowledge gained from the investments in the Flexibility Market Unlocked (FMU) and Automatic Asset Registration (AAR) projects to accelerate the development of FMAR, with validation from the Market Facilitator and stakeholders.

- FMU and AAR have solved several of the challenges that the common FMAR seeks to address. The AAR in particular is quite advanced (moving into phase 3 next year) and addresses several key issues to ensure assets are reliably registered at the point of installation.
- Clarity on the scope of FMAR relative to FMU and AAR would help to focus the policy intervention.

Policy intervention needs to be light-touch to ensure that solutions are market-driven. Rather than having solutions prescribed through policy, light-touch intervention will encourage solutions that are market-driven and built by organisations with expertise. This will ensure that existing levers can be explored in the first instance, such as for networks to provide and share data. We believe a light-touch design that mandates agreed outcomes, and not interactions, will accelerate progress. To enable this, there must be robust incentives for the delivery body to meet the agreed timescales.

Policy intervention must clarify the interaction between Data Sharing Infrastructure (DSI), Flexibility Digital Infrastructure (FDI), and FMAR, particularly governance roles and responsibilities. It is key that the interactions between DSI, FDI, and FMAR are defined with stakeholders, including governance roles and where responsibility starts/stops. Otherwise, there is a risk of duplicating responsibilities. ESO would consider FDI as a use case of the DSI, and FMAR as a node/user of the DSI.

Different levels of policy intervention are required across the FMAR solution, with the focus of intervention being registers (systems) rather than registration (process).

- There can then be multiple market solutions for the registration of assets.
- The data requirements of assets and markets require detailed definitions and need to evolve.
- The focus of policy intervention should be a standardised digital FMAR infrastructure; data exchange, architecture, performance, and governance for sharing data from flexible assets. The data sets can then be developed separately and evolve.

Question 2: Do you agree that for other FDI outcomes policy intervention is not needed at this stage? Are there any risks to consider with this approach to FDI delivery?

We agree that for other FDI outcomes, policy intervention is not needed at this stage, although industry progress should continue to be monitored to identify whether future policy intervention is required. Other FDI outcomes may be realised by the market if the base infrastructure is solved. There needs to be continuous review through the build phase of FMAR and DSI to keep decisions relevant and alignment across the FDI initiatives. We welcome Ofgem’s proposal of monitoring industry progress to determine if Ofgem has a further role to play. This would be beneficial given the interactions between the different licensees responsible for delivering FDI.

Each FDI initiative should be aligned to long-term FDI objectives, irrespective of who is the delivery body. Incremental progress by different initiatives must not diverge from the long-term FDI objectives. There is a potential risk of this with the mix of interim roles and lack of overarching governance for DSI and the Market Facilitator. Whilst the Market Facilitator is in development, the processes for FMAR still need to be

developed at pace. Interactions and governance of the FMAR and interim DSI coordinator require more clarification, to prevent duplication of roles and responsibilities. Clear timescales need to be set out to ensure progress can be made effectively and efficiently for the FDI outcomes.

ESO would consider FDI as a use case of the DSI, and FMAR as a node/user of the DSI.

Question 3: Are there any other policy alignments or industry developments, in the UK or internationally, which should be considered as part of ongoing FDI policy development?

FMAR and FDI must be aligned to other policy and industry developments, especially the DSI, to ensure that digital infrastructure developments can be efficiently embedded into the GB electricity system:

Digitalisation Orchestrator: the proposed body responsible from 2028 onwards for all common/shared digital assets in the sector is important. Consideration should be made around how the interim DSI Coordinator role potentially transitions to the Digitalisation Orchestrator through time in line with the Department for Energy Security and Net Zero's response to the Digital Spine Feasibility Study and the commitments made. If there is no effective alignment with these other digital developments, there is the risk that FMAR, DSI and Consumer Consent will not align.

FMU and AAR: to speed implementation, the current FMU and AAR innovation projects should be aligned and, where appropriate, commercialised. It is key that all digital developments support 'process' developments. For example, the FMU primacy rules test bed goes a step further and makes systems useful operationally.

ESO's Distributed Energy Resource (DER) Visibility programme.

Related Grid Code modifications: GC0139, GC0117.

Related DNO developments: Energy Network Association's DER-DNO data harmonisation.

AEMO: Lessons learnt from Australian Energy Market Operator (AEMO) Project EDGE.

BSI: Ensuring alignment with the newly established BSI steering group for developing PAS 1878 (Energy smart appliances - System functionality and architecture - Specification) and 1879.

Flex Assure, and HOMEFlex Code of Conduct

The current Consumer Consent consultation focuses on energy data. However, suppliers/FSPs/others would want permission to access data about Low Carbon Technologies (LCTs) for visibility and access.

FMAR is closely connected but not dependent on other flexibility-related work, for example, alignment across ESO-DSOs and revenue stacking; network related activities such as forecasting and reinforcement planning, and operational activities such as primacy and general coordination.

- These are generally 'process' programmes of work where operational data is transferred between networks for operational coordination. There does need to be alignment and consideration taken by whichever body is responsible for the design of FMAR and the future FMAR delivery body, as FMAR could enable this other flexibility-related work in the future.

Question 4: Do you agree with the scope proposed for markets, assets, and data? Should anything else be considered?

Markets

FMAR needs to be decoupled from current Markets as far as possible. Otherwise, the solution will only satisfy current requirements and will need to be modified to meet new service requirements as market design and market participants evolve. This risks delays in the development of new services.

The collection of asset data should be kept separate from the need to deliver flexibility into specific markets, as the markets will change, and the assets would normally be aggregated before being used to provide flexibility. The suitability to markets should be determined by asset availability and performance, by FSPs, not by prescribing specific markets through the FMAR solution.

We agree with Ofgem's view that the FMAR should focus on both ESO markets² and DSO markets³.

- Future iterations could consider capacity and wholesale markets but this is currently not appropriate. There is also the potential that FMAR could extend to other energy sources and new markets in development as well, such as future hydrogen, carbon, and gas markets.
- From an FSP perspective, registration of stackable services would appear to be a priority (see [Cornwall Insights report for the ENA](#)).

As ESO and DSO markets require different levels of FSP registration and qualification, a tiered user and asset registration approach should be adopted to reduce the need for multiple and unnecessary data entry. A tiered approach would, for example, mean only the minimum data is required for simple assets, but more detailed datasets are added for more complex assets. The same would apply to supplier-market data.

In addition, ESO market changes need to comply with requirements including under our licence conditions and Article 18 of the guideline on Electricity Balancing so cannot easily be changed to fit an FMAR solution.

Assets

There also needs to be consideration of the process for aggregators to 'acquire' or 'transfer' assets and data. This should also include consideration of historical data. It should be easy to move assets between FSPs to ensure the market works effectively. Many aggregated assets currently participate in ESO and DSO markets and this is likely to expand to other markets in the future (e.g. P415 and the Wholesale Market).

Most current ESO markets do not use <1MW assets directly. However, our need for detailed asset data will increase in the future as markets and systems evolve.

- We do require <1MW asset data for Local Constraint Markets (LCM), the Demand Flexibility Service (DFS), and our system security service MW Dispatch, and we understand the importance of visibility of <1MW asset data for aggregators and in the participation in DSO Markets.
- Assets below the 1MW threshold can be aggregated up to the minimum threshold of 1MW. While individual assets are not directly contracted parties, details of smaller assets as part of aggregated portfolios will need to be captured to enable ESO-DSO coordination.

The focus on a prioritised approach to the registration of <1MW assets is sensible given the lack of visibility and the highest registration burden today, and the existing availability of data for assets >1MW, such as the Embedded Capacity Registers. We believe the prioritisation should be based on the flexibility the asset provides, and so should be electric vehicles (EVs), heat pumps and batteries. In contrast, refrigerators might be *difficult* but of lesser value.

ESO (and DSOs) would gain value for the ability to coordinate the use of flexibility assets. Most of these assets are >1MW. We see no reason why the FMAR should not be expanded to cover assets >1MW to drive further benefits of greater flexibility participation.

There are additional complexities with specific asset set-ups that need to be considered by the FMAR solution. The solution should cover situations where there are multiple assets per location or household, or when assets are not discrete or could be mapped to multiple Meter Point Administration Number (MPANs). For example, where they are controlled by a Home Energy Management System (HEMS)/Customer Energy Manager (CEM) or an EV and a charger combination. We note that the Smart and Secure Electricity System (SSES) programme is also unclear on how these will be treated. We believe a tiered approach could also apply to the standard (type data) and installed performance. For example, a product can export at 7kW, but the site only has permission to export at 3.68kW, so an FSP would need to take the lower of the two.

Data about assets that may not be directly involved in flexibility such as solar PV is important for planning and forecasting. We recommend that the scope therefore includes all LCT assets.

² All ancillary and balancing services, including the Balancing Mechanism

³ The five standard flexibility products

Data

The ‘static’ or ‘dynamic’ way of characterising different data types in the consultation needs a more robust definition; both are required. Temporal aspects of data are key to both value and cost of acquisition, meaning it could be better to define the data by time (temporally) or events rather than as static or dynamic. It would be useful to explain how the dynamic data (3.18) is obtained and used, and why it differs from the data in 3.16.

Data currency: although asset data may appear to be ‘static’ it could be considered ‘dynamic’ in specific circumstances. This needs to be considered when designing the FMAR solution. The static data in 3.16 and 3.17 could change. For example, EVs and people move, equipment is replaced and reconfigured, and software updates may change capabilities. The data needs to be regularly verified and updated, otherwise the quality of the data will suffer. It may also be helpful to record when the data was verified and/or an expiry date.

Data quality needs greater focus, including verification and rectification; rectification of poor data is generally more expensive than error-free collection. The source and currency (last update) of the data must be part of the dataset to track data quality. All data needs to be verified, for quality purposes; we prefer the term ‘verified’ to ‘trusted’. There also needs to be consideration within FMAR of dependence on other devices; for example, smart meters which may stop sending signals.

Scalability needs to be properly considered. For example, there could be c30 million assets.

Extensibility: the extent of future datasets is unknown so the solution needs to have the capability to be extensible without too much administration or cost.

- As ESO and DSO markets may require different levels of asset data, our preference is to collect all the data required about an asset at registration rather than a set that restricts the asset to ESO or DSO markets only. This needs to be considered in future scalability studies.
- Our analysis (see Appendix 3) shows that there are between 62 – 215 data points currently captured in ESO and DNO databases, with some inconsistency in how they are used. So detailed design work is required.

Other data considerations:

- It could be preferable to split the data into:
 - o ‘Basic’ and ‘asset type’ with each asset type having a specific data set. The asset data set can then cover the information according to asset type. Multiple and new asset types can then be easily added.
 - o Consumer (including consents), assets, location, FSP, market and then define the relationships. The precise data requirements can then be defined separately. This will allow data sets to be defined for different types of assets (above/below 1MW). This avoids the mix of data in 3.16.
- The functional requirements for the delivery of the data for planning and operational purposes need to be defined as this might differ slightly from flexibility requirements.
- How operational and asset metering would be included does not appear to be covered, although it is mentioned.
- The design phase should identify other data, such as software version numbers (if applicable) which may assist in not core activities such as cybersecurity.

Should anything else be considered?

Processes that support the data lifecycle (creation, updating, etc) also need to be considered, as they may affect the required solution design. Use cases would also assist the design process, especially in the context of how any such information would ultimately support the management of conflicts between DSO and ESO service participation in procurement and real-time operation.

Question 5: Do you agree with the functional outcomes? Should anything else be considered?

The list in Table 1 is a useful starting point. We would view these as functional outputs rather than functional outcomes. Additional detail would be helpful. An outcome, for example, would be ‘increased flexibility available at lower cost’, whereas the list in Table 1 are outputs.

Our specific comments on functional outcomes are:

- 'Data is maintained' doesn't specify the multiple triggers/events – which may dictate the architecture and implementation
- 'Data quality is sufficient' needs to identify who is responsible and reflect the costs of verification and correcting data
- Unique asset ID 'enables de-duplication of asset data records' is not correct as the asset may have been registered twice (needs serial number)
- As the AAR project demonstrates, the best time to register assets is at installation not '...collect flexibility market registration data at point of market entry' which is too late.
- 'Data is maintained through data management services' may be a major process.
- Temporal (timing) requirements, and resilience/recovery are missing.
- User experience: does this refer to ESO/DSO/FSP type users, or installers? If a wider user base is anticipated, the user interface (UI) should be left to product/tool experts.
- Delivery of non-functional requirements is also critical.

We should use learnings from the functions and governance of existing registration processes, avoiding complex governance that risks slow progress.

- To reduce the risk of delays, we need to use existing registers, including suppliers and DNOs as this is where the data is currently being gathered, and learn from their governance processes. For example, the Embedded Capacity Registers allow multiple technologies to be registered per MPAN by stating Primary, Secondary and Tertiary technology types, with associated installed and export/import capacities.
- Reusing existing datasets and registration methods (such as the FMU and AAR capabilities) needs to be explored, as adoption could reduce timelines for the delivery of FMAR.
- For robust FMAR solution design, it is important to draw upon different understandings of the complete domain from consumer through to system operation from other registration processes across the sector.

Question 6: Do you agree with the design principles? Should anything else be considered?

We agree with the high-level design principles set out in the consultation; we have a few suggestions for improvement. To help shape the more detailed principles that will be developed in time, we suggest:

- Timely and Pragmatic Delivery: design and delivery methods should be adopted that reduce the timelines such as exploring reuse of FMU and AAR capabilities.
- Competitive and Innovative: vendor or technology lock-in is not a key issue as it can be mitigated commercially. Resilience, redundancy and availability are more important as they are difficult to mitigate commercially.
- Competitive and Innovative: the solution does not need to use the 'latest technology developments'. Other industries such as mobile telephony and transport have adopted solutions of similar or greater complexity.
- As the consultation implies, the monopoly part of the solution should be minimised; this can be solely the data sharing infrastructure, with agreed data structures.

Question 7: Do you agree with the enablers and design activities needed and for the Market Facilitator to coordinate Working Groups for them? If not, what other activities and governance arrangements should be considered?

We agree with the enablers and design activities. Decoupling the asset data from the ESO and DSO markets will allow the FMAR solution to proceed faster. This is key as whilst the enablers look right, they are complex. This means that realistic plans and resourcing need to be provided to deliver them, given that the changes to processes and systems will cascade through all six DNOs and ESO. We think that there is the option to decouple asset data from the ESO and DSO markets, and therefore allow the FMAR solution to be delivered ahead of the enablers. This would both reduce timescales and reduce the risk of data being inadequate for future markets.

We agree that the Market Facilitator could be an appropriate body for coordinating the FMAR solution. However, we would encourage Open Networks to begin this work during the transitional period while the Market Facilitator is set up.

We recommend that i) the existing projects and data sources be utilised where possible and ii) working groups convene immediately under the Open Networks Programme, with the option of commissioning a commercial company to design the data model and infrastructure (with the working groups acting as user groups). This can start immediately, with a payment mechanism that disincentivises late delivery. We believe commissioning a commercial company would:

- Enable the project to start earlier, as it wouldn't be reliant on existing resources.
- Provide digital technical and design expertise and experience from other industries that have already addressed parallel problems.
- Accelerate the solution by providing an independent, objective expert view on the technical design. This would reduce the costs of retrospective registration.
- Reduce the costs, much of which are hidden, from reliance on voluntary support.
- Provide a degree of competition.

The roles and responsibilities of the Market Facilitator, DSI Coordinator and FMAR should be clearly defined to prevent duplication. The Market Facilitator could be appropriate to oversee the development of the data models for what needs to be shared and transmitted, to define who should see it, when and for what purposes. The responsibility for the exchange of data sits with organisations exchanging data. The Interim DSI Coordinator facilitates this through the use of its technology and governance (building the DSI as the noted data exchange model). The industry needs to be very clear about how that works, and to what extent the DSI Coordinator prioritises any integration work with the Market Facilitator and FMAR work.

The Open Networks Programme has a strong track record of coordinating networks and collating information, as seen in the development of the Embedded Capacity Registers, and these skills could be utilised to enable timely delivery. The Market Facilitator could operate as the Chair for these groups to ensure coordination with its wider strategic development of the Market Facilitator role and its priorities.

We are also supportive of commissioning another organisation to deliver the design work, so as not to delay progress while waiting for the Market Facilitator delivery body to be stood up.

Question 8: What are the advantages and disadvantages of the proposed delivery body options for the Flexibility Market Asset Registration digital infrastructure? Are there any additional options that should be considered? Do you agree with the justification for discounting approaches?

We do not have a strong preference for which delivery body is chosen for the FMAR solution. ESO does not view itself as the correct organisation to own or operate the FMAR. Regardless of who is chosen, there should be a commercial procurement process with a payment mechanism that disincentivises late delivery and options to reassign to another delivery body if needed due to inadequate performance.

Ideally, the platform would be run independently on a commercial basis by an organisation with the required capabilities, under an appropriate contract with SLAs. We agree in its current form 'option 1 commercial solution' should be discounted, as the implementation requires an investment that cannot currently be justified by commercial companies. However, if a well-defined solution was mandated, we believe it could attract commercial interest from multiple players. This would be ideal as the competition between the players could ensure that the FMAR solution is developed rapidly, and assets would be added through commercial incentives (to installers etc). This single underlying data register and sharing process would then facilitate growth in flexibility without stifling competition.

We believe the Market Facilitator is an appropriate delivery body as it will be responsible for overseeing the design of the solution and related processes. However, several organisations with aligned capabilities such as Electralink or the Smart DCC could also be considered and avoid overloading the Market Facilitator, as a focused scope has been recommended by industry stakeholders in assuring delivery of specific Market Facilitation activities.

- Electralink and the Smart DCC for example have experience in data collection and management, regulatory oversight and industry experience. However, there would still be a steep learning curve to cover the FMAR requirements.

- A more detailed evaluation of the capabilities and commercial requirements e.g. national infrastructure, industry knowledge, data collection and management, and business model would be welcome.

As stated in Question 7 as an alternative we suggest that Ofgem consider commissioning another organisation to deliver the design of the FMAR solution. The Market Facilitator's involvement in overseeing the initial design and facilitating of the working groups could make it best placed to be the delivery body.

ESO's Single Markets Platform (SMP) is primarily a procurement platform for ESO balancing services (focused on onboarding, pre-qualification and post-auction contracting) and it would not be easy to evolve it into a FMAR solution. A profile of the SMP is provided in Appendix 2.

- SMP's functions cover more than asset registration. Its wider functions include unit creation and versioning, prequalification, relationship management and contract management.
- Whilst we would need to conduct a detailed technical assessment to confirm this, we expect that it won't be scalable to cover the large volumes of asset registration data required, through our experience of creating the Demand Flexibility Service which required the registration of millions of MPANs.

Data verification, validation and maintenance will be a key role to be undertaken by the delivery body. The chosen party should have sufficient capabilities and controls in place to maintain data security and integrity. The ESO does not have the ability to verify asset information for distributed connected assets currently and would be dependent on suppliers, DNOs or the AAR to provide this information.

Question 9: Do you agree with the timelines proposed? Should anything else be considered?

The FMAR solution needs to be implemented as soon as possible; 2025-2026 ahead of MHHS is the priority period for delivery.

- Delivery in 2027-28 would increase the amount and cost of retrospective registration. The problem of unregistered assets is growing quickly with 7 million EVs and heat pumps by 2026 rising to 9.5M by 2027. Without timely intervention, these 2.5 million assets may be subject to barriers to participation based on the issues identified within this consultation.
- To unlock the energy system value of this growth in flexible resources connected to the distribution network, FMAR must be introduced as soon as possible. The lack of an FMAR solution during this period could be a blocker to other initiatives such as operational metering and it is adding to costs to run the electricity system, such as the manual checks required for duplicated MPANs.
- We can learn best practice from other industries, such as the mobile telephone and internet which both relied on a single (but diverse) infrastructure with competitive service(s) built upon it.
- Our preference is for the FMAR solution to be in place before market-wide half-hourly settlement, which is likely to be in place by the end of 2026.
- We do not believe the government's Review of Electricity Market Arrangements (REMA) will reduce the need for the FMAR solution. We should continue to build the solution with the potential to scale to meet the market reform introduced by REMA to increase the capacity of distributed flexibility in GB's electricity markets.

With a focus on assets <1MW, the volumes of assets that would be included within the register will be substantial. Predicted volumes of EVs and Heat Pumps from 2023 DFES publications by DNOs estimates an additional 7 million assets by 2026, rising to 9.5 million by 2027. Any delays to the initial design and capture of this information will increase the size of the backlog and may prevent these assets from meaningfully participating in flexibility services across all markets.

We believe timescales can be expedited through the Open Networks programme, which successfully delivered projects such as the Embedded Capacity Register in previous years.

Both ESO and DNOs are incentivised through ED2 and BP2/3 to share information to aid coordination. The progression of the FMAR supports these incentives and encourages a coordinated approach, preventing siloed developments in the interim.

Other options for expediting the design phase could include revisiting the work undertaken by IBM in the initial Flexibility Digital Infrastructure consultation, to commission a detailed design of data requirements and systems through a commercial procurement process.

- A structured approach to design-build-operate could deliver a system much faster than trying to design the solution through working groups.

Timescales could also be expedited by collecting, cleansing and sharing data from existing registers in parallel with designing the FMAR solution.

These include the Embedded Capacity Register (ECR), Feed-in-tariff (FIT), and Accelerated Loss of Mains Change Programme (ALoMCP).

Some regulatory changes may be required to ensure ESO, DNOs and other interested parties have access.

Question 10: What existing or new policy levers could be used to improve asset visibility?

There is a range of policy levers available to improve asset visibility. It is important that these are explored in parallel to the development of the FMAR solution.

- Refreshing the Energy Digitalisation Strategy (EDS).
- GC0117 currently in review.
- Policy initiatives to support DER and Consumer Energy Resource (CER) visibility.
- Firmer requirements for data validity and population of Embedded Capacity Registers
- Expand distribution code changes (now engineering recommendation) on DER harmonisation to include ESO requirements.
- Implementing licence conditions for suppliers, aggregators and load controllers to share asset data
- Ofgem releasing FIT data to populate the FMAR database.
- Moving from sharing data 'where necessary' to not sharing data for specific reasons.
- Consumer consent for access to energy data, data about LCTs and access and control consumer LCTs.

Question 11: What use cases for asset visibility should be considered as priorities and why?

'Static' asset data will fully or partially enable all 177 use cases identified through ESO's DER Visibility programme. Modelling and forecasting, and network planning, are the priority use cases which will support real-time network operation activities across ESO-DSO, including the dispatch of flexibility, required to secure the network.

Other use cases include:

- Improve operational forecasting
- Improve data modelling interoperability e.g. between short/long-term forecasts or between ESO and DNOs
- Improve accuracy of network reconfiguration – e.g. restoration following faults, network maintenance and managing faults
- Monitoring DERs to manage system operation and resilience
- Improving procurement decisions for ancillary services/Balancing Mechanism/system restoration DNO flexibility and CM
- Controlling DERs/CERs to manage system operation and resilience
- Support peer-to-peer trading to reduce the need for curtailment
- Outage planning
- Improve network constraints forecasting
- Avoiding conflict between ESO, DNO and IDNO instructions to DER
- Monitoring of DER compliance to instruction from ESO/DNO and settlement
- Compliance with service standards determined by ESO/DNO and settlement of services
- Monitoring of DER receipt of instruction from ESO/DNO
- Network development and access planning

Question 12: What costs, benefits or factors should be considered in a Cost-Benefit Analysis for asset registration solutions? Consideration should be given to:

the time (in minutes) and resources required to complete current EREC G98, EREC G99 and MCS asset registrations (accounting for any recent process improvements, including ENA's Connect Direct)

the current rate of duplicative registration processes for assets (e.g. networks and MCS)

whether any additional asset data (beyond that of the current registration processes) needs to be registered to enable the benefit cases to be realised

the costs to establish and maintain a register of assets

the process required to assess suitability in accessing asset data

what the essential asset registration requirements are to enable the benefit cases to be realised

We have summarised a few of the potential costs and benefits of the FMAR, based on a scope aligned with our responses:

A key benefit of the FMAR solution is increased flexibility capacity made available across the transmission-distribution boundary through an effective and efficient asset registration process. The FMAR solution also allows registration without additional cost or complexity required for retrospective asset registration. This encourages FSP to expand the amount of flexibility they can offer. This reduction in energy costs to consumers from their flexible assets would not require action from the consumer, except their consent. A less complex asset registration process through the FMAR solution will also reduce the cost and time of registering the asset by installers and consumers. This increases the speed at which flexible assets can take part in ESO and DSO markets, driving costs down for all consumers.

Increased use of CER assets for flexibility will enable a net reduction in carbon emissions during use. For example, from turn up when renewable resources are available or demand reduction when supply carbon intensity is high.

Improved quality and up-to-date asset data will reduce the cost of rectifying poor data and ensure more assets are available for flexibility. The current data captured is inconsistent and not standardised.

Consumers will benefit from an easier customer journey if their assets are already registered and they simply need to provide permission to receive the benefits of participating in flexibility.

- Better asset visibility leads to better forecasting and reduced costs for system operators in planning their network. This leads to more efficient procurement of market services and avoids network investment.

Improved asset registration data, enabling other flexibility-related work, for example, alignment across ESO-DSOs, primacy, and stacking. The benefits related to an increase in participation in ESO and DSO markets from FSPs, coordination across ESO-DSO markets, facilitating stacking by improved MPAN data and correct allocation of assets to FSPs and reduction in duplication, need to be taken into account.

Identifying vulnerabilities and improved cyber security. Fire authorities and cyber security experts could use data to manage risks in their areas of focus. For example: in case of a building fire, knowledge of DER or CER assets would allow correct selection of firefighting equipment.

There needs to be careful consideration of the costs of the solution, including both direct and indirect costs such as:

- Time and costs of stakeholder engagement in the design process.
- Data migration and cleansing from other registers.
- Cost of retrospective manual registration.
- Cyber security.
- Fallback alternatives in case of failure. This includes costs for ensuring the FMAR solution has security, availability, redundancy, recovery, and fallback alternatives. Costs need to include procurement of the system and costs to maintain the data in a backup solution.

From an ESO perspective, we envisage some services will require additional asset and supplier data beyond the capabilities of the FMU. But these would be for assets with a capability <1MW.

The commercial model or method of cost recovery should also be considered; we need to ensure there are incentives for registration, not costs.

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ESO

Appendix 2 – Single Markets Platform (SMP)

Introduction

ESO's Single Markets Platform (SMP) is primarily a procurement platform for ESO balancing services (focused on onboarding, pre-qualification and post-auction contracting). Following its initial release in February 2022 SMP has been developed in an agile manner. The SMP focus is on ESO balancing services markets, where asset registration information can be very complex. Significant investment, rework and time would be required to evolve it into an FMAR solution.

SMP Scope

SMP facilitates the onboarding, pre-qualification and contracting processes for ESO balancing services. This has initially focused on day-ahead markets such as Dynamic Response and Balancing Reserve. It will also include Quick and Slow Reserve subject to their approvals. SMP also supports the Regional Development Programme (RDP – MW Dispatch) and DFS services. SMP will also take responsibility for all Balancing Mechanism (BM) registration processes as well as expanding into wider balancing services such as Restoration and Mandatory Frequency Response in the future.

At this time SMP is not expected to be involved in the procurement process of long-term Network Services Procurement (NSP) events (previously known as Pathfinders) for Reactive and Stability that have four-year lead times and long-term contracts.

Within the onboarding process, SMP facilitates the registration of “assets” of any size that can then be allocated to a tradable “unit”. These units can be made up of a single asset or any number of aggregated assets. The unit is required to be above 1MW in size for participation in ESO balancing services. SMP users can input asset and unit details directly to SMP via the Graphical User Interface (GUI) or in bulk via the Application Programming Interface (API). The API is especially useful for high numbers of smaller assets that require aggregation. Once assets and units are committed to SMP the user is then required to complete the pre-qualification process for each ESO service by sharing the required evidence; a user will be supported through this process by an ESO account manager. Once pre-qualification has been approved, users are asked to accede to generic and service-specific contract terms and are then able to participate in the relevant auction process. Subject to the outcome of the auction any contract information will be available on SMP. The SMP shares contract data with downstream ESO systems that are focused on dispatch, performance monitoring and settlement.

Suitability for the FMAR

The scope of the SMP does not fully overlap with the FMAR. If the FMAR existed, the SMP would still be required for ESO balancing services. This is partially due to the 1MW priority for the FMAR but mainly the level of information ESO needs for pre-qualification of suppliers and assets to participate in ESO services.

It is worth noting that whilst we have onboarded DFS through SMP for the past two years, this is at the (aggregated) balancing “unit” level only; none of the 2-3 million assets are on SMP and these are cross-checked for duplication through a different process. However, SMP is capable of registering many millions of assets but, to date, we have not stress-tested this capability.

From an SMP perspective, more than other ESO systems, we are specifically interested in collating sufficient asset-level information that can then facilitate the creation of units that can participate in our balancing services. We capture the information required to give our account managers confidence that the unit meets the requirements to participate in the relevant service. These requirements differ based on service and are generally more demanding than DNO service entry criteria.

Figure 1 below shows the context of the SMP in the wider balancing services procurement cycle.

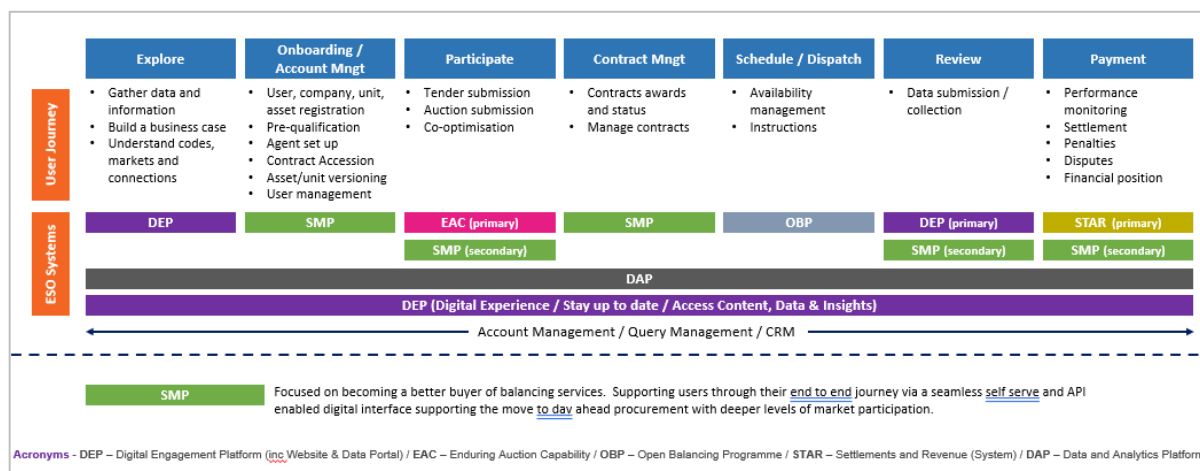


Figure 1 ESO Balancing Services Life Cycle

The SMP is built on Salesforce. Salesforce is an excellent platform to build solutions like SMP. It provides extensive flexibility and customisation that can be applied in designing the user experience and delivery of complex functions. Salesforce does not have a limit on the number of records. However, the performance of SMP, and therefore the user experience, could be impacted if the number of asset records increases from the 'designed for' thousands to 10-30 million.

A detailed technical assessment would need to be completed to assess the platform's capabilities for a different function. In addition, the Salesforce licensing model and costs might not align with the new function.

It is highly likely that after the cost and time for an assessment, the best economic and performance solution will be a separate platform for the FMAR that facilitates the registration of the limited data set that Ofgem is suggesting.

SMP could provide asset information to the FMAR, given the correct consent. FSPs and Aggregators could also use FMAR to create the base information for their asset registration submission to SMP.

ESO as the Delivery Body

Assuming SMP could be extended to cover the FMAR requirements:

- NESO does not have experience in administering a database for consumer-level devices.
- There is a much closer match of the AAR/CAR project to FMAR than to the SMP. The AAR includes automatic verification processes which are not included in the SMP.
- Developing the SMP to cover purposes for which it wasn't designed would risk an impact on its current function and extend the timescales for implantation of the FMAR core AAR/CAR functionality.
- Data verification, validation and maintenance will be a key role to be undertaken by the delivery body. The ESO does not have the ability to verify asset information for distributed connected assets currently and would be dependent on suppliers, DNOs or the AAR to provide this information.

Appendix 3 – FMAR Data Fields

A comparison of the current data fields in the Ofgem Flexibility Market Asset Registration consultation DNOs asset registers, the ESO CRM and SMP, and the Embedded Capacity Register (ECR).

Data Point Comparison - OFGEM vs DNO vs CRM vs SMP					
	OFGEM	DNO	ESO - CRM (pre Asset Registration)	ESO - SMP	ECR - 50kW - <1MW
OFGEM FMAR	Data Points: 13	Match: 8 Partial Data: 1 Close Match: 2 No Match: 2	Match: 4 Partial Data: 2* Close Match: 1 No Match: 6	Match: 5 Partial Data: 5** Close Match: 2 No Match: 1	Match: 6 Partial Data: 1 Close Match: 0 No Match: 6
DNO		Data Points: 66	Match: 16*** Partial Data: 4 Close Match: 0 No Match: 46	Match: 31*** Partial Data: 2 Close Match: 3 No Match: 30	Match: 25 **** Partial Data: 0 Close Match: 0 No Match: 41
ESO - CRM			Data Points: 65	Match: 65	
ESO - SMP				Data Points: 215	
Embedded Capacity Register 50kW - <1MW					Data Points: 62

Key

Match - Matching Data point in both data sets

Partial Data - Data point contains partial matching data

Close Match - Similar data but not a true match

No Match - No matching data point across both data sets

* Partial Data due to changes made within CRM, affecting ability to record MPANs

** Partial Data mainly due to differing requirements for services

*** Some data points are recorded in different formats / are service dependant, but could be made to match with additional calculations

**** Comparison of data headers only within the 50kW - <1MW register, the bulk of data points are not populated within the current registries

Commentary

DNOs and ESO (SMP) record the majority of the example data fields outlined in paragraphs 3.16 and 3.17 of the Flexibility Market Asset Registration consultation paper.

There are a number of data points recorded as partial matches within ESO systems as several of the proposed data fields are dependant on the service that is being provided.

DNOs capture 66 data points across their Commercial and Technical Service Pre-qualification Template, 31 Commercial data fields and 35 Technical data fields. ESO CRM pre Asset Registration process has a full or partial match to 20 data points. Single Market Platform (SMP) Registration process has a full or partial match to 33 data points.

The CRM captures 10 Commercial and 10 Technical Data points, SMP Captures 12 Commercial and 21 Technical Data points.

Due to differences in how the data is recorded between the DNOs and ESO, the majority of data points that match are recorded in different ways.

For example: "Registered Address". The DNOs use Line 1, Line 2, Line 3, Postcode. The SMP uses Street, City, County, Postcode.