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Improving the visibility of distributed energy assets

Dear Flexibility and Digitalisation Strategy Team, DESNZ

Who we are

NESO lies at the heart of the energy system as an independent, public corporation responsible for planning Great Britain's electricity and gas networks, operating the electricity system, and creating insights and recommendations for the future whole energy system.

At the forefront of our efforts is delivering value for consumers. We work with government, regulators, and our customers to create an integrated future-proof system that works for people, communities, businesses, and industry, where everyone has access to clean, reliable and affordable energy.

NESO's primary duty is to promote three objectives: enabling the government to deliver net zero, promoting efficient, coordinated, and economical systems for electricity and gas and the economy and efficiency of energy businesses and ensuring security of supply for current and future consumers. NESO will take a whole system approach, looking across natural gas, electricity and other forms of energy and will engage participants in all parts of the energy ecosystem to deliver the plans, markets, and operations of the energy system of today and the future.

Our key points

- NESO welcomes the consultation as a critical step towards addressing the challenges of managing an increasingly decentralised and complex energy system. We consider distributed energy assets visibility and access as key to energy system modernisation for NESO and the energy industry. These challenges necessitate real-time, accurate, and granular data on distributed energy assets and require a step change, with industry consensus, to establish a policy-guided harmonised agreement to address system needs and facilitate consumer benefits from market evolution.

- Limitations in existing arrangements range from total absence of visibility of distributed assets to regional network area and service specific data flows or post-event data with limited granularity. These limitations have a consequential impact with decisions not benefitting from essential data driven, scalable insights. The proposed focus on distributed asset visibility & access at all levels and across all timescales offers several operational benefits in improved forecasting and balancing, enhanced DSO coordination critical for managing bidirectional power flows and empowering consumers as active participants, reducing system costs, and supporting clean energy & decarbonisation goals. In 2022 we published a position paper consultation outlining a benefits assessment estimating £150m/year from increased distributed energy asset visibility for NESO alone. We have undertaken a more detailed benefit assessment to reflect industry and system changes. Our findings are consistent with previous assessment and indicate significant qualitative and quantitative increase in consumer benefits from increased visibility of distributed energy assets. We aim to publish the findings of this benefits study in due course.
- Though we have no objections to the recommendations in this call for evidence, there are important challenges and gaps we believe need to be highlighted and further considered, such as the need for regulatory alignment, a clearly defined mechanism for DNO funding and incentives, real-time access to data, standardisation of data and interoperability, exclusion of non-residential distributed assets constituting a significant portion of the distributed energy asset base, harmonised definitions of DER and CERs, and privacy & cybersecurity. Moreover, despite the consultation’s emphasises on asset visibility, it does not detail how distributed asset visibility will translate into market participation.
- We see visibility to be more than just static data (e.g., what and where an asset is) and consider access to distributed energy assets to be just as essential. It also encompasses requirements for historic data (what an asset did in the past), real time data (what an asset is doing now) and future data (what an asset is expected to do next). There is currently a gap in data standardisation and interoperability across industry. We have provided information on relevant assets and the data required in Question 1c of this consultation. In addition, there is a lack of coordinated plans and funding to support the delivery of this ambition for improved visibility and access.
- We would advocate for retaining the definitions of DERs and CERs included in Ofgem's Future of Distributed Flexibility to avoid confusion about which assets are being referred to as these definitions encompass all assets connected to the distribution network. The term 'Asset visibility' requires a holistic definition that is cohesive and representative of all types of distributed assets. This visibility goes beyond static asset data and includes real time, forecasted and historical data.

- This consultation focuses on small residential energy assets (<50kW), termed Consumer Energy Resources (CERs), but appears to overlook larger Distributed Energy Resources (DERs) such as commercial solar, wind, and battery systems. Insufficient visibility of both CERs and DERs is causing operational challenges for the electricity network, including frequency swings, voltage instability, and reduced inertia. To manage these challenges NESO holds more reserves and intervenes more in the balancing market, with increased consumer costs. Therefore, as the asset base increases in volume these issues will increase, and costs increase without intervention.
- NESO supports the consultation's alignment with Clean Power 2030 Action Plan[1] (CP30) and the proposed Clean Flexibility Roadmap[2] as this signals co-ordinated approach to integration of distributed energy into broader energy strategy.

We look forward to engaging with you further. Should you require further information on any of the points raised in our response please contact Deepak Lala, TIDE Manager, Distributed Energy Enablement, via Deepak.Lala@neso.energy.

Yours sincerely

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[1] *Clean Power 2030 Action Plan*
[2] *Clean Flexibility Roadmap*

Appendix 1 Consultation Question Responses

Question 1: What are your views on:

a. The definition of assets relevant for consumer flexibility, network planning or other benefits of asset visibility?

The definition of types of assets encompasses most technologies that are likely to enable consumer led flexibility. However, we agree with the option to leave the definition open to future technologies. It may be useful to have clearer distinctions between low carbon technologies *(e.g. solar PV, domestic scale batteries*) and higher carbon generators *(e.g. micro-CHP)* as this is beneficial for aspects like emissions reporting.

It would also be beneficial to indicate how responsive these assets are to market signals. For example, a household with solar only versus a household with solar, EV and domestic battery would potentially have different demand and generation profiles.

For the definition of size of assets, we would emphasise the requirement for visibility of DERs as well, which are typically larger sized assets above the 50KW consultation threshold. This would enable NESO to assess and manage wider system operations impacts effectively. Improving asset visibility is a current focus for NESO, offering opportunities and benefits to support both industry and consumers. We would advocate retaining the definitions of DERs and CERs as included in Ofgem's Future of Distributed Flexibility[3] to avoid confusion about which assets are being referenced, as these definitions encompass all assets connected to the distribution network. In addition, an industry standard taxonomy of distributed assets would be beneficial in providing clarity on definition of assets.

In the Clean Flexibility Roadmap, DESNZ defines all relevant types of flexibility based on the source of flexibility and duration. It would be helpful if there was a direct mapping between the definitions in the roadmap and this consultation.

b. Who do you think will need to have visibility of these assets?

We agree with the inclusion of operational benefits of increased distributed energy asset visibility to NESO's network planning and forecasting functions. In addition, we anticipate significant benefit to NESO's system operation roles, outage planning, restoration, resilience, market facilitation, transparency, and compliance activities, as follows:

- **Modelling & Forecasting:** Visibility of aggregated assets is needed as they appear at the distribution / transmission boundaries and more granular data associated with typical consumers or neighbourhoods is essential to understand potential future deployment rates or response to policy. Increased visibility of distributed energy assets with granular data enables more accurate load and generation forecasts, capacity market planning, and forecasting price and volume of services. For forecasting, NESO needs increased

[3] Ofgem's Future of Distributed Flexibility *Definitions of CER & DER pages 64-65*

visibility of distributed energy assets and greater understanding of their behaviour to improve demand and renewable forecasting. Understanding real time behaviour of distributed assets can help avoid over procurement of reserves and reduce costs.

- **Network Planning:** Accurate data on distributed energy assets enables better forecasting of load and generation patterns, reducing risk of grid congestion or underutilisation.
- **Outage Planning:** Increased visibility of distributed energy assets supports optimisation of short, medium, and long-term outage planning.
- **Restoration:** Greater visibility of and access to distributed energy assets enables NESO to be able to restore the distribution and transmission network more quickly in the event of a system restoration event.
- **Resilience:** Visibility of distributed energy assets allows NESO to respond dynamically to grid events such as outages & frequency imbalances, by leveraging flexible assets.
- **Market Facilitation:** Enhanced visibility supports the growth of markets where distributed energy assets can provide services such as demand response or frequency regulation creating consumer participation and increasing liquidity. Additionally, NESO commissioned the case for change[4] with Afry that identified three key limitations of the current arrangements:
    - Incentives
    - Visibility and access
    - Intertemporal issues

  Afry concluded in the report a clear for case for change from the status quo. Specifically on visibility and access, the following challenges were identified:

Visibility and access	**Incomplete coverage:** coverage of FPNs is incomplete, particularly for the growing share of flexible non-BM resources, meaning ESO has limited visibility of full market schedules when doing contingency planning
	Inaccurate information: schedules change significantly before gate closure meaning ESO decisions are taken with inaccurate information
	Behaviour: uncertainty on the expected level of system support balancing by flexible non-BM resources (e.g. NIV chasing or response to retail tariffs)
	ESO access to resources: key resources respond to wholesale market signals but are not dispatchable by ESO in balancing timeframes
	Coordination: sequential procurement of balancing services adds uncertainty to decision making for both ESO and market participants

- **System Operations:** Increased visibility of distributed energy assets is needed by our control room teams to better forecast their expected behaviour in near to and real-time, their expected delivery of balancing and ancillary services, and to use this situational awareness to act accordingly in maintaining system security. Additionally, storing the highest granularity of distributed energy assets (DER/CER) data is crucial in the event NESO requires such data for post-event technical analysis. This supports NESO in addressing the lack of data accessibility/visibility and tools required to support future investigations of

4 GB Scheduling and Dispatch – Case for Change

system disturbances. Such was the requirement for disturbance events that have previously occurred (e.g., December 2023[5]) where a lack of granular data and accurate information on distributed generation hindered post-event analysis of the events. Moreover, inverter-based resources are expanding across substations, making current Phasor Measurement Unit (PMU) coverage insufficient. NESO requires installation of more PMUs to improve grid monitoring which will require capable datacentres to process and store data as well as stronger collaboration with Transmission Owners. PMU data has proved to be vital in the past sub-synchronous oscillations investigations[6] and we foresee its increasing importance while inverter-based resources get integrated to the transmission system.

- **Transparency & Compliance:** Greater visibility of distributed energy assets will allow NESO to assess compliance of services being provided by these assets and act in cases of non-compliance.

c. What information about these assets will be most relevant?

At a summary level, the definition of asset visibility needs to cover historic, real time, and future data requirements as well as static data. We have defined the following key distributed energy data groups that are required by NESO to meet our use cases:

1. **Distributed energy asset (DER/CER) static data**

Static asset data refers to the unchanging technical and configuration details of Distributed Energy Resources (DERs) and Consumer Energy Resources (CERs). This data characterises the physical and operational attributes of the technology and its connection to the grid, and typically includes:

- Installed capacity of technologies (e.g. solar PV, batteries, EV charge points)
- Technology type and model specifications
- Installation date and commissioning status
- Connection point details (e.g. Grid Supply Point or Bulk Supply Point)
- Ownership and location metadata
- Grid integration parameters (e.g. export limits, phase connection)

This data is predominantly static and not expected to change frequently.

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5 *ESO OTF 17 January 2024: Overview of frequency event on 22nd December*
6 Sub-synchronous Oscillations in GB 2024 Report

2. DER/CER real-time & historic metering

Real-time metering data on Distributed Energy Resources (DERs) and Consumer Energy Resources (CERs) refers to the continuous stream of operational measurements captured at the point of connection to the grid. This data is essential for monitoring, system control, and optimisation of distributed embedded generation and is typically:

- Captured directly from DERs (e.g., solar PV, batteries etc.) at their grid interface
- Aggregated by market participants or aggregators for CERs across facilities, substations, or individual units

Key parameters include:

- Active power (kW) and reactive power (kVAR)
- Voltage (V) and current (A)
- Frequency, power factor, and other grid stability indicators

Historic metering data on DERs and CERs refers to the time-series records of operational measurements collected at the point of connection to the grid. Unlike real-time data, this dataset captures the past performance and behaviour of distributed assets over defined intervals.

3. DNO network model & real-time flows

Network model data refers to the structured representation of the electrical configuration, topology, and operational characteristics of the sub-transmission network in Great Britain, primarily owned and operated by **Distribution Network Operators (DNOs)**. This data is essential for NESO to accurately model the distribution network and assess its impact on whole-system operations. It includes:

- Line Diagrams and topological layouts of circuits, substations, and feeders
- Circuit breaker (CB) status, current flows, and voltage levels at Grid Supply Points (GSPs), busbars, and substations
- Transformer parameters, fault infeed data, and reactive compensation assets
- Embedded generation connection details, including capacity, location, and technology type
- Running arrangements, such as network switching states and inter-tripping signals for Active Network Management (ANM) schemes

Real Time Flows is operational data across the wider network between distribution and transmission network. It includes datasets like:

- Transformer Flow- Active & Reactive Power
- Transformer Flow- Voltage & Current
- Busbar Voltage

- Flows at other switching assets
- Transformer tap positions

Having these datasets in real time will help to control active power flows across the network and make models to converge both on Transmission and Distribution side - as NMS (Network Management System) and additional system rely on this data, as well as guarantee a higher degree of visibility of the whole network.

4. **DER/CER market & dispatch data**

Market and dispatch data on DERs and CERs refers to the structured and time-sensitive information that enables system operators (NESO and DSOs), aggregators, and market participants to monitor, forecast, coordinate, and validate the participation of distributed assets in energy markets and system operations.

This data encompasses:

A. Dynamic Operational Profiles

- **Aggregated CER demand and generation profiles of DER and CER** especially for dispatchable and non-weather-dependent assets (e.g. batteries, CHP, diesel gensets).
- **Real-time availability and delivery metrics** for services such as frequency response, reactive power, and arming services.
- **Half-hourly usage patterns** of flexible loads like EV chargers to understand behavioural timing and duration of charging events

B. Dispatch Coordination and Service Delivery

- **Dispatch instructions and execution logs** showing when and how DERs were activated, curtailed, or overridden by NESO or DSOs.
- **Service registry** detailing contracted services and historical delivery records for each asset
- **Constraint schedules and override mechanisms** used by DSOs to manage local network health and enforce deliverability limits

C. Market Participation Signals

- **Time-of-use and price-based dispatch signals** that influence DER behaviour, including synchronised responses that may cause local congestion.

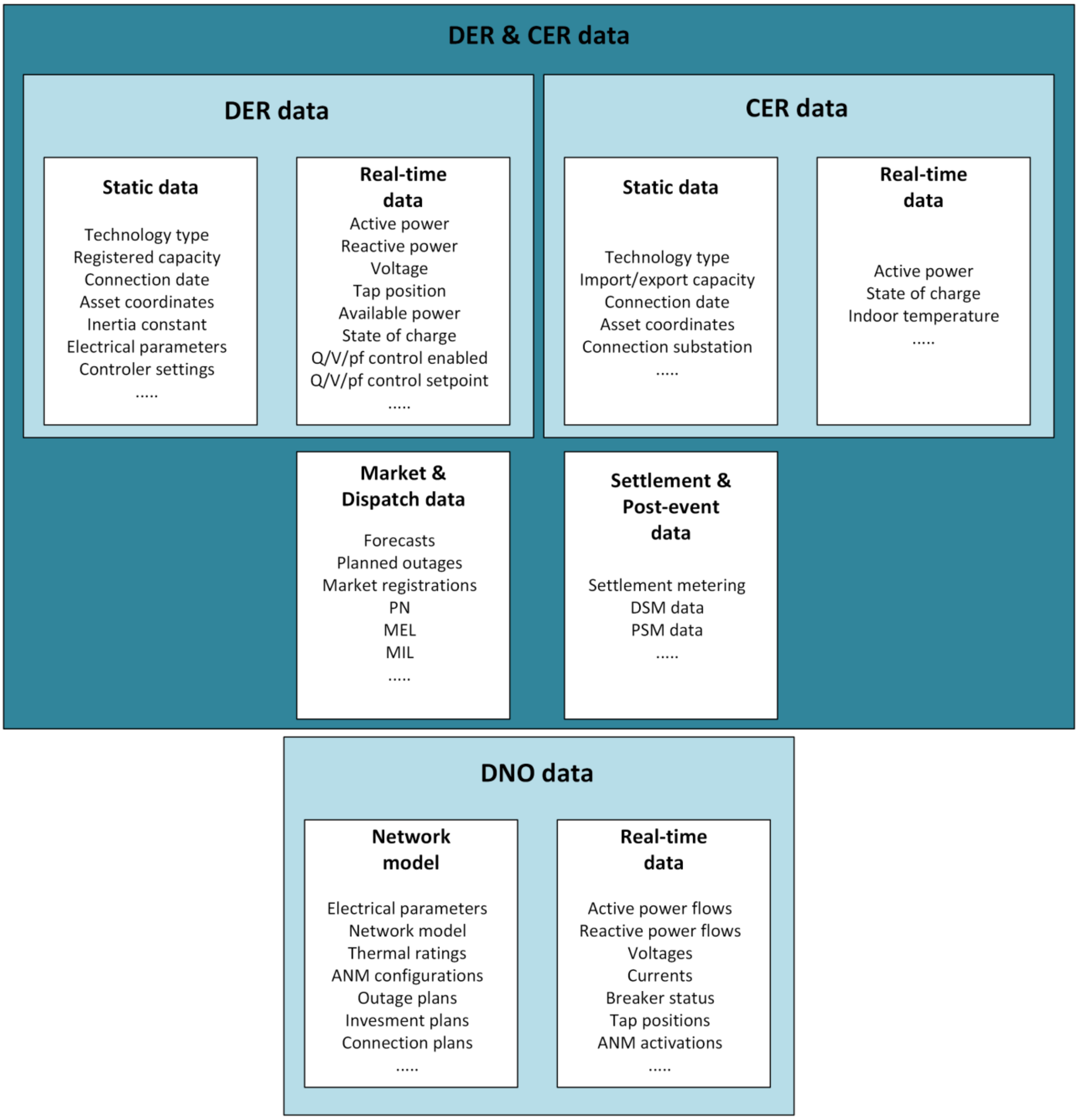
D. Forecasting and Planning Inputs

- **Day-ahead and intraday forecasts** of active/reactive power at asset, GSP, and technology levels, including constrained/unconstrained scenarios
- **Embedded asset explorer tools** that visualise DER locations, connectivity, and commissioning timelines to support planning and scenario analysis

DER/CER settlement & post-event data

Datasets such as historical MW/MVAR metering are to be used for settlements and payments associated with assets participating in markets and services. Dynamic system monitoring (DSM) data and Phasor Measurement Unit (PMU) data from DERs and power stations, and historical MW and MVAR metering from DERs and CERs.

There is a fundamental need for full standardisation in data collection and naming conventions across different distribution network operators (DNOs). The aggregated data could be publicly available to benefit academics, consultancies, and government organisations.



Question 2: To what extent do you agree with the benefits and use cases for asset data visibility and access set out in section 2, and how might they support increased system flexibility?

We agree with the benefits and use cases for asset data visibility and access outlined in Section 2. Enhanced visibility enables faster and more cost-effective connections for end-consumers, which is crucial for driving economic growth, supporting innovation, and enabling new business models across Great Britain. By making asset data more accessible, stakeholders can better coordinate and optimise energy usage, which directly contributes to increased system flexibility.

To further amplify these benefits, NESO has introduced initiatives such as the Demand Flexibility Service (DFS) and expanded access to the Balancing Mechanism. These measures empower consumers and market participants to respond dynamically to system needs, helping to balance supply and demand more efficiently while unlocking new value streams. Though, Section 2.2. lacks mention of NESO's increasing need of including Distribution network connected assets in our markets (as stated in our Enabling Demand Side Flex[7] in NESO Markets publication). To deliver CP30, NESO will require a higher penetration of flex in our markets. To achieve this, NESO need to make its markets coherent, competitive, and coordinated with the DNO markets. As both NESO and the DNOs must have access to the flexibility provided by flex assets, we need to ensure a suitable level of asset visibility is enabled between the two parties to facilitate the dispatch and use of flexibility without imposing grid operations risks.

The increased visibility of distributed energy resources is crucial for the efficient and effective management of the energy system. Currently, information about small-scale flexible assets, such as EV chargers, batteries, and heat pumps, is poor and difficult to access. Information such as its location, capacity, operational status, and connectivity is required by a wide variety of people and organisations, with the most developed use cases for network planning and enabling flexibility.

The current electrification ambitions and growth of distributed energy assets will result in these assets being a major bedrock for the electricity system in Great Britain. Visibility and control of these assets will be essential to ensure efficient operation of the electricity network and reduce consumers costs.

We also acknowledge the benefits to DNOs, including but not limited to optimised usage of infrastructure, better planning of outages and network investments, and faster connection of customers. The increased situational awareness from DNOs will improve their planning significantly such that they can optimise network investments to the locations where an urgent investment need exists and optimises their day-to-day operations to reduce costs and improve service to customers. The benefits propagate to higher voltages for the TOs and NESO at regional and national levels. This leads to an optimised usage of infrastructure, faster customer connections and improved network operability.

The rollout of flexible low-carbon technologies, especially electric vehicles and electrified residential heating, is essential to deliver Clean Power 2030 ambitions. They are also needed to

[7] *NESO Enabling Demand Side Flexibility*

meet Net Zero commitments in 2050 and enabling greater participation of consumers in our energy markets.

Question 3: What level of asset registration (the minimum rate of registration of all installed assets, by asset type) do you believe is necessary to support effective network planning and operation? Please explain your reasoning.

In terms of the relevant information which need to be captured during registration, there are multiple levels, based on the purpose of use of the data:

1. Analytical and operational purposes
2. Wider participation to DNO/NESO flexibility services and its contribution at national level

With regard to **1**, we advise a centralised body (or DNOs) will be able to collect basic information regarding new assets, which installation underpins the potential to radically change the household demand profile. This encompasses the MPAN behind which the asset is installed, postcode (if not inferable from the MPAN information), asset type (heat pump, EV charger, micro-PV, or wind), the size, connection type (1-phase or 3-phase). In other words, all the different pieces of information useful to model demand at residential level and its effectiveness. Each one of the assets should be assigned a unique identifier.

With regard to **2**, we advise each single Network Operator and NESO will maintain a register of units participating in flexibility services. The expectation is all the register will be integrated into the FMAR. This register will include **additional** pieces of information, with respect to what is already described above, necessary for those who want to offer services in DNOs and NESO markets. This includes, consumer type, boundary meter or sub-meter, manually initiated or directly instructible, specific technical capabilities (e.g. ramp-up rate or ramp-down rate) and response time.

The asset register can be maintained and updated over time, reflecting an accurate picture of what are the appliances used and installed at a specific location. Due to the complexity which sits behind the constant updating process of the registers, it is also suggested that additional insights are derived by smart meter in general, both gas and electricity, as a shift from one vector to the other can be appreciated.

Registration Level	Data Group	Impacted Area	Rationale
Basic static information	• Locational • Asset Type • Size/Capacity	Demand Forecasting (month, week, day -ahead)	Implementing bottom-up methodologies to refine and enhance current demand forecasting methodologies. This is key, as this data informs service procurement needs for real-time operations. A high accuracy in demand forecasting translates to the

Registration Level	Data Group	Impacted Area	Rationale
			reduction of real-time energy imbalances, with an overall reduction of balancing costs
		Energy Scenarios	FES/DFES improvements, as NESO would be able to baseline current regional consumption and electrification patterns, which could then be scaled up nationally, both to infer future system wide needs and decarbonisation scenarios towards net-zero
		Constraint Forecasting	Integrating and modelling CER effectiveness in national models, can produce more accurate forecasting of demand at GSP level and it will allow to better estimate and forecast transmission network constraints
		Network Development Plan	Advance modelling of the national demand is a key factor, which is necessary to plan for long-term investments as part of the TYNDP (Ten Year Network Development Plan)
Flex static information	• Consumer Type • Metering Type • Event Initiation mode • Technical Capabilities (depending on the flex service – e.g. ramp-up/down rate and time) • Response Time	Dispatch	Lowering the barrier to market participation to CERs, translates into having cheaper options in terms of balancing, ancillary services, and system's needs. This will allow a considerable reduction to balancing costs and allow consumers to lower their energy bills
		NESO-DNO service coordination (Primacy)	NESO could use this information to select contract aggregated volumes of CERs, distribution connected assets, with specific response capabilities, though this scenario needs to be simulated and validated jointly with DNOs, making sure units are not constrained at distribution level
		Demand Forecasting (month, week, day -ahead)	Implementing bottom-up methodologies to refine and enhance current demand forecasting methodologies. This is key, as this information informs service procurement needs for real-time operations. A high accuracy in demand forecasting translates to the reduction of real-time energy imbalances, with an overall reduction of balancing costs

Question 4: Do you have a view of the comprehensiveness of the distributed energy asset visibility landscape set out in this call for evidence, or are there any other pertinent components, actors, gaps, barriers, or duplication which should be considered?

The landscape provided in this consultation effectively includes coverage of distributed energy asset <50 KW (CERs) but appears to exclude assets >50 KW (DERs). At present, we do not have full visibility nor control over DERs down to 1 MW. There would be quick benefits realised, to promote efficient and effective system operation if there was full visibility and control over all assets; both above and below 50 kW.

More so, there are no initiatives that cover operational data from these distributed energy resources. Also, access to smart meter data requires individual consent and may obscure the asset usage among other assets, particularly when it comes to behind the meter assets, like heat pumps and residential EV chargers.

We agree that the proposed solution must be seamless and efficient. A developer installing tens to hundreds of distributed energy resources a month should be able to efficiently register once for all these datasets. Furthermore, consumer flexibility assets, like smart plugs and small-scale batteries, can be aggregated by capacity at substation level. This might be useful to avoid GDPR issues while still providing useful information for network planning and consumer flexibility.

Question 5: Do you have a view of the efficiency of the current asset visibility landscape?

The current system consists of data distributed across multiple registers and exhibiting varying quality. Limited coverage of distributed energy resources and inconsistent data quality affect the overall usability of the data. Additionally, the absence of a unified taxonomy further complicates data integration and analysis, making it more difficult to compare and combine information from various sources. Such limitations pose significant challenges to using these registers in production environments.

Asset visibility is low in part due to the administrative burden on installers, resulting in fewer asset registrations. Even when assets are registered, the data quality is often poor and stored in isolated systems that do not communicate.

A major challenge with these initiatives is data quality and reliability. Many fields in these datasets were not validated, i.e., have invalid or illogical records. Furthermore, there is a challenge with decommissioned or changed assets, where updates to the datasets is missing. In some cases, duplicate registers for same asset exist in a single system. It is essential to ensure quality of the proposed solution.

Usually merging several datasets is needed before any useful insights can be made from the data. This merge is often challenging given the risk of duplicate data and questionable records.

Furthermore, in the Net Zero Market Reform consultation, we recommended that Government consider suitable eligibility requirements that would provide control room visibility and dispatch of all CMUs, for example by reconsidering the requirement for CMUs to be registered as BMUs, to manage potential risks to security of supply and consumer costs from lack of control room visibility and dispatch of embedded CMUs. Government's 2021 Capacity Market consultation considered this issue and concluded that, while the change would provide benefits to the CM and wider system, further work was required to address barriers to entry and other stakeholder concerns with Balancing Mechanism (BM) participation. We recommend for Government to reconsider this position given emerging risks to security of supply caused by the lack of visibility of embedded CMUs, as well as progress on initiatives, including code changes, to enable wider access to the BM.

Question 6: Do you agree that the improvements to the minor connections process Ofgem has consulted on will encourage asset registration by installers, increasing asset visibility with DNOs?

We welcome the government's support to Ofgem's end-to-end connection review and the commitment to Clean Flexibility Roadmap.

It is encouraging to learn more about this work and would highly likely improve asset visibility with DNOs. Also reviewing current thresholds for when a DNO must undertake an assessment of the network impacts of the connection is highly encouraged.

Question 7: What use cases or practical applications do you see for improved DNO registers of small-scale distributed energy assets and what industry actors would require access? Please reference and where possible quantify benefits, as well as relevant access arrangements that would be required.

Low carbon technologies are essential in the future electricity system. These technologies are enabler of future flexibility and are core in the electrification of the country. Technologies such as heat pumps, solar panels, batteries and EVs will improve efficiency of energy usage, produce electricity locally, and provide flexibility and energy storage capabilities to the electric grid. With the increased reliance on renewable energy sources, flexibility from heat pumps, EVs, batteries and other assets is paramount to ensure efficient and stable operations of the electricity network.

As mentioned in previous questions responses, visibility of these assets will enable us to better forecast demand and flexibility. It will also enable NESO to improve our network short term and long-term planning. These capabilities ensures that the consumer cost can be reduced through efficient usage of all available resources in the energy system.

Embedded capacity register database is the primary source of embedded data; however, it does not cover all embedded data such as micro data below 50 kW, and there are issues with non-registered installers not informing DNOs about their installations. On the other hand, Micro Certificate Scheme (MCS) data provides data for 50 kW and below assets, with same problem that it does not have all connected generators especially on residential levels. Combining and exchanging data from these databases across the industry could enhance asset visibility.

Question 8: Do you have a view of the completeness of installer obligations to register assets with DNOs as set out in section 4.2? Are there obligations and existing requirements that have not been covered, but relevant in providing visibility of assets to DNOs?

NESO has not provided a response to this question. Other industry participants are better placed to answer questions on this topic.

Question 9: Which installer obligation clarification and streamlining option(s) would you support for increasing the registration of assets with DNOs? Please explain your view.

NESO has not provided a response to this question. Other industry participants are better placed to answer questions on this topic.

Question 10: How effectively could enhancements to existing digital tools (such as Connect Direct), or the development of new solutions, streamline the notification and registration process for installers, particularly in the context of minor connections processes and asset visibility objectives?

From NESO's understanding, the process of assets at registration is a complex matter and it reserves various hurdles, from both technical and practical perspectives. In terms of designing a new or refining a current registration process, criteria for fairness, efficiency, and practicality could be followed considering all the actors involved. It is fair to say that for any registration process to be implemented there is the risk of several assets may end up unregistered, even if adequate incentives and penalties are in place. This is due to the large volume of assets to be processed and the perception that this will cause an inconvenience or additional burden to end consumers or whoever is proposed to perform the action.

To design a revised small-asset registration process, we suggest focussing on the current gaps, paving the way towards digitally enhances processes such as automatic asset registration (AAR) or similar. It is also worth noting that a more active role and involvement for FSPs and aggregators should be considered, as leaving all the burden on installers might not be the right option. In the case of small-scale assets or other peculiar cases, installers may not even be involved in the process, though FSPs and aggregators might play a role by filling the gap and collecting missing data as a pre-condition necessary for the end-consumer to pre-qualify and participate in national or local flexibility services.

Furthermore, the emphasis could be on the mere registration process, but additional effort needs to be put in place to enforce data quality and consistency within the context of a robust methodology also being able to cope with changes with agility and adaptability (i.e. assets moving to one place to another as people might move).

Subsequently, it is crucial to provide easy access to these resources and registers to key industry actors, such as network operators, NESO, Market Facilitator and FSPs and aggregators to promote additional network visibility, enhance forecasting and planning capabilities, while fostering a wider market participation at domestic level.

NESO can be more informed on the end-to-end processes as well as aspects where improvements may be required to support all parties by leveraging visibility / access to such tools and registers. NESO is not looking to own or manage this process, however having visibility would support efficient ways of working between parties particularly in data sharing.

Question 11: Which existing notification and data provision requirements across distributed energy asset installation processes could be consolidated or streamlined and in what priority order? What evidence supports the benefits of such consolidation in reducing installer burden and/or improving asset visibility?

NESO has not provided a response to this question. Other industry participants are better placed to answer questions on this topic.

Question 12: What delivery routes would you see as appropriate for streamlining and consolidating of installer notification requirements, given that it would involve coordination across multiple recipient organisations? Please consider cost and implementation feasibility for market participants in providing your views.

NESO believes that it will be most efficient if the Flexibility Market Asset Registration system (FMAR) is used as the "single source of the truth" for both NESO and DSO markets.

Question 13: How could the usage of digital tools and solutions be encouraged, making them desirable in reducing administrative burden on installers?

Other industry participants are better placed to answer questions on this topic.

However, it is important to mention that data collected must be well maintained, digitally stored, and processes should be improved where required. Sharing with NESO would support relevant planning processes.

We need to ensure the move to flexibly managing demand is easy and straight-forward for consumers in order to build consumer trust in how suppliers & aggregators are using their assets.

Question 14: To what extent do you consider asset self-registration to be a desirable approach in this context? In addition to the considerations outlined in Section 4.2, are there any other factors you believe are relevant to assessing the feasibility of this option?

Overall, we disagree with the idea of implementing full self-registration for assets. While the concept may seem efficient in theory, the reality is far more complex and impractical. First, the infrastructure required to support self-registration, particularly through APIs integrated with GB systems, simply does not exist yet. Convincing equipment manufacturers to adopt and consistently use such systems may take considerable time, yet there is an urgent need for a workable interim solution.

Moreover, full self-registration is fundamentally flawed because certain asset data is inherently subjective. Factors like the owner's interpretation or the geographical context of the asset cannot be reliably captured without human input. This means that a level of manual oversight will always be necessary to ensure accuracy and consistency.

From a technical standpoint, delivering a robust self-registration system would be an enormous burden. It would introduce significant complexity, require ongoing maintenance, and result in frequent downtime. The cost for resources and reliability far outweighs the potential benefits. For all these reasons, NESO believes pursuing full self-registration is not a viable path forward.

In addition to the considerations outlined in Section 4.2, other aspects to consider are market incentives, proper regulatory mandates, trust mechanisms and incentives, smooth user interface, compatibility with existing systems, and governance must be considered to make this work.

- **Market incentives and Regulation**: Self registration can be facilitated with mandates and financial incentives (lower tariffs, access to flex markets etc.,). Further motivation can be provided in terms of operational benefits such as smoother grid connections and faster approvals.
- **Identity and asset authentication**: The registration process must verify that a real, eligible asset is getting registered. This requires:
  - ✓ Asset certification
  - ✓ Device level authentication protocols
  - ✓ Integration with smart meter or commissioning records

- **Integration with Existing system**s: Self registration tools shall be able to connect into existing network/system operator platforms via APIs or suitable middleware. Integration costs need to be optimal, otherwise feasibility will decrease.
- **User Experience**: Smooth and less complex user experience needs to be put in place which will make the self-registration process seamless. Feasibility is significantly

enhanced when registration process is embedded within existing user workflows – such as device commissioning or activation.

Question 15: What existing industry data may be used to help increase distributed energy asset visibility, with reference to:

a. What additional routes to access such data would be considered necessary and why?

While existing initiatives provide a partial view, several additional routes may improve both the access and quality of distributed energy data.

1. Mandated Real Time or near real time data sharing from distributed energy operators, asset owners, aggregators such as operational status, capacity, and location in near real time with system operators and DNOs to support dynamic system balancing and network planning.
2. Establishing common data models and APIs across various industry platforms would enable data sharing without bespoke integration.
3. Geospatial and asset level data integration: Creating a layer of DER asset data onto geographic and network models would help DNO and NESO simulate constraints, assess availability and future flexibility scenarios.
4. Incentivise Consumers and Asset Owners: Platforms/initiatives that reward consumers and asset owners for sharing energy production and consumption data can help increase the visibility of DERs/CERs.

b. What provisions (data safety, security, and appropriate access consent) should be put in place to enable the better use of such data within the constraints of protecting critical national infrastructure (CNI) sensitive information?

To enable better use of such data considering the CNI constraints, a proper framework needs to be put in place comprising of the following:

1. **Data Classification:** Classify data into tiers e.g., public, CNI restrictive, confidential. Apply appropriate metadata tags to reflect the classification at source.
2. **Access Control and Permissions:** Use role-based access control with strict authentication.
3. **Secure data exchange protocols:** Use end to end encryption for all data exchange. Use private networks/VPNs (CNI specific) for data sharing.
4. **Monitoring and Audits:** Log all data access, extraction, and modification activities. Review the logs regularly and setup alerts on anomaly detections.

5. **CNI Risk Assessments for new datasets:** Some data which are not sensitive, can become sensitive when combined with other datasets. Before publishing or sharing any DER specific dataset, conducting a CNI impact assessment will provide dependencies and risks if any.

Question 16: Beyond the options already outlined, are there any additional policy or technical solutions that could effectively support the achievement of the objective to improve visibility of small-scale distributed energy assets? In your response, please consider opportunities to enhance data collection, storage, and access processes.

NESO believes that the outlined initiatives cover the current existing policies that can be evaluated to increase visibility of distributed energy assets.

Question 17: Are there particular groupings or pairings of the proposed options that should be considered jointly to help deliver increased asset visibility?

NESO sees significant value in being able to access distributed energy asset data, but we do not collect or store this data. Instead, we expect we will need to draw on sources of this data from a range of different industry actors, particularly DNOs (Embedded Capacity Registers, analysis of smart meter data), suppliers (smart meter data), DCC(smart meter data), Elexon (FMAR), Retail Energy Code (RECCo, consumer consent, tariff data). Given our need for this data to be collected and stored by others, we need existing and innovative solutions to be supported by policy directives to collect data required by NESO and to share this with NESO. Without this expectation, there is a risk that other industry actors will not include NESO's requirements in the data they collect and will not establish a means to share this data with NESO. This would mean that NESO must engage with all actors to ensure they update the approach used to collect the additional data required and share the data NESO requires, delaying the consumer benefit we expect to realise. Actors may not be able to or may refuse to collect additional data and/or share data with NESO, eroding the consumer benefit we expect to realise.

Therefore, we strongly feel that a progression of the proposed options must also be supported by these policy directives and hope that your next steps following the conclusion of this call for evidence will provide this directive to relevant energy actors to support NESO's needs.

Question 18: Do you agree with the proposed criteria for assessing future policy options to improve visibility of distributed energy assets, or are there any additional criteria that you feel should be considered?

Overall, we support the criteria included but can suggest two further considerations:

1. **Effectiveness**

   This criterion needs to be articulated in terms of holistic system and consumer benefit, not benefit to individual actors. For example, we forecast that provision of increased visibility of distributed energy assets will deliver significant system and consumer benefit but, NESO recognise that such benefit may lead to cost and impact to other energy actors; DNOs, IDNOs, Flexibility Service Providers, Asset Owners / Operators, central bodies. The total benefit to the system and consumers ought to drive the assessment of proposed options, instead of the disadvantage to individual actors.

2. **Futureproofing & Deliverability**

   Both criteria must also consider the alignment of any policy decision made through this call for evidence with other relevant recent policy decisions – Clean Power 2030, REMA, Market Facilitator / FMAR, Data Sharing Infrastructure, etc. This can be assessed from a future-proofing perspective in terms of whether the proposed options conflict or support those policies and as such, what changes must be made to this decision or to other policies to offer better alignment. This would be followed by an assessment of the deliverability, in terms of whether changes to other policies are needed to avoid conflicts that may block changes to be made through this policy, and how these conflicts and changes would need to be communicated as part of delivery to avoid confusion or changes being blocked.