

ED3 Framework Consultation response – Smarter Grid Solutions

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Smarter Grid Solutions

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About Smarter Grid Solutions

Smarter Grid Solutions (SGS) is a Mitsubishi Electric company. For over 15 years, SGS has been developing and delivering Distributed Energy Resources management software (DERMS).

SGS is the UK's leading dedicated smart grid technology company, offering innovative smart grid solutions and consultancy to the power industry.

The company's innovative and proven Active Network Management technology enables power companies to grow their existing grid capacity to connect more renewable energy and respond to rising electricity demand. This is more cost-effective, sustainable and timely than building new grid infrastructure, helping to make the cost of a low carbon transition more affordable for power companies and their customers.

Our focus is on working closely with our customers to fully understand the details of their grid management challenges, and then developing the most effective, affordable and flexible solution.

SGS also offer several consultancy services to support developers, governmental agencies, and utilities to develop strategy and assessment of Distributed Energy Resources (DER). Our consultancy team is experienced and equipped to help with any challenge. We use various sophisticated in-house models and analytical techniques together with expert knowledge and real-world experience of DER grid integration to provide an excellent service.

Our focus is on working closely with our customers to fully understand the details of their grid management challenges in order to provide added valuable information or recommendations.

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1 Executive Summary

Overall, Smarter Grid Solutions (SGS) believes that this framework consultation sets out a sensible and thorough approach to setting the Electricity Distribution (ED3) price controls. We do however highlight areas of the consultation where Ofgem must give greater consideration, or it risks doing harm to the progress of net zero and driving sub-optimal outcomes for consumers.

We particularly welcome Ofgem's move towards allowing Distribution Network Operators (DNOs) to invest in their networks in a way that gives greater consideration to the long-term requirements of the network including projected increases in demand. We see this shift towards more strategic investment as a fundamental cornerstone if the networks are to catch up to their required position for facilitating net zero climate objectives and ensure they do not become a barrier to low-carbon energy growth.

We are also pleased to see that Ofgem has broadened its consideration of distributed flexibility to consider domestic participation in system-scale flexibility markets. SGS understands this type of domestic flexibility as part of the critical pathway for balancing a more renewable system in a resilient and economically efficient way.

In contrast, we strongly believe that Ofgem needs to give more careful and holistic consideration on its position on local flexibility markets before making a final determination. We believe that Ofgem's position that domestic flexibility assets must be able to participate in system wide flexibility markets is correct and important, but we think that Ofgem has revealed some fundamental misunderstandings about the use of flexibility by the DNOs in local markets that has introduced a flaw to its approach.

The Flexibility First approach to network investment aimed to challenge the perceived bias that the DNOs always use reinforcement whether it was in the consumers best interests or not, however it does not follow that the network companies will, now, always use flexibility before reinforcing. This can be seen from the DNOAs¹ and other planning data and documents published by the DNOs, where the methodology shows that reinforcement is the economic and efficient solution this is implemented.

In addition, the statistics that Ofgem has published in Figure 16, p83. show that the primary use of flexibility by the DNOs is in agreements with generators to change their output in response to faults and asset outages. Using flexibility to manage constraints is the lowest use category of flexibility product, this contradicts Ofgem's concern that the use of flexibility may cannibalise opportunities for Domestic participation in system markets. We believe a diverse approach to flexibility provision

¹ Distribution Network Options Assessments.

is key, whether sourced directly from large-scale flexible assets, aggregated across large volumes of smaller-scale energy assets, or sourced from domestic consumers participating via supplier incentives.

Much progress has been made in the field of flexibility usage across DNOs, introducing fundamental changes to network investment and network operations, including more efficient operation of networks. We urge Ofgem to understand that different sources of flexibility can be complimentary services, and potential conflicts managed operationally (for example, important work achieved on Primacy Rules through the Open Networks). With the progress achieved over ED2 to date, we encourage Ofgem to ensure that DNOs are still encouraged to operate more flexible and efficient networks to accelerate the drive towards net zero electricity system.

SGS has confined the response to the consultation sections where we have particular expertise, these are:

1. Drivers for Change,
2. Networks for Net Zero, and
3. Smarter Networks.

Our response is not confidential, and Ofgem is welcome to contact us for any clarifications it may require.

2 Drivers for change

2.1 Q1: Do you agree with our characterisation of the wider context for ED3? Are there any other areas of context that you consider material for ED3?

Ofgem has performed a good job considering the context for ED3 and has identified the most highly pertinent areas for attention. In particular, we agree with the highlighted urgency for growth in both distributed generation and new demand connections, whilst ensuring that there is capability for customers to connect promptly ahead of capacity. This aligns with the recognised challenges that are driving wider connections reform across both distribution and transmission networks.

We suggest however that two areas will benefit from a more nuanced and detailed consideration:

Flexibility: We agree that increased flexibility has a role to play for wider system optimisation (not just local system constraint management), however Ofgem appears to consider flexibility and network build to be at odds. This approach is likely to bring dismay to many in the industry that have worked hard to respond to Ofgem's previous position that flexibility should be considered as a valid solution in network planning and operation. Crucially, we challenge the view that flexibility will simply defer and not avoid investment: a balance must be struck between targeted reinforcement and flexibility, ensuring that we have an efficient network where capacity is allocated to account for the diversity between different customers and takes advantage of the enhanced flexibility that is needed for system-wide optimisation. There cannot be a view that flexibility simply defers reinforcement prior to a point where all new connections have 'firm' network access – this will result in highly under-utilised and inefficient networks. We will elaborate on this further in our response to the Smart Networks section.

Connections: Ofgem appears to assume that future connections processes will follow a similar approach to the current arrangements with some additional arrangements to expedite times for connections. This does not consider moving to alternative arrangements, for example technical best where connections are prioritised by the overall requirements of the grid and UK energy mix. The proposed end-to-end review of connections to explore issues is welcome, where we encourage attention to the emergence of distribution-system constraints and ensuring effective/optimised investment, in addition to the transmission constraints and restrictions which receive much publicity.

2.2 What are your views on our overarching objective and proposed consumer outcomes?

As high-level principles, we agree that the consumer outcomes chosen are important. We think that the wording for "Networks for Net Zero" should be amended to prioritise for best value, rather than

least cost. Overall, there may be occasions where the option that maximises value to consumers is not the cheapest option.

3 Networks for Net Zero.

3.1 Q10. What is the potential availability of network flex across GB for DNOs in the short term and on the journey to net zero during ED3?

In principle the flexible capacity available to DNOs is the same as that available to wider system markets, with price as the key differentiator in which markets the assets choose to make themselves available in. In practice, the localised nature of the typical DNO markets means that assets need to be geographically and topologically connected to the section of network that requires flexible support.

The capacity of flexible assets that choose to make themselves available in markets will be heavily influenced by factors such as market wide half hourly settlement and other policy and regulation amendments that need to happen in order for participation to become easier and the true value of their flexibility to be rewarded.

One factor raised in the ED3 Framework is to consider the implications of capacity constraint, or need for distribution flexibility dispatch, as a barrier to distribution-hosted flexibility providing services to the wider system. In this case we recommend a better analysis of the correlation between typical system-wide conditions that require flexibility, and scenarios where local flexibility will be required on the distribution network. Where these requirements overlap, there must be a check to identify if the overlap is “in conflict” or “complementary” in achieving the desired system-wide effect. While work on Primacy has a way to go, we believe that the best solution is to ensure full NESO and DNO participation in resolving these conflicts if they arrive. This way we ensure that flexibility can be harnessed and deliver value for both local distribution applications as well as system-wide applications.

3.2 Q12. Do you agree that the risk and downside for consumers of network underinvestment in network reinforcement would be greater than the downside of overinvestment?

Given the context of the proceeding section of the consultation, this question appears to imply that the use of flexibility will intrinsically lead to an underinvestment in networks. SGS does not agree with this position.

As Ofgem’s own consultation reveals, the DNOs make very little use of flexibility in relation to the management of constraints under *intact conditions*, instead using it to avoid outages due to planned maintenance, or to provide support when the network is running abnormally, figure 16, pg 83. This ultimately shows that flexibility still provides security of supply benefits to customers, and reinforces

the conservatism of capacity design principles such that under intact network conditions the demand/loading is not exceeding asset capacity limits.

However, with the scale of investment and change required we agree that it is very unlikely that network infrastructure built in the period of ED3 will be underutilised and therefore that underinvestment is already causing great harm that could have been avoided. We strongly agree that underinvestment at this critical stage of the transition poses a greater threat to present and future consumers than overinvestment, but we do not see the use of local flexibility as being likely to result in underinvestment. A set of robust and clear processes of value assessment for consideration of flexibility & reinforcement strategies must ensure it is not a case of binary options, but that combinations of flexibility and reinforcement are considered.

3.3 Q13. What are the benefits and risks to deliverability if network reinforcement is deferred to future periods?

Given the scale of network build required in the ED3 period, prioritisation of reinforcement works will be necessitated due to workforce availability, supply chain limitations, and other logistical and bureaucratic limitations such as wayleaves etc. Where sections of the network are lower on the prioritisation order, flexibility is the logical and economic choice for the networks to use while they work on higher order imperatives. We believe that the prioritisation of areas for reinforcement should be evaluated alongside the impact of interim flexibility: assessing areas should identify where the implementation of flexibility requires fewer flex interventions and does not restrict any services/activities that benefit the wider network and customers – and thus assigning these areas lower priority levels as flexibility can be feasibly applied at low impact and overall cost.

In such cases Flexibility must be viewed less a tool to defer what would otherwise be reinforced, but a tool to maintain the network until reinforcement is possible.

3.4 Q14. What do you see as the role of distributed flexibility, both in the short and longer term, to manage distribution network constraints?

There is an important distinction to make between the network operating in intact conditions, and abnormal conditions. Ofgem has identified that to date, the application of flexibility services has been primarily to support the network under abnormal, outage-type conditions. We see this as a valid application of flexibility to support security of supply and is an economic approach to managing constraints that arise. Ofgem's own analysis shows that the use of flexibility for managing constraints under intact conditions is low, in reality, were flexibility to be needed for constraint under intact conditions the business case for reinforcement would be clear. We also suggest greater interrogation of why "Sustain" products are less utilised than other flexibility products: is it due to less requirement for such a service, is it due to fewer flexibility providers available to participate, or is it due to fewer flexibility providers willing to participate? In understanding the value of 'Sustain'

product utilisation, the focus must be on the deferred/avoided reinforcement, rather than the volume of dispatch/procurement.

The exception to this is Active Network Management (ANM) which allows significant capacity of renewable generation to connect to the network in advance of reinforcement works being completed. In this case, the benefits to both generators and consumers are significant. Generators are able to connect for a far lower upfront cost and provide significant quantities of renewable energy to the system, earning them revenues far earlier than they would otherwise be able to. For consumers the benefits case is even clearer, reinforcing the network is expensive and ultimately that cost is borne by consumers, regardless of network charges as generators will recoup capital expenditure through the prices they charge for their power. The stochastic nature of renewables means that a fully reinforced network would often be significantly underutilised. This is supported by SGSs own analysis that shows that, of the generators located on mainland Britain and controlled via SGSs ANM platform, Strata Grid, the average rate of curtailment is less than 1%.² As increasing volumes of flexible and dispatchable storage are deployed onto the network, there is opportunity to further optimize network operation and maximise the energy yield from low carbon renewable generators.

It is also important to consider that the significantly growing volume of new demand due to Battery Energy Storage (BES) connections, means that planning capacity to deliver 'firm' unmanaged connections will result in huge sections of underutilised networks that never reach their peak demand, minimum generation condition. As the numbers of BES in the connection queue progress to an operational state, the correlation and diversity of export/import behaviours and true utilisation of the network will become apparent. We believe that provision of firm, unconstrained connections for these new connections will result in highly expensive and underutilised network infrastructure, where by harnessing the inherent flexibility in the technology, DSO flexibility services can offer an efficient means of connecting these resources.

3.5 Q15. How do we ensure that network flexibility is used only when it is in consumers' long-term interests in ED3?

Network companies already publish their methodologies for deciding whether flexibility is an appropriate solution when considering network options. Combined with Ofgem's proposed shift towards more strategic investment SGS see the risk of flexibility being used in a way that is damaging to the long-term interests of consumers as very low. Improved cost-benefit analysis methods are required that can fully assess the likelihood of flexibility need, the wider benefits case

² This figure is calculated by taking the curtailment instruction set point against the generators rated output capacity. As generators may not be exporting at maximum capacity at the time of receiving a curtailment instruction this number is likely to be higher than the actual amount of energy curtailed.

of incentivising flexibility from distribution assets, and potential restrictions for realising flexibility value.

3.6 Q16. How are unexpected constraints dealt with currently? How quickly can these be eased, and what is the impact of these unexpected constraints (eg on LCT uptake)?

A better question might be how often are there unexpected constraints?

So far in the ED2 price period the network operators are all significantly underspending against their projected load related reinforcement, although all DNOs anticipate that they will finish ED2 on track. This underspend has primarily been attributed to the low uptake of LCTs.

In the case of new generation/load connections, the accelerated roll-out of ANM infrastructure must ensure DNOs have the capability to quickly manage grid constraints, even for interim basis due to conditions such as unplanned asset outages or reinforcement/maintenance outages. There is an important role in operational technology in ensuring that DNOs can manage unexpected or emergency conditions.

3.7 Q17. Do you agree that the tRESP output outlined for early 2026 will help create a level playing field for DNOs' business planning and support the ED3 objective and consumer outcomes?

SGS cautions against the assumption that the creation of tRESPs will lead to a step change in local planning capability.

The DNOs already do extensive engagement with local councils and have significant local knowledge which is fed into their planning and forecasting processes. In the long run the RESPS may be able to bring a more cohesive and holistic approach to planning that spans multiple vectors and social considerations, but at the early stage of 2026 it is more likely that the tRESP output will be a comprehensive assessment of our current position and while it may provide some insight for bringing this together it is unlikely to reveal new or novel insights.

3.8 Q18. Can anticipatory network reinforcement be used to smooth the long-term build profile to avoid creating pinch points for the supply chain and workforce? What are the risks and trade-offs?

We agree that this is very likely to be the case. The enhancement of network planning methods and inclusion of stochastic/probabilistic methods is proposed to support the process of identifying best-value anticipatory reinforcements.

3.9 Q19. Do you agree that investment optioneering should aim to reduce the lifetime costs by sizing elements of works for long-term need, including considering the impact of thermal losses?

We agree with this position, noting that the impact of factors such as thermal losses should be studied alongside the wider benefits/limitations of investment options that include operational methods over reinforcement/capital investment.

3.10 Q20. Is a 5-year price control (2028-33) the right duration to achieve the objective of securing timely network capacity for the net zero transition at least cost to consumers over the long run?

A shorter price control will not provide the required timeframes for DNOs to respond to incentives.

A longer price control could be considered but would need significantly more uncertainty mechanisms and re-opener windows, this will increase administrative burden and may result in the DNOs chasing re-openers.

We believe that 5 years is the least-worst compromise for the price control time period.

4 Smarter Networks

4.1 Q48. How should the price control encourage ongoing development of the DSO role and activities to optimise whole system benefits for existing and future consumers?

The concept of a Distribution System Operator is still roughly defined with different DNOs building out different functions and capabilities within their DNO and DSO teams. Ultimately, whether we call the Distribution Utilities DNOs or DSOs makes no valuable difference to consumers and the focus should be making sure that the utility is ready and able to facilitate the delivery of a net zero energy system.

There is a great variation in priorities and requirements across the licence areas, with the needs of the Southeast looking very different to the needs of the north of Scotland, or the north west of England. This is a known characteristic of our networks and the nature of DSO roles and their evaluation/incentivisation should be reflective of this. The focus should be placed on network operators taking actions that optimise and improve both their licence areas and, where appropriate, the whole system. These actions will differ by region and any incentive or penalty in the price control should be designed to allow this regionality. It could be appropriate to consider that different regions have different objectives or thresholds for success depending on their customers needs and the scale of investment/reinforcement required to move towards net zero networks. Whatever is designed through the price control should aim to avoid volume drivers and consider very carefully whether bench marking is an appropriate way of determining the success or failure of an operator. We acknowledge the diversity in DSO roles across GB introduces challenges in the assessment/benchmarking of incentives, however this cannot be a barrier to the setting of incentives and ensuring that DNOs are sufficiently rewarded, or penalised, for their continued expansion and value-add from the DSO role.

We believe it is crucially important to continue to incentivise DSO development and roll-out across ED3. Areas of importance as DSO flexibility matures will be:

- Focus on optimal application/use of flexibility.
- Continued development of services/products to bring dispatch closer to real-time (and thus more efficient and avoiding conflict with other system-wide services).
- Improved utilisation of the inherent flexibility in electricity grids, for example through reconfiguring sections of the network to release capacity.
- Expanding the consideration of smart networks to consider operational solutions to voltage optimisation and fault level deviations.
- Improving data-sharing to introduce more operational closer-to-real-time datasets that will help customers schedule their assets to avoid conflict, mitigate ANM curtailment, and

participate in both local DNO and wider NESO flexibility services. This may consist of network forecast information alongside network operational/topology details and market information.

- Actions taken to ensure generator curtailment due to ANM is minimised through efficient control schemes, and curtailment-mitigation flexibility.

Flexibility can be considered as a solution with both local distribution benefit and wider system benefit. We believe in a world where efficient, economic grid connections require occasional constraint/curtailment to avoid consumers paying for underutilised network capacity greater volumes of flexibility on the distribution network can be used to minimise grid curtailment from renewable sources. This is an untapped value of enhanced flexibility (and deployment of the digitalisation control solutions that facilitate that) which, with the correct market and constraint forecasting structures can be used to minimise curtailment and optimise operation of the distribution networks.

4.2 Q49. What should the role of the DSOs be in identifying and delivering whole system benefits?

Supportive and collaborative. DNOs have a responsibility to operate efficient, coordinated, and economical networks.

There will be two types of whole system benefits worth considering here, firstly those within the energy system but across vectors or licensees, e.g. Tx to Dx, in which case the DNOs role should be far more active. The challenge with these types of benefits is that the network companies are still ultimately assessed against each other, disincentivising collaboration where the greater benefits of an action accrue to another network operators customers.

The need for cross-license whole-system coordination is highly relevant given the nature of capacity/constraint management challenges and facilitating distribution connections in areas with a congested local transmission system. ED2 has successfully defined the “Technical Limits” approach to accelerate connections limited by transmission restriction. ED3 must incentivise DNO/DSOs to be proactive in advancing these arrangements, which will ultimately require collaboration with NESO and TOs (which should be similarly incentivised). For example, we see the refinement of Technical Limits, moving towards more dynamic setting of GSP export/import thresholds to reflect real-time transmission grid conditions, as an ‘easy win’ approach to improving grid capacity and connecting greater volumes of generation to the distribution system. All network parties however must be sufficiently incentivised to deliver this improvement.

The second form of whole system benefit is the broader social benefits or benefits to other sectors such as transport. While DNOs may, in some occasions, be positioned to identify these benefits it is more likely that experts within the sectors impacted by energy use can more clearly identify and

articulate the likely benefits. In these scenarios the role for the networks ought to be as collaborators and facilitators. At an early stage facilitation is supported through data sharing initiatives.

4.3 Q50. Our historic approach to publishing and sharing datasets has been stakeholder led and focused on establishing good digital foundations in the DNOs. With the rapid pace needed for enhanced data and digitalisation, should we instead be considering incentives around strategic priorities, such as network planning, flexibility, and connections?

ED2 has seen great improvements in the data that is published and shared by DNOs. That data sharing/availability is already incentivised and we strongly believe that the expanding the sharing of datasets and improvement in data quality, granularity, and relevance must continue.

As DSO markets evolve, the ongoing sharing of market data will become important for parties assessing value in participation and revenue stacking opportunities.

Sharing of network models and their relevance/quality will be increasingly important as FSPs and constrained customers look to perform their own forecasts of short and long-term grid constraint. At present the LTDS³ provides information that is relevant and allows development of 'static' models for study. We believe however that the more frequent release of information regarding network operating conditions can help generation/BESS customers schedule their operation to support wider grid conditions. ED2 has seen DNOs work towards inclusion of CIM models within the Long-Term Development Statement (LTDS) publication, however progression towards models suitable for third-party use has been very slow, this lack of progress has resulted in limited value to the developers and consultants that would use such models.

4.4 Q51. How can we enable greater development of internal digital expertise in its licensees?

Allowances for hiring digital experts and clear obligations to deliver digitalisation both internally and externally to stakeholders.

Determination on standards that are appropriate, e.g. CIM, to remove uncertainty and drive progress on adoption.

Ofgem should additionally seek to improve its own IT infrastructure and continue to upskill in this area. Ofgem appears to suffer from a similar challenge to the DNOs, data and digitalisation fall

³ Long Term Development Statement

outside its traditional remit and it has been equally slow to adapt to the need for greater digitalisation.

4.5 Q52. How should network companies use AI to improve network insight and decision making (both operating expenditure (opex) and capital expenditure (capex)) and how should we be encouraging this through the ED3 framework?

With great caution and with a clear understanding of where AI can deliver benefits and areas where benefit may be limited. AI is excellent at pattern recognition and can use this to create forecasts within certain parameters.

There is no underlying physics, or technical engineering in a Large Language Model and thus the application of AI to areas that require underlying technical models or planning/operational experience must be carefully considered. As with use of AI in other sectors, standards must be established to ensure security of DNO and customer datasets when being fed into AI models and processes.

There isn't a clear role for Ofgem to be encouraging or dis-incentivising the use of AI in the networks, focus instead on setting the right outcomes with the correct requirements for safety and security of the network.

4.6 Q54. Are there any factors particular to DNOs that facilitate or challenge deployment of innovation on their own and across networks?

We note that challenges that DNOs typically face given their role as the interface to the customer on the Low Voltage network: a more challenging level of stakeholder interaction is required which then requires very particular forms of innovation that require higher levels of stakeholder engagement to non-technical audiences.

Most DNOs started their journey establishing markets and DSO services in ED2 – a significant step for organisations that previously did not have such in-house expertise or technology to facilitate. This will continue to be a theme of innovation for DNOs going forward.

On the theme of data and digitalisation, DNOs are faced with enhanced complexity due to the sheer volume of assets and thus operational datasets that are available across their portfolios. The prioritisation of high-impact data capture and analytics (potentially with use of AI tools) is key for DNOs as they look to extract greater value from enhanced visibility of network for both planning and operations.

5 Appendices

Appendix 1: Document Control

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Appendix 2: Disclaimer

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