

SMPnet Response to Ofgem

Call for Input: The Future of Local Energy Institutions and Governance

May 2023

For the attention of Ofgem's DSO Governance team

SMPnet responds to Ofgem's consultation on The Future of Local Energy Institutions and Governance, which focuses on the roles and governance structures needed in a flex-centred energy system. SMPnet looks forward to the continued development of this consultation and is happy to clarify or discuss our comments with Ofgem further.

Network operations are impacted by the deployment of renewable and zero-carbon technologies, which means utilities must depend on various tools in their control room for the enhanced coordination of different network nodes and across voltage levels. These smart grid enablers, which include flexibility services, monitoring systems, real-time optimisation platforms and digital substations, will form the backbone of a digitalised and decentralised energy system and must operate as an optimised, integrated, and interoperable network of tools.

System Operators (SOs) are responsible for carrying out the real-time operation of their networks. In many areas, SOs have demonstrated a shift to a more advanced and digitalised way of operating their networks. Small-scale innovation projects have been key to this shift so far and have shown that SOs at a distribution level are well-placed and capable of continuing to carry out this role as networks decarbonise.

However, clear SO roles and responsibilities are needed to establish the required mindset and approach towards achieving the smart grid-enabled control room set out above. Specifically, the framework must enable System Operators to capture the benefits that proven technologies can deliver to a flex-centred energy system, allowing the shift from small-scale innovation trials to business-as-usual deployment. This foundation is therefore important to achieve a flex-centred energy system with distribution flexibility at its core.

Introduction to SMPnet and Omega's Role in distribution flexibility

Founded by Dr Anastasios Rousis (PhD, MSc, MEng) and Dr Dimitrios Tzelepis (PhD, MSc, BSc), SMPnet has developed an energy tech platform that offers tangible solutions to imminent network issues. The Omega platform is an adaptive and real-time control technology, which, when installed at distribution network primary and secondary substations, unlocks several benefits to a flexible, resilient system:

1. The technology provides unprecedented close to real-time visibility and network activity monitoring at a granularity of <20ms. These measurements enable a shift away from predictions and forecasts to understanding the true nature of network activity, including constraints.
 2. Omega can use this real-time monitoring capability to optimise and control primary and secondary substations dynamically to ensure networks comply with capacity limits, exploit unutilised capacity, and remove the need to disconnect renewable generation.
 3. Through a wide envelope of communications standards and protocols, including IEC61850 international standard, Modbus, DNP3, OpenADR, C37.118, IEC 60870-5-104 protocol, IEEE 2030.5, etc., Omega can connect and integrate across different systems and platforms, allowing data sharing, communication, and signals to be exchanged, including with other substations, Active Network Management (ANM), Distributed Energy Resource Management Systems (DERMS), Advanced Distribution Management
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Systems (ADMS), Supervisory Control and Data Acquisition (SCADA) systems and flexibility marketplaces.

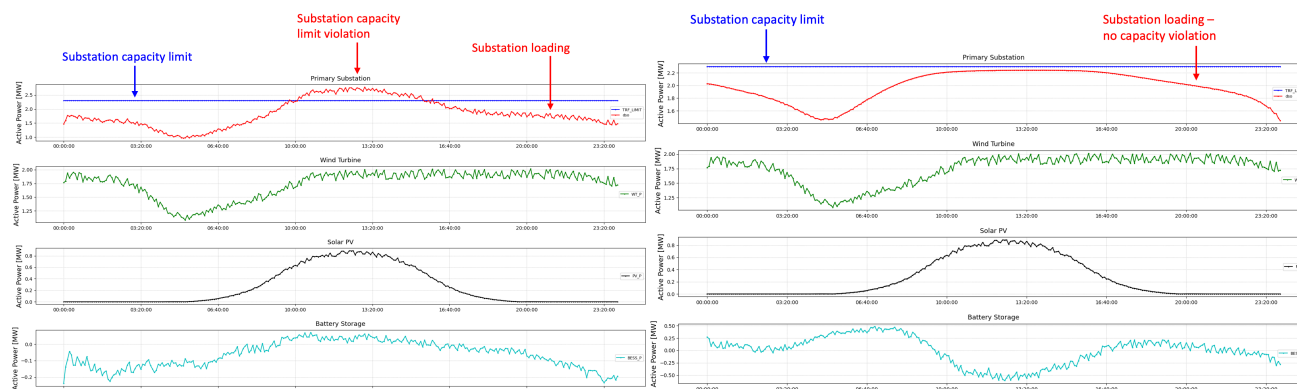


Figure 1. Operation of network comprising primary substation and DER assets downstream; without Omega (left) and with Omega (right)

The platform acts as an important smart grid enabler by unlocking the close to real-time network visibility needed to understand network capacity limits and other constraints, optimise and control assets at a substation level and downstream to alleviate any identified conditions as well as share relevant data to systems (such as DERMS) capable of using the data to initiate flexibility service requirements and dispatch. It benefits the wider system and utilities by helping them to:

- **Operate their networks:** monitor, optimise and control multiple network assets in real-time, supporting increased resilience and security of supply.
- **Deliver value-based growth:** optimising networks to reduce OPEX, defer network reinforcements, increase revenues through flexibility and maximise renewable energy asset integration.
- **Digitise:** these digital tools enable multi-vendor interoperability and unlock AI-based energy insights to inform planning schedules and operational regimes, creating a unified digitised platform for precise, optimised network management, much closer to real-time than what is currently achieved.

Response to Question

- Do you agree that DNOs should retain responsibility for real-time operations? If not, why not?

SOs should retain responsibility for real-time operations.

To date, SOs have demonstrated the experience and expertise needed for the real-time operation of their grids. Climate change-related extreme weather conditions has already caused challenges for distribution grid operation. For instance, a 40-degree heat wave in 2022 led to mainstream media outlets reporting risks of network damage, demand outstripping generation, disconnections, and blackouts in the UK:

- ITV July 2022: [Heatwave: Power networks monitoring the situation as Met Office issues red weather warning](#)
- iNews July 2022: [40°C heatwave pushed UK grid to the brink of blackouts with electricity demand close to outstripping supply](#)

Additionally, renewable generation and zero-carbon technology deployment mean that real-time monitoring and distribution flexibility is key in identifying and reducing network constraints and the need for network infrastructure reinforcements – ultimately providing a cost-effective solution for end consumers.

In many areas, these SOs have already demonstrated a shift to a more advanced and digitalised way of operating their networks to tackle the climate change-related issues facing network operations cited above. Examples of this include implementing new 'Engineering Recommendations' for the connection of renewable energy sources and the establishment of further protection and control settings for distribution systems, including EREC G59/3 and G99, which recognises the important role of plant controllability options for SOs connecting new assets. Small-scale innovation projects have also been key to this shift so far and have demonstrated that SOs at a distribution level are well-placed and capable of continuing to carry out this role as networks decarbonise.

However, the governance framework must enable System Operators to capture the benefits that proven technologies can deliver to a flex-centred energy system, allowing the shift beyond small-scale innovation trials to business-as-usual deployment. Examples of where this kind of shift is necessary include National Grid ESO's Distributed ReStart project and the UK Power Networks' project on Constellation, which aims to create revolutionary smart substations that free up capacity for renewable energy. Both these projects have explored the potential for enabling technologies to accelerate and advance network decarbonisation or resilience. How the networks aim to capture the benefits from these technologies and piloted projects moving forward in an integrated, interoperable, and coordinated way must be established within the governance framework.

Additionally, network operation will be optimised by integrating digital substations and network optimisation tools with the wider system of flexibility services. The governance framework for SO roles must deliver this.

Digital substations are core to delivering the visibility, monitoring, control, and communication across DERMS, ANM, ADMS and SCADA at the granular level required for a flex-centred net-zero energy system. These transformed substations will allow the real-time nature of network activity, even at a low voltage, to be understood and make it possible to identify capacity constraints or operational issues. Digital substations using common communications to align with DERMS, ANM and ADMS can determine where and when control of assets can be used to alleviate these issues and where and when flexibility services must be procured and dispatched to support reducing the spending on network reinforcements and upgrades, such as new substations.

A net-zero system will see periods where total substation loading exceeds capacity limits. Hence, visibility, monitoring and control across integrated networks and in communication with the system of tools, markets and services are important. Without this functionality, flexibility markets will continue to operate separately from other network systems, and their activity will be based on suboptimal data. The deployment and integration of digital substations with wider systems will be a key accelerator to delivering distribution flexibility as well as accessible, coordinated, and trusted markets that are optimised and provide value for consumers. The governance framework must deliver this.

About the Founders:

- Dr Dimitrios Tzelepis is a reputable engineer with core expertise in power systems control and protection. He is a co-founder of SMPnet and currently serves as its CTO. His work has involved the implementation of intelligent algorithms for control and fault management applications, including machine learning methods and advanced and intelligent signal processing techniques. Before co-founding SMPnet, Dimitrios led research projects sponsored by National Grid, ENA, SONI and NIE Networks, which have had a huge impact on UK networks through authoring and contributing to 'Engineering Recommendations' for the connection of renewable energy sources and establishing new protection and control settings for distribution systems, including EREC G59/3. He has also co-designed HVDC protection systems for General Electric, which have been patented and later commercialised. He has also played a leading role in the execution of national flagship projects in the UK, including Constellation, PHOENIX and EFCC, Distributed ReStart and VSM. Additionally, he has developed MVPs for other start-ups in the energy sector and has led relevant FAT activities. Dimitrios is currently occupying strategic roles in several technical committees to decarbonise the energy sector, including CIGRE, Global Smart Grids Innovation Hub of Iberdrola, and R&D Committees to draft and advance Grid Codes in Asia and Saudi Arabia. He has authored or co-authored over 50 research papers and patents.
- Dr Anastasios Rousis is a highly accomplished engineer-turned-entrepreneur who serves as the CEO and co-founder of SMPnet. His work at SMPnet is focused on breaking down the barriers to a sustainable energy transition, promoting digitalisation and decarbonisation in the process. With his vast experience working alongside C-level executives and thought leaders in the energy sector, Anastasios brings a unique perspective to the industry. Dr Rousis also serves as an advisor to the Greek government as a member of the Greek Sectoral Council for Environment, Energy, and Sustainability Mobility, which falls under the Ministry of Development & Investments. He is also a member of technical committees (including CIGRE and Global Smart Grids Innovation Hub of Iberdrola) challenging the status quo to realise a successful and cost-effective energy transition. Anastasios' academic credentials include two Master's degrees and a PhD from Imperial College London. He has had a leading role in significant research projects of the UK and European Commission, including the Power Potential (NG ESO) and EU SysFlex projects, respectively. He has authored or co-authored more than 25 peer-reviewed research papers and patents, laying the foundations for his recent work to revolutionise the energy world.

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