

# transition

Moving to a smart future



## DSO Functions Workshop

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Scottish & Southern  
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# Executive Summary

TRANSITION is an Ofgem Electricity Network Innovation Competition (NIC) funded project led by Scottish and Southern Electricity Network (SSEN) in conjunction with our project partners Electricity North West Ltd (ENWL), CGI, Origami and Atkins. As part of this project SSEN delivered a workshop to engage stakeholders on the Distribution System Operator (DSO) required functions. This reports details what those functions are, how they were described and demonstrated to the audience. SSEN sought feedback on how it could best carry out these functions and from this were able to draw recommendations on priorities that the DSO could implement to improve its service. The key areas for improvement for the DSO to review were standardisation of flexibility services including contracts; ensuring transparency and data availability; a guarantee of a fair price for flexibility services and implementing a consistent, conflict free, approach for DSOs interaction with Local Area Energy Plans. SSEN will take these learnings forward as it delivers on its DSO function in RIIO-ED2 regulatory price control and with other DSOs in the Energy Network Association Open Network Project.

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## Introduction

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The transition from Distribution Network Operator (DNO) to DSO and the enablement of local energy markets requires a proactive involvement of not only the DNO, but of all stakeholders, such as local authorities, providers of flexibility services, including suppliers, aggregators, distributed generators large demand customers and, potentially residential customers.

TRANSITION held a workshop on the 26-Oct-22 with relevant stakeholders to:

- increase their knowledge of flexibility services and associated operations
- enable overall engagement in the discussion on DSO functions
- understand their views on the three functions of the DSO

The event welcomed around 20 attendees from a variety of organisations, including National Grid Electricity Distribution, the Department for Business, Energy and Industrial Strategy, Scottish & Southern Electricity Networks, Electricity North West, flexibility providers and research organisations (University of Oxford, Environmental Change Institute).

The original remit for the workshop was to consider different market models<sup>4</sup> for flexibility services. This work is likely to change as a result of the ongoing work with “Call for Input on Future of Local Energy Institutions and Governance” (Ofgem)<sup>5</sup> and the “Review of Electricity Market Arrangements” (BEIS)<sup>6</sup>. It was therefore decided that more value could be obtained by focusing the workshop on the roles of the DSO contained in that paper as they would be applicable to any future market model.

The workshop was structured around three main areas:

- A case study to explore how flexibility can support network growth.
- A trading game (see section 0) to explore the decisions of participants in different market settings with increasing competition.
- A round table discussion to explore how four market roles (flexibility providers, Electricity System Operator, Local Government and Customers), interact with the three DSO functions which TRANSITION has categorised below based on Ofgem’s Call for Input on Future of Local Energy Institutions and Governance<sup>2</sup>:
  - energy system planning** – the integration of network planning for electricity, gas and heat with local area planning to identify and deliver the most cost effective decarbonisation solutions to deliver Net Zero;
  - market facilitation of flexible resources** – focused on alleviating constraints and supporting network restoration after supply interruptions (linking with peer-to-peer and wholesale markets over time); and
  - real-time operations of local energy networks** - managing real-time electricity flows on the distribution network, using flexible resources to alleviate capacity constraints.

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<sup>4</sup> [High-Level-Solution-Design-Summary-v1.pdf \(ssen-transition.com\)](#), published by SSEN, November 2019

<sup>5</sup> [“Call for Input: Future of local energy institutions and governance”](#), published by Ofgem, 26 April 2022

<sup>6</sup> [“Review of Electricity Market Arrangements Consultation Document”](#), published by BEIS, July 2022

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## Workshop Methodology

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The following sections discuss in more detail how the DSO functions were described, demonstrated and feedback on these functions sought.

### A Case Study in how flexibility can support network growth

A case study was presented for connecting two developments to the DNO network:

- A hydro generation development connected at 33kV that would accelerate network issues during winter peak demand time due to its low generation profile during daytime.

- A housing development with a significant amount of rooftop solar PV that overloaded the LV network during summer generation peak<sup>7</sup>.

Two possible solutions to the above issues were discussed. For both developments:

- the connection could be delayed until the network was reinforced but this would delay the developments; or

- use flexibility services or flexible connection to enable the early connection for these schemes until the relevant network reinforcement was completed.

There was a high level of engagement from attendees during the discussion. This covered; the duration of flexibility need, at what point the DSO will have more certainty of future growth, and how the DSO can determine, contract and procure the optimal level of flexibility for the period between connection of the developments and commissioning of the network reinforcement. The success of this engagement is reflected in the positive feedback received from attendees, as shown in the feedback section of this report.

### Trading of flexibility with increasing competition

Attendees at each table were asked to consider being an owner and / or operator of a Distributed Energy Resource and the price they would require if delivering flexibility services. The aim was to provide attendees with the experience of the strategic decision making and to make them aware of the underlying assumptions faced by real-world flexibility providers. There were three rounds with increasing market participant / capacity and changes in pricing mechanisms; the winner was the participant with the highest average price throughout the three rounds.

The main outcome of the game was understanding how bidding decisions can vary between market participants and across time:

- Round 1 – attendees had to determine the offer price for their flexibility when the market has a capped price, little competition (5 flexibility providers) and very low market liquidity (offered volume is below requested volume). Most prices were at the price cap, although two prices were marginally below.

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<sup>7</sup> A period of low demand and high solar generation, usually midday during the summer months.

Round 2 – the price cap was removed, the market liquidity almost doubled (above the requested volume), and competition doubled (10 flexibility providers). Most offer prices were around the level of the price cap used in the previous round. One offer price was significantly above the previous price cap and was rejected even though this meant the requested capacity was not met.

Round 3 – further increases in competition (15 flexibility providers) and market liquidity (significantly above the requested volume) resulted in lower offer prices. Five offers were rejected due to the level of liquidity being 50% over the requested volume. The maximum price offered was half the maximum price in Round 2 due to historic market data and the effect of increased competition.

## Round table discussions on interaction between market roles and DSO roles

The round table discussions involved allocating an energy industry role to each table and asked them to consider how it interacts with the three possible DSO functions. The market roles allocated to the five tables were: Electricity System Operator (ESO) / Future System Operator (FSO), Local Authority, Customer and (two) Flexibility Provider(s).

The three DSO functions are: planning, market facilitation and real-time operation. For ease of discussion market facilitation was grouped with operational activity (although it is recognised that services may be procured years ahead), to enable two round table sessions:

**System Planning** – the definition, roles and scope of the Local Area Energy Planning (LAEP) were provided to attendees who discussed several questions from the viewpoint of their assigned industry role. The details provided included the ambition of the LAEP, an evidence-based system approach used to define a long-term vision and near-term actions and projects to meet Net Zero targets in the local area. The details provided also included the challenges of the LAEP, e.g. its reliance on a collaborative approach requires detailed design and high-granularity data from many stakeholders. The questions discussed included identifying the group responsible to produce the LAEP, discussing how the LAEP affects existing responsibilities, e.g. Ofgem ED2 requirements and security of supply, and identifying data requirements.

**Market Facilitation / Real-time Operation** – the definitions of the other two DSO roles were provided to attendees who addressed questions from the viewpoint of their given role. For the Market Facilitation role the emphasis was on the DSO's responsibility to ensure a fair and transparent marketplace with a variety of services that could provide multiple revenue streams, addressing potential conflicts with the ESO and to provide data to flexibility providers for them to build a business case. For the Real-time Operation the emphasis was on the DSO's responsibility to ensure reliability, security and stability of local networks and to efficiently instruct the delivery of flexibility services. The questions discussed included the scope of standardisation in flexibility markets for different elements such as contracts, services etc, the type of DSO data and information that market participants would find most useful in decision making and how different market participants define fair prices.

The discussion provided a wider perspective of the DSO functions. A summary of the outcome of the round table discussions is provided in the Appendix.

## Feedback on Workshop

Feedback for the workshop was solicited through sli.do questions by either ranking areas on a scale of 1 (poor) to 5 (good):

### Case Study:

Attendees found this presentation and discussion Informative and helpful in understanding the effect of a new connection on a DNO network. This area scored 4 out of 5.

### Trading of Flexibility:

Attendees found this activity very engaging and informative. The discussions helped understand key aspects of flexibility markets from different perspectives and the relative importance of some factors, e.g. operation and maintenance costs. This area scored 4 out of 5.

### Round table discussions:

Attendees were surprised at how relatively uninterested some roles were in areas discussed; customers cared about the effect of Net Zero on costs but did not have strong opinions on LAEP while flexibility providers were uninterested in the LAEP they were very interested in the translation of the outcomes into a need for flexibility services. The LAEP section was determined to be the most informative area as few attendees were aware of this area; one participant found the explanation provided to be the most articulate they had seen and asked for details and presentation materials for use within their organisation. The word map in Figure 1 was created from the discussion on the other factors the DSO should take into consideration when planning network development. This area scored 3.28 out of 5.



Figure 2 Factors to be considered in network planning

## Conclusions

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The diverse backgrounds of attendees helped build a comprehensive mapping of stakeholders that can and should inform the LAEP. The main conclusions of the workshop are summarised below.

**Standardisation** - the perceived benefits of standardisation include reduced costs, increased transparency and greater participation. There was a strong appetite to standardise elements of the flexibility market including contracts, trade duration and baselining.

**Transparency and data availability** - these are important to market participants and can affect fair pricing of flexibility, e.g. flexibility providers would welcome details on the local flexibility market to help them make better informed decisions.

**Fair price for flexibility** – allowing flexibility to be rewarded for the value associated with the delivery of flexibility and not just the price received from the buyer of the flexibility service is important to all market participants, e.g. delivering benefits to other market actors (addressing supplier imbalance), and non-financial benefits need to be considered, e.g. reducing national and local CO<sub>2</sub> emissions (contributing to Net Zero targets) and improving local air quality (increasing life expectancy). Three specific areas were identified:

There should be fewer restrictions on market participants to stack services.

Prices may need to be differentiated to reflect the market risk of market participants.

Prices should reflect the wider benefits resulting from the delivery of flexibility.

### **Leading LAEP implementation**

Local Authorities were considered ideally placed to oversee the development and implementation of the LAEP but would require an explicit mandate to do so, a roadmap with specific skill needs and funding to deliver. In addition, there is a need to clarify the contributing organisations (and their roles), responsibilities, and funding source.

## Recommendations and Next Steps

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It is recommended the following activities are progressed with the Energy Network Association Open Network Project (ENA ON-P) to maximise the benefits from the workshop:

**Standardisation** - to increase DSO service attractiveness by further standardising services within flexibility markets (FSA, products and services) to reduce the burden of market participants, particularly those engaging with several DSOs; consider reinforcing the TEF “Product Catalogue” report.

**Transparency and data availability** - to standardise the type and range of data shared and exchanged in respect of DSO flexibility markets; consider including the ESO flexibility markets.

**Fair price for flexibility (Common Evaluation Model)** - to review the application and use of the Common Evaluation Model to determine what changes (if any) are required to; (i) standardise the valuing of a premium to reflect the optionality value of flexibility when the future is uncertain, (ii) determine what other factors should be included, e.g. carbon evaluation, and (iii) to align with the wider use of flexibility during ED2.

**Fair price for flexibility (service stacking)** – to review the approach towards the stacking of flexibility services to make the provision of flexibility more attractive to potential market participants.

**Fair price for flexibility (prices)** – to determine how flexibility providers could be rewarded for the wider benefits resulting from the delivery of flexibility; this activity could include engagement with ESO and market participants (directly or through third parties).

**LAEP** – to determine how DNOs / DSOs standardise their interaction with the LAEP process and how to address any conflicts with ED2 development plans; this activity could include engagement with ESO and government agencies.

Following on for this workshop TRANSITION will work the Project LEO<sup>8</sup> consortium to understand the business models of potential DER flexibility providers and their finding on participating in flexibility market trials. This will be used for further recommendations on how the DSO can improve its market facilitation and operations functions.

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<sup>8</sup> [Home - Project LEO \(project-leo.co.uk\)](http://project-leo.co.uk)



## Appendix: Summary of Round Table Discussions

The workshop included two round table discussions for the DSO roles.

In the first discussion the attendees explored the interactions between their assigned role and the **planning role** of the DSO.

### Who has the responsibility to produce the Local Area Energy Plan?

main responsibility with the Local Authority and the electricity and gas network operators  
 many parties are directly impacted and can provide critical input  
 there is scope for main lead and secondary lead  
 implementation should be combination of top-down and bottom-up: the national government should produce a blueprint framework that can be localised for individual LAEPs, while empirical data available at local data should feed into bottom-up forecasting models  
 there is asymmetry or reasons for getting involved: some organisations have an obligation to take a certain role, while others may be motivated by vested interests  
 ensuring neutrality becomes critical; this can be financed by a collaboration of gas and electricity networks

### What other institutions should feed into or support the Local Area Energy Plan and how?

relevant stakeholders include the gas and water networks, (commercial and residential) construction industry, district heating providers and major employers, social landlords, community groups  
 stakeholders can provide critical input: for example, environmental agencies can provide information on areas with expected high heat episodes and the construction industry can use this information in including appropriate insulation in the development projects

### How does the Local Area Energy Plan interact with national and strategic planning including transmission - distribution planning?

the interaction is assumed to follow a combined top-down / bottom-up approach; for example, attendees expect funding to be provided top-down, while data on localised needs will be provided bottom-up  
 a bottom-up approach is needed to ensure increasing convergence, as the process advances aggregated outputs from all LAEP will need to provide data and information as inputs to develop investment cases for national infrastructure

In the second discussion the attendees explored the interactions between their assigned role and the **market facilitator and real-time operations roles** of the DSO.

**What elements of the ESO / FSO and the DSO flexibility markets should be standardised, e.g. contracts, services, delivery windows, time horizon?**

most of them, with a few exceptions, e.g. delivery windows, procurement and time horizons standardisation reduces cost and time (e.g. by removing the need for external specialist advice or the time to approve the FSA by different market participants for each DSO)

elements to particularly benefit from standardisation include: contracts, baselining methodology, market platform, network data platform, interface, terminology in particular

standardisation increases the ability to transact with multiple parties

introduction of framework contracts is very welcome, to allow for a certain degree of flexibility

**What data and information should the DSO provide to market participants to enable them to make informed decisions on participation in LV flexibility markets and increase market liquidity?**

due to early stage of the market, there is not a consolidated historical database. For this reason, there is considerable uncertainty on optimal bids for utilisation and availability

all data that reduces uncertainty is welcome, e.g. total capacity in a given area, historical participation profiles of different assets, cost savings due to the flexibility provided, information on constrained substation etc.

**How can we ensure a fair price for flexibility that reflects its value to the network and system (including stacking of services) without overburdening network customers?**

whole system benefit is considered and if interactions are needed by ESO and DSO this is done in a transparent manner

fair price is proportional with cost savings due to deferred reinforcement

weight of operational costs is important to both the DSO and providers; the current rates that providers receive do not support the business case

fairness is defined differently to different stakeholders: DSO, providers, customers