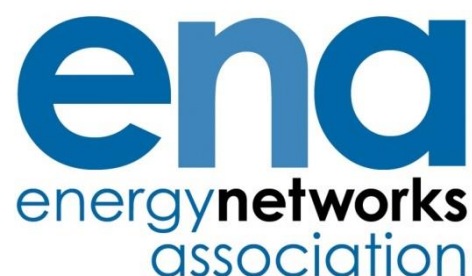


The Voice of the Networks



Open Networks Workstream 1 (T-D Processes)

Product 2: DER Services Procurement Deliverable 2.1: Review Key Learnings

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1. Introduction

As part of the Open Networks Project's Phase 2 plan for Work Stream 1 (T – D Processes), Product 2 (DER Services Procurement) seeks to develop the commercial principles and methodology to enable efficient access to services from Distributed Energy Resources (DER) to manage both transmission and distribution networks. This will require a framework for coordinated procurement, contract visibility, conflict resolution and service optimisation across both transmission and distribution networks, to drive efficiency.

Product 2 has five key deliverables:

- 2.1 Review key learnings from external & earlier Open Networks activities, including the 2017 (Commercial Principles) consultation;
- 2.2 Establish the end-to-end process to roll-out of ancillary services in distribution networks. This should include communications and data transfers;
- 2.3 Establish mechanisms for the efficient shared procurement of services from DER providers;
- 2.4 Establish process to assess and resolve operational conflicts that might arise through flexible DER connections; and
- 2.5 Define DSO Products.

This report constitutes the first deliverable (2.1) of Product 2. It sets out relevant work previously undertaken; both within the ENA and externally, the key learnings of which will be used to inform the development of processes for the efficient procurement and use of DER services.

2. Summary of work relevant to Product 2

The following items of previous and current work have been identified as having the potential to inform the work of the Product 2 work group:

1. Previous and ongoing DNO Service Procurement activities;
2. Outputs from the ENA's Shared Services Group;
3. Previous work delivered under Phase 1 of the Open Networks project (including responses to its 'Commercial Principles' consultation);
4. Feedback from the ENA's consultation on Phase 2 scope for Open Networks
5. National Grid's System Needs and Product Strategy (SNaPS); and
6. Feedback from Regional Development Programmes between partner DNOs and National Grid.

The remainder of this section looks in more detail at the insights each of these items should provide for the work of the Product 2 work group.

2.1 Previous and ongoing DNO Service Procurement Activities

Different DNOs face different operational challenges, and have sought to tackle these using a range of different tools and techniques – including those developed as a result of Network Innovation Allowance and Network Innovation Competition-funded initiatives. A number of DNOs have sought to harness flexibility available from connectees to their network, and in doing so have specified the type of services they are interested in procuring, as well as designing processes to do just that.

Table 1 summarises feedback on DNO service procurement activities received from members of the Product 2 work group. *Each of the initiatives in the table should be able to inform the products to procure and the processes by which they may be procured, with some also providing insights into stakeholder engagement and managing potential conflicts between service utilisation and network capability.*

Table 1: Previous and ongoing DNO Service procurement activities

DNO Licence Area	Details
Electricity North West Limited	<p>Between 2008 and 2015 ENWL undertook a number of trials purchasing a range of demand side response products directly from customers and via aggregators. To date ENWL has purchased demand response, generation response and post fault demand response i.e. customers who contractually agree to remain off supply in fault outage conditions thus allowing non-contracted customers to be restored from the post fault capacity. These services are generally purchased with existing connected customers, through amendment to the connection agreement, but ENWL also offers new connectees the option of flexible connection arrangements that incorporate response requirements. These trials successfully deferred reinforcement until such time as the DSR was no longer required.</p> <p>In April 2018 ENWL issued an Expression of Interest seeking services from customers (ie generators, consumers, and electricity storage connected to our networks) with the flexibility to increase exports (generate more) or reduce imports (consume less) when instructed.</p>
Northern Ireland Electricity Networks Limited	<p>NIE Networks have not previously been directly involved in any procurement of system services exclusively for DNO usage, however they have been involved in some capacity in the TSO (SONI/Eirgrid) system services tender process where the service is connected to their distribution network. Their role in this process is to inform the TSO on the suitability of each individual D connected site on their capability of providing system services and placing any restrictions on these sites. The TSO then takes these findings and input this detail into their procurement decision process.</p> <p>Going forward, NIEN has a number of trials proposed to prove different technologies connected to the D-system that ultimately they would be tendering for under system services as part of the DNO-DSO transition. These trials will include a range of different types of services (fast frequency response, VAr provision etc.).</p> <p>(Further detail on specific services up for trial is not yet available, as as each project has to be approved individually by the NI Utility Regulator as per the RP6 price control. NIEN are still in the very early stages of considering what services they wish to trial - and where on the network to trial them).</p>
UKPN: London Power Networks plc; South Eastern Power Networks plc; Eastern Power Networks plc	<p>Flexibility</p> <p>Recruitment of DER to provide flexibility in network areas where flexibility can be an alternative to asset intervention. Key areas of feedback relate to DER's conflicts of service with the Ancillary Service (AS) and their ability to stack revenues. Additionally,</p>

DNO Licence Area	Details
	<p>DER raised their preference to avoid very short term contracts. Also, DER expressed their familiarity with a payment mechanism that combines an availability and utilisation fees. These indicate the need to resolve conflicts of services and provide visibility of future revenues in a consistent manner.</p> <p>Power Potential</p> <p>Recruitment of DER to provide reactive power services to the Transmission System Operator at the transmission/distribution interface (Grid Supply Points) through a reactive power market. The participating DER's reactive power service will be competing with transmission assets and transmission connected generators providing reactive power. Learning from Power Potential will feed more broadly into the Open Networks Project once it is available.</p> <p>Regional Development Programme</p> <p>Recruitment/engagement with new generation to connect to the South-East Coast network area through a "Deep Connect and Manage" approach. Existing connected generators can also participate. The project aims to release new capacity in the system, through visibility and controllability of DER output, to alleviate transmission constraints. The project involves compensating DER for their curtailment. Learning from the technical and commercial elements of this aspect of the UKPN RDP will feed more broadly into the Open Networks Project once it is available.</p> <p>Flexible Distributed Generators</p> <p>Rolling out of flexible connections as an alternative to reinforcements, which would otherwise be required to accommodate firm access to the distribution network for (mainly generation) customers. This is similar to RDP, but for distribution constraints and does not involve explicit compensation as in RDP.</p>
<p>WPD: Western Power Distribution (East Midlands) plc; West Midlands plc; (South West) plc; (South Wales) plc</p>	<p>FALCON LCNF trial in Milton Keynes</p> <p>Procured demand turn down and generation turn up across 2 seasons. Following limited success in the first season, the second season showed significant improvement in both volume and reliability. This was mainly due to the move to week ahead notification. The key learning from trial was:</p> <ul style="list-style-type: none"> - The importance of considering the wider ancillary services market to understand conflicts - The improved reliability gained from longer notice periods for calls - In order to solve an issue at one voltage level, you need to contract with participants at the level below. <p>SYNC-DTU</p> <p>Involved the joint procurement of Demand Turn Up with National Grid to solve generation led constraints. The coordination worked in theory with a bilateral in place</p>

DNO Licence Area	Details
	<p>between WPD and National Grid. The project was limited however by the limited capacity available in the target area. Whilst good volume was available across the country for National Grid, the volume in generation constrained DNO networks was limited.</p> <p>Entire</p> <p>Looking at an alternative procurement method, instead of joint procurement, we are looking to design a complementary service to fit around existing services (mainly a flexible STOR contract). Aimed at demand turn down or generation turn up. The trial is going live in April 2018.</p> <p>Local Energy Market</p> <p>Looking at the communication of our requirements to a flexibility platform through the Cornwall local energy market via our Plugs and Sockets NIA project</p> <p>Trials on domestic DSR</p> <p>There have been a number of domestic DSR trials. This is not a priority area for WPD at the moment as the trials suggested that domestic DSR market is not yet mature enough to provide a credible alternative to network reinforcement, requiring key enablers like HH metering, Time of Use tariffs and automation to be in place first.</p>
<p>Scottish & Southern Electricity Networks (Southern Electricity Power Distribution, Scottish Hydro Electricity Power Distribution, Scottish Hydro Electric Transmission)</p>	<p>NTVV (New Thames Valley Vision)</p> <p>Secured ADR (Automated Demand Response) services from 30 large commercial sites, utilising BMS (Building Management Systems) operated through an aggregated control platform to provide LV demand balancing.</p> <p>Over 1000 trials run within the ADR elements, including up to 4 hour shedding events, these trials were successful both for impact on LV networks and positive feedback from commercial sites providing response. Barriers to BAU rollout for these types of services include the immaturity of markets, inability for DNO's to incentivise these services (lack of commercial relationship with connected customers) and low values related to LV reinforcements resulting in low incentive levels. A point to note is a number of the 30 commercial customers retained the BMS & control system links post project completion for financial benefits derived from independent aggregation services.</p> <p>Also trialled domestic demand management through thermal storage and PV systems. The domestic approach proved ineffective due to high installation costs vs impact on LV network, however customers benefitted directly by utilising more energy generated through PV cells (thus reducing bills) and more efficient domestic heating. .</p> <p>NINES (Northern Isles New energy Solution)</p> <p>Implemented DDSM (Domestic Demand Side Management) services from 234 homes through the incentivised installation of new storage & hot water tanks supplied by Dimplex, controlled through the advanced ANM system installed on Shetland. The approach provided a positive network benefit across the aggregated project population</p>

DNO Licence Area

Details

and highlighted the potential balancing potential of the UK electrically heated population. However, the cost of system and installation is too expensive for BAU roll-out despite the wider benefits to customers, such as reduced energy consumption and improved comfort levels (as per domestic elements of NTVV)

CMZ (Constraint Managed Zones)

SSEN's BAU initiative to commercially secure demand management/power injection services to defer/avoid network reinforcement is a first for UK DNO's. The CMZ is a procurement based, technology agnostic approach which has been developed from learning generated through innovations projects such as NINES & NTVV and wider industry approaches. Offering both Utilisation and Availability payments for a MW response within a specific, seasonal service window, with figures calculated from a percentage of the cost of reinforcement. The CMZ service is designed to generate an NPV for the DNO deferring investment while encouraging flexibility and providing value for money for UK customers.

To date 2 ITT's (Invitation To Tender) have been issued totalling 19 MW's released to potential market solutions across 4 network zones, one of these tenders is still live with planned completion expected in May.

The CMZ approach has proven complex, key issues have included;

- A lack of a mature 'distribution focussed' services market
- Complex procurement processes which could exclude a large proportion of smaller commercial and community customers from engaging with CMZ
- Low levels of pre-existing or connected resources responding to tenders
- High value/reward expectations from responding suppliers
- Complexity of contractual agreements and IT requirements for management systems

Despite these issues SSEN has continued to progress and is committed to continuing CMZ development, including a more localised, socially beneficial approach alongside the current more commercially focused initiative and expects further tender releases later in 2018.

SSEN is compiling a CMZ report which we expect to release in July 2018, the report will review lesson learnt and provide knowledge sharing for the wider industry, the report release will be supported by engagements with industry partners and key stakeholders.

DNO Licence Area	Details
<p>Northern Powergrid</p>	<p>Northern Powergrid provides flexible connections to generators wishing to connect to congested areas of the network. These range from basic inter-trip schemes to more complex active network management (ANM) solutions. There are four active network management zones active currently.</p> <p>Northern Powergrid has not yet had the need to go to market for the provision of flexibility services for demand reduction as an alternative to network reinforcement. However, it is preparing to go to market for peak load shifting flexibility services from industrial & commercial (I&C) customers. The Customer-Led Network Revolution project undertook trials at both the I&C level and the residential customer level between 2012 and 2014 in order to gain experience on the use and effectiveness of this approach. The demand response tested mainly involved sites turning up generation to supply on-site load although there were sites that were able to provide the service using flexible load capabilities.</p> <p>The residential trials are currently being undertaken as part of the Activating Community Engagement (ACE) project. This is using gamification to elicit load reductions from engaged individuals playing Gengame for prizes and it has been successful at recruiting participants using targeted social media. Whilst the individuals load reductions per customer are relatively small using today's appliances it is thought that this approach could provide network support if played by the future owners of electric vehicles.</p> <p>Flexibility is also being trialled on other Northern Powergrid projects where commercial aggregators are trading from distributed energy resources with the national System Operator to understand the local issues and opportunities for customers. These trials include trading from an HV connected 2.5MVA battery, community energy domestic batteries twinned with solar panels and widespread demonstration of vehicle to grid services.</p>

2.2 Outputs from the ENA Shared Services Group

The ENA's Shared Services Group was established in [2014] to provide an electricity network operator perspective of how Demand Side Response (DSR) could be utilised by different parties. It delivered proposals for the types of services DNOs may require to manage their networks, a shared services framework to manage interactions between DER services procurement for both transmission system operation and distribution network management, and a list of further work it thought should be undertaken.

On DNO/SO Service Compatibility, the Group compared potential DNO flexibility service needs against existing SO balancing services, to identify both compatibility and conflicts – but only in terms of direction of energy delivered. If direction of energy requirement is the same, the Group suggested that services could potentially be shared. No consideration was given to whether existing processes are conducive to service sharing.

The output of the Shared Services Group should be able to inform the products to procure and the processes by which they may be procured, and managing potential synergies and conflicts between service utilisation and network capability at both transmission and distribution level.

The Group recommended further work is done on a number of issues, all of which are captured within Open Networks Phase 2. With the exception of (1) below, all are being progressed within this Product 2:

1. **Requirement setting** – understanding transmission and distribution service needs, and aligning where possible (*the distribution element of this is being progressed under WS1 Product 6: Regional Service Requirements, with the transmission element ongoing via National Grid’s System Operability Framework and SNaPS work*);
2. **Operational and Planning notifications** – level of communication needed between transmission and distribution regarding service availability, call-off, etc (note that technical elements of this work are being progressed via WS1 Product 13: Operational Data and Control Architectures);
3. **Commercial/Payment** – who pays to meet shared needs;
4. **Contractual Issues** – exclusivity, defaults, frameworks; *and*
5. **Data Sharing** – visibility of service use, location of DER (*this work will need to align with relevant broader initiatives relating to service information and transparency*).

As this work was not progressed by the Shared Services Group, its insights will be used to help frame the issues that the Product 2 work group is tackling.

Regarding stakeholder engagement, the Shared Services working group initiated in April 2014 a stakeholder consultation to get feedback on its proposed shared services framework to inform the terms of reference for the group. From the feedback received, it noted the following highlights for further consideration:

- There was support for consulting with a wider range of stakeholders on any future work (including, but not limited to, energy suppliers, aggregators, Ofgem and BEIS); and
- A demonstration or trial project is a sensible next step to the work carried out so far. Since the consultation, trials have been initiated through Regional Development Programmes by National Grid with UKPN and WPD, with a desire to undertake further trials with other DNOs.

In line with the feedback received it is expected that there will be key elements of the work of the Product 2 work group that will benefit from broader stakeholder engagement, including for example how to baseline availabilities for the purposes of understanding service capability and facilitating service settlement. The Product 2 work group will identify such opportunities through the course of its work and use appropriate forums to engage.

2.3 Previous WS1 (Phase 1) work

2.3.1 Phase 1 Product 5 (Coordination in an Operation Timeframe)

This product aimed to identify key principles of operability on a transmission - distribution basis (irrespective of DSO 'world') and to define the co-ordination activities required across the transmission - distribution boundary to deliver whole system outcomes. This included:

- Process and responsibility mapping for co-ordinated control systems;
- Design of inter-control room interfaces;
- Information exchange for constraint management on a real-time and planning basis;
- Facilitation of harmonised constraint mitigation and T-D flexibility services;
- Ensuring network security / resilience is maintained; and
- Updating the ANM Good Practice Guide to include Demand-Side Response and other flexibility services.

Much of this work was technical in nature, and so will be factored into ongoing developments under WS1 Product 13: Operational Data and Control Architectures. However there are close links between the technical work of P13 and the commercial work of this Product 2, so necessary links will be made.

2.3.2 Commercial Principles consultation responses

The ENA consulted on “Commercial Principles for Contracted Flexibility: Promoting Access to Markets for Distributed Energy Resources” in 2017, receiving 29 detailed responses from a range of stakeholders. These are available on the ENA’s website, alongside a summary of the key themes and messages from those responses, which included:

- An emphasis on the importance of multiple routes to market;
- That aggregators have an important role to play in enabling and simplifying market access for DER;
- That coordination between T and D at both an operational and commercial level is fundamental to greater DER participation in markets;
- That T/D network requirements and market opportunities need to be clearly articulated;
- A clear desire to avoid different approaches across DSOs, to promote consistent services and user experiences; and
- A general expectation that respondents and broader industry would be involved in ongoing developments

The Product 2 work group will ensure that these themes, and the detailed responses that drive them, will be appropriately captured in its work.

2.4 Responses to Open Networks Phase 2 Consultation

In January 2018 the Open Networks Project consulted on its Phase 2 work programme. The consultation lasted four weeks; and a public webinar was held on 15th February to provide additional context to support consultation responses. In total, eighteen written responses were received from a wide range of stakeholders.

A key theme in the responses was around standardisation of services and alignment with ongoing National Grid service developments – in a similar vein to last year’s Commercial Principles consultation responses. The ENA summarised comments relevant to this topic as follows:

- Standardised services, products and a single set of arrangements are important for market simplicity;
- [It might be beneficial to] have a separate product to standardise DSO processes to ensure focus; and
- [There needs to be] consistency and alignment with other work e.g. National Grid’s System Needs and Product Strategy [work].

The Product 2 work group will ensure that these themes, and the detailed responses that drive them, will be appropriately captured in its work. It is noted at this stage that it will be important to be clear on what we mean by standardisation, and how we balance consistency with practicality across different distribution regions with different operational needs; however the consistency and simplicity of arrangements when viewed from DERs’ perspective will be paramount.

The Product 2 work group will also seek to ensure that WS3 (DSO Transition) takes account of relevant ‘key enablers’ for DSO use of services from DER in its deliverables.

2.5 System Needs and Product Strategy (SNaPS)

National Grid’s SNaPS gives more information on its future system needs, and consulted on how it can best facilitate the evolution of future balancing services markets. It noted that a key element of this is for it to work closely with distribution network colleagues to understand how best to facilitate a whole system approach to managing the network, ensuring parties at all levels of the system have the appropriate access and routes to market.

A key element of the work of the Product 2 work group will be around how transmission and distribution services interact, so it will monitor ongoing SNaPS-related work and ensure relevant links are established and maintained.

2.6 Feedback from Regional Development Programmes

Regional Development Programmes cover a range of topics pertinent to the aims of the Open Networks project, and seek to share learning to inform ongoing developments. Of direct relevance to the work of the Product 2 work group are the following initiatives:

- a ‘back-stop’ pricing approach to DER managing transmission constraints, being implemented in UKPN’s South Coast and WPD’s South West region, which works in conjunction with revisions to connection agreements to deliver visibility and controllability of DER output;
- a whole-system approach to balancing services procurement, developed with UKPN, which highlights key points where enhanced transmission and distribution interactions can support more efficient procurement of services from DER; and
- trials to demonstrate the pros and cons of different approaches to managing the risk that distribution network restrictions might impact delivery of balancing services from DER to the transmission system (UKPN will trial a ‘DSO-led’ approach, whilst WPD will trial a ‘TSO-led’ approach. This work also has close ties to WS1 13: Operational Data and Control Architectures.

Learnings from the RDPs will provide a key input into the work the Product 2 work group will undertake to establish an efficient, consistent approach to procurement of distribution services across GB, and the management of interactions in terms of procurement, utilisation and settlement of services.



3. References

This section contains link to relevant source material that will support the work of the Product 2 work group.

Open Networks Work Stream 1 work:

<http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-workstream-products.html/workstream-1-t-d-process.html>

Open Networks Consultations:

<http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-stakeholder-engagement/public-consultations.html>

DSO Service Procurement Initiatives:

UKPN Flexibility Service: <https://www.ukpowernetworks.co.uk/internet/en/have-your-say/listening-to-our-connections-customers/flexibility-services.HTML>

WPD Flexible Power (constraint Management Zones):

<http://www.flexiblepower.co.uk/>

ANM Good Practice Guide:

http://www.energynetworks.org/assets/files/news/publications/1500205_ENA_ANM_report_AW_online.pdf

National Grid SNaPS:

<https://www.nationalgrid.com/sites/default/files/documents/8589940795-System%20Needs%20and%20Product%20Strategy%20-%20Final.pdf>

National Grid Future of Balancing Services leaflet:

https://www.nationalgrid.com/sites/default/files/documents/8589940796-14131_NG_Future%20of%20Balancing%20Services_6PP_A4_leaflet_A06.pdf