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OPEN NETWORKS

SUMMARY REPORT FOR SCOTTISH RENEWABLES

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Notes

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Acronyms

Acronym	Full Term
ANM	Active Network Management
BEIS	Department of Business Energy and Industrial Strategy
BM	Balancing Mechanism
BSUoS	Balancing Services Use of System
CBA	Cost Benefit Analysis
CDCM	Common Distribution Charging Methodology
DER	Distributed Energy Resources
DNO	Distribution Network Operator
DSO	Distribution System Operator
EDCM	Extra High Voltage Distribution Charging Methodology
ENA	Energy Network Association
FES	Future Energy Scenarios
GDUoS	Generator Distribution Use of System
GSP	Grid Supply Point
IDNO	Independent Network Operator
NETS	National Electricity Transmission System
NETSO	National Electricity Transmission System Operator
NGET	National Grid Electricity Transmission (the NETSO)
Ofgem	Office of gas and electricity markets
RDP	Regional Development Program
SCR	Significant Code Review
SGAM	Smart Grid Architectural Model
SoW	Statement of Works
SR	Scottish Renewables
TCR	Targeted Charging Review
TDI	Transmission Distribution Interface
TNUoS	Transmission Network Use of System
TO	Transmission Operator
UK	United Kingdom
UKPN	United Kingdom Power Network
WPD	Western Power Distribution
XE	Xero Energy Limited

Executive Summary

Introduction
Xero Energy Limited has been commissioned by Scottish Renewables (SR) to provide an overview of the Open Networks Project currently being progressed by the Energy Networks Association (ENA) – to review its work to date and set out the likely direction of travel and impact on SR membership.

Structure and governance
Open Networks Project is a closed membership group instigated, supervised and constituted of the Energy Networks Association and its members (network owners and operators within the UK and Ireland). SR is a member of the 'Advisory Group' which meets with various members of the Open Networks Project to get updates and provide feedback for the project Steering Group to consider.

Objectives and scope
The focus of the work has been to understand what a Distribution System Operator (DSO) is, what it might do, how it might do it and how it interfaces with other industry parties. The development of the DSO function will have an impact on all SR members that currently have or plan to have in the future transmission or distribution connected sites – whether generation, demand or both.

However, there appears to be limited regulatory oversight of the project which raises concerns about its scope and objectives. For example, one of the fundamental assumptions of much of the work being taken forward by the project is that any DSO function will be performed by the incumbent.

Likely outcome of Open Networks Project
The evidence that is being developed as part of the Open Networks Project will be likely used by the DNOs to launch code and licence change proposals in relation to:

- Changes to the functions and responsibilities described under the existing Distribution Network Operator (DNO) licences in order to deliver the identified DSO functions.
- Creation of the market structure for distribution of ancillary services.

Overall, the likely outcome of the project will be a set of proposals that will likely provide a framework for a significant shift in how the energy market operates.

Progress and status
The Open Networks Project has, made significant strides in developing an understanding of the potential issues and barriers for implementing a new DSO model.

The initial phase of the work – to identify issues for investigation - will conclude at the end of 2017. This will be followed by the second phase of work – relating to development of solutions to the issues identified – that will take the project through 2018 and likely beyond. Each workstream has developed a set of topics (known as products) to explore during Phase 2.

Consultation with industry
Although significant progress has been made on a number of issues, there has been little consultation with industry. A single consultation has been issued by the project, with the responses yet to be collated, review and reflected within the work. Further, much of the work that has been done to date is poorly supported by reporting which is publicly available or visible to the advisory group.

➔ Given the potential impact of the outcomes of this project and the apparent lack of industry input and regulatory oversight, SR may wish to consider whether to call upon Ofgem and/or government to appraise the project. The aim of the appraisal is to understand whether the project needs to be reconstituted with a more formal structure, regulatory oversight or at least review the project's scope, terms of reference and objectives to ensure that they are appropriate.

Recommendations for SR engagement

The project is currently at an important juncture with the conclusion of Phase 1 (identification of issues) and imminent commencement of Phase 2 (development of solutions). Therefore, the workstreams are currently looking for input regarding their priorities for Phase 2 (2018 and beyond).

General

- ➔ SR should consider the proposed list of products that have been identified by the workstreams and identify which should be prioritised or whether any are missing or shouldn't be taken forward.

Workstream 1: T-D interface

- ➔ WS1 has performed extensive work to assess the transmission to distribution interface and has developed a long list of products for Phase 2. SR should consider this list and identify its priorities. A set of recommendations has been provided in Section 3.5 above which highlights the subjects which are likely to have the most significant benefit on SR members in the near term.

Workstream 2: Customer Experience

- ➔ WS2 relates most directly to SR members as network customers, focusing on information provision. Therefore, SR should canvass membership on the proposed set of products that the workstream intends to cover under the next phase of the project (list shown in Appendix C), to ensure that the issues identified by the workstream sufficiently capture those which affect SR members.
- ➔ Through the assessment of outcomes from each of the workstreams, it appears that WS2 has low levels of activity. Therefore, SR should encourage the ENA to commit sufficient resource to ensure that WS2 activities are progressed with the same vigour as the other workstreams.
- ➔ Suggest that an additional product is added to consider customer experience under the proposed DSO model – to ensure that the customer experience is central to the development of the function.

Workstream 3: Transition to DSO

- ➔ Definition for a DSO has been developed by the Open Networks group without any industry discussion. Suggest that WS3 is encouraged to engage with wider industry on the proposed definition of DSO.
- ➔ Encourage WS3 to review and incorporate feedback from responses to the Commercial Principles consultation before moving into the next phase of work.
- ➔ Encourage WS3 to consider wider consultation regarding their definition of DSO and the principles which underpin it.
- ➔ Encourage WS3 should focus on developing the DSO model in isolation from the DNO licence model. The workstream has been focused on measuring the DSO functions against DNO capabilities. However, the DSO function should be developed and refined without regard to the existing DNO functions. This to ensure that an objective set of proposals can be developed and assessed/measured rationally against the needs of the consumer rather than DNO businesses.
- ➔ Unlike the other workstreams there appears to have been little in the way of input from external stakeholders to identify the issues that need to be addressed under Phase 2. WS3 should be encouraged to develop and publish any analysis work or papers developed that support the list of products identified for Phase 2.

Workstream 4: Charging

- ➔ Given that the charging issues raised by WS4 have been overtaken by Ofgem's Charging Futures Forum, SR should carefully consider its overall strategy for engaging with this process. SR should at least consider representation at the bi-monthly forum meetings if not the specific task forces set up Ofgem.

1 Introduction

1.1 General

Xero Energy Limited (XE) has been commissioned by Scottish Renewables (SR) to provide an overview of the 'Open Networks' project currently being progressed by the Energy Networks Association (ENA).

Throughout this report, XE has discussed the proposed work in terms of the potential impact on SR members – in particular renewable energy generators and projects connected at distribution.

1.2 This report

This report covers:

- A brief history of the Open Networks Project.
- A summary of each of the workstreams and their outputs to date.
- A discussion regarding the direction of travel for each of the workstreams and the likely outcomes.
- A discussion of the impact of the likely outcomes from each workstream and the issues that are particularly pertinent to Scottish Renewables' members.

1.3 Report structure

The report is structured as follows:

- Section 1 – Introduction
- Section 2 – Open Networks overview
- Section 3 – Workstream 1 : T-D interface
- Section 4 – Workstream 2 : Customer Experience
- Section 5 – Workstream 3 : Transition to DSO
- Section 6 – Workstream 4 : Charging
- Section 7 – Summary and recommendations
- Section 8 – References
- Appendix A – Open Networks Project outputs to date
- Appendix B – WS1 Phase 2 draft products list
- Appendix C – WS2 Phase 1 – Customer issues list

2 Open Networks overview

2.1 Introduction

This section provides a brief history of the Open Networks Project – why it was established, what form it takes, who are the key parties and what are its aims.

2.2 The ENA

The ENA is an industry trade body that represents the interests of network owners and operators in the UK and Ireland. Membership is open to all owners and operators of energy networks in the UK [1]. Like any other trade body, the ENA is sustained by its membership [2,3,4] The published list of members appears to cover all of the DNOs, TOs and National Grid (as the National Electricity Transmission System Operator, NETSO) as well as one of the independent network owners (IDNO) – GTC plc.

As well as being the 'voice of the networks', the ENA is responsible for maintaining some 400 Technical Specifications, Engineering Recommendations and Engineering Technical Reports. Many of these documents are fundamental codes relating to the design of distribution networks and connections (e.g. Engineering Recommendations P2/6 and G59/3) and are referenced in the Distribution Code.

2.3 Distribution System Operators

The Open Networks Project is focused on the development of a new role within the electricity industry – the Distribution System Operator (DSO).

A DSO is a new concept and is likely to differ significantly from the role that is currently performed by the DNOs – much like the role of the NETSO differs from the role of the TOs at transmission.

Defining what a DSO actually is has been looked at by the Open Networks Project. Nonetheless, the term remains largely undefined throughout industry. It is likely that the attributes of the DSO role will likely be characterised by the following key functions and qualities.

- A body that measures and analyses significant amounts of data regarding the performance of the electricity distribution networks to enable a strong understanding of network condition and operation.
- A body that can respond to its own data analysis by improving network performance, customer experience and ultimately the economic outcomes for consumers.
- A body that can identify solutions (traditional and innovative) to the evolving needs of the network and its customers.
- A body that can appraise the identified solution based on economic outcomes for consumers as well as sustainability, security and safety.
- A body that can identify and recommend investment in network solutions in order to achieve the best economic outcomes for consumers.
- A body that can facilitate an effective marketplace to ensure services can be procured efficiently.

2.4 Open Networks Project history

The Open Networks Project (originally called the TSO-DSO project) was launched by the ENA in January 2017, in response to the Call for Evidence that was issued by Ofgem and BEIS on Smart Flexible Energy System [5].

In launching the Open Networks Project, the ENA stated that it *"has seized the initiative to influence the outcome in the development of a UK energy industry that addresses the challenges the future will bring. We are working hard to establish in the minds of policymakers, the vital role networks will play in developing an energy sector that can handle the demands that come with tackling climate change and keeping energy supplies secure."* [6]

The project replaced a previous work stream that was being overseen by the ENA called the Transmission Distribution Interface (TDI) steering group which was made up entirely of networks companies. The TDI steering group ran for about a year from the end of 2015, and oversaw a clutch of working groups that were focused on a specific set of issues that exist between the transmission and distribution.

The TDI group was established due to a request from Ofgem to all the network owners to consider the 'whole system' impact of distributed generation. When the final TDI steering group report was issued in December 2016, 'mixed' progress had been made on the workstreams [7]. The key outcomes of each TDI working group were as follows:

- Shared services from distribution connected sites – how to make best use of available flexible resource. This group managed to map out the services currently procured by National Grid and the DNOs and what future services might emerge and when. No progress was made on development of solutions.
- The Statement of Works process – providing better up front information. This group developed a new process that allows the DNOs (in many cases) to make offers without individual applications to the NETSO. This need process is still being trialled and has not yet become 'business-as-usual'.
- Active Network Management principles – managing flexible connections across transmission and distribution. There were no outputs from this group.
- Trialling voltage management solutions. This group identified options for future management of voltage and areas across the network to assess the possible options for assessing these options with trials to be progressed through 2017.
- Differences in charging arrangements between transmission and distribution. This group developed some analysis and mapping of charging and access arrangements – analysing how these interact across transmission and distribution. Key priorities were then identified for taking forward.
- Ongoing effectiveness of the Low Frequency Demand Disconnection system with high levels of distributed generation. The group concluded that arrangements were acceptable in the short term.

The report also included five 'barriers' where the TDI Steering Group wanted action from Ofgem and BEIS including: Differences in charging arrangements across distribution and transmission, 'lack of powers' to recover unused capacity, charging of upfront connection application fees and clarity on the role/responsibility of the DNOs going forward. These issues have been carried forward into the Open Networks Project.

2.5 Purpose and objectives

According to the ENA, the Open Networks Project is a 'pan-industry initiative' to 'lay the foundations of a smart energy grid in the UK' [8]. The project was launched *"to explore how the changing roles and responsibilities of network companies can deliver the greatest benefit to energy customers"* [9].

There are four stated objectives for the project cover the initial phase of work in 2017, including:

1. Develop improved ***T-D processes*** around connections, planning, shared TSO/DSO services and operation.
2. Assess the gaps between the ***experience our customers*** currently receive and what they would like, and identify any further changes to close the gaps within the context of a 'level playing field' and common T & D approach.
3. Develop a more detailed view of the required transition from ***DNO to DSO*** including the impacts on existing organisation capability.
4. Consider the ***charging*** requirements of enduring electricity transmission/distribution systems.

There appears to be little documentation available which sets out the justification for these objectives. In particular there is an implicit assumption (under objective 3) that DSO functions will be performed by the current network owners.

Therefore, it would be appropriate to consider highlighting to Ofgem the need for some regulatory oversight with regard to the DSO role, in particular an industry discussion is required surrounding which party is best placed to perform this role. The Ofgem and BEIS call for evidence in 2016 did not include any discussion regarding the most appropriate body to deliver the DSO functions – there was an implicit assumption within the paper that the existing DNOs would transition towards the new role [10].

- ➔ It is not clear how the objectives for the Open Networks Project have been arrived at and why these items were prioritised.
- ➔ SR may wish to consider opening a discussion with the membership to canvass whether SR supports the objectives of the Open Networks Project, whether the objectives appropriately capture the needs of SR members. However, given that the project is already 9 months old the opportunity to revisit the objectives is likely to be limited but it may be worth lodging a view nonetheless (noting that such opportunity was not made available through the Open Networks Project itself).

2.6 Open Networks Project governance structure

The Open Networks Project is broken into five workstreams. These workstreams do not have published terms of reference but are based on the stated objectives of the Open Networks Project.

- T-D process
- Customer Experience
- DSO Transition
- Charging
- Communications (stakeholder engagement).

Each workstream is chaired by a nominated individual (all from DNO companies) and completed by 'member representatives'. There is no visibility of the make-up of the workstream group or how experts are identified or who they are.

Based on the information published, each workstream appears to have a set of 'products' identified, in order to deliver its objective. However, there is not a published list of products, or how they have been developed and so no clear indication of what products will be delivered by each workstream.

These workstreams are overseen by a Steering Group which reports solely to the ENA's board (and the internal ENA 'Future Group'). The Steering Group is made up of ENA members (i.e. DNOs, TOs, NETSO, and IDNOs) with Ofgem and BEIS invited to every second or third meeting and is therefore completely dominated by network companies. It is not clear if Ofgem and/or BEIS attend the workstream meetings.

The agendas and minutes from the steering group meetings are not published, nor are any minutes or discussions from each of the workstreams.

- ➔ The Open Networks Project is relatively restricted in participation to network owners and operators with limited involvement from Ofgem and BEIS.
- ➔ There is very poor visibility to the wider industry of the Open Networks Project processes. With the advisory panel meetings and public consultations being the only vessel for interrogating the process, see also Section 2.7 overleaf.

2.7 Industry participation

There are two key modes of engagement for the wider industry. The Steering Group provides information to the industry 'Advisory Group' (which SR is a member of) who can provide advice in response to the information provided by the Steering Group. However, the advisory group has no formal role in the project and can therefore only have a peripheral influence on the outcome.

The only other opportunity that industry has to influence the outcome of the process is to respond to consultations. To date, only one consultation has been issued as part of the Open Networks Project and is discussed in Section 2.9 below [10].

The focus of the Open Networks Project is to develop a new market place for energy products and services. The development of this market is being developed and controlled exclusively by the networks companies. This introduces significant risks for other industry participants – with the outcome potentially resulting in sub-optimal, distorted market arrangements.

➔ The form and oversight structure of the Open Networks Project presents a significant risk to the wider industry. Particularly with limited opportunity for wider industry to engage and influence the process.

2.8 Timeline

The figure below illustrates the high level timeline of the project. At the time of writing, the initial phase of the project is coming to an end.

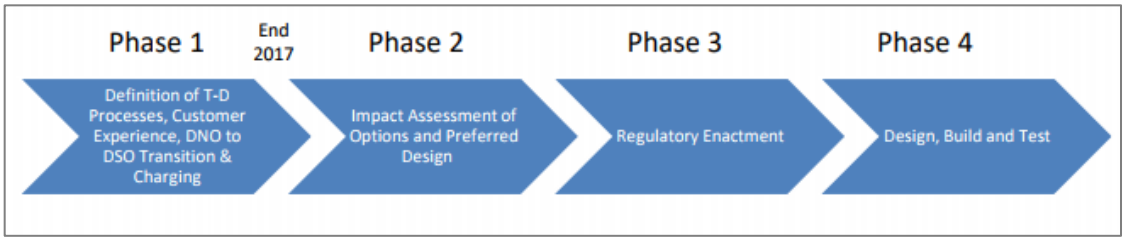

Figure 2-1: Timeline of Open Networks Project [11]

Based on the timeline set out at the start of the project, 2017 (Phase 1) was focused on definitions, with the next phase in 2018 to look at impact assessment of proposed options for change. It is not clear how long the second phase of work is expected to last or what stage code and licence changes are expected to be developed through industry processes.

➔ 2018+ will be dedicated to assessing change options based on the initial work which has focused on creating definitions of the existing industry status.

2.9 Outputs to date

XE has prepared a summary table of the outputs to date that have been issued by the Open Networks Project along with a summary of the content of each. This table can be seen in Appendix A of this report. Overall the volume and quality of written outputs from each of the workstreams has been variable. The outputs delivered by each of the workstreams are discussed further in the following sections of this report.

The structure of the outputs from the Open Networks Project is not clear. It seems as though each workstream has developed its own list of topics that form the scope of the work [12]. The following sections of the report highlight the topics for each workstream in turn. Each of these topics has been termed a 'product'. Some products have had several outputs linked to it, while others have had little or none. There are also outputs that aren't identified as linked to any of the products.

➔ The structure of the outputs from the Open Networks Project is not clear.

In addition to the outputs shown in Appendix A, a single consultation has been issued so far – the DSO Commercial Principles paper was issued in August 2017 and closed for responses on 29 September 2017 [10]. XE supported the drafting of the joint Scottish Renewables and Renewable UK response to this consultation.

There were several key parts of the consultation including:

- Discussion regarding the contracting and compensation arrangements for the provision of flexibility services.
- A set of ancillary service procurement models that looked at the interplay between the NETSO, DNOs, aggregators and distributed providers of flexibility services.

The key themes of the SR/ Renewable UK response included:

- Concern over the fundamental governance structure of the Open Networks Project.
- Concern regarding the incentives for the DNOs in the long term. Concern that DSO functions are be performed by a business that is incentivised to build network assets.
- Concern about the ambiguity regarding distribution access rights for network users.
- Concern that 'flexible' and 'constrained' connections put risk on customers and don't provide a price signal for DNOs to invest in their networks.
- The risk of poor local market functioning due to the lack of a diverse pool of flexibility providers to manage network issues.
- Concern that without the rules being detailed and codified, there is potential for flexibility markets to become disparate and opaque with several different models evolving across the DNOs.

XE notes that the service procurement models consulted on as part of the DSO commercial principles paper are being taken forward under Workstream 3 (transition to the DSO). However, the consultation responses have not yet been collated and processed to feed into the further work.

3 Workstream 1 : T-D interface

3.1 Introduction

This part of the report provides an overview of the activity of Workstream 1 (WS1) as well as some discussion on the direction of travel and likely impacts on SR members of this work.

WS1 is focused on the data and process interface between transmission and distribution systems. The original list of topics (products) for this workstream was set out at the first advisory group meeting in April as follows [12]:

Phase 1 Product (April 2017)	XE notes
Investment Planning processes (processes that result in either capital or opex investment decisions for network businesses).	• Appears to relate to how transmission and distribution approach network planning.
Operational Planning processes (capturing operational planning, real time, balancing and settlement).	• Appears to relate to how transmission and distribution approach network operation.
Develop whole system investment and operational Planning Processes/models.	• Follows on from the first two products – development of solution to how network planning and operation could be done across transmission and distribution.
Review development of ancillary services across GB.	• Appears to be a review of NGET's ancillary services function.
Develop approach for the co-ordination of transmission and distribution constraints in an operational timeframe.	• Currently the approach to transmission and distribution constraint management is completely isolated from one another.
Develop whole system commercial agreements for Active Network Management with distributed generators.	• Currently there are fundamental differences between the commercial treatment of constraints between transmission and distribution.
Review and update SoW to take into account of the project scope and developments.	• Statement of works (SoW) process is being developed under trials but likely that this relates to much more fundamental review of the process.

Table 3-1: List of WS1 Phase 1 products communicated to the advisory group in April 2017

WS1 has not provided any additional guidance or description of this list of products to help understand what each relates to, which means that the scope of each product is unclear.

➔ The list of products identified by WS1 does not have any supporting explanation to help understand what each relates to or how they have been identified.

Several parts of the original scope (in red above) do not appear to have been taken forward as part of Phase 1. Most of these items relate to development of solutions for the issues identified which relates more to Phase 2 work (discussed below). It is therefore reasonable that they have not yet been progressed.

3.2 2017 written outputs (Phase 1)

This subsection provides a short overview of the key outputs from WS1 during 2017. WS1 has been the most productive workstream, having provided five separate written outputs as well as the only workstream to produce an industry consultation. Appendix A includes a summary table of the written outputs from WS1.

T-D processes mapping – June 2017

In June, the WS1 released a relatively detailed report on network planning and operational processes across transmission and distribution as well as the ancillary services used by the NETSO [13]. The report concluded that the data flows and processes between transmission and distribution are dictated by the Grid Code and therefore are largely constrained to an annual planning cycle. Further, the report highlighted the different approaches used at transmission and distribution in relation to network investment decisions. For example, the NETSO uses a planning process based on multiple possible future scenarios consider a wide range of variables, known as the Future Energy Scenarios, whilst the DNOs appear to forecast based on a single scenario with a limited range of variables considered.

Learning from trials – Aug 2017

In August 2017 the workstream published a report which drew out the key learnings from the various funded innovation trials that had been conducted by the networks companies to explore the interface between transmission and distribution [14].

The Statement of Works process was a key focus for the WS1 Phase 1 work. Two slightly difference trials have been conducted – one in England and Wales and another in Scotland. In essence the trialled processes allow the DNOs to have upfront information about 'headroom' limits to transmission capacity and any works/costs for upgrades. The DNOs can then make offers to distributed generation on this basis, upfront.

The outcomes of the trials were mixed. For the trial run in England and Wales, where a flat 50MW headroom limit was used worked well in areas that were not constrained. But for areas that were busy with connections/applications, the trialled process didn't work as well. Under the trial in Scotland, it was concluded that transmission impact information was able to be given earlier than under the normal process. However, it was noted that no grid connection offers had yet been accepted under the trial. Therefore, it was concluded that up front information about transmission impact may reduce the volume of accepted offers. It is not clear from the report what the next steps are for this trial.

T-D- processes – gaps and issues – Oct 2017

In follow-up to the process mapping report, WS1 published a gap and issues analysis in October. This report compared the investment and operational processes at transmission and distribution to identify the barriers for aligning these processes [15]. A strong theme throughout the report was the lack of DNO measurement and data acquisition capabilities, network modelling and forecasting capabilities.

The conclusions of this report have formed many of the proposed 'products' for the Phase 2. Whilst many of the issues and gaps identified only have indirect bearing on generation and SR members they are nonetheless likely important in facilitating an open ancillary services market across transmission and distribution and to help with better coordination of connections. The key outcomes which do impact on SR members have been discussed in the following subsections.

3.3 2018 (Phase 2)

WS1 has sought to scope out its activities for Phase 2 with an extensive list of 24 'products', including two which have 'rolled over' from 2017. The list of products for Phase 2 is detailed in Appendix B. The majority of these proposed products relate to establishing more robust processes and resources to facilitate better communications and coordination between the NETSO and the DNOs.

It is highly unlikely that all of these products will be taken forward in 2018. Therefore, there is an opportunity to inform the priorities for this workstream going forward. As with all of the workstreams, WS1 is looking for input from industry regarding its priorities for Phase 2.

➔ WS1 is looking for input regarding the prioritisation of products for 2018 (Phase 2). SR should consider the items that are likely to have a significant impact on members and identify its priorities to feedback to the project.

3.4 Direction of travel and impact on SR members

WS1 is focused on improving the processes that exist between transmission and distribution. Many of these processes are important, particularly for Scottish stakeholders given that the interface between transmission and distribution is much closer to many embedded generators and Scottish embedded generators are normally affected by transmission issues.

Based on the work done to date and the identified list of priorities for 2018 (Phase 2), XE has set out the key themes below followed by suggestions on the likely key items for members, and which SR should target, in Section 3.5.

3.4.1 Transmission and Distribution investment decision making processes

- Better alignment of network investment processes.
- It is likely that scenario based cost benefit analysis (i.e. the Network Options Assessment process) will continue to dominate the investment decisions for wider transmission network reinforcements and likely that a similar model will extend into distribution. This will make the investment decision process at transmission and distribution more complex and potentially less predictable for customers. The investment process may take longer as a result, potentially delaying connections.
- Market derived (e.g. services from flexibility providers) network investment alternatives will be considered as part of the cost benefit appraisal process. As communicated at the advisory group meeting in October 2017, the immediate next step is focused on finding a way to include solutions from distribution networks (either the DNO or third part flexibility provider) to address transmission issues as part of the network investment process.
- Data collection from generation. It is likely that more information will be required from distribution network customers (including generators) as part of the connection process as well as during operation to provide the DNOs with sufficient data to inform analysis.

3.4.2 Statement of Works process

- It is likely that the new 'Appendix G' Statement of Works process will continue to become standard. This is positive as it provides more information to projects, earlier in the process and allows distribution connection offers to be accepted with more confidence.
- It is likely that there will be some divergence of the exact methodology used across DNOs. SR should consider whether a standardised approach should be adopted by the DNOs to help visibility.

3.4.3 Ancillary service markets

- Initial steps are to focus on how distribution connected providers of flexibility can better participate in existing ancillary services markets. It is likely that this will be delivered through the NGETSO's ongoing review of ancillary services and the current Balancing and Settlement Code modification relating to BM Lite [16].
- It is likely that DNOs will start looking at how to establish 'flexibility markets' to procure ancillary services. The opening up of new markets for service provision is likely to be an important potential revenue stream for SR members' projects in future and should be encouraged, albeit supported by strong consultation with industry.

3.4.4 Constraint management

- It is likely that assessment of network constraint issues will be evolved to better reflect capacity constraints across the transmission and distribution boundary. Any improvement in this is likely to increase the capacity limits associated with transmission constraints on embedded generation and/or visibility of constraint risk. However, this is likely to most significantly impact on customers located in England and Wales rather than Scotland.

3.5 SR recommendation proposals for 2018 (Phase 2)

Of the 24 products identified, and in considering the key themes above, the following are likely to have the most significant impact on SR members and it is thus suggested that these are supported as priority items for Phase 2 of WS1:

- ➔ Product 1 – roll out of the trials being conducted in UKPN and WPD regions to improve processes between DNOs and NETSO to see if alternatives to transmission reinforcements can be found to solve regional stability and voltage issues. Extension of these trials is likely to present further service opportunities for distributed generation as well as release network capacity. However, it isn't clear how this may improve network access in Scotland given that thermal constraints tend to dominate issues across the Scottish transmission system.
- ➔ Product 4 – relates to the coordination of ancillary services across transmission and distribution. Access to ancillary services markets may present further opportunities for distributed generation to generate revenue.
- ➔ Product 5 – review of planning standards is the avenue for setting out the potential role of flexibility services in supporting network security and planning. This is likely to be key to identifying the value of flexibility services and how these can be compared to traditional network investments.
- ➔ Product 6 – distribution connected generation participating in the balancing mechanism is a clear enabler for allowing distributed resources to participate more in existing ancillary services markets.
- ➔ Product 8 – the identification of specific distribution system needs for flexibility. Frameworks for the identification of flexibility needs should be supported as they will help to provide industry with a clearer picture of the market for flexibility.
- ➔ Product 9 – publication of national and regional ancillary service requirements. This builds on product 8 in determining system service needs. This would help distributed generation to identify potential ancillary service opportunities.
- ➔ Product 16 – system wide register of contracted and connected generation. Visibility of information is critical to understanding network opportunities and much of the information is not currently visible (recently contracted parties, parties that have been through the SoW process, etc).
- ➔ Products 18-22 – managing flexibility sources in capacity queues. Ofgem identified this as a priority for the industry as part of its Smart Flexible Energy Systems Plan in July 2017 [17]. There is a need to ensure that this is done appropriately and doesn't have a negative impact on generation already queued and waiting for connection.

4 Workstream 2 : Customer Experience

4.1 Introduction

This part of the report provides an overview of the activity of Workstream 2 (WS2) as well as some discussion on the direction of travel and likely impacts on SR members of this work. WS2 relates to 'Customer Experience'. The original list of topics (products) for this workstream was set out at the first advisory group meeting in April as follows [12]:

Phase 1 product (identified April 2017)	XE notes
Customer Journey Maps for Connections & Service Provision	• A process chart to understand how third parties connecting to the DNO networks engage with the DNOs.
Short Term Improvements – make early improvements to processes for connection and service provision.	• Stated goal rather than a topic area to explore.
Updated Connection Arrangements - Agree and implement changes to network access arrangements (Bilateral Connection Agreements) for Distributed Energy Resources. Explain the different connection offers available to customers and the impact that these can have on them.	• Appears to relate to how network access arrangements can be formalised at distribution. • Access arrangements are a fundamental issue which is being taken up by Ofgem's Charging Delivery Body.
Service Provision Improvements.	• Issues to be addressed under this product are not clear.
Customer Journey Maps for Changes to Legacy Arrangements.	• A process chart relating to updates to existing connection agreements.
Emergency Events Customer Journey Maps.	• A process chart to set out the communication between DNOs and customers during unplanned outages.
Customer Information Requirements – improvements to the information that is provided to support network access and service provision.	• Not clear.
Ensure that agreed improvements to customer experience are taken forward in other workstreams.	• No comment.
Complete ongoing work to improve Statement of Works process.	• SoW touched upon under WS1. • New SoW process is currently being trialled across several DNOs. Likely that this product relates to any lessons learned and roll-out of the new process.

Table 4-1: List of WS2 Phase 1 products communicated to the advisory group in April 2017

WS2 has not provided any additional guidance or description of this list of products to help understand what each relates to, which means that the scope of each product is unclear.

➔ The list of products identified by WS2 does not have any supporting explanation to help understand what each relates to or how they have been identified.

The items highlighted in red identify the parts of the initial scope which have not been explicitly addressed in any of the workstream outputs under Phase 1. The items which have not been taken forward relate specifically to the topics which are likely to be useful items for SR members as they relate to the real and immediate issues that developers and project

owners face when engaging with the DNOs. However, when compared to the issues addressed under the other workstream such as charging, flexibility markets and constraints these items should be relatively low priority.

➔ The majority of the initial scope of workstream 2 has not translated into specific written outputs during 2017. The items which have not been progressed are pertinent to SR members.

4.2 2017 written outputs (Phase 1)

The workstream has issued three short written outputs – one which provides a description of the different types of DNO customer and two relating to customer journey maps (for new/modified connections and network outages).

These outputs provide a good outline of the existing industry conditions and represent a helpful basis for discussion about how the customer types might change and how the customer 'journey' could and should evolve to better meet the needs of customers. However, there has not been any published assessment of these customer types against the stated journeys. No products have been delivered in relation to improvements of the connection process, customer information requirements or statement of works.

4.3 2018 (Phase 2)

At the advisory group meeting #4 [18], the workstream lead outlined that over the course of 2017 (Phase 1) a log of issues had been developed which will be used to frame the products for Phase 2. A compiled list of these issues was presented to the advisory group at meeting 3 [19], the list of issues raised is given in Appendix C.

From this list of issues, the workstream has identified the following products to take forward into 2018 (Phase 2). The products that WS2 intend to take through the assessment phase in 2018 are shown in Table 4-2 below.

	Product	**Timeline**
1	Agree best practices and provide guidance to customers in the pre-application process.	Jan 18 – Jun 18
2	Position paper for capacity recycling.	Jan 18 – Sep 18
3	Document to define 'Terms' and agree 'Definitions'.	Jan 18 – Jun 18
4	Pre-application improvement for DNO seeking flexibility services. • Part 1: Best practices for DNOs to get their flexibility requirements into the developers world. • Part 2: Ensure GBSO and DNOs are aligned in how they procure flexibility services.	Part 1: Apr 18 – Sep 18 Part 2: Jul 18 – Dec 18
5	Improve the management of issues raised by multiple applications in local areas of the network. • Part 1: Customer optioneering to identify preferred connection sites. • Part 2: Improvement on how interactive applications are handled. • Part 3: Queue management where connection capacity is limited.	Part 1: Apr 18 – Sep 18 Part 2: May 18 – Aug 18 Part 3: Sep 18 – Dec 18
6	Provide guidance to customers on the impact of post-connection changes to DER operational regimes and agree when and how changes should be notified to DNOs.	Jan 18 – Sep 18
7	Review what constraint information would be most useful to customers, what can be provided and establish best practice for network operators.	Apr 18 – Dec 18

Table 4-2: Proposed WS2 products for Phase 2

4.4 Direction of travel and impact on SR members

The focus of WS2 appears to be on information provision to customers. Information provision has been a key theme of the work undertaken by the ENA's DG-DNO working group [20] and therefore many of the issues that have been identified are not new.

WS2 is likely to deliver a set of informal policy proposals and guidance documents to ensure that the DNOs adopt consistent approaches to various customer related issues largely relating to information provision. Each of these proposals is to be welcomed and ensuring that there is consistency across the DNOs. However, whether or not these proposals and policies will result simply in guidance documents or more substantive changes to industry codes is not clear. There is a risk that, without codifying the outputs from this workstream that there will continue to be large disparities between the DNOs in relation to each of these points.

One of the most significant outputs from this workstream is likely to be information related to constraints (identified as product 7). As industry continues to consider moving away from traditional network investment strategies, the issues surrounding network access rights and constraint risk (how much and who bears the risk) will become more and more critical.

Each of the products identified for the next phase of work are likely to have a positive impact on SR members – allowing a better and more consistent standard of data and information provision from the DNOs.

4.5 SR recommendation proposals for 2018 (Phase 2)

Overall, the output from WS2 during Phase 1 has been low. There does not appear to have been much effort to create an exhaustive list of issues present and potential issues in the future under the DSO models. Fundamentally, SR should consider support of workstream 2 and encouraging the Open Networks Project to ensure that sufficient resource is allocated to develop it.

SR should also consider canvassing membership on the proposed set of Phase 2 products as these will frame the assessment effort for 2018 and beyond and will set the direction of travel.

Specifically, SR may wish to consider that WS2 is encouraged to add a specific product to explore what customer needs will be in the context of the DSO models. For example, what information will customers need at each stage of the connection and operation process.

- ➔ Canvass membership on the proposed set of Phase 2 products to ensure that the issues have been sufficiently covered.
- ➔ Support and encourage the ENA to commit sufficient resource to ensure that WS2 activities are progressed.
- ➔ Suggest that an additional product is added to consider customer experience under the proposed DSO models.

5 Workstream 3: Transition to DSO

5.1 Introduction

This part of the report provides an overview of the activity of Workstream 3 (WS3) as well as some discussion on the direction of travel and likely impacts on SR members of this work.

Workstream 3 is focused on the transition from DNO to DSO. This workstream is concerned with the functions and responsibilities that DNOs currently have and how this relates to the expected role of DSOs. It should be noted that this workstream is focused on transitioning the DNO functions to DSO functions, without any consideration of whether the DNOs will be the parties responsible for the DSO functions.

The original list of topics (products) for this workstream was set out at the first advisory group meeting in April as follows [12]:

Phase 1 product (identified April 2017)	XE notes
DSO Transition Roadmap - a roadmap to deliver transition to DSO in the short, medium and long term.	• Appears to relate to setting out a set of milestones/processes for how DNOs will transition to the DSO model.
DSO Functional Requirements.	• Appears to relate to how the development of the DSO function – to define what it will be and do.
Model for DSO - model for DSO with some options set out for governance models which will allocate DSO functions to system roles and responsibilities.	• Not clear.
DSO Market Model Options Comparison & Evaluation - an assessment of the risks/benefits for power system users, customers and industry participants.	• Appears to target an appraisal of the different kinds of DSO model.
Trials to Support DSO Definition – if necessary definition and initiation of trials to test different market models and/or any gaps in the existing evidence base to support decisions to define market models (across different regions and Network Operators).	• Appears to target setting up new trials to help provide evidence for supporting the appraisal/development of the DSO model.

Table 5-1: List of WS3 Phase 1 products communicated to the advisory group in April 2017

WS3 has not provided any additional guidance or description of this list of products to help understand what each relates to, which means that the scope of each product is unclear.

➔ The list of products identified by WS3 does not have any supporting explanation to help understand what each relates to or how they have been identified.

The items highlighted in red above have not been taken forward during 2017, with specific products published on the project website. However, the unaddressed scope items are being taken forward already under Phase 2.

5.2 2017 written outputs (Phase 1)

A summary of the two products from WS3 is shown in Appendix A and described below.

5.2.1 DSO definition

The first product was a simple definition of what a DSO is and how its functions relate (at a high level) to the functions of a DNO. The definition of a DSO that has been developed by WS3 was published in a short paper in June 2017 [21] and is:

> *"A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DER). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers; enabling customer access to networks and markets, customer choice and great customer service."*

The DSO definition is based on a set of principles which seem to have been derived from within the project itself. There has been little shared outside of the Open Networks Project workstream regarding the discussions held to determine this definition (or the principles which underpin it), nor has there yet been any consultation with industry.

➔ Definition for a DSO has been developed by the Open Networks group without any industry consultation.

Given the likely importance going forward of the DSO definition, SR may wish to consider pressing that WS3 provide a discussion paper regarding the definition along with a consultation exercise on the principles and resultant definition.

➔ Suggest that WS3 is encouraged to engage with wider industry on the proposed definition of DSO and the principles behind it.

5.2.2 DSO functions

Further to the definition and mapping of functions, the workstream went on to produce a 'roadmap' to set out the actions required to move from DNO to DSO. The final product from the workstream was a detailed report on how far up the scale the DNOs are in terms of competencies relating to the identified DSO functions. The report concludes with a matrix showing the various DSO functions and competencies along with a score based on the current DNO model. The list of functions and competencies appear to be well developed.

It should be noted that the scores used in the assessment matrix are based on the 'best-in-class' competencies across the DNOs, based on the assumption that learning could be shared amongst other DNOs. Therefore, the scores do not necessarily accurately represent the competency gap between the individual DNOs and the DSO model. It should be noted that the scoring identifies some significant gaps in the competency of the DNOs against the DSO functions including power systems analysis, data management, change management and regulation.

- WS3 has assessed the scale of competency uplift required by the DNOs to change to the expected function and role of the DSO.

5.3 2018 (Phase 2)

The proposed products for Phase 2 are identified below. However, it is not clear how these products have been identified and prioritised.

➔ There appears to have been very little in the way of input from external stakeholders to identify the issues that need to be addressed under Phase 2. WS3 should be encouraged to develop and publish any analysis work or papers developed that support the list of products identified for Phase 2.

	Product	Timeline
1	Future DSO model SGAM Framework & Analysis (Deferred from Phase 1) • Complete analysis of 3 selected models for DER procurement. • Dissemination of SGAM modelling and report.	Jan 18 – Apr 18
2	Future SGAM modelling to capture As-Is position and other models as required. • Knowledge transfer to member to enable further SGAM modelling. • Modelling of As-Is DNO positon. • SGAM modelling of Workstream 1 investment planning models.	Mar 18 – Dec 18
3	Cost Benefit Analysis (CBA) of DSO models to demonstrate future consumer benefit. • Establish scope & methodology for CBA. • Carry out CBA for relevant DSO models.	Apr 18 – Sep 18
4	Further independent validation of SGAM framework. • Risk assessment • Legal assessment	Jul 18 – Sep 18
5	Identify key enablers & produce "key Enablers" document. This would include DNO Gap Analysis against preferred DSO models and review of regulatory policy gaps. • DSOs to carry out GAP Analysis against preferred DSO models for DER procurement. • Wider review of regulatory policy gaps. • Identify key enablers for DSO implementation and publish "Key Enablers" document.	Apr 18 – Sep 18
6	Identify and initiate programme of trials to address gaps. • Consider involving disruptors as well as traditional actors. • Preparation of project proposals including funding bids. • Take forward industry trials (possibly funded).	Jun 18 – Oct 19 (and onwards for trials)
7	DSO implementation plan • Update DSO roadmap and put in place more detailed implementation plan based on preferred DSO model(s) and Gap analysis.	Oct 18 – Dec 18

Table 5-2: WS3 products identified for Phase 2 (2018)

In October 2017, WS3 invited input from the advisory group regarding its priorities for Phase 2 work [ref]. However, the priorities for this workstream appear already set as work has begun (through an external consultant) to develop product 1. This product relates to the detailed analysis of the DSO business function. These models are being built within an assessment tool known as the 'Smart Grid Architectural Model' (SGAM). Little information has been released by WS3 regarding the function of this model, how it operates and what the purpose of the modelling is. At the advisory group meeting in October, the workstream lead outlined that the model captures the business processes and interfaces to identify risks. WS3 has held two workshops with wider stakeholders to develop the DSO models under this SGAM modelling framework. However, it is not clear what the purpose, agenda or content of either these workshops was as no written deliverables have been circulated to industry.
Three different DSO models are being assessed through the SGAM method. Two scenarios have been identified by WS3 – the first scenario (known as 'DSO World A') is where the procurement and dispatch of distribution flexibility services is performed by the DSO while the second model ('DSO World B') relates to shared procurement/dispatch between the DSO and National Grid (the NETSO). Ofgem has insisted that a third DSO model is prioritised in the SGAM assessment. This model has been described as a 'price driven flexibility' model. No details have yet been outlined, but this topic is scheduled to be discussed at a workshop on 17th November.

Industry was consulted as part of the commercial principles paper on the DSO 'World A' and 'World B' models [18]. There were several other models consulted on as part of this consultation (including procurement/dispatch from the NETSO). However, these other models have not been prioritised as part of the first phase of SGAM modelling. As noted at the October advisory group meeting, this next stage of modelling is being progressed by WS3 without any consideration of the consultation responses - consultation responses hadn't been collated and reviewed.

- ➔ Work on product 1 has already begun, ahead of that start of Phase 2 and without consultation with the advisory group or consideration of the responses from the industry consultation on commercial principles.
- ➔ SR may wish to consider discussing this particular workstream with Ofgem (potentially alongside other trade bodies) given the particular lack of engagement with industry so far.

5.4 Direction of travel and impact on SR members

In the immediate term, WS3 appears to be focused on the development of the SGAM models and it is expected that this is likely to dominate the WS3 agenda for 2018. Given the lack of clarity from WS3 regarding the function and purpose of the SGAM models, it is difficult to determine the likely outcome.

In the longer term, the most significant impact of the WS3 work is that it will likely generate evidence to support any future change to DNO licences or the creation of a separate DSO licence function. It will also inform what types of system operation functions are performed by the DNO/DSO and what are not and how these functions interface with the NETSO.

This will likely form part of the fundamental structure of future market arrangements for flexibility services, i.e. it will determine who (NGET or DSO or both **but not others**) identifies the need for distribution connected flexibility services, procures it and controls it?

Therefore, the main impact on Scottish renewable energy projects will be:

- Can services be sold to NGET and the DSO, or will there be a single procurement counterparty for flexibility services.
- How these services are scoped, procured and coordinated across transmission and distribution.

5.5 SR recommendation proposals for 2018 (Phase 2)

SR should consider the following:

- ➔ Encourage WS3 to review and incorporate feedback from responses to the Commercial Principles consultation before moving into the next phase of work.
- ➔ Encourage WS3 to consider wider consultation regarding their definition of DSO and the principles which underpin it.
- ➔ Encourage WS3 to focus on developing the DSO model in isolation from the DNO licence model. The workstream has been focused on measuring the DSO functions against DNO capabilities. However, the DSO function should be developed and refined without regard to the existing DNO functions. This to ensure that an objective set of proposals can be developed and assessed/measured rationally against the needs of the consumer rather than DNO businesses.
- ➔ Consider engagement with Ofgem and other trade bodies on the lack of transparency, consultation and objectivity.

6 Workstream 4: Charging

6.1 Introduction

This part of the report provides an overview of the activity of Workstream 4 (WS4) as well as some discussion on the direction of travel and likely impacts on SR members of this work. WS4 is focused on how the charging arrangements vary across the connection voltages – between transmission and distribution and across distribution levels.

This workstream has made significant progress to date (much of which had been made up the previous 'TDI' ENA project) but has now largely been put on hold in light of the wider charging review which is being coordinated by Ofgem's Charging Delivery Body [22]. Therefore, there is unlikely to be any further outputs from this workstream, for the time being. The original list of topics (products) for this workstream was set out at the first advisory group meeting in April as follows [12]:

Phase 1 product (identified April 2017)	XE notes
Short-term – by June 2017	
Identify problems caused for customers through the interaction of current charging arrangements across Transmission and Distribution on customers.	• The charging arrangements at transmission and distribution are disparate and likely need to be rationalised / aligned to ensure that transmission and distribution system users are treated fairly.
Capture the root causes of these problems.	• Not comment
Establish the level of commonality that might be required to resolve identified root causes and deliver project and workstream objectives/goals.	• Assess how much the charging arrangements at transmission and distribution might need to be aligned.
Develop recommendations including - overview of current industry charging reviews, proposals to solve issues identified, implications to existing arrangements and steps needed to implement, recommendations for a charging framework (focused on connection and Use of System charging), identification of quick wins. Medium-term – by December 2017	• Develop a plan of action relating to the review of charging issues across transmission and distribution.
Recommendations to Ofgem : Smart tariffs, flexible connection services, ancillary services pricing; identify requirement for (cross sector/industry) working groups to progress long term deliverables.	• Item to capture some of the key long term commercial and charging issues that relate to DSO.
Long-term Products potentially 2018-2020	
Strategic Review – Whole System Pricing.	• No comment.
Consider proposals to change the governance around changes to the methodologies	• No comment.

Table 6-1: List of WS4 Phase 1 products communicated to the advisory group in April 2017

The items highlighted in red above are the topics identified for WS4 that have not resulted in any outputs. These outputs relate to developing recommendations for how to address the charging issues identified with the DSO model.

6.2 2017 written outputs (Phase 1)

The full list of products that were produced by WS4 is given in Appendix A. The work performed by WS4 is focused mainly on comparing the charging and access rights between transmission and distribution connected costumers.

The following key points were discussed and highlighted as part of WS4.

6.2.1 Charging – transmission vs distribution

- WS4 provided a short piece summarising the differences between the charging regimes at transmission and distribution, concluding that fundamental charging principles and licence objectives are the same between transmission and distribution [23]. However, there are very different connections and use of system charging methodologies across transmission and distribution. The key difference being that the 'charging boundary' at distribution is much deeper than at transmission (i.e. new customers pay capital costs for much more of the required network reinforcements at distribution than at transmission).
- The workstream also explored whether these differences influence the behaviour of parties that want to connect to the systems [24]. The report from August 2017 concluded that for demand customers there is little distortion between transmission and distribution. However, for generation customers there is an overall incentive for parties to connect to the distribution system. This is due to a combination of reasons including triad avoidance payments, lower use of system costs and the BSUoS charging recovery methodology (benefit at distribution).
- WS4 outlined some options for how further 'commonality' could be achieved between the charging regimes [25]. The key recommendations for making the arrangements more consistent with each other is to align the 'charging boundary' between transmission and distribution and the tariff calculation/modelling methods used to assess the networks.

6.2.2 Charging – CDCM (≤11kV) vs EDCM (≥33kV)

- Between 11kV (and below) and 33kV (and above) there are differences in the use of system charges, with generators at 11kV (and below) always paid a credit regardless of connection location and arrangement [24].
- WS4 published a short update paper providing some background history of the Common Distribution Charging Methodology (CDCM) and the Extra High Voltage Distribution Charging Methodology (EDCM) [26], and review work of these methodologies completed since they were implemented. There are many issues and themes identified in relation to how these methodologies should develop. A key point that is raised in this paper is that it suggests Ofgem supports creating a single charging methodology which would replace the current two (CDCM and EDCM). Also, that Ofgem supports more extensive use of time of use tariffs. The review of charging is also looking at implementing charges for distribution network ancillary services as well as network assets.

6.2.3 Charging – other issues

In August the following list of charging issues were identified by WS4 and will likely be progressed by Ofgem [27].

- The requirement for a common charging methodology for the costs associated with Active Network Management (ANM).
- The development of future compensation arrangements for distributed energy resources (distribution constraint payments).
- The development of cost-reflective charging arrangements for 'behind the meter' connection.
- The development of cost-reflective charging arrangements for reactive power across transmission and distribution (Reactive Power Charges).
- The development of cost reflective charging arrangements for electricity storage providers.

6.2.4 Access arrangements

- The workstream also investigated the differences in access arrangements between transmission and distribution and how parties are compensated for lack of access to the networks and what the ongoing obligations are on parties [28]. The note outlines that there are significant differences between access rights, compensation arrangements and operational liabilities between transmission and distribution. The key differences being that network unavailability payments vary significantly, transmission customers can have significant ongoing liabilities whilst there is little incentive for distribution connected parties to reduce capacity/terminate even if the connection is no longer required.

6.3 Work going forward

WS4 is effectively on hold, as charging is being looked at in a wider sense through Ofgem's Charging Delivery Body. Therefore there is no further work planned for Phase 2.

The Charging Delivery Body is still at inception stage but that already two 'task forces' have been proposed by Ofgem – one to look at distribution access rights and one to look at 'forward looking' charges.

6.4 Impact on SR members

WS4 has only proceeded as far as the early stages of identifying the issues associated with charging and access arrangements and how they vary across transmission and distribution. Therefore, it is difficult to foresee with much certainty what the likely direction of travel is for this workstream.

However, the review of charging arrangements which is being undertaken by Ofgem is very significant and likely to have a wide reaching and may fundamentally change the charging arrangements across transmission and distribution and is likely to impact on all of SR members in one way or another.

- Ofgem's Charging Futures Forum (review of charging) is likely to develop new network access and charging policies that will likely have an impact on **all SR members**.

6.5 SR recommendations for 2018 (Phase 2)

There are no specific recommendations that relate to WS4. However, the issues raised through this workstream are being progressed under Ofgem's Charging Futures Forum, which is likely to deliver wide reaching and potentially fundamental changes to network charging and access for all types of user.

For example some of the potential outcomes of the process may be:

- Better alignment of transmission and distribution charging methodologies (GDUoS could significantly increase or TNUoS could significantly decrease, or both).
- Principles (and methodology) for how distribution ancillary services are charged to customers.
- Review of BSUoS methodology (including the payment of this embedded benefit to distribution connected customers).
- Principles and methodology for compensation due to distribution network curtailment and constraint.

➔ Therefore, SR should carefully consider its overall strategy for engaging in Ofgem's Charging Futures Forum process and likely that at least should be represented at the bi-monthly forum meetings.

7 Summary and recommendations

7.1 Introduction

XE has been commissioned by SR to provide an overview of the Open Networks Project currently being progressed by the ENA – to review its work to date and set out the likely direction of travel and impact on SR membership.

7.2 Structure and governance

Open Networks Project is a closed membership group instigated, supervised and constituted of the Energy Networks Association and its members (network owners and operators within the UK and Ireland). SR is a member of the 'Advisory Group' which meets with various members of the Open Networks Project to get updates and provide feedback for the project Steering Group to consider.

7.3 Objectives and scope

The focus of the work has been to understand what a DSO is, what it might do, how it might do it and how it interfaces with other industry parties. The development of the DSO function will have an impact on all SR members that currently have or plan to have in the future transmission or distribution connected sites – whether generation, demand or both.

However, there appears to be limited regulatory oversight of the project which raises concerns about its scope and objectives. For example, one of the fundamental assumptions of much of the work being taken forward by the project is that any DSO function will be performed by the incumbent.

7.4 Likely outcome of Open Networks Project

The evidence that is being developed as part of the Open Networks Project will be likely used by the DNOs to launch code and licence change proposals in relation to:

- Changes to the functions and responsibilities described under the DNO licences in order to deliver the identified DSO functions.
- Creation of the market structure for distribution of ancillary services.

Overall, the likely outcome of the project will be a set of proposals that will likely provide a framework for a significant shift in how the energy market operates.

7.5 Progress and status

The Open Networks Project has, made significant strides in developing an understanding of the potential issues and barriers for implementing a new DSO model.

The initial phase of the work – to identify issues for investigation - will conclude at the end of 2017. This will be followed by the second phase of work – relating to development of solutions to the issues identified – that will take the project through 2018 and likely beyond. Each workstream has developed a set of topics (known as products) to explore during Phase 2.

7.6 Consultation with industry

Although significant progress has been made on a number of issues, there has been little consultation with industry. A single consultation has been issued by the project, with the responses yet to be collated, review and reflected within the work. Further, much of the work that has been done to date is poorly supported by reporting which is publicly available or visible to the advisory group.

➔ Given the potential impact of the outcomes of this project and the apparent lack of industry input and regulatory oversight, SR may wish to consider whether to call upon Ofgem and/or government to appraise the project. The aim of the appraisal is to understand whether the project needs to be reconstituted with a more formal structure, regulatory oversight or at least review the project's scope, terms of reference and objectives to ensure that they are appropriate.

7.7 Recommendations for SR engagement

The project is currently at an important juncture with the conclusion of Phase 1 (identification of issues) and imminent commencement of Phase 2 (development of solutions). Therefore, the workstreams are currently looking for input regarding their priorities for Phase 2 (2018 and beyond).

General

➔ SR should consider the proposed list of products that have been identified by the workstreams and identify which should be prioritised or whether any are missing or shouldn't be taken forward.

Workstream 1: T-D interface

➔ WS1 has performed extensive work to assess the T-D interface and has developed a long list of products for Phase 2. SR should consider this list and identify its priorities. A set of recommendations has been provided in Section 3.5 above which highlights the subjects which are likely to have the most significant benefit on SR members in the near term.

Workstream 2: Customer Experience

➔ WS2 relates most directly to SR members as network customers, focusing on information provision. Therefore, SR should canvass membership on the proposed set of products that the workstream intends to cover under the next phase of the project (list shown in Appendix C), to ensure that the issues identified by the workstream sufficiently capture those which affect SR members.

➔ Through the assessment of outcomes from each of the workstreams, it appears that WS2 has low levels of activity. Therefore, SR should encourage the ENA to commit sufficient resource to ensure that WS2 activities are progressed with the same vigour as the other workstreams.

➔ Suggest that an additional product is added to consider customer experience under the proposed DSO model – to ensure that the customer experience is central to the development of the function.

Workstream 3: Transition to DSO

- ➔ Definition for a DSO has been developed by the Open Networks group without any industry discussion. Suggest that WS3 is encouraged to engage with wider industry on the proposed definition of DSO.
- ➔ Encourage WS3 to review and incorporate feedback from responses to the Commercial Principles consultation before moving into the next phase of work.
- ➔ Encourage WS3 to consider wider consultation regarding their definition of DSO and the principles which underpin it.
- ➔ Encourage WS3 should focus on developing the DSO model in isolation from the DNO licence model. The workstream has been focused on measuring the DSO functions against DNO capabilities. However, the DSO function should be developed and refined without regard to the existing DNO functions. This to ensure that an objective set of proposals can be developed and assessed/measured rationally against the needs of the consumer rather than DNO businesses.
- ➔ Unlike the other workstreams there appears to have been little in the way of input from external stakeholders to identify the issues that need to be addressed under Phase 2. WS3 should be encouraged to develop and publish any analysis work or papers developed that support the list of products identified for Phase 2.

Workstream 4: Charging

- ➔ Given that the charging issues raised by WS4 have been overtaken by Ofgem's Charging Futures Forum, SR should carefully consider its overall strategy for engaging with this process. SR should at least consider representation at the bi-monthly forum meetings if not the specific task forces set up Ofgem.

8 References

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9 Appendix A – Open Networks Project outputs to date

Work stream	Output name	Summary of content	Volume (pgs)	Date issued
WS1	Product 1 Mapping current NETSO, TO and DNO processes	Planning maps of current processes and data underlying the DNOs and NETSO/TOs processes: • Investment planning process. • Operational planning process. • Ancillary services used by the NETSO. • Customer connections assessment.	53	12/06/17
WS1	Product 1 Key learnings from trial projects	Report focusing on three key 'innovation' projects in order to capture important lessons, additional benefits and improvements. The projects are: **CLASS project**, run by Electricity North West Limited, to investigate the effects of electricity demand by controlling network voltage. **Statement of Works Trial** of changes with various DNOs in England and Scotland. Both trials related to GSP headroom identified. Key difference is the 'materiality limit' (flat 50MW) used in England, but a planning limit used in Scotland. **Regional Development Programs** (RDPs) set up by National Grid and UKPN and WPD, to "focus on areas where significant network reinforcements are necessary to overcome transmission restrictions emerging from the proliferation of DER".	17	16/08/17
WS1	Product 2 Gaps & Issues Report	Report detailing the objectives, scope of work, considerations and reference documents in order to perform the Gaps and Issues Analysis in the Investment Processes.	53	02/10/17
WS1	Product 7 Existing Statement of Works Customer Journey Maps	Existing process maps showing the process flows and data exchange along with proposed process that will "establish planning limits at each DNO GSP, new contractual arrangements between the DNOs and NETSO and the resulting customer benefits".	2	17/09/17
WS1	Product 7 Statement of Works Data Template	Template of data to be completed by DNOs and provided to NGET for SoW applications, in order to determine the impact on the NETS. The SoW is being reviewed at the moment, but this dataset is not expected to change.	10	16/08/17
WS2	Product 1 Customer Category Descriptions	Document providing descriptions of four different types of customers (System Service Providers, Active Participants, Passive Participants and Passive Consumers), their characteristics, some examples of customers and types of contract.	4	
WS2	Product 3 Customer Journey Maps - New or Modified Connection	Process map detailing the steps taken by the customer-DNO-NETSO/TO and their interactions for new and modified connections to the system	4	
WS2	Product Customer Journey Maps - Post Connection	Process map detailing the steps taken by the customer-DNO-NETSO/TO and their interactions when changing the contract/service. Included are planned outages and faults/emergency events.	6	

Work stream	Output name	Summary of content	Volume (pgs)	Date issued
WS3	Product 1a DSO Definition	Document providing the definition of a DSO, its roles and responsibilities and principles of operation. Also listed are the various functions of a DNO/DSO (eight functions) and how their respective roles will evolve/overlap when transitioning from one to the other.	4	02/06/17
WS3	Product 1b DSO Roadmap	Roadmap to DSO transition up to 2030. Grouped in three categories (Customer and Commercial Development, Technical Development and ICT) and short, medium and long term actions.	11	
WS3	Product 2 Functional & System Requirements	Report that has produced a framework based on eight potential DSO functions that future GB DSOs may need to carry out. The functions are: System Co-ordination, Network Operation, Investment Planning, Connection& Connection Rights, System Defence & Restoration, Service/Market Facilitation, Service Provision and Charging. "The maturity of each function can be measured by relating underlying competences to the delivery of each function. Twelve competences have been identified and mapped to each function. The level of each competence (measured from 1 to 5) allows a simple means to compare current DNO capability with future required DSO capability." A gap analysis for each DSO function and competence has been performed and a simple scoring matrix used to compare the different transitional states. The results are presented in the report.	65	18/08/17
WS4	Analysis of Commonality of Approach and Principles	Five guidelines/charging methodologies were looked at to find differences/commonalities between distribution and transmission charges. These were: • Council of European Energy Regulators Guidelines of Good Practice on Electricity Distribution Network Tariffs – only consider distribution. • Distribution/Transmission Licences – "no material differences in the 'relevant objectives' for Transmission and Distribution charges which form the basis of use of system charging" • Connection Charging - "no material differences in the 'relevant objectives' for Transmission and Distribution charges which form the basis of use of system charging" • Transmission and Distribution Charging Methodologies – "Significant differences in methodologies between Transmission and Distribution with distribution charges containing a far larger locational signal through the connection charge". • Use of System Charging Methodologies –"The CDCM approach is quite different from the EDCM approach and the Transmission charging approach. Also significant differences in the recovery of residual revenues.	7	
WS4	Entitlements and Rights	Table with list of customer entitlements and rights at transmission and distribution, focusing on the compensation arrangements for lack of network access.	2	

Work stream	Output name	Summary of content	Volume (pgs)	Date issued
WS4	Charging Scenarios	Report looking at the difference in charging arrangements between transmission and distribution (and within distribution) and how these influence connection decisions (how and where to connect to). Where economic differences in charging methodologies exist, there is then the potential for unintended consequences/ inefficiencies when connecting to a specific network (i.e. a higher cost solution being developed and these costs may be borne by the end consumer rather than the connecting customer). Scenarios developed (generation/demand/storage specific) to understand the differences and possible improvements. Conclusions and recommendations given.	19	16/08/17
WS4	Distribution Charging Review Update	Review of the CDCM and EDCM, background and changes since they were implemented. Analysis of reviews undertaken, with recommendations identified and Ofgem's response. Progress since Jan 2017 (costing models and tariff structures developed) and next steps.	4	
WS4	Ofgem Charging Review Update	One page document describing the Ofgem charging review consultation of spring 2017, its considerations, possible changes and Significant Code Review (SCR) and coordination between Ofgem and ENA WS4 to help steer the policy development	1	
WS4	Charging Issues	List of charging issues (8 in total) needing further work identified by WS4 (not exhaustive). Not all will be taken forward by WS4 – the first five will be: • The requirement for a common charging methodology for the costs associated with Active Network Management (ANM). • The development of future compensation arrangements for distributed energy resources. (Distribution Constraint Payments). • The development of cost-reflective charging arrangements for 'behind the meter' connection. • The development of cost-reflective charging arrangements for reactive power across transmission and distribution (Reactive Power Charges). • The development of cost reflective charging arrangements for electricity storage providers. WS4 might offer support on the last three. The issues are listed along with how they are currently dealt with. Some potential options are also offered.	11	16/08/17
WS4	Transmission Charging Review (TCR)Update	Update on NGET TCR to the Steering Group, with some background on the review and progress so far (proposals to change the TNUoS charging, transmission charging for storage, review of charging for embedded benefits, ofgem targeted charging review (TCR)).	2	
WS4	Summary of Advisory Group Papers	List of papers/products (Items 14, 15, 16, 17 and 18 above) with key conclusions.	1	

Work stream	Output name	Summary of content	Volume (pgs)	Date issued
WS4	Options for Increasing Commonality of Approach in Transmission and Distribution Charging	List of options for increasing commonality of approach in Transmission and Distribution Charging. • Make the connection boundary more similar by making the transmission connection boundary deeper. • Make the connection boundary more similar by making the distribution connection boundary shallower. • Agree common cost drivers/scenarios for use of system cost modelling. • Harmonise the modelling approaches. • Harmonisation of residual charges/ scaling approaches. For each option, its impact is discussed along with a general comment on practical issues/implementations etc.	2	

Table 9-1: Schedule of outputs from Open Networks Project to date

10 Appendix B – WS1 Phase 2 draft products list

Product	Whole System Products	Timeline
1	Review the need for further Regional Development Programmes (RDPs) and establish new RDPs were these could unlock significant capacity.	Jan 18 – Dec 18
2	Revise investment processes to enable a whole system approach to investment and the consideration of a range of investment and operability options to address capacity limitations across T&D.	Jan 18 –Dec 18
3	Develop constraint assessment tools for assessing whole system T&D network limitations.	Mar 18 – Dec 18
4	Build on 2017 work on the procurement of DER services to develop framework for providing contact visibility, conflict resolution and services optimisation across T&D networks.	Jan 18 – Dec 18
5	Harmonise principles for security of supply across T&D and consider emergency procedures.	Jan 18 – Dec 18
6	Support ongoing BSC modification on DER participation in Balancing Mechanism.	Ongoing
7	Establish a whole system approach to future energy scenario (FES) production for T&D assessment including consistency across national and regional scenarios.	Jan 18 – Dec 18
8	Define regional service requirements and constraint heat maps.	Jul 18 onwards
9	Publish national and regional requirements for services.	Oct 18 onwards
10	Complete update of Statement of Works process and consider revisions to ongoing Week 24 and 42 processes.	Jan 18 – Sep 18
11	Improve Control Room Interfacing links.	Jan 18 – Sep 18
12	Develop regional/national requirements and a co-ordinated T-D approach to system monitoring.	Jul 18 – Dec 18
13	Develop Whole System network analysis capability, shared planning models and mechanisms to enable whole system network capability assessment.	Mar 18 – Dec 18
14	Provide a mechanism for sharing information on constraints, costs and conflicts (between T&D).	Mar 18 – Sep 18
15	Establish processes to capture ANM system status and performance for investment planning purposes.	Jul 18 – Dec 18
16	Establish a system-wide resource register that includes all GB generation, storage and flexible demand (T&D).	Jan 18 – Jun 18
17	Update minimum/detailed data requirements to be provided by DER customers when they apply for, and after they agree a connection.	Jan 18 – Jun 18
18	Short term gap analysis and action plan for flexible resources in connection queues (including storage as per action 1.6 from the Smart Systems and Flexiblity Plan).	Oct 17 – Jan 18
19	Develop publication for stakeholders to disseminate results of the short term gap analysis and action plan.	Jan 18 – Feb 18
20	Medium and long term gap analysis and action plan for flexible resources in connection queues (including storage as per the Smart Systems and Flexibility Plan).	Feb 18 – Jun 18
21	Develip publication for stakeholders to disseminate the medium and long term gap analysis and action plan.	Jun 18 – Aug 18
22	Follow action plan for Flexible Resources as developed from Products 18 to 21.	Sep 18 – Dec 18
23	Develop whole system operational planning processes and models (P3)	Jan 18 – Jun 18
24	Further Operational Planning actions developed from product 23	Jul 18 – Dec 18

Table 10-1: WS1 Phase 2 draft product list

11 Appendix C – WS2 Phase 1 - Customer issues identified

11.1 Pre-connection/Application stage

1. Customer information requirement under consideration for more information on capacity, constraints and potential costs that helps inform applications. Need to improve customer information provided up-front. More visibility around network constraints on either Transmission of Distribution would help customers highlight these issues up front and better evaluate where to apply.
2.
    a) Consider asking customers what additional information would benefit them.
    b) DNO heat maps have various levels of interactivity and don't correspond to charging. Information on potential future costs is key for customers.
    c) Members indicated a stronger market signal would be more useful than heat maps particularly as market complexity develops (innovative projects looking at this).
    d) Distribution Export Capacity register would be useful (similar to Transmission Exit Capacity.
    e) Challenge transmission to provide more visibility around network constraints to help customers identify where connections many have transmission implications.
3. Need to clarify for the customers the process where they want to change arrangements on site. Give information to customers on what is expected when they want to make a change to their connection.
4.
    a) Curtailment queues and historical data may be useful for look ahead scenarios.
    b) Consider expanding on types of curtailment and level of information.
    c) ENA's Good Practice Guide to ANM contains some relevant connections information.
5. Communications between the DNO, Customer and Transmission could be improved to increase the efficiency of this system – Appendix G works will until applications exceed the headroom.
6. Industry-wide definition of firm vs non-firm.
7. Industry consistency – Achieve greater alignment across DNO connection processes.
8. Put in place guidelines for dealing with multiple connection applications from customers.
9. Develop processes for co-ordinated T/D connection optioneering.
10. Consistency on approach to storage.
11. Network data provision to support customer applications.
12. Reduce number of speculative applications.

11.2 New/modified connections

1. Should look at other workstreams and evaluate how the new models may affect these maps i.e. how will the DNO-DSO transition affect the process?
2. Need to further clarify how storage connections are dealt with.
3. Processes need to be able to cope with changing technologies.
4. Review whether capacities can be booked (as with gas).
5. Processes should be future-proofed (up to 10 years).
6. Ensure processes deal with import , export and import/export connections.
7. Queue management process to be fully documented (regional variations noted).
8. Processes to be designed for combinations of capacities and sites.
9. Consider process for aggregators who install controllable demand/generation capabilities which may impact the network but do not currently trigger these processes.
10. Advise customers when costs will be incurred.
11. How are modifications to agreements handled especially if customer has restriction at time of connection.
12. More information in Connection Offer – Connection Storage.
13.
    a) Clarify connections process – domestic and co-located storage.
    b) Where to connect – better heat maps or something else?
    c) Queue management – in a DSO world can we prioritise the connection of storage?
14. Put in place guidelines for existing customers to determine when to request an updated connection agreement.
15. Behind the meter applications.
16. Co-locating generation and storage.
17. Zero export connections.

11.3 Change of Contract/Service

1. Understand which contracts/documents are affected/need changing.
2. Ensure fit for purpose through transition from DNO to DSO – review as necessary.
3. Balance functionality with bureaucracy.
4. Consider process for withdrawing changing capacity if not utilised – use it or lose it!
5. Consider how charging signals could help with issue of underutilised capacity.
6. Consider how process could be revised to allow more timely change of contract/service.

11.4 Operation issues

1. Capture contracts with embedded generators who need to turn-up as opposed to turn-down generation.
2. Use term “connection on/off” rather than supply – update flow diagrams.
3. System status visible online for ANM scheme.
4. Encourage introduction of Owner/Operator forums.
5. Early outage notification.
6. Dialogue between parties to minimise impact.