The Voice of the Networks

Energy Networks Association

Open Networks Project

DSO Services – Conflict Management & Co-optimisation

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Introduction

1.1 Open Networks Project

The Open Networks Project is a major energy industry initiative, run by the Energy Networks Association, which will transform the way our energy networks work, underpinning the delivery of the smart grid. This project brings together 9 of UK and Ireland's electricity grid operators, respected academics, NGOs, Government departments and the energy regulator Ofgem. The **2019 Project Initiation Document** outlines what the Open Networks Project will deliver in 2019, how it will be delivered and when. There are a number of workstreams delivering a wide range of products that are supporting the transition to a smart grid.

1.2 Workstream 1A – Flexibility Services

Workstream 1A is focused on facilitating flexibility services in the developing flexibility market and has 3 key objectives:

1. Develop and deliver good practice and convergence of directly contracted DSO services to customers across DNOs to deliver a consistent experience for customers
2. Facilitate markets outside the direct procurement of service by DSOs to allow third parties to develop effective and liquid market platforms for customers to realise value for flexibility
3. Support the wider use of DSO services by removing barriers and encouraging the consideration of flexibility solutions

1.3 Product 5 – DSO Services – Conflict Management & Co-optimisation

The following extract summarises the aims for Product 5 in Workstream 1A, Conflict Management & Co-optimisation, for which this report is a key deliverable.

> ***DSO Services – Conflict Management & Co-optimisation***
>
> *Take learnings available through the Regional Development Programmes (RDPs) under 2018 WS1 P13 and 2019 WS1B P4 to:*
>
> *a) Develop a good practice for conflict resolution (ESO-DNO or DNO-DNO or DNO-other e.g. industrial facility, Suppliers) for these DSO services.*
>
> *b) Develop good practice for co-optimisation of services between ESO and DSO.*
>
> *These products will describe conflicts in service and not conflicts of interest in providing services.*

The Trans European Replacement Reserve Exchange (TERRE) project is the European implementation project for exchanging replacement reserves in line with the Electricity Balancing guideline. In enacting

TERRE within the UK, some important processes for identifying and managing potential service conflicts have been created and these should be considered within the product.

1.4 Scope

Within Product 5, there are two key aspects of DSO services that require further process development; conflict resolution and co-optimisation.

The scope for this product will include:

- Develop good practice for conflict resolution between all market participants
- Develop good practice for co-optimisation of services across the whole system

The output of this product will be a Report on good practice for conflict resolution and co-optimisation.

2 Executive Summary

Conflict between one or more services required by System Operators may result in inefficiencies within the electricity system. This may be further compounded by conflicts between the capacity required to accommodate System Operator services and the capacity provided by Network Owners.

Many of the conflicts potentially occurring between services are managed by contractual controls which place conditions on the flexibility provider to avoid any conflicts. These have been developed in 2019 under ONWS1A P2.

Furthermore, conflicts between DSO services have been mitigated through product design during 2019 within ONWS1A P4.

ONWS1A P5 is specifically looking at the additional steps System Operators and Network Owners can collaboratively undertake to identify and manage service conflict and optimisation.

Whilst service conflict is clearly a potential risk, there have been no measurable impacts to date and examples of conflict have been purely theoretical. This product seeks to identify a number of techniques which could be used to manage service conflict and deliver co-optimisation between services. These techniques will be implemented through Regional Development Programmes (RDPs), Trans-European Replacement Reserve Exchange (TERRE) and other flexibility market case studies. The efficacy of these techniques will be reviewed after implementation and future improvements will be recommended for consideration under the ON2021 programme.

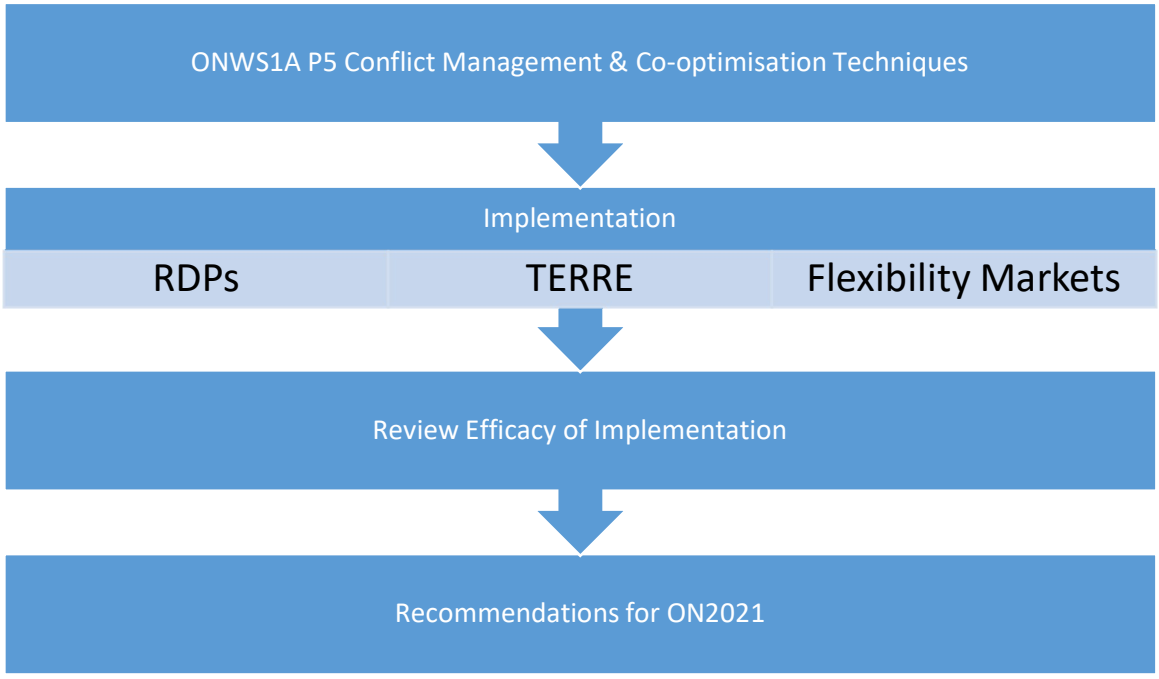


Figure 1 - Implementation Cycle

3 Implementation

Implementation Actions

Conflict Management

Provide Network Owner Service Conflict Identification contact details (Appendix 4)	31/03/2020	Network Owners
Adopt Informed Procurement Process (includes both the requesting of conflict information and responding to conflict information requests)	29/05/2020	System Operators and Network Owners
Conform to SLA of Network Owner returns within 5 days	31/08/2020	Network Owners
Review Usage of Process, Mitigation Actions and Effectiveness	30/11/2020	System Operators and Network Owners

Co-optimisation Actions

Review co-optimisation framework when considering options for co-optimisation	31/03/2020	System Operators and Network Owners
Review Usage of Framework, Co-optimisation Options and Effectiveness	30/11/2020	System Operators and Network Owners

Table 1 - Implementation Actions and Roles

4 Conflict Management

4.1 Scope

This term relates to the actions aimed at identifying and resolving conflicts in how specific assets are used to provide flexibility services. Conflicts can be identified across a number of different timescales depending on the procurement process and the data exchange refresh rate; from many years in advance, through to much closer in real-time. As many procurement processes are currently undertaken manually, the shortest time considered within this work is one week ahead.

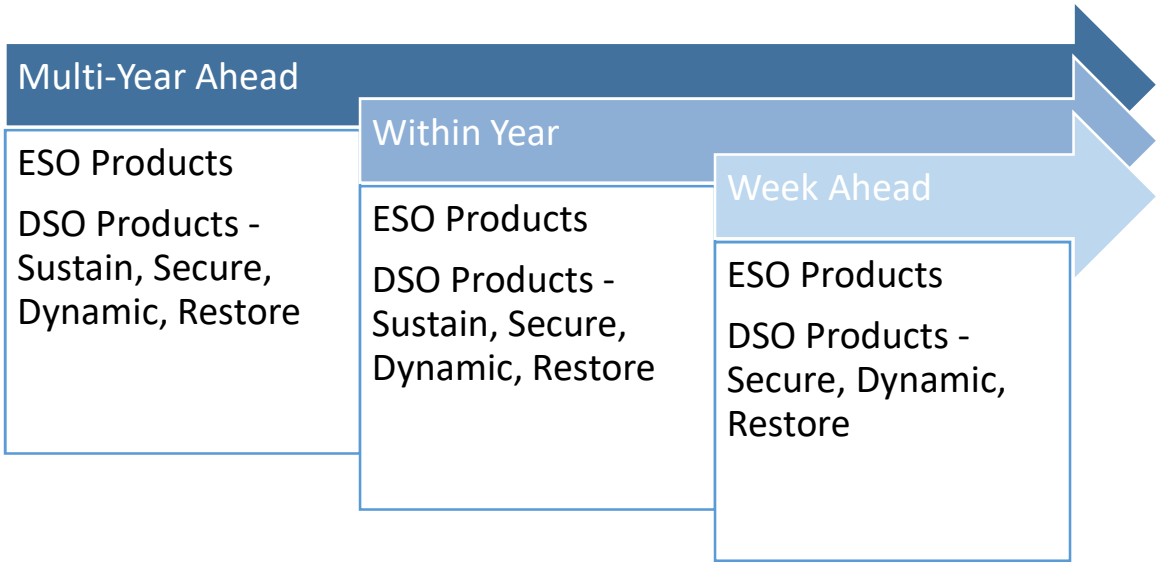


Figure 2 - Timescales for identifying conflicts

Conflicts can occur between different assets being used to manage different system constraints as well as conflicts occurring between services required and the ability of the network to accommodate those services.

4.2 Typical conflicts likely to be found

Due to the way roles and responsibilities on the electricity system are distributed, and the differences in visibility created by traditional boundaries, then conflicts across different parties and actors are increasingly likely.

1. More than one user of flexibility services trying to use the same asset at the same time. (regardless of whether they want the same action).

2. More than one flex service user trying to user the same asset – only if working on opposite directions.

3. Different flex service users procuring/dispatching services on different assets that are electrically arranged so that one service negates or partially negates the other.

4. DNOs ANM scheme reducing generation constriction (or load restriction on Load ANM scheme in the future) which negates the impact of a flexibility service procured/dispatched by a third party

5. A flex service user (other than DNO) procuring/dispatching a service that results in a capacity threshold being breached on the DNO network, and then causes the DNO to take action (may or may not be flex service) to avoid that threshold

6. A DNO procuring/dispatching a service that results in a capacity threshold being breached at the Grid Supply Point and then causes the ESO a problem.

4.3 Approach to resolution

The general approach to better management of conflicts is underpinned by an improvement in the visibility of both undertaken and prospective actions of services within the system. This will be facilitated as data around energy system operation becomes more open and ubiquitous, but as an interim stage, it will be necessary for energy system operators to be more proactive in identifying and responding to potential conflicts of service.

A potential cycle of conflict management is outlined below:

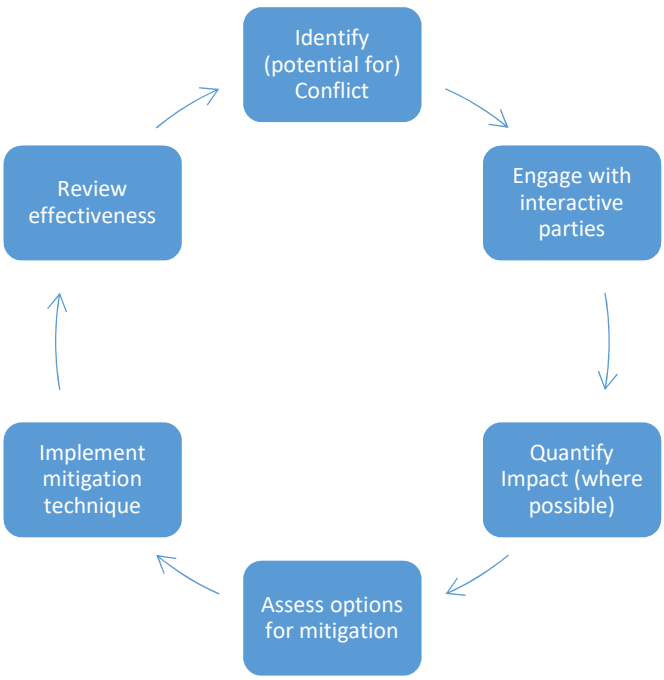


Figure 3 - Conflict Management Cycle

4.3.1 Identify (potential for) Conflict

As the number of active services on the energy system increases, the potential for conflict also increases. The first step in better managing these conflicts is to identify where conflict may occur.

Through development within ENA's Open Networks, network owners and system operators are beginning to provide better visibility of actions, both between parties and to the wider system.

Where there is the potential for conflict to occur, the onus is on the procurer of the service to ensure the network owner where the service resides is aware of the service contract in place.

4.3.2 Engage with interactive parties

Once the actual or perceived issue of conflict has been identified, the next step is to engage with the parties who may be impacted by the conflict. This will generally be between the system operator procuring the service and the network owner providing the network the service is connected to, however it may also involve multiple system operators if the service and system need reside on different voltage levels, or it may involve conflict management between adjacent services.

Type of Conflict	Suggested Interactions
Uniqueness of flexibility/service provision (how to ensure a device participating through multiple markets isn't being double counted, including with aggregators)	Procurer of the service, system operator(s) accommodating the service, aggregators, flexibility providers
Division between market/price-driven vs electricity system hierarchy of operations and when this should be enacted	Procurer of the service, system operator(s) accommodating the service
Routes for secondary trading of capacity	System operator(s) accommodating the service
DSO to DSO & DSO to iDNO flexibility dispatch or conflict management	System operator(s) accommodating the service
Interactions between different service types – i.e. Reserve, Response, Reactive, Black Start	System operators

Table 2 - Types of Conflict

4.3.3 Quantify Impact (where possible)

This stage requires the network owners and system operators to evaluate the potential impacts of the conflict on the parties involved. This will generally require more detailed analysis of the information available to determine the likelihood, risk and consequence of conflict. Information exchanged should detail the network/asset ratings, the expected underlying load behaviour and the flexibility services requiring accommodation.

The impact on service providers also need to be factored into account. The quantification of impact should cover the whole system impact as evenly as possible.

Where it isn't possible to quantify the impact, then any supporting information should be shared between network owners and system operators to better inform future analysis.

4.3.4 Assess options for mitigation

Options for mitigation available to the service procurer should be assessed using all relevant information and a mitigation plan should be proposed by the service procurer, after consultation with the other affected system operators and network owners. The assessment should take into account the cost effectiveness, complexity of implementation and transparency of actions, but ultimately should best facilitate the efficient and economic operation of the system.

Typical options for mitigation may include:

- Reacting to instances of service utilisation to understand extent of conflict (where the potential for conflict was already understood)
- Over procurement
- Service substitution
- Operational mitigations

4.3.5 Implement mitigation technique

Implementation of the mitigation should be completed to help resolve potential conflicts. This may include more than one mitigation if necessary.

Implementation, and hence costs, will typically fall to the procuring entity to facilitate, however in some cases, the whole system analysis may indicate it would be most cost effective for another party to undertake the mitigation. Where this occurs, capability and cost sharing mechanisms need to be considered.

4.3.6 Review effectiveness

A post-implementation stage is recommended whereby the accuracy of the impact assessment, the suitability of the mitigation and the efficiency of the mitigation are reviewed to best inform future applications of conflict management.

5 Conflict Management Framework

To establish some early techniques on managing and mitigating conflicts between services, a number of methods are described below for use by network owners and system operators.

5.1 Informed Procurement

During the procurement stage of a service, the procuring system operator should be able to identify any potential for conflict, primarily due to services being procured in a lower voltage level by a system operator running across an overarching a higher voltage level.

The DER will have a responsibility to ensure it can meet the requirements of the service it is entering procurement for within its connection agreement and without conflicting any other contracts it may be satisfying.

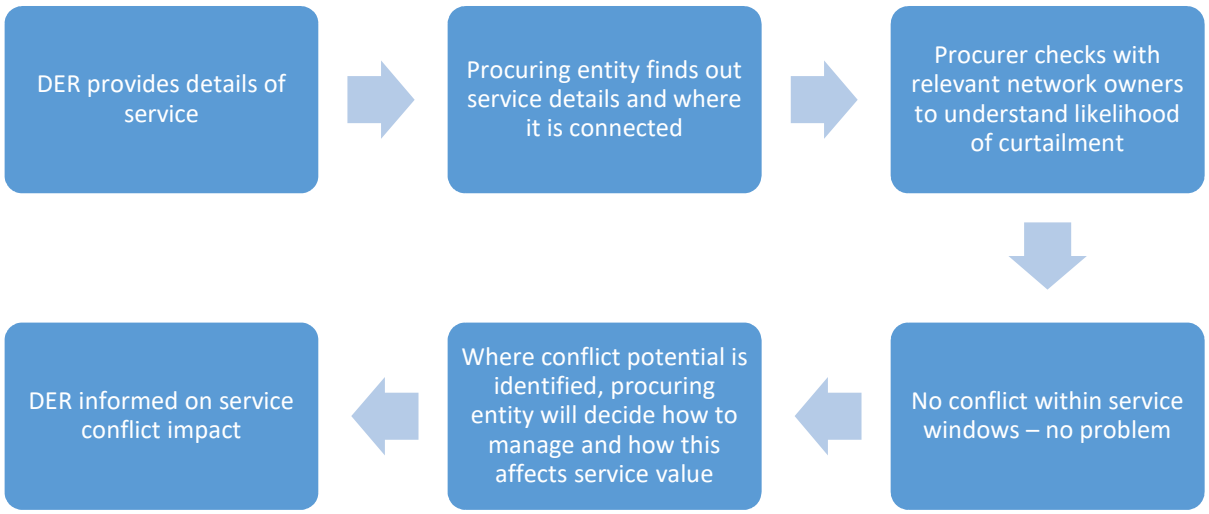


Figure 4 - Process flow for Informed Procurement

5.1.1 Information Exchange and Visibility

Improved data exchange and visibility will be key in enabling conflicts to be identified. System operators (e.g. ESO and DSOs) will need to share the existence of contractual positions and expected dispatch schedules to the best of their knowledge at the time. Network owners (e.g. TOs, DNOs and iDNOs) will have to provide the best understanding of the ability of their network to accommodate services.

The figure below details the types of information that may be passed between network owners and system operators to better understand the potential for conflict.

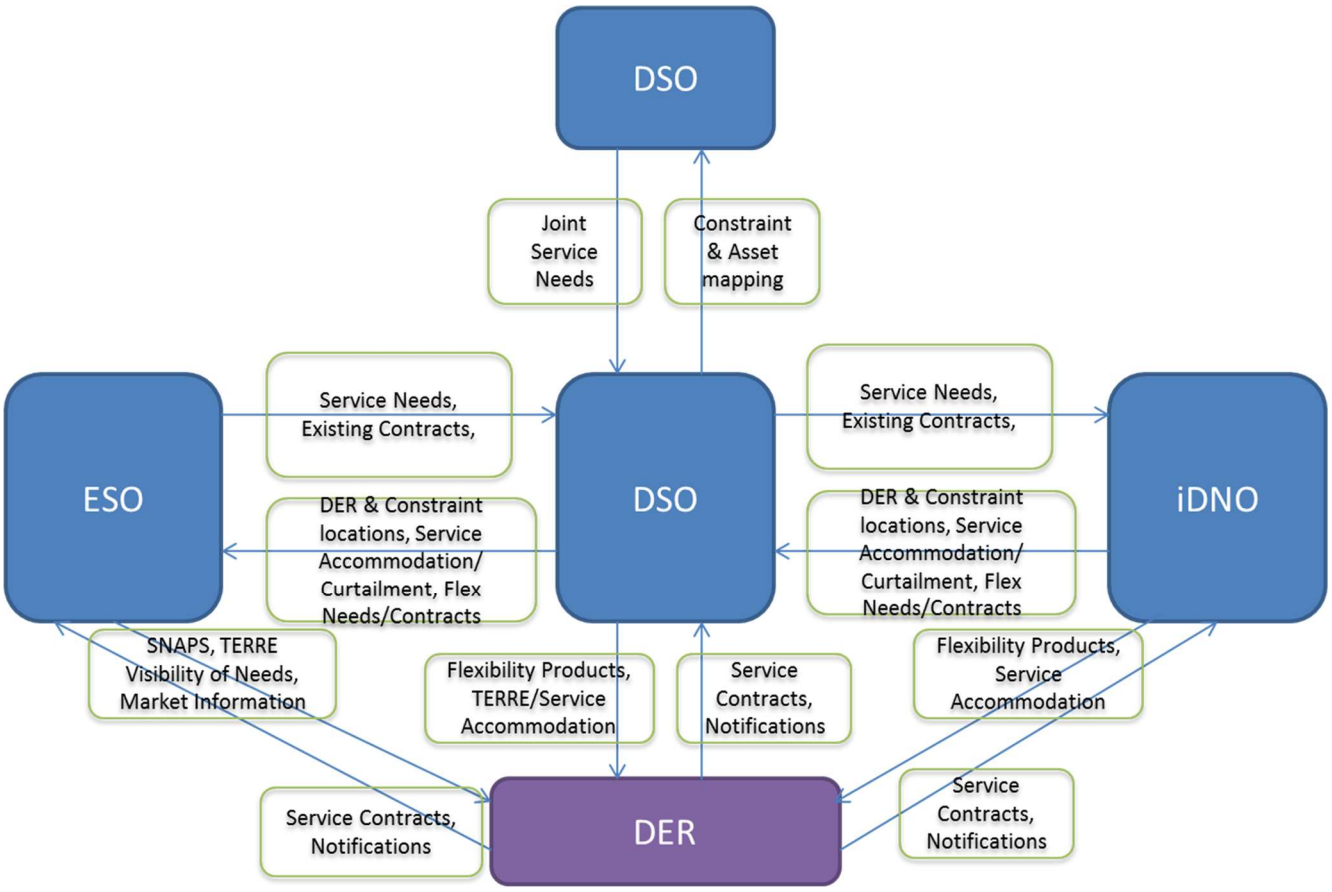


Figure 5 - Information flow of service provision in procurement timescales

The main type of potential conflict identified for early mitigation is for services being procured in a lower voltage level by a system operator running across an overarching a higher voltage level.

A DSO to DSO information flow may need to be maintained where DNO network areas are supplied from other distribution networks and not directly from the transmission network.

5.1.2 DER Data

In order for the service procurer to adequately inform the relevant system operators and network owners of the potential for conflict, it needs to collect a certain level of information from the DER or flexibility provider during the procurement process.

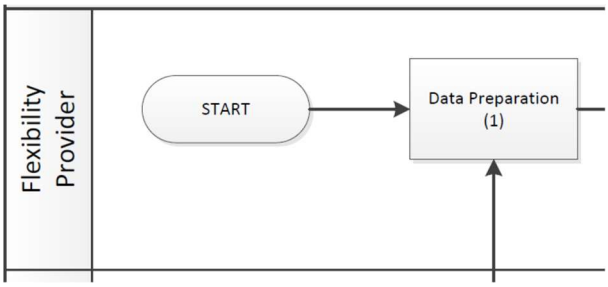
Data required:

- MPAN for each sub-component
- Post code for each sub-component
- The technology of each source (including fuel type)
- The installed capacity of each sub-component
- Control point of BMU/Flexibility Provider
- Are there any restrictions in their DNO/iDNO connection agreements?
- Do they have a firm, non-firm or flexible connection?
- Voltage level at point of connection

- Maximum ramp rates
- Can the BMU/Flexibility Provider instruct all sub-components?

Appendix 1: Conflict Management Process Map shows the process developed to better manage conflicts across network owners and system operators.

The data detailed in this section is to be prepared by the DER or flexibility provider, as per the process in Appendix 1.



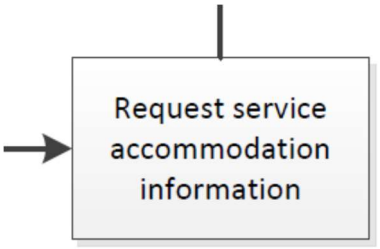
It will be collected and checked by the service procurer and passed to the relevant system operators and network owners.

5.1.3 Engagement with other System Operators and Network Owners

Once sufficient information has been gathered, the next step in the informed procurement process is to engage with the other affected parties. This will usually be defined by the MPAN code, though recognising the possibility for multiple system operators and network owners may be affected, particularly for iDNO networks.

To best facilitate this engagement process, a list of contacts has been established in Appendix 4: Network Owner Conflict Management Contacts.

This engagement will be instigated by the service procurer as per the process identified in Appendix 1 – Conflict Management Process Map. The service procurer will request the service accommodation information from the relevant system operators and network owners.



5.1.4 Understanding Service Accommodation

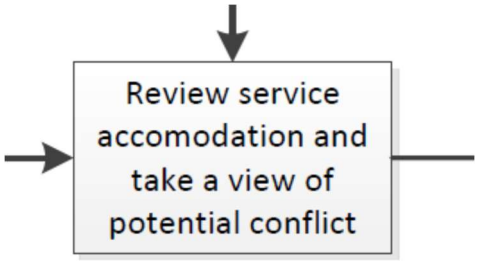
Where a system operator requests conflict management identification of a service, the affected system operators and network owners will provide further details on whether there is any active management of load in that network area. System operators and network owners should confirm whether any load management, Active Network Management or flexibility services are used and, where possible, provide further details of the services, or curtailment assessment.

The reporting boundary for these details will be at the system boundary between parties. For most circumstances, this will be the GSP boundary.

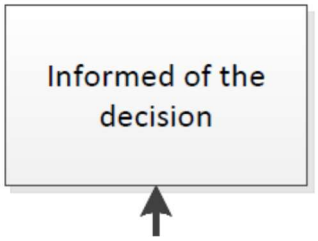
Curtailment information may be reported on the same basis as the curtailment assessment developed as part of ON2018 WS1 P5.

5.1.5 Conflict Mitigation

The service procurer will review the information provided on likelihood of conflict between the service it seeks to procure, and other services and network capacity and take a view on whether further mitigation is required.



Where the conflict mitigation has a resultant impact on the flexibility provider, they should be informed of this by the service procurer. The service procurer should provide further details to the service provider on the conflict identified and the mitigation applied.



5.2 Informed Dispatch

Whilst the potential for conflict can be identified during procurement, it may not be possible to accurately quantify the impact within those timescales. It may be possible to better identify the magnitude of constraints in real-time, during the operational stage of a service. During operational timescales, the system operator should have sufficient information to confirm that there is enough capacity within a network to accommodate the operation of a service they are dispatching.

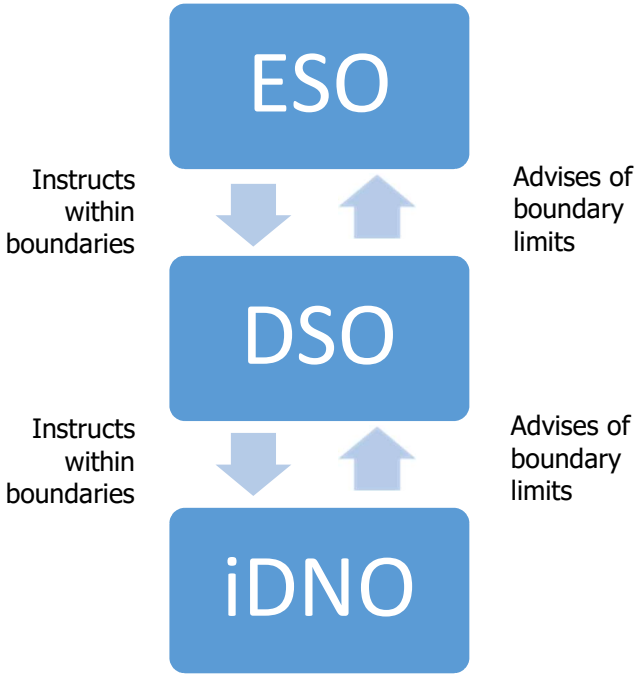


Figure 6 – Information flow for Informed Dispatch

5.2.1 Information Exchange and Visibility

Improved data exchange and visibility will be key in enabling conflicts to be identified. The real-time data exchange requirements defined in ON2019 WS1B P3 enable sufficient information to be exchanges across boundaries to enable visibility of network capacity and also of potential system operator actions.

The figure below details the types of information that may be passed between network owners and system operators to better understand the potential for conflict.

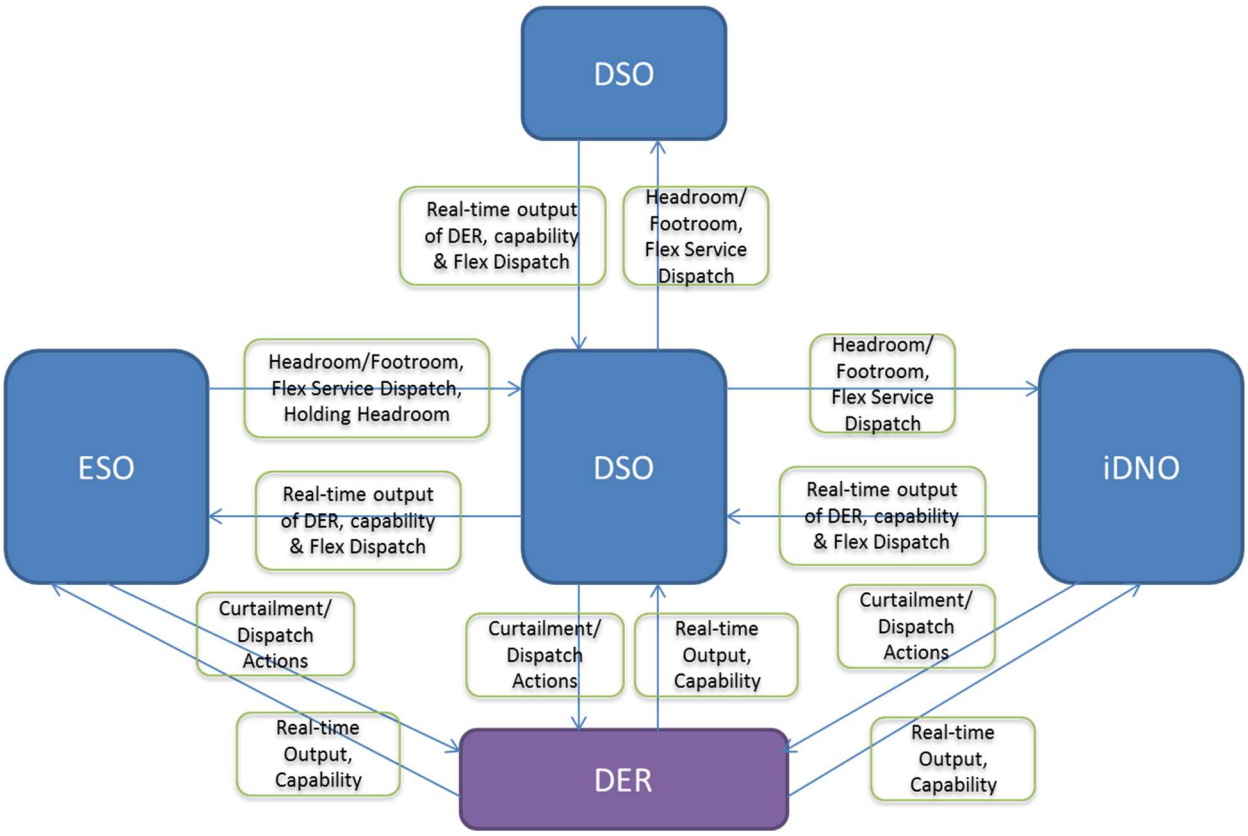


Figure 7 - Information flow of Informed Dispatch in real time

A DSO to DSO information flow may need to be maintained where DNO network areas are supplied from other distribution networks and not directly from the transmission network.

5.2.2 Priority of Actions

From the European System Operation Guideline (SOGL) Art 182 (Cooperation with DSOs), services being provided from distribution connected resources can only be precluded for "technical" reasons. Where headroom and/or footroom is technically limited, the DSO will advise the ESO and the ESO will not take actions to negatively impact the constraint.

Where a commercial action with the highest merit order action might negatively affect a technical network constraint, the system operator will take the next available commercial action in the merit order which does not impact a technical constraint.

Where a commercial action can be taken to resolve technical constraints, and a commercial agreement exists between network owners and system operators, then the system operator will take that action on behalf of the network owner.

5.3 Joint Procurement

Many of the potential service conflicts are due to network constraints and system requirements not being considered together when procuring the flexibility services.

Where it is identified that services could be jointly procured to efficiently meet individual system needs on a whole electricity system basis, many of the potential conflicts can be quantified during the procurement phase and immediately addressed, therefore not require ongoing mitigation.

The convergence of flexibility products across system operators and network owners is a key output of the Open Network project and procuring these services together jointly would take this one step further to reduce the likelihood of conflicts during more active system operation. It should be recognised that it may not be appropriate to jointly procure all services where the needs and requirements are fundamentally different across system operators.

A process to compare how joint procurement might expedite conflict mitigation can be found in Appendix 3: Joint Procurement Process Map.

6 Co-optimisation

6.1 Scope

Services being operated on the energy system for a procuring party may also have the potential to provide additional benefit to other parties. This may allow a service procured to satisfy one requirement either fully or partially satisfying the requirements for another area of network or system operation.

The technical possibility for the benefits to be shared for a single service enables the potential for revenues for that service to be sought from multiple parties.

Co-optimisation deals with the processes around enabling multiple parties sharing a single service.

6.2 Potential for co-optimisation

Improved data exchange and visibility will be key in enabling conflicts to be identified. Having oversight of what services are required and where these are likely to be dispatched might enable co-optimisation to occur, depending on how those services would be utilised by system operators and network owners.

Expected examples of co-optimisation are detailed below:

- Standardised or joint contractual terms between system operators and network owners which allow for the sharing of services
- Approaches to joint procurement
- Ability for the order of dispatch of services to be influenced by the whole system value
- Sharing of availability payments across multiple parties
- A move towards real-time pricing/valuation of utilisation vs fixed/pre-procured pricing
- Increased accessibility for iDNO, DSO and ESO flexibility to be used for whole system benefits

6.3 Approach for co-optimisation

As services become more prevalent across all voltages of the energy system, it will become more likely that a single service can provide benefit to multiple parties. Whilst co-optimisation might be able to provide potential benefits, there has been little exploitation of shared services, joint procurement or service cost apportionment due to the nascence of distribution services and the exclusivity of transmission services. Further work needs to be done, using examples of potential co-optimisation as they occur, to better understand the mechanics, benefits and consequences

There does not appear to be any regulatory barriers to enable co-optimisation and potential opportunities may grow significantly as distribution flexibility markets increase in volumes and the ability to stack services across distribution and transmission markets becomes clearer.

Where opportunities for co-optimisation present themselves, these should be taken forward between relevant parties to further develop the concept and feed the knowledge back into industry as a case study.

6.4 Framework for Co-optimisation

The following list of potential co-optimisation activities is provided and should be built upon as opportunities for further development occur within the sector.

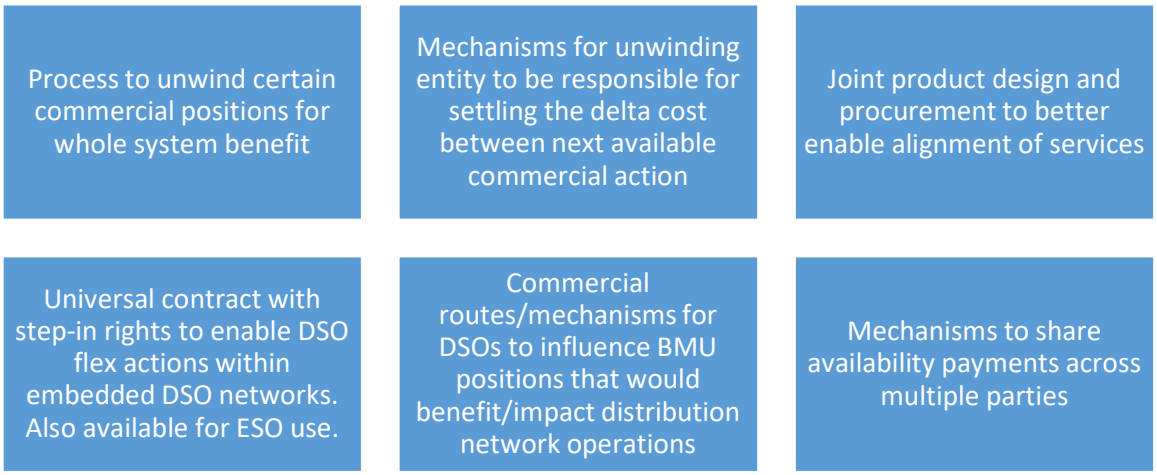


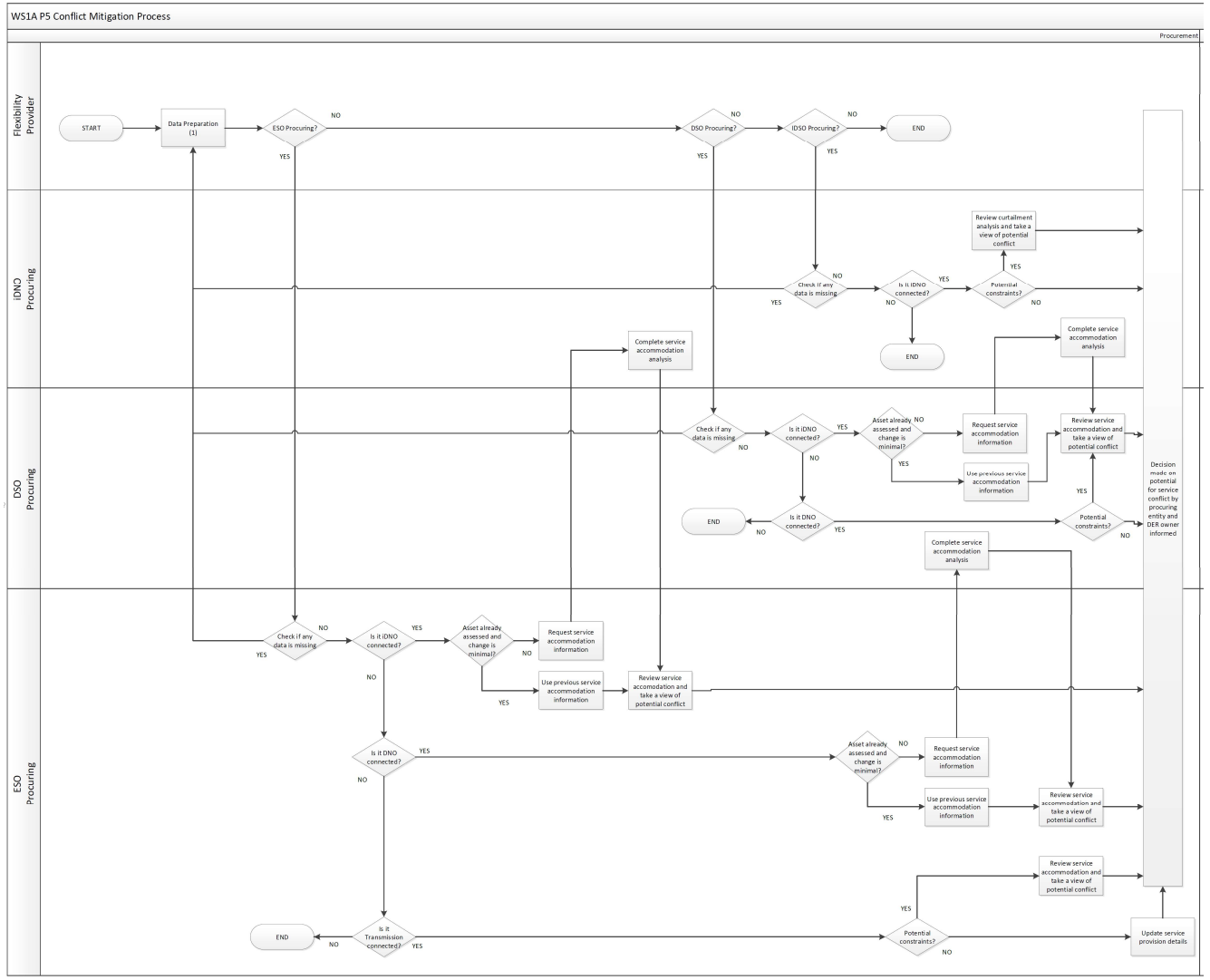
Figure 8 - Framework for Co-optimisation

6.5 Delivery of co-optimisation

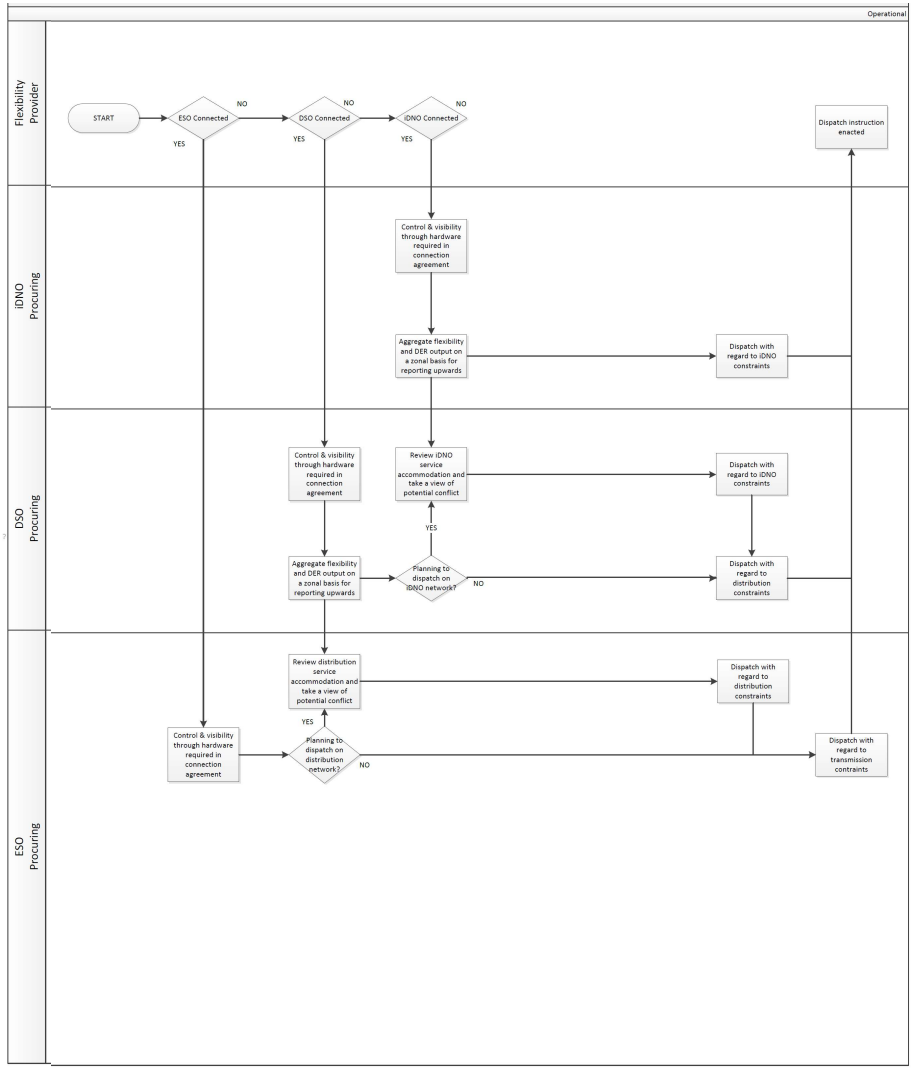
Network owners and system operators are committed by standard licence conditions to support the running of an efficient and economic electricity system. Realising the net economic benefits of the co-optimisation of flexibility services is a high priority for network owners and system operators, but this could also be a facility enabled by new emerging flexibility platforms.

The extent as to how new markets might be able to support better co-optimisation should form future development work in Open Networks from 2021 onwards.

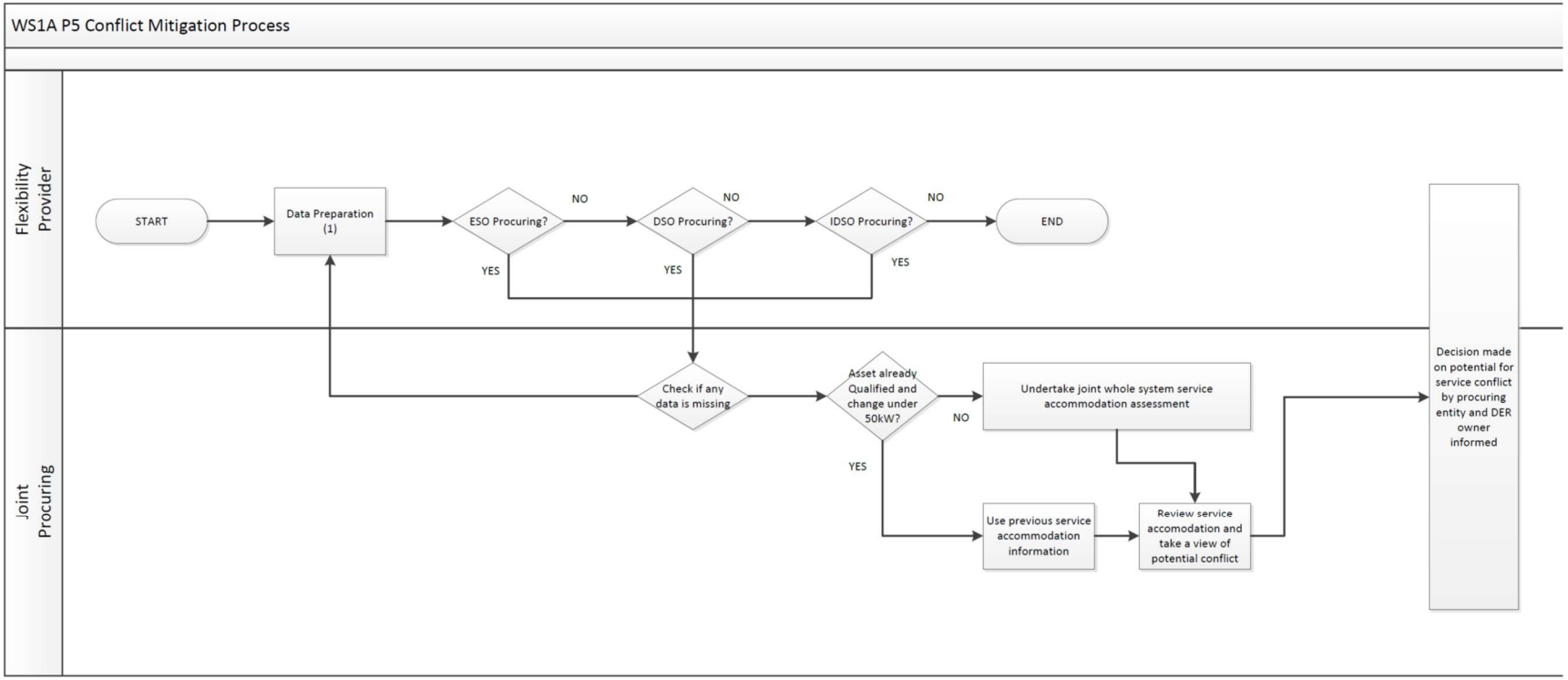
Appendix 1: Informed Procurement Process Map



Appendix 2: Informed Dispatch Process Map



Appendix 3: Joint Procurement Process Map



Appendix 4: Network Owner Conflict Management Contacts

MPAN ID	Network Owner	Conflict Management Contact
10	UKPN – EELC	
11	WPD – EMEB	wpdnetworkstrategy@westernpower.co.uk
12	UKPN – LOND	
13	SPEN – MANW	
14	WPD – MIDE	wpdnetworkstrategy@westernpower.co.uk
15	NPG – NEEB	
16	ENWL – NORW	
17	SSEN – HYDE	
18	SPEN – SPOW	
19	UKPN – SEEB	
20	SSEN – SOUT	
21	WPD – SWAE	wpdnetworkstrategy@westernpower.co.uk
22	WPD – SWEB	wpdnetworkstrategy@westernpower.co.uk
23	NPG – YELG	
24	GTC – IPNL	
25	ESP – LENG	
26	Energetics – GUCL	
27	GTC – ETCL	
28	UKPN – EDFI	
29	Harlaxton – HARL	
30	Peel – PENL	
31	UKPD – UKPD	
32	Energy Assets Networks – UDNL	
35	Fulcrum - FEAL	

Table 3 - Network Owner Conflict Management Contacts