



BiTraDER

Deliverable 7

Functional Specification

July 2026

Version

Version	Date	Author	Status	Comments
V1.0	29/06/2026	Christopher Greenfield	First draft	For review
V1.1	30/06/2026	Christopher Greenfield	First draft	For submission
V1.2	28/07/26	Christopher Greenfield	Second draft	Updated following peer review

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Glossary

ANM	Active Network Management - The use of distributed control systems to continually monitor network limits and provide signals to curtailable connections or flexible services to modify outputs in line with these limits.
BAU	Business As Usual
Connectee	Any individual or company connected to the electricity distribution network
Constraint	A demand greater than network ratings or voltage outside statutory limits. In this definition demand is used in the context of the load on the network (including generation).
Constraint Look Ahead	The forecasted list of constraints, predicted by the ANM system to occur for each hourly period up to 48 hours in advance
Curtailable connection	Connection arrangements which allow Electricity North West to signal, in real time, a curtailment of demand or generation when there are network overloads or restrictions affecting the network local to the connectee whilst the network is operating in an intact, system normal state. Connectees will generally be given a curtailable connection where offering a non-curtailable connection would require network reinforcement which has cost and time implications on them being connected
Curtailment	The turning off, or down, of a connectee's import or export to alleviate a constraint based upon contracted and agreed principles of available capacity
Curtailment obligation	The requirement for a connectee to provide curtailment. The specific details of this requirement will be stated in their connection agreement
DNO	Distribution Network Operator – An organisation that owns, operates and manages the electricity infrastructure that distributes electricity from the transmission network operated by NESO, to end users (commercial and domestic properties)
Demand connection	An asset that is connected to the distribution network and requires import supply
Demand increase (flexible service)	A connectee providing a flexible service where the outcome is an increase in demand (this could be provided by either generator reducing export, or a demand connectee increasing import within their maximum import capacity limits)

Demand reduction (flexible service)	A connectee providing a flexible service where the outcome is a reduction in demand (this could be provided by either generator increasing export within their maximum export capacity limits, or a demand connectee reducing import)
ENA	Energy Networks Association
Flexibility	The modification of generation injection and/or consumption patterns, on an individual or aggregated level, often in reaction to an external signal, to provide a service within the energy system
Merit order list	A list of connectees in a specific order for the ANM system to action
NESO	National Energy System Operator – An organisation that monitors, controls and actively manages the power flows on the electricity transmission network to maintain a safe, secure and reliable electricity supply. NESO is a natural monopoly in the flexibility market, acting as a neutral facilitator
NIC	Network Innovation Competition
Non-curtable	Under system normal conditions, a connection which is planned and operated such that it should not be curtailed; however, it may be curtailed in the event of the loss of any one or more elements (e.g. an overhead line route, a transformer, an underground cable)
SP ENW	Scottish Power Electricity North West
UI	User Interface

Executive Summary

This report is the seventh deliverable for the BiTraDER (Network Innovation Competition) NIC project which is being delivered by SP Electricity North West (SP ENW) and its partners. The aim of this report is to explain the project progress to date, focusing on the results and learnings from the live network trials.

It builds upon the previously delivered and published report for the BiTraDER project:

1	BiTraDER Customer Engagement and Trading Scenarios	30/11/22
2	BiTraDER Trials Plan, Trading Rules and Initial Specification Report	30/06/23
3	BiTraDER Trading Platform Design	03/09/24
4	BiTraDER Architecture Build Lessons Learned Report	10/03/25
5	BiTraDER Simulation Trials Report	28/05/25
6	BiTraDER Network Trials Report	29/05/26

The main objective of the BiTraDER project is to demonstrate how access to a neutral market allows connected resources to trade their obligations bilaterally, encouraging more of them to offer flexible services, increasing availability of flexibility and thereby reducing whole system costs.

The project currently remains on track to meet its aims, objectives, and all deliverables outlined within the full submission document.

This report provides an overview of the project and the final functional specification for BiTraDER, along with the next steps.

1 Introduction

As part of the UK's journey toward net zero, Distribution Network Operators (DNOs) are experiencing an increase in requests by customers to connect low carbon, renewable energy sources to the network. These connections can cause network constraints which are usually resolved through expensive, time-consuming and disruptive network reinforcement.

As a more cost-effective solution, DNOs have introduced curtailable connections and flexible services which, when used alongside advanced network automation algorithms such as Active Network Management (ANM), can control the customer's generation or demand output in real-time to resolve constraints.

Curtailable connections allow customers to connect to the network without the need for traditional reinforcement. Therefore, these connections are lower cost and can be delivered within shorter timescales than a 'non-curtailable' connection. When accepting a curtailable connection, a customer accepts the obligation to curtail their asset's export or import, in response to a request from the DNO, under certain network conditions. This is referred to as a 'curtailment obligation' and the specific details are stated in the customer's connection agreement.

Although these connections are lower cost and quicker, many customers are hesitant to accept them due to the inherent risk of being curtailed, and the associated commercial risk. Instead, some customers prefer to pay more and wait for a non-curtailable connection with negligible risk of being curtailed. In the case of low carbon generation such as solar, owing to the high capital investment required to establish the facility in the first instance, customers need certainty of a high in-service utilisation factor, meaning they are particularly sensitive to the risk of curtailment and much less likely to accept a curtailable connection.

Additionally, customers can provide a 'flexible service' to the DNO by agreeing to increase generation output, or reduce demand, at times defined by the DNO in exchange for remuneration. Owing to the long-term commitment associated with a flexible service contract, some customers are similarly hesitant to offer this. The commitment can be perceived as a barrier if customers are unable to meet the contract requirements over a prolonged period (i.e., a year).

BiTraDER seeks to allow new and existing customers to mitigate the risks associated with curtailment obligations by enabling customers to trade their curtailment obligations bilaterally. BiTraDER will also provide an opportunity for customers to participate in flexibility on an 'ad hoc' basis, removing the risk associated with long term contracts and boosting liquidity in the market.

2 Overview of BiTraDER

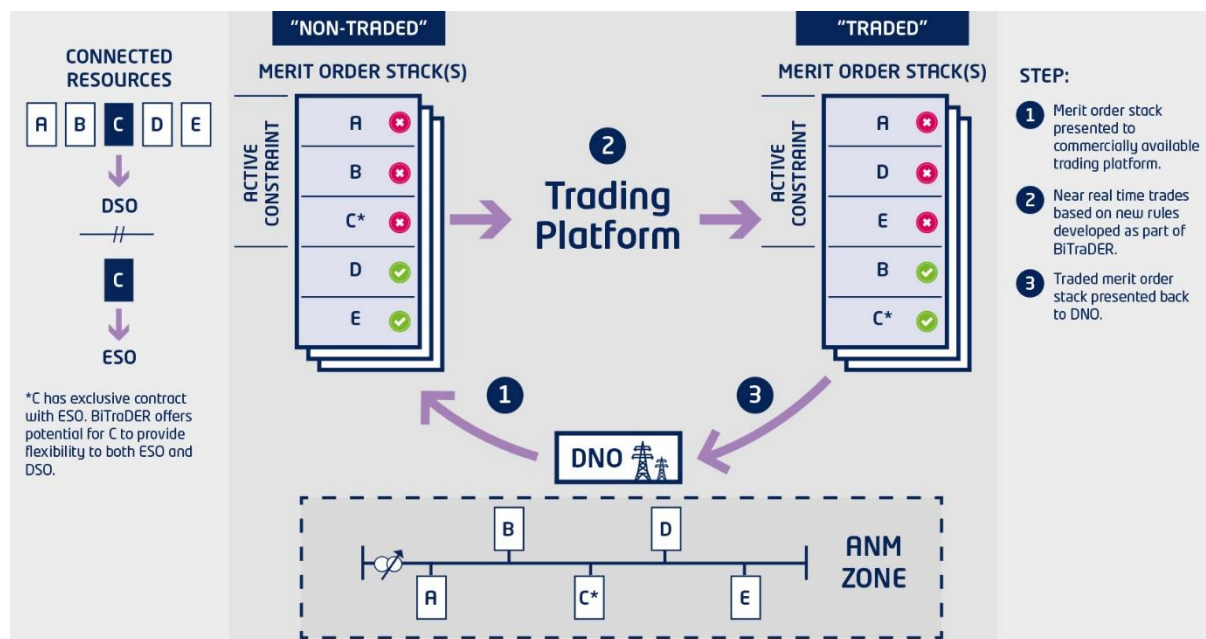
BiTraDER will investigate, design, build and trial – on our live network – a brand new and highly innovative market allowing resources connected to the distribution network to trade their curtailment obligation bilaterally.

The project will assess current and future customers' appetite for bilateral trading, determine the data requirements to support operation of the market, design the interfaces needed to present all necessary information to the trading platform, develop the bilateral market trading rules

determining what is and isn't a valid trade, explore the market's ability to operate in near real-time, and determine the functionality required to return the output of the market to the DNO and National Energy System Operator (NESO) systems for execution in real time.

BiTraDER is designed to facilitate independent trading, therefore SP ENW will provide the necessary information to the market and receive the output of the market after close of trading. The project will examine the role of the market administrator and propose who might be best placed to operate the market in Business As Usual (BAU). Figure 1 shows the high-level illustration of the trading process as per the BiTraDER full submission document.

Figure 1 BiTraDER illustrative method



BiTraDER will be completed in six phases, over a four-year period:

1. *Customer engagement* – engagement and recruitment of customers to inform the design of the trading rules and platform, during the design phase, and to participate in trading during the simulation and live trial phases.
2. *Design* – development of the core trading scenarios, market principles and trading rules, including validation and practical challenges associated with enabling trades. Design of the trading platform and end to end data architecture, considering cyber security and other associated risks. Capture of the technical requirements and the interface considerations for integrating the trading platform with the SP ENW systems.
3. *Build* – build and test of the trading platform and data architecture using the outputs of the design phase. The acceptance criteria for testing will be developed during the design phase.

4. *Simulation trials* – a series of tests will be run using simulated network models and customer assets, allowing customers to participate in simulated trading of their curtailment obligations.

Following the simulation trials there is a ‘Stage Gate’ which provides the opportunity to ensure that the plan for implementation of the live trial is both reasonable and deliverable within the constraints of the approved project. Should the project pass the stage gate we will move to the live trial phase, otherwise we will progress immediately to project closedown and BAU transition.

5. *Live network trials* – a live trial of trading covering a specific area of the SP ENW network, including the curtailment of assets connected to our network.
6. *Closedown and BAU transition* – analyse the costs and benefits of BiTraDER and produce a closedown report for dissemination. Develop the process for transition to BAU, provide training to internal planners and operational engineers on all new codes of practice, and publish a functional specification for BiTraDER.

3 Functional Specification

The requirements for deliverable 7 are to inform the reader of a final functional specification for BiTraDER, including:

- *Trading rules*
- *Interface requirements*
- *Data requirements*
- *Platform design*

Throughout the project, particularly during the design phase, key elements of the functional specification have been developed. A large part of these elements remain the same accounting for the fact that the design process was based off useful insights from early customer workshops combined with existing expert knowledge from the project partners.

Since the design phase, the trials have completed, which thoroughly tested the market operation and gathered additional insights into how the functionality could be improved. The project team have reviewed the requirements of deliverable 7 and for each requirement, will reference the initial specification developed under previous deliverables and consider any additional changes that need to be made following stakeholder feedback.

Table 1 lists each requirement and where each initial specification can be found:

Table 1 BiTraDER initial specifications

Functional Specification Requirement	Deliverable Submitted Within	Report Name
Trading Rules	D2	Trading Rules Report
Interface Requirements	D2 – section 5.4	System Architecture
	D3 – section 4.6	Systems Integration Design and Interfaces
Data Requirements	D3 – section 4.6	Systems Integration Design and Interfaces
Platform Design	D2	Trading Platform High Level Functional Requirements Report
	D3	Trading Platform Design and Data Model Report

3.1 Trading rules

The original [BiTraDER Trading Rules Report](#) was published in 2023. Since the publication of this report a significant amount of work has been undertaken on the project including the completion of the trials phase.

A review of the trading rules was undertaken to ensure that any learnings were taken account of and implemented into the final specification. This was focused on a review of the potential impact of nested constraints and alternative payment structures.

3.1.1 Nested Constraints

As demand and generation increase on the network, the number of constraints will increase, and this is likely to lead to more nested constraints. The following issues were identified to arise from nested constraints:

- Sellers not useful: Despite trading there is the potential that a buyer would not avoid curtailment. In the payment structure which includes an availability payment, the buyer will still have to pay an availability payment to the seller, even though the buyer did not avoid being curtailed and the seller could not help with the binding constraint.*
- Buyer off the hook for the constraint: It is possible that the buyer would still need to pay the seller the utilisation payment even though the buyer was not 'on the hook' for a specific nested constraint.*

To understand the continued impact of this issue we hosted a trading rules workshop. The outcomes of this workshop are set out below.

We identified that it remains acceptable that nested constraints are not formulated within the trading platform at this stage. This is due to the low risk of occurrence and subsequent impact on the operation of the scheme.

However, to ensure this remains the case it will be important to continue to monitor the following assumptions:

- *Trades are only allowed for those constraints which are identified by the Constraint Look Ahead (CLA), between a sub-set of parties who can solve that constraint.*
- *Utilisation payment is only made if the seller is called on to deliver (and actually delivers).*
- *There is no need to withhold the availability payment if the seller was unable to deliver due to a nested constraint (different rules for non-delivery).*
- *The curtailment index for the buyer is updated to reflect any delivered curtailment which is delivered by the seller on its behalf.*

As BiTraDER is moved to BAU, it will be important for the impact of nested constraints to be monitored, including ongoing feedback from industry stakeholders to ensure solutions are put in place where necessary.

3.1.2 Alternative payment structures

The accepted and rejected 'pricing structures' discussed in the trading rules have been reassessed based on further stakeholder discussions and trial outcomes.

We explored three options for determining the price paid by the buyer to the seller:

- *Option A: utilisation payment only (pay as clear)*
- *Option B1: availability and utilisation payment with matching based on buyer's highest total bid and seller's lowest availability (pay as bid / offer)*
- *Option B2: availability and utilisation payment with matching based on buyer's highest total bid and seller's lowest total offer (pay as bid / offer)*

Further details of these options are explored in the [BiTraDER Trading Rules Report](#).

Following further detailed review and engagement with trial participants, it was decided that the trading rules for the platform design and subsequent trials would be based on:

- *Buyers: Submit an availability and utilisation price – based on the maximum they are willing to pay. Bids are ordered by the 'all in' bid (availability and utilisation) price and the higher the 'all-in' price the greater the possibility of matching.*
- *Sellers: Submit an availability and utilisation price – based on the minimum they are willing to pay. Offers are then prioritised on the basis of the lowest 'utilisation price' first and then the lowest 'all-in' price. Offers are then accepted if the required availability is less than the maximum buyer availability price and the all-in offer is below the buyer 'all-in' price.*

3.1.3 Additional Market Design Choices

In addition to the bid / offer structure we have considered a review of other market design choices discussed during the trial period. These choices are linked to ability of participants to accurately understand the value of participating in the BiTraDER market at any point in time. These were raised with the intention of attempting to mitigate the risks linked to the levels of liquidity.

As part of the initial trading rules design the gate closure was set in the morning of the day prior to the 'constraint day'. The intention here was to give participants sufficient time to make necessary operational changes reflect a new position in the curtailment merit order.

However, as part of the trials some participants identified that the current gate closure position impacted on their ability to operate in other markets. This could potentially leave them exposed to other contractual and energy delivery obligations. And since the potential revenues available in the BiTraDER market are lower than other markets these participants would either not participate or include a large premium to bids/offers to mitigate this risk.

As a result, it was agreed during the live trials that the gate closure position would be moved to later in the day. This new position was tested and considered an improvement. As a result, this will be taken forward into BAU.

During the initial trading rules development, it was assumed that the participant bid and offers should be private (except in the case of a bid/offer match) to protect strategies and commercial positions. However, as part of the trials it became evident that there were significant differences in the pricing strategies being operated by the different participants. This was driven by the different operations of participants and their interaction with other markets (e.g. both energy and ancillary).

Given that this design choice had not been explored in depth and the case for change not convincingly made, it was decided not to change the rules for the trials on a forward-looking basis. However, as a mitigation it was decided that at the end of each trial day, we would share with participants all bids and offers on an anonymised basis. It was decided that this would have limited impact on the future trials (and potential bias and learnings linked to price discovery) given each trial day based on a different type of 'constraint use case'.

Going forward it is recommended that this design choice is considered in more detail prior to BAU roll-out. Initial discussions with participants identified advantages linked to the ability to understand other participant positions and increase the chance of matching while the liquidity improves. But both the potential commercial impacts as well as potential unintended consequences on the market in the long term remain a risk and must be considered in more detail and in consultation with all participant groups, before any change is made.

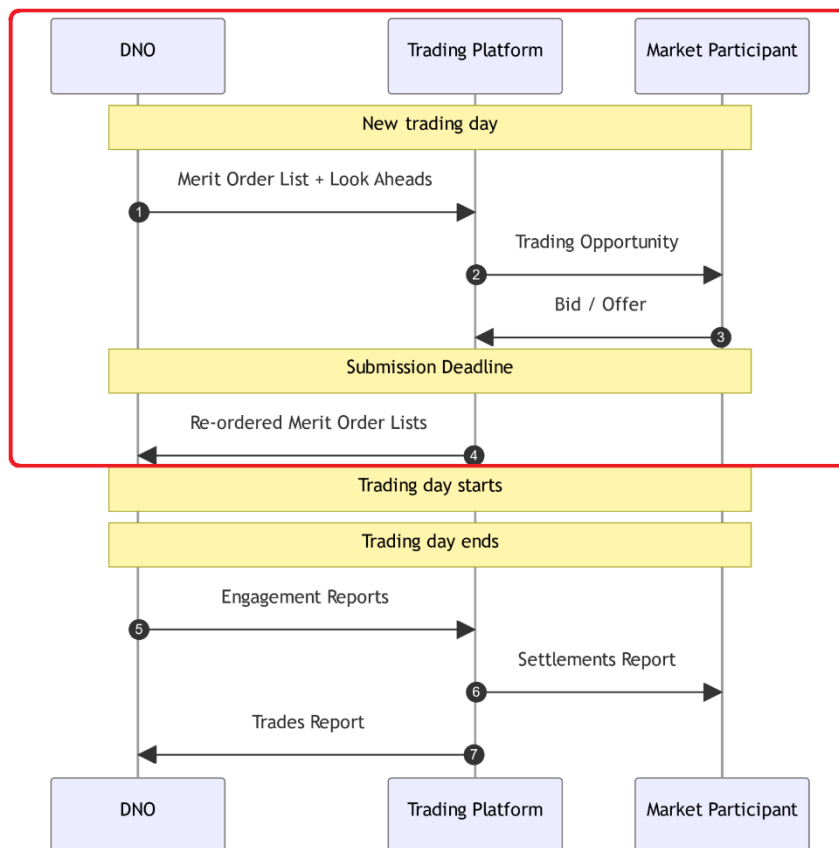
To conclude, there are no additional elements required to be added into the final functional specification, and so the initial report is still considered the most relevant, along with the outcomes of the review within this report.

3.2 Interface/Data Requirements

The data and interface requirements work hand in hand and the required data is shared between the ANM system and the trading platform through an Application Programming Interface (API).

Figure 2 shows a high-level overview of the information flows within the scope of BiTraDER.

Figure2 Architecture Overview



The dataflow consists of the following steps:

- *Constraint detected by the ANM look ahead*
- *Look ahead sent from ANM to the trading platform*
- *Merit Order list sent from ANM to the trading platform*
- *Trading platform processes the look ahead and merit order lists and generates trading opportunities*
- *Trading platform sends an updated merit order list back to ANM for execution during a constraint*

The payload data for each step is shown below:

ANM to BiTraDER – Look ahead list

This is a list of constraints for a defined period (hour) from a given start date time up to 48 hours.

Table 2 Look ahead list

Field	Type	Comment
Start date time	Date time	Time of the report (local time)
Offset time	time	Offset of records format Hh:mm Hh is 00 to 48
Constraint id	text	Constraint Identifier
Constraint size	real	size of the constraint expressed in kW
Constraint Unit	text	kW or KVAr
Constraint Signal Name	text	Signal name of constraint
Constraint Zone	text	Zone of constraint
Constraint circuit	text	Circuit of constraint
Constraint flexible resource id	text	Unique identifier of a flexible resource. Can be multiple flexible resources for a constraint
Constraint flexible resource name	text	Name of flexible resource above

ANM to BiTraDER – Merit order list

This is an ordered list of multiple contracts to use when a constraint triggers.

Table 3 Merit order list

Field	Type	Comment
Ordinal number	Integer	The numbering starts at 1 for each, non-empty, list.
Flexible resource ID	Text	This must be the same as that held in GIS for a contract.
Contract operation type	Text	- constrainedDemand: the contract allows the export of power to be curtailed. - constrainedGeneration: the contract allows the import of power to be curtailed. - flexibleOutputChange: an increase/reduction in power flow that has been purchased by SP ENW.
Value	Real	constrainedDemand . the maximum value which can be imported by a resource when it is curtailed. For units see next entry. constrainedGeneration the maximum value which can be exported by a resource when it is curtailed. For units see next entry. flexibleOutputChange Positive value denotes import increase, while negative value denotes import decrease.

Field	Type	Comment
Unit	Text	kW or KVAr
MEC_kVAr	Real	
MEC_KW	Real	
MIC_kVAr	Real	
MIC_kVAr	Real	
Resource name	Text	
Contract_id	Text	
Bitrader_contract_ref	Text	
Buyer_seller	Text	= Buyer / Seller / Not Applicable
Timestamp	Text	UTC timestamp when merit order list is applicable

ANM to BiTraDER – Execution list

This is a list of BiTraDER contracts used to satisfy a constraint.

Table 4 Execution list

Field	Type	Comment
Flexible resource ID	text	This must be the same as that held in GIS for a contract.
Contract type	text	flexible / curtailment
Initial set point	real	% set point before engagement
Final set point	real	% set point or curtailed / adjusted amount of power output
Curtailment value	real	Curtailed / adjusted amount of power output
Setpoint type	text	kW or KVAr
Timestamp	text	The UTC time when the command is executed
Contract id	text	Contract id

BiTraDER to ANM – Returned merit order list

This is a list of contracts whose order is decided by BiTraDER

Table 5 Returned merit order list

Field	Type	Comment
Ordinal number	integer	The numbering starts at 1.
Flexible resource ID	text	This identifier must be the same as that held in GIS for a contract.
Contract operation type	Text	- constrainedDemand – the contract allows the export of power to be curtailed. - constrainedGeneration – the contract allows the import of power to be curtailed. - flexibleOutputChange – an increase/reduction in power flow that has been purchased by SP ENW

Field	Type	Comment
Value	real	constrainedDemand . the maximum value which can be imported by a resource when it is curtailed. For units see next entry. constrainedGeneration the maximum value which can be exported by a resource when it is curtailed. flexibleOutputChange Positive value denotes import increase, while negative value denotes import decrease.
Unit	text	kW or kVAr
MEC_kW	real	
MEC_KVAr	real	
MIC_kW	real	
MIC_KVAr	real	
Resource name	text	
Contract_id	text	
Bitrader_contract_ref	text	
Buyer_seller	text	= Buyer / Seller / Not Applicable

BiTraDER to ANM – Settlement report

This is a list of contracts in the execution list which are confirmed by BiTraDER to have traded

Table 6 Settlement report

Field	Type	Comment
Flexible resource ID	text	This must be the same as that held in GIS for a contract.
Contract type	text	flexible / curtailment
Initial set point	real	% set point before engagement
Final set point	real	% set point or curtailed / adjusted amount of power output
Curtailment value	real	Curtailed / adjusted amount of power output
Setpoint type	text	kW or KVAR
Timestamp	text	The UTC time when the command is executed
Contract id	text	

The tables in this section show the final specification for the necessary integration of the SP ENW ANM system with the BiTraDER trading platform.

SP ENW recognise that its control system is unique in sourcing its NMS system from Schneider Electric. Hence additional integration with other DNO ANM systems will be required, along with ensuring that the merit order change principles are applicable to that system. For instance, the merit order stack at SP ENW is based on a curtailment index, whilst some other DNOs across GB have stacks based on a LIFO arrangement.

It is anticipated that integrating the market into other DNO systems will involve a technical review of the merit order trading principles and thorough testing of data transfer. It is difficult to estimate the costs of this as they will likely vary between each system and DNO.

3.3 Trading Platform Specification

An overview of the market functional improvements required for transition to BAU are shown below along with which stage of the market process they align to. Apart from these improvements, the specification shown in table 1 remains the most relevant.

3.3.1 View anonymised bid and offer information

Users of the BiTraDER platform will be able to view bid and offer information to support effective price discovery and improve the likelihood of successful trade matching.

By giving market participants access to other parties' anonymised price and volume data for each constraint, this will help buyers and sellers understand the underlying market conditions to make more informed trading decisions. Minimum and maximum price guides for BiTraDER buyers and sellers further enhance this visibility, offering a clear sense of the trading range within the market.

To deliver this functionality, the platform must display submitted bid and offer data, including price and volume (MW), in a dedicated order book page or tab. This interface should also allow users to export the information in CSV format for further analysis.

3.3.2 Bid/offer resubmission

Users of the BiTraDER platform will be able to resubmit their bid and offer prices and volumes for a given constraint, provided the submission window is still open. This capability ensures that buyers and sellers can adjust their positions as market conditions evolve, improving the accuracy and relevance of the information used during trade matching.

To support this functionality, the platform must store every bid and offer submitted by a user and update the submission table whenever an entry is overridden. The user interface should clearly reflect the most recent submission while ensuring historical data remains accessible through the audit trail.

3.3.3 Enable half-hourly trading

BiTraDER will support half-hourly trading so that participants can submit bids and offers for each individual half-hour within a constraint. This enables buyers and sellers to participate more flexibly and better reflect the value of assets with shorter run-times or variable capacity.

To make this possible, the platform must display half-hourly constraint sizes and the associated Merit Order List (MOL), giving users clear visibility of trading opportunities at a more granular level. A further enhancement could include generating a prefilled submissions template containing relevant asset and constraint information for each user, improving efficiency and reducing manual input.

Delivering half-hourly trading requires the platform to ingest CLA and MOL data in half-hourly increments. The user interface will need updates, including changes to the trading opportunities table, and adjustments to the submission section to support bulk entry. This functionality depends on updates to the granularity of data provided by SP ENW's ANM system, ensuring that half-hourly information is available and consistent across the platform.

3.3.4 Trade verification

BiTraDER will verify trades dynamically by continually updating constraint information throughout the trading and delivery windows. As new CLA and MOL are ingested, the platform refreshes constraint details and checks whether previously matched trades remain valid.

Any trades that no longer meet the updated conditions are cancelled, with the platform updating post-trade MOLs and notifying affected buyers and sellers. This ensures that participants only rely on trades that reflect the most current network conditions.

A new Constraint Information section will present these updates over time, while the completed trades tab will display any cancelled trades. Delivering this functionality requires coordination between SP ENW's ANM system and the BiTraDER platform, as well as ongoing use of asset data within the trading algorithm.

The platform will also ensure that participants can only submit bids and offers and be contracted for trades that align with their asset's operational capabilities. Validation rules will prevent users from submitting consecutive bids or offers that exceed an asset's maximum run-time, using registered asset data to enforce these limits. If a user attempts an action that breaches these rules, the interface will display relevant error messages.

The BiTraDER platform also enforces maximum bid or offer sizes based on each asset's instruction size, calculated from the merit order data received from SP ENW's system. To support this, the ANM system will need updates so that it accurately reflects assets' varying capacities over time.

3.3.5 Automatic seller dispatch

BiTraDER will support automatic seller dispatch by sending instructions directly to seller assets whenever the ANM system triggers a dispatch event. This ensures that dispatch actions occur promptly and consistently, without requiring manual intervention from the market operator. The platform will ingest instructions from the ANM system and generate corresponding dispatch commands via webhook, maintaining alignment between network conditions and market-driven actions. The market operator will still retain the ability to manually adjust or stop dispatch if circumstances require operational oversight or corrective action.

To enable this functionality, the platform must reliably receive and process ANM instructions, translating them into accurate dispatch signals for BiTraDER seller assets. Delivering this feature requires a thorough review and testing of the interaction between SP ENW's ANM system and the BiTraDER platform to ensure seamless communication and dependable performance.

3.3.6 Automatic bid/offer submission

BiTraDER can support automatic bid and offer submission for users whose assets have fixed capacity and stable price strategies, helping them reduce the operational effort required to participate in the market each day.

By allowing participants to easily reuse the same capacity and price values submitted on a previous trading day, the platform streamlines routine activity and makes it simpler for buyers and sellers to maintain consistent market engagement without repeated manual entry.

3.3.7 Market opportunity notification

BiTraDER will provide automatic market opportunity notifications so that participants are alerted whenever a new market is published in a network location where they already hold qualified assets. This ensures buyers and sellers are made aware of relevant trading opportunities without needing to manually monitor the platform, reducing missed markets and improving engagement.

Notifications will be sent by email to the appropriate participants as soon as a market is published, allowing them to quickly access and review available opportunities.

3.3.8 BiTraDER settlement calculations

BiTraDER will generate settlement calculations automatically so that market operators receive timely settlement reports for all participating buyers and sellers. These reports will be produced on an agreed schedule and will support the buyer-to-seller payment process by applying the parameters defined in the BiTraDER settlement methodology.

The platform will calculate settlement values automatically and distribute standardised settlement reports, ensuring consistency and reducing manual processing for both participants and the market operator. Reports will follow a uniform format and include market operator branding to maintain clarity and professionalism.

To enable this functionality, the platform will rely on settlement methodology parameters defined by the market operator. A simple pro-rata adjustment will be applied to availability and utilisation payments in cases of under-delivery, although a fully formalised settlement methodology will be required for business-as-usual operation.

4 Cyber security

The architectural approach to cyber security has full traceability in a bi-directional way between what has been implemented, and the origins of certain decisions being made.

Within the design process we adhere to cyber security standards and frameworks which contain obligatory security controls across physical, network, operating system, application, and data stacks. These controls must be met to reach compliance with the particular standard and thus become measurable.

In implementing these controls, we create architectural principles, which any given control may apply to one or more principles. The principles apply the security controls to business risk, technical, and user requirements, which in turn inform the design.

In terms of BiTraDER, the approach in table 7 applies:

Table 7 Cyber security requirements

BiTraDER deliverable	Cyber security deliverable	Rationale
D1 – Customer engagement and scenarios	None	Initial engagement with customers to determine the appetite for the peer-to-peer trading model
D2 – Trading rules and technical requirements (including business process maps and information models)	Business impact assessment	Business processes are mapped such that key business impacts can be analysed
	Threat analysis	There are existing threat models that can be applied to the documented BiTraDER business processes
	Security principles	These are generic and are applied across all projects
	Security requirements	These are based on ISO 27001 standards
D3 – Trading platform design	Risk assessment	Risk assessment needs IT assets to be determined as part of the design phase
D4 – Architecture build	Penetration testing	The built architecture is tested from a security perspective to ensure that the security requirements have been met
D5 – Simulation trials	None	The simulation trial system has already incorporated the necessary requirements to account for cyber security risks
D6 – Live Network trials	None	The live trial system has already incorporated the necessary requirements to account for cyber security risks
D7 – Functional Requirements	None	There are no further upgrades to the system at this time

4.1 BiTraDER cyber security report

The information within the full BiTraDER cyber security report contains sensitive information that could be used by an adversary. The full report can be provided to parties who require it to conduct their duties in delivering the project.

5 Conclusions and next steps

This report addresses the requirements for the BiTraDER D7 deliverable. The next step is to produce the closedown report following submission of the final Cost Benefit Analysis (CBA).

This report is due on 31/07/26.