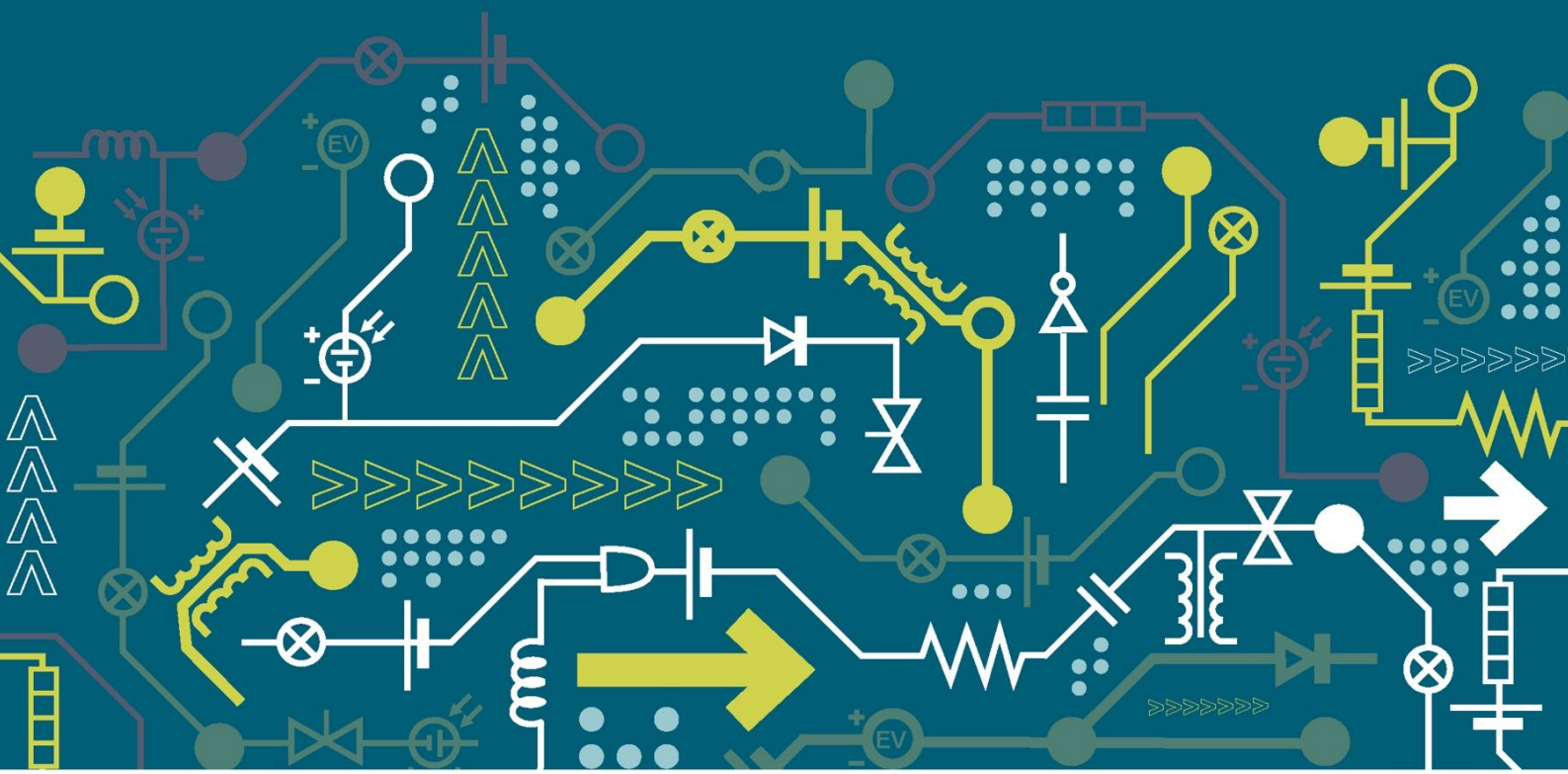
WPD INNOVATION

IntraFlex

WPD_NIA_046

SIX MONTHLY PROGRESS REPORT

REPORTING PERIOD: APR 2020 – SEP 2020



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Contents

1 Executive Summary

The IntraFlex project is funded through Ofgem's Network Innovation Allowance (NIA). IntraFlex was registered in October 2019 and will be complete by November 2021.

The IntraFlex project aims to understand how to deliver a link between Distribution Network Operator (DNO) procurement activity and Balance Responsible Party (BRP) imbalance positions. It will test a short-term market for DNO flexibility which actively accounts for the imbalance it creates in the electricity market. The project is looking to lower supplier exposure to imbalance costs and decrease the costs of providing flexibility in the long run.

Whilst this is primarily a technology and process trial, it is initially focusing on areas where Constraint Management Zone (CMZ) procurement is already underway. This should maximise any network benefit and facilitate any potential roll out to Business as Usual (BaU).

The project is using a market platform operated by NODES. This has, and will continue to be developed as the trial continues. In addition, Western Power Distribution (WPD) developed a link between the platform and existing metering functionality.

This report details progress of the project, focusing on the last six months, April 2020 to the end of September 2020.

1.1 Business Case

The current method of procuring DNO flexibility services does not actively account for the imbalance caused by the action. This simplifies procurement from the perspective of the buyer of flexibility but adds complexity on the seller side.

For many participants this isn't managed directly and is accounted for through loose supply contracts, pushing a poorly quantified risk to the Balance Responsible Party (BRP). Whilst volumes of flexibility have been low this has been seen as a viable method of managing the risk. However, as volumes increase, the associated risk also increases.

There is a risk that the reflectance of true costs increases the costs of flexibility in the short term, as costs that are currently borne by BRPs across whole portfolios are allocated to specific actions. However, this should create a more cost reflective system that reduces overall risk which should in turn reduce costs in the long run.

If the problem were solved, risk associated with the provision of flexibility services would be reduced. In the long run we would expect to see increased liquidity within DNO DSR markets and a corresponding reduction in pricing.

This project will look to provide better tools for managing the imbalance risk, via a direct rebalancing tool (via integration to the intraday markets) as well as information sharing at the day ahead stage. This should minimise the risk (at the intraday timescale) or provide the means for mitigation (at the day-ahead timescale) for the BRP. Reducing this risk should encourage participation from BRPs, as well as make it easier for non-BRPs to work alongside the BRP.

It is anticipated that the value of DNO DSR could reach £12.1m/year by the end of ED1 (£3.38m/year within WPD). If the increased liquidity drove a 10% saving in this value the savings would be £340k/year across WPD or £1.21m/year across the UK.

- Base cost = 12.1m/year
- Method cost = 12.1*0.9= £10.9m/year

- Financial benefits = £1.21m/year

The costs of roll out across the UK would be limited. This would simply require each DNO licencing the required platform which is a commercial product from NODES.

1.2 Project Progress

This is the second progress report covering progress from March 2020 to October 2020. This has focussed on the building and operational testing of the first phase of the market. This can be broken down into the below tasks (and is further detailed in section 2.2);

- **NODES System & Process Build**; Preparing and testing the core NODES flexibility market platform for the trial. This included some development such as support for 30-minute Imbalance Settlement Period (ISP) and localisation
- **WPD System & Process Build;** Ensuring that WPD has the required systems and processes to utilise the NODES marketplace effectively. This included building a link between the NODES platform and Flexible Power metering processes.
- **Phase 1 Trial;** Designing and implementation of 4 targeted trials to deliver closer to real time flexibility procurement in August and September. This included procuring 50.15 ½ hourly MW.

With these stages drawing to completion the project moves on to scoping phase 2 of the trial with a more robust Flexibility Service Provider (FSP) focussed system for trial in Spring 2021.

1.3 Project Delivery Structure

1.3.1 Project Review Group

The IntraFlex Project Review Group meets on a bi-annual basis. The role of the Project Review Group is to:

- Ensure the project is aligned with organisational strategy;
- Ensure the project makes good use of assets;
- Assist with resolving strategic level issues and risks;
- Approve or reject changes to the project with a high impact on timelines and budget;
- Assess project progress and report on project to senior management and higher authorities;
- Provide advice and guidance on business issues facing the project;
- Use influence and authority to assist the project in achieving its outcomes;
- Review and approve final project deliverables; and
- Perform reviews at agreed stage boundaries.

1.3.2 Project Resource

The original project scope was proposed by NODES building on their experience in other European countries. WPD subsequently formed a project team led by NODES to deliver the IntraFlex project, with the assistance of Smart Grid Consultancy (SGC).

The project partners are all experts in their field, as detailed below, and the project will be managed by Smart Grid Consultancy.

One key subcontractor has been used in this phase of the project: Kiwi Power to help manage the integration with Flexible Power metering systems.

Project Partners	
	**NODES** will develop and deploy their marketplace. This will be based on their experience of delivering flexibility markets across Europe. Platform improvements are detailed in section 2.2 and were developed as part of their existing R&D program, and hence not funded under NIA funding.
	**Smart Grid Consultancy**: Will manage the project. In addition they will provide detailed technical assistance on service design, building on previous trial learning and participant recruitment support.
Project Sub Contractors	
	**Kiwi:** Will deliver the system build requirements for baselining, metering and links to the NODES system.

1.4 Procurement

No procurement of partners has been carried out. We have however procured 50.15 ½ Hourly MW volume of flexibility via the NODES market place.

1.5 Project Risks

A proactive role in ensuring effective risk management for IntraFlex is taken. This ensures that processes have been put in place to review whether risks still exist, whether new risks have arisen, whether the likelihood and impact of risks have changed, reporting of significant changes that will affect risk priorities and deliver assurance of the effectiveness of control.

Contained within Section 7 of this report are the current top risks associated with successfully delivering IntraFlex as captured in our Risk Register. Section 0 provides an update on the most prominent risks identified at the project bid phase.

1.6 Project Learning and Dissemination

Project lessons learned and what worked well are captured throughout the project lifecycle. These are captured through a series of on-going reviews with stakeholders and project team members and will be shared in lessons learned workshops at the end of the project. These are reported in Section 5 of this report.

The key dissemination activities held in this reporting period have focussed on getting potential participants up to speed. These were;

- 2 Stakeholder Webinars to share the purpose of the upcoming trials and how the participants should engage with the system on-boarding process
- Market Platform usage tutorial video created giving a step by step introduction to using the system.
- Ongoing 1 on 1 FSP conversations guiding participants through the on-boarding process and

- Industry wide promotion of the trials, via LinkedIn, email distribution lists, industry newsletters and targeted communications.

2 Project Manager's Report

2.1 Project Background

IntraFlex aims to understand how to deliver a link between DNO procurement activity and Balance Responsible Party (BRP) imbalance positions.

As such the project is looking to trial a short-term marketplace for the procurement of DNO flexibility. The original plan was to trial an active rebalancing link to the Nord Pool intraday market as well as an information exchange with day-ahead markets.

The value of procuring services in the short term is also being investigated, as it is hoped this can facilitate the participation of new assets.

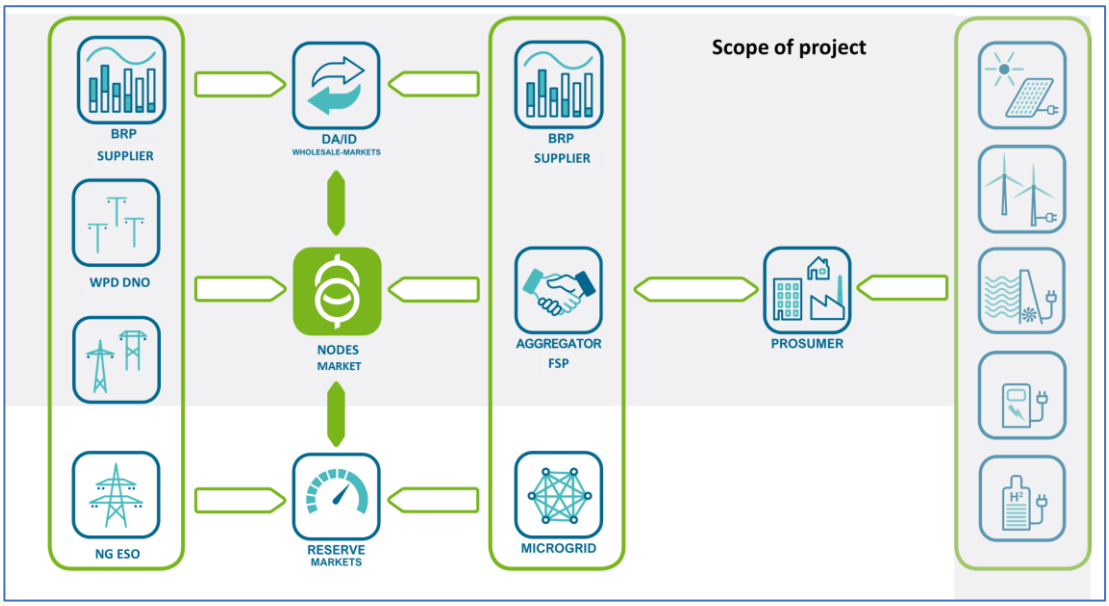


Figure 1: Scope of IntraFlex

The trial is broken into five work packages based around two trials. These trials will consist of a test of NODES' ShortFlex service for DNO flexibility, followed by a more comprehensive trial with automated rebalancing of imbalance positions through the integration with the GB intraday market.

	Timeline												
Activity	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
WP1 PM and reporting													
WP2 Detailed Stakeholder Engagement and Market Design													
WP3 NODES Build													
WP4 WPD Build													
WP5 Trial													
	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21
WP1 PM and reporting													
WP2 Detailed Stakeholder Engagement and Market Design													
WP3 NODES Build													
WP4 WPD Build													
WP5 Trial													

Figure 2: Project Timeline

The objectives of the project is to develop learning on;

- The operability of short-term flexibility markets

- The value of increased information at the day ahead stage to suppliers
- The value of an integrated link for rebalancing in the intra-day market.

The success criteria of the project are;

- Development of a UK Market design for short term flexibility market that reflects imbalance costs
- WPD access to ShortFlex products that have the potential to benefit the distribution network
- Procurement of ShortFlex via the NODES platform
- Demonstration of ShortFlex products that limit supplier exposure to imbalance costs
- Delivery of the project on time and on budget.

The work packages are:

WP1 Project Management and Reporting

Led by SGC, this work package will cover the management of the project and will include the maintenance of the necessary logs as well as the project reporting. This will run throughout the project. NODES and WPD will feed into this work package.

The Key outputs will include monthly project management reports (including the latest logs), 6 monthly project progress reports, project review groups and the final closedown report.

WP2 Detailed Stakeholder Engagement & Market Design

This joint work package was aimed at specifying and verifying the market design for the project and is primarily aimed at understanding current processes for the handling of imbalance risk as well as the systems in place to mitigate them.

The verification has been via extensive engagement with potential stakeholders to refine the proposed market design and validate assumptions and value flows.

The key outputs of this work package included;

1) An initial market design document,
2) Detailed feedback on this design
3) A final Market design and technical requirement specification documents.
4) Expressions of interest for participation
5) There was a go/no-go stage gate at the end of this work package which will consider the viability and potential value of the market design proposed.

WP3 NODES System & Process Build

This work package led by NODES will build out the technology platform to help deliver the trial. It is split into 3 phases.

- WP3a – Implementation of ShortFlex at WPD
- WP3b – Implementation of Wholesale Intraday rebalancing
- WP3c – Investigation into ESO integration

WP4 WPD System & Process Build

This work package is led by SGC and aimed to ensure that WPD has the required systems and processes to utilise the NODES marketplace effectively. Including the design of new Payment Mechanics, the build of a link between the NODES platform and WPD dispatch processes, a review of procurement law and analysis on the ability to target future audits with existing WPD data.

The outputs of the work package will include a defined contractual relationship with NODES and participants, a live working link to the NODES platform, a procurement review document highlighting the viability of a short-term marketplace and an audit targeting tool.

WP5 Trial

This work package will be led by SGC and is aimed at delivering a trial of the developed tools. The trial will actually be split into two sub-trials: an initial ShortFlex trial and a more comprehensive intraday trial.

Alongside each trial, significant stakeholder engagement will be required and following each trial, a summary learning report will be produced.

2.2 Project Progress

2.2.1 Work Package 1: Project Management and Reporting

Progress within this Reporting Period

This work package runs for the duration of the project and looks to ensure the project is running smoothly and is progressing adequately. This also looks to track and manage risks to maximise the change of successful delivery. Key elements of this are mentioned in Sections 3-7.

Next steps

This work package will continue for the duration of the project.

2.2.2 Work Package 2: Detailed Stakeholder Engagement & Market Design

Progress within this reporting period

This work package has now completed with the key outputs including; completion of the final Market Design document and Technical Requirement Specification document.

Due to the extension of the Expression of Interest (EOI), this was concluded this reporting period. The extension was implemented following feedback on the challenge of timescales given the COVID lockdown. We closed the extended expressions of interest window with 22 submissions providing over 700MW of response from 68 sites. These are summarised in the table below

Table 1: Overview of EoI responses

	MW		Sites	
	Total	Unique	Total	Unique
In Active Zone	103.5	82.1	17	14
Total	707.1	631.7	68	63

**the large domestic providers were omitted from this summary tables to help provide more visibility of responses*

We further refined the submissions and confirmed recruitment across the current Flexible Power zones, aggregating them by licence area for dispatch purposes and liquidity.

Table 2: Responses Split by Licence Area

		East Midlands	South West	West Midlands	South Wales	Total
In Active Zone	Unique MW	32.7	39.3	10.1	0.0	**82.1**
	Unique Sites	5	7	2	0	**14**
Total	Unique MW	115.9	95.4	256.9	163.5	**631.7**
	Unique Sites	14	11	24	11	**63**

**the large domestic providers were omitted from this summary tables to help provide more visibility of responses*

Intraday Auto rebalancing service

We had limited initial feedback from stakeholders on the auto rebalancing proposal so upon agreement with the steering group we set a new deadline for the collation of feedback and the development of a tangible value case for it. During this extension we engaged in a more detailed engagement with the BRPs via an online survey and a few follow up interviews.

The survey was specifically targeted at licensed electricity suppliers and was designed to openly ask, if they as BRP's, would be interested in two trial elements of the project being;

- An information service detailing what flexibility has been procured by the DNO from the BRP's customers
- A rebalancing service that automatically flattened the BRP's position due to the procurement of flexibility by the DNO.

We had 4 respondents with half having a peak consumption of more than 1GW and half less than 500MW. All organisations were aware of imbalance costs and that they are important for their organisations but, unsurprisingly, they each had differing hurdle rates, for when the costs of imbalance become material enough for them to act, ranging from £10k - £m's.

On the 2 key questions about the Information service and Auto Rebalancing the feedback is very clear.

- ✓ **75%** of the respondents **WOULD** potentially sign up to the Information Service, as they see the information as useful

and

- ✕ **75%** of the respondents would **NOT** sign up to the Auto Rebalancing Service, as they see this as a step too far.

Therefore, as the survey very clearly highlighted limited value in the auto rebalancing service, following the appropriate change procedure, we removed it from the project scope. The general view was that such a service was too complex and risky whilst providing limited financial value. The information service was seen as a far more workable, and less risky option.

2.2.3 Work Package 3: NODES System & Process Build

Progress within this reporting period

The first phase of this work package has now been completed with the live market platform in use with WPD able to procure flexibility closer to real-time than the current Flexible Power process.

To enable the new markets to function, a number of systems and interfaces were required. This has involved significant coordination between NODES, Kiwi Power and the BaU Flexible Power team.

The primary system is owned and operated by NODES and focuses on the commercial relationship between the participants (FSP and DSO). This built on their existing market platform and was supplemented with project specific development.

For the trial the metering systems (the project metering and baseline calculations) functions are provided through integration with existing WPD metering capability. The development of the metering system is covered in section 2.2.4.

NODES MARKET PLATFORM

The NODES market platform provides the commercial systems with participants able to interact via a Graphical User Interface (GUI) or Application Programming Interface (API).

The team created a guide to take FSPs through a step by step journey on how to use the platform. The following section highlights the key elements of the platform.

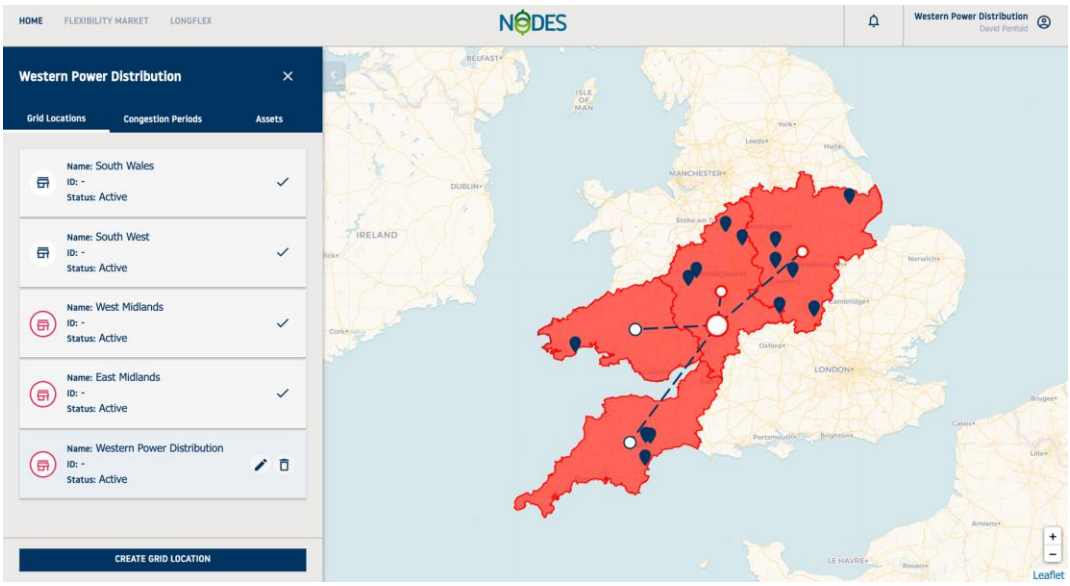


Figure 1: NODES marketplace home screen

As shown on the screen above the team decided to create 4 subzones (1 per licence area) which fed into 1 overarching zone (whole of WPD). Flexibility was purchased at the whole of WPD level of the trial to maximise liquidity and competition. Initially each relevant CMZ was uploaded, but this created an overly complex structure for trial.

The following portal screen allows WPD to add the required zones (Grid Locations). Zones could be added by either using grid coordinates or drawing the zone. An example can be seen below being the green area.

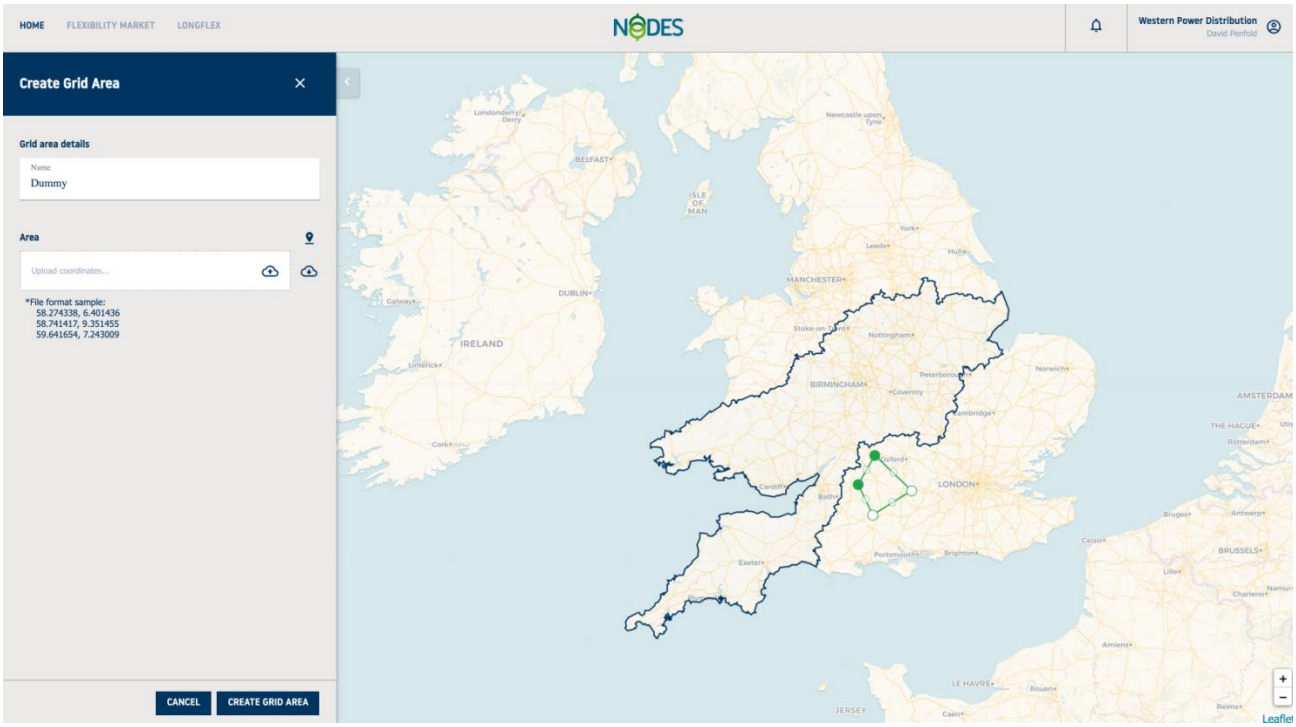


Figure 2: Defining Grid Locations on the NODES platform

The following portal screens allow FSPs to register their assets onto the NODES Market Platform and for WPD to approve the assets for use.

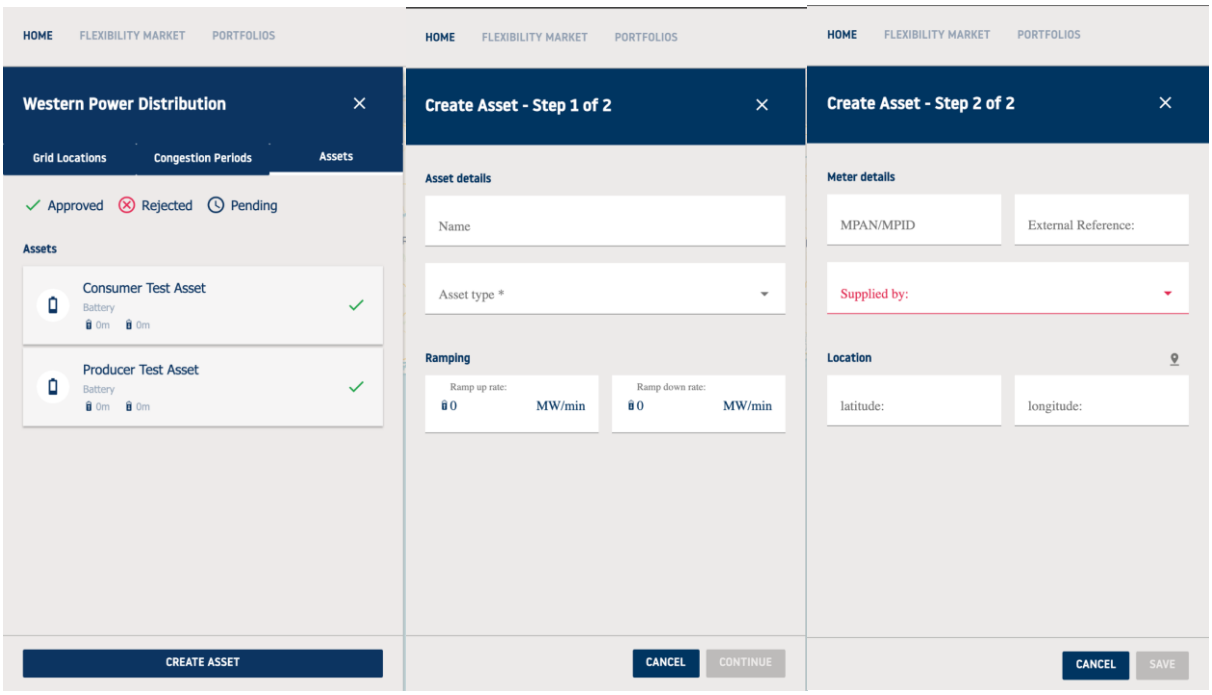


Figure 3: Fields to be populated by FSPs

Name: Asset name of FSPs choice.

Asset type: The generation type from a drop-down list.

Meter point: The asset's MPAN.

Latitude and **Longitude:** The grid coordinates where the asset is located.

Ramping time: Value in MW/minutes. Ramping time is entered for information only for the IntraFlex pilot

The External Reference was used to input the unique asset ID created in the metering system to allow NODES to associate the right metering with the right asset. The option to provide details on who the Supplier was also added.

The following portal screens allow WPD to validate and approve the assets entered by the FSPs using the external ID provided by the Intraflex metering portal. The key validation was that the asset was in a relevant CMZ zone (via the MPAN information) and that a valid external reference was provided. If correct, the asset was added to the relevant sub zone.

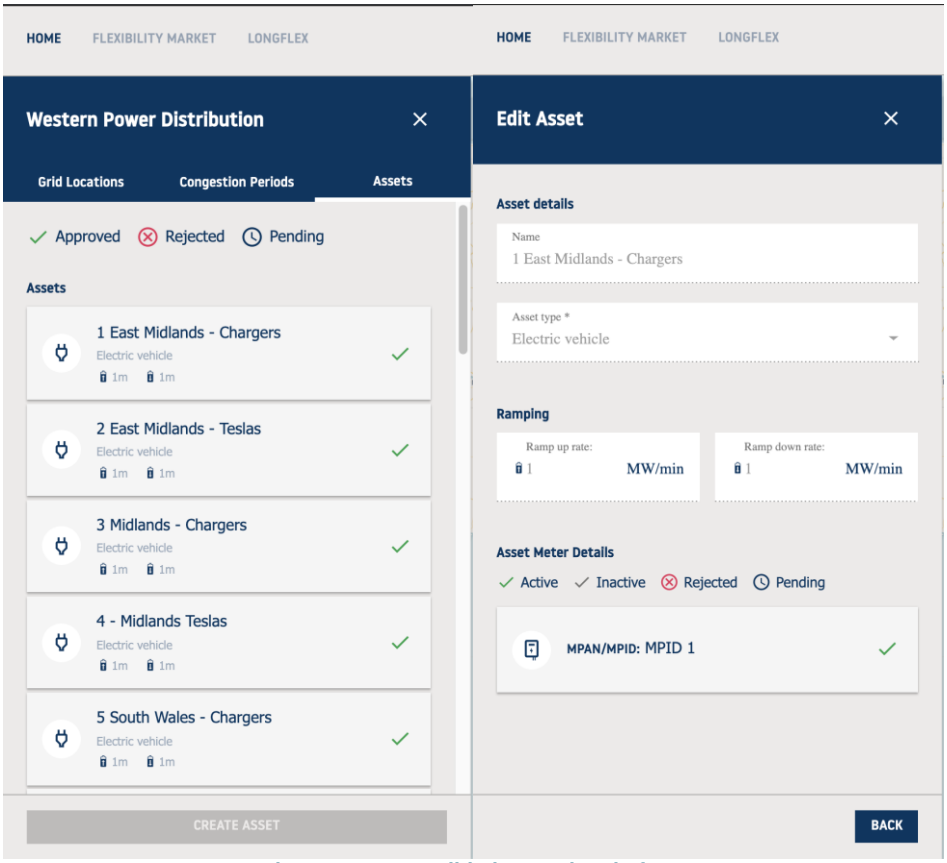


Figure 4: Asset Validation on the platform

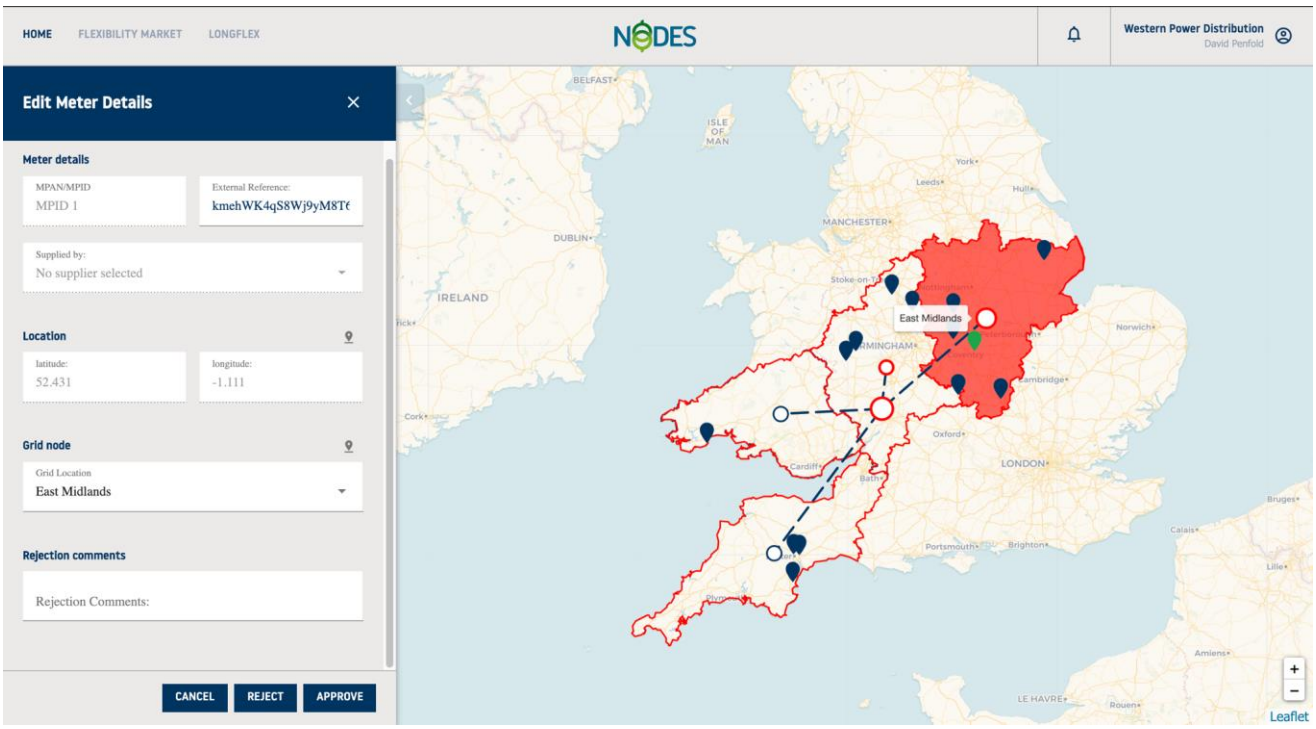


Figure 5: Detailed Asset Validation

Once validated, assets could be added to participant portfolios, as shown in the following screens.

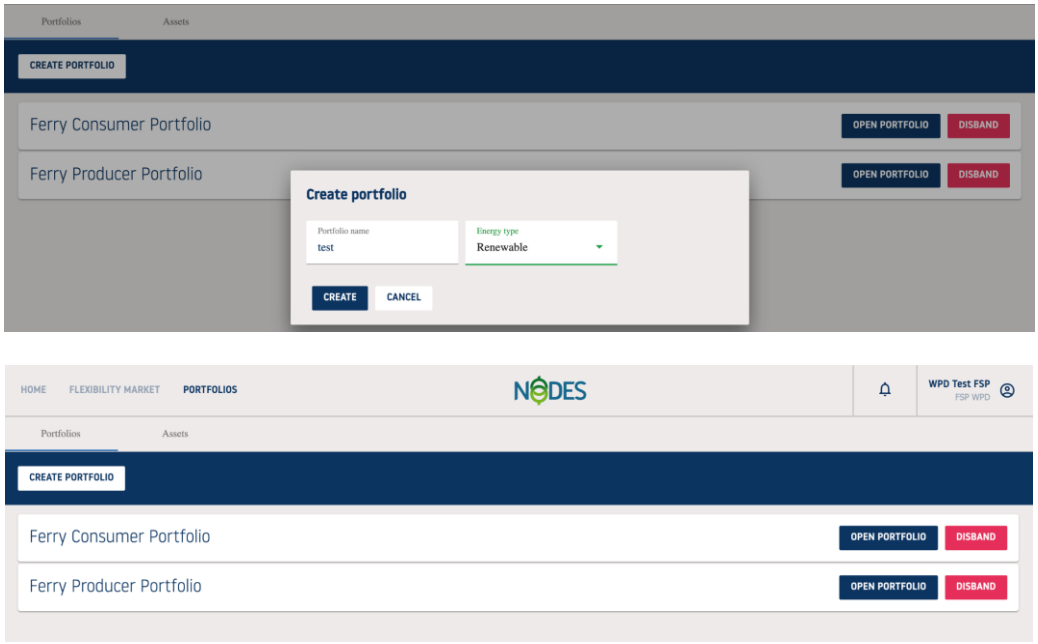


Figure 6: Portfolio Creation

Options for automated dispatch signals were then provided which the FSPs could choose to receive or not.

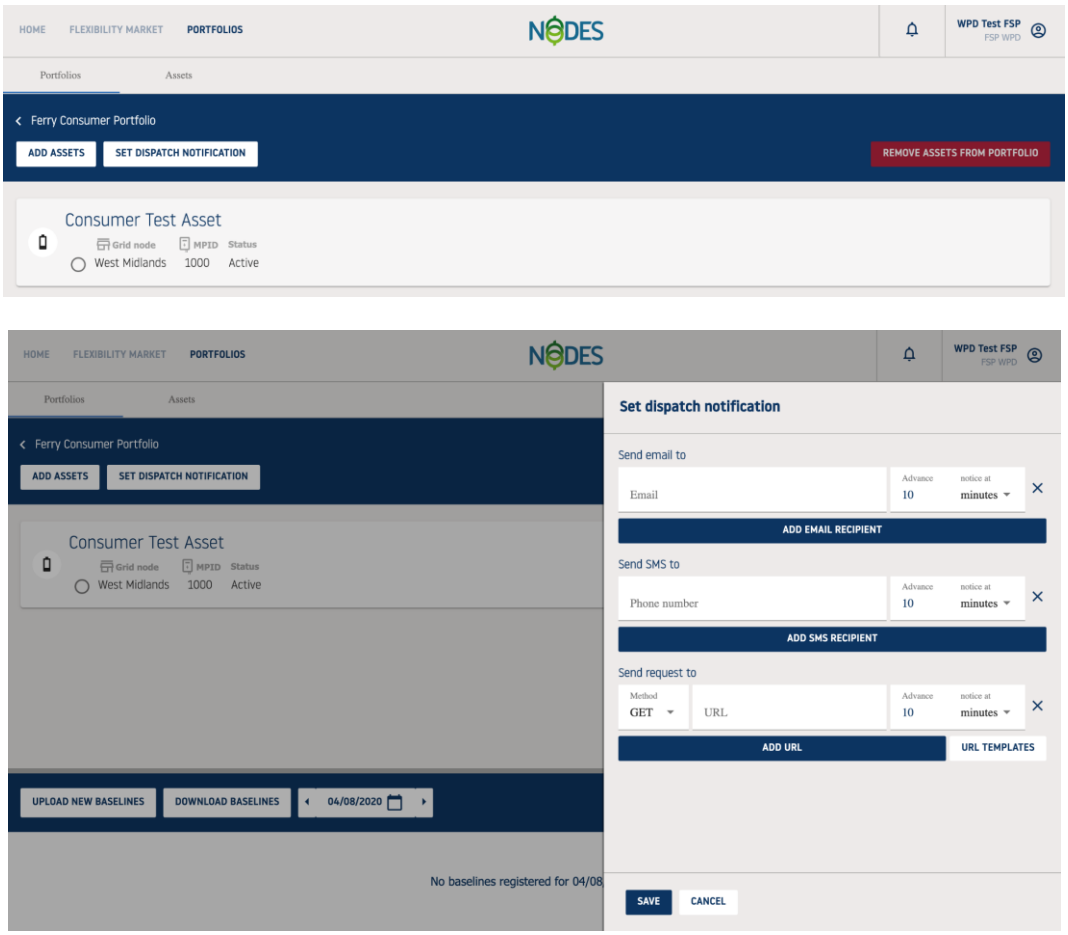


Figure 7: Dispatch set up

Once portfolios were created, FSPs could then set baselines and place bids on the market.

The following input screens allowed FSPs to view the current default baseline for their assets or input their own baseline. The default baseline was pulled from the IntraFlex metering system as detailed in section 2.2.4.

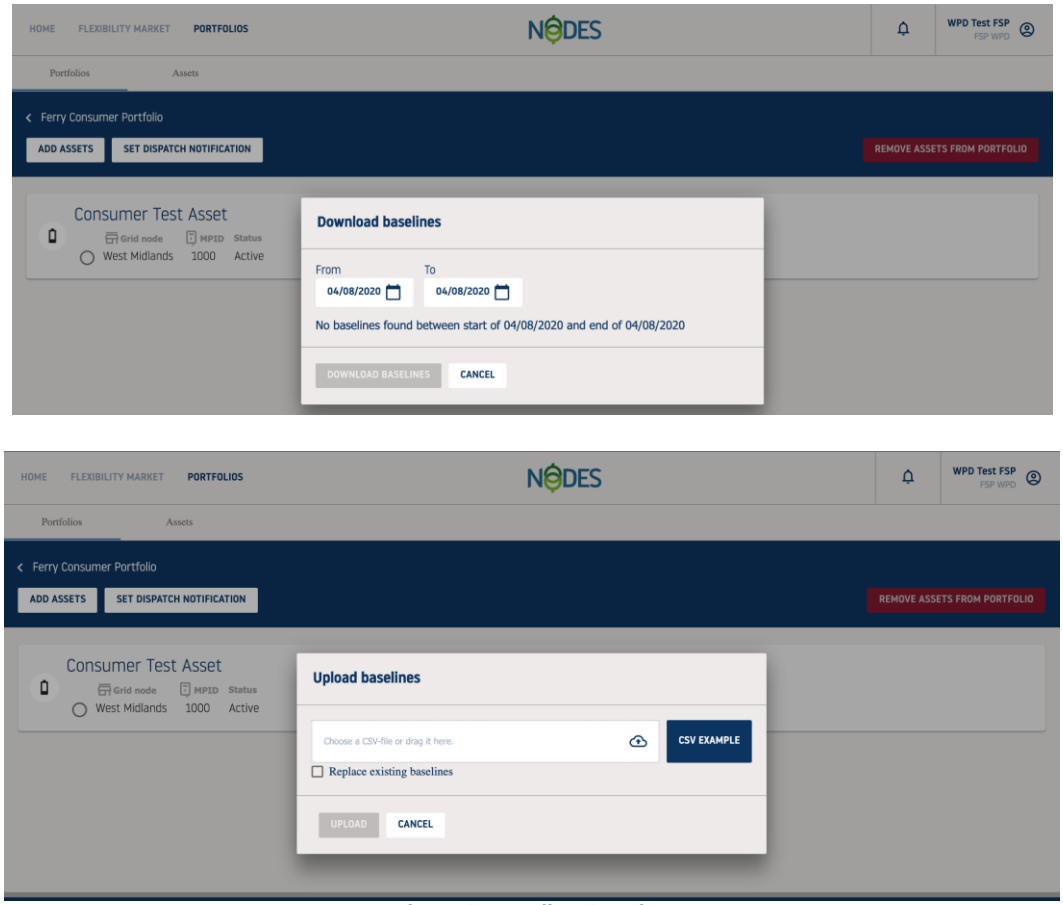


Figure 8: Baseline Creation

The Trading section then allowed FSPs to enter their offers to requirements placed onto the market by the DNO. FSPs can also place offers onto the screen proactively, in advance of WPD placing a bid. The screen below shows and example of the screen used to place a bid (from DNO) and an offer (from FSPs).

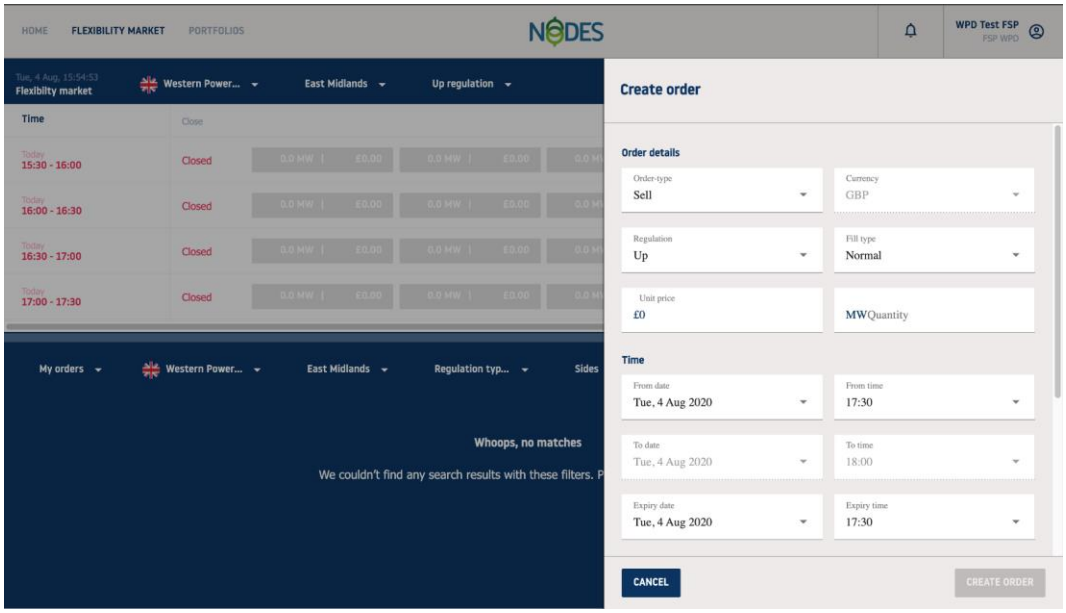


Figure 9: Bid/Offer entry

Trading would happen as follows:

- **Products** - Order volumes would be in MW, with a minimum lot size of 0.001 MW, Prices would be in £/MW/HH & Flexibility is traded in half hourly periods.
- **Order matching -** Matched continuously, ranked by price and time. All confirmed transactions are for triggered utilisation only.
- **Gate closure time -** Orders placed onto NODES starting 72 hours ahead of the delivery period. With the market being open until 90 minutes before the delivery period.

The view below shows the market interface.

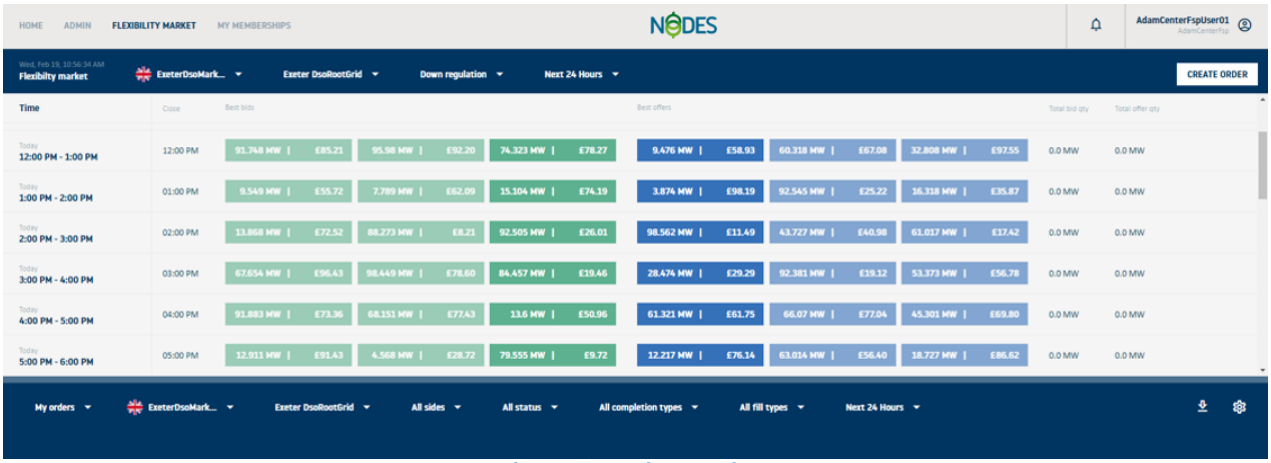


Figure 10: Market Interface

Once orders (bids or offers) were placed a details screen was created to enable users to cancel an order if required.

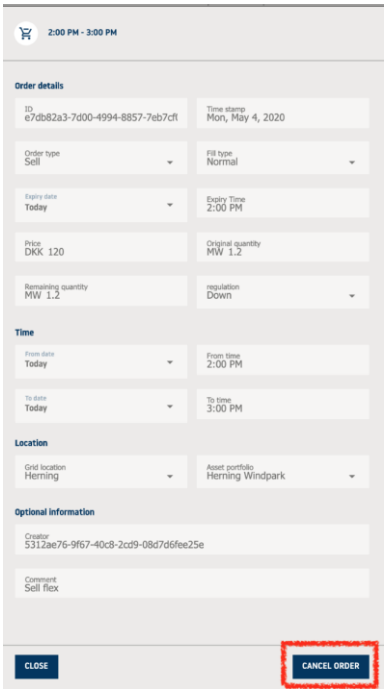


Figure 11: Order Cancellation

NODES validated that FSPs have delivered the flexibility services that have been sold prior to financial settlement after the delivery period has passed, by comparing meter values to the baselines that are available by default on the Platform or that have been uploaded by the FSP.
As per Flexible Power:

- Where delivery is validated for 95% or more of the volume that was sold, the FSP still receives full payment.
- Where delivery is validated for less than 95% of the volume that was sold, payments are reduced by 3% for each percentage point that the validated deliveries differ from the sold volume.
- Where delivery is validated for higher than the volume that was sold there are no overpayments.

NODES also created an online video tutorial to explain at high level the processes for using the NODES platform.

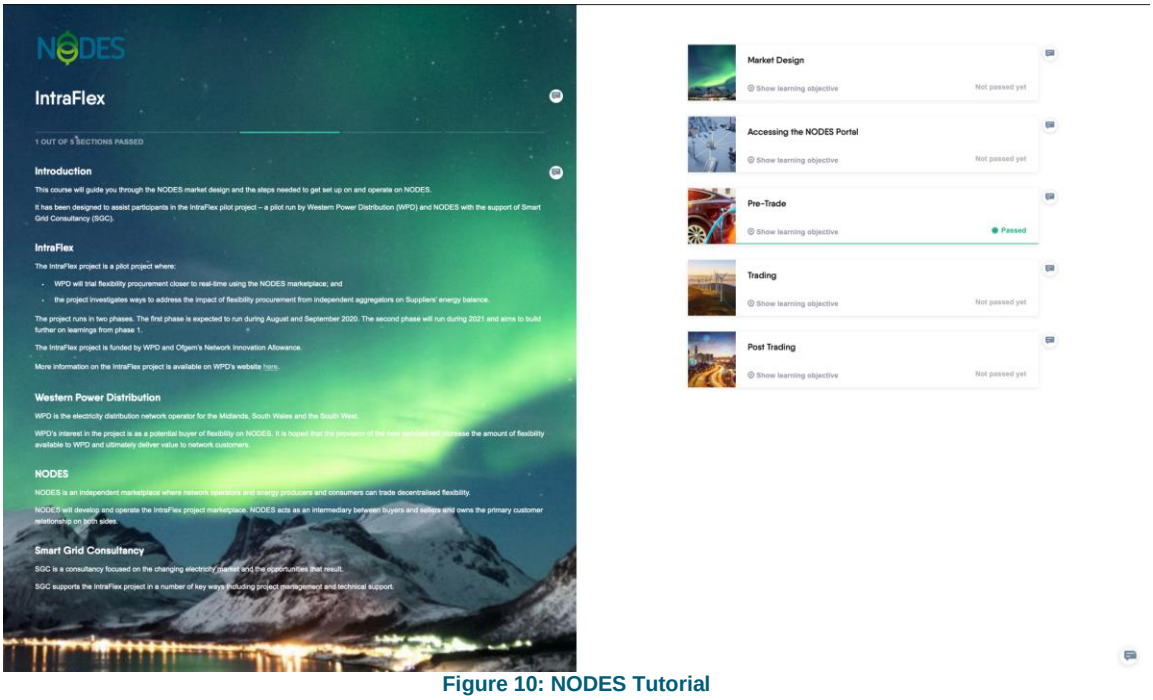


Figure 10: NODES Tutorial

Project specific development work

During the extensive user testing prior to going live a number of platform improvements were highlighted and action by NODES as follows:

Platform Area	***Development***
Home Page - FSPs	
Map View:	Linked the map to zone names and make it more navigable. When you click on the map, assets now get filtered by the location selected.
Asset Entry	There was a need to identify an asset after they have been registered. This was actioned by creating a link to the asset being edited on the map.
	Ensure grid coordinates continue to be displayed after the asset is approved
	We made sure the reason for rejection of an asset by the DSO was displayed to the FSPs on their asset view.
Meter point Entry Field	This is the Unique ID so we made this a mandatory field.
Home Page - DSO	
Flex Market Page	Defaults for the drop down menus changed to be at top of the page. The following lists were changed to default to the last selection; • DSO • Grid Location. • Up/down regulation
	Drop down lists at bottom half of page were amended to add a tick box to display all orders that have been placed in all markets and display the DSO and Grid Location.
Order Entry:	"From time" field changed to display the market view so 5 days forward.

Several options for participant dispatch information were also provided. These built on functionality already developed by NODES. This included the options for FSPs to receive dispatch notification via SMS, email or through a URL call-back.

Finally, NODES developed internal processes to pick up baseline and meter values from the metering portal, using the APIs developed. The key linkage between the 2 systems was the Meterable Unit ID. This is a unique identifier, generated per asset in the metering portal and provided by the participant as part of asset registration. This allowed NODES to pull the right metering signals and baselines.

Next steps

After the conclusion of the learnings from the phase 1 trials the next steps will be to agree the scope of the more robust phase 2 platform which is due for trial in Spring 2021.

2.2.4 Work Package 4: WPD System & Process Build

Progress within this reporting period

The first phase of this work package has now been completed with metering API, Baselining and Payment Mechanics developed and in use by participants in conjunction with the NODES Market Platform.

For the trial the metering systems functions are provided through integration with existing Flexible Power metering capability. This was done to facilitate the timely deployment of the trial as well as the de-risking of the project rather than the mandated long-term solution.

The IntraFlex metering portal (https://intraflexmetering.co.uk), was used to facilitate verification and metering of sites and assets. This portal provided each of the enrolled assets with a unique identification code that is used to link it with the NODES market platform, to ensure the correct metering feed is available. It was based on the existing Flexible Power platform and adapted to accommodate the trial in the simplest manner possible.

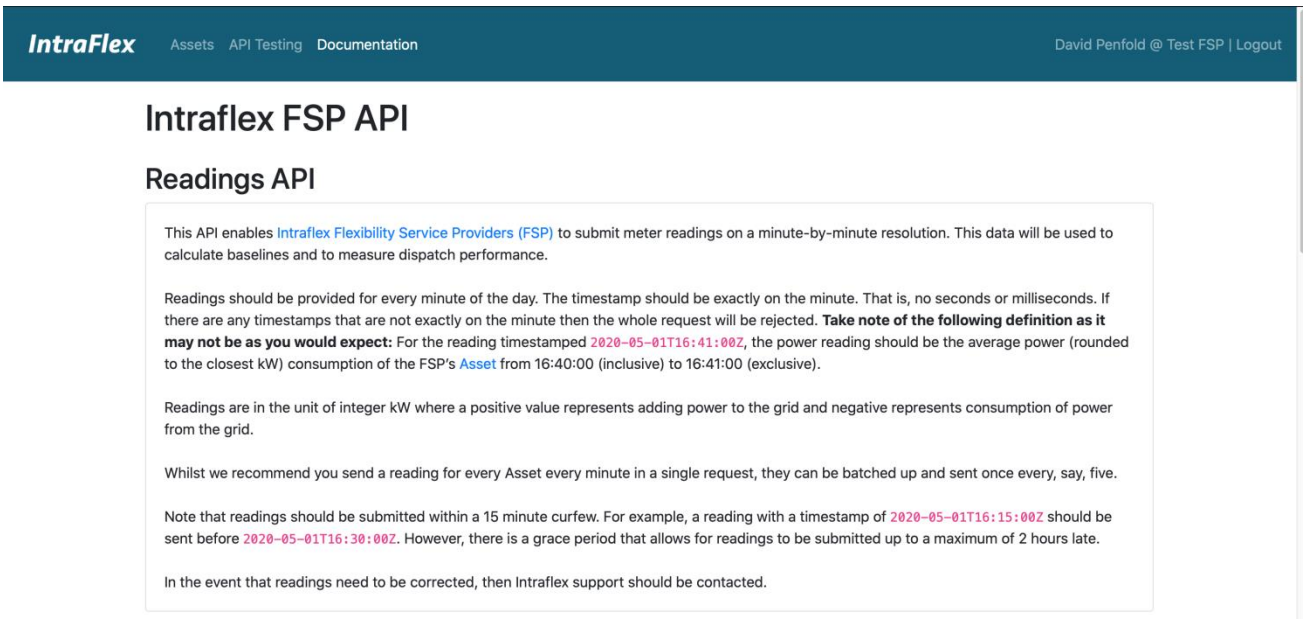


Figure 11: API overview

The following portal screens were created to allow FSPs to register their assets onto the Intraflex Metering Portal. By them adding assets the objective was for them to obtain an identification code that will match metering feeds with the appropriate bids on the NODES market platform.

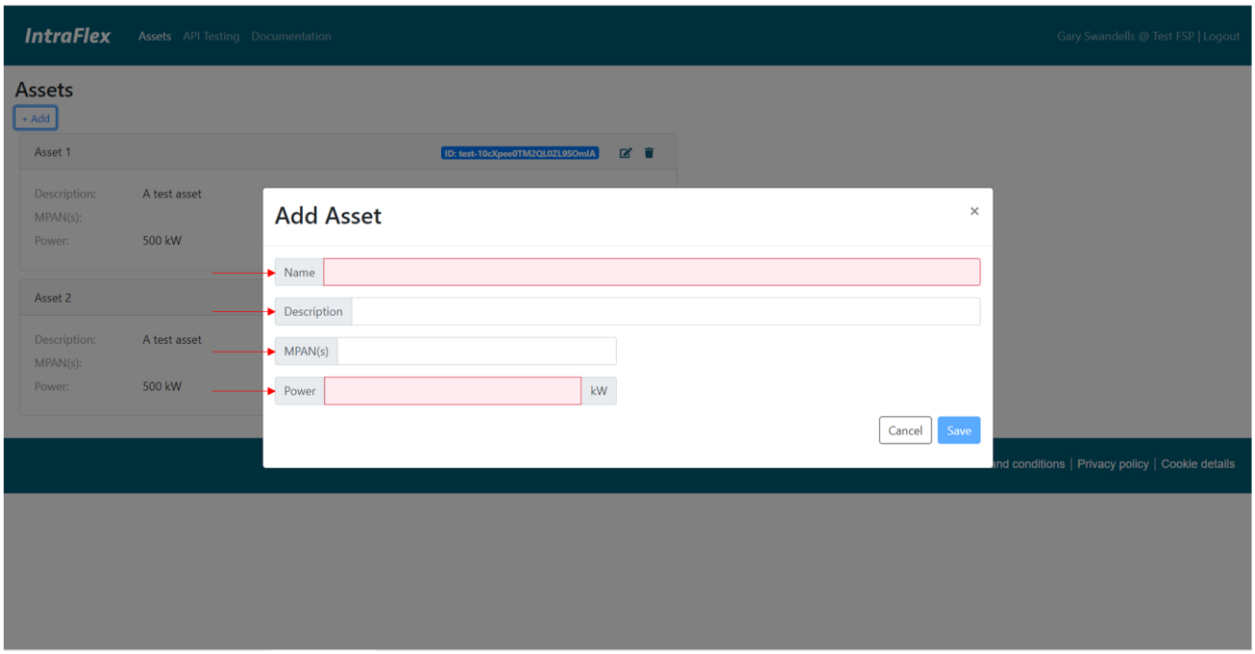


Figure 12: Asset creation on the metering portal

Upon saving the ID was generated for the API metering connection. To set this up FSPs followed the 'API Testing' link on the navigation bar.

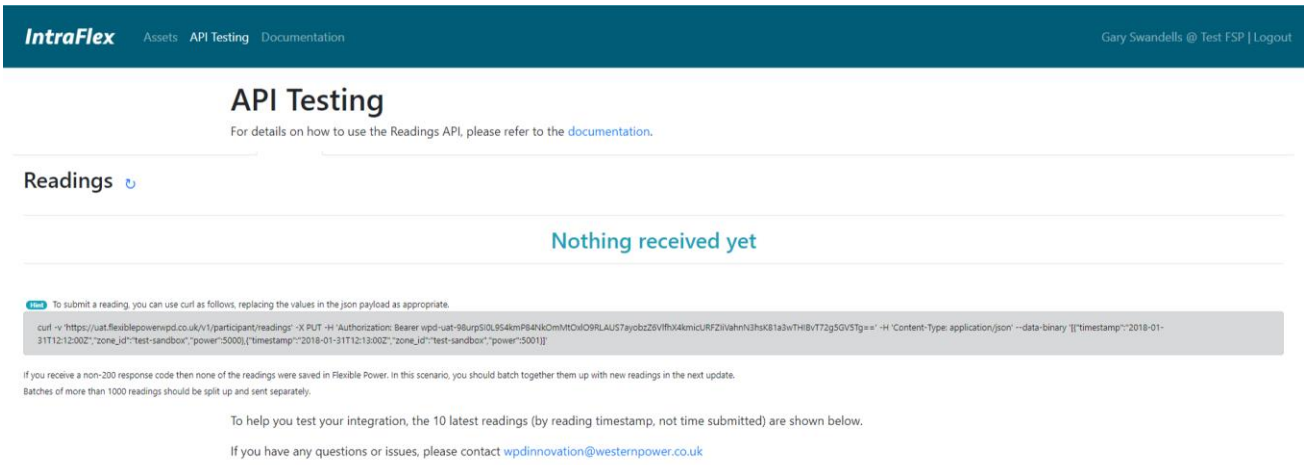


Figure 13: API testing on the metering portal

The set-up page allowed an FSP to see up to 5 most recent metering signals being received by IntraFlex. This is very similar to the process used for testing the Flexible Power API.

The API set up could be carried out on a self-service basis and can be achieved in a variety of ways depending on the FSPs assets and IT skills / environment.

Project Specific Development work

The Intraflex portal built on the existing Flexible Power portal, adapting it for use within the project context. The work included the following developments.

Platform Area	***Development***
Adapting the metering API	A key task was to adapt the Flexible Power API to accommodate the simpler requirements within IntraFlex. The new API is defined on the portal and is directed to a new URL. The data structure was also adapted to rationalise to a single metering database (as opposed to the 2 used in Flexible Power) and the addition of a 2hr cut off for the provision of data (adapted from the 15 mins used in Flexible Power). As per the Flexible Power API all timings are in UTC.
Baseline Calculation	The portal then used the metering to calculate the baselines as per the baseline methodology. Some detailed rules were applied in terms of the calculations and how they treated missing data. This worked in two stages, calculating the half hourly averages for each day and then the average across the last 5 days was taken. As long as data is provided for at least 1 minute in the HH then the process would return a value. These are rounded to the closest kW. No provisions were implemented for clock change as this was not necessary at this stage and bank holidays are treated as normal working days.
NODES Baseline API	An API was built so that NODES could pull the values from the metering portal. NODES developed a process to pull this at around 2AM every morning
NODES metering API	This allows NODES to pull the required metering data for settlement. This is pulled when NODES runs settlement.
Portal branding and Segregation	The portal was rebranded and hosted on a new domain to segregate it from the Flexible Power portal. Segregation between the back ends was limited to reduce costs. This means that new users needed for providers of both services.
Asset validation data	A simple asset visualisation and export tool was created to allow WPD to view the assets on the system. This allowed assets on the NODES marketplace to be approved.

Next steps

After the conclusion of the learnings from the phase 1 trials the next steps will be to agree the scope of the more robust phase 2 platform which is due for trial in spring 2021. It is expected that WPD development work will focus less on participant interface, and more on how WPD interacts with the marketplace.

2.2.5 Work Package 5: Trial

Progress within this reporting period

This work package is ongoing but as part of phase 1 during summer 2020 the team developed bid strategy documents, trial scopes for the individual tests which formed part of the phase 1 trial and held a webinar to inform the participants of the purpose of the test.

The team have fully delivered three of the four phase 1 tests with the fourth test ongoing at the time of writing this report.

Trial Plan and Bidding Strategy

The trial plan and Bid strategy document, was developed with the intention of assisting participants and stakeholders understanding of the approach to the tests and the purpose of the changing approaches they will observe from WPD as the operational phase progresses.

There are a number of different ways of buying flexibility within the NODES market platform. This document looked to review how this might be implemented for the project and offer recommendations as to the learning that could be targeted through the first operational phase of the trial.

There were a series of learning objectives that have were out for the trial covering various different aspects including;

- How this will fit alongside other existing and proposed flexibility initiatives?
- Whether flex markets need to link back to other energy services and markets including wholesale?
- Is there an appetite amongst FSPs to participate in services of this nature?
- Does the technical solution meet the requirements of the users?
- Can a continuously clearing market satisfy the needs of the DNO / DSO?

For the duration of the trial the term 'Bid' related to an action taken by WPD as the DSO purchasing flexibility. Regardless of whether WPD initiated this or responded to an 'Offer' placed on the system by an FSP this was always be regarded as a bid.

Under normal conditions, the NODES marketplace is designed to be used in a manner where either trading party can initiate the trade. A transaction can result from the seller submitting details of their offer first or alternatively the buyer publishing their bid.

A **passive** bidding approach would be reliant on being seller led and the assumption from other markets is that this is likely to provide the best pricing in highly liquid markets. Sellers can compete in ever lowering bids with the buyer only acting when the pricing and volume suits.

A more **active** bidding approach requires the buyer to provide signals to the market in terms of value and timing. Depending on the strategies employed this could help stimulate interest to which the sellers can respond.

During the first phase of the project as expected there was insufficient FSP volumes to rely upon to meet the trial's learning objectives. Therefore, the default was for WPD to initiate the trades by 'actively' submitting bids to the platform.

The system is currently configured with NODES to offer forward visibility of 120 hours ahead (5 Days) on a continually rolling basis. The market then closes with no more bids or offers able to be submitted at 90 mins ahead or real-time.

In order to ensure that we didn't place avoidable operational burden on FSPs of checking back into the NODES systems at an unnecessary frequency, we intended to, and delivered for test 4, activity alerts. Therefore, we started the initial tests within the trial to occur during a predetermined window and supplemented this with a regular market notification email to FSPs.

	Thr	Fri	Sat	Sun	Mon	Tue	Wed
Week 1	Test 1 Commences	Publish bids for week 1, and minded to position for Thr & Fri, week 2			Publish bids for week 2 Thr & Fri and minded to position for Mon – Wed.		
Week 2		Publish bids for week 1, and minded to position for Thr & Fri, week 2			Publish bids for week 2 Thr & Fri and minded to position for Mon – Wed.		
Week 3		Test 1 concludes Test 2 commences					

Figure 14: Trial bidding timeline

There are 3 types of bid on the NODES platform;

- **Normal**: Matches all possible volume of the order under given limit. The remaining volume is placed in the orderbook.
- **Fill or Kill**: All or no volume is matched when Order is entered. Order is cancelled immediately if not all volume is filled.
- **Fill and Kill**: Matches all possible volume under given limit, the remainder volume is cancelled.

The bids published by WPD were done on a 'normal' matching but should an FSP wish to pre-empt this by submitting competitive bids in advance, the fill / kill options can be used to define whether they can be matched partially or in total.

Individual Tests as Part of Phase 1

Test 0 Technical Proving; The initial 'pre-trial' test was intended to facilitate non-market responses to the system to ensure that everything was set up correctly and working as intended. This test was compulsory for all participating FSPs and required an individual test for each to be scheduled at a mutually convenient time.

To ensure that this could be achieved without other FSPs seeing the published requirement and bidding it was necessary for each FSP to submit an on offer against which WPD bid. In order to facilitate this, each FSP confirmed when they were ready to undertake a test and correspond with the team running the trial to agree a set period along with price and capacity. Once matched on the system the FSP completed the event to ensure end to end test including settlement and payment.

Test 1 Basic Function and FSP Interaction; The first full test simply aimed to confirm that the FSPs who have enrolled are comfortable with the platform and the procedure to submit an offer, and that the assumptions around baselines etc. work as intended.

We carried out analysis to inspect the relationship between forecast and actual baselines at the event start, as well as the delivery performance from participants and systems function fitness for purpose.

Test 2 – Speed of response to order requirements; Based on the assumption that £300 MWh would be an acceptable incentive then this test was intended to see how quickly we got responses or whether we ended up with some requirements expiring on the system unfulfilled.

These tests were published competitively and offers matched with WPD bids on a first come first serve basis. All FSPs had equal opportunity to respond to WPD bids as a notification of the bid being published on NODES was issued by a group email dispatch.

It was desirable to WPD to see responses from multiple FSPs to ensure that it is fit for purpose across the wider participation group rather than just one or two.

There were 2 potential outcomes from the test:

- Outcome A – limited bids or no bids received. If this is the result, then we will commence to test 3.
- Outcome B – majority of capacity is fulfilled within 24 hrs of publication. If we find this happens, it would be reasonable to regard this as the limit of the learning for Test 2 and a successful result would enable advancing straight to test 4.

The outcome of this test was 'B' so the project progressed directly to test 4

Test 4 – Profiled Capacity linked to pricing; This test is ongoing at the time of compiling this report.

By leading the market and publishing requirements WPD are looking to establish the principles through which FSP can respond to a meritocracy, linked to the network needs. The service pricing, instead of being linked to any time influence, showed different values on offer during each ½ hour directly correlating to the capacity needed. Peak periods which are forecast to require more capacity were bid at a higher rate.

Each time an offer was received the price bid was adjusted down to reflect the value of the remaining capacity. In theory if price is a critical sensitivity then this method should fill the requirements quicker with the highest prices secured by first bids. While we anticipated this will ultimately create a service that helps fulfil a profiled delivery over a day, we would like to see if there are any specific patterns in bidder behaviour.

The payment calculation is based on the following principles

- Price controls applied on a formulaic basis
- Base price is set at the average demand from across the day
- Price rate adjusts upwards when above the average
- Price rate adjusts down when below the average
- If bid is only partially matched the remaining capacity is cancelled and MWh value recalculated

To ensure fairness a tool, 'Variable Bid Calculation Tool', was developed that enabled WPD to set the base price and a calendar with 48 periods per day into which the forecast requirements can be input. It then automatically calculated;

- Max bid price per MW for each ½ hour to be published on the NODES market platform
- Total cost per ½ hour based on fulfilling all capacity at max bid price
- Total daily budget
- Total weekly budget
-

FSP Participation and Flexibility procured

The trial onboarding process successfully engaged 8 interested participants with all signing membership agreements and gaining access to the NODES platform.

During the subsequent IntraFlex metering portal set up and system commissioning test zero 2 of these participants decided not to actively take part in the live trials due either not having the appropriate assets or just wanting to have a watching brief.

At the time of writing this report, across the 4 tests implemented so far, we have completed 241 trades procuring ½ hourly 150.15MW.

We have had ½ hourly offers ranging from 1.5MW down to 10kW and we have traded at price (in £/MW for the settlement period of £165 down to £130. This equates to £260-330/MWh.

Some of the initial interesting offer behaviours we have seen to date are as follows. These will be reviewed with participants to confirm our understanding of what is driving bid behaviours:

- The participants with large generating assets are appearing to post offers in batches as soon as they can following the publishing of the Market Information email.
- The smaller generating asset participants with small batteries and or EV's are posting offers much closer to real time than the larger generating asset owners and are not necessarily reacting to the market emails.
- The closest to delivery period an offer has been received is 2 hours and 20 minutes with the longest gap being 4 days and 4 hours

Next steps

Completion of the Phase 1 trial with analysis of the bidding verses offers strategies followed by dissemination of the learnings.

In parallel the project team will develop the scope for the more robust Phase 2 trials liaising with FSP participants and key stakeholders.

3 Progress against Budget

Spend Area	Budget (£k)	Expected Spend to Date (£k)	Actual Spend to Date (£k)	Variance to expected (£k)	Variance to expected %
WPD Project Management	£101,435	£48,100	£39,646	£8,454	18%
Contractors	£573,294	£289,764	£244,570	£45,194	16%
Payments to Users	£100,000	£50,000	£0	£50,000	100%
Dissemination	£30,000	£20,000	£1,570	£18,430	92%
Contingency	£116,473	£0	£0	£0	0%
TOTAL	**£921,202**	**£407,864**	**£285,786**	**£122,078**	**30%**

Comments around variance:

Costs to date have generally been lower than expected. This is due to a number of contributing factors:

- NODES travel costs have been lower than expected due to COVID,
- SGC have required less time to date for the project than expected,
- Less face to face dissemination than expected has been required and is expected to be required going forward.

The Nil payments to users, are simply due to internal financial processing.

4 Progress towards Success Criteria

Objectives	Status
The operability of short-term flexibility markets	**In progress:** This is being tested through the trials. Initial views seem positive, however this will be refined in the Phase 2 trial.
The value of increased information at the day ahead stage to suppliers	**In progress:** Initial stakeholder feedback clearly indicated that this could be a valuable service for suppliers. However there has been no take up of this service within the Phase 1 trial. This is probably due to the disconnect between the party needing action (the FSP) and the beneficiary (the BRP). .
The value of an integrated link for rebalancing in the intra-day market	**Complete:** During the ongoing review of the potential to develop this service, the feedback from the current participants and stakeholders, has very clearly informed the project team that this auto rebalancing service is of no interest at current market volumes. The costs and risk of such a system far outweigh any benefit.

Success Criteria	Status
Development of a UK Market design for short term flexibility market that reflects imbalance costs	**In progress:** The development has been completed as part of work package 2 and is now being validated via the trials.
WPD access to ShortFlex products that have the potential to benefit the distribution network	**In progress:** Currently being validated as part of the phase 1 trials with further learnings to be identified from Phase 2 Spring 2021
Procurement of ShortFlex via the NODES platform	**In progress:** Shortflex is currently being procured as part of the phase 1 trials and will be procured again in Phase 2.
Demonstration of ShortFlex products that limit supplier exposure to imbalance costs	**In progress:** To be validated via the phase 2 trials. This will be limited to the information service as the auto-rebalancing service has been de-scoped.

Delivery of the project on time and on budget.	**In progress:** During the first year both timescales and overall budget have been adhered to.

5 Learning Outcomes

Within this reporting period we have focused building the systems and operating the marketplace. Therefore our key learnings are as follows:

- Converting a platform designed for market wide transactions to a platform based on locality of transactions requires some detailed design of user documentation.
- BRPs do not currently see DNO imbalance as having a material impact on business costs
- BRPs do not currently support other entities automatically rebalancing their positions.
- BRPs do see benefit in an information system that helps them act on imbalance created
- FSPs do not see the benefit to signing up for the information service.
- The onboarding process benefitted greatly from having defined and regularly communicated deadlines for participants to act by.
- Clarity should be given during any future scoping & design processes for similar systems on the time of day be it GMT, BST, UTC or other.
- Bids are being accepted at a lower volume than expected when taking into account known system sizes. This may be being influenced by there being no penalty for over delivery.
- Participants are interested in discussing baseline clarification post-delivery. This needs to be thought through especially the need for the "Burden of proof" that would be needed to enable this.

It should be noted that learning on FSP behavior has yet to be confirmed with detailed interviews planned in the next reporting period.

6 Intellectual Property Rights

A complete list of all background IPR from all project partners has been compiled. The IP register is reviewed on a quarterly basis.

IPR	Category	Owner	Progress
NODES Platform	Background	NODES	Developed before the project
NODES Intraday link	Foreground	NODES	No longer being developed
NODES day ahead information	Foreground	NODES	First version has been developed
Flexible Power documentation and Processes	Background	WPD	Developed before the project
Audit Targeting	Relevant Foreground	WPD	Still to be developed
UCR review	Relevant Foreground	WPD	In development
Link to FP dispatch	Relevant Foreground	WPD	Developed
UK Market design	Relevant Foreground	All partners	First version developed and published. To be revised following trials
NODES Market design	Background	NODES	Developed before the project
UK Market design technical adaption white paper.	Relevant Foreground	All partners	Still to be developed

7 Risk Management Current Risks

Our risk management objectives are to:

- Ensure that risk management is clearly and consistently integrated into the project management activities and evidenced through the project documentation;
- Comply with WPDs risk management processes and any governance requirements as specified by Ofgem; and
- Anticipate and respond to changing project requirements.

These objectives will be achieved by:

- ✓ Defining the roles, responsibilities and reporting lines within the Project Delivery Team for risk management;
- ✓ Including risk management issues when writing reports and considering decisions;
- ✓ Maintaining a risk register;
- ✓ Communicating risks and ensuring suitable training and supervision is provided;
- ✓ Preparing mitigation action plans;
- ✓ Preparing contingency action plans; and
- ✓ Monitoring and updating of risks and the risk controls.

7.1 Current Risks

The IntraFlex risk register is a live document and is updated regularly. There are currently 46 live project related risks. Mitigation action plans are identified when raising a risk and the appropriate steps then taken to ensure risks do not become issues wherever possible.

In **Error! Reference source not found.** we give details of our top five current risks by category. or each of these risks, a mitigation action plan has been identified and the progress of these are tracked and reported.

Table 7-1: Top five current risks (by rating)

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
Budget available for platform trades is exhausted quicker than anticipated	Major	Budget tracker compiled	Weekly budget meeting is being held to review the tracker.
Lack of submitted baselines impacts ability to confirm flexibility procurement and subsequent payments	Major	Platform being updated to not allow offers to be placed if no baseline exists	Update to be implemented for Phase 2
Technical failure of FSP systems due to communication and or metering failures.	Major	Continual contact with the FSP providers.	Ongoing conversations with each FSP are taking place
Technical failure of NODES Platform	Major	Technical support team on hand from both NODES	NODES early alert system has been put in place
Technical failure of WPD Platform	Major	Technical support team on hand from both SGC (WPD)	SGC and Kiwi alert system is in place

Error! Reference source not found. provides a snapshot of the risk register, detailed graphically, o provide an on-going understanding of the projects' risks.

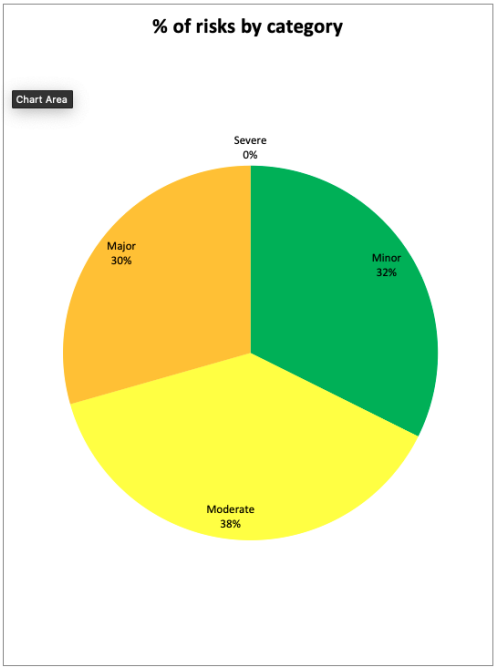
Table 7-2: Graphical view of Risk Register

Likelihood = Probability x Proximity	1. Insignificant changes, re-planning may be required	2. Small Delay, small increased cost but absorbable	3. Delay, increased cost in excess of tolerance	4. Substantial Delay, key deliverables not met, significant increase in time/cost	5. Inability to deliver, business case/objective not viable
Certain/Imminent (21-25)	0	0	0	0	0
More likely to occur than not/Likely to be near future (16-20)	0	0	0	0	0
50/50 chance of occuring/ Mid to short term (11-15)	0	0	4	0	0
Less likely to occur/Mid to long term (6-10)	0	1	9	6	0
Very unlikely to occur/Far in the future (1-5)	0	3	7	4	0
	Impact				

	Minor	Moderate	Major	Severe	
Legend	11	13	10	0	**No of instances**
Total	34				No of live risks

Error! Reference source not found. provides an overview of the risks by category, minor, oderate, major and severe. This information is used to understand the complete risk level of the project.

Table 7-3: Percentage of Risk by Category



7.2 Update for risks previously identified

Descriptions of the most significant risks, identified within the previous report are provided in **Error! eference source not found.** with updates on their current risk status.

Table 7-4: Risks identified in the Project Outline

Details of the Risk	Previous Risk Rating	Current Risk Rating	Mitigation Action Plan	Progress
COVID - 19 Impact	Major	Moderate	Separate COVID-19 risk register and process put in place with mitigating actions for sickness understood	Managed through separate COVID 19 Risk Register. Risk has dropped as lockdown has eased and we haven't struggled to interact with FSPs.
WP2 - Recruitment risk - Cannot recruit enough flex providers Scoping Phase	Major	Closed	Significant time and resource allocated to this project task. In addition, a project review will assess any uncertainty to determine the impact on the project at the first stage gate.	6 Participants recruited for Phase 1 with a second round planned for phase 2
WP3 - Cost of signing up to NORDPOOL platform could be prohibitive	Major	Closed	Discussion to be held with Platform owner over cost to sign up	Removed with the removal of the auto rebalancing service
WP2 - Limited Evidence of the Market Value and therefore limited	Major	Closed	Extensive engagement and review of feedback with BRP's	Evidence provided

value of the project				
WP1 - Resource constraints (WPD)	Major	Moderate	Clear expectation of work required set out in project plan	Good engagement to date.

8 Consistency with Project Registration Document

There have been a number of changes to the project as it has progressed. These have been logged within WPD's Change Management process and are all aimed at maximising the value of the project and limiting any development of services with limited ongoing value.

In addition to the changes mentioned in the previous report, this month, following the BRP survey we decided to de-scope the auto-rebalancing services. With consistent feedback that it provided little value, and no feedback to the contrary, building and testing such a service would not have provided good value for money. Instead the project has focussed more on the information service.

9 Accuracy Assurance Statement

This report has been prepared by the SGC IntraFlex Project Manager (David Penfold), reviewed by the WPD Project Manager (Matt Watson) and approved by the Innovation Team Manager (Yiango Mavrocostanti).

All efforts have been made to ensure that the information contained within this report is accurate. WPD confirms that this report has been produced, reviewed and approved following our quality assurance process for external documents and reports.

10 Glossary

Abbreviation	Term
ABSVD	Applicable Balancing Services Volume Data
API	Application Programming Interface
BaU	Business as Usual
BEIS	Department for Business, Energy and Industrial Strategy
BM	Balancing Mechanism
BRP	Balance Responsible Party
BSP	Balancing Service Provider
CMZ	Constraint Management Zone
COVID-19	2019 Novel Coronavirus
DNO	Distribution Network Operator
DA/ID	Day Ahead/ Intra Day
DSO	Distribution System Operator
DSR	Demand Side Response
EOI	Expressions of Interest
ESO	Electricity System Operator
FSP	Flexibility Service Provider
GB	Great Britain
GUI	Graphical User Interface
IPR	Intellectual Property Rights
ISP	Imbalance Settlement Period
kW	Kilowatts
LongFlex	Long Term Flexibility (before day ahead timeframe)
MW	Megawatt
MWh	Megawatts per hour
NIA	Network Innovation Allowance
OFGEM	Office of Gas and Electricity Markets
PM	Project Management
SAA	Settlement Administration Agent
SAT	Site Acceptance Test
SGC	Smart Grid Consultancy
ShortFlex	Short Term Flexibility (on a day ahead or intra-day timeframe)
UCR	Utilities Contracts Regulations
UK	United Kingdom
WP#	Work Package
WPD	Western Power Distribution

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