EQUINOX

NIC Project Progress Report

October 2024 – September 2025

Electricity Distribution

nationalgrid

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1. Executive Summary

Equitable Novel Flexibility Exchange (EQUINOX) is funded through the Office of Gas and Electricity Market's (Ofgem)'s Network Innovation Competition (NIC) and has a budget of £7,766,110. The project was awarded funding in December 2021 and its final deliverables will be complete by December 2025, ahead of closedown in March 2026.

EQUINOX is the first NIC project dedicated to addressing the challenges Distribution Network Operator's (DNO's) face with the electrification of heat. The project is developing novel commercial arrangements and supporting technologies that will unlock flexibility from residential low carbon heating, while meeting the needs of all consumers, including the fuel poor and those with vulnerabilities.

In line with the current Ofgem NIC project governance v3.0 and EQUINOX project direction requirements, this report details progress of the project, focusing on the last twelve months, October 2024 – September 2025.

During this reporting period we have once again achieved a number of key deliverables and milestones. We have designed and completed the final trials, which aimed to fill the learning gaps remaining following the projects first two trials. Based on the gaps identified, we developed commercial arrangements, technical arrangements and customer engagement methods to test daily flexibility, morning and evening flexibility and a new use case: turn up events. They were divided across five mini-trials exploring varied event types, durations, and timings.

During this reporting period we published a number of our committed deliverables, firstly, Ofgem deliverable 5 [1] focussing on the learning from engaging with customers. We also published an additional report on engagement with customers that may be vulnerable[2]. A key aspect of EQUINOX has been on understanding customer impact of the project and ensuring that all customers can participate equitably in these new services. These reports addressed this using insights gained from the trials in addition to learning from carrying out surveys with a wider consumer group.

In addition, the project team have been active in the dissemination of the results and outcomes to date, with a range of events attended and feedback obtained on the work that we are doing. We continue to produce and make our Horizon Scan reports available, ensuring that the team and our stakeholders are aware of all developments in this space, and providing a resource for others looking to carry work on domestic low carbon heating and flexibility.

The project team are now focussed on ensuring that learning and methods from the project can be applied within BaU, both within networks and the wider supply chain needed for flexibility. This will lead to the successful completion of our final Ofgem deliverable later this year, focussed on this transition to BaU and providing an update to the projects business case based on learnings from the project and movement on the use case and value of flexibility from the FSP submission.

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[1] D5: Learnings from engaging customers throughout the EQUINOX trials

[2] Trial 3 Engaging Vulnerable customers report

This report provides more detail on the progress made in this reporting period, as well as outlining the current risk, and finance profiles of the project to date.

2. Project Manager's Report

Project Background

The EQUINOX project has been trialling domestic heat pump flexibility at scale over the course of three winter trial periods in 2022-2024. The project team is split into five complementary workstreams, which interlink to deliver the three trial phases that have taken place over the lifecycle of the project. These include commercial arrangements, technical integration, customer engagement and experience, trials management, and knowledge capture & dissemination. The high-level plan submitted within the FSP[3] has been adhered to, and is as follows:

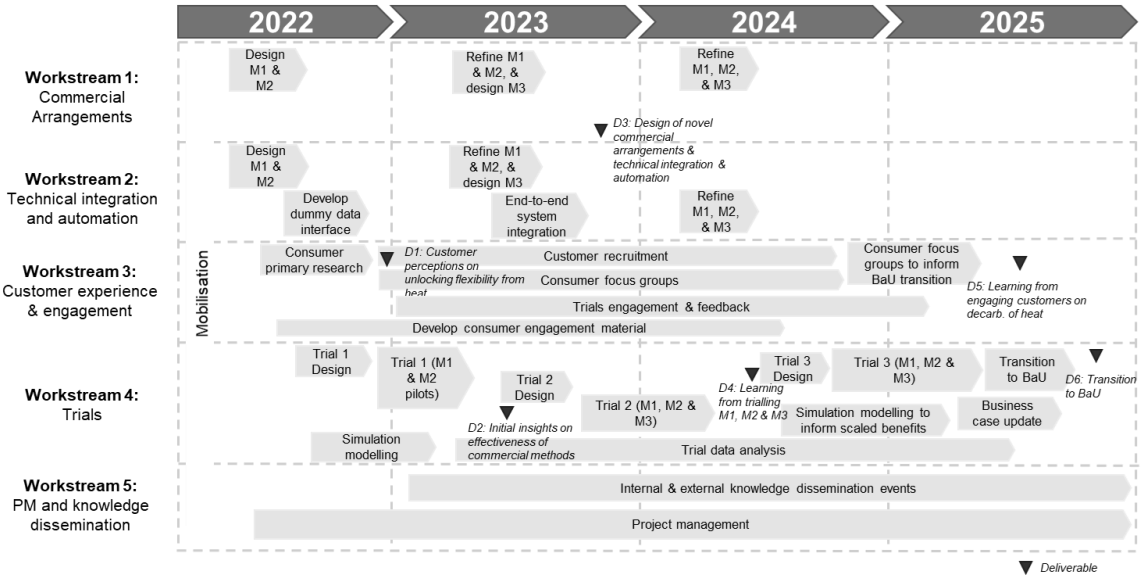


Fig. 1 High level project summary plan

The business case detailed and reviewed within this report was, and remains, clear. Heat flexibility is going to be a major part of the future for DNO's and we needed a scaled and strong project to explore its potential to manage network constraints, liaise with customers, and develop robust commercial products that can and are maturing into Business as Usual (BaU) following the project. EQUINOX provides an opportunity to build the evidence needed, and has provided that strong evidence base for planning for heat flexibility into the future. The business case has also been updated to reflect the way that flexibility may be used in the future, that is the release of headroom rather than explicitly the deferral of reinforcement.

[3] 20211008 EQUINOX FSP Full Submission FINAL v2.0_ REDACTED.pdf

Project Progress against Plan

During this reporting period, the EQUINOX team finalised the preparations for the final trials, and then carried out the final trial phase. This work has included:

- refining and testing commercial and technical arrangements,
- on-boarding over 1,760 customers across all of the trials, from across both our and SP Energy Networks license areas,
- designing, scheduling and executing events during the trial period, and
- capturing data and participant feedback to enable use to successfully measure and quantify the outcomes of the trial.

Following this, work was carried out to analyse trial data, before reporting on the learning and outcomes from trials. The following sections provide detail on the work carried out within each of the workstreams:

Workstream 1- Commercial Design

Trial three Commercial Arrangements

EQUINOX trial one (winter 2022-3) and trial two (winter 2023-4) had demonstrated heat pump flexibility can reduce electricity demand during the weekday evening. These are peak times for networks, typically between 4-8pm, at a rate of two to three events per week on non-consecutive days. Trial three's design commenced in March 2024, seeking to investigate new ways in which heat pump flexibility can support networks. Held between September 2024 and April 2025, Trial three aimed to:

- Test the potential for domestic heat pumps to participate in demand turn-up services.
- Explore longer flexibility events beyond the two hours tested in trials one and two.
- Improve understanding of customer vulnerability in the context of heating flexibility.
- Test heat pump flexibility during both the morning and evening peaks.
- Assess the potential for daily flexibility participation.
- Test the customer proposition for stacking flexibility through EQUINOX alongside an active NESO product.

All tariff types were eligible for Turn Up Flex; however, customers on time-of-use tariffs with variable daytime pricing were excluded from the other trials, following findings from trial two that such customers already demonstrated flexibility through their tariffs, leaving limited additional capacity for event-based participation.

Testing demand turn-up reflected that in some NGED areas, electricity supply can exceed demand, particularly during high solar generation, and that heat pump participation could support constraint management. Longer events were trialed to mirror the 4-hour evening peak, based on the understanding that extending participation duration could double the magnitude of network response compared to shorter events, engaging heat pumps in 2-hour events required any group to be halved to ensure coverage of a 4-hour flexibility window.

Examining customer vulnerability ensured potentially vulnerable participants could safely and equitably engage with flexibility services, identifying whether adaptations were needed. Testing morning peak flexibility (8–10am) addressed a known knowledge gap. Morning peaks have been observed at certain substations, however morning events had not been trialed previously.

The daily flexibility element was introduced after analysis of trial two data, which showed greater network benefit when participants operated daily rather than intermittently, since groups of customers could cover a greater portion of a networks flexibility need as opposed to the need to stagger them for individual segments of individual days. Finally, service stacking explored customer appetite for dual participation in DSO and NESO products, since stacking offers the potential to maximise asset availability for flexibility services alongside participant rewards.

Based on trial three's aims, five mini-trials were developed. These are summarised in Table 1 below. The mini-trials were split across the two energy suppliers, Octopus Energy (3 mini-trials) and ScottishPower (2 mini-trials). The largest mini-trial in terms of customer count was Longer Events Flex (878 customers), and the longest duration mini-trials were Daily Evening Flex (11 weeks) and Daily Morning Flex (8 weeks).

Mini-trial name	Reference term	Date	Supplier/ Customer	Mini-trial Focus
1. Heat pump turn up flexibility	'Turn Up Flex'	September-October 2024 (3-weeks)	106 customers of Octopus Energy	Demand turn up[4] events on non-consecutive days, between 11am-1pm
2. Longer heat pump flexibility events	'Longer Events Flex'	November-December 2024 (3-weeks)	878 customers of Octopus Energy	Demand turndown[5] events of differing lengths, on non-consecutive days, between 4-8pm
3. Daily evening heat pump flexibility	'Daily Evening Flex'	January-April 2025 (11-weeks)	706 customers of Octopus Energy	Daily demand turndown events on weekdays, across consecutive weeks and occurring between 4-8pm Customers could additionally choose to participate in NESO's Demand Flexibility Service (DFS).
4. Morning heat pump flexibility events	'Morning Peak Flex'	January-February 2025 (2 weeks)	29 customers of ScottishPower	Demand turndown events on non-consecutive days, between 8-10am
5. Daily morning heat pump flexibility	'Daily Morning Flex'	February-April 2025 (8 weeks)	41 customers of ScottishPower	Daily demand turndown events on weekdays, across consecutive weeks and between both 8-10am and 5-7pm. Customers additionally participated in a simulated DFS service.

Table 1: Trial three mini-trials summary

Additionally, Trial three's commercial arrangements are summarised in Table 2 below. Turn Up Flex was the only mini-trial conducted solely within NGED's licence area, while the other mini-trials recruited customers from both NGED and SPEN regions.

All five mini-trials followed a treatment–control design, where treatment participants were asked to adjust their heat pump settings in response to event signals, and the control group did not receive any request. For Morning Peak Flex and Daily Morning Flex, all participants were assigned to the treatment group due to small sample sizes, with anonymised consumption data from non-trial heat pump users used for comparison.

[4] Demand response when more electricity is consumed relative to a baseline.

[5] Demand response when less electricity is consumed relative to a baseline.

Turn Up Flex, Longer Flex, and Morning Peak Flex ran one to three events per week, while Daily Evening Flex and Daily Morning Flex tested daily participation. Turn Up Flex participants were incentivised through free electricity during events, while Longer Flex and Morning Peak Flex offered survey-based rewards (that is customers received a reward for completing a survey). Daily Flex participants received fixed weekly payments for maintaining electricity use below a pre-trial baseline. All participants, including controls, received additional incentives for completing recruitment, start-of-trial, and end-of-trial surveys.

Daily Evening Flex participants were also able to join NESO's Demand Flexibility Service (DFS) through Octopus Energy's Octoplus Savings Sessions, with NESO and Octopus managing all event notifications, settlements, and incentives independently of EQUINOX. In contrast, ScottishPower's Daily Morning Flex participants were not called for any NESO DFS events by January 2025, so four simulated DFS events were conducted instead, with payment rates designed to reflect those typically offered through DFS.

Item	Turn up Flex	Longer Flex	Morning Peak Flex	Daily Evening Flex	Daily Morning Flex
Event length	2 hours	2-4 hours	2 hours	Group A: 2 hours. Group B: 4 hours[6]	2 hours (first 4 weeks) 4 hours (second 4 weeks)[7]
Event Timing	11am-1pm	4-8pm	8-10am	5-7pm or 4-8pm	8-10am, then 8-10am & 5-7pm
Event period		Single day		11 weeks	8 weeks
License area	NGED		NGED and SPEN[8]		
Participation type	Treatment and control	Treatment and control	Treatment only	Treatment and control	Treatment only

[6] The Daily Evening Flex cohort was split into two and four hour groups based upon their personally disclosed event length preferences.

[7] The Daily Morning Flex cohort took part in morning only events for four weeks, then morning and evening events for the final four weeks.

[8] Trial three also onboarded SPEN, which hosted EQUINOX events in its license area, alongside NGED.

Customer incentive	Free electricity	£2 per event upon completion of post-event survey	£1.50 per event upon completion of post event survey	£1 per week (requires opt-in for 4/5 days) Those part of DFS Saving Sessions earned DFS payment if they participated in DFS events	£2 per week morning only (requires opt-in for 4/5 days) £3 a week morning and evening Simulated DFS: £0.30/kWh
Tariff criteria	All accepted		No Time of Use tariffs accepted		

Table 2: Trial three commercial arrangements

Workstream 2- Technical Integration

The Workstream 2 element of EQUINOX focuses on the technical needs that are required in order to successfully dispatch flexibility, starting from the source, the DNO, then towards the supplier or aggregator and then to the customer and their heat pump. The approach taken was to minimise costs by utilising and repurposing as much of what already exists as possible.

Trial three Technical Design:

Trial three proposed no changes to the technical architecture and aimed to continue to integrate technical designs with existing and new energy suppliers involved in EQUINOX.

The team utilised existing solutions to deliver the outcomes, although they varied slightly across the Flexibility Service Providers, they all used existing market solutions for requesting services, Flexible Power and Piclo. The high level flow for Flexible Power looked like this:

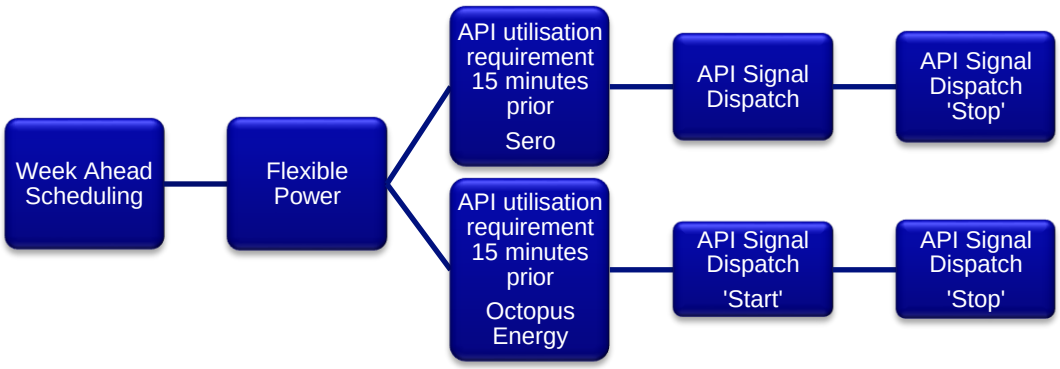


Fig. 2 Flexible Power High level flow diagram

Analysis from trials one and two identified development areas to be carried out in order to achieve better performance during the forthcoming trial events., Throughout EQUINOX we tried to ensure that the process to enable participation was a frictionless as possible using as much of the existing systems and business processes as possible.

Workstream 3- Customer Engagement

Primary Market Research

During trial three in December 2024, primary market research was conducted to see how preferences and attitudes may have changed since the primary market research was conducted in the first trial during September 2022. Overall, the research sought to understand attitudes towards heat pumps and the likelihood of adopting such a low carbon technology for home heating, as well as to uncover ways of shaping customer preference with a view to drive uptake heat pumps.

The primary market research took a similar approach to the first round of market research, a combination of quantitative and qualitative research. This included an online survey, face-to-face surveys to capture digitally disconnected individuals

We also leveraged the learnings from the primary market research to benchmark the learnings and findings from trial three to support our outcomes. This was achieved through surveys, focus groups and interviews. Findings from the field work was synthesised and summarised in Deliverable 5: Learnings from engaging customers[9] and is available on the EQUINOX webpage.

Recruitment for Trial three

Each supplier led customer recruitment activities for their customer base and oversaw trial delivery for their own participants. Suppliers followed common approaches to recruitment, though each had suitable freedom to engage with their own customer base as they felt was appropriate. Energy suppliers predominately conducted customer outreach via emails which included messaging about EQUINOX project aims, a description of what would be requested of customers participating in each of the trials, and the potential financial benefits of taking part. Wherever possible, recruitment happened shortly before trial events began (e.g. 1-2 weeks before trial start). Participation in the trials was framed as an opportunity to take part in an innovation project furthering collective understanding of how low carbon heating could be utilised flexibly for wider network benefits.

[9] Deliverable 5: Learnings from engaging customers throughout the EQUINOX trials

An example of the email is below:

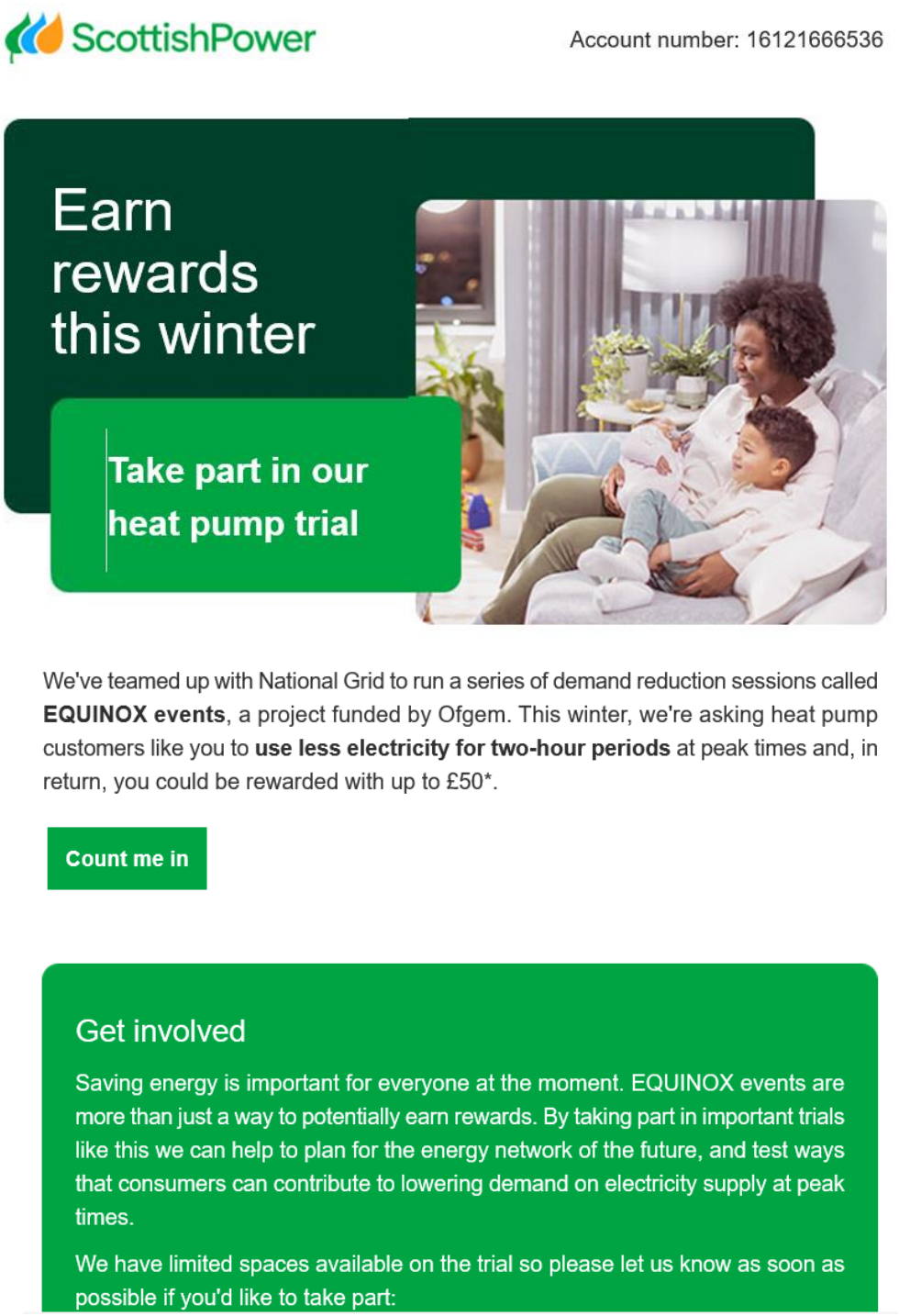


Fig 3: Example Scottish Power email to customers

Suppliers were very successful in recruiting participants from their customer bases, with a total of 843 customers being recruited across trial three. Across the board EQUINOX recruited 1282

unique customers across all trials and of this 45% of unique participants took part in >1 winter and 136 OE customers took part in all 3 winters.

In addition to the typical recruitment methods as describe ahead, during trial three we trialled additional recruitment methods. Ahead of trial three ScottishPower installed a significant number of heat pumps as part of the ECO4 (Energy Company Obligation) Government Obligation. Recruitment for trial three was targeted at these customers. Due to the eligibility criteria for ECO4, there was a greater proportion of low income and potentially vulnerable participants in this group compared to the overall EQUINOX participant pool which provided an opportunity for additional equitability learnings in the trial. These customers were offered £10 sign-up bonus to help incentivise greater representation from ScottishPower customers in the overall participant pool.

Trial three also tested if recruitment of households with more vulnerability factors would increase through a non-digital outreach approach. To test this, the West Midlands Combined Authority (WMCA) conducted a recruitment drive involving a campaign in an area of social housing known to have had heat pumps installed through grant funding schemes. This did not contribute to significant uptake among social housing tenants. We believe the limited success was due to most social housing tenants contacted being ineligible to participate in EQUINOX because they were not with an eligible energy supplier. Of the over 300 households that were targeted during this exercise, 10% responded. Additionally, WMCA found many were somewhat reluctant to engage in something on the doorstep or did not answer the door.

Customer Engagement during trial three

Customer engagement in EQUINOX was primarily led by the energy suppliers collaborating on the project. Participants received communications from their supplier throughout the trial experience. For both Octopus Energy and ScottishPower customers, customer engagement in EQUINOX leveraged existing communication channels, issuing invitations, notifications and surveys by email, with some event notifications through mobile apps. This approach mimics the BaU set up where customers engage with their energy supplier rather than the DNO, increasing the chances of greater customer participation.

Throughout trial three, we captured the experiences and perceptions of trial participants through surveys, interviews and focus groups. Beyond trial participants, we ran a survey of social housing tenants in and around the West Midlands and the primary market research survey of around 2000 adults. These additional surveys aimed to assess broader customer perceptions of heat pumps and the energy transition to benchmark our findings and enhance our understanding of a wider group of customers.

Customer experience evaluation during trial three

Directly engaging participants underpinned the customer research conducted during trial three. This research included both qualitative and quantitative methods, including surveys, interviews, and focus groups.

The customer research aimed to understand:

- Why participants signed up and were motivated to participate.
- How participant demographics compared to the UK population.

- How satisfied participants were with the trial design and experience.
- How EQUINOX events altered participant behaviour and if they impacted thermal comfort.
- What the barriers and benefits were of participating.
- Whether or not participants with potential vulnerabilities were equally able to take part in events and benefit from participating.
- How participant experiences were shaped by trial design factors.

Customer research was gathered from:

- Online survey sent at the start of each of the mini-trials ('start of trial survey') to understand motivations to participate, experience with trial sign up, and information about home heating set-up and participant demographics.
- Online survey sent during the last week of the trial ('end of trial survey') to understand satisfaction with trial design, views on technology automation and stacking, and the impact of trial on customer comfort.
- Short online survey sent to participants immediately following each of the EQUINOX events ('post-event survey') gather information on whether households participated and their comfort levels during the events. These were short surveys consisting of two to five questions.
- Six focus groups with 30+ customers, in total including three focus groups with customers with potential vulnerabilities, to enable more context and personal narratives to be captured around motivations for taking part in EQUINOX, home heating practices and comfort, heat pump learnings, and trial design.
- Four individual customer interviews to capture qualitative learnings of the same nature as the focus groups.

The findings from surveys, interviews, and focus groups were analysed and shared with the EQUINOX consortium. They were also published in Deliverable 5: Learnings from engaging customers[10] and EQUINOX trial three: Engaging vulnerable customers[11]. Both reports are available on the EQUINOX website.

[10] Deliverable 5: Learning from engaging customers

[11] Trial Three: Engaging Vulnerable Customers

Trial three Event Schedule

We used trial three to test any research gaps that remained after concluding trials one and two, therefore the event schedule was split across 5 mini-trials – each with their own set of variables.

The main trial period ran from 27th September 2024 – 4th April 2025, with a Christmas break from 23rd December 2024 – 19th January 2025, this was due to extreme weather predictions. There were 114 EQUINOX events held over this period; participants experienced 1-5 events per week depending on which mini-trial they joined.

Details of the schedule for each mini-trial are below:

Trial	No of events and timing
Dynamic Turn Up	6 events from 27th Sept – 18th Oct 24
Dynamic Longer	8 events from 18th Nov – 20th Dec 24
Sustain (Octopus)	55 events from 20th Jan – 4th Apr 25
Dynamic Morning	5 events from 27th Jan – 7th Feb 25
Sustain Morning/Morning & Evening	40 events from 1oth Feb to 4th Apr 25

Table 3: Event Schedule

Overarching Trial 3 timeline

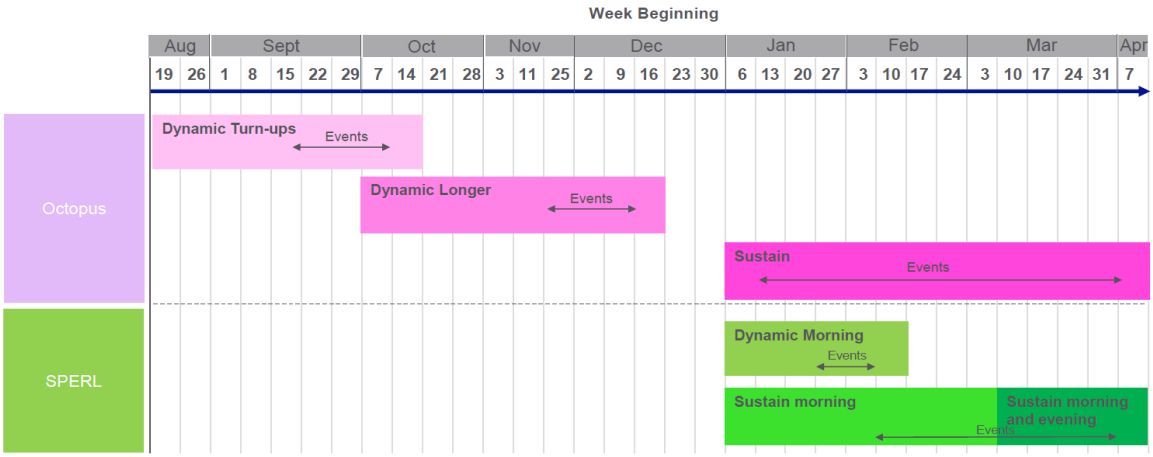


Fig 4 : Trial three timeline

Trial three Scheduling & Forecasting

Temperature was a key variable whose impact on the demand response delivered by participating households was to be explored. Therefore, for the mini-trials which didn't involve daily events, event days were chosen on a weekly basis by considering the external temperature forecast for the following week. A range of temperatures needed to be captured across the 114 events, in particular the coldest days of the year. Therefore, the coldest forecast days were prioritised when choosing event days for the following week.

Hourly external temperature forecasts were captured for Bristol (main weather station due to central location within our license areas) and also for Plymouth and Birmingham (allowed us to check for variation across the license areas), and were stored in a tracking spreadsheet on a weekly basis. After each event, the average temperature at the Bristol weather station between 4-8pm was calculated and also stored. The spreadsheet also contained the actual average temperature measured between 4-8pm every weekday, which was captured prior to the forecasting efforts of the following week. This enabled two actions:

- Comparison of forecast temperatures with actuals. There could be occasional notable disparities between the two, particularly if an event day was chosen to occur later in the week – a Friday event day would occur nine days after it was chosen on the preceding Wednesday.

- The ability to track the spread of temperatures that were observed during 4-8pm on event days that had already occurred, and thus gauge which temperature range (mild, cold, very cold) required more event days to provide a sufficient amount of experimental data.

Every Wednesday during the trial period NGED scheduled the event days for the following week by completing the below actions:

- Used the tracking spreadsheet to assess the temperature forecast for the following week's Monday to Friday.

- Use the average 4-8pm forecasted temperatures to choose 1-3 event days with low temperatures.

- Collate actual temperatures for the prior week and input the data into the tracking spreadsheet.

Every Thursday after 12:00 during the trial period NGED completed the following actions:

- Informed Octopus Energy and Scottish Power Energy Retail Limited of the chosen event days via email.

- Accept availability on the Flexible Power Portal for the chosen days and time periods

Event Summary

Figure 3 shows the count of event and non-event days across the mini-trials broken down into temperature bands and calculated using the forecasted temperatures. Table set 4 and 5 shows the same information but calculated using the actual temperatures seen on each event and non-event day. For the Sustain mini-trial, all available week days during the trial period were event days, therefore the table only shows the event day temperature split.

Temperature Type	Temperature Band (degrees Celsius)
Warmer	$x \geq 10$
Mild	$5 \leq x < 10$
Cold	$0 \leq x < 5$
Very Cold	$x < 0$

Table 4: Count of event and non-event days split by temperature bands (forecasted)

Temperature Type (Forecast - Turn Up)			
	Days Considered	Event	Non-Event
Warmer	26	6	20
Mild	0	0	0
Cold	0	0	0
V. Cold	0	0	0

Temperature Type (Actual - Turn Up)			
	Days Considered	Event	Non-Event
Warmer	26	6	20
Mild	0	0	0
Cold	0	0	0
V. Cold	0	0	0

Temperature Type (Forecast - Morning)			
	Days Considered	Event	Non-Event
Warmer	0	0	0
Mild	6	2	4
Cold	4	3	1
V. Cold	0	0	0

Temperature Type (Actual - Morning)			
	Days Considered	Event	Non-Event
Warmer	1	0	1
Mild	7	3	4
Cold	2	2	0
V. Cold	0	0	0

Temperature Type (Forecast - Longer)			
	Days Considered	Event	Non-Event
Warmer	0	0	0
Mild	16	6	10
Cold	9	5	4
V. Cold	0	0	0

Temperature Type (Actual - Longer)			
	Days Considered	Event	Non-Event
Warmer	2	0	2
Mild	16	7	9
Cold	7	4	3
V. Cold	0	0	0

Temperature Type (Forecast - Sustain)			
	Days Considered	Event	Non-Event
Warmer	13	13	0
Mild	35	35	0
Cold	7	7	0
V. Cold	0	0	0

Temperature Type (Actual - Sustain)			
	Days Considered	Event	Non-Event
Warmer	10	11	0
Mild	30	30	0
Cold	10	10	0
V. Cold	0	0	0

Fig 5: - Count of event and non-event days split by temperature bands (actual)

Workstream 5- Knowledge Capture and Project Communications

Strategy for project communications

The knowledge capture and project communication workstream has continued to make progress on the dissemination of learnings from the project. There is a clear plan in place to ensure the project is being communicated effectively both internally and externally with our partners, along with a plan for future conferences / dissemination events we can attend, which has provided an opportunity to share learning throughout the project. Learning dissemination has been a particularly strong feature of EQUINOX with a number of webinars and presentations undertaken throughout the project.

We have had a number of opportunities to share project learning throughout the project and this last year has been no different. We have undertaken a number of trial two dissemination events, using existing industry events as below. We are currently planning closedown with a series of learning events being scheduled in 2026.

Dissemination

EQUINOX has been disseminated at a number of events during this reporting period, including those shown in Table 5.

Event Name	Date	Location	Dissemination Type
Energy Innovation Summit	October 2024	Liverpool	Presentation
Utility Week Live	20-21st May 25	Birmingham	Presentation
CIRED, International Conference on Electricity Distribution	June 25	Geneva	Presentation
British Institute of Energy Economics, Energy Research Conference	23rd September 2025	Oxford	Presentation

National Grid Innovation Day	September 25	Boston	Demonstration Stand

Table 5: EQUINOX Dissemination Events

Horizon Scan

As part of EQUINOX, we committed to undertake a series of regular market “Horizon Scan’s” to ensure that we minimised duplication with other projects. Since the last progress update, we have continued with our ‘Horizon Scan’, which collates and summarises research and innovation projects, plus regulations and policy, which are deemed relevant to the delivery of the EQUINOX project.

Given that, EQUINOX has monitored the backdrop of three years of policy and regulatory change regarding many areas relevant to project delivery, including flexibility market design and heat pump roll out, we have recently completed our latest scan and have tracked current and upcoming policies and regulations to ensure EQUINOX tests commercial arrangements which reflect reality.

Furthermore, as a condition of Ofgem funding, EQUINOX must directly acknowledge and build upon other innovation projects relating to electrification of heat and flexibility by UK DNOs and others. We are therefore collating all relevant projects to facilitate the identification of opportunities to disseminate EQUINOX learnings to other projects who can benefit from them.

The Horizon Scan is updated with updates on relevant ongoing innovation projects, newly identified innovation projects from the UK and beyond, and identify new UK policies, regulations, and market activity relevant to flexibility and low carbon heat. It is our hope that this can be a go-to resource for other networks, charities, low carbon heating firms, and flexibility specialists looking to understand the UK’s current and future domestic low carbon flexibility landscape.

The horizon scans can be found here under documents and links.

3. Business Case Update

This section provides an update on the EQUINOX business case presented within the FSP and previous project progress reports. During this reporting period, we have continued to review the business case based on trial two and three results and are reviewing it more deeply for the next deliverable in December 2026: Recommended transition of learning to BaU, which will give further insight into the potential of Heat Pump flexibility. This includes learning on demand turndown achievable, response rate, and required commercial arrangements. We will continue to assess and update the business case in line with the ongoing assessment carried out during the project and any assumptions and changes to it accordingly.

Business case scope update

The original FSP provided an estimation of the potential benefits of scaling-up heat pump flexibility in GB. The calculated benefits were based on an assessment of reinforcement needs to accommodate the future uptake of non-flexible heat pumps across GB, and the capability to defer or avoid this reinforcement by procuring flexibility from those customers with heat pumps. The assessment considered that procuring flexibility from heat pumps would enable their peak demand contribution to be reduced, resulting in increased substation headroom. This assessment was based on ED2 guidance and the use of flexibility to defer or avoid reinforcement.

We are now in the process of updating the business case, with a scope that follows the same core principle of modelling scaled-up heat-pump flexibility to reduce peak demand and increase substation headroom. However, the application of this additional headroom has been realigned to reflect ED3 guidance. Rather than emphasising substation reinforcement deferral, the business case now focuses on enabling new connections that would otherwise need to be delayed until reinforcement is completed.

There are multiple use-cases for heat pump flexibility, including the use of demand turndown to create substation headroom, but also the use of demand turndown to support fault maintenance or demand turn up to support supply-demand imbalances. This updated business case will focus on the substation headroom benefits case, though highlights these additional use-cases for heat pump flexibility can provide substantial value to the GB energy system.

The analysis will be focused on developing and comparing two scenarios for heat pumps: a Counterfactual scenario, where no forecasted heat pumps participate in flexibility, and an EQUINOX scenario, where a proportion of forecasted heat pumps participate in two-hour flexibility events in line with the EQUINOX trial results. In the EQUINOX scenario, headroom additions are valued to demonstrate the system benefits of heat pump flexibility.

The Counterfactual assumes no participation in flexibility. The EQUINOX scenario will apply flexibility performance from the trials to the same forecasted network conditions. A 40% participation rate is assumed, reflecting behaviour during the coldest trial two events of -1.4°C. Participating customers are modelled to participate in flexibility every winter day for two hours between 4-8pm. This performance is in line with the post-trial two network impact analysis, which showed that daily deployment of heat pump flexibility provides the highest network value, while the timing aligns to the traditional peak times on NGED's networks. These assumptions were presented in the business case update within our last project progress report submission.

Full details of this and the results from carrying it out will be presented in our next Ofgem deliverable Recommended transition of learning to BaU.due in December 2026.

4. Progress Against Budget

Table 6 below details the progress against budget to date:

Category	Budget (£k)	Expected Spend to date (£k)	Current Spend (£k)	Variance to Expected (£k)	Variance to Expected (%)
Labour	£4,993.52	£ 4,290.80	£3,177.16	-£1,113.64	-25.95
Equipment	£456.20	-	-	-	-
Contractors	£483.80	£470.36	£230.4	-£239.97	-51.02
IT	£221.97	-	-	-	-
IPR Costs	-	-	-	-	-
Travel & Expenses	£17.76	£8.43	£2.15	-£6.28	-74.53
Payments to users	£250	£155.98	£83.34	-£72.64	-46.57
Contingency	£1,231.43	£530.00	£530.00	£0	0.0
Decommissioning	-	-	-	-	-
Other	£111.43	-	-	-	-
Total	**£7,766.11**	**£5,455.56**	**£4,023.04**	£1,432.53	-26%

Table 6: Progress against Budget

Comments around variance

As reported in past progress reports, contingency spend has been allocated to support the addition of Scottish Power Energy Retail costs to the project. This spend will allow us to significantly enhance the learning from the project by demonstrating how the methods can be replicated with this additional supplier, as well as allowing us to reach a wider demographic of customers for trial participation.

Variance in each spend area is as follows:

- Labour & Contractors – current labour and contractor spend is lower than anticipated at this stage. One factor contributing to this is that changes have been made to contractual arrangements delaying payments. Another factor contributing to this relates to the reduction in technical integration requirements from the FSP stage, where it was initially thought that more EQUINOX specific development would be needed. Where possible BaU methods were used to ensure scalability in the future and alignment to BaU. Now that the

final trial period has been completed we are aware that no further technical development is required and this will lead to an underspend in this area.

- Equipment – at the bid stage it was anticipated that some equipment would be needed to execute trials with customers. EQUINOX eligibility for trials relied upon customers having an operating smart meter and an installed heat pump, but some also had additional equipment beyond this (particularly those with a Sero Building Energy Engine). The range of control methods used during the project, and the use of surveys to augment data on in home temperatures where monitoring was not available, has enabled us to carry out trials with all participants without requiring any additional equipment to be installed. Now that all trials are complete, we are not expecting there to be any future spend in this area.

- IT – as mentioned above and in previous project progress reports, we took an early decision to repurpose existing technical integration solutions where possible. This has led to a reduction in IT costs across partners and has also reduced the overall spend. Now that all trials are complete, we are not expecting there to be any future spend in this area.

- Travel and Expenses – current spend in this area is lower than originally forecast at this stage and is still expected to remain within the overall budget during the remainder of the project. This links to more meetings being carried out virtually than expected and making use of locations to avoid travel costs when in person.

- Payments to Users – final invoicing and validation for trial payments to users will be completed in the period following this reporting period as payments for trial three were due later than period covered by this report.

- Other – audit costs will be added to this line item following the final deliverable submission. This will be carried out during the period between final deliverable submission and closedown report submission.

5. Project Deliverables

The project has made the following progress below in Table 7 towards the Success Criteria and Deliverables within the Project Direction:

Reference	Project Deliverable	Deadline	Evidence	Progress
1	Customer perceptions on unlocking flexibility from heat [WS3]	Dec 2022	A report containing: • Insights from customer surveys and customer focus groups on the barriers and enablers for unlocking flexibility from heat	**Submitted** – December 2022
2	Initial insights on effectiveness of commercial methods [WS1 & WS4]	Jul 2023	A report containing: • An overview of theoretical flexibility simulation modelling based on 'digital twin' housing archetypes • Analysis and learning from early trial data to understand the impact of commercial methods and control on flexibility outcomes	**Submitted** – July 2023
3	Design of novel commercial methods & technical integration [WS1 & WS2]	Nov 2023	A report containing: • An overview of the novel commercial arrangements (M1, M2, & M3), including: requirements, commercial heads of terms with suppliers and customers • An overview of the technical integration between DNO, suppliers, in-home automation, and customers including: solution requirements (incl. cyber requirements) and specifications (DNO, supplier, & customer) high-level architecture, test plans, and test results. • An overview of learning from designing, developing and testing the novel methods in collaboration with Project Partners and customers.	**Submitted** – November 2023

4	Learning from trialling novel commercial methods [WS4]	Aug 2024	A report containing: • An overview of the commercial terms for DNOs, energy suppliers and customers. • An overview of learning from trialling the range of novel commercial method • An overview of the customer experience during the trials based on customer feedback • An overview of the simulated network impact throughout the trial flexibility events	**Submitted** – August 2024
5	Learning from engaging customers on the barriers & enablers of the electrifications of heat and unlocking domestic flexibility [WS3]	Aug 2025	A report containing: • Lessons learned from engaging with customers on the electrification of heat • Lessons learned on enabling equal opportunities and benefits for fuel poor and vulnerable customers	**Submitted** August 2025

			• Recommendations on the role of DNOs in customer engagement	
6	Recommended transition of learning to BaU [WS4]	Dec 2025	A report detailing: • Updates to flexibility simulation models using trial data • A description of the recommended commercial arrangements, procurement strategy and technical integration to unlock maximum flexibility from domestic customers • An overview of any regulatory or policy change needed to enable efficient roll out • An update of the project business case that considers project learning	**In progress**
N/A	Comply with knowledge transfer requirements of the Governance Document.	End of Project	1. Annual Project Progress Reports which comply with the requirements of the Governance Document. 2. Completed Close Down Report which complies with the	**Ongoing** – this report forms the final Annual Project Progress Report submission

			requirements of the Governance Document. 3. Evidence of attendance and participation in the Annual Conference as described in the Governance Document.

Table 7: Project Deliverables

6. Data Access Details

Data from the EQUINOX project is currently made available via the nationalgrid.co.uk website, where all project deliverables and outputs are published. Only aggregated data from the trial can be shared due to individual customers smart meter data being considered personal data and therefore being treated to ensure GDPR compliance.

7. Learning Outcomes

Table 8 below shares some of the recent learning captured as part of the EQUINOX project. These learnings are focused on recent trial outputs, and will feature in more detail within the projects next Ofgem deliverable, due at the end of 2025. This includes some general practical learning outcomes that we think are useful to other planning projects of a similar scale, as well as specific technical and commercial learning.

Area	Learning Point	Outcome
WS4	For Turn Up events, customers with a heat pump can provide demand turn up during the middle of the day (11am-1pm) via their heat pump and doing so will provide a significant proportion of potential overall demand turn up even when customers are able to turn up any asset.	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS3	Providing demand turn up is well tolerated by customers. 94% of participants self-reported being satisfied with their participation in Turn Up Flex. These survey results suggest that customers would be willing to participate in similar trials or sign up to an ongoing turn up product	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS3	For Turn Up events, smart thermostat uptake may increase if customers can participate in demand turn up services. 48% of participants reported that would install a smart thermostat if there were ongoing turn up trials in the summer, and 49% reported they would do so if there were ongoing turn up trials in the winter.	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS4	For Longer events heat pump homes can achieve demand turndown response during the evening peak for up to 4-hours	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS3	For Longer events, trial satisfaction was high, suggesting willingness to participate in longer duration flexibility events. Half of participants preferred 2-hour events, though large minorities preferred 3-hour and 4-hour events.	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS3	For Longer events, poor insulation was the only identifiable determinant of event length preference.	Feeding into policy recommendations updates as part of the transition to BaU deliverable 6.
WS3	For Longer events most participants did not experience a change in comfort due to events. For those who did, the change was overwhelmingly mild, with little variation among potentially vulnerable and non-vulnerable participants.	Feeding into flexibility procurement recommendations updates as part of the transition to BaU deliverable 6.
WS4	For Longer events, trial participants expressed strong satisfaction with day ahead event notification and end-of-event notifications	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS4	For Daily Evening events: the 2-hour group participants provided statistically significant average demand response in 7 out of the 11 trial weeks, primarily in the first half of the mini-trial	Shared internally with NG DSO Flexibility Team and detailed in project reporting.

WS4	For Daily Evening events, the 4-hour group participants provided statistically significant demand response in weeks 1-5 in the first half of the trial.	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS4	For Daily Evening events, both overall trial satisfaction and satisfaction with the event frequency was high, suggesting willingness to participate in daily flexibility.	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS4	For Daily Evening events, the control method was highly correlated with event frequency satisfaction, suggesting that improving accessibility to remote control methods could greatly improve rates of public willingness to participate in daily flexibility	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS4	For Morning Peak Flex, heat pump homes can provide flexibility in the morning without experiencing inconvenience	Shared internally with NG DSO Flexibility Team and detailed in project reporting.
WS3	For Morning Peak Flex, sending a reminder that an event has ended could be especially important for potentially vulnerable customers	Feeding into flexibility procurement recommendations updates as part of the transition to BaU deliverable 6.

Table 8: Learning Log

8. Intellectual Property Rights

A complete list of all background IPR from all project partners has been compiled. The IPR register is reviewed on a quarterly basis. No new foreground IPR has been generated to date within the EQUINOX project.

9. Risk Management

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 NGED's 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.

Current Risks

The EQUINOX risk register is a live document and is updated regularly, as the project is in its later stages, with the final trial now complete, the risks identified remain largely closed with some residual risks around closedown activities only. Unsurprisingly, as we move to focus the final deliverables there are currently only 8 live project related risks. Mitigation action plans are identified and reviewed for each open risk and the appropriate steps then taken to ensure risks do not become issues wherever possible. In Table 9, we give details of our only current major risk. For each of risk identified, a mitigation action plan has been identified and the progress of these are tracked and reported.

Table 9: Top current risk (by rating) - Updated since last report

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
There is a risk that the partners may accidentally share personal customer data with other EQUINOX partners and contractors	Major	Data is only being shared in accordance with agreed Data Sharing Agreements, which outline exactly what data can be shared and in what ways. Data is typically shared in aggregated format to avoid the need for sharing personal data.	DSA's were put in place and reviewed ahead of each trial. To date these have been used successfully with no accidental sharing of data. This remains open due to final reporting being underway .

Figure 8 provides a snapshot of the risk register, details graphically, to provide an on-going understanding of the projects' risks.

Fig 7: Graphical view of risk register and percentage risk per category

Figure 7 provides an overview of the risks by category, minor, moderate, major and severe. This information is used to understand the complete risk level of the project. It also shows the percentage per risk category.

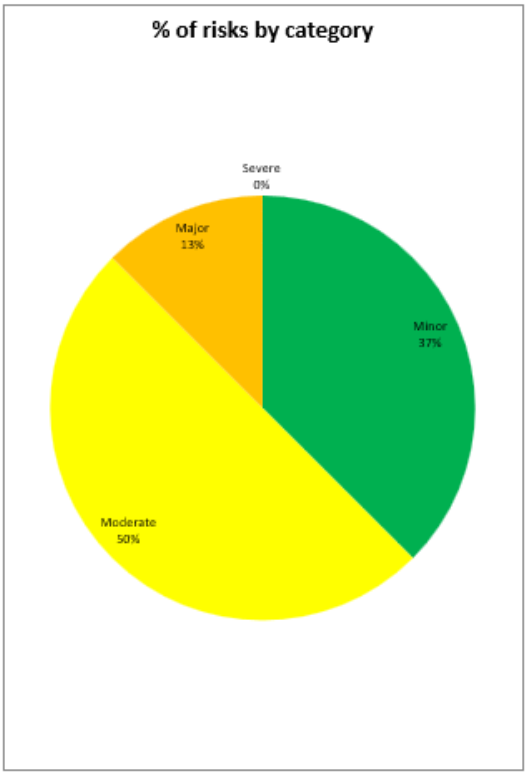
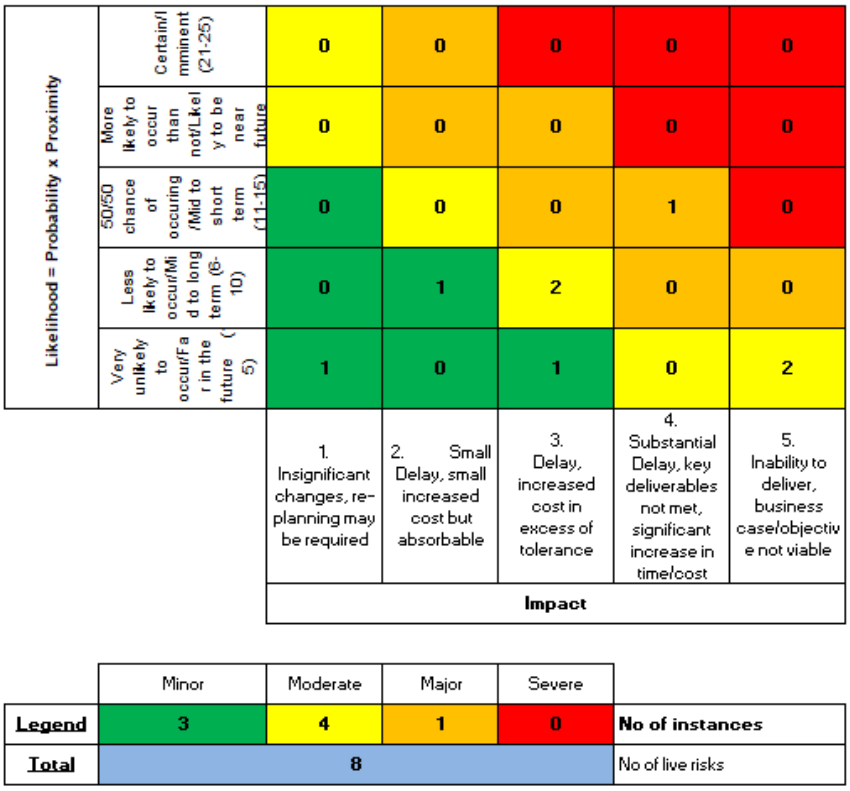


Fig 7: Graphical view of risk register and percentage risk per category



Likelihood = Probability x Proximity						
	Certain/Imminent (21-25)	0	0	0	0	0
	More likely to occur than not/Likely to be near future	0	0	0	0	0
	50/50 chance of occuring /Mid to short term (11-15)	0	0	0	1	0
	Less likely to occur/Mid to long term (6-10)	0	1	2	0	0
	Very unlikely to occur/Far in the future (1-5)	1	0	1	0	2
		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
		Impact				

	Minor	Moderate	Major	Severe	
Legend	3	4	1	0	**No of instances**
Total	8				No of live risks

Fig 8: Snapshot of the Risk Register

Update for risks previously identified

The number of open project risks has decreased during this reporting period. Below is an update on the 6 top risks from the previous progress report, one of which remains open:

Table 10: Update on Previously Identified Risks

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
There is a risk that the difficult to reach customers are not reflected in the trial participants and therefore the trial participants aren't reflective of NGED's entire customer base.	Closed	EQUINOX purposefully aims to include a range of customers within the trials. NGED will use its contact with charities and organisations working with difficult to reach customers to promote EQUINOX No new equipment required for participation - only smart meter & heat pump. By definition, this means anyone with a heat pump and a smart meter could participate. Potential app-based control could also increase/encourage access	Trial three recruitment was scheduled and we monitored customers numbers and characteristics. Demographics of these customers have been tracked and reported. We have benchmarked this against data on heat pump owners as well as wider population.
There is a risk that the partners may accidentally share personal customer data with other EQUINOX partners and contractors	Major	Data is only being shared in accordance with agreed Data Sharing Agreements, which outline exactly what data can be shared and in what ways. Data is typically shared in aggregated format to avoid the need for sharing personal data.	DSA's were put in place for trials and were used successfully with no accidental sharing of data. This remains open thought due to final reporting .
There is a risk of DFS events not being held during the trial three period.	Closed	Communication with NESO Team Engagement and trials planning to ensure maximum benefit	Stacking was demonstrated in trial three where Octopus Energy were able to schedule through saving sessions
Risk of delayed analysis after each mini trial in trial three,	Closed	Reporting may be delayed due to time between each mini trial	Data analysis timelines were set out, tracked and delivered in line with trial reporting and

leading to overall reporting delays		and project deliverables. Investigation into options including parallelisation, repurposing and other mitigations	Ofgem deliverable deadlines.
There is a risk that the amount of repeat participants leads to unrepresentative results	Closed	Consumer engagement early to ensure maximum participation Analysis of repeat participants and investigation into options to ensure that we do not disincentivise participation but also ensure balance of new/existing consumers	We tracked participant demographics including those that has previously participated in EQUINOX. More on this is provided in our final trials and customer engagement reports.
Risk that we do not capture a wide enough range of external temperatures specifically for Sustain based events.	Closed	Trial two results demonstrated that a key driver for demand turn down was external temperature. If temperatures are all mild during trial events then results wont be representative.	In trial three we continued to schedule dynamic events based on temperature forecasting, and expect to capture a full range when carrying out sustain type events. Results of this are detailed in the final reports. Temperature is though something we accept that we cannot do much about.

10. Consistency with Project Direction

The scale, overall budget, and timeframe of the project have remained consistent with the project direction, a copy of which can be found here:

Project Direction: EQUINOX- Western Power Distribution | Ofgem

Change has been made to the cost centre allocations to reflect the original full submission proforma spreadsheet. This change has been included in previous project progress reports.

As outlined in Section 4, we are expecting EQUINOX to be delivered under its original project direction budget. This has not had an impact on the project's scope, deliverables or outcomes, and final finance details will be detailed within the closedown report due to be published in March 2026.

11. Accuracy Assurance Statement

This report has been prepared by the EQUINOX Project Manager (Stuart Fowler), reviewed by another Innovation Engineer (Laurence Hunter), and then reviewed and approved by the Innovation Programme Lead (Ryan Huxtable).

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

Glossary

Term	Definition
API	Application programming Interface
BaU	Business as Usual
BDR	Behavioural Demand Response
BEE	Building Energy Engine
C2C	Capacity 2 Customers Project
CCC	Climate Change Committee
DG	Dispatch Groups
DLC	Direct Load Control
DNO	Distribution Network Operator
DSO	Distribution System Operator
DSR	Demand Side Response
EHV	Extra High Voltage
EPC	Energy Performance Certificate
EQUINOX	Equitable Novel Flexibility Exchange
ESO	Electricity System Operator
FAQ	Frequently Asked Question
FSP	Full Submission Proforma
FSP	Flexibility Service Provider
GDPR	General Data Protection Regulation
HP	Heat Pump
HV	High Voltage

Imperial College London	ICL
IOT	Internet of Things
IPR	Intellectual Property Rights
IT	Information Technology
kWh	kilowatt hour
LCT	Low Carbon Technologies
LV	Low Voltage
MU	Meterable Units
MW	Megawatt
NGED	National Grid Electricity Distribution
NIC	Network Innovation Competition
Ofgem	Office of Gas and Electricity Market
ORP	Optimised Retrofit Programme
PEN Test	Penetration Test
PPR	Project Progress Report
Q1-4	Quarter 1-4
SPERL	Scottish Power Energy Retail
T&Cs	Terms and Conditions
WS	Workstream

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