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CrowdFlex Report: Availability Trial

July 2025

NESO
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Executive summary

Demand flexibility, whereby consumers shift their electricity use to align with supply-side conditions, can play an important part in balancing the future electricity grid. As part of its Clean Power 2030 Action Plan, the UK government has an ambition to increase levels of demand flexibility in the system by four to five-fold within just five years. Electric vehicle (EV) charging represents a crucial opportunity for load-shifting, including during events called by grid operators which encourage consumers - or aggregators on their behalf - to adjust demand in line with system needs.

This trial explored how EV demand flexibility can be incentivised using availability payments, which reward customers for being plugged in and available to respond when events are called. It was delivered as part of CrowdFlex, a National Energy System Operator (NESO) led Innovation project delivered by NESO, OVO, Ohme, Centre for Net Zero, ERM, AWS, National Grid Electricity Distribution, and Scottish and Southern Electricity Networks, with the support of Smart Grid Consultancy, CGI, Smith Institute, and the Centre for Sustainable Energy. This trial was delivered by two Demand Side Response Service Providers (DSRSPs), Ohme and OVO Energy, with trial design and analysis led by Centre for Net Zero. CrowdFlex is funded by energy network users and consumers through the Strategic Innovation Fund, a programme from the UK's independent energy regulator Ofgem managed in partnership with Innovate UK.

To rigorously evaluate these effects, both used randomised controlled trials, randomly assigning participants to different incentive structures. Over 8,000 Ohme and 5,900 OVO customers participated at the trial's end, with data collected across 375 flexibility events.

It examined two incentive mechanisms for availability payments:

- **Escalating Payments**: Weekly payments increasing with more frequent plug-ins (£0 to £3 per week depending on plug-in frequency).
- **Flat Payments**: £8 per month regardless of plug-in frequency.

It explored three levels of inquiry:

1. **Primary**: Do different incentive structures increase weekly plug-in frequency?
2. **Secondary**: Do the treatments, via increased plug-in availability, translate to greater demand response during turn-up and turn-down events?
3. **Exploratory**: What effect do other factors have on response, such as behavioural nudges, time of day, battery size, tariff type?

Key findings from the trial were:

1. **Availability payments significantly increased plug-in frequency and duration**. Both incentive structures tested resulted in an increase in plug-in hours and weekly plug-in sessions across OVO and Ohme participants. Effect sizes were larger for OVO. Escalating Payments had a greater impact than Flat Payments on both metrics for OVO; the differences between treatment groups were not statistically significant for Ohme.
2. **Greater availability translated to demand flexibility in both turn-down and turn-up events**. For turn-down events, both structures achieved large reductions in consumption (~38% OVO; ~18% Ohme - Executive Summary Table 1). However, there was no meaningful difference between Flat and Escalating Payments for turn-down events. For turn-up events, both incentives increased consumption - with greater effect sizes than turn-down events, possibly due to the timing of these events (overnight) being more aligned with increased availability of customers' EVs. Escalating Payments yielded slightly better outcomes than Flat Payments for OVO participants (e.g., 0.908 vs. 0.878 kW during turn-up events).
3. **Escalating Payments delivered flexibility at a lower cost per kWh.** Escalating Payments were generally more cost-effective in terms of total flexibility delivered per £ spent by DSRSPs on remuneration.
4. **Non-financial behavioural nudges also showed promising results for cost-effective behaviour reinforcement.** Weekly email reminders boosted plug-in sessions and hours for both Flat and Escalating groups for OVO, although only saw positive effects in the Flat Payments group for Ohme, suggesting possible saturation under higher financial incentives.
5. **The treatments had consistent effects throughout the day**: both Escalating and Flat Payments increased plug-in and kW during turn-up events across all periods, with the strongest impacts in the late afternoon and evening. Turn-down effects were more variable but, other than during the evening peak, also consistent. The evening peak showed strong turn-up responses but weak turn-down, likely because customers were already avoiding charging during this period—limiting further reduction while making turn-up especially feasible.

The table below summarises the key results underpinning these findings. All effects are statistically significantly different from the control group.

Executive Summary Table 1: Key results

	OVO % difference vs. control (95% confidence interval)	Ohme % difference vs. control (95% confidence interval)
Primary analysis		
Plug-in sessions		
Escalating	20.95% (17.42%, 24.47%)	8.3% (5.72%, 10.88%)
Flat	15.96% (12.46%, 19.47%)	7.82% (5.29%, 10.34%)
Plug-in hours		
Escalating	25.58% (21.17%, 29.99%)	18.62% (14.14%, 23.09%)
Flat	21.43% (17.03%, 25.83%)	17.85% (13.41%, 22.29%)
Secondary analysis		
Turn-up (kWh per hour)		
Escalating	51.78% (47.26%, 56.29%)	17.35% (13.54%, 21.15%)
Flat	45.48% (41.06%, 49.89%)	15.7% (11.97%, 19.42%)
Turn-down (kWh per hour)		
Escalating	-38.68% (-42.14%, -35.22%)	-18.5% (-20.92%, -14.29%)
Flat	-38.2% (-41.66%, -34.75%)	-17.6% (-21.81%, -15.18%)

The trial demonstrated that availability payments - especially with escalating structures - increased EV plug-in frequency. Aggregators and grid operators may want to prioritise escalating incentives where cost-effectiveness is a priority, although certain levels of flat payments combined with non-financial behavioural nudges may achieve a similar response. These insights are relevant as the UK prepares to scale up participation in demand-side response to support the transition to clean power.

1. Introduction

1.1 Background and rationale

With increasing deployment of variable renewable generation, the need to optimise electricity grid management is becoming more important. Enhancing demand flexibility - enabling consumers to shift their electricity use in response to system needs - can play an important role in improving system efficiency, balancing supply and demand, alleviating capacity constraints, and supporting the integration of renewable generation.

Electric vehicle (EV) charging represents a key opportunity for demand flexibility due to its large additional electricity load and potential for temporal load-shifting during long periods that cars are plugged in. This includes contributing to explicit demand flexibility, whereby consumers - or aggregators on their behalf - adjust electricity use in response to requests from grid operators. Understanding the impact of different incentive structures to influence consumer charging behaviour is important for designing effective, scalable demand-side response (DSR) programmes that contribute to a smart, sustainable energy system.

Availability payments are a type of incentive designed to reward customers simply for being plugged in and thus available for dispatch by DSRSPs, regardless of whether any load-shifting occurs. The availability of the EVs allows Demand Side Response Service Providers (DSRSPs) to aggregate plugged-in devices and, when instructed by the grid operator, remotely adjust charging patterns in line with system balancing needs.

CrowdFlex's Winter 2024-2025 Availability Trial, undertaken by two DSRSPs — Ohme and OVO Energy — investigated how financial incentives influence customers' plug-in frequency and electricity demand during demand turn-up and turn-down events. The trial ran from October 2024 to March 2025. Conducted as a randomised controlled trial (RCT), this study provided rigorous evidence on the effect of different availability payment structures to enhance demand flexibility. The findings can inform policy and industry strategies for leveraging automation in energy flexibility markets, supporting the UK's broader decarbonisation objectives.

1.2 Research questions and hypotheses

This trial explored two incentive structures for availability payments:

- **Escalating Payments**, which increased in value with greater weekly plug-ins.

- **Flat Payments**, which offered a monthly payment to customers in a way that was framed as encouraging more frequent plug-ins, but was not tied to or influenced by any specific level of plugging in.

Comparing these two structures allowed us to test whether escalating incentives, which rely on behavioural reinforcement through growing rewards, were more effective at eliciting plug-in frequency and therefore flexibility through availability payments.

We also used events scheduled by NESO to test whether the greater availability actually led to greater flexibility delivery during events.

1.2.1 Primary research question:

Research question: How do the treatments (incentive structure) affect the frequency of plug-in sessions per week?

Hypotheses:

- Participants receiving flat payments plug in more frequently than those in the control group.

- Participants receiving escalating payments plug in more frequently than those in both the control and flat payment groups, due to the sharper incentive for greater plug-in.

The primary objective is to determine whether different incentive structures effectively encourage EV owners to plug in more often. A higher plug-in frequency enables greater flexibility, facilitating efficient energy consumption shifts in response to grid needs.

1.2.2 Secondary research questions

Research question: How do the treatments affect demand response in events (i.e., increasing electricity demand during turn-up event windows and decreasing it during turn-down event windows)?

Hypotheses:

- Groups with higher plug-in frequency will show greater demand reduction in turn-down events.

- Groups with higher plug-in frequency will show greater demand increase in turn-up events.

This question extends beyond plug-in frequency to assess actual electricity consumption shifts. By analysing response to turn-up and turn-down events, based on availability, we can evaluate the practical impact of incentives on demand flexibility. The results will provide insights into the scalability of such interventions for wider demand flexibility initiatives.

1.2.3 Exploratory research questions

Beyond the primary and secondary outcomes, we examined how these behaviours vary across event parameters. These factors, which differ between events but are not randomly assigned, include:

- **Impact of non-financial nudges:** Assessing whether behavioural prompts enhance plug-in frequency and responsiveness to flexibility events.

- **Electricity Forward Agreement** (EFA) block analysis: Understanding variations in plug-in behaviour across different EFA time blocks (four-hour periods used to divide the day in British electricity markets).

- **Event duration**: Investigating whether longer or shorter events influence responsiveness.

- **Effect of day type** (weekend vs. weekday) — Comparing responsiveness on weekdays versus weekends to understand behavioural differences.

- **Effect of estimated annual consumption** (EAC) — Investigating whether households with higher or lower estimated annual consumption respond differently to the treatments.

- **Treatment effects by month** — Evaluating whether the effectiveness of incentives changes over time, due to participant fatigue and/or other time-related factors.

- **Effect of battery size** (Ohme only) — Examining whether EV battery capacity influences charging patterns and responsiveness to incentives.

- **Effect on total weekly consumption** — Analysing whether the treatments caused higher weekly consumption from customers' home chargers, either due to demand creation or substitution from other charging sources (such as offices or public charging networks).

By integrating these insights with the experimental results, we aimed to provide empirical evidence to support the design of demand flexibility strategies that maximise grid benefits while assessing consumer engagement.

2. Methodology

2.1 Trial design, eligibility, and interventions

We employed a parallel-group RCT design to evaluate the effects of financial and behavioural interventions on EV charging behaviours. Participants were identified by the two DSRSPs and invited to opt in to the trial. Only those who opted in were eligible to participate, with eligibility criteria ensuring that they had the necessary charging equipment. The trial consisted of five distinct arms, as outlined in Table 1, which details the trial interventions and payment structures.

Table 1: Trial interventions and payment structure

Trial Arm	Description
Control group	No communication or financial incentives.
Escalating payment	Payments scaled based on the frequency of plug-in sessions:
	- 0-2 plug-in sessions per week: £0/week
	- 3 plug-in sessions per week: £1/week
	- 4 plug-in sessions per week: £2/week
	- 5 or more plug-in sessions per week: £3/week
	A minimum of 3 plug-in sessions per week was required to qualify for a reward. A qualifying session was defined as being plugged in for at least 3 hours during a day (from 12 pm to 12 pm the following day).
Escalating payment + weekly nudge	Escalating payments combined with weekly communications encouraging frequent plug-in sessions.
Flat payment	£8/month payment provided regardless of plug-in behaviour.
Flat payment + weekly nudge	£8/month payment combined with weekly emails encouraging participants to plug in more frequently.

Eligibility criteria varied slightly between the two trials:

- **Ohme trial:** Participants were required to be EV owners with compatible charging infrastructure.
- **OVO trial:** Participants were recruited from customers who had the Charge Anytime add-on. An add-on is an optional service that customers can choose to include as part of their energy plan. The Charge Anytime add-on enables smart EV charging by allowing OVO to optimise when the vehicle charges.

In the context of both trials, nudges refer to weekly reminders sent to participants, encouraging them to plug in their vehicles. Payments were disbursed monthly. Nudges (where applicable) were delivered weekly via email. A qualifying plug-in was defined as being plugged in for at least 3 hours during a day (from 12 pm to 12 pm the following day).

2.2 Randomisation and group allocation

Eligible participants were randomly assigned to different treatment and control groups within each trial:

- **Ohme trial:** Customers were randomly allocated to one of four treatment groups (rows 2 - 5 from Table 1). A matched control group was created separately based on the characteristics of recruited customers to ensure comparability. Section 2.8 provides more detail on Ohme's matched control group.

- **OVO trial:** Customers who signed up to the trial were randomly allocated to treatment or control groups using a fully randomised process.[1] OVO compared the behaviour (plug-ins and consumption) of their matched and randomised control groups in the period after the randomised control group had stopped being dispatched and found the groups' behaviour was similar.

Randomisation was conducted at the individual level to ensure an even distribution of participants across the trial arms. Charging behaviour and electricity consumption characteristics were monitored to confirm balance between groups, ensuring that key variables related to EV usage were evenly distributed amongst the trial arms. The use of a control group in the trial ensured that all comparative analyses were robust and reflective of actual behavioural differences induced by the interventions. This approach strengthens the validity of the trial results and ensures meaningful insights into the effectiveness of financial incentives and behavioural nudges on EV charging behaviour.

2.3 Sample size

Power calculations ensured that the trial as designed enabled analysts to reliably detect meaningful changes in consumer behaviour. By determining the minimum detectable effect size (MDES), we confirmed that the sample sizes and analysis approaches were robust to capture even moderate shifts in behaviour. This precision was important for evaluating the impact of interventions, allowing us to reliably measure the effectiveness of interventions in influencing electricity consumption.

In our winter trials design summary[2], we calculated the minimum detectable effect size (MDES) we could reliably detect — we found that MDES was 5-7% for our primary analysis (plug-in) and 9-11% for our secondary outcome (kWh from the EV charger) (Table 2).

Table 2: Power calculation results from our pre-analysis plan

Scenario	Charger-only half-hourly consumption data	# Plug ins per week
2000 per cohort	10.90%	6.62%
2000 control, 4000 treatment	9.45%	5.73%

The sample size of both Ohme and OVO are detailed below and includes the change in customer numbers from the start to the end of the trial (Table 3).

Table 3: DSRSP sample size

Group	Ohme		OVO	
	At trial start 20/09/2024	At trial end 30/04/2025	At trial start 20/09/2024	At trial end 30/04/2025
Control	2,500	2,239	1490	1203
Escalating	4,927	4,217	2972	2354
Flat	4,918	4,186	2988	2411
Total	9,845	8,403	7450	5968

2.4 Event parameters and variability

The availability trial events were structured across different Electricity Forward Agreement (EFA) blocks to assess the impact of demand turn-up, turn-down, and anti-symmetric events at various times of the day.[3] The trial was designed to capture variability in charging behaviour based on underlying grid conditions, vehicle plug-in rates, and potential system constraints.

Across all time periods, a total of 215 turn-down events, 142 turn-up events, and 18 anti events were recorded, resulting in a total of 375 events (Table 4). Across 409.5 hours of recorded events, turn-up events accounted for 231.5 hours, turn-down events for 148 hours, and anti-symmetric events for 30 hours. A full schedule of the events is provided in the Appendix (Table 48).

2.4.1 EFA block prioritisation and event distribution

Turn-up events: Turn-up events were most frequent during EFA block 1 (23:00 - 03:00), EFA block 2 (03:00 - 07:00), and EFA block 6 (19:00 - 23:00) — each had approximately events. This temporal distribution reflects an effort to strategically align turn-up events deployment with typical overnight and early morning grid conditions. (Table 4).

Turn-down events: The highest number of turn-down events occurred during EFA block 5 (15:00 - 19:00) with 49 instances, followed by EFA block 6 (19:00 - 23:00) with 47. This concentration strategically leveraged these afternoon and evening periods to effectively capture the impact of these events during the grid's peak demand.

Anti-symmetric events: Scheduled selectively across different EFAs, particularly in EFA 1 (6 events) and EFA 4 (6 events), to assess consumer behaviour without incentives.

Table 4: The distribution of availability trial events by time of day and direction.

From	To	EFA	Turn-down	Turn-up	Anti
23:00	03:00	1	37	30	6
03:00	07:00	2	21	30	6
07:00	11:00	3	25	11	0
11:00	15:00	4	36	27	6
15:00	19:00	5	49	13	0

From	To	EFA	Turn-down	Turn-up	Anti
19:00	23:00	6	**47**	**31**	**0**
Total			**215**	**142**	**18**

2.5 Outcome measures and data collection

Data were collected through telemetry systems integrated with EV chargers, providing the necessary data regarding plug-in frequency and electricity consumption.

- **Primary outcomes:** Plug-in frequency was measured in two ways: "qualifying" plug-in sessions per week (qualifying sessions were defined as being plugged in for at least 3 hours during a day, from 12 pm to 12 pm the following day) and hours plugged in per week.

- **Secondary outcome:** The secondary measure focused on energy consumption (half-hourly kWh, converted to kW for ease of interpretation), used to evaluate the extent to which higher plug-in frequencies resulted in increased flexibility capacity for demand turn-up and turn-down events. Note that both OVO and Ohme used consumption data from the charger itself, not from customers' smart meters.

Data collection was continuous throughout the trial period, capturing variations across different EFA blocks and trial arms.

2.6 Statistical methods

To assess the impact of the interventions on plug-in frequency and electricity consumption, regression models were employed. The analyses are organised into primary, secondary, and exploratory components. In the OVO trial, regressions control for customer GSP Group (region), projected annual consumption (extrapolated where necessary), and settlement period (half-hour) fixed effects. In the Ohme trial, regressions include only half-hour fixed effects. Both DSRSPs also ran unadjusted regressions without covariate controls as a sensitivity check. For both trials, standard errors are clustered at the customer or account level to account for within-unit correlation over time.

2.6.1 Primary and secondary analysis

The primary analysis focused on estimating the overall treatment effects of the interventions by comparing:

- **Treatment vs. Control**: Measuring the impact of different interventions on plug-in sessions and hours per week (primary outcome measure) and kWh/half-hour demand during events (secondary outcome measure, converted to kW for ease of interpretation), during the trial period.

- **Treatment vs. Treatment**: Comparing treatment groups to each other to determine whether varying incentive structures led to statistically significant differences in the outcome measures.

Linear regression models were applied to estimate the intervention effects, summarised using the following statistical measures:

- **Coefficient:** Measuring the magnitude of the intervention effect relative to the control group or other treatment groups.

- **Standard Error:** Indicating the precision of the estimated effect.

- **P-value:** Assessing statistical significance to determine whether observed differences are likely due to chance. We use the following notation to mark p-values: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$. We use *** $p < 0.05$** as the conventional threshold of statistical significance, while still noting results of + $p < 0.10$ as being "marginally" statistically significant.

2.6.2 Exploratory analysis

Analysis of the impact of nudges on primary outcome measures was analysed as a separate exploratory analysis. For the primary analysis, participants who received nudges were pooled with their respective non-nudge financial incentive groups (flat or escalating payments). This approach ensured that the primary analysis focused on evaluating the impact of financial incentives, while still allowing for an exploratory assessment of whether nudges provided any additional behavioural effect. This choice was made as nudges were designed as a supporting intervention, rather than a standalone treatment.

Further exploratory analyses were conducted to gain additional insights into the factors influencing electricity consumption beyond the structured comparisons of the primary and secondary analyses. Unlike the primary and secondary analyses, the exploratory analyses are not based on randomisation and should be interpreted as indicative rather than causal. The findings are intended to uncover patterns and relationships that may inform future research rather than provide definitive conclusions about causal effects.[4]

2.6.3 Sensitivity analysis

Additional robustness checks were performed to ensure the stability of results across different model specifications and subgroups. This included testing alternative regression specifications (in particular, regressions with no covariate controls). As noted above, OVO also compared the behaviour (plug-ins and consumption) of their matched and randomised control groups in the period after the randomised control group had stopped being dispatched and found the groups' behaviour was similar.

2.7 OVO balance checks

Balance checks were conducted for the OVO trial to ensure baseline comparability across the three pooled trial arms (control, flat payment, and escalating payment). These checks aimed to validate the randomisation process and confirm that pre-existing differences in electricity consumption or group composition would not confound the trial's results.

The following baseline variables were tested:

- **Estimated Annual Consumption (EAC):** Mean, standard deviation, minimum, and maximum of customers' estimated annual electricity consumption.
- **Economy 7 (E7) tariff:** Whether a customer was on an E7 tariff.
- **Tenure:** The length of time a customer had been on supply with OVO.

Pairwise t-tests and Chi-squared tests were used to compare these variables between groups, with a p-value threshold of 0.05 used to determine statistical significance. The pooled three trial arms did not show statistically significant differences on these variables, suggesting good balance (see results in the Appendix.)

2.8 Ohme matched control group selection

For the Ohme trial, the matched control group was created to ensure comparability with the treatment group. The selection process followed a structured approach to ensure that the control group closely mirrored the characteristics of the treatment group.

Before constructing the matched control group, Ohme assessed the distribution of key characteristics across the treatment groups. Ohme checked balance on tariff type, battery size, app smart features usage, route to market, and energy consumption patterns; they reported that differences across groups were minimal (all lower than <10%).

To select the control group, Ohme then used:

1. **K-nearest neighbours (KNN) matching:** Ohme trained a KNN classifier using aggregate half-hourly consumption data from the past 30 days for the treatment group. This model was applied to all eligible but uncontacted customers, identifying the 10,000 customers most similar to the treatment group based on historical energy consumption patterns.

2. **Random sampling using Bernoulli sampling algorithm:** From the 10,000 closest-matching to ensure a balanced and representative control group.

3. **Final balance check:** To validate the selection process, Ohme compared half-hourly consumption patterns over the past few months across treatment and control groups. The percentage spreads remained minimal, confirming that the matched control group was sufficiently comparable to the treatment group.

This approach ensured that the control group maintained similar consumption characteristics to the treatment group, allowing for credible comparisons of intervention effects.

3. Results

3.1 Primary analysis: Plug-in behaviour

The primary analysis assessed the impact of the two incentive structures on plug-in behaviour, focusing on the number of qualifying plug-in sessions[5] and the total number of plugged-in hours per week.

By comparing each treatment arm to the control group, this section evaluated whether financial incentives encouraged participants to plug in more often and for longer durations. Additionally, a direct comparison between the two treatment groups examined whether escalating payments were more effective than flat payments in influencing plug-in behaviour.

3.1.1 OVO primary analysis: Plug-in behaviour

3.1.1.1 Impact of incentive structures on weekly plug-in sessions

Tables 5 and 6 explore the impact of different incentive structures on the average weekly plug-in sessions for OVO customers. Table 5 compares both the Escalating Payments and Flat Payments groups to a control group, while Table 6 directly compares the Escalating Payments group to the Flat Payments group.

According to Table 5, the control group averaged 3.02 weekly plug-in sessions. Both incentive structures led to statistically significant increases in plug-in frequency when compared to the control ($p < 0.001$). The Escalating Payments group showed a 20.95% increase with an average of 3.66 weekly plug-in sessions, and the Flat Payments group exhibited a 15.96% increase with an average of 3.51 weekly plug-in sessions (Figure 1; Figure 2).

Table 6 provides a direct comparison between the two incentive structures. It details a statistically significant difference ($p = 0.002$) in their effectiveness. The Escalating Payments incentive resulted in a 4.29% higher average of weekly plug-in sessions (3.66) compared to the Flat Payments incentive (3.51). This indicates that while both incentive structures significantly increased plug-in behaviour compared to the control, the Escalating Payments structure had a significantly greater impact than the Flat Payments structure. Importantly, this effect is unlikely to be driven by differences in the size of the reward; in fact, the Escalating group received lower average remuneration than the Flat group, yet their behaviour was more responsive, suggesting that the incentive structure, rather than the total payment, played a key role in motivating engagement.

Table 5: Effect of incentive structures on weekly plug-in sessions - OVO

Trial Arm	Avg. weekly plug-in sessions	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	3.020				
Escalating	3.660	0.633	0.054	<0.001***	20.95%
Flat	3.510	0.482	0.054	<0.001***	15.96%

Figure 1: Average weekly plug-in sessions by treatment arm - OVO

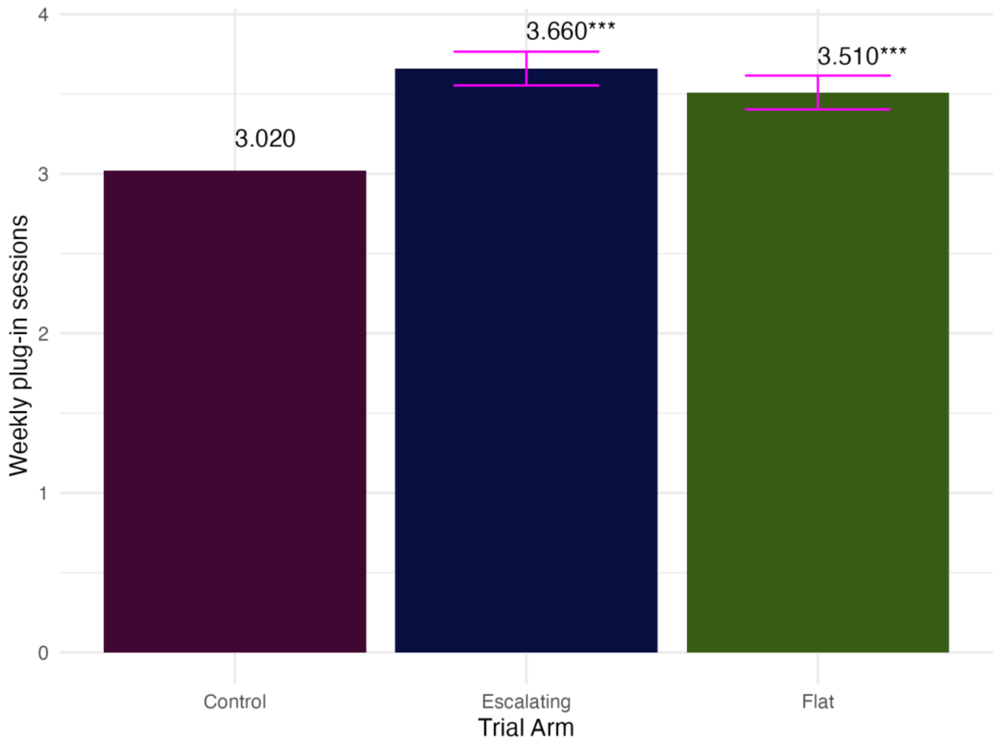


Figure 2: Treatment effects on weekly plug-in sessions (vs. Control) - OVO

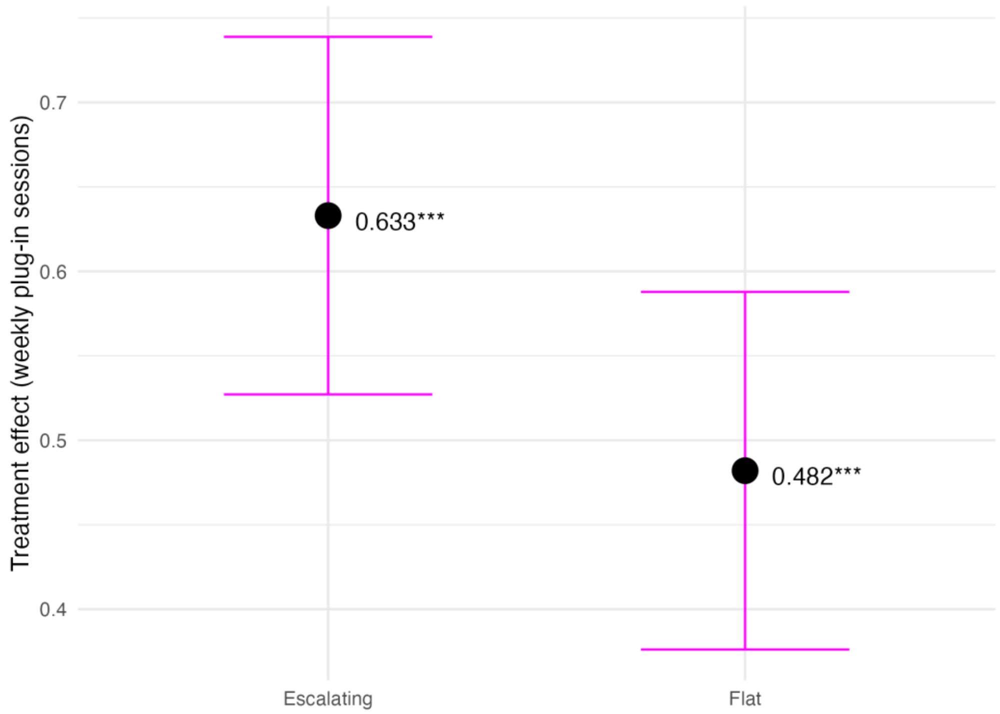


Table 6: Treatment vs. treatment comparison for plug-in sessions - OVO

Trial Arm	Avg. weekly plug-in sessions	Coefficient	Standard Error	P-value	% difference (Escalating coefficient vs. Flat)
Flat	3.510				
Escalating	3.660	0.150	0.048	0.002**	4.29%

3.1.1.2 Impact of incentive structures on weekly plug-in hours

Table 7 presents a comparison of the average weekly plug-in hours across the control group, the Escalating Payments group, and the Flat Payments group. The control group recorded an average of 46.4 plug-in hours per week.

Compared to the control group, both incentive structures resulted in statistically significant increases in average weekly plug-in hours ($p < 0.001$). The Escalating Payments group averaged 58.4 weekly plug-in hours, a 25.88% increase over the control. The Flat Payments group showed a 21.43% increase with an average of 56.50 weekly plug-in hours (Figure 3; Figure 4). The coefficients for both treatment arms were statistically significant, indicating a positive impact of these incentive structures on plug-in duration.

There was a statistically significant increase ($p = 0.041$) in average weekly plug-in hours in the Escalating Payments group (58.4 hours) compared to the Flat Payments group (56.5 hours), representing a 3.40% difference (Table 8).

Both incentive structures led to an increase in average weekly plug-in hours compared to the control group. Furthermore, the Escalating Payments structure resulted in a statistically significant longer average plug-in duration than the Flat Payments structure.

Table 7: Effect of incentive structures on weekly plug-in hours - OVO

Trial Arm	Avg. weekly plug-in hours	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	46.400				
Escalating	58.400	11.867	1.044	<0.001***	25.58%
Flat	56.500	9.943	1.042	<0.001***	21.43%

Figure 3: Average weekly plug-in hours by treatment arm - OVO

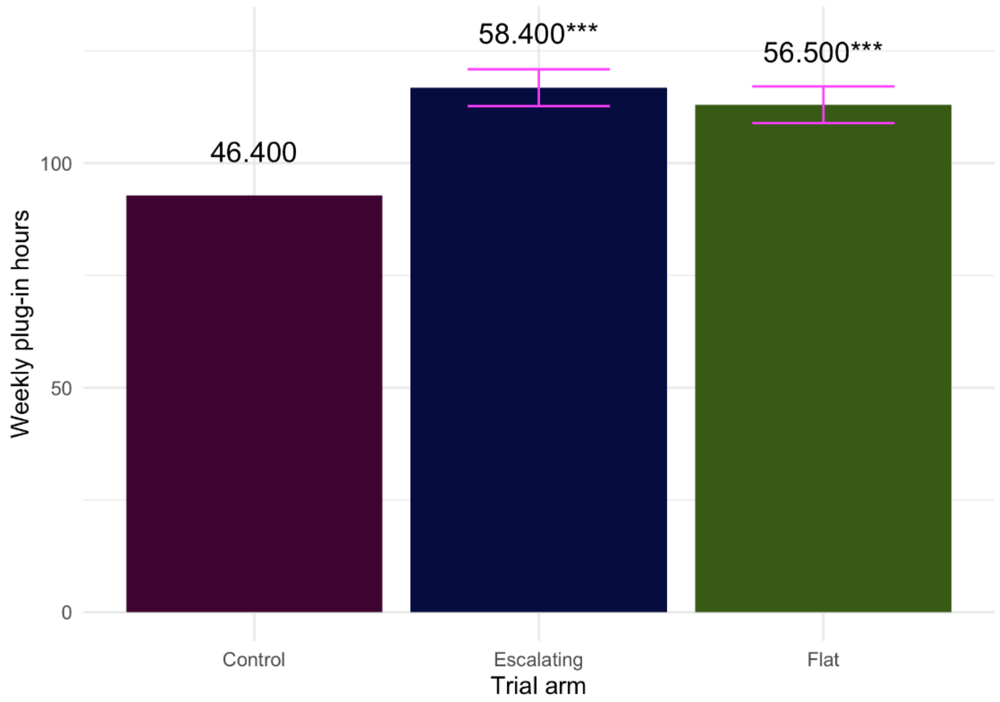


Figure 4: Treatment effects on weekly plug-in hours (vs. Control) - OVO

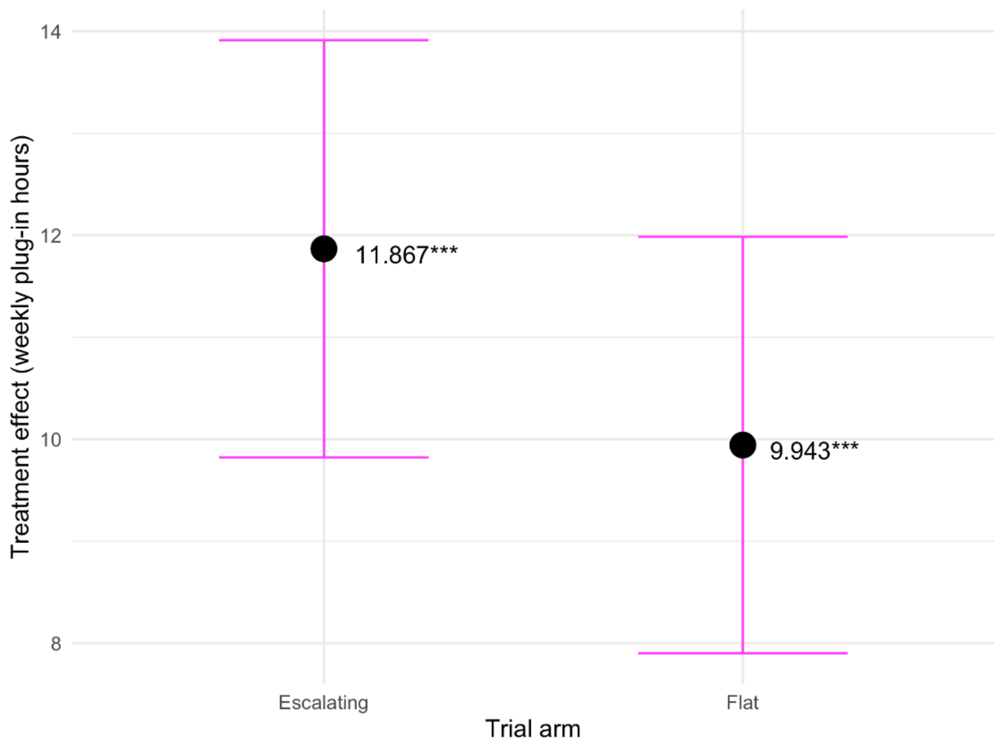


Table 8: Treatment vs. treatment comparison for plug-in hours - OVO

Trial Arm	Avg. weekly plug-in hours	Coefficient (vs. Flat)	Standard Error	P-value	% difference (Escalating coefficient vs. Flat)
Flat	56.500				
Escalating	58.400	1.922	0.939	0.041*	3.40%

3.1.2 Ohme primary analysis: Plug-in behaviour

3.1.2.1 Impact of incentive structures on weekly plug-in sessions

Table 9 shows how different incentives affected the average number of weekly plug-in sessions for Ohme customers. The control group plugged in an average of 3.49 days per week.

Compared to the control group, both the Escalating and Flat Payments trial arms showed statistically significant increases in average weekly plug-in sessions. The Escalating Payments arm resulted in an average of 3.78 weekly plug-in sessions ($p < 0.001$), representing an 8.30% difference compared to the control. Similarly, the Flat Payments arm showed an average of 3.77 weekly plug-in sessions ($p < 0.001$), a 7.82% difference from the control group (Table 9; Figure 5).

The coefficients for both treatment arms were statistically significant, indicating a positive impact of these incentive structures on plug-in behaviour for Ohme customers (Figure 6).

Table 10 provides a direct comparison between the Escalating and Flat Payment groups in terms of average weekly plug-in sessions. There was no statistically significant difference in the average number of weekly plug-in days between the Flat and Escalating payment groups. The Escalating arm showed a small increase (+0.02 sessions, or 0.45%), but this was not significant ($p = 0.663$), suggesting that both payment structures resulted in similar plug-in behaviour.

In summary, both incentive structures significantly increased the average weekly plug-in sessions compared to the control group. However, there was no statistically significant difference between the Escalating and Flat Payments structures.

Table 9: Effect of incentive structures on weekly plug-in sessions - Ohme

Trial Arm	Avg. weekly plug-in days	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	3.492				
Escalating	3.782	0.290	0.046	<0.001***	8.30%
Flat	3.765	0.273	0.045	<0.001***	7.82%

Figure 5: Average weekly plug-in sessions by treatment arm – Ohme

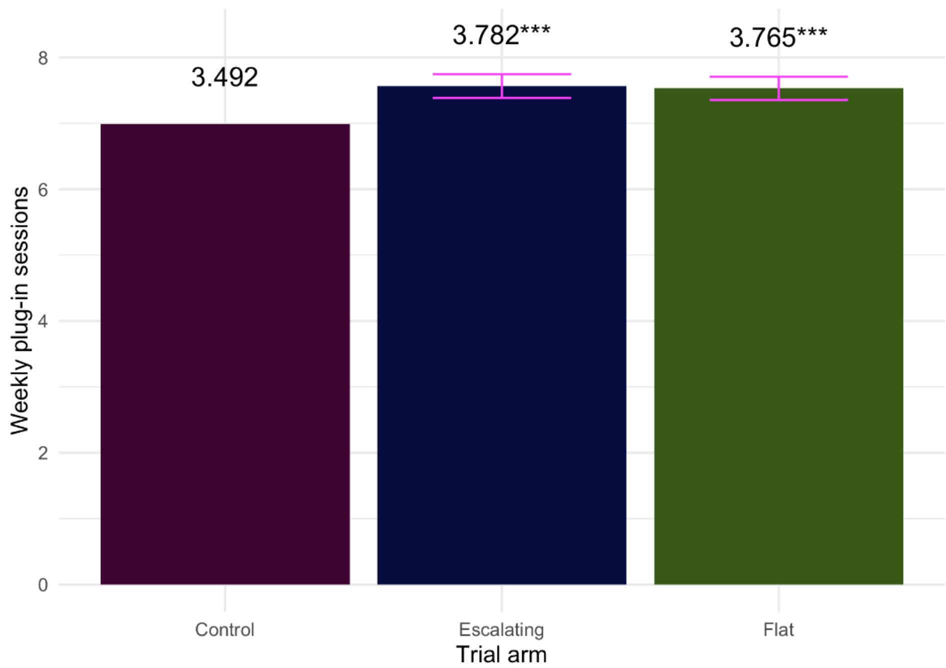


Figure 6: Treatment effects on weekly plug-in sessions (vs. Control) - Ohme

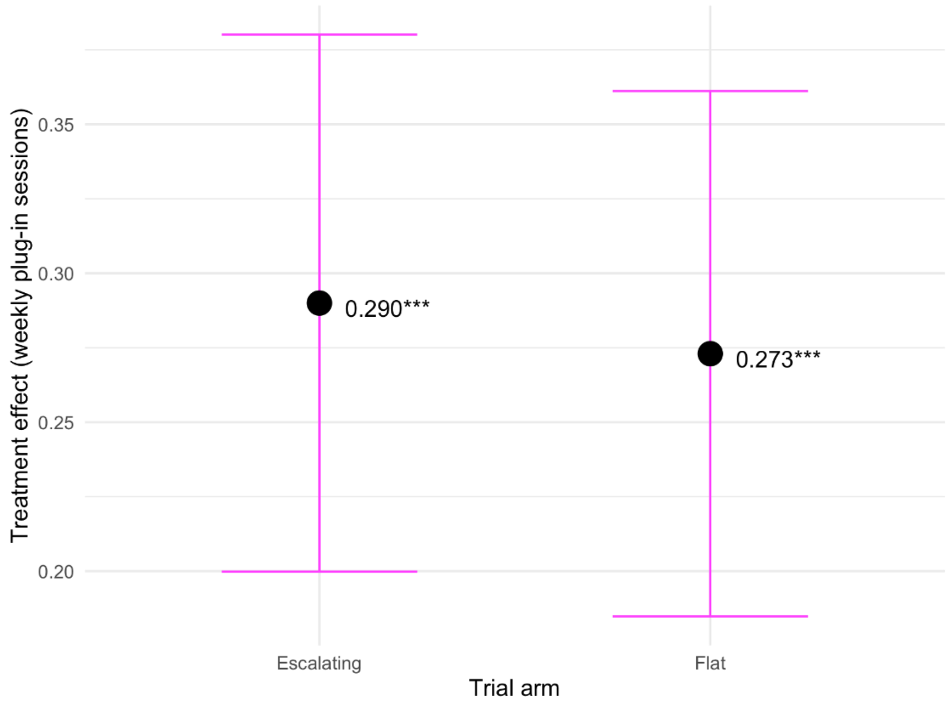


Table 10: Treatment vs. treatment comparison for plug-in sessions - Ohme

Trial Arm	Avg. weekly plug-in days	Coefficient	Standard error	P-value	% difference (coefficient vs. flat)
Flat Payments	3.782				
Escalating	3.765	0.017	0.039	0.663	0.45%

3.1.2.2 Impact of incentive structures on weekly plug-in hours

Table 11 details the impact of different incentive structures on the average weekly plug-in hours for Ohme customers. The control group had an average of 30.32 weekly plug-in hours.

Compared to the control group, both the Escalating and Flat Payments trial arms showed statistically significant increases in average weekly plug-in hours. The Escalating Payments arm resulted in an average of 35.96 weekly plug-in hours ($p < 0.001$), representing a 18.62% difference compared to the control. Similarly, the Flat

Payments arm showed an average of 35.73 weekly plug-in hours ($p < 0.001$), a 17.85% difference from the control group (Table 11; Figure 7). The coefficients for both treatment arms were statistically significant, indicating a positive impact of these incentive structures on plug-in duration for Ohme customers (Figure 8).

The Escalating Payments group had slightly higher plug-in hours than the Flat Payments group, but the observed 0.65% difference was not statistically significant ($p = 0.716$) (Table 12).

In summary, for Ohme customers, both incentive structures significantly increased the average weekly plug-in hours compared to the control group. However, there was no statistically significant difference observed between the Escalating Payments and Flat Payments structures in their effect on weekly plug-in hours.

Table 11: Effect of incentive structures on weekly plug-in hours - Ohme

Trial Arm	Avg. weekly plug-in hours	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	30.318				
Escalating	35.963	5.645	0.692	<0.001***	18.62%
Flat	35.730	5.412	0.687	<0.001***	17.85%

Figure 7: Average weekly plug-in sessions by treatment arm - Ohme

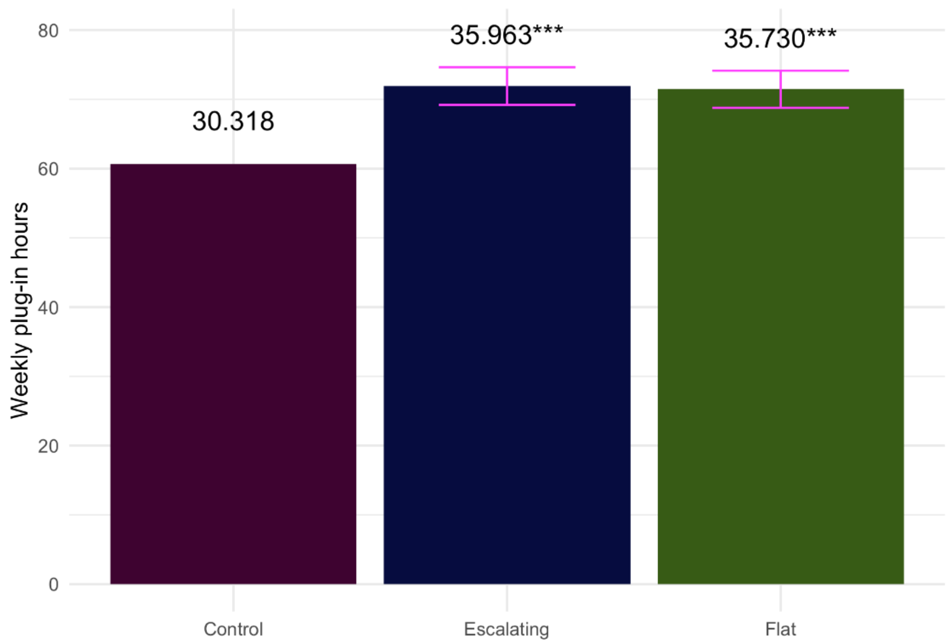


Figure 8: Treatment effects on weekly plug-in hours (vs. Control) - Ohme

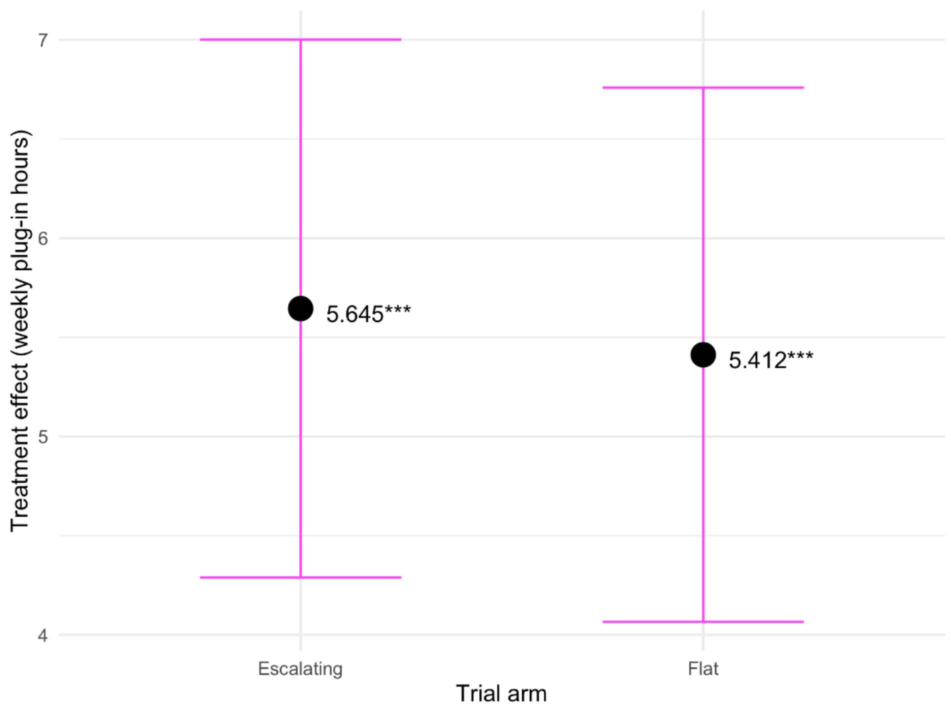


Table 12: Treatment vs. treatment comparison for plug-in hours - Ohme

Trial Arm	Avg. weekly plug-in hours	Regression coefficient (vs. Flat)	Standard error	P-value	% difference (coefficient vs. flat)
Flat Payments	35.730				
Escalating	35.963	0.233	0.641	0.716	0.65%

3.2 Secondary analysis: kW demand during events

The secondary analysis examines the impact of the treatments on turn-up and turn-down energy consumption, assessing the extent to which increased plug-in behaviour translated into shifts in energy usage during events called by the grid operator (in this case, NESO). This section evaluates both treatment arms relative to the control group and explores whether differences emerge between the two incentive structures. We do this separately for "turn-down" and "turn-up" events.[6]

Note that the treatments affect demand during events via two mechanisms. First, the DSRSPs did not dispatch the control group during events, but did dispatch the treatment groups. Second, the treatment groups were theoretically more likely to have their EVs plugged in and thus available for dispatch than the control group. In comparing the treatment groups to each other, only the second mechanism — greater availability — is a relevant behavioural question.

3.2.1 OVO secondary analysis: kW during events

3.2.1.1 Turn-up

Table 13 presents a comparison of the average kWh/half-hour (converted to kW for ease of interpretation) during turn-up events across the control group, the Flat Payments group, and the Escalating Payments group.

The control group consumed an average of 0.59 kW during turn-up events.

Compared to the control group, both incentive structures led to statistically significant increases in average consumption per hour ($p < 0.001$). The Escalating Payments group showed a 51.78% increase with an average of 0.91 kW, and the Flat Payments group exhibited a 45.48% increase with an average of 0.88 kW (Figure 9; Figure 10). The coefficients for both treatment arms were statistically significant, indicating a positive impact of these incentive structures on electricity demand during turn-up events when compared to the control group.

During turn-up events, the Escalating Payments group's 0.91 kW was statistically significantly higher (p = 0.020) than the Flat Payments group's 0.88 kW. This represents a 4.22% increase in the coefficient for the Escalating Payments group compared to the Flat Payments group (Table 14).

In summary, both incentive structures significantly increased electricity demand during turn-up events compared to the control group. However, when directly comparing the two incentive structures, the Escalating Payments group exhibited a statistically significantly higher average turn-up consumption per hour than the Flat Payments group.

Table 13: Effect of incentive structures on demand during turn-up events - OVO

Trial Arm	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	0.588				
Escalating	0.908	0.304	0.014	<0.001***	51.78%
Flat	0.878	0.267	0.013	<0.001***	45.48%

Figure 9: Average demand during turn-up events by trial arm – OVO

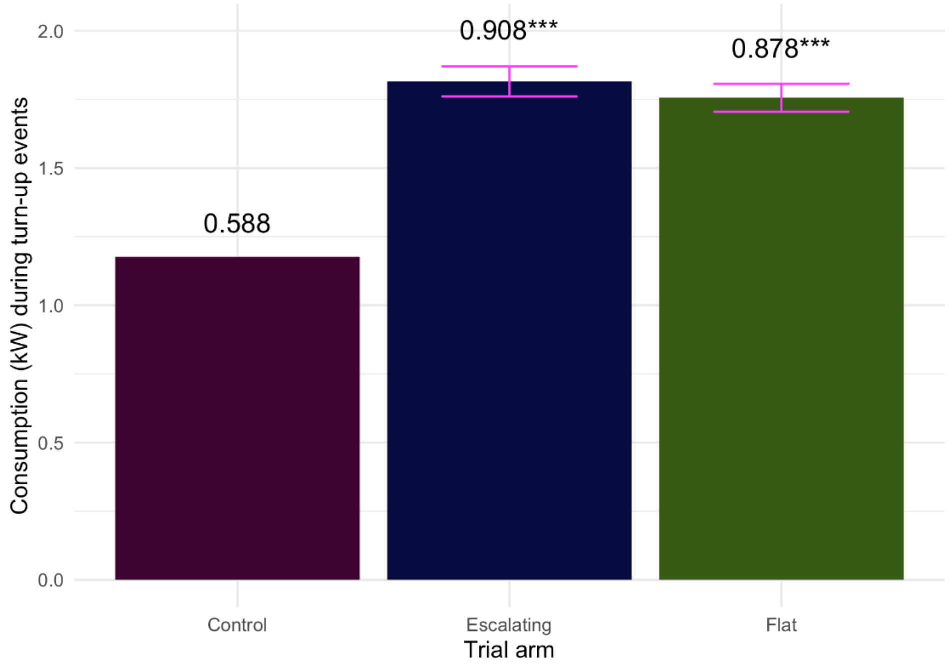


Figure 10: Treatment effects on demand during turn-up events (vs. Control) - OVO

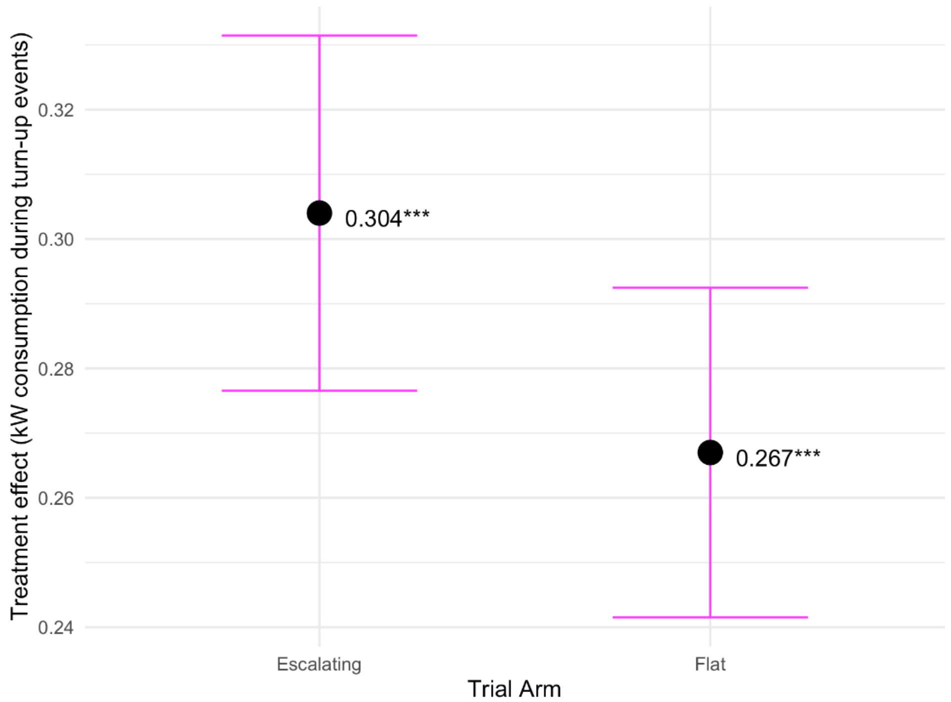


Table 14: Treatment vs. treatment comparison for turn-up consumption - OVO

Trial Arm	Avg. kW	Coefficient (vs. Flat)	Standard Error	P-value	% difference (Escalating coefficient vs. Flat)
Flat	0.878				
Escalating	0.908	0.037	0.016	0.020*	4.22%

3.2.1.2 Turn-down

Table 15 presents the effect of treatments on the average kW during turn-down events. The control group recorded an average of 0.34 kW; the lower demand during turn-down events suggests that, in OVO's sample, customers were already using less electricity at those times compared to the periods when turn-up events were held. Both the Flat and Escalating Payments groups exhibited statistically significant decreases in average consumption per hour compared to the control group ($p < 0.001$). The Flat Payments group averaged 0.20 kW, a 38.68% decrease, and the Escalating Payments group averaged 0.20 kW, a 38.20% decrease (Figure 11, Figure 12). The negative and significant coefficients for both treatment arms indicate a substantial reduction in turn-down consumption associated with these incentive structures.

Table 16 directly compares the Escalating Payments group to the Flat Payments group for turn-down consumption. The Flat Payments group averaged 0.20 kW, while the Escalating Payments group averaged 0.20 kW. The difference between the coefficients is not statistically significant ($p = 0.980$), with a very small percentage difference of 0.03%. This suggests that there is no discernible difference in the effect on turn-down consumption between the Escalating and Flat Payments incentive structures.

Table 15: Effect of incentive structures on demand during turn-down events - OVO

Trial Arm	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	0.340				
Escalating	0.202	-0.132	0.006	<0.001***	-38.68%

Trial Arm	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Flat	0.204	-0.130	0.006	<0.001***	-38.20%

Figure 11: Average demand during turn-down events by trial arm – OVO

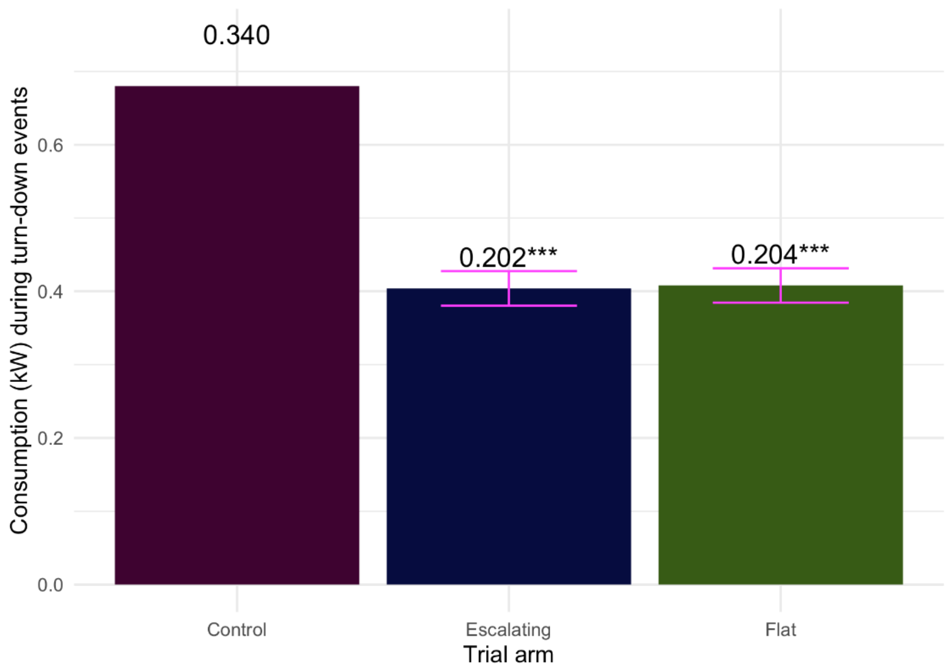


Figure 12: Treatment effects on demand during turn-down events (vs. Control) - OVO

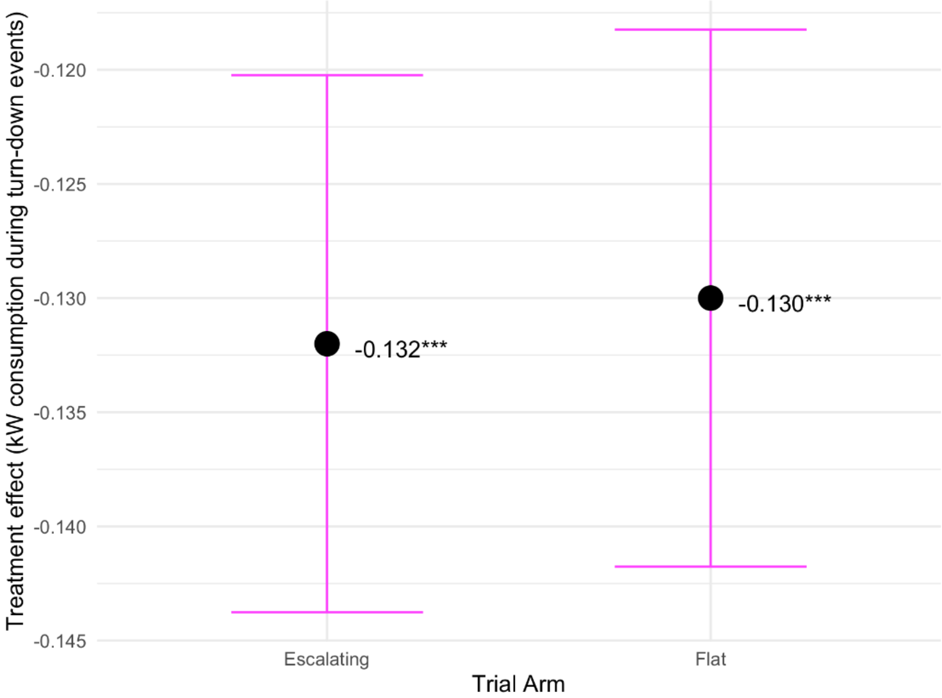


Table 16: Treatment vs. treatment comparison for turn-down consumption - OVO

Trial Arm	Avg. kW	Coefficient (vs. Flat)	Standard Error	P-value	% difference (Escalating coefficient vs. Flat)
Flat	0.202				
Escalating	0.204	0.000	0.003	0.980	0.03%

3.2.1.3 Summary of turn-up vs. turn-down consumption effects — OVO

Availability payments translated to expected changes in electricity consumption in response to turn-up and turn-down events. During turn-up events (as shown in Tables 13 and 14), both the Flat and Escalating Payments incentives led to a statistically significant increase in average kW compared to the control group. Escalating Payments resulted in a significantly higher consumption than Flat Payments during turn-up events. During turn-down events (as shown in Tables 15 and 16), both incentive structures caused a statistically significant decrease in average kW compared to the control group. However, unlike turn-up events, there was no statistically significant difference between the Flat and Escalating Payments in their effect on consumption.

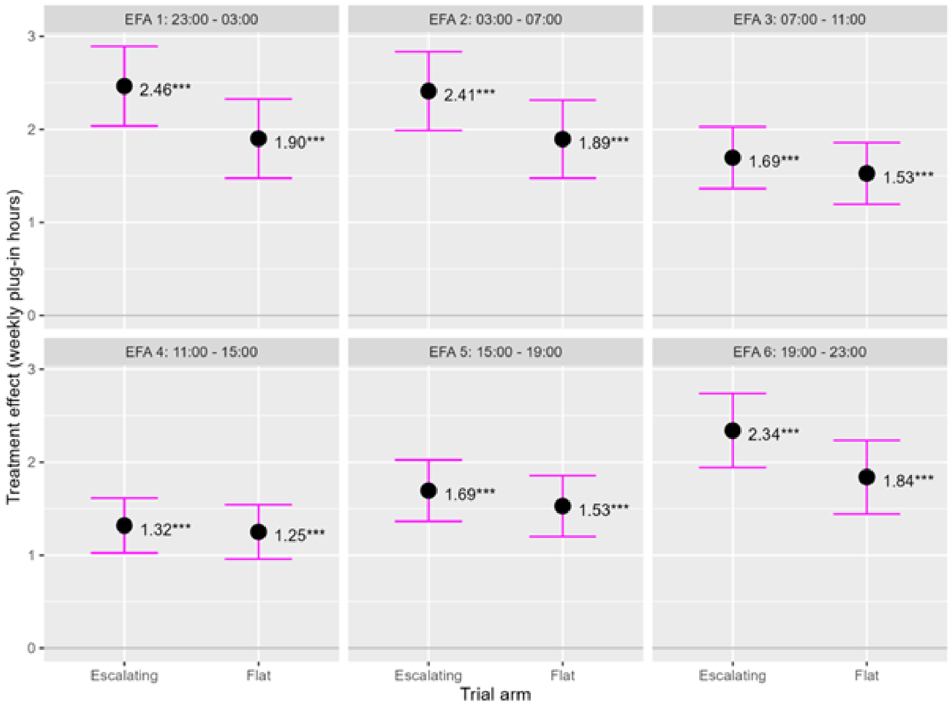
It is also worth noting that we saw more than double the flexibility (in kW magnitude) during turn-up events, compared to turn-down events. There are a few potential reasons for this.

First, the turn-down effect may appear smaller simply because there is a natural floor on electricity consumption; charge rate and thus demand cannot be reduced below zero. This creates a flooring effect that limits the potential for observed reductions during turn-down events. In contrast, the upper constraint (the charger's charging speed and battery size) may be less binding in practice, making the impact of increased plug-in behaviour more fully reflected in turn-up consumption.

Second, interpretation is further complicated by optimisation logic and operational rules applied by the DSRSPs, which are not detailed in this document. For instance, if a rule causes vehicles to charge at a third of their maximum rate when the battery is not full, then the scope for increased consumption during turn-up events could be roughly twice as large as the scope for reduction during turn-down events, even if underlying behaviour is symmetric. It may be more feasible to defer charging to an event time (for turn-up) many hours in advance, but harder to bring forward charging in advance of the turn-down event to enable turn-down during that event.

Third, while the incentive structure itself does not directly influence how much electricity is shifted during events, it may affect when customers plug in their EV, which in turn shapes its availability to be turned up or down by DSRSPs. In this trial, many turn-up events occurred overnight. If availability payments encouraged participants to plug in more consistently during these hours — and especially if this was true of customers receiving Escalating Payments — this could lead to higher observed responsiveness simply because more vehicles happened to be available when events were called. Indeed, we see suggestive evidence that plug-in impacts of the Escalating Payments were greater in overnight hours than Flat Payments, as seen in Figure 13 (for further discussion of effects by time of day, see Section 4.4.1).

Figure 13: Treatment effects on weekly plug-in hours, by time of day - OVO



3.2.2 Ohme secondary analysis: kW during events

3.2.2.1 Turn-up

Table 17 details the impact of the treatments on the average kW during turn-up events for Ohme customers. The control group consumed an average of 0.48 kW.

Compared to the control group, both the Escalating and Flat Payments trial arms showed statistically significant increases in average consumption per hour. The Escalating Payments arm resulted in an average of 0.57 kW ($p < 0.001$), representing a 17.35% difference compared to the control (Table 17; Figure 14). Similarly, the Flat Payments arm showed an average of 0.56 kW ($p < 0.001$), a 15.70% difference from the control group. The coefficients for both treatment arms were statistically significant, indicating a positive impact of these incentive structures on electricity demand during turn-up events for Ohme customers.

There was no statistically significant difference in average kW between the Escalating and Flat payment groups. The Escalating Payment group saw a slight increase (1.39%), but this was not statistically significant ($p = 0.433$), suggesting that both incentive structures resulted in similar effects on consumption (Table 18).

In summary, for Ohme customers, both incentive structures significantly increased the average electricity consumption per hour during turn-up events compared to the control group.

It is not clear why Ohme's average flexibility delivered is lower than OVO's (for both turn-up, discussed here, and turn-down, discussed next). There are many potential reasons, including OVO customers' greater plug-in hours compared to Ohme customers, potential differences in customers' EV type and battery size between the DSRSPS, and potential differences in the DSRSPs' charging dispatch strategies and rules.[7]

It is worth noting that OVO's participants were likely a more uniform group — all were enrolled on the Charge Anytime add-on and integrated directly via API, enabling a higher degree of controllability and potentially more consistent response to signals. In contrast, Ohme's customer base was likely more heterogeneous, with a mix of tariffs and integration types. For example, some customers were on flat-rate tariffs, typically associated with lower engagement, and not all were connected via direct vehicle API. While this may have reduced the average observed flexibility, it is also possible that Ohme's customer base is more representative of the broader UK population, although in a business-as-usual service, it will be at the DSRSP's discretion as to which customers provide the most value.

Table 17: Effect of incentive structures on demand during turn-up events - Ohme

Trial Arm	Avg. kW	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	0.484				
Escalating	0.568	0.084	0.009	<0.001***	17.35%
Flat	0.560	0.076	0.009	<0.001***	15.70%

Table 18: Treatment vs. treatment comparison for turn-up consumption - Ohme

Trial Arm	Avg. kW	Regression coefficient (vs. Flat)	Standard error	P-value	% difference (coefficient vs. flat)
Flat	0.560				

Trial Arm	Avg. kW	Regression coefficient (vs. Flat)	Standard error	P-value	% difference (coefficient vs. flat)
Escalating	0.568	0.008	0.008	0.433	1.39%

Figure 14: Average demand during turn-up events by trial arm – Ohme

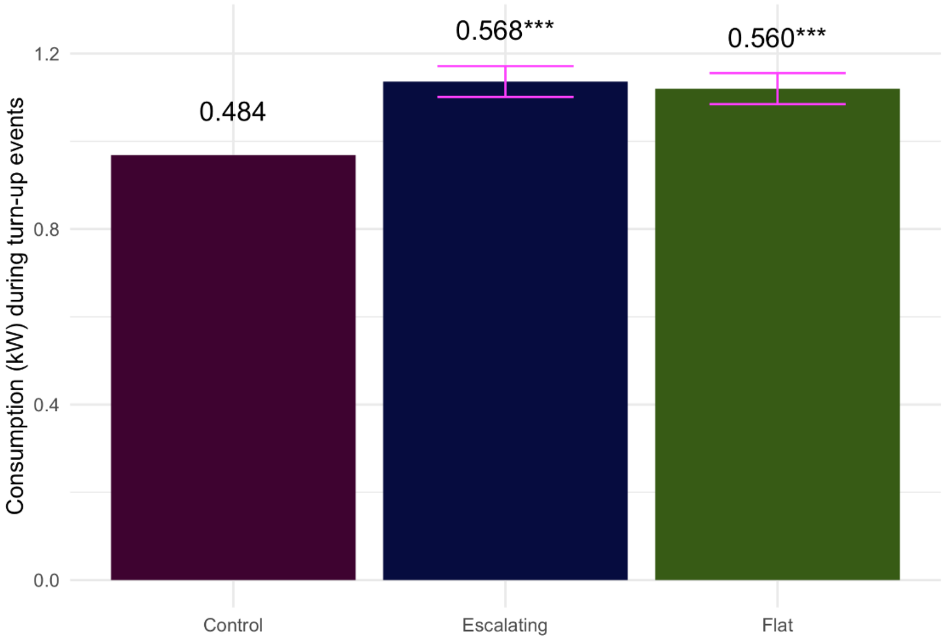
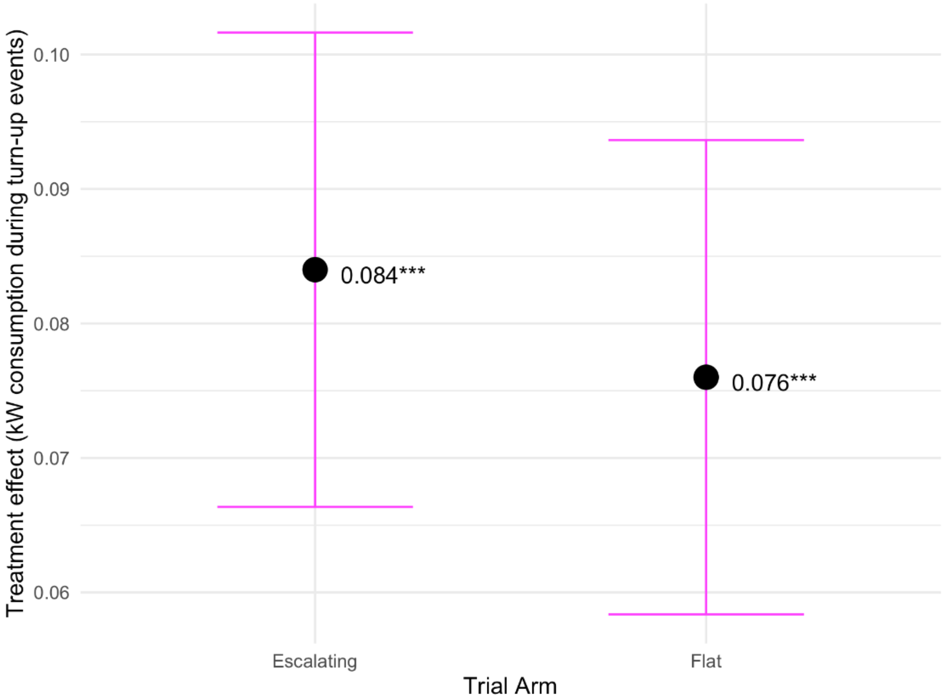


Figure 15: Treatment effects on demand during turn-up events (vs. Control) - Ohme



3.2.2.2 Turn-down

During turn-down events for Ohme customers, treatment significantly reduced average kW (Table 19). Compared to the control group (0.38 kW), both the Escalating Payments group (0.31 kW, a 17.60% decrease) and the Flat Payments group (0.31 kW, an 18.50% decrease) showed statistically significant reductions ($p < 0.001$) (Figure 16). The statistically significant negative coefficients for both incentive structures indicate their effectiveness in decreasing demand during these events for Ohme customers.

The average energy delivered per hour during availability events was similar across both trial arms. The Escalating group showed a 1.10% increase compared to Flat, but this difference was small and not statistically significant ($p = 0.730$). This suggests no meaningful difference in electricity delivery between the two incentive structures Table 20).

In summary, for Ohme customers during turn-down events, both incentive structures significantly reduced electricity consumption compared to the control group.

Table 19: Effect of incentive structures on demand during turn-down events - Ohme

Trial Arm	Avg. kW	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	0.378				
Escalating	0.312	-0.067	0.006	<0.001***	-17.60%
Flat	0.308	-0.070	0.006	<0.001***	-18.50%

Table 20: Treatment vs. treatment comparison for turn-down consumption - Ohme

Trial Arm	Avg. kW	Regression coefficient (vs. Flat)	Standard error	P-value	% difference (coefficient vs. flat)
Flat	0.308				
Escalating	0.312	0.003	0.005	0.730	1.10%

Figure 16: Average demand during turn-down events by trial arm – Ohme

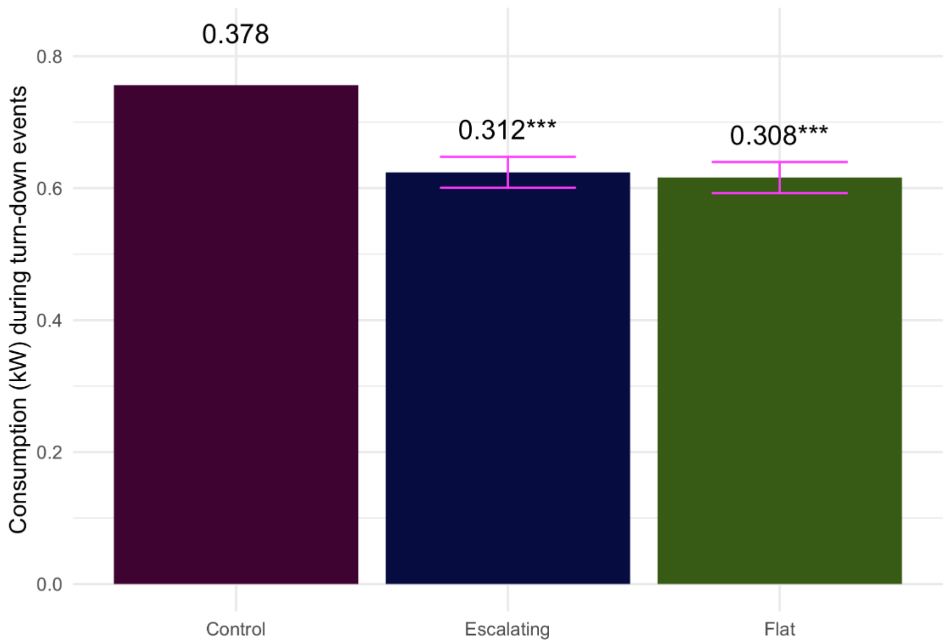
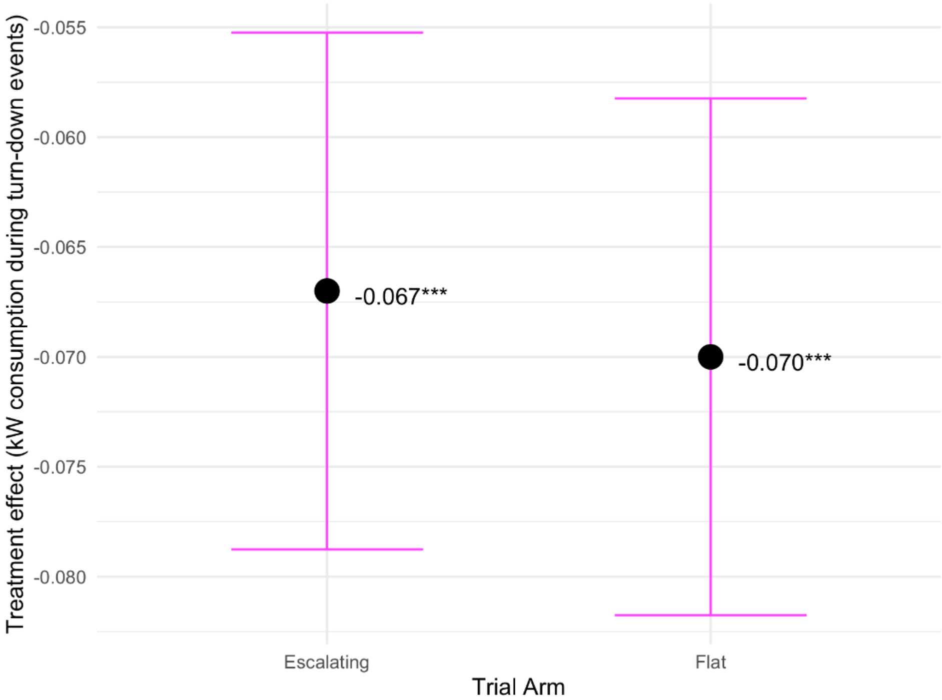


Figure 17: Treatment effects on demand during turn-down events (vs. Control) - Ohme



3.3 Exploratory analysis: Impact of nudges

3.3.1 OVO: Effect of nudges

OVO began testing nudges on 14 November 2024. All data in this section is therefore from 14 November 2024 until the trial's completion on 30 April 2025.

Tables 21 and 22 examine the effect of non-financial nudges on the Escalating and Flat payment incentive structures for both average weekly plug-in sessions and average weekly plug-in hours. The control group averaged 3.1 weekly plug-in sessions and 47.4 weekly plug-in hours, while the Flat (no nudges) group averaged 3.4 weekly plug-in sessions and 54.4 weekly plug-in hours.

For weekly plug-in sessions, the introduction of nudges to the Flat payment structure resulted in a statistically significant increase ($p < 0.001$). The Flat + Nudges group averaged 3.7 weekly plug-in sessions, a 7.87% increase in the coefficient compared to the Flat (no nudges) group. The addition of nudges to the Escalating Payments structure increased plug-in sessions by a similar amount ($p = 0.890$), with the Escalating + Nudge interaction group averaging 3.9 weekly plug-in sessions.

The results for weekly plug-in hours largely mirror these findings. The Flat + Nudges group showed a statistically significant increase compared to the Flat (no nudges) group ($p < 0.001$), averaging 60.5 weekly plug-in hours, a 10.72% increase in the coefficient. Consistent with the plug-in sessions analysis, the addition of nudges to the Escalating payment structure also increased plug-in hours, but not in a way that was statistically significantly different from the increase for the Flat Payments group ($p = 0.580$), with the Escalating + Nudge interaction group averaging 62.2 weekly plug-in hours.

In summary, for both weekly plug-in sessions and hours, the introduction of nudges had a significant positive impact on customers exposed to both Flat Payments and Escalating Payments. There was a similar size of effect of nudges between the Flat Payments and Escalating Payments groups.

Table 21: Effect of nudges on weekly plug-in sessions - OVO

Trial Arm	Avg. Weekly Plug-in Sessions	Coefficient (vs. non-nudge arm)	Standard Error	P-Value	% difference (coefficient vs. Flat)
Control	3.1				
Flat	3.4				
Flat + Nudges (vs Flat no nudges)	3.7	0.268	0.068	<0.001***	7.87%
Escalating no nudges (vs Flat no nudges)	3.6	0.176	0.068	0.010*	5.16%
Escalating * Nudge interaction	3.9	-0.013	0.098	0.890	-0.38%

Table 22: Effect of nudges on weekly plug-in hours - OVO

Trial Arm	Avg. Weekly Plug-in Hours	Coefficient (vs. non-nudge arm)	Standard Error	P-Value	% difference (coefficient vs. Flat)
Control	47.4				

Trial Arm	Avg. Weekly Plug-in Hours	Coefficient (vs. non-nudge arm)	Standard Error	P-Value	% difference (coefficient vs. Flat)
Flat	54.4				
Flat + Nudges (vs Flat no nudges)	60.5	5.832	1.369	<0.001***	10.72%
Escalating no nudges (vs Flat no nudges)	57.5	2.912	1.353	0.031*	5.35%
Escalating * Nudge interaction	62.2	-1.072	1.951	0.580	-1.97%

Figures 18 and 19 present monthly averages of weekly plug-in sessions and weekly plugged-in hours across groups. These figures suggest that nudges may be particularly effective in the later months of the trial — and, interestingly, to a similar extent regardless of Flat versus Escalating Payments structure. This pattern points to a potential fatigue-mitigation or behavioural-reminder effect, where nudges help sustain or reinvigorate engagement over time.

Figure 18: Treatment effects on weekly plug-in sessions, by month - OVO

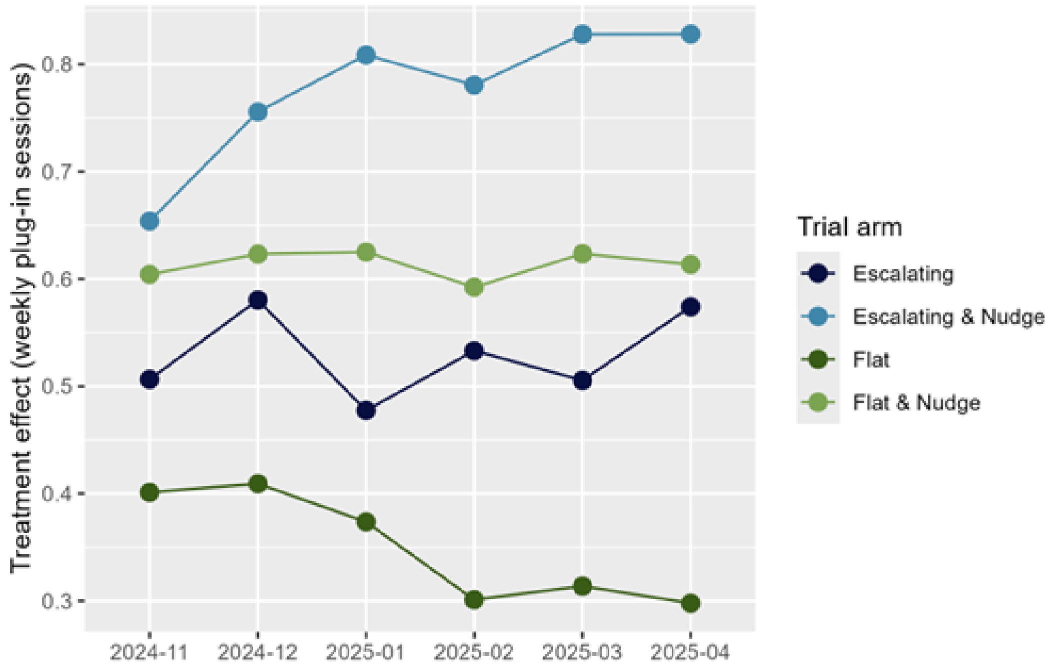
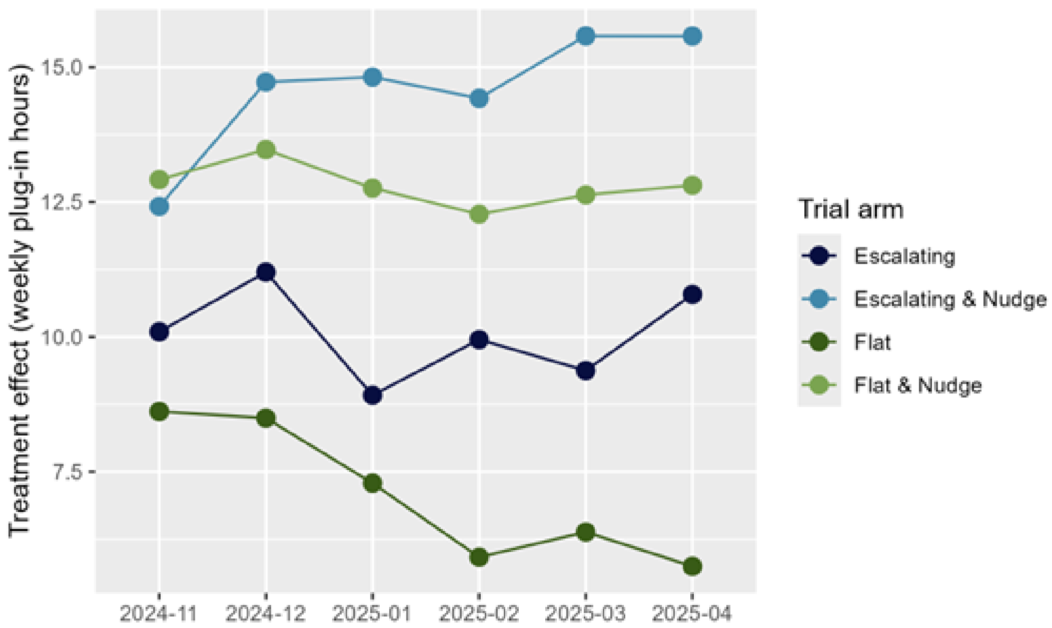


Figure 19: Treatment effects on weekly plug-in hours, by month - OVO



3.3.2 Ohme: Effect of nudges

Tables 23 and 24 present the results of the nudges analysis in the Ohme trial, examining their effect on average weekly plug-in sessions and weekly plug-in hours within each trial arm. Unlike OVO, the analysis here does not use interaction regressions; instead, Ohme's analysts conducted separate regressions comparing nudged and non-nudged groups within each payment type.[8]

For weekly plug-in sessions, nudges demonstrated a small but statistically significant impact exclusively within the Flat Payments group. Participants who received nudges recorded an average of 2.71 plug-in sessions per week, an increase of 3.83% compared to the 2.61 average in the non-nudged Flat Payments group (p = 0.04) (Table 23; Figure 20). Conversely, no statistically significant difference was observed in the Escalating Payments group, where the nudged cohort averaged 2.7 plug-in sessions weekly versus 2.72 in the non-nudged group (p = 0.68) (Table 24).

A similar pattern emerged for weekly plug-in hours. In the Flat Payments group, nudges produced a significant increase: participants receiving nudges averaged 41.4 plug-in hours per week compared to 39.6 hours without nudges, a difference of 4.49% (p = 0.05) (Table 26; Figure 22). In the Escalating Payments group, nudges did not result in a significant change; plug-in hours showed a slight, non-significant decrease from 41.36 to 41.21 hours (p = 0.860).

Ohme's results suggest that while nudges can modestly increase weekly plug-in sessions, their effectiveness appears to be contingent on the payment structure. Specifically, nudges showed a positive impact within the Flat Payments group for plug-in sessions, but their influence was negligible for the Escalating Payments group.

Table 23: Effect of nudges on weekly plug-in sessions - Ohme

Trial Arm	Avg. weekly plug-in days	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	2.560				
Escalating	2.720	0.180	0.080	0.020*	7.03%
Escalating + nudges	2.700	0.160	0.080	0.050+	6.25%

Flat	2.610	0.070	0.080	0.360	2.73%
Flat + nudges	2.710	0.180	0.080	0.030*	7.03%

Figure 20: Effect of treatment on weekly plug-in sessions, with nudge groups – Ohme

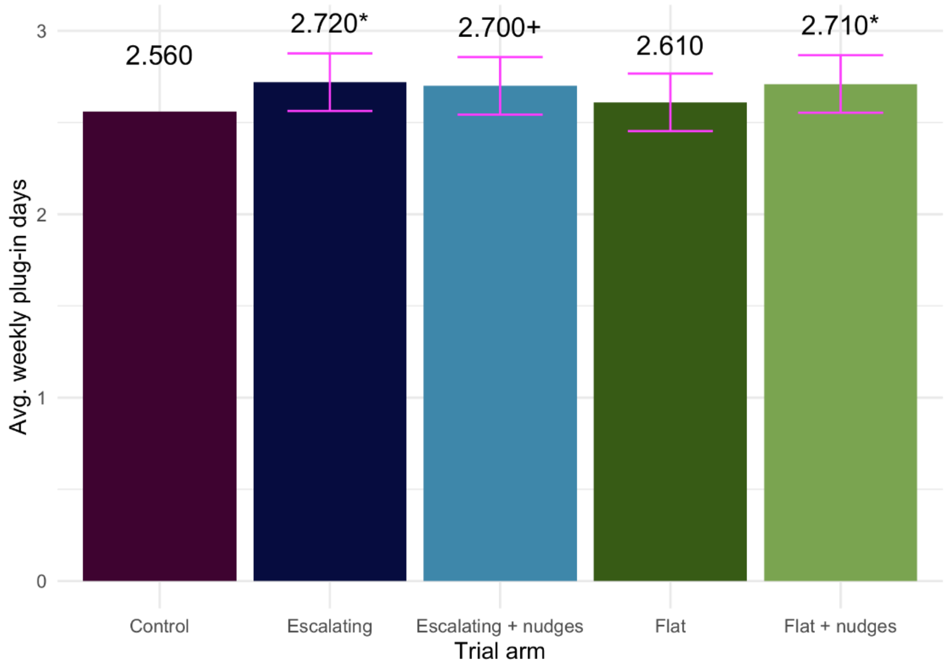


Figure 21: Treatment effects on weekly plug-in sessions, with nudge groups – Ohme

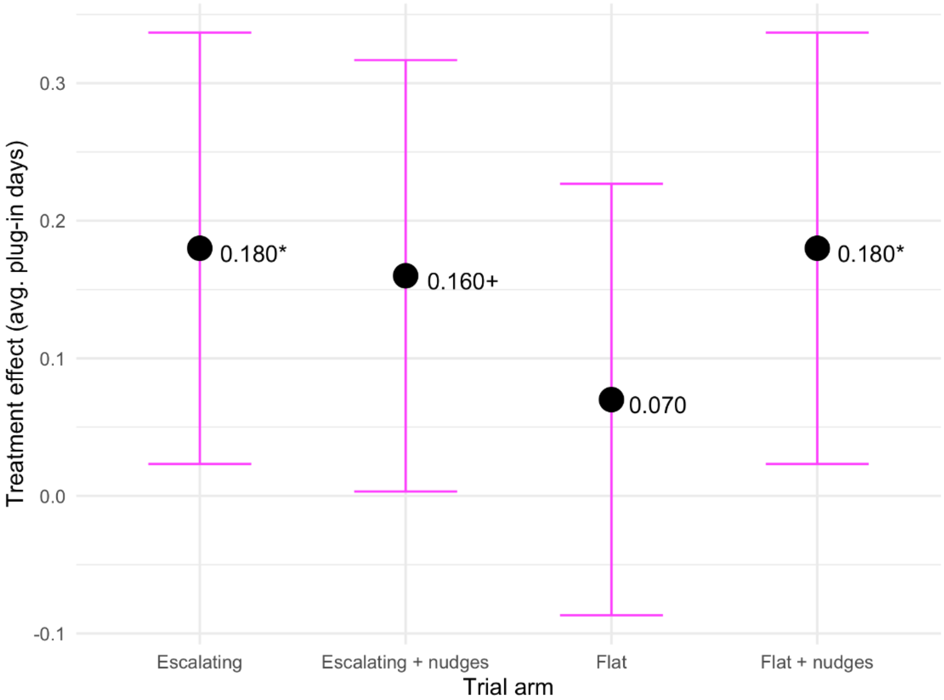


Table 24: Pairwise comparison on the effect of nudges on weekly plug-in sessions - Ohme

Trial Arm	Avg. weekly plug-in days	Coefficient	Standard error	P-value	% difference (coefficient)
Flat	2.610				
Escalating	2.720	0.110	0.050	0.030*	4.21%
Flat	2.610				
Flat + nudges	2.710	0.100	0.050	0.040*	3.83%
Escalating	2.720				
Escalating + nudges	2.700	-0.020	0.050	0.680	-0.74%
Flat + nudges	2.710				
Escalating + nudges	2.700	-0.010	0.050	0.790	-0.37%

Table 25: Effect of nudges on weekly plug-in hours - Ohme

Trial Arm	Avg. weekly plug-in hours	Coefficient	Standard error	P-value	% difference (coefficient vs. control)
Control	38.200				
Escalating	41.400	3.720	1.400	0.010*	9.74%
Escalating + nudges	41.200	3.560	1.400	0.010*	9.32%
Flat	39.600	2.000	1.390	0.150	5.24%
Flat + nudges	41.400	3.780	1.400	0.010*	9.90%

Figure 22: Effect of treatment on weekly plug-in hours, with nudge groups – Ohme

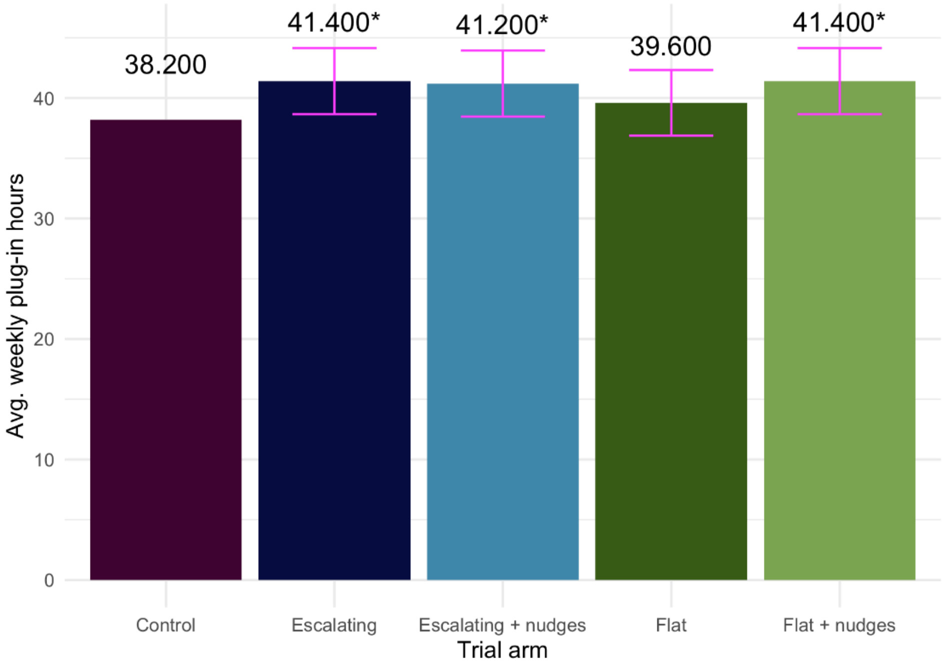


Figure 23: Treatment effects on weekly plug-in hours, with nudge groups – Ohme

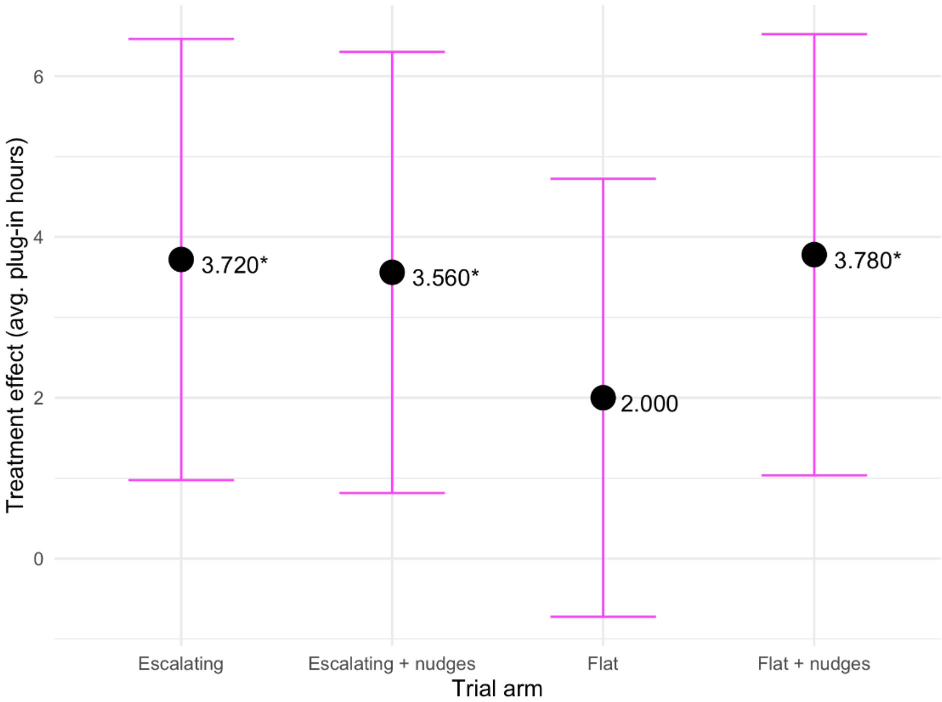


Table 26: Pairwise comparison on the effect of nudges on weekly plug-in hours - Ohme

Trial Arm	Avg. weekly plug-in hours	Regression coefficient	Standard error	P-value	% difference (coefficient)
Flat	39.600				
Escalating	41.400	1.720	0.900	0.050+	4.34%
Flat	39.640				
Flat + nudges	41.420	1.780	0.900	0.050+	4.49%
Escalating	41.360				
Escalating + nudges	41.210	-0.160	0.910	0.860	-0.39%
Flat + nudges	41.420				
Escalating + nudges	41.210	-0.220	0.910	0.810	-0.53%

3.4 Other exploratory analyses

3.4.1 Effect of event timing

3.4.1.1 OVO

Analysing the impact of Escalating and Flat payment incentive structures across different EFA blocks (four-hour periods used to divide the day in British electricity markets, known as Electricity Forward Agreement blocks) reveals distinct patterns in weekly plug-in hours, kW during turn-up events, and kW during turn-down events, compared to the control group.

Effect on weekly Plug-in hours: Both the Escalating and Flat payment structures consistently encouraged greater weekly plug-in duration, demonstrating statistically significant increases in average weekly plug-in hours across all six EFA blocks. The enhancement ranged from approximately 18% to 31% for the Flat payment structure and from roughly 22% to 31% for the Escalating payment structure relative to the control group (Table 27). While both incentive structures were effective, the Escalating structure often showed a slightly larger positive coefficient, especially during overnight hours, although most of these differences were not statistically significant in pairwise testing.

Table 27: Effect of EFA block on weekly plug-in hours - OVO

EFA Block	Trial Arm	Avg. Weekly Plug-in hours	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	10.70				
	Escalating	13.20	2.42	0.22	<0.001***	22.62%
	Flat	12.70	1.93	0.22	<0.001***	18.04%
EFA 2: 03:00 — 07:00	Control	10.60				
	Escalating	13.00	2.38	0.22	<0.001***	22.45%
	Flat	12.50	1.93	0.22	<0.001***	18.21%
EFA 3: 07:00 — 11:00	Control	6.64				
	Escalating	8.34	1.68	0.17	<0.001***	25.30%
	Flat	8.24	1.58	0.17	<0.001***	23.80%
EFA 4: 11:00 — 15:00	Control	4.24				
	Escalating	5.54	1.30	0.15	<0.001***	30.66%
	Flat	5.56	1.31	0.15	<0.001***	30.90%
EFA 5: 15:00 — 19:00	Control	5.33				
	Escalating	7.01	1.67	0.17	<0.001***	31.33%
	Flat	6.94	1.60	0.17	<0.001***	30.02%
	Control	8.88				

EFA Block	Trial Arm	Avg. Weekly Plug-in hours	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 6: 19:00 — 23:00	Escalating	11.20	2.31	0.20	<0.001***	26.01%
	Flat	10.80	1.90	0.20	<0.001***	21.40%

Effect on turn-up kW: Similar to their influence on plug-in hours, both Escalating and Flat payments led to statistically significant increases in average kW during turn-up events throughout the day. The percentage difference in the coefficient compared to the control group exhibited more variability than for turn-down, spanning from ~17% to ~61% for the Flat payment structure and from approximately 20% to 61% for the Escalating payment structure, with the most substantial increases observed between 15:00 - 19:00 (EFA 5) (Table 28). Again, the more effective treatment for turn-up consumption was almost always Escalating Payments, but by a small amount.

Table 28: Effect of EFA block on turn-up event kW - OVO

EFA Block	Trial Arm	Average kW	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	1.08				
	Escalating	1.51	0.24	0.02	<0.001***	22.46%
	Flat	1.43	0.20	0.02	<0.001***	18.48%
EFA 2: 03:00 — 07:00	Control	0.64				
	Escalating	0.92	0.13	0.01	<0.001***	20.19%
	Flat	0.90	0.11	0.01	<0.001***	17.08%
EFA 3: 07:00 — 11:00	Control	0.11				
	Escalating	0.17	0.03	0.00	<0.001***	25.13%
	Flat	0.18	0.04	0.00	<0.001***	32.32%

EFA Block	Trial Arm	Average kW	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 4: 11:00 — 15:00	Control	0.14				
	Escalating	0.21	0.04	0.00	<0.001***	26.28%
	Flat	0.22	0.04	0.00	<0.001***	28.47%
EFA 5: 15:00 — 19:00	Control	0.17				
	Escalating	0.44	0.10	0.01	<0.001***	60.82%
	Flat	0.43	0.11	0.01	<0.001***	61.40%
EFA 6: 19:00 — 23:00	Control	0.60				
	Escalating	1.15	0.27	0.01	<0.001***	44.54%
	Flat	1.12	0.25	0.01	<0.001***	41.72%

Effect on turn-down kW: For three of the six EFA blocks, both the Escalating and Flat payment structures resulted in statistically significant reductions in average kW compared to the control group, with notable decreases of ~27-28% during the late-night and early-morning periods (EFA 1 and EFA 2) (Table 29). However, between 07:00 and 15:00 (EFA 3 and EFA 4), the Flat payment structure did not show a significant reduction in turn-down consumption, and between 15:00 - 19:00 (EFA 5), neither incentive had a significant effect. When significant, the magnitude of the reduction in turn-down consumption was comparable between the two incentive types.

Table 29: Effect of EFA block on turn-down event kW - OVO

EFA Block	Trial Arm	Average kW	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	0.76				
	Escalating	0.34	-0.21	0.01	<0.001***	-27.82%
	Flat	0.35	-0.21	0.01	<0.001***	-27.95%

EFA Block	Trial Arm	Average kW	Coefficient (vs. Control)	Standard Error	P-value	% difference (coefficient vs. control)
EFA 2: 03:00 — 07:00	Control	0.47				
	Escalating	0.23	-0.14	0.01	<0.001***	-28.60%
	Flat	0.23	-0.14	0.01	<0.001***	-28.60%
EFA 3: 07:00 — 11:00	Control	0.10				
	Escalating	0.08	-0.01	0.00	0.007**	-6.78%
	Flat	0.09	0.00	0.00	0.130	-3.88%
EFA 4: 11:00 — 15:00	Control	0.11				
	Escalating	0.09	-0.01	0.00	0.002**	-8.18%
	Flat	0.10	0.00	0.00	0.264	-3.03%
EFA 5: 15:00 — 19:00	Control	0.13				
	Escalating	0.13	0.00	0.00	0.640	1.06%
	Flat	0.13	0.00	0.00	0.970	-0.10%
EFA 6: 19:00 — 23:00	Control	0.40				
	Escalating	0.27	-0.06	0.01	<0.001***	-14.90%
	Flat	0.27	-0.06	0.01	<0.001***	-15.66%

EFA 5 stands out for showing one of the strongest effects during turn-up events, yet performing poorly during turn-down. We hypothesise that this pattern arises because customers are already avoiding charging during this period, likely as a result of automation by both OVO and Ohme, regardless of whether an event is active. This would leave little room for additional turn-down, while creating ideal conditions for a strong turn-up response.

3.4.1.2 Ohme

Effect on weekly Plug-in hours: Both the Escalating and Flat payment structures encouraged greater weekly plug-in duration, demonstrating statistically significant increases in average weekly plug-in hours across all six EFA blocks (Table 30). The enhancement ranged from approximately 13.64% to 21.43% for the Flat payment structure and from roughly 14.94% to 25.00% for the Escalating payment structure, relative to the Control (referencing the provided table). While both incentive structures were effective, the Escalating structure often showed a slightly larger (but not statistically significantly so) positive coefficient and higher percentage increase compared to the Flat structure.

Table 30: Effect of EFA block on weekly plug-in hours - Ohme

EFA Block	Trial Arm	Avg. Weekly Plug-in hours	Regression coefficient (vs. Control)	Standard error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	17.600				
	Escalating	20.400	2.800	0.800	0.002**	15.91%
	Flat	20.000	2.400	0.800	0.006**	13.64%
EFA 2: 03:00 — 07:00	Control	17.400				
	Escalating	20.000	2.600	0.800	0.003**	14.94%
	Flat	19.800	2.400	0.800	0.008**	13.79%
EFA 3: 07:00 — 11:00	Control	10.200				
	Escalating	12.200	2.000	0.600	0.004**	19.61%
	Flat	12.000	1.600	0.600	0.013*	15.69%
EFA 4: 11:00 — 15:00	Control	5.600				
	Escalating	7.000	1.400	0.400	<0.001***	25.00%
	Flat	6.800	1.200	0.400	0.002**	21.43%
	Control	7.600				

EFA Block	Trial Arm	Avg. Weekly Plug-in hours	Regression coefficient (vs. Control)	Standard error	P-value	% difference (coefficient vs. control)
EFA 5: 15:00 — 19:00	Escalating	9.200	1.600	0.400	<0.001***	21.05%
	Flat	9.000	1.400	0.400	0.001**	18.42%
EFA 6: 19:00 — 23:00	Control	14.000				
	Escalating	16.400	2.400	0.800	0.001**	17.14%
	Flat	16.200	2.200	0.800	0.004**	15.71%

Effect on turn-up kW: Similar to their influence on plug-in hours, both Escalating and Flat payments generally led to increases in average kW during turn-up events throughout the day, often with statistical significance. The percentage difference in the coefficient compared with the control group exhibited some variability across EFA blocks. For the Flat payment structure, the increase spanned from approximately 8.59% to 52.42%, whilst for the Escalating payment structure, it ranged from roughly 7.90% to 53.10%. The most substantial increases for both treatments were observed between 15:00 - 19:00 (EFA 5), where the effect was highly significant (Table 31). However, it is noteworthy that the increases in EFA 2 (03:00 - 07:00) and EFA 3 (07:00 - 11:00) were not statistically significant for either treatment.

Table 31: Effect of EFA block on turn-up event kW - Ohme

EFA Block	Trial Arm	Average kW	Regression coefficient (vs. Control)	Standard error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	1.065				
	Escalating	1.181	0.116	0.027	<0.001***	10.85%
	Flat	1.157	0.091	0.027	<0.001***	8.59%
EFA 2: 03:00 — 07:00	Control	0.472				
	Escalating	0.510	0.037	0.037	0.300	7.90%

EFA Block	Trial Arm	Average kW	Regression coefficient (vs. Control)	Standard error	P-value	% difference (coefficient vs. control)
	Flat	0.512	0.039	0.037	0.300	8.30%
EFA 3: 07:00 — 11:00	Control	0.092				
	Escalating	0.107	0.015	0.008	0.051+	16.65%
	Flat	0.103	0.011	0.008	0.169	11.66%
EFA 4: 11:00 — 15:00	Control	0.113				
	Escalating	0.134	0.022	0.006	<0.001***	19.39%
	Flat	0.136	0.023	0.006	<0.001***	20.69%
EFA 5: 15:00 — 19:00	Control	0.183				
	Escalating	0.280	0.097	0.033	0.004**	53.10%
	Flat	0.279	0.096	0.033	0.005**	52.42%
EFA 6: 19:00 — 23:00	Control	0.442				
	Escalating	0.617	0.175	0.028	<0.001***	39.64%
	Flat	0.613	0.172	0.028	<0.001***	38.93%

Effect on turn-down kW: The impact on turn-down consumption was consistent across EFA blocks. For most EFA blocks, both the Escalating and Flat payment structures resulted in statistically significant reductions in average kW compared with the Control group. For instance, notable decreases were observed during the late-night and early-morning periods (EFA 1, 23:00 - 03:00), with reductions of approximately 14.56% for Escalating Payments and 15.62% for Flat Payments (Table 32). Furthermore, substantial reductions continued through EFA 3 (07:00 - 11:00) up to EFA 6 (19:00 - 23:00), where both schemes consistently showed significant negative impacts on consumption, with reductions reaching 28.96% for Escalating Payments and 29.69% for Flat Payments in EFA 5 (15:00 - 19:00). However, between 03:00 and 07:00 (EFA 2), neither incentive had a statistically significant effect on turn-down consumption (p>0.65). When significant, the magnitude of the reduction in turn-down consumption was generally comparable between the two treatment groups.

Table 32: Effect of EFA block on turn-down event kW - Ohme

EFA Block	Trial Arm	Avg. kW	Regression coefficient (vs. Control)	Standard error	P-value	% difference (coefficient vs. control)
EFA 1: 23:00 — 03:00	Control	1.042				
	Escalating	0.891	-0.152	0.044	<0.001***	-14.55%
	Flat	0.880	-0.163	0.044	<0.001***	-15.62%
EFA 2: 03:00 — 07:00	Control	0.457				
	Escalating	0.430	-0.027	0.061	0.650	-5.95%
	Flat	0.433	-0.024	0.061	0.690	-5.24%
EFA 3: 07:00 — 11:00	Control	0.085				
	Escalating	0.073	-0.012	0.005	0.012*	-14.02%
	Flat	0.069	-0.017	0.005	<0.001***	-19.38%
EFA 4: 11:00 — 15:00	Control	0.111				
	Escalating	0.092	-0.019	0.007	0.005**	-17.33%
	Flat	0.091	-0.020	0.007	0.004**	-18.02%
EFA 5: 15:00 — 19:00	Control	0.194				
	Escalating	0.138	-0.056	0.009	<0.001***	-28.86%
	Flat	0.137	-0.058	0.009	<0.001***	-29.69%
EFA 6: 19:00 — 23:00	Control	0.406				
	Escalating	0.296	-0.110	0.022	<0.001***	-27.15%
	Flat	0.300	-0.106	0.022	<0.001***	-26.14%

Ohme's findings indicate that both Escalating and Flat Payment incentive structures were largely effective in influencing EV charging demand when dispatched for turn-up and turn-down events. Across most EFA blocks, these incentives led to statistically significant increases in average weekly plug-in hours. Similarly, during "turn-up" events, both payment types generally resulted in significant increases in kW. Conversely, for "turn-down" events, the schemes typically achieved statistically significant reductions in kW across the majority of time blocks.

3.4.2 Effect of event duration

3.4.2.1 OVO

For this analysis, we classified events of 60 minutes or less as “short” and events of 120 minutes or more as “long” (there were no events lasting between 61 and 119 minutes).

Effect on turn-up consumption: The analysis of turn-up events reveals that the treatment had a statistically significant effect on increasing the average energy consumption across different durations. For short duration events with the treatment, a 75.64% increase in consumption was observed compared to the control group during short events ($p < 0.001$), indicating a positive impact of the treatment on energy use (Table 33). For long duration events with the treatment, the turn-up is less — the interaction effect is a 5.59% reduction in the treatment effect when going from short to long events, again relative to the control group average demand during short events.[9]

Table 33: Effect of duration on turn-up event kW - OVO

Duration length	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Short	0.468				
Short + treated	0.766	0.354	0.012	<0.001***	75.64%
Long (vs. short)	0.798	0.008	0.003	0.005**	1.67%
Long * treated interaction	1.134	-0.026	0.005	<0.001***	-5.60%

Effect on turn-down consumption: The analysis of turn-down events indicates that the treatment had a statistically significant effect on average energy consumption across different durations. For short duration events with the treatment, a 49.60% reduction in consumption was observed compared to the baseline ($p < 0.001$). For long duration events with the treatment, this effect was less, where the interaction effect is 5.72% of the control group average demand during short events (Table 34). Therefore, the treatment was associated with a substantial decrease in consumption for short events, and while it also resulted in a considerable reduction for long duration events, the effect was less pronounced.

Table 34: Effect of duration on turn-down event kW - OVO

Duration length	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Short	0.312				
Short + treated	0.187	-0.155	0.006	<0.001***	-49.60%
Long (vs. short)	0.394	-0.012	0.003	<0.001***	-3.81%
Long * treated interaction	0.236	0.018	0.003	<0.001***	5.72%

3.4.3 Effect of day type

3.4.3.1 OVO

Turn-up events: The analysis of turn-up events indicated that the day of the week had a statistically significant influence on the effectiveness of the treatment in increasing electricity consumption. Weekday turn-up was 55.44% of control group average demand during the same hours on weekdays. Customers' turn-up on weekends was an additional 10.49% (of control group average weekday consumption) (Table 35). This greater treatment effect came despite weekend consumption having lower consumption than weekdays in the control group.

Table 35: Effect of day type on turn-up event kW - OVO

Day type	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Weekday	0.542				
Weekend	0.550	-0.036	0.007	<0.001***	-6.68%
Weekday + treated	0.834	0.300	0.010	<0.001***	55.44%
Weekend * treated interaction	0.890	0.057	0.010	<0.001***	10.49%

Turn-down events: In contrast, the analysis of turn-down events suggested a stronger treatment effect on weekdays. Weekday events with the treatment resulted in a significant reduction of 40.77% in electricity consumption compared to the weekday baseline (Table 36). While weekend events with the treatment also showed a reduction, estimated at 32.02% compared to the weekday baseline (calculated by summing the percentage differences for 'Weekday + treated' and the weekend treatment interaction effect), the magnitude of this reduction was smaller than that observed during weekdays. Whilst both treatments resulted in a significant difference compared with the baseline, the treatment was more effective at reducing electricity demand during weekday turn-down events.

Table 36: Effect of day type on turn-down event kW - OVO

Day type	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Weekday	0.340				
Weekend	0.314	-0.022	0.004	<0.001***	-6.51%

Day type	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Weekday + treated	0.199	-0.139	0.006	<0.001***	-40.77%
Weekend * treated interaction	0.199	0.030	0.005	<0.001***	8.75%

3.4.4 Effect of estimated annual consumption (EAC)

We examined whether treatment effects differed by customers' annual consumption. OVO used customers' estimated annual consumption (EAC) from their smart meters; median consumption was 7,300 kWh; for these heterogeneity analyses, "high" EAC customers were defined as having EAC ≥ 7,300 kWh, and "low" EAC customers were defined as having EAC < 7,300 kWh. Ohme used customers' estimated annual charger consumption (EACC).

3.4.4.1 OVO

Turn-up consumption: The analysis indicated statistically significant effects of the treatments for both low and high EAC groups compared to the baseline group (p < 0.001). The low EAC group with the treatment exhibited a significant increase of 37.71% in average kW compared to the control group. The treated high EAC group's turn-up was larger still — a further increase in average kW equal to 71.51% of the non-treated low EAC group (Table 37). The exploratory analysis suggests that, while both treated groups significantly increased their demand during the event, participants with high EAC exhibited a stronger response, indicating a greater capacity to shift demand effectively.

Table 37: Effect of EAC on turn-up events kW - OVO

EAC	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Low	0.384				

EAC	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
High	0.702	-0.060	0.020	0.003**	-15.67%
Low + treated	0.604	0.145	0.012	<0.001***	37.71%
High * treated interaction	1.080	0.275	0.020	<0.001***	71.51%

Turn-down consumption: Both the Low + Treated and High + Treated groups showed statistically significant reductions in electricity demand during events, relative to the Low baseline group. Customers in the Low + Treated group reduced their consumption by 43.99% compared to the Low baseline. Customers in the High + Treated group reduced by an additional 32.36% (relative to low EAC control customers) (Table 38). The results suggest that whilst both treated groups are able to significantly reduce their demand during events, customers with a High EAC reduced by more.

Table 38: Effect of EAC on turn-down events kW - OVO

EAC	Avg. kW	Coefficient	Standard error	P-value	% difference (Coefficient vs. 1st row average)
Low	0.216				
High	0.444	0.072	0.011	<0.001***	33.53%
Low + treated	0.128	-0.095	0.005	<0.001***	-43.99%
High * treated interaction	0.264	-0.070	0.010	<0.001***	-32.36%

3.4.5 Month to month treatment effects on weekly plug-in sessions

3.4.5.1 OVO

Both escalating and flat incentive structures significantly increased weekly plug-in sessions ($p < 0.001$) across September to April compared to a control group. The coefficient values indicated the positive impact of each strategy, with % difference from Control ranging from approximately 14% to 22.6% (Table 39). While both strategies were effective, the escalating pricing generally showed a slightly larger positive effect on weekly plug-in sessions than the flat pricing strategy within the same month, with this effect seeming to widen as the trial progressed.

Table 39: Effect of month-to-month treatment effects on weekly plug-in sessions

Month	Weekly plug-in sessions	Coefficient	Standard error	P-value	% difference (Regression vs. Control)
September control	2.850				
September escalating	3.440	0.582	0.075	<0.001***	20.43%
September flat	3.390	0.512	0.075	<0.001***	17.97%
October control	2.880				
October escalating	3.420	0.530	0.064	<0.001***	18.41%
October flat	3.360	0.464	0.064	<0.001***	16.12%
November control	3.040				
November escalating	3.670	0.613	0.061	<0.001***	20.17%
November flat	3.550	0.492	0.060	<0.001***	16.19%
December control	2.970				
December escalating	3.650	0.668	0.059	<0.001***	22.50%
December flat	3.500	0.516	0.059	<0.001***	17.37%
January control	3.190				
January escalating	3.850	0.642	0.065	<0.001***	20.14%

Month	Weekly plug-in sessions	Coefficient	Standard error	P-value	% difference (Regression vs. Control)
January flat	3.710	0.499	0.064	<0.001***	15.65%
February control	3.140				
February escalating	3.800	0.656	0.065	<0.001***	20.90%
February flat	3.590	0.446	0.064	<0.001***	14.20%
March control	2.940				
March escalating	3.620	0.665	0.065	<0.001***	22.63%
March flat	3.420	0.468	0.064	<0.001***	15.91%
April control	3.070				
April escalating	3.740	0.661	0.065	<0.001***	21.52%
April flat	3.530	0.450	0.065	<0.001***	14.64%

3.4.5.2 Ohme

From September to April, customers who received incentives plugged in their electric vehicles more frequently than those in the control group, with this pattern holding consistently across all months of the trial. Participants in the control group averaged between 3.18 and 3.66 plug-ins per week, depending on the month (Table 40). In comparison, the flat incentive group recorded between 6.6% and 14.0% more weekly plug-ins than the control group, while the escalating incentive group showed increases ranging from 7.2% to 13.8%. Across all months, these differences were statistically significant (compared to the control group).

Table 40: Effect of month-to-month treatment effects on weekly plug-in sessions

Month	Weekly plug-in sessions	Coefficient	Standard error	P-value	% difference (Regression vs. Control)
September control	3.351				

Month	Weekly plug-in sessions	Coefficient	Standard error	P-value	% difference (Regression vs. Control)
September escalating	3.814	0.464	0.053	<0.001***	13.83%
September flat	3.819	0.468	0.053	<0.001***	13.97%
October control	3.405				
October escalating	3.759	0.354	0.050	<0.001***	10.41%
October flat	3.711	0.306	0.050	<0.001***	8.99%
November control	3.597				
November escalating	3.877	0.280	0.050	<0.001***	7.77%
November flat	3.862	0.265	0.050	<0.001***	7.37%
December control	3.571				
December escalating	3.809	0.238	0.049	<0.001***	6.66%
December flat	3.808	0.237	0.049	<0.001***	6.65%
January control	3.660				
January escalating	3.915	0.254	0.052	<0.001***	6.95%
January flat	3.894	0.234	0.051	<0.001***	6.39%
February control	3.624				
February escalating	3.863	0.239	0.053	<0.001***	6.59%
February flat	3.851	0.227	0.053	<0.001***	6.26%
March control	3.406				
March escalating	3.702	0.297	0.054	<0.001***	8.71%
March flat	3.690	0.284	0.053	<0.001***	8.35%

Month	Weekly plug-in sessions	Coefficient	Standard error	P-value	% difference (Regression vs. Control)
April control	3.180				
April escalating	3.472	0.292	0.052	<0.001***	9.19%
April flat	3.450	0.271	0.052	<0.001***	8.51%

3.4.6 Effect of treatments on weekly consumption

3.4.6.1 OVO

Table 41 shows that participants in the Flat and Escalating trial arms recorded significantly higher weekly charger consumption than the control group. The Flat Payments group consumed 6.22% more electricity per week on average (p = 0.002), while the Escalating Payments group used 4.70% more (p = 0.017). This suggests evidence of demand creation driven by the availability payments, with participants not only plugging in more often but also increasing their total volume of home charging. This additional electricity consumption may reflect net new demand, but they could also be the result of shifting charging from other locations to the home.

Table 41: Weekly charger consumption (kWh), by trial arm- OVO

Trial Arm	Avg. weekly kWh	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	59.900				
Escalating	62.100	2.812	1.181	0.017*	4.70%
Flat	62.900	3.727	1.197	0.002**	6.22%

3.4.6.1 Ohme

The results in Table 42 indicate that weekly charger consumption was very similar across all trial arms, with no statistically significant differences observed. In the control group, average weekly consumption was 67.480 kWh. For the Flat Payments group, consumption was slightly lower at 67.420 kWh, representing a negligible decrease of -

0.09% compared to the control, and the result was not statistically significant (p = 0.948).

In the Escalating Payments group, average weekly consumption was 68.040 kWh, reflecting a small increase of 0.82% relative to the control. However, this difference was also not statistically significant (p = 0.573).

Overall, the findings suggest that availability payments did not materially impact weekly charger energy consumption, as both trial arms show minimal and statistically insignificant differences compared to the control group. This result is in contrast to OVO's findings.

Table 42: Weekly charger consumption (kWh), by trial arm - Ohme

Trial Arm	Avg. weekly kWh	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Control	67.480				
Escalating	68.040	0.55	0.982	0.573	0.82%
Flat	67.420	-0.06	0.956	0.948	-0.09%

3.4.7 Effect of treatments on battery size

3.4.7.1 Ohme

Turn-up consumption: The results suggest that receiving an availability payment is associated with higher consumption during turn-up events, with effects increasing alongside battery size. For smaller batteries (under 11 kWh), the estimated treatment effect was a 7.7% decrease in consumption relative to the control group (a backfire), though this estimate was not statistically significant (p = 0.564). Medium batteries (11 to 22 kWh) showed a significant increase in consumption of 16.1% (p = 0.002), while large batteries (over 22 kWh) saw the largest increase of 27.6% (p < 0.001) (Table 43). These results suggest that larger batteries may offer greater capacity or flexibility to absorb additional energy during turn-up events, resulting in greater treatment effects both in absolute and relative terms. However, we note that Ohme's control group was matched rather than randomised, so some of the observed variation across battery sizes may reflect underlying imbalance rather than true differences in causal treatment effects.

Table 43: Effect of treatment on consumption during turn-up events by battery size

Trial arm, by battery Size	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Small (control)	0.287				
Small (treatment)	0.431	-0.0222	0.038	0.564	-7.7%
Medium (control)	0.3012				
Medium (treatment)	0.531	0.0486	0.016	0.002**	16.1%
Large (control)	0.5054				
Large	0.644	0.1396	0.02	< 0.001	27.6%

Turn-down consumption: Availability payments led to reductions in consumption across all battery sizes, though the magnitude of the effect varied. Small batteries (under 11 kWh) showed the largest relative reduction, with consumption falling by 79.2%, a statistically significant effect ($p < 0.001$). Medium batteries (11–22 kWh) also saw a significant reduction of 34.6% ($p < 0.001$). For large batteries (over 22 kWh), the reduction was smaller at 3.1% and not statistically significant ($p = 0.428$) (Table 44). The large relative reduction among small batteries is somewhat surprising, particularly given that the heterogeneity pattern for turn-up events ran in the opposite direction. As before, we caution that Ohme's control group was matched rather than randomized, so some of the apparent variation across battery sizes may reflect residual imbalance rather than true differences in causal treatment effects.

Table 44: Effect of treatment on consumption during turn-up events by battery size

Trial arm, by battery Size	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Small (control)	0.220				
Small (treatment)	0.187	-0.174	0.028	< 0.001	-79.2%
Medium (control)	0.2606				
Medium (treatment)	0.279	-0.0902	0.01	< 0.001	-34.6%

Trial arm, by battery Size	Avg. kW	Coefficient	Standard Error	P-value	% difference (coefficient vs. control)
Large (control)	0.393				
Large	0.380	-0.012	0.016	0.428	-3.1%

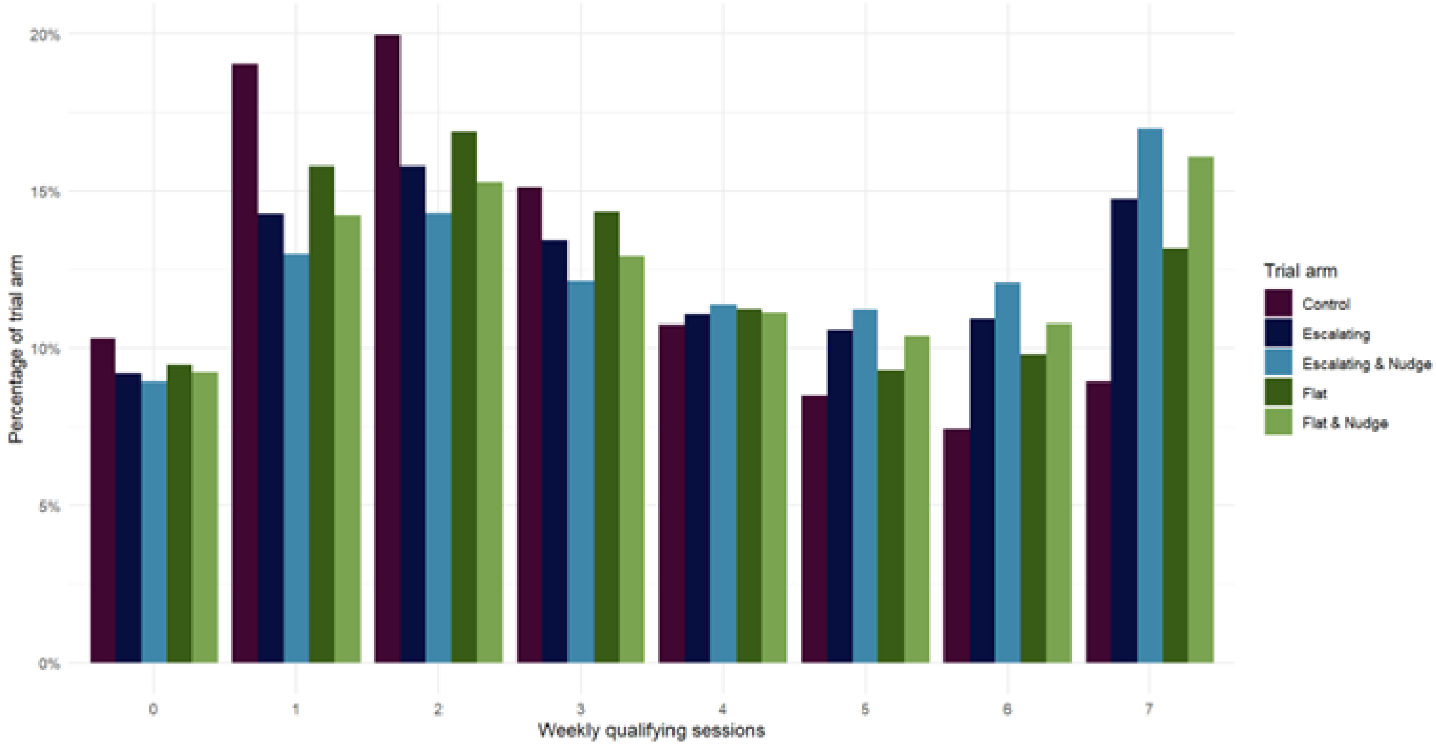
3.4.7 Examining distribution of weekly plug-in sessions (OVO only)

To explore how treatments influenced participation frequency, we examined the distribution of the number of qualifying sessions completed by OVO customers each week during the trial. For each cohort, we calculated the weekly proportion of customers with 0 to 7 qualifying sessions. We then averaged these weekly percentages across the full trial period to capture a stable picture of participation behaviour.

The resulting distributions reflect the treatment effects described previously. In the Control group, participation was concentrated in the mid-range (1–3 sessions per week), with relatively few customers achieving the maximum of 7. In contrast, all active treatment groups showed a noticeable rightward shift in the distribution. Customers in the Escalating arm had more weekly plug-in sessions than those in the Flat arm, and in both cases, adding nudges further increased session frequency. For example, 17% of customers in the Escalating & Nudge group recorded the maximum of seven qualifying plug-in sessions per week, compared to just 9% in the Control group.

This rightward shift in the distribution across treatment arms suggests that both incentives and nudges were effective in encouraging more consistent plug-in behaviour throughout the trial, and that these effects were additive.

Figure 24: Weekly plug-in sessions distribution by trial arm



3.5 Exploratory analysis: translating treatment effects into flexibility value

The secondary analyses estimated the impact of treatments on electricity consumption (half-hourly kWh, converted to kW for ease of interpretation). This section explores the associated cost of the flexibility delivered. Although a detailed assessment of this aspect will be undertaken by ERM as part of separate deliverables within the CrowdFlex programme, we provide high-level estimates here as a preliminary indication.

As reminder, the payment levels were:

- **Escalating Payments**: Weekly payments increasing with more frequent plug-ins (£0 to £3 per week depending on plug-in frequency).
- **Flat Payments**: £8 per month regardless of plug-in frequency.

We first estimated the total flexibility delivered by the Escalating Payments and Flat Payments groups, in turn-up and turn-down events, in Ohme and OVO's trials (Table 45; Table 46).[10]

Among OVO customers:

- Turn-up came to 124,103 kWh in the Escalating Payments group and 107,523 kWh in the Flat Payments group.

- Total turn-down came to 91,765 kWh in the Escalating Payments group and 89,417 kWh in the Flat Payments group.

Among Ohme customers:

- Total turn-up came to 88,907 kWh in the Escalating Payments group and 80,088 kWh in the Flat Payments group.

- Total turn-down came to 73,012 kWh in the Escalating Payments group and 75,948 kWh in the Flat Payments group.

We then calculated the total flexibility (turn-up + turn-down) delivered across both event types; we then compared this total to remuneration across the trial. For OVO, the Escalating Payments group yielded a greater total kWh shift for OVO customers (215,868 kWh vs. 196,941 kWh), at lower cost of remuneration (£111,700 vs. £172,800) compared to the Flat Payments group. For Ohme, the Escalating Payments group also resulted in a larger overall kWh shift (161,919 kWh vs. 156,036 kWh), while their remuneration was also lower (£145,775 vs. £286,803). Putting all of this together, the Escalating Payments group yielded a lower cost per kWh (£/kWh) for both Ohme (£0.90 vs. £1.84) and OVO (£0.52 vs. £0.88) (Table 47).

Table 45: Consumption increase across OVO and Ohme during turn-up events

Turn-up	Per hour (kW)		Per cohort hour (kW)		Across all events (kWh)	
	Ohme	OVO	Ohme	OVO	Ohme	OVO
Escalating	0.084	0.304	384	822	88,907	124,103
Flat	0.076	0.267	346	712	80,088	107,523

Table 46: Consumption decrease across OVO and Ohme during turn-down events

Turn-down	Per hour (kW)		Per cohort hour (kW)		Across all events (kWh)	
	Ohme	OVO	Ohme	OVO	Ohme	OVO
Escalating	-0.067	-0.132	-306	-355	-73,012	-91,765
Flat	-0.070	-0.130	-319	-346	-75,948	-89,417

Table 47: Aggregated flexibility, remuneration, and price per kWh across Ohme and OVO

Pooled treatments	Total flex (kWh)		Remuneration		£/kWh	
	Ohme	OVO	Ohme	OVO	Ohme	OVO
Escalating	161,919	215,868	£145,775	£111,700	£0.90	£0.52
Flat	156,036	196,941	£286,803	£172,800	£1.84	£0.88

4. Discussion

The results from both OVO and Ohme trials offer strong evidence that availability payments can effectively incentivise more frequent EV plug-in. This finding is particularly important given the behaviour observed in the DSRSPs' control groups, where customers typically plugged in only two to three times per week — far less than many energy system models assume when forecasting EV flexibility.[11]

Escalating Payments - i.e., payments linked to performance - led to the larger behavioural shifts. Among OVO participants, weekly plug-in sessions rose by 21% under escalating incentives, compared to 16% for flat incentives; plug-in hours rose 26% and 21% respectively. This suggests that escalating structures more effectively reinforce behaviour, consistent with other studies emphasising the use of dynamic rewards, particularly financial-based (Ito et al., 2018[12]).

Interestingly, behavioural nudges - weekly reminders to plug in - also showed potential to complement payments, particularly as a substitute for reinforcement where escalating payments were not used. We see some evidence that these nudges may be particularly effective to maintain engagement over time. This is broadly consistent with behavioural economics literature on the use of non-financial incentives to help address knowledge-action gaps for personal values as well as material interests (Frederiks et al, 2015[13]). For OVO, nudges increased plug-ins in both incentive arms. However, the effect of nudges appeared weaker in the Ohme escalating arm, suggesting the possibility of saturated attention or diminishing returns when used with existing financial signals.[14]

The greater plug-in availability translated into measurable shifts in electricity demand during events dispatched by NESO. Turn-down events reduced demand by ~38% for OVO and ~18% for Ohme participants, with no significant difference between Flat and

Escalating Payments. Conversely, turn-up events increased demand by 45-52% for OVO and 14-18% for Ohme participants. In turn-up events in OVO's trial, turn-up was greater in the Escalating Payments group. These effects were particularly evident overnight, where escalating payments likely drove more consistent availability.[15] While it is not clear why Ohme's effect sizes were lower than OVO's, it may be due to a sample that contained a more diverse range of customers, including customers who plugged in substantially less and were less engaged in other ways.

In exloratory analysis, the trial also found evidence that availability payments - especially under escalating structures - can drive an increase in home charging demand overall, either as pure demand creation or displacing charging demand from workplaces or public charge points.

Considering cost-effectiveness, escalating payments offered superior value-for-money. OVO's cost per delivered kWh was £0.52 under escalating payments versus £0.88 for flat payments; Ohme saw a similar pattern (£0.97 vs. £1.73).

Overall, the trial underscored the potential of structured availability payments - particularly with an escalating structure or paired with behaviour nudges - to procure meaningful EV flexibility from households. These findings build on and extend prior demand response trials in the UK, but offer insights into availability-based incentives rather than volume-linked rewards. As the UK accelerates its grid decarbonisation agenda, these tools represent a scalable, cost-effective route to enabling demand-side participation from residential EV users.

5. Appendix:

5.1 Balance check results for OVO

The results of OVO's balance checks are presented in Tables 48 - 50.

Estimated annual consumption (EAC): The t-tests revealed no statistically significant differences in baseline EAC between the Escalating Payments group and the control group (t = 0.978, p = 0.328), nor between the Flat Payments group and the control group (t = 0.807, p = 0.420). Furthermore, there was no significant difference in baseline EAC between the Escalating and Flat Payments groups (t = -0.210, p = 0.834).

E7 tariff participation: The Chi-squared tests indicated no statistically significant differences in the proportion of participants on the E7 plan at baseline between the Escalating Payments group and the control group ($\chi 2$ = 0.217, p = 0.642), nor between the Flat Payments group and the control group ($\chi 2$ = 0.011, p = 0.917). Similarly, there was no significant difference in E7 plan participation between the Escalating and Flat Payments groups ($\chi 2$ = 0.640, p = 0.424).

Tenure in years: The t-tests showed no statistically significant differences in customer tenure at baseline between the Escalating Payments group and the control group (t = -0.096, p = 0.924), nor between the Flat Payments group and the control group (t = 0.950, p = 0.342). Additionally, there was no significant difference in baseline tenure between the Escalating and Flat Payments groups (t = 1.259, p = 0.208).

Conclusion of balance check: The non-significant p-values across all comparisons for EAC, E7 plan participation, and tenure in years suggest that the randomisation process was successful in creating treatment and control groups that were balanced on these key baseline characteristics. This provides confidence that any observed differences in the outcomes of the trial are likely attributable to the interventions rather than pre-existing differences between the groups.

Table 48: OVO t-test results - comparing EAC of each group

Group 1	Group 2	t value	P-value
Escalating	Control	0.978	0.328
Flat	Control	0.807	0.420
Escalating	Flat	-0.209	0.834

Table 49: OVO Chi-squared test results - comparing E7 customers in each group

Group 1	Group 2	X-squared	P-value
Escalating	Control	0.217	0.642
Flat	Control	0.011	0.917
Escalating	Flat	0.640	0.424

Table 50: OVO t-test results - comparing tenure of customers in each group

Group 1	Group 2	t value	P-value
Escalating	Control	-0.096	0.924
Flat	Control	0.950	0.342
Escalating	Flat	1.259	0.208

5.2 Full event schedule

Table 51: Full event schedule

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
20/09/2024	15:00:00	5	Weekday	Up	60
20/09/2024	20:00:00	6	Weekday	Down	60
21/09/2024	10:00:00	3	Weekend	Down	60
21/09/2024	16:00:00	5	Weekend	Up	60
21/09/2024	21:00:00	6	Weekend	Down	60
22/09/2024	11:00:00	4	Weekend	Down	60
22/09/2024	17:00:00	5	Weekend	Up	60
22/09/2024	22:00:00	6	Weekend	Down	60
23/09/2024	05:00:00	2	Weekday	Up	30
23/09/2024	06:30:00	2	Weekday	Down	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
23/09/2024	17:00:00	5	Weekday	Up	30
23/09/2024	18:30:00	5	Weekday	Down	30
24/09/2024	06:00:00	2	Weekday	Up	30
24/09/2024	07:30:00	3	Weekday	Down	30
24/09/2024	18:00:00	5	Weekday	Up	30
24/09/2024	19:30:00	6	Weekday	Down	30
25/09/2024	07:00:00	3	Weekday	Up	30
25/09/2024	08:30:00	3	Weekday	Down	30
25/09/2024	19:00:00	6	Weekday	Up	30
25/09/2024	20:30:00	6	Weekday	Down	30
26/09/2024	08:00:00	3	Weekday	Up	30
26/09/2024	09:30:00	3	Weekday	Down	30
26/09/2024	20:00:00	6	Weekday	Up	30
26/09/2024	21:30:00	6	Weekday	Down	30
27/09/2024	09:00:00	3	Weekday	Up	30
27/09/2024	10:30:00	3	Weekday	Down	30
27/09/2024	21:00:00	6	Weekday	Up	30
27/09/2024	22:30:00	6	Weekday	Down	30
28/09/2024	10:00:00	3	Weekend	Up	30
28/09/2024	11:30:00	4	Weekend	Down	30
28/09/2024	22:00:00	6	Weekend	Up	30
28/09/2024	23:30:00	1	Weekend	Down	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
29/09/2024	11:00:00	4	Weekend	Up	30
29/09/2024	12:30:00	4	Weekend	Down	30
29/09/2024	23:00:00	1	Weekend	Up	30
29/09/2024	00:30:00	1	Weekday	Down	30
30/09/2024	12:00:00	4	Weekday	Up	180
01/10/2024	12:00:00	4	Weekday	Down	180
02/10/2024	14:00:00	4	Weekday	Up	60
03/10/2024	14:00:00	4	Weekday	Down	60
04/10/2024	16:00:00	5	Weekday	Up	60
05/10/2024	16:00:00	5	Weekend	Down	60
06/10/2024	18:00:00	5	Weekend	Up	60
07/10/2024	18:00:00	5	Weekday	Down	60
08/10/2024	07:00:00	3	Weekday	Down	60
08/10/2024	13:00:00	4	Weekday	Up	30
08/10/2024	23:00:00	1	Weekday	Down	30
09/10/2024	08:00:00	3	Weekday	Down	60
09/10/2024	14:00:00	4	Weekday	Up	30
09/10/2024	00:00:00	1	Weekday	Down	30
10/10/2024	09:00:00	3	Weekday	Down	60
10/10/2024	15:00:00	5	Weekday	Up	30
10/10/2024	01:00:00	1	Weekday	Down	30
11/10/2024	10:00:00	3	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
11/10/2024	16:00:00	5	Weekday	Up	30
11/10/2024	02:00:00	1	Weekend	Down	30
12/10/2024	11:00:00	4	Weekend	Down	60
12/10/2024	17:00:00	5	Weekend	Up	30
12/10/2024	03:00:00	2	Weekend	Down	30
13/10/2024	12:00:00	4	Weekend	Down	60
13/10/2024	18:00:00	5	Weekend	Up	30
13/10/2024	04:00:00	2	Weekday	Down	30
14/10/2024	06:00:00	2	Weekday	Down	60
14/10/2024	12:00:00	4	Weekday	Up	30
14/10/2024	22:00:00	6	Weekday	Down	30
15/10/2024	00:00:00	1	Weekday	Anti	120
16/10/2024	12:00:00	4	Weekday	Down	30
16/10/2024	16:00:00	5	Weekday	Down	30
16/10/2024	00:00:00	1	Weekday	Up	60
17/10/2024	15:00:00	5	Weekday	Down	60
17/10/2024	01:00:00	1	Weekday	Up	60
18/10/2024	17:00:00	5	Weekday	Down	60
18/10/2024	02:00:00	1	Weekend	Up	60
19/10/2024	16:00:00	5	Weekend	Down	60
20/10/2024	05:00:00	2	Weekend	Down	60
20/10/2024	23:00:00	1	Weekend	Down	120

Public

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
21/10/2024	05:00:00	2	Weekday	Up	60
21/10/2024	21:00:00	6	Weekday	Down	60
21/10/2024	01:00:00	1	Weekday	Up	60
22/10/2024	17:00:00	5	Weekday	Down	60
22/10/2024	00:30:00	1	Weekday	Up	30
23/10/2024	17:00:00	5	Weekday	Down	30
23/10/2024	22:00:00	6	Weekday	Down	30
24/10/2024	05:00:00	2	Weekday	Up	60
24/10/2024	18:00:00	5	Weekday	Down	60
24/10/2024	00:00:00	1	Weekday	Up	120
26/10/2024	08:00:00	3	Weekend	Down	60
26/10/2024	19:00:00	6	Weekend	Up	60
27/10/2024	20:00:00	6	Weekend	Down	120
27/10/2024	03:00:00	2	Weekday	Up	120
30/10/2024	11:00:00	4	Weekday	Up	60
30/10/2024	19:00:00	6	Weekday	Down	60
31/10/2024	16:00:00	5	Weekday	Down	120
31/10/2024	04:00:00	2	Weekday	Up	60
01/11/2024	19:00:00	6	Weekday	Up	60
01/11/2024	03:00:00	2	Weekend	Up	60
02/11/2024	16:00:00	5	Weekend	Down	30
02/11/2024	21:00:00	6	Weekend	Down	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
03/11/2024	16:00:00	5	Weekend	Down	120
04/11/2024	20:00:00	6	Weekday	Down	120
05/11/2024	11:00:00	4	Weekday	Down	120
05/11/2024	04:00:00	2	Weekday	Down	60
06/11/2024	13:00:00	4	Weekday	Down	60
06/11/2024	01:00:00	1	Weekday	Down	60
07/11/2024	07:00:00	3	Weekday	Up	60
07/11/2024	01:00:00	1	Weekday	Down	120
08/11/2024	00:00:00	1	Weekend	Up	120
09/11/2024	00:00:00	1	Weekend	Down	60
10/11/2024	07:00:00	3	Weekend	Up	60
10/11/2024	03:00:00	2	Weekday	Anti	120
12/11/2024	19:00:00	6	Weekday	Up	120
13/11/2024	16:00:00	5	Weekday	Down	120
14/11/2024	19:00:00	6	Weekday	Down	120
14/11/2024	00:00:00	1	Weekday	Anti	120
16/11/2024	11:00:00	4	Weekend	Down	120
16/11/2024	03:00:00	2	Weekend	Up	120
18/11/2024	20:00:00	6	Weekday	Down	120
19/11/2024	08:00:00	3	Weekday	Up	60
19/11/2024	13:00:00	4	Weekday	Down	30
19/11/2024	23:00:00	1	Weekday	Up	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
20/11/2024	09:00:00	3	Weekday	Up	60
20/11/2024	20:00:00	6	Weekday	Up	60
20/11/2024	04:00:00	2	Weekday	Anti	120
22/11/2024	06:00:00	2	Weekday	Down	60
22/11/2024	21:00:00	6	Weekday	Up	60
22/11/2024	03:00:00	2	Weekend	Anti	120
24/11/2024	11:00:00	4	Weekend	Up	60
24/11/2024	20:00:00	6	Weekend	Up	60
24/11/2024	02:00:00	1	Weekday	Down	60
25/11/2024	14:00:00	4	Weekday	Down	60
26/11/2024	16:00:00	5	Weekday	Down	120
26/11/2024	01:00:00	1	Weekday	Up	30
26/11/2024	04:00:00	2	Weekday	Up	60
27/11/2024	18:00:00	5	Weekday	Down	30
27/11/2024	01:00:00	1	Weekday	Up	120
29/11/2024	06:00:00	2	Weekday	Up	60
29/11/2024	23:00:00	1	Weekday	Up	60
30/11/2024	13:00:00	4	Weekend	Up	60
30/11/2024	19:00:00	6	Weekend	Down	60
30/11/2024	01:00:00	1	Weekend	Up	60
01/12/2024	18:00:00	5	Weekend	Down	60
01/12/2024	04:00:00	2	Weekday	Up	120

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
03/12/2024	17:00:00	5	Weekday	Down	30
03/12/2024	21:00:00	6	Weekday	Up	60
04/12/2024	17:00:00	5	Weekday	Down	120
05/12/2024	21:00:00	6	Weekday	Up	120
06/12/2024	16:00:00	5	Weekday	Down	120
06/12/2024	01:00:00	1	Weekend	Anti	120
07/12/2024	04:00:00	2	Weekend	Up	30
08/12/2024	20:00:00	6	Weekend	Up	120
09/12/2024	12:00:00	4	Weekday	Up	60
09/12/2024	17:00:00	5	Weekday	Down	60
09/12/2024	01:00:00	1	Weekday	Anti	120
10/12/2024	04:00:00	2	Weekday	Up	30
11/12/2024	15:00:00	5	Weekday	Down	30
11/12/2024	19:00:00	6	Weekday	Down	30
11/12/2024	00:00:00	1	Weekday	Up	60
12/12/2024	21:00:00	6	Weekday	Down	60
12/12/2024	23:00:00	1	Weekday	Up	120
13/12/2024	22:00:00	6	Weekday	Up	30
14/12/2024	07:00:00	3	Weekend	Down	60
14/12/2024	17:00:00	5	Weekend	Down	60
15/12/2024	05:00:00	2	Weekend	Up	60
16/12/2024	18:00:00	5	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
16/12/2024	22:00:00	6	Weekday	Up	60
16/12/2024	02:00:00	1	Weekday	Down	60
17/12/2024	10:00:00	3	Weekday	Up	60
17/12/2024	22:00:00	6	Weekday	Down	60
17/12/2024	01:00:00	1	Weekday	Up	120
18/12/2024	03:00:00	2	Weekday	Up	120
19/12/2024	12:00:00	4	Weekday	Down	30
20/12/2024	17:00:00	5	Weekday	Down	120
20/12/2024	02:00:00	1	Weekend	Up	30
21/12/2024	15:00:00	5	Weekend	Down	60
21/12/2024	20:00:00	6	Weekend	Up	30
22/12/2024	05:00:00	2	Weekend	Anti	120
05/01/2025	04:00:00	2	Weekday	Up	60
06/01/2025	21:00:00	6	Weekday	Up	60
07/01/2025	23:00:00	1	Weekday	Down	60
07/01/2025	14:00:00	4	Weekday	Up	60
08/01/2025	19:00:00	6	Weekday	Up	120
08/01/2025	03:00:00	2	Weekday	Down	60
09/01/2025	21:00:00	6	Weekday	Up	60
09/01/2025	00:00:00	1	Weekday	Down	30
10/01/2025	11:00:00	4	Weekday	Up	60
10/01/2025	18:00:00	5	Weekday	Down	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
11/01/2025	06:00:00	2	Weekend	Up	60
11/01/2025	19:00:00	6	Weekend	Up	60
12/01/2025	05:00:00	2	Weekend	Down	60
12/01/2025	14:00:00	4	Weekend	Down	60
12/01/2025	02:00:00	1	Weekday	Up	30
13/01/2025	20:00:00	6	Weekday	Up	120
13/01/2025	01:00:00	1	Weekday	Up	60
14/01/2025	07:00:00	3	Weekday	Down	60
14/01/2025	02:00:00	1	Weekday	Up	60
15/01/2025	13:00:00	4	Weekday	Up	60
15/01/2025	00:00:00	1	Weekday	Up	60
16/01/2025	01:00:00	1	Weekday	Down	60
17/01/2025	21:00:00	6	Weekday	Down	60
18/01/2025	13:00:00	4	Weekend	Up	60
18/01/2025	21:00:00	6	Weekend	Down	60
18/01/2025	01:00:00	1	Weekend	Up	60
19/01/2025	13:00:00	4	Weekend	Up	60
19/01/2025	00:00:00	1	Weekday	Up	60
20/01/2025	09:00:00	3	Weekday	Down	60
20/01/2025	23:00:00	1	Weekday	Up	60
21/01/2025	07:00:00	3	Weekday	Down	60
21/01/2025	19:00:00	6	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
22/01/2025	20:00:00	6	Weekday	Down	120
23/01/2025	05:00:00	2	Weekday	Up	60
23/01/2025	12:00:00	4	Weekday	Up	60
24/01/2025	10:00:00	3	Weekday	Down	60
24/01/2025	22:00:00	6	Weekday	Down	60
24/01/2025	04:00:00	2	Weekend	Up	120
25/01/2025	00:00:00	1	Weekend	Up	60
26/01/2025	17:00:00	5	Weekend	Down	30
26/01/2025	19:00:00	6	Weekend	Down	30
27/01/2025	08:00:00	3	Weekday	Down	60
27/01/2025	21:00:00	6	Weekday	Down	60
27/01/2025	01:00:00	1	Weekday	Up	60
28/01/2025	21:00:00	6	Weekday	Up	60
29/01/2025	13:00:00	4	Weekday	Up	60
29/01/2025	17:00:00	5	Weekday	Down	60
29/01/2025	01:00:00	1	Weekday	Down	120
30/01/2025	13:00:00	4	Weekday	Down	30
30/01/2025	01:00:00	1	Weekday	Up	60
31/01/2025	21:00:00	6	Weekday	Up	60
01/02/2025	09:00:00	3	Weekend	Down	60
01/02/2025	21:00:00	6	Weekend	Up	60
02/02/2025	09:00:00	3	Weekend	Down	60

Public

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
02/02/2025	17:00:00	5	Weekend	Down	30
02/02/2025	21:00:00	6	Weekend	Up	60
02/02/2025	04:00:00	2	Weekday	Anti	120
03/02/2025	03:00:00	2	Weekday	Up	60
04/02/2025	16:00:00	5	Weekday	Up	60
04/02/2025	02:00:00	1	Weekday	Down	60
05/02/2025	12:00:00	4	Weekday	Down	60
06/02/2025	05:00:00	2	Weekday	Up	120
06/02/2025	23:00:00	1	Weekday	Anti	120
07/02/2025	14:00:00	4	Weekday	Down	30
08/02/2025	11:00:00	4	Weekend	Up	60
07/02/2025	23:00:00	1	Weekday	Up	120
09/02/2025	06:00:00	2	Weekend	Up	60
09/02/2025	12:00:00	4	Weekend	Down	60
09/02/2025	04:00:00	2	Weekday	Up	60
10/02/2025	14:00:00	4	Weekday	Up	60
10/02/2025	00:00:00	1	Weekday	Down	120
11/02/2025	10:00:00	3	Weekday	Up	60
12/02/2025	06:00:00	2	Weekday	Down	60
12/02/2025	11:00:00	4	Weekday	Up	60
13/02/2025	08:00:00	3	Weekday	Down	60
13/02/2025	18:00:00	5	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
14/02/2025	12:00:00	4	Weekday	Down	30
14/02/2025	19:00:00	6	Weekday	Down	120
14/02/2025	01:00:00	1	Weekend	Down	60
15/02/2025	16:00:00	5	Weekend	Down	60
16/02/2025	14:00:00	4	Weekend	Down	120
16/02/2025	22:00:00	6	Weekend	Down	30
16/02/2025	02:00:00	1	Weekday	Down	60
17/02/2025	14:00:00	4	Weekday	Up	60
17/02/2025	03:00:00	2	Weekday	Up	60
18/02/2025	13:00:00	4	Weekday	Down	60
19/02/2025	11:00:00	4	Weekday	Up	60
19/02/2025	17:00:00	5	Weekday	Down	60
20/02/2025	07:00:00	3	Weekday	Down	60
20/02/2025	15:00:00	5	Weekday	Down	60
21/02/2025	05:00:00	2	Weekday	Up	30
21/02/2025	20:00:00	6	Weekday	Down	60
21/02/2025	00:00:00	1	Weekend	Down	60
22/02/2025	15:00:00	5	Weekend	Down	120
22/02/2025	00:00:00	1	Weekend	Anti	120
23/02/2025	13:00:00	4	Weekend	Down	30
23/02/2025	01:00:00	1	Weekday	Down	30
24/02/2025	22:00:00	6	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
25/02/2025	10:00:00	3	Weekday	Down	60
25/02/2025	17:00:00	5	Weekday	Down	60
25/02/2025	04:00:00	2	Weekday	Down	60
26/02/2025	15:00:00	5	Weekday	Up	60
26/02/2025	04:00:00	2	Weekday	Up	60
27/02/2025	20:00:00	6	Weekday	Up	60
27/02/2025	03:00:00	2	Weekday	Anti	120
01/03/2025	08:00:00	3	Weekend	Up	60
01/03/2025	18:00:00	5	Weekend	Down	60
01/03/2025	23:00:00	1	Weekend	Down	120
02/03/2025	04:00:00	2	Weekday	Down	60
03/03/2025	20:00:00	6	Weekday	Down	60
04/03/2025	12:00:00	4	Weekday	Up	60
04/03/2025	16:00:00	5	Weekday	Down	60
05/03/2025	14:00:00	4	Weekday	Down	60
05/03/2025	19:00:00	6	Weekday	Up	60
06/03/2025	09:00:00	3	Weekday	Down	60
06/03/2025	21:00:00	6	Weekday	Down	60
07/03/2025	20:00:00	6	Weekday	Down	120
07/03/2025	02:00:00	1	Weekend	Down	30
08/03/2025	21:00:00	6	Weekend	Up	120
09/03/2025	06:00:00	2	Weekend	Up	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
09/03/2025	20:00:00	6	Weekend	Down	60
10/03/2025	12:00:00	4	Weekday	Down	60
10/03/2025	22:00:00	6	Weekday	Up	60
11/03/2025	05:00:00	2	Weekday	Down	60
11/03/2025	13:00:00	4	Weekday	Anti	60
12/03/2025	05:00:00	2	Weekday	Up	60
12/03/2025	13:00:00	4	Weekday	Anti	60
13/03/2025	05:00:00	2	Weekday	Down	60
13/03/2025	17:00:00	5	Weekday	Down	60
14/03/2025	13:00:00	4	Weekday	Up	60
14/03/2025	01:00:00	1	Weekend	Up	120
16/03/2025	13:00:00	4	Weekend	Anti	60
16/03/2025	01:00:00	1	Weekday	Down	60
17/03/2025	21:00:00	6	Weekday	Down	60
18/03/2025	13:00:00	4	Weekday	Up	60
18/03/2025	21:00:00	6	Weekday	Down	60
19/03/2025	05:00:00	2	Weekday	Down	60
19/03/2025	17:00:00	5	Weekday	Down	60
20/03/2025	09:00:00	3	Weekday	Down	60
20/03/2025	21:00:00	6	Weekday	Down	60
20/03/2025	01:00:00	1	Weekday	Down	120
21/03/2025	21:00:00	6	Weekday	Down	30

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
22/03/2025	13:00:00	4	Weekend	Anti	60
22/03/2025	01:00:00	1	Weekend	Up	60
23/03/2025	21:00:00	6	Weekend	Up	60
24/03/2025	05:00:00	2	Weekday	Down	60
24/03/2025	13:00:00	4	Weekday	Up	60
24/03/2025	00:00:00	1	Weekday	Down	120
25/03/2025	18:00:00	5	Weekday	Down	30
26/03/2025	11:00:00	4	Weekday	Anti	60
26/03/2025	22:00:00	6	Weekday	Down	60
27/03/2025	19:00:00	6	Weekday	Up	120
27/03/2025	03:00:00	2	Weekday	Down	60
28/03/2025	16:00:00	5	Weekday	Down	60
28/03/2025	04:00:00	2	Weekend	Up	30
29/03/2025	14:00:00	4	Weekend	Up	60
30/03/2025	06:00:00	2	Weekend	Down	60
30/03/2025	19:00:00	6	Weekend	Down	120
31/03/2025	06:00:00	2	Weekday	Down	60
31/03/2025	14:00:00	4	Weekday	Anti	60
31/03/2025	02:00:00	1	Weekday	Down	60
01/04/2025	18:00:00	5	Weekday	Down	60
01/04/2025	23:00:00	1	Weekday	Down	120
02/04/2025	02:00:00	1	Weekday	Down	60

Public

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
03/04/2025	12:00:00	4	Weekday	Down	60
04/04/2025	15:00:00	5	Weekday	Down	120
05/04/2025	11:00:00	4	Weekend	Down	120
05/04/2025	03:00:00	2	Weekend	Down	60
06/04/2025	17:00:00	5	Weekend	Down	60
07/04/2025	20:00:00	6	Weekday	Down	120
07/04/2025	01:00:00	1	Weekday	Down	60
08/04/2025	08:00:00	3	Weekday	Down	60
09/04/2025	12:00:00	4	Weekday	Down	120
09/04/2025	04:00:00	2	Weekday	Down	60
10/04/2025	16:00:00	5	Weekday	Down	60
11/04/2025	18:00:00	5	Weekday	Down	120
11/04/2025	00:00:00	1	Weekend	Down	60
13/04/2025	20:00:00	6	Weekend	Down	60
14/04/2025	14:00:00	4	Weekday	Down	60
14/04/2025	19:00:00	6	Weekday	Down	60
15/04/2025	13:00:00	4	Weekday	Down	60
16/04/2025	21:00:00	6	Weekday	Down	120
17/04/2025	15:00:00	5	Weekday	Down	60
16/04/2025	02:00:00	1	Weekday	Down	60
17/04/2025	00:00:00	1	Weekday	Down	60
18/04/2025	14:00:00	4	Weekday	Down	60

Date	Start time	EFA	Weekday / weekend	Demand response direction	Duration (minutes)
18/04/2025	02:00:00	1	Weekend	Down	60
19/04/2025	22:00:00	6	Weekend	Down	60
20/04/2025	15:00:00	5	Weekend	Down	120
21/04/2025	11:00:00	4	Weekday	Down	120
21/04/2025	02:00:00	1	Weekday	Down	60
22/04/2025	13:00:00	4	Weekday	Down	60
23/04/2025	13:00:00	4	Weekday	Down	120
23/04/2025	00:00:00	1	Weekday	Down	60
24/04/2025	14:00:00	4	Weekday	Down	60
25/04/2025	12:00:00	4	Weekday	Down	120
25/04/2025	03:00:00	2	Weekend	Up	60
26/04/2025	07:00:00	3	Weekend	Down	60
27/04/2025	21:00:00	6	Weekend	Down	120

Table 52: Total event hours

Event type	Minutes	Hours
Turn-down	13890	231.5
Turn-up	8880	148
Anti-symmetric	1800	30
Total	24570	409.5