CrowdFlex: Alpha

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D2.2 – Delivery approach for consumer engagement for trial

Strategic Innovation Fund

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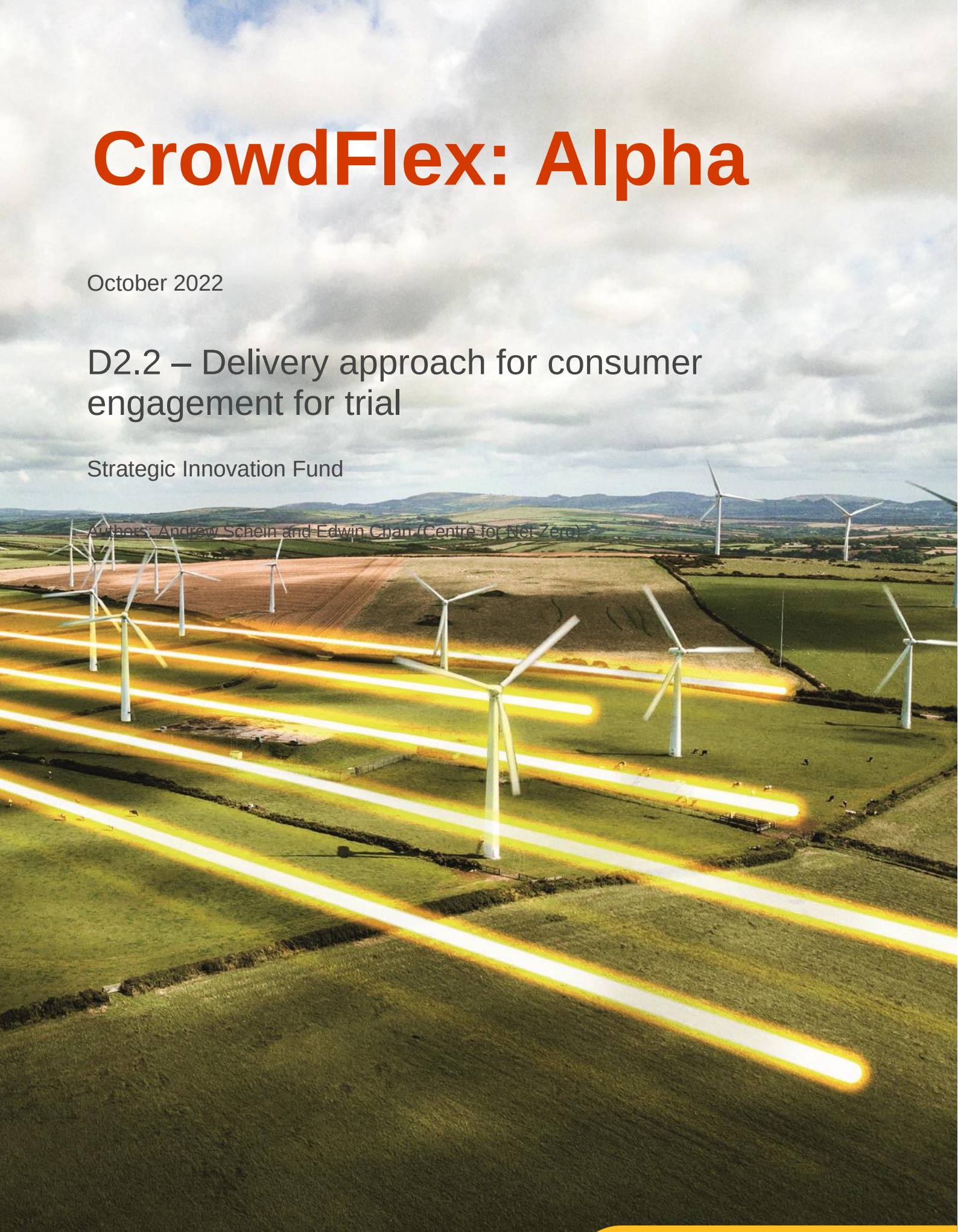

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1 Background and objectives

This task involves developing a high-level delivery approach for the Beta phase of CrowdFlex to identify, recruit, and communicate with consumers, as well as to monitor their engagement/satisfaction and gather feedback from them. This is to ensure the project engages end-customers and feedback is incorporated iteratively into the trial. To do so, we undertook the following activities:

1. A non-systematic literature review (complementing the literature review into consumer flexibility undertake for D2.1) to understand how consumer attributes impact the amount of flexibility delivered; and to understand consumer perspectives on preferred types of incentive structures / reward mechanisms for flexibility.
2. Interviews with relevant third-party organisations to understand key issues related to consumer benefits and impacts in flexibility trials.

This document summarises our findings and knowledge gaps. We recommend a high-level delivery approach for each stage of the trial: (1) initial recruitment, (2) during the trial, and (3) after the trial. We have structured our recommendations within the Behavioural Insights Team's EAST framework[1] to ensure participation in the trial is Easy, Attractive, Social and Timely.

[1] The Behavioural Insights Team. (2014). EAST: Four simple ways to apply behavioural insights. www.behaviouralinsights.co.uk/publications/east-four-simple-ways-to-apply-behavioural-insights. The Behavioural Insights Team (BIT) is a social-purpose consultancy, now wholly owned by Nesta. We generate and apply behavioural insights and conduct evaluations to inform policy and improve products, services, and policies.

2 Summary of our recommendations

In the next sections of this document, we discuss the evidence we have reviewed and the recommendations that we believe follow from that evidence. However, to aid the reader in skimming this document, here we list our main recommendations.

2.1 Recruitment

1. Recruit through two channels: (1) an open invitation and (2) targeted invitations.
2. Refine the recruitment communications through tests with customers to optimise comprehensibility and engagement.

2.2 Comforting customers while maintaining high engagement

3. Use an 'opt-in' design for the programme as a whole, but use an 'opt-out' design for individual events.
4. Emphasise that customers will be able to override automation during the trial – at the start of the trial, and in each event email.
5. Use clear and understandable language and avoid jargon unless absolutely necessary. Use inclusive language.
6. Educate and build trust with consumers, including being transparent on data sharing.
7. Set realistic expectations about participation, performance of technology, and potential bill savings.

2.3 Helping customers plan their responses

8. Communicate the details of the events and set expectations. Give sufficient notice period, e.g., day-ahead for manual response.
9. Show simple steps to reduce energy consumption. If possible, provide steps that are tailored to the participant's energy consumption profile. Also, emphasise steps customers should not take during events – for example, steps that may put the participant in danger, particularly in winter.
10. Ensure our recruitment materials steer customers away from engaging in demand response if doing so would put them at risk.
11. Anticipate common issues and pre-empt them before they escalate, for example by having a 'frequently asked questions' section in recruitment materials.
12. Harness and emphasise social networks where possible, and communicate demand response as the norm (not as a niche).
13. Incorporate push notifications from suppliers' apps to enhance manual turn-down / turn-up capacity among households by increasing events' salience.

2.4 Incentives

14. Continue using financial incentives for participation – while pairing this with an emphasis on the environmental benefits of demand response.
15. Avoid complex incentives. A heuristic we suggest is that one household member should be able to explain the incentive structure to another.
16. If setting goals and targets as in CrowdFlex:NIA, set realistic, achievable goals for participants. However, we note that the Demand Flexibility Service involves no targets at all; instead, customers are compensated per kWh saved below their baseline. We believe that this is a promising alternative design – it is simple to convey and understand, and it means even households with small turn-down or turn-up potential can earn financial rewards from participating.
    a. However, to bolster motivation in situations where turn-down (and thus rewards) may be small, we recommend adding gamified elements, such as the 'OctoPoints' that Octopus Energy will apply to customers participating in Saving Sessions (separate from, and additive to, the financial incentive).

b. And, consider ‘tiered’ pricing: Even a small bit of turn-down achieves a reward, but further turn-down gains disproportionately more rewards.

17. Ensure participants are reimbursed promptly. In addition, provide ways for customers to view previous participation and rewards from the trial – similar to ‘activity logs’ in apps that allow perusal of historical actions and performance, such as banking apps or FitBit.

2.5 Supplementary data collection

18. We also suggest drafting surveys to collect data on customer experience, comfort, understanding of the flexibility event logistics, understanding of the purpose of flexibility, views on and satisfaction with event logistics, and the behaviours customers report employing to shift their demand. We suggest that these surveys be sent at various points during the trial to a random subset of customers – including at the beginning (to obtain baselines) and end of the CrowdFlex program, but also at various points during the program. Ideally, survey completion would be compensated to encourage high participation.

3 Initial recruitment

3.1 Implementation recommendations

We recommend recruiting participants to participate in the trial through two channels: (1) an open invitation and (2) targeted invitations.

In the open invitation, the supplier(s) involved can set up a dedicated webpage to allow their customers to register their interest by entering their email address. This has been used in numerous flexibility trials such as Domestic Scarcity Reserve Trial by ESO and Octopus Energy, Savings Sessions by Octopus Energy (again in collaboration with ESO), Curb Your Power by Powershop, and Flex Alert by Pacific, Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDGE).

The open invitation online should communicate:

- The purpose of the trial.
- Eligibility of participation.
- Rewards for participating in the trial.
- Risks involved for participating in the trial.
- Data sharing and privacy.
- Reassurance on safety issues, e.g., for EV charging customers opting in to automation as part of the flexibility response.
- How to opt out from the programme after opting in.
- How the trial affects the customer's billing and payments for their energy consumption.
- Recommended methods of flexibility provision (such as 'put your dishwasher or washing machine on a few hours delay') to help customers less familiar with demand side response understand the idea.

In the targeted invitation, suppliers should email their customers to invite them to participate in the trial. In a flexibility trial in Japan[2] the researchers recruited participants using a recruitment. All 40,710 residential electricity customers in the Keihanna area received the letter by mail. Only 1,659 customers confirmed their participation (4% signup rate). Our view is that this letter could have been improved by incorporating some of the behavioural insights we list below, thereby increasing the signup rate. (Note that CrowdFlex:NIA and the Demand Scarcity Reserve Trials achieved much higher sign-up rates – nearly 33% of customers that Octopus Energy contacted signed up – perhaps due to the email invitations by Octopus Energy compared to invitations by post in the Japanese study.)

3.2 Make it Easy

Striking the best balance between an opt-out and opt-in design: It is worth considering the pros and cons of using an opt-out design, which would mean that the supplier(s) implicitly *assume* customer participation in the trial, and in individual events. An extreme opt-out design could mean no formal recruitment is needed.

- The supplier(s) might still send an email to customers explaining the way the trial and flexibility events would work. However, in this 'extreme' version of opt-out, the supplier(s) would send *all* customers an invitation to reduce their energy during event windows, giving them an opportunity to opt-out of the event (or the trial as a whole). Customers would still have the choice to participate, or not, but the default would be participation. (This is similar to the set-up pursued by Powershop, an energy retailer in Australia, in a flexibility trial conducted with BIT – we describe this work in more depth below.)
- One of the most robust findings on consumer participation in demand response is that recruitment based on consumers opting-out successfully enrols a far greater proportion of households than opt-in recruitment. A review of 40 domestic pricing field trials and 20 meta-studies on consumer price response

[2] Ito, K., Ida, T., & Tanaka, M. (2018). Moral suasion and economic incentives: Field experimental evidence from energy demand. *American Economic Journal: Economic Policy*, *10*(1), 240-67.

20 meta-studies of responsiveness in field trials of Time-of-Use (ToU) tariffs estimated 20% ToU uptake under opt-in and 80% uptake under opt-out.[3]

- Note that although opt-out is likely to enrol many more households, the total or aggregate demand response delivered does not directly scale up, as many participants enrolled through opt-out recruitment are likely to show little engagement in terms of responsiveness.[4] However, note that this evidence relates to 'routine' flexibility (i.e., flexibility from ongoing/persistent incentives such as ToU tariffs, rather than from 'events').
- There is some evidence that the situation may be different for 'response' (events-based) flexibility. Partnering with Powershop, BIT conducted a RCT to evaluate different recruitment designs on Curb Your Power, a demand flexibility program in Australia. They found that households who were automatically enrolled in the program by default (e.g. put through an 'opt out' journey) used an impressive 13.8% less power during peak times.[5] This was not only because of higher participation than in the business-as-usual arm, but also because curtailment per household was (unexpectedly) *higher* in the automatic enrolment trial arm; this may be because households in this arm had more energy-inefficient appliances that allowed them to curtail electricity consumption more easily. This points to benefits from opt-out journeys that go beyond higher participation – the journeys seem to capture a different *composition* of customers as well (i.e., capturing some lower-engagement customers that opt-in journeys miss).

We recommend a 'compromise' between opt-in and opt-out framing: **making overall program participation 'opt-in' but event-by-event participation 'opt-out'.**[6] We also recommend using opt-out design to receive notifications (SMS, in app notification, email) during the trial. That is, unless customers actively choose not to receive notifications, we will send them notifications related to the trial via email, SMS and in-app notifications.

- Automation has complex interactions with opt-out framing. For ethical and practical reasons, it is important to obtain informed consent and formal opt-in from customers before automating appliances, EV chargers, heat pumps, etc. However, once customers opt in to the overall program, automation has no problem with making event-by-event participation opt-out. (In general, **we recommend a separate targeted email to the cohort of customers we explicitly want to automate – for now, given current consortium members, that would mean all Ohme customers and all Intelligent Octopus customers.**
- For customers manually turning down or up their consumption, we think there are benefits to this set-up as well. By obtaining informed consent and formal opt-in to the program as a whole, the supplier(s) ensures that only customers who want to participate receive emails about CrowdFlex. However, by changing each event to 'opt-out', we will reduce frictions associated with customers manually turning down or up their energy consumption in response to an event announcement.

Opt-out framing is closely related to an important concept in behavioural economics: the strong anchoring influence of **defaults** on people's decisions and revealed preferences. Defaults (by definition) require less engagement, effort, interest, or informedness. However, customers also often see defaults as subtle recommendations or signals of safety. In a randomised controlled trial amongst German energy customers, setting the default choice to more expensive 'green' energy (that is, where consumers have to actively opt out if they do not want it) increased purchases of such nearly tenfold, from approximately 7% to approximately 70% uptake.[7] Follow-up experiments indicated that the power of the default on tariff choice was not driven by

[3] The Value of TOU Tariffs in Great Britain: Insights for Decision-makers, a report for Citizens Advice (Vol. 1). Retrieved from https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/the-value-of-time-of-use-tariffs-in-great-britain/

[4] The Value of TOU Tariffs in Great Britain: Insights for Decision-makers, a report for Citizens Advice (Vol. 1). Retrieved from https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/the-value-of-time-of-use-tariffs-in-great-britain/

[5] Behavioural Insights Team (2017): Applying Behavioural Insights to Powershop's Curb Your Power program. Retrieved from: https://arena.gov.au/assets/2017/12/applying-behavioural-insights-powershops-curb-your-power.pdf

[6] If new customers join a supplier, or join an automated tariff, part-way through the trial, a question is whether they will have the chance to opt in to the program to participate in the (remaining) events? We recommend that they *should* be able to do so, if it is feasible for the supplier(s). Their consumption behaviour may be particularly relevant to investigate as a subgroup of interest.

[7] Ebeling, F., & Lotz, S. (2015). Domestic uptake of green energy promoted by opt-out tariffs. Nature Climate Change, 5(9), 868.

unawareness amongst customers. A more recent analysis of German customers' energy tariff choices exploited regional variation in how often green tariffs were the default, finding that automatically enrolling customers onto green tariffs increases the popularity of these tariffs.[8] These data points provide interesting evidence of defaults' ability to change preferences; we urge the CrowdFlex program to use them thoughtfully.

Use clear and understandable language: As recommended by Energy Systems Catapult (ESC), we should try to use simple, clear language and avoid jargon or overly complicated sentences during recruitment.[9] We recommend using online tools[10] and copy editors to proofread the recruitment materials to ensure they are easy to understand by a layperson. For example, we recommend using physical examples to accompany abstract concepts like kWh (such as how many hours of oven time or dishwasher loads) and CO2e (such as how many flights from London to New York City). We also recommend user-testing online materials to ensure customers understand the materials key messages (see separate section on *testing before full trial implementation*).

3.3 Make it Attractive

Incentivise to participate: A review of demand response programs and surveys related to demand response found that financial and environmental benefits were the most common motivations for people to participate in demand response programs. Financial benefits were typically more important than environmental ones.[11] Interestingly, some users in a UK focus group about automated demand response stated that bill reductions were more appealing than rewards or other financial incentives for automation.[12] A US study finds approximately 50% of respondents are willing to participate in a direct-load-control scheme utilising a smart thermostat designed to reallocate consumer electricity demand on summer days when grid stress is high at a median willingness-to-accept figure of USD 9.50 per month that lasts for one summer (June through August), or slightly less than USD 30 per annum.[13]

Framing the reward: A debate in many areas of behavioural science concerns whether framing an incentive as avoiding a *loss* is more motivating than framing the incentive as a *gain*. The evidence is not consistent on this question with regards to demand response. A review of demand response programs in Switzerland suggested that a 'loss' framing (e.g. 'you can prevent an additional fee of £X per month on your electricity bill') is at least as effective (but not necessarily more so) as a 'reward' framing (e.g. 'you will receive a discount of £X per month on your electricity bill') in engaging customers to participate in a demand-response program.[14] However, we note here that this loss versus gain framing is purely semantic – there might be larger differences where the framing is more meaningful, such as giving customers windfalls in cash (arguably a 'gain frame') versus reducing the bill (arguably a 'loss frame').

Emphasise the carbon environmental benefits of demand response: Environmental benefits are one of the most common motivations of customer behaviour change with respect to their energy consumption.[15] However, the potential environmental benefits of participating in demand response may not be obvious to

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[8] Kaiser, M., Bernauer, M., Sunstein, C. R., & Reisch, L. A. (2020). The power of green defaults: the impact of regional variation of opt-out tariffs on green energy demand in Germany. Ecological Economics, 174, 106685.

[9] Trialling with disabled consumers: Enabling energy innovation to be inclusive. Retrieved from https://es.catapult.org.uk/report/trialling-with-disabled-consumers-enabling-energy-innovation-to-be-inclusive/

[10] For example, Hemingway Editor https://hemingwayapp.com/ or the Crystal Mark by the Plain English Campaign.

[11] Parrish, B., Heptonstall, P., Gross, R., & Sovacool, B. K. (2020). A systematic review of motivations, enablers and barriers for consumer engagement with residential demand response. *Energy Policy*, *138*, 111221.

[12] Buchanan et al. (2016) Grid4EU DEMO6 - dD6.8-1 Assessment of the Social Behaviour of the Residential Customers after on Site Tests. Grid4EU.

- Note that this preference is potentially an example of loss aversion – reducing your expenses is more appealing than increasing your income. It may also be related to proportional price evaluation: where saving £50 is, for example, 30% off your monthly energy bill, but earning £50 is only a 2% bonus on your monthly income.

[13] Kaczmarski, J., Jones, B., & Chermak, J. (2022). Determinants of demand response program participation: Contingent valuation evidence from a smart thermostat program. *Energies*, *15*(2), 590.

[14] Gamma, K., Mai, R., Cometta, C., & Loock, M. (2021). Engaging customers in demand response programs: The role of reward and punishment in customer adoption in Switzerland. *Energy Research & Social Science*, *74*, 101927.

[15] Dütschke, E., & Paetz, A. G. (2013). Dynamic electricity pricing—Which programs do consumers prefer?. *Energy Policy*, *59*, 226-234.

customers, for example because customers may note that their *total* electricity use may remain unchanged.[16] This points to the need for some explanation (as Octopus Energy did in CrowdFlex:NIA and the Demand Scarcity Reserve Trials) of *why* demand response is environmentally beneficial. In general, **we recommend linking customer actions to consequences, either on the individual level or scaled across all participants** (e.g., 'As a result of all X,000 people turning {up, down}, we collectively saved Y tonnes of CO2, equivalent to Z!').

3.4 Make it Social

Harnessing social networks: In a Western Power trial of new ways to optimise solar PV and in-home battery storage, researchers noted that participants expressed pride in their participation, and even discussed it with neighbours. They also reported being encouraged by children to be more environmentally friendly (and enjoyed that their participation in the Western Power trial was a way to show the children that they were trying to do so).[17]

Another program, Flex Alert, made explicit use of certain social network features by showing the number of participants in each postcode.[18] Our interpretation of this design is that it suggests a social norm to customers – showing visually that other customers are joining in too, implying social acceptability and desirability.

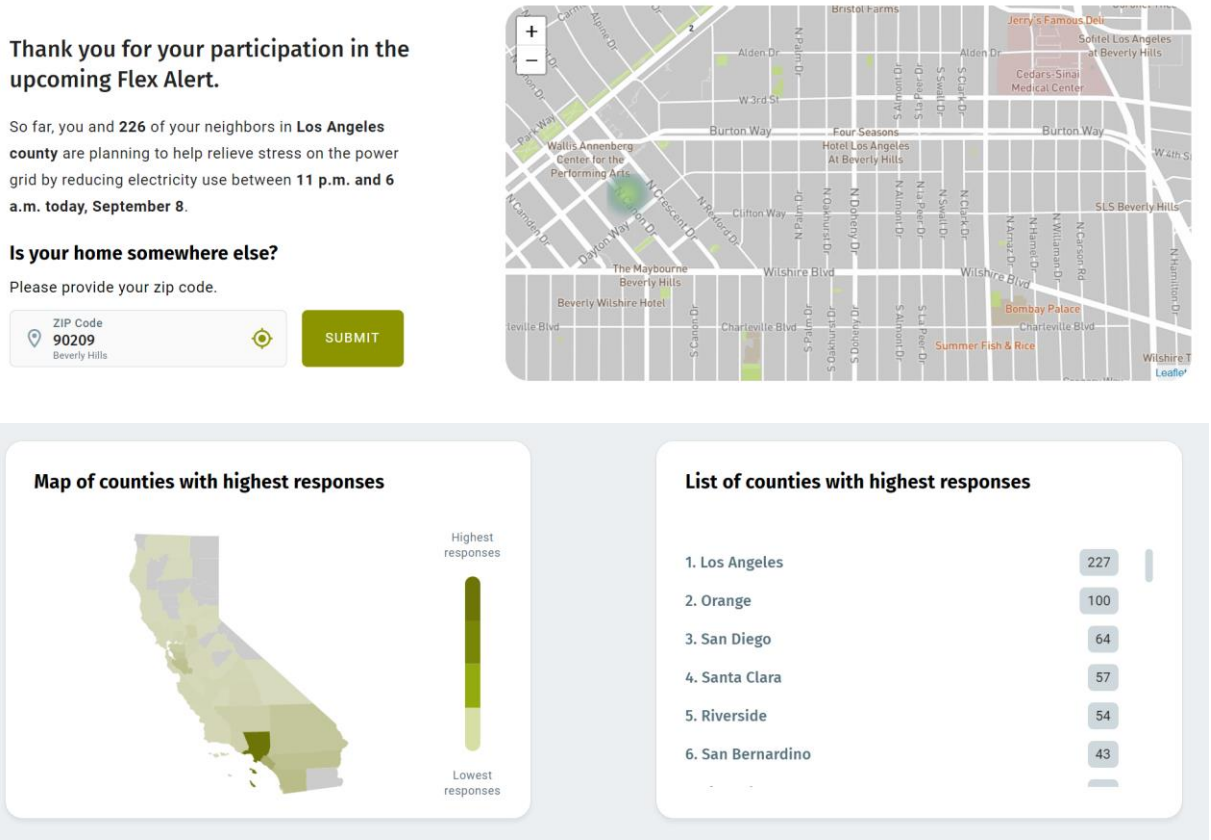

Figure 3-1 : Flex Alert showing the number of participants in each postcode

This social norm is connected to another key concept from behavioural science – the strong influence of people's instinct towards reciprocity. Demand-shifting behaviours reduce the marginal electricity costs, and therefore system operational costs, which benefits everyone. We speculate that communications should emphasise this, for example noting what other stakeholders and consumers are doing to ensure a resilient, green energy system and imploring customers to participate too – in short, 'everyone needs to do their bit.'

[16] Hall, N.L., Jeanneret, T.D., Rai, A., 2016. Cost-reflective electricity pricing: consumer preferences and perceptions. Energy Policy 95, 62–72
[17] Western Power Distribution, 2016. SoLa Bristol SDRC 9.8 Final Report. Western Power Distribution, Bristol. https://www.westernpower.co.uk/downloads-view-reciteme/2527
[18] Screenshot from: https://participate.flexalert.org/sign-in/success

BIT has found this framing to be effective in diverse contexts, including organ donation[19], job fair attendance[20], and charity donations[21]. We think reciprocity might be a useful framing to discuss cost of living issues (discussed below).

Educate and build trust with consumers, including being transparent on data sharing: As noted in D2.1 (formal Literature Review), energy consumers' views on data sharing and smart devices, engagement from energy consumers will be vital in the transition to a low carbon and high-tech market.[22]

Citizens Advice notes the importance of explaining data sharing in a transparent way when engaging with customers when introducing innovative products and services.[23] This transparency will be especially important where the data will be used by multiple consortium partners. Our view is that, where possible, information about data sharing and privacy should incorporate language about the prosocial, environmental benefits of the overall trial. For example, Ecobee's Donate-Your-Data program asks customers to 'donate' their data to 'help scientists advance the way to a sustainable future'.[24]

Use inclusive language: As advised by ESC, we should be cautious with our language when we recruit vulnerable customers and be aware of language or phrases that might make them uncomfortable or that they may find offensive. ESC recommends: 'Disabled people should not be referred to collectively as "the disabled" or with medical labels such as "patients". We should avoid talking about people's different abilities or needs in negative terms – for example a wheelchair user may not consider themselves 'confined' to their wheelchair – and think instead of their wheelchair as a mobility aid.'[25] We recommend following the Government's guidance[26] on using inclusive language and words to use and avoid when writing about disability.

3.5 Make it Timely

Communicate the details of the events and set expectations: A flexibility trial in California found that the main reason for attrition during the trial was 'likely associated' with a lack of demand response events during the winter.[27] Hence, it is important to set expectations with participants on how often events will be during the trial, and how this may vary by time of year. We understand that there is a trade-off between setting concrete expectations from the start (e.g., promising at least one event per week) and maintaining trial flexibility, and the possibility of randomising customers into groups that feature different event frequency. Ultimately, we urge CrowdFlex consortium partners to be as concrete in setting expectations from the start as possible.

Discussion of cost-of-living concerns: Cost-of-living concerns are salient, but sensitive. Although participating in the CrowdFlex trials may cause customers to save money, we caution against setting their expectations excessively high on the savings they may achieve. That said, it is legitimate to note that the high

[19] Cabinet Office Behavioural Insights Team (2013). *Applying behavioral insights to organ donation.* (People were more likely to sign up to be organ donors if messages asked 'If you needed an organ transplant, would you have one? If so please help others.')
[20] Sanders, M & Kirkman, E. (2014). I've booked you a place. Good luck: A field experiment applying behavioural science to improve attendance at high-impact recruitment events. *Centre for Market and Public Organisation Working Paper Series No. 14/334.* (Jobseekers' advisors who wrote 'I've booked you a place' on recruitment event invitations increased the jobseekers' attendance.)
[21] Cabinet Office Behavioural Insights Team (2013). *Applying behavioural insights to charitable giving.* (Giving people a small packet of sweets raised donation rates by seven percentage points.)
[22] Clear and in control: Energy consumers' views on data sharing and smart devices; https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/clear-and-in-control/
[23] Citizens Advice (2019). Clear and in control: Energy consumers' views on data sharing and smart devices, Retrieve from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/clear-and-in-control/
[24] https://www.ecobee.com/donate-your-data/
[25] Trialling with disabled consumers: Enabling energy innovation to be inclusive. Retrieved from https://es.catapult.org.uk/report/trialling-with-disabled-consumers-enabling-energy-innovation-to-be-inclusive/
[26] https://www.gov.uk/government/publications/inclusive-communication/inclusive-language-words-to- use-and-avoid-when-writing-about-disability
[27] Identifying effective demand response program designs for residential customers. Retrieved from: https://innovation.luskin.ucla.edu/wp-content/uploads/2021/01/Identifying-Effective-Demand-Response-Program-Designs-for-Residential-Customers.pdf

cost of energy in peak times of day is a major reason for high energy prices in general – and note that customers are on the cutting edge of addressing this systemic problem. As discussed in D2.1:

> *'[The fact that some customers can provide energy flexibility services] paves the way to the provision of service quality costs for those who in principle do not have that ability… CrowdFlex should note and consider the system cost benefit from a proportion of the total possible market of domestic households and quantify the cost savings for those who do not actively engage in flexibility, not just those who do.'*

3.6 Issues to be aware of

The importance of brevity: People systematically underrate the importance of brief, concise communications.[28] Simplifying language and reducing email length consistently improve engagement.[29] Despite the large number of recommendations we list above, CrowdFlex:Beta partners must be careful to avoid creating communications that are longer and more cumbersome than necessary. Pre-testing (described below) may help here – giving the consortium some early feedback on perceptions about length and understanding about messages.

Automation: Automated demand response has the potential to become a source of consumer anxiety. A poll commissioned by the UK Energy Research Centre found that 40 percent of consumers felt negatively about automation. Interestingly, views differed with respect to appliance type – automation of fridges and freezers was the most unpopular (47% reported this was unacceptable), whereas automation of wet goods was more acceptable (only 32% reported this was unacceptable).[30]

A Citizens Advice report on demand response notes that automation in any form poses questions of who manages the risk of mishaps, who is accountable, and who has control over appliances.[31] The Citizens Advice authors note: 'A key protection will be the provision of an override function that is easy to identify and use, and can be used at the consumer's discretion without incurring a financial penalty other than forgoing the incentive to use off-peak power.' Insofar as this might limit the 'effectiveness' of automated demand response, they argue that 'the essential principle is that automation should be a tool to help consumers shift their usage if they wish to do so, not a way of forcing them to'. This principle underpinned CrowdFlex:NIA and should continue to underpin the automation involved in CrowdFlex.

Citizens Advice also argues that the majority of automation should take place when consumers are unaware of it. We believe this is an oversimplification; desirable automation can still be noticed, and undesirable automation might go unnoticed, but overall we do agree that 'noticeability' is an interesting heuristic for demand response automation that works well.

From the perspective of recruitment communications, **our main recommendation is that the CrowdFlex consortium should emphasise that customers will be able to override automation during the trial.** We also recommend conducting accessibility testing prior to full trial launch (described further in the section on *testing before full trial implementation*).

Vulnerable customers: In the Citizens Advice report discussed above, the authors emphasised that the impact on different vulnerable consumer groups needs to be considered in flexibility trials[32] – first, to ensure

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[28] Rogers, T. (2022). How to Write so Busy People Will Read. Bloomberg Harvard City Leadership Initiative. Retrieved from: https://assets-global.website-files.com/60f998ee966fd623d55b7838/61156a515b7f134ed5cd3923_Leadership%2BEssentials%2BSlides%2BApril%2B22.pdf

[29] Lasky-Fink, J., Robinson, C. D., Chang, H. N. L., & Rogers, T. (2021). Using behavioral insights to improve school administrative communications: The case of truancy notifications. *Educational researcher*, *50*(7), 442-450.

[30] UKERC (2013), Transforming the UK Energy System – Public values, attitudes and acceptability, Retrieve from: https://ukerc.ac.uk/publications/transforming-the-uk-energy-system-public-values-attitudes-and-acceptability/

[31] Citizens Advice (2014): Take a walk on the demand side, Retrieved from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/take-a-walk-on-the-demand-side/

[32] Citizens Advice (2014): Take a walk on the demand side, Retrieved from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/take-a-walk-on-the-demand-side/

that they are not negatively affected by DSR, and second to empower them to share in its benefits. The authors note that vulnerable customers include:

- Older people.
- Low-income and fuel poor households.
- People with disabilities.
- People who do not use the internet.
- People who speak little or no English.
- Renters.
- Families with young children

During the trial, there may be methodologies to identify vulnerable customers (for example, participation in the Warm Homes Discount); but some of these attributes (e.g., internet access, language, family composition) may be unmeasurable in the trial. So **the default assumption in all communications is that we are speaking with someone who may be a vulnerable customer**, and so it should be front and centre of recruitment materials.

In a series of semi-structured interviews with UK customers, a separate Citizens Advice report found that health and comfort are key drivers of high electricity use.[33] This is particularly true for older customers and customers with children, who the researchers found were likely to use electric heaters for health reasons, for example, or have higher cleanliness requirements (particularly if they had young children or medical conditions) that required more regular washing machine use. The report also found evidence of customers with health conditions engage in self-rationing strategies such as (1) keeping one room in the house warm, (2) only boiling one cup of water at a time (3) using thermoses to keep water warm and (4) using hot water bottles to keep warm if ill. Insofar as demand response could lead to self-rationing, we need to **ensure our recruitment materials steer customers away from engaging in demand response if doing so would put them at risk**.

Mistrust: A systematic review of flexibility trials[34] found that mistrust can arise before and after enrolment due to:

- Technology not working as expected, and technical issues causing snags in consumer journeys;
- Lack of clarity around what demand response involves and who it benefits;
- Concerns around privacy and autonomy connected to direct load control;
- Lack of clarity on why energy companies pursue demand response programs.

To build trust with participants, it is important to:

- Address customers' questions and issues promptly;
- Anticipate common issues and pre-empt them before they escalate, for example by having a 'frequently asked questions' section in recruitment materials;
- Set realistic expectations about participation, performance of technology, and potential bill savings.

[33] Citizens Advice (2020): Understanding high and low electricity usage. Retrieved from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/understanding-high-and-low-electricity-usage/

[34] Parrish, B., Heptonstall, P., Gross, R., & Sovacool, B. K. (2020). A systematic review of motivations, enablers and barriers for consumer engagement with residential demand response. *Energy Policy*, *138*, 111221.

4 During the trial

4.1 Make it Easy

Avoid complex incentives: High complexity and effort associated with demand response can reduce consumer engagement before and after enrolment, especially where customers are confused or uncertain about how to react to complex pricing schedules.[35]

- **A heuristic we suggest is that one household member should be able to explain the incentive structure to another.**
- However, there is some nuance to this point. More predictable pricing schedules are seen as less complex than unpredictable ones. And, of course, enabling technologies, including automation, can reduce the effort involved in responding to complex pricing schedules.[36] Our view is that simple pricing and incentive structures are best for motivating manual turn-down or turn-up. Automated dispatch can cope better with complex pricing and incentives, but even for customers with automated dispatch capability, we emphasise that incentive comprehensibility is important to encourage high rates of consent for the automation.

Opt-out for Ohme users, and other managed charging users (e.g., Intelligent Octopus): As discussed in our section on initial recruitment, for EV customers with Ohme chargers, we recommend adopting an opt-out design *once we obtain their consent during the initial recruitment stage*. That is, we recommend not actively asking these customers whether we can automatically control their EV chargers on an event-by-event basis. This design is similar to ecobee's pilot program with San Diego Gas & Electric (SDGE).[37] Ecobee sent users a notification if SDGE had informed ecobee of an expected grid emergency within the next 24 hours. The notification was sent to users via mobile app. Customers could opt out, but if they did not, Ecobee would modulate their thermostat to keep their home 1 to 4 º Fahrenheit cooler or warmer than usual (in order to use less electricity for air conditioning). When the participant received the notification before the event, they were able to choose not to participate in the event by selecting '**Skip this time**'. However, if they did not choose to skip, they automatically participated. As noted, we believe this is a sound basis for CrowdFlex's default customer journey, too.

Show simple steps to reduce energy consumption: Customers are more likely to act on a message if it is easy to understand. Another California program, Flex Alert, provided actionable tips for preparing before the event and how to reduce energy consumption during the event.[38] By giving an easy-to-follow guide, our hypothesis is that customers feel more capable of achieving meaningful turn-down or turn-up, making them more likely to engage and more likely to achieve larger electricity consumption change.

[35] Ito, K. (2014). Do consumers respond to marginal or average price? Evidence from nonlinear electricity pricing. *American Economic Review*, *104*(2), 537-63.
[36] Parrish, B., Heptonstall, P., Gross, R., & Sovacool, B. K. (2020). A systematic review of motivations, enablers and barriers for consumer engagement with residential demand response. *Energy Policy*, *138*, 111221.
[37] See: https://support.ecobee.com/s/articles/eco-Frequently-Asked-Questions and https://www.ecobee.com/en-us/newsroom/press-releases/ecobee-launches-pilot-program-with-california-utility-to-help-prevent-power/
[38] https://www.flexalert.org/save-energy/energy-saving-tips

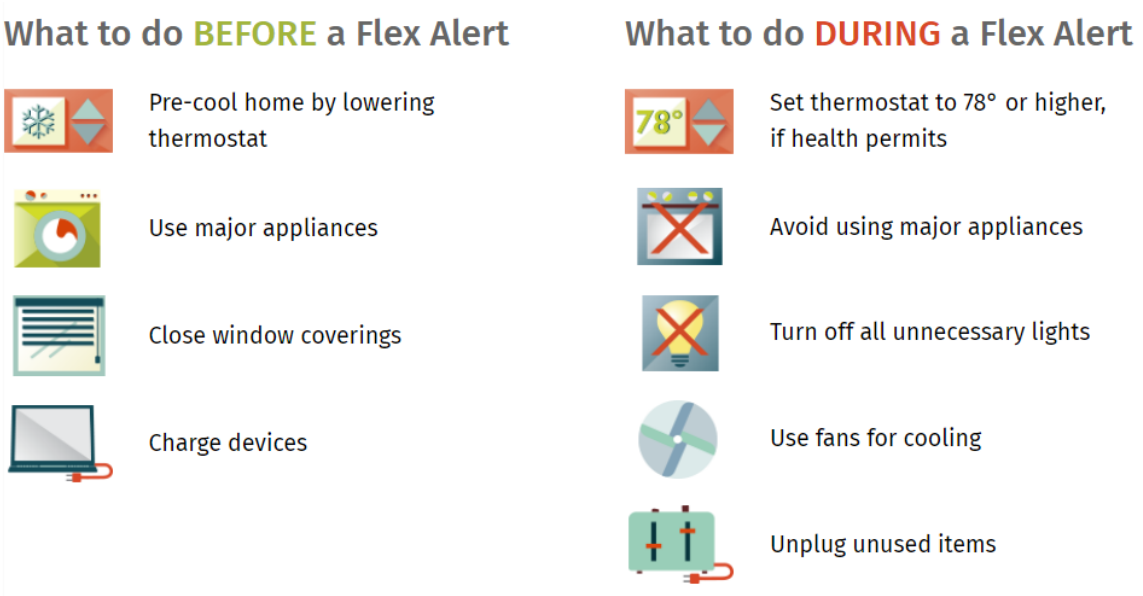

Figure 4-1: Flex Alert's 'tips' to reduce energy consumption during an event in California

In addition to recommending concrete steps to reduce energy consumption, **we recommend providing steps that are tailored to the participant's energy consumption profile,** for example, disaggregated by high-level appliance category (if possible).

- Note that there is somewhat mixed evidence on disaggregation's promise in reducing energy consumption overall. Customers exposed to disaggregated energy information reduced their energy consumption by 14% in a small-sample quasi-experimental trial with 330 customers in California.[39] In theory, providing more detailed information on energy consumption, including coarse appliance-level energy disaggregation, customers can identify particularly relevant opportunities for energy reduction. However, a systematic review of 12 studies found that the benefits compared to aggregate consumption feedback appear to be small. Kelly and Knottenbelt found a weighted average energy reduction of 4.5% from disaggregated energy feedback, compared to 3% reduction from aggregate energy feedback.[40] No studies directly compared energy savings from feedback about disaggregated versus aggregate consumption, and no studies that we know of look at disaggregation in the context of *demand response* specifically.
- That said, there are simpler ways to personalise the recommended steps. Octopus Energy knows which customers have EVs and can make sure to only serve EV-related recommendations to these customers.

Finally, it is important to **emphasise steps customers should *not* take during events – for example, steps that may put the participant in danger**. These include switching off refrigerators, freezers, medical equipment, and any other items that require constant electricity for hygiene, health, and safety.

4.2 Make it Attractive

Set realistic, achievable goals for participants: One-off events of the type CrowdFlex:NIA used gave customers a clearly defined energy saving target to achieve within a certain period of time. A study in the US found that giving customers the opportunity to set goals increased sign-up to an energy saving program – even when the goal was non-binding and did not involve any financial reward.[41] Participants in the program subsequently reduced their energy consumption, achieving savings of nearly 11% if they chose a realistic goal (though note the average effect size among customers who set goals was a 4.4% reduction). Behavioural

[39] Gupta, A., & Chakrabarty, P. (2013). Impact of energy disaggregation on consumer behavior. In Behaviour, Energy and Climate Change Conference.
[40] Kelly, J., & Knottenbelt, W. (2016). Does disaggregated electricity feedback reduce domestic electricity consumption? A systematic review of the literature. arXiv preprint.
[41] Harding, M., & Hsiaw, A. (2014). Goal setting and energy conservation. *Journal of Economic Behavior & Organization*, *107*, 209-227.

scientists agree generally that 'goals that are too easy may be boring while goals that are too hard cause frustration'.[42] With these points in mind:

- Our overarching recommendation is that the supplier(s) and consortium partners set achievable, realistic targets for customers to achieve a financial reward – one that, for example, at least 50% of *participating* customers would be able to achieve, based on CrowdFlex:NIA data. This would mean setting goals that are *less* ambitious than in CrowdFlex:NIA; e.g. 20-30% rather than 30-40% deviations from 'baseline'.
- However, we note that the Demand Flexibility Service involves *no* targets at all; instead, customers are compensated per kWh that they turn down below their baseline. We believe that this is a promising alternative design – it is simple to convey and understand, and it means even households with small turn-down or turn-up potential can earn financial rewards from participating.
- A happy medium might be 'tiered' pricing: Even a small bit of turn-down achieves a reward, but further turn-down gains disproportionately more rewards. For example, 'Save 0-X kWh - you get £x per kwh; save X-Y kwh, you get £2x per kwh.' (Indeed, Octopus Energy's rewards in the Windy Turn Up were tiered in a similar fashion.)
- In addition, to bolster motivation in situations where turn-down (and thus rewards) may be small, we recommend adding gamified elements, such as the 'OctoPoints' that Octopus Energy will apply to customers participating in Saving Sessions (separate from, and additive to, the financial incentive).
- Finally, we note that the supplier(s) should probably communicate goals to customers *regardless* of the incentive. For example, 'in previous events, you reduced {/ increased} your use by X% – can you beat your personal record?' Or, 'in previous events, customers reduced {/ increased} their use by X%, on average – can you beat the average?'

Financial incentives: An RCT conducted in Japan evaluated whether financial incentives[43] or a simple request[44] were more successful at generating energy reduction in a flexibility trial.[45] Among the group receiving the 'simple request', customers' peak-time (a 3-hour window) electricity usage fell by 3.1% on summer days and by a similar magnitude the peak-time period on winter days. The level of the reduction was much larger for the individuals who received the financial incentive, though: 15.4% during the summer, and a similar magnitude during the winter. The authors also found that the 'simple request' customers' reduction diminishes over time (i.e., in later events), whereas there was no diminishing effect seen among customers who received the financial incentives.

[42] Uetake, K., & Yang, N. (2018). Harnessing the small victories: Goal design strategies for a mobile calorie and weight loss tracking application. *Available at SSRN 2928441*.
[43] *'You will be charged high electricity prices during the critical peak demand hours on peak demand days. The critical peak price will be either 65, 85, or 105 cents per kWh.' (note: baseline price = 25)*
[44] *'Energy conservation will be required for the society during the critical peak demand hours on peak demand days, in which electricity supply would be very limited relative to demand. Please reduce your electricity usage during the critical peak hours.'*
[45] Ito, K., Ida, T., & Tanaka, M. (2018). Moral suasion and economic incentives: Field experimental evidence from energy demand. *American Economic Journal: Economic Policy*, *10*(1), 240-67.

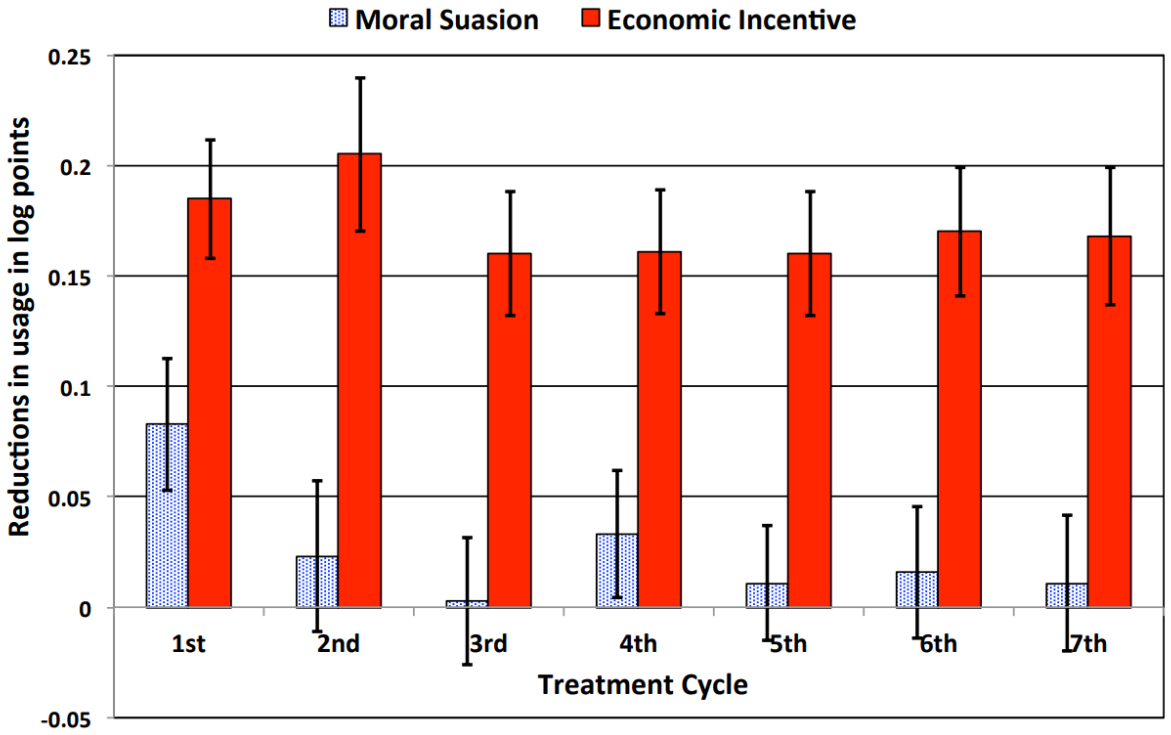

Figure 4-2: Comparing the effect of a simple request[46] and financial incentive on energy consumption in a flexibility trial in early and later events

To ensure enduring participation over time, we suggest providing financial incentives to participants for turning down (or turning up, depending on the event), in line with the design of CrowdFlex:NIA and the Demand Flexibility Service. Gamification, discussed below, is another (complementary, or substitute) method to ensure endured participation

Make it salient: In an RCT conducted in the US, researchers evaluated whether customers were more sensitive to price changes if they were given an in-home-display.[47] Households only experiencing price increases reduce demand by 0 to 7%, whereas those also given the IHD exhibited a usage reduction of 8 to 22%, depending on the amount of advance notice. The authors suggest that being aware of an event is important, and they found customers who are given an IHD are more than 6 percentage points more likely to be aware that a pricing event was occurring. Although it would likely be infeasible to incorporate special IHD provision as part of CrowdFlex, this result does suggest that **push notifications from suppliers' apps could be an important catalyst for manual turn-down capacity among households.**

4.3 Make it Social

Gamification: A small qualitative study interviewing participants in a dynamic peak pricing trial on household cooling practices in the Australian state of New South Wales found that many participants saw participation as fun and interesting.[48] For example, one man noted: 'We use it as a bit of fun. … "Okay, it's a red light – candles everybody!"' A woman noted: 'We're probably taking it to the extreme but we've made a bit of fun out of it.' We understand that Octopus Energy has found this to be the case, too, in its demand response events and programs. Leaning into the 'game' and social elements of demand response could increase recruitment success and help maintain engagement – for example, by showing households how they rank in terms of their response compared to other households.

Indeed, **leveraging social norms** has a rich history in applying behavioural insights to energy consumption. As social creatures, we judge the appropriateness of our actions based on the behaviour of our peers. Information on how others behave – a 'descriptive' social norm – can help align our behaviour with that

[46] "Moral suasion" refers to the simple request
[47] Jessoe, K., & Rapson, D. (2014). Knowledge is (less) power: Experimental evidence from residential energy use. *American Economic Review*, *104*(4), 1417-38.
[48] Strengers, Y., 2010. Air-conditioning Australian households: the impact of dynamic peak pricing. Energy Policy 38 (11), 7312–7322. https://doi.org/10.1016/j. enpol.2010.08.006

norm.[49] This is one of the most well-documented findings in behavioural science. 'Injunctive' social norms then explicitly give cues regarding the acceptability of a social behaviour. In both cases, when effective, the external norm is translated into an internal goal.

Note that famous communication campaign backfires involve a conflict between an injunctive and descriptive social norm. Campaigns against incorrect hand-washing techniques that note how frequently people use the wrong technique to wash their hands transmit the (injunctive) norm that good hand-washing technique is desirable but may simultaneously send the message that the (descriptive) norm is to cut corners while washing one's hands. This conflict is sometimes called the 'Big Mistake'[50] – to avoid it, service designers must align a message's descriptive *and* injunctive norms. Indeed, evidence shows that when injunctive and descriptive norms work together, they reinforce each other.[51]

Figure 4-3: A University of Utah poster potentially making the 'Big Mistake' – exhorting people to do a behaviour while simultaneously informing them that the behaviour is uncommon

An upshot for demand flexibility trials' communications to customers is that we should default towards describing other customers as doing the desirable, demand-shifting, behaviour – rather than pitching demand-shifting as unusual, niche, or eccentric. There are interesting ways this can blend with push notifications and email communications; for example, we could tell customers that, if they were successful, they were 'among the 78% of people who successfully turned down in this event, and you were one of them!' At the same time, we would want to be cautious of pointing out when people were in the *minority* of successful participants.

The classic study of social norms in energy consumption involved 39,217 electricity customers in Minnesota who received monthly home energy reports, quarterly home energy reports, or no home energy report.[52] [53] The home energy reports provided information on strategies to conserve energy, but, crucially, also compared the household's electricity consumption to its one hundred nearest geographical neighbours in houses of comparable size (and rated how the household was doing, based on that comparison, as 'Below Average,' 'Good,' or 'Great'). Key findings were:

[49] Cialdini, R. B. (2007). Descriptive social norms as underappreciated sources of social control. Psychometrika, 72(2), 263.
[50] See, for example, Halpern, D. (2015). How Can Governments and Businesses Avoid the 'Big Mistake?' Behavioral Scientist. https://behavioralscientist.org/how-can-governments-and-businesses-avoid-the-big-mistake/
[51] Bonan, J., Cattaneo, C., d'Adda, G., & Tavoni, M. (2020). The interaction of descriptive and injunctive social norms in promoting energy conservation. *Nature Energy*, *5*(11), 900-909.
[52] Allcott, H. (2011). Social norms and energy conservation. Journal of public Economics, 95(9), 1082-1095.
[53] Allcott, H., & Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. American Economic Review, 104(10), 3003-37.

- Those receiving the monthly home energy report consumed approximately 2% less energy than the households receiving no home energy report.
- Households receiving the home energy reports on a quarterly basis reduced their electricity consumption by approximately 2% as well in the first month, but this effect 'decayed' to an average approximate 1-1.5% reduction in the months between receiving reports, increasing again with the receipt of the next report.
- Across the monthly and quarterly energy report groups, the higher-consuming households reduced their post-report consumption (even as a percentage of their baseline consumption) more than lower-consuming households – the top-consuming decile reduced their consumption 6.4% (compared to the control households), whereas the bottom-consuming 20% of households did not reduce their energy consumption at all in response to the home energy reports.

Insofar as doing so would be applicable, **it may be fruitful to incorporate social norms into communications in CrowdFlex**. However, we recommend making the feedback feel like part of the 'fun' game of flexibility events, in slight contrast to the somewhat harsh tone taken by traditional home energy reports' feedback to higher-than-average-consuming households.

4.4 Make it Timely

Give sufficient notice period: In an RCT conducted in the US, researchers evaluated whether customers were more sensitive to price changes if they were given more notice in advance of an event.[54] They compared two journeys: the first provided day-ahead notification that the per-kWh electricity price would be increased by $0.50. The second sent notification of a $1.25 increase in the per-kWh price of electricity thirty minutes before the event. Customers were more responsive to pricing events that occur with advance notice. This was true despite the fact that the price increase in the second type of events was more than twice that for the first type of events ($1.25 as compared to $0.50). This suggests that, at least for customers whose turn-down is manual, advance notice may be an important determinant of participation and magnitude of turn-down achieved. However, note that CrowdFlex has the opportunity to test this on a large scale by varying the notice period by event and examining how average turn-down differs by notice period.

Help customers plan: The 'intention-behaviour gap' is an important concept in behavioural science.[55] However, research indicates that creating **concrete plans of action** specifying when, where and which actions need to be taken can help bridge the gap between intentions and behaviour.[56] [57] The upshot for flexibility trials is that emails and/or push notifications in advance of events should encourage customers to plan the actions they will pursue to achieve flexibility. To do this, we suggest that CrowdFlex partners:

- Send customers an email and/or in-app notification alerting them to the upcoming event, suggesting that they make plans for how they might turn down (or up) their electricity, and laying out simple-to-follow steps to achieve the target, tailored for the participant's energy profile (if possible). (Note that if this makes messages too long, we could provide links for customers to read about the simple steps they can take.)
- Send participants feedback after each event on how well they did during the event. In an RCT conducted in the US, researchers evaluated whether providing feedback on goal achievement reduced energy consumption subsequently – they found very strong effects of pairing feedback with goals – among participants with ambitious goals (reduce energy consumption by 20%), those who received feedback reduced their consumption much more than those who did not (-13% vs no effect).[58]

Ensure participants are reimbursed promptly: Citizen Advice found in their research that customers like to 'see if the fruits of their labour have paid off; their self-rationing translated to a more affordable bill, or they

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[54] Jessoe, K., & Rapson, D. (2014). Knowledge is (less) power: Experimental evidence from residential energy use. *American Economic Review*, *104*(4), 1417-38.
[55] Sheeran, P., & Webb, T. L. (2016). The intention–behavior gap. *Social and personality psychology compass*, *10*(9), 503-518.
[56] Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D. & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. Proceedings of the National Academy of Sciences, 108(26), 10415–10420.
[57] Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D. & Madrian, B. C. (2012). Following through on good intentions: The power of Planning Prompts. Working Paper No. 17995.
[58] Becker, L. J. (1978). Joint effect of feedback and goal setting on performance: A field study of residential energy conservation. *Journal of applied psychology*, *63*(4), 428.

managed to avoid incurring an additional charge.'[59] Hence, to continually engage customers to participate in the trial, we recommend reimbursing customers after each event, or in the next possible bill. We also emphasise highlighting the reimbursement saliently in the bill, if possible.[60]

4.5 Issues to be aware of

Customer concerns about turning down just before a blackout: Various strands of evidence indicate that customers are nervous about participating in flexibility events during periods when they sense that the grid is under severe pressure. Although these are the periods when demand-side flexibility is arguably most important, customers may feel that they should prioritise their own electricity security (and 'make the most' of electricity while it is still flowing). In conducting background research for this note, CNZ spoke with UCL researcher Max Woollard, whose Masters dissertation investigated the behaviour of customers with in-home batteries participating in flexibility services during extreme events in a lab-based simulation.[61] He noted: 'Just the concept of an amber warning, prior to any actual impact, was enough to cause the participants to "stockpile" their battery charge.'[62] This behaviour is related to the psychological tendency to ascribe higher value to scarce resources.[63]

- Note that we believe that the opt-out framing on an event-by-event basis (after obtaining informed consent from participants into the overall CrowdFlex programme) may partially address this issue – by making participation in each event feel more normal, subtly recommended, and more of the 'status quo'.
- We want to avoid framing demand response as something customers only do in emergencies; if every time the 'change your energy usage' notification comes up, households are filled with anxiety, that might be an unproductive association. Fortunately, the nature of the CrowdFlex program will involve events happening at many different sorts of times, only some of which will be ones associated with an emergency.

Discomfort and excessive self-rationing: As we discussed in the recruitment section, Citizens Advice emphasised that the impact on different vulnerable consumer groups needs to be considered in flexibility trials,[64] first to ensure that they are not negatively affected by DSR, and second to empower them to share in its benefits. Vulnerable customers can be negatively impacted by DSR as demand response can potentially lead to self-rationing, which can affect their physical and mental health. However, outcomes such as the customers' subjective comfort and stress cannot be directly observed within the trial. Customers may be achieving their goals and receiving financial incentives at the cost of their comfort and health due to self-rationing. **We recommend conducting interim surveys, ideally oversampling on customers with pre-identified vulnerabilities.** These surveys will collect important qualitative outcomes such as participants' subjective comfort during the event.

Differential attrition: To estimate the effect of the treatment on participants' consumption, ideally there will be no systematic difference in attrition between treatment groups.[65] Since we observe attrited participants' consumption as long as they stay with the supplier(s) involved in CrowdFlex, this only poses a threat to the

[59] Citizens Advice (2020): Understanding high and low electricity usage. Retrieved from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/understanding-high-and-low-electricity-usage/
[60] Note that Octopus Energy, currently the only supplier in the consortium, has flexibility event bonuses as a separate line item on the bill, but currently only labelled as 'Customer Campaign Reward: +£0.20'. It might be fruitful to be explicit about the source of this reward: i.e. 'For participation in X event for CrowdFlex'.
[61] The masters dissertation examines households' behaviour when playing a physical peer-to-peer electricity trading 'game' – a modified version of https://wattsthedeal.org/.
[62] The amber event, in this case, was a weather warning: 'Amber Warning: There is an increased likelihood of impacts from severe weather, which could potentially disrupt your plans. This means there is the possibility of travel delays, road and rail closures, power cuts and the potential risk to life and property.'
[63] Brock, T.C. (1968). Implications of commodity theory for value change. *Psychological Foundations of Attitudes,* 243-275
[64] Citizens Advice (2014): Take a walk on the demand side, Retrieved from: https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-policy-research/take-a-walk-on-the-demand-side/
[65] Deke, J., Sama-Miller, E., & Hershey, A. (2015). *Addressing attrition bias in randomized controlled trials: Considerations for systematic evidence reviews* (No. 182c57707b464906b26c77513a057508). Mathematica Policy Research.

statistical analysis if attrited participants change energy suppliers and we can no longer observe their energy consumption. We think this is a moderate threat, especially for the later part of the trial.

5 Testing before full trial implementation & supplementary data collection

We recommend a few pieces of work in the beta phase before the trial begins, as well as supplementary data collection during the trial.

Before the trial begins:

1. Draft and roll out a quantitative survey to understand how customers currently use technology that could provide flexibility, including EVs, heat pumps, and batteries, but also washers, washer dryers, and dishwashers.
2. Draft webpage communications and recruitment emails and test their compressibility and acceptability with a small but diverse group of customers. These could take the form of short (15-30 minute) interviews, or slightly longer (40-60 minute) focus groups. A mix could be valuable, with 1:1 interviews to elicit views and reactions from vulnerable customers. Ideally, these tests could be done iteratively, with versions of webpage communications and recruitment emails being improved through various rounds of feedback from customers.

Note that we may want to oversample vulnerable customers – if feasible – for both the survey and qualitative research.

Supplementary in-trial data collection:

3. We also suggest drafting surveys to collect data on customer experience, comfort, understanding of the flexibility event logistics, understanding of the purpose of flexibility, views on and satisfaction with event logistics, and the behaviours customers report employing to shift their demand.

   We suggest that these surveys be sent at various points during the trial to a random subset of customers – including at the beginning (to obtain baselines) and end of the CrowdFlex program, but also at various points during the program. Ideally, survey completion would be compensated to encourage high participation.

6 Recommendations on additional consortium partners

At this point, we believe there are two useful (but not critical) partners that would be useful to incorporate into CrowdFlex:

1. A **research participant recruitment agency** that specialises in identifying and recruiting vulnerable customers into trials. BIT has used such agencies in past research[66] involving vulnerable customers. We have found them to be valuable in accessing these otherwise hard-to-reach customers. Because the main channels we suggest for initial recruitment (an open invitation and targeted invitations) both require active opt-in, there is no guarantee that vulnerable customers will participate. Moreover, even where vulnerable customers do opt in, we may not know that they are vulnerable. Insofar as ESO wants at least some vulnerable customers in the larger trial sample, and wants to focus on their preferences, behaviour, and outcomes (as a subgroup of interest), we think a research recruitment agency would be a necessary partner or subcontractor.
2. A **second energy supplier** would increase the external validity of our trial findings. Currently, the consortium includes only one supplier – and indeed one whose customers may be atypically engaged in energy and interested in enabling a greener grid. Even internally valid findings (i.e., comparisons between perfectly randomised groups) may not be generalisable to other suppliers' customers. Including a second supplier would allow us to examine which test results differ by supplier; and, we will have greater confidence in the external validity of test results that are consistent between the suppliers.

[66] Two agencies that BIT rates highly are Roots research and Saros. ESC's Living Lab may also be a useful partner.