MADE

FLEXIBLE, COORDINATED DOMESTIC HEAT, POWER AND TRANSPORT

CUSTOMER ENGAGEMENT REPORT

28/02/20

CONTENTS

SURVEY 1 AND INTERVIEW 1 - EXECUTIVE SUMMARY – KEY FINDINGS AND RECOMMENDATIONS

Shifting customers away from conventional fossil fuels to LCTs will be a challenge - customers are overwhelmingly positive about their existing fossil fuel assets: In order for customers to engage with LCTs it must be able to compete on the priority areas of running costs, reliability and comfort. When combined with low LCT awareness the scale of the challenge is clear. There is a real need for education among customers, and installers (who largely hold the customer relationship). A near term option could be to target environmentally conscious homeowners, who are more likely to be motivated to reduce their carbon footprint as a basis for building expertise and customer momentum.

Recommendation: trusted advisor role needs to be filled to engage customers and installers, off-gas homes should be an initial target.

The technology has been proven – customers were overwhelmingly positive about the LCTs: The trial has proven that both the installation of LCTs with 3rd party controls, and the long-term use and operation of LCTs in a variety of house types and customer types is possible. The LCT with optimised controls largely met the comfort and reliability challenge, and all customers were satisfied. The most satisfied customers experienced a high quality customer journey throughout, from the information at pre-trial, to the installation and follow ups. This highlights how important it is to get the customer journey right. Bundling with smart controls also proved popular, and can support increased customer engagement and confidence.

Recommendation: Offer end-to-end LCT service, from pre-install to aftersales support to ensure customer 'peace of mind'. Bundling with smart controls should be standard.

Financial criteria are a key priority for customers - innovative business models will be needed for market creation – participants were drawn to the trial because they would get free LCTs, but also because they believed they would save money on their energy bill (even though this was not a stated aim of the trial). Energy prices today make this difficult, and we know up-front costs are typically higher for LCTs than conventional fossil fuel equivalent replacements so the market will need to address these challenges to capture customer attention.

Recommendation: Consider the potential of LCT for free models, leasing, or other innovative financial models.

There is an opportunity around DSR which needs further exploration – The trial participants in this research demonstrated a high level of interest in future DSR propositions, although it is clear that many struggle to understand the concept, so there is an education piece here too. However, once explained, respondents were open to DSR. With the right incentives in place DSR could offer significant network benefits and support the creation of innovative energy tariffs – that in turn could support LCT uptake if it provides the running cost saving customers require in order to invest.

Recommendation: Explore potential DSR opportunity with further research, and consider what sort of incentives or tariffs it could support.

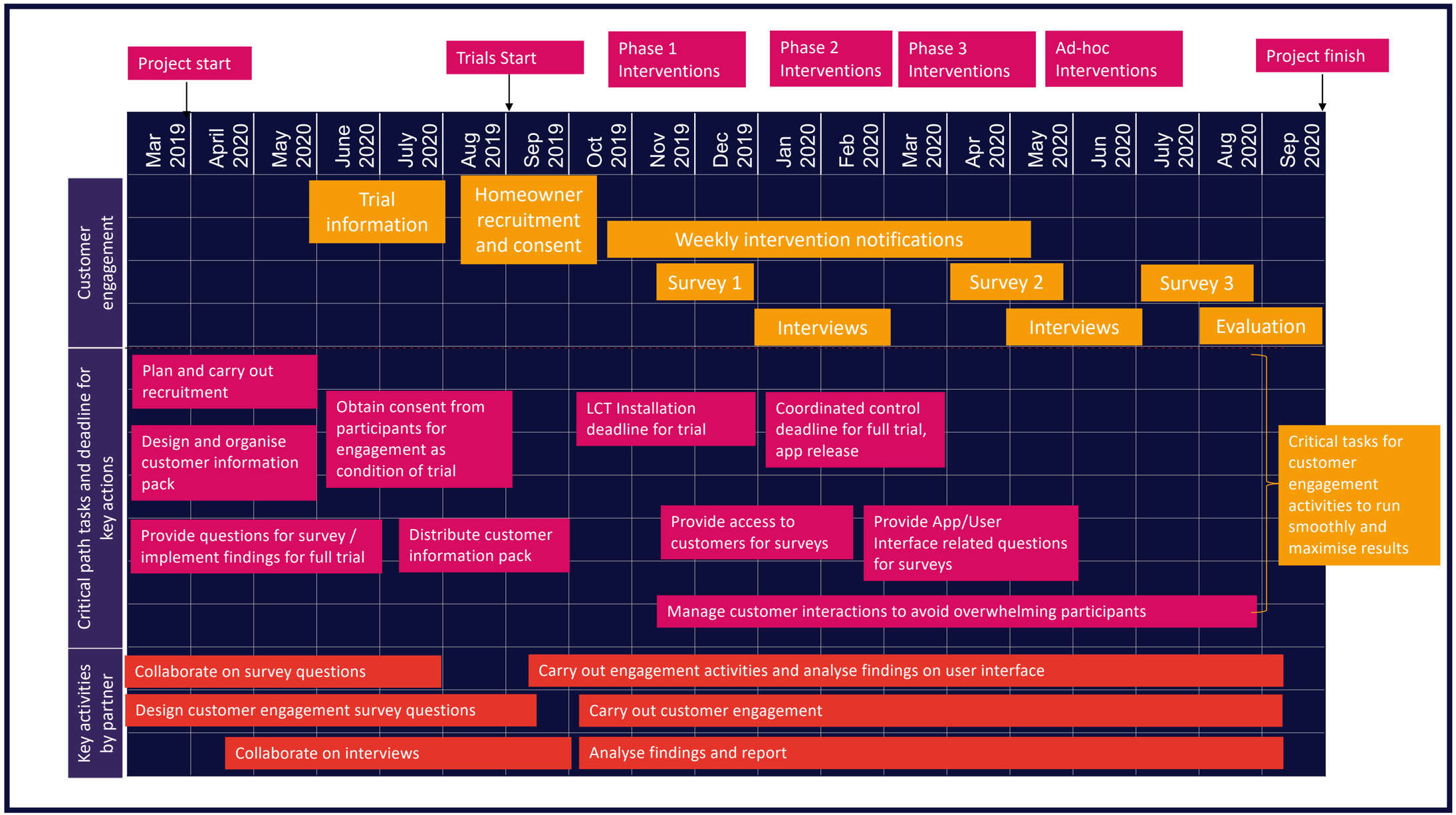
INTRODUCTION AND LEARNING OBJECTIVES OF CUSTOMER ENGAGEMENT

In the proposal for the MADE project, we agreed on the following learning objectives at different times throughout the trial. A combination of in-depth interviews and surveys are to be utilised at various stages of the trial in order to assess customer experiences and perceptions of LCTs with integrated control throughout.

This report provides an interim update on the research undertaken at various stages of the trial with the exceptions of the post-heating survey, interviews and post-trial survey which will follow after the trials have been completed.

Research objectives	Status
Pre-trial – Survey 1 and interview 1: ▪ Understanding existing consumer perception and expectations of LCTs. ▪ Identifying potential barriers and concerns about LCTs. ▪ Identifying potential attractions of LCTs and willingness to pay for additional benefits. ▪ Outcome: de-risks and helps to ensure success of controls strategy, customer targeting, customer proposition & trial design.	Complete
During trial – Survey 1 and interview 1: ▪ Assessing the installation and commissioning process and lessons learnt. ▪ Reviewing in-use performance of integrated LCT control with optimisation and whether this meets expectations and requirements. What could be improved? ▪ Assessing the user experience of the smart control user interfaces and evaluate potential improvements.	Complete
Post-trial – Survey 2 and interview 2: ▪ Identifying the successes and failures of the trial to feed into future systems design. ▪ Clarifying the requirements of customers and what the market needs to offer. ▪ Assessing barriers to large-scale deployment and recommending how issues can be addressed.	April and May 2020
Post-project – Survey 3 • Trial participant satisfaction survey. • Future project improvements.	June 2020

CUSTOMER JOURNEY - TIMELINE



CUSTOMER ENGAGEMENT OVERVIEW

	Complete – December 2019 and January 2020		To be completed in April and May 2020	
	Survey 1 to all customers	**Interim trial Interviews**	**Survey 2 to all customers**	**Post-trial interviews**
#	5	5	**5**	5
What	Online surveys to track appeal, experience, likes/dislikes etc. ~32 questions / 20 minutes.	Two rounds of in-depth interviews, with a duration of up to 1 hour.	Online surveys to track appeal, experience, likes/dislikes etc. ~20 questions / 20 minutes.	Two rounds of in-depth interviews, with a duration of up to 1 hour.
Type	Quantitative	Qualitative	Quantitative	Qualitative
Where	Online	Face-to-face	Online	Face-to-face
When	December 2019 and January 2020	December 2019 and January 2020	April and May 2020	April and May 2020
Why	Track customer experiences to understand the customer journey.	To form case studies and obtain higher quality of detailed insight.	Track customer experiences to understand the customer journey.	To form case studies and obtain higher quality of detailed insight.
Who	All trial participants.	All trial participants.	All trial participants.	All trial participants.
Owner	PassivSystems	PassivSystems	PassivSystems	PassivSystems
Topics	Track customer experience over the year. Analyse experiences.	Experiences and customer journey.	Track customer experience over the year. Analyse experiences.	Experiences and customer journey.
Risks	1. No/limited participation. 2. Limited detail available through this approach.	1. Availability of trial participants/ when they will be at home. 2. No/limited participation.	1. No/limited participation. 2. Limited detail available through this approach.	1. Availability of trial participants/ when they will be at home. 2. No/limited participation.

SURVEY 1 - TOPIC GUIDE – DECEMBER 2019 – JANUARY 2020

Survey 1: focuses on tracking experiences with the installation and the product so far, interactions with the user interface and identifying any potential issues participants are having using the system.

Characterising the Sample
This allows us to analyse the findings and see if any patterns emerge based on customer type

- Age
- Income
- SEG
- Property age and size
- Environmental attitudes

Tracking questions
These will be repeated in each survey to assess any changes in participant attitudes as the trial continues

- Overall experience of LCTs?
- Ease of use of smart controls?
- Experience vs Expectation?
- How confident are you in the LCTs?
- Would they recommend a LCTs?

Installation Experience

- Overall experience of installation
- What could we do better?
- Attitude towards the system location
- Attitude towards installation company
- Any problems during install? How were these dealt with?
- Any other feedback?

Initial Experience with the system

- How would you rate your experience with the LCTs?
- What do you think of the look / size of the internal systems? / External system?
- How aware are customer about which part is working at any given time?
- Any operational problems using the system?
- Any requirement/comfort issues?
- Expectations going forward?
- Improvements?

Other comments

We will provide an open forum at the survey for participants to highlight any other issues they have with their system.

The outputs of this survey will help to:

- Further define areas to be explored in survey 2 on user experience through the heating season
- Define focus areas for the interviews
- Provide insight into how the LCT installations went, and things that could be done in future installations to improve the experience.

SURVEY 2 - TOPIC GUIDE – APRIL 2020 – MAY 2020

Survey 2: focuses on tracking experiences with using the LCTs through the winter heating season. It also explored in more detail attitudes towards the controls and towards DSR / Fuel switching in addition to identifying operational complaints.

Characterising the Sample

This allows us to analyse the findings and see if any patterns emerge based on customer type

- Age
- Income
- SEG
- Property age and size
- Environmental attitudes

Tracking questions

These will be repeated in each survey to assess any changes in participant attitudes as the trial continues

- Overall experience of LCTs?
- Confidence that LCTS is performing correctly
- Experience vs expectations of LCTs
- Would they recommend a LCTs?

Experience of using LCTs and the smart controls

- Do they understand how to use the system?
- Is your vehicle charging correctly?
- Do they ever feel too hot / too cold?
- Any operational problems with the LCTs?
- Have these been resolved?
- How easy is it to use the app for LCT control?
- What instructions were they given / would they prefer?
- What features do they use regularly?
- How often do they use the app, and what do they use it for?
- Any additional features they would like added?

Experience of fuel switching and attitudes towards DSR

- How appealing is the concept of DSR? Why?
- Would they like notification of DSR?
- Do they like the fuel switching feature? Why?
- Have they been aware of when smart charging has occurred? If yes how?
- Have they been aware of when fuel switching has occurred? If yes how?
- How would they like to be notified and how far in advance?
- How important would an ‘over-ride’ feature be?
- What rewards would the expect for allowing DSR?

Other comments

We will provide an open forum at the survey for participants to highlight any other issues they have with their system.

The outputs of this survey will help to:

- Provide insight into whether attitudes towards LCTs and user experience has changed over the last 6-12 months
- Explore in depth, what customers like or dislike about the controls to identify potential future improvements
- Explore in depth, attitudes towards DSR, and whether customers would be likely open to this in the future

MADE PRIMARY CUSTOMER RESEARCH (1/2)

Key findings of the MADE customer research are presented here.

The 5 trial participants who all owned at least one Low Carbon Technology (LCT) are higher income and more engaged.

One of the apparent trends in the results is that the LCT owners tend to be between the ages of 25-49, are more engaged with switching their energy supplier, tend to have higher incomes (over £64k household income /year) and own their own homes.

They also tend to live in detached homes. This makes sense as detached homes are more likely to have their own driveway (for EV charging) and more external space, for putting a heat pump. 4 of the 5 homes were interested in installing a battery system. When asked about their attitude towards the environment they tend to think they are doing as much as they can to be environmentally friendly.

Those who owned a hybrid heating system prior to the MADE trial are more engaged.

Of the survey respondents, 4 said electric heating was their main source of heating.

Those who previously owned a hybrid heating system also switched suppliers annually and were aware of variable supplier tariffs.

There was one respondent, on a lower income that was not interested in LCTs. They was not as interested in being green and do not regularly switch energy suppliers. They also had little awareness of LCTs, smart appliances or third-party control.

MADE PRIMARY CUSTOMER RESEARCH (2/2)

Key findings of the MADE customer research are presented here.

EV charging

EV charging habits have been highly varied. The data seems to suggest that a "little and often" charging pattern will be the preference, however, it was also suggested that EV charging trust was their initial concern. The most popular place for charging is at home.

The MADE trial participants charge their EVs less than 5 hours per session. If forced to allow third party control of their EV charging for the purposes of V2G, the MADE trial participants are willing to let their batteries be discharged to a minimum level of 20%. Since adopting an EV through the MADE project the trial participants were mostly very positive about the idea of having an app to help them control their charging.

Third party control

There was a slight concern around third party control of charging and heating systems across all 5 trial participants, they still want to feel as if they are ultimately in control at all times and that the third party is helping them save money and help the environment.

MADE PRIMARY CUSTOMER RESEARCH

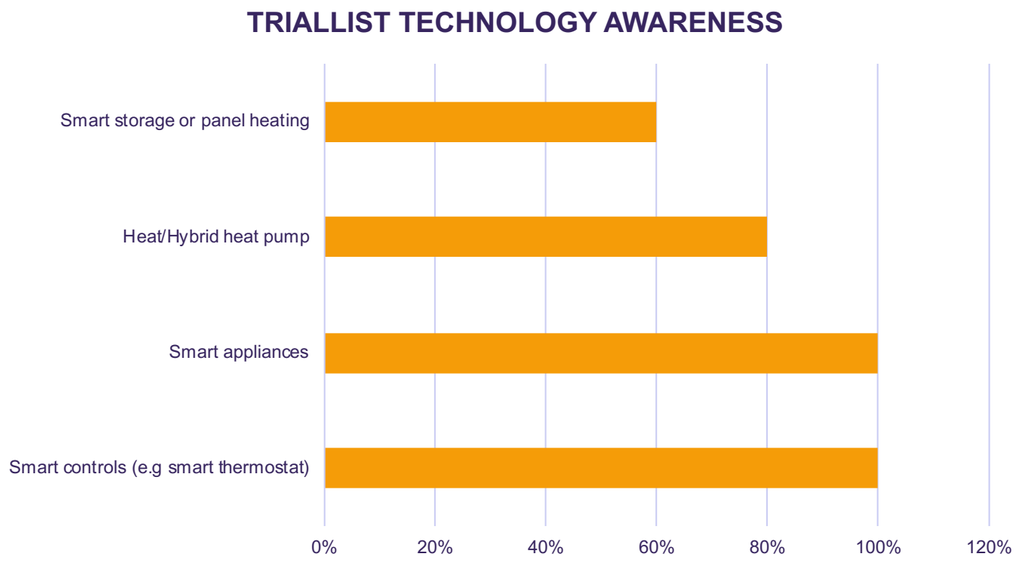
Technology awareness and views on heat

Awareness of the operation of smart hybrid heat systems is low compared to other smart technologies. All 5 MADE trial participants pay attention to what they spend on heat to keep costs down.

Awareness of technologies

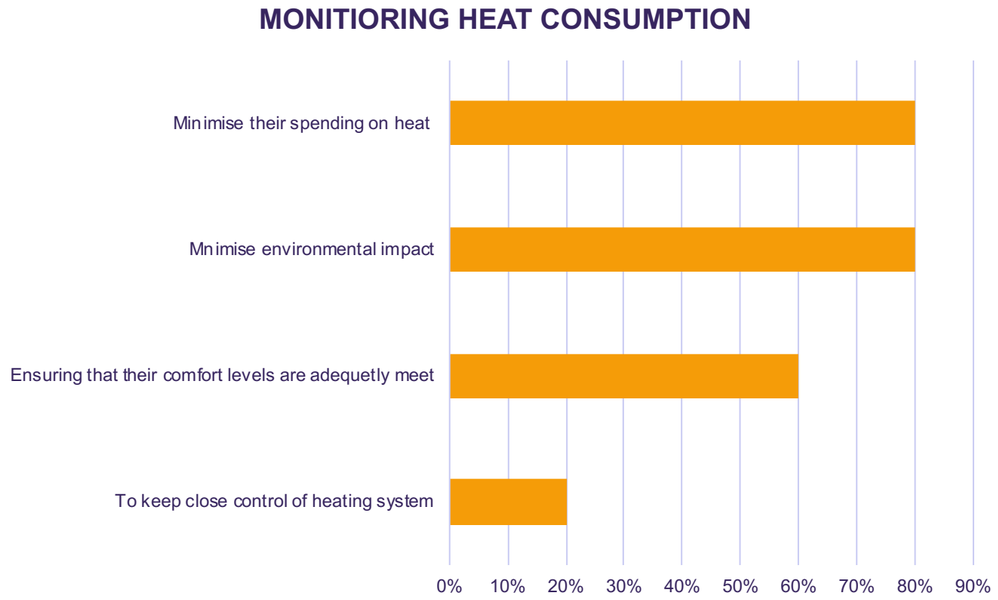
Those aware of the different technologies were significantly more likely to be under 49, and live in a detached house, earn more (over £64k), switch energy suppliers and are more environmentally conscious.

The chart below indicates the awareness the trial participants had of the different technologies**:



Heat

Only 20% of respondents said they ‘pay not very much or no attention at all’ to the amount of heat they use to heat their homes. For the 80% that pay a lot / a fair amount of attention to the amount of heat they use, reasons given for why this is the case were as follows**:



**respondents were allowed to select multiple reasons – therefore the total is greater than 100%

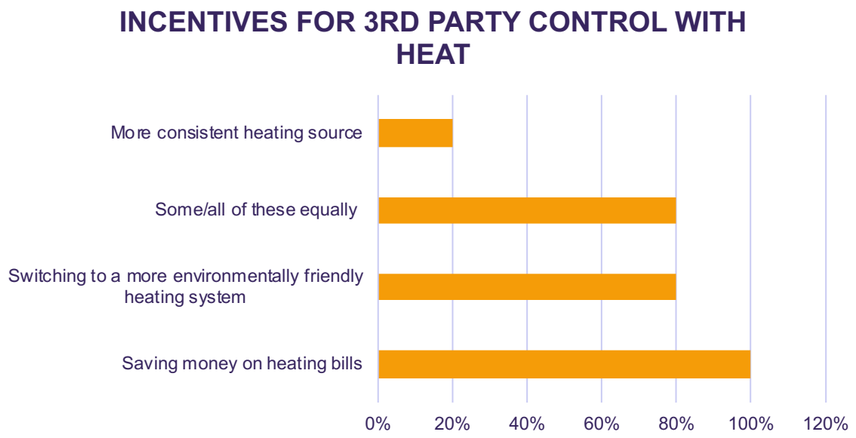
MADE PRIMARY CUSTOMER RESEARCH

Views on heat and third party control of heating

Saving money / getting money back is the primary consideration when people are changing their heating system or as a motivator behind third party control.

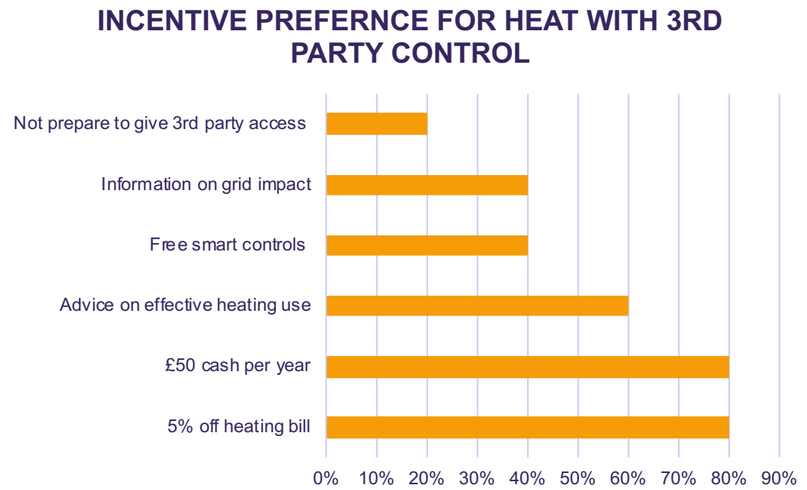
Heat (continued)

The chart below shows that saving money is the most important consideration when the trial participants are looking to change their heating system. Being environmentally friendly is also an important consideration for many – these respondents were more likely to be younger, wealthier and more engaged (in terms of energy supplier switching).



Heat and third party control

The following chart indicates the types of incentives that would encourage the trial participants to allow third party control of their heating system. Cash back as a cash lump sum or a % off their bill, is the biggest incentive, however, there are a large portion of respondents not willing to allow control under any circumstance.



**respondents were allowed to select multiple reasons – therefore the total is greater than 100%

MADE PRIMARY CUSTOMER RESEARCH

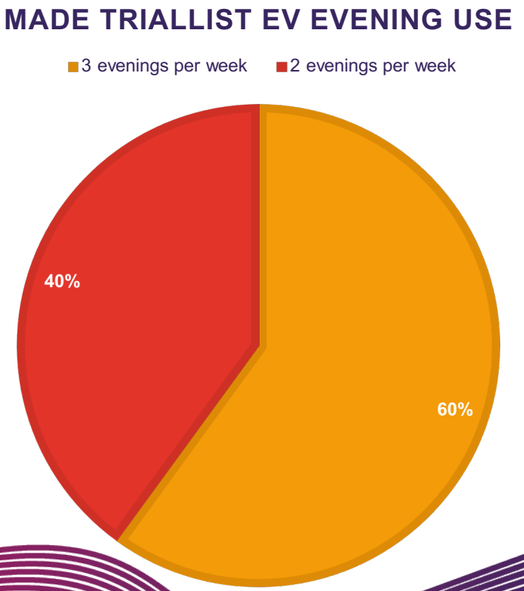
MADE trial participant – evening use of their vehicles

80% of the MADE trial participants are younger, wealthier, more engaged and were considering owning an EV. 3 MADE trial participants use their EVs at least 3 evenings per week. 2 MADE trial participants use their EVs at least 2 evenings.

80% of the MADE trial participants were generally more progressive of Low Carbon Technologies (LCTs). They were significantly younger (mostly under 49), have higher incomes (£64k), paid more attention to their environmental impact, are more likely to be open to third party control of their heating system, switch their energy supplier more regularly and would consider owning solar PV.

Based on trial data and survey (100%) MADE trial participants said they use there EV at least one or more times per day. The 80% of MADE trial participants owned a second or third car, and tended to use their EV mainly for short commutes or social purposes. One MADE trial participant split between business, social and commuting use of their EV.

In terms of the evening use of their EVs, all MADE trial participants use their EV 2-3 evenings per week. This is likely skewed by the fact that most trial participants are under 49. People may also be more inclined to take their EV to social engagement to demonstrate their participation in the MADE Project. The following chart presents the results:

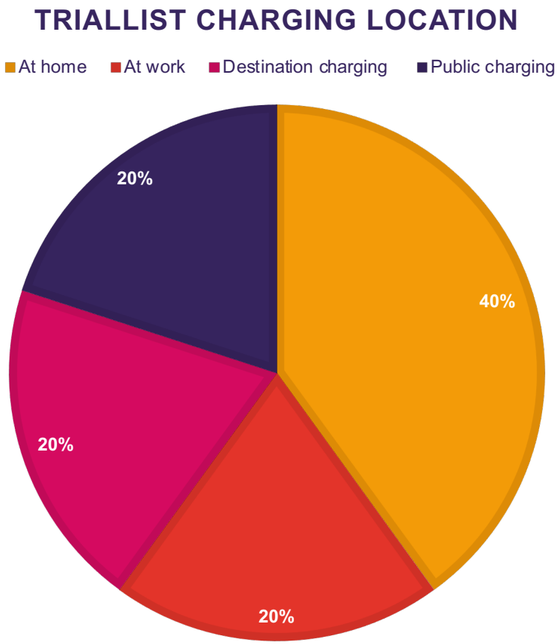


MADE PRIMARY CUSTOMER RESEARCH

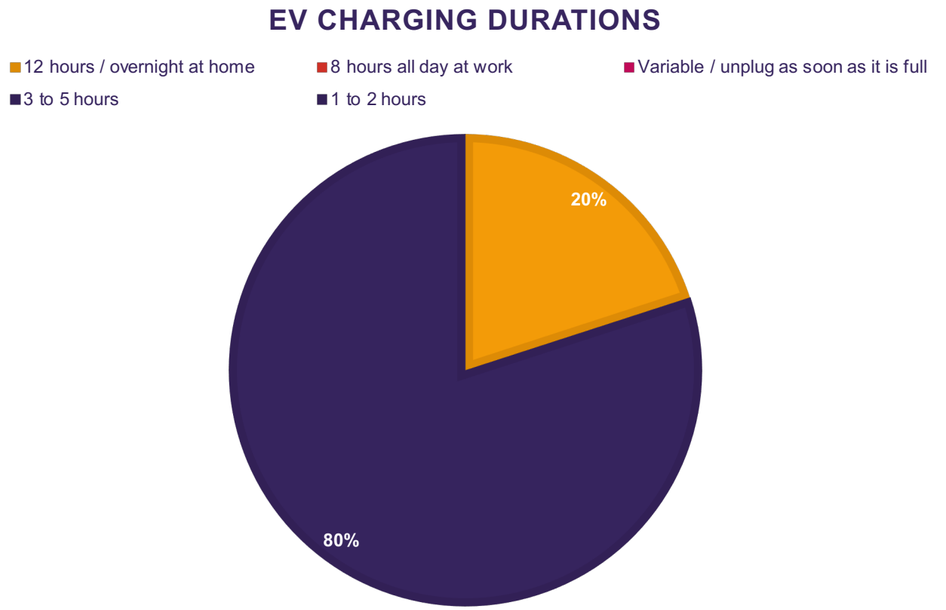
EV charging habits - reality versus expectations

The most popular place for charging is at home. The MADE trial participants charge their EVs less than 2 hours per session.

There is some variation between the MADE trial participants in terms of where they currently charge their EVs as expected. The chart below shows the average proportion of their charging that happens in the following locations:



In terms of the timing of charging, 80% of the MADE trial participants primarily charge their EVs either during the morning or evening. The following chart gives the results of the typical duration of charging sessions across the MADE trial participant:



MADE PRIMARY CUSTOMER RESEARCH

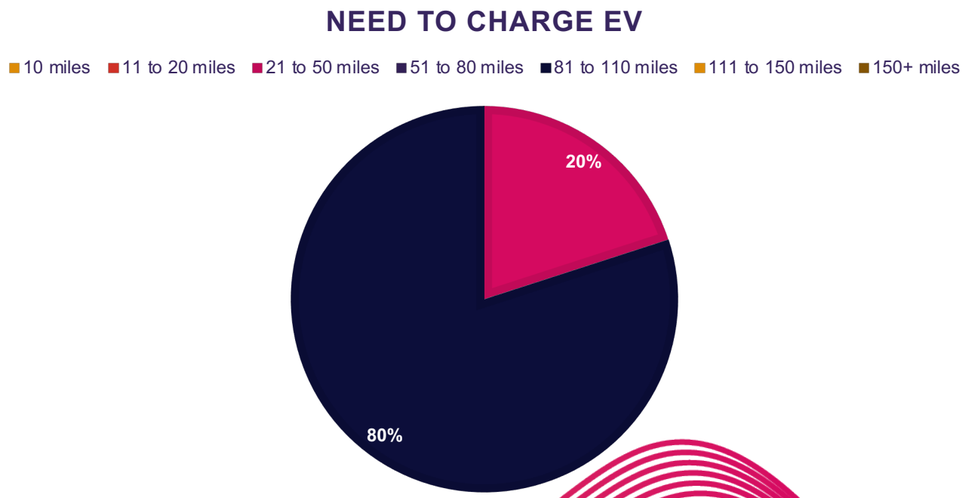
MADE trial participant charging habits

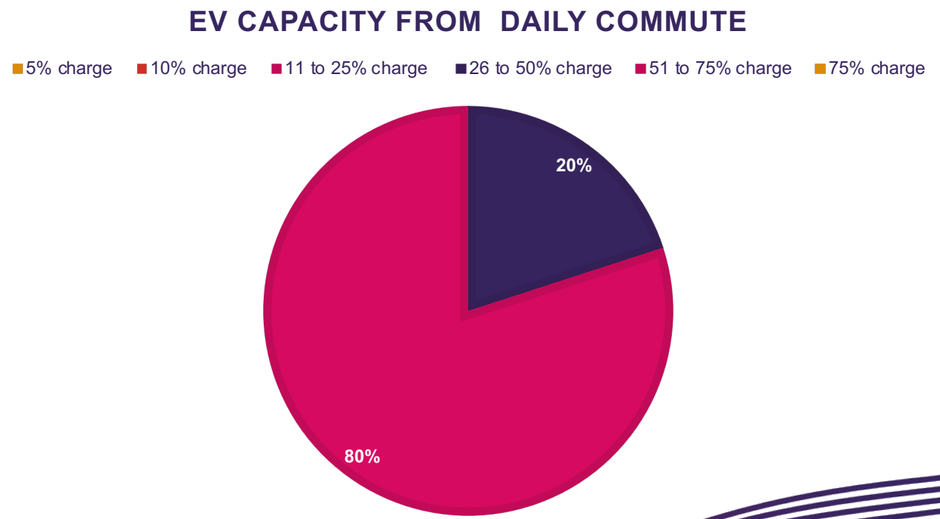
EV charging habits are likely to highly varied. Data seems to suggest that a "little and often" charging pattern is the preference.

When the MADE trial participants were asked at what point they feel the need to charge their EV batteries given the range they have left, the responses indicate charging will be highly varied.

The full responses are charted below and show that 4 of the respondents feel the need to charge their EV when the charge level falls somewhere below 110 miles, this roughly equates to a battery level of 80% for a new Nissan leaf or 20% of a Tesla Model 3 standard range.

In terms of the typical level of charge the MADE trial participants have left at the end of the day, there is a fairly even distribution amongst them, as the chart below shows. The chart indicates that close to half of the MADE trial participants return home with their batteries over 50% full.





MADE PRIMARY CUSTOMER RESEARCH

EVs and range

80% of the MADE trial participants have considered buying an EV – the biggest barrier being cost. Most people drive less than 40 miles/day, well under the range of an EV.

Considering buying an EV

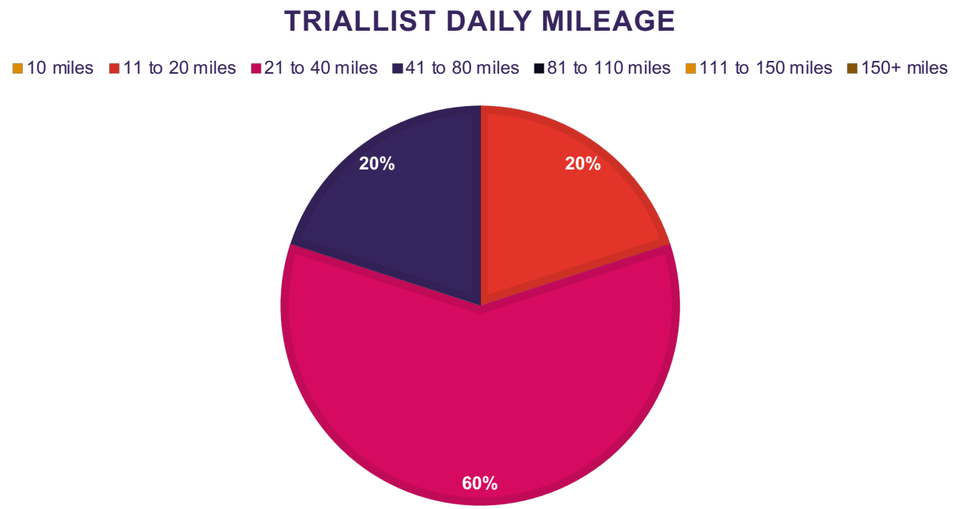
When the MADE trial participants were asked about their attitude towards buying an EV, 60% are currently considering or have considered buying an EV. The largest sub-group, amongst the latter, at 20%, have not bought one due to cost. One MADE trial participant (20%) hadn't thought about buying an EV at all.

MADE trial participants looking to buy an EV soon (60%), a significantly higher proportion are under the age of 49, have incomes of £64k+. Of those looking to buy in the next 5 years,

MADE trial participants that are considering buying an EV (60%) are also more active energy switchers and consider themselves more environmentally friendly – these demographics align with the EV owners group.

Driving distance

The MADE trial participants (80%) drive less than 40 miles each day. Driving 40 miles equates to using approximately 22% of the battery capacity of a new Nissan Leaf (40kWh model) and 10% of a Tesla Model 3.The chart below shows the typical distance travelled per day by the MADE trial participants:



MADE PRIMARY CUSTOMER RESEARCH

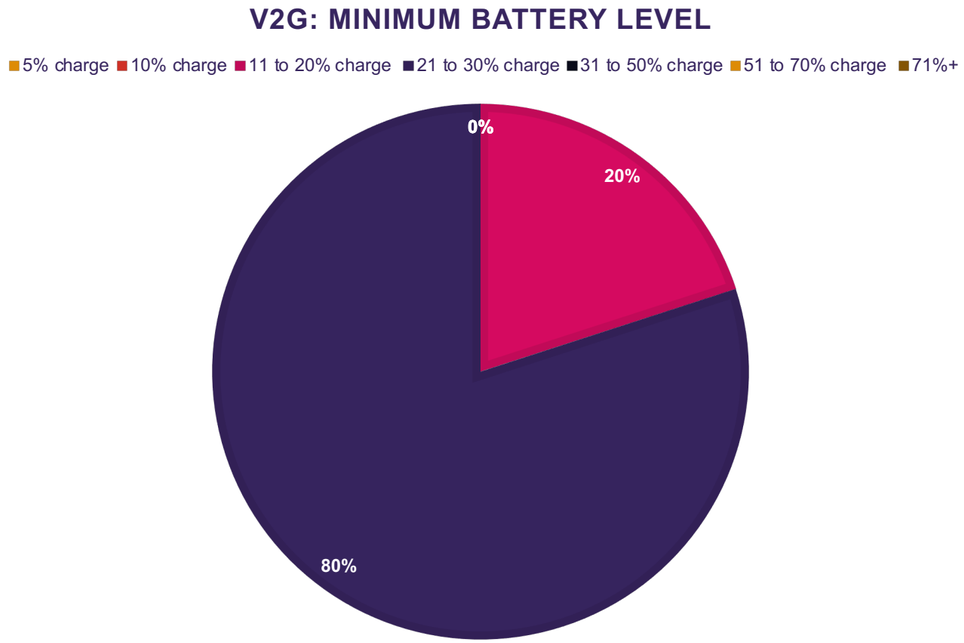
EVs and range

If forced to allow third party control of their EV charging for the purposes of V2G, the MADE trial participants are willing to let their batteries be discharged to a minimum level of 30%.

The minimum level of charge a MADE trial participant will accept for their EVs is important to understand for the purposes of using EVs to provide power to the grid (V2G). MADE trial participants, (100%) say that they want to be able to drive the EV for emergency and be able to the shops and back at all times.

The MADE trial participants are generally willing to accept shorter distances / lower level of charge. This tends to suggest that MADE trial participants can be classed as an early EV adopter, overly pessimistic and have a lack of trust for their EV.

Minimum acceptable level of charge you would allow your battery to reach as a result of a third party using your EV for vehicle to grid*:



*Respondents were told their battery would be charged to an acceptable level (set by them in advance) by the time they required the use of their EV and the company discharging the battery would also pay them a small fee every time they discharged their battery

MADE PRIMARY CUSTOMER RESEARCH

EVs and third party control

There is a slight concern regarding third party control. If third party control is to be accepted, MADE trial participants want to still be able to take over at any point.

Over half (80%) of the MADE trial participant are ‘slightly concerned’ about third parties having the ability to control the charging regime of their EVs, despite being told that this would help save them money and they would be able to override the third party at any time. Only 20% (1 trial participant) of respondents were ‘not concerned’ about third party control. The breakdown of concerns among the MADE trial participants regarding third party control for V2G was similar, with 80% expressing some concern.

When the MADE trial participants were asked how they would like the arrangement regarding third party control of their EVs set-up (assuming that they had to allow it) – 40% of respondents want to remain fully in control with the third party having to ask for permission every time they want to control their EV charging. Unsurprisingly, this group is also made up of those that are generally quite / very concerned about a third party taking control of their heating.

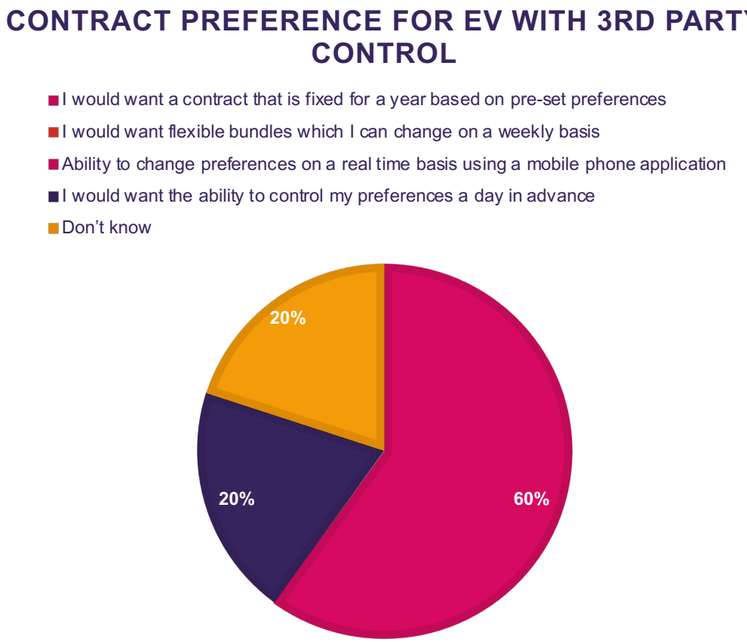
40% of the MADE trial participants wanted to be notified every time the third party was planning on taking control of their charging with the power to override them and take control at any time. The remaining (60% in total) were open to even more flexible schemes where they are notified in advance or the third parties had total control.

MADE PRIMARY CUSTOMER RESEARCH

EVs and third party control

There is no clear winner regarding the MADE trial participants would like to set-up the contracting of a third party to manage their EV charging and heating energy needs.

The following chart gives the results of the type of arrangement the MADE trial participants would be most comfortable having with a third party to control their EV charging and heating system*:



The chart shows that there are different preferences for desirable EV owners (dark) versus non-desirable EV owners (light) regarding the arrangement they would like to have with a third party to manage their heating and EV charging energy demands. The difference is greatest regarding the 'fixed for a year' contract option which was the most favoured option by the MADE trial participants.

The spread across the options was more even for the non-desirable EV drivers. There is also a significant proportion of non-desirable EV owners that 'don't know' what contract type they would prefer. This group was made up of older, lower income respondents.

Overall, none of the options came out as a clear winner across the two groups. This is perhaps due to the nascent nature of this space.

*Exact question phrasing: "If you were to use a third party to help control the balance between the electricity used for heating and the electricity used to charge your electric vehicle, how flexible would you want this arrangement to be?"

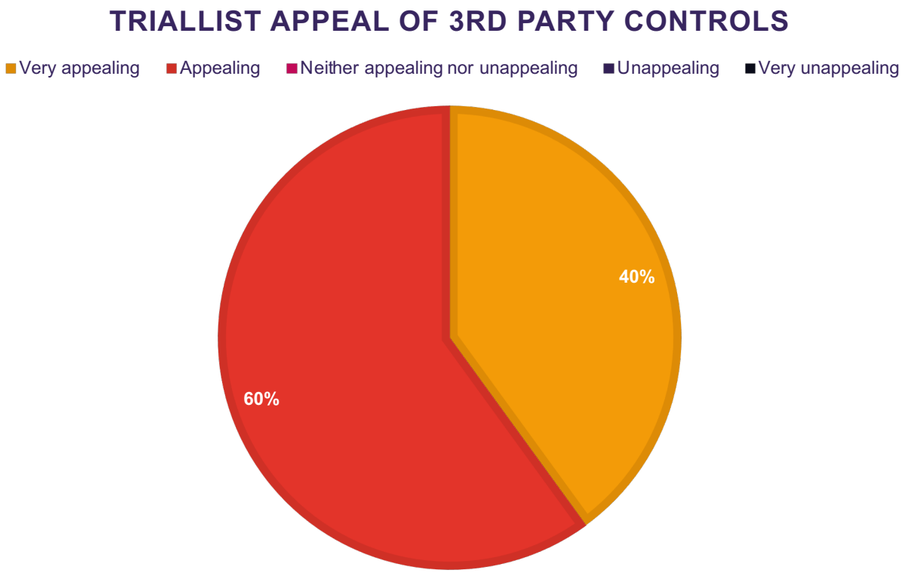
MADE PRIMARY CUSTOMER RESEARCH

EV charging monitoring and control

The MADE trial participants are positive about the idea of having an app to help them control their charging.

Of the MADE trial participants, 100% of respondents found it appealing to have an app that connects to their smart charging device to optimise their vehicle charging based on their desired preferences regarding when they require their vehicle the next day and how far they plan to drive it*.

The chart shows the full results of how appealing the MADE trial participants find the idea of having an app to help control their charging:



*Respondents were also told the app ‘could potentially save you money’

MADE PRIMARY CUSTOMER RESEARCH

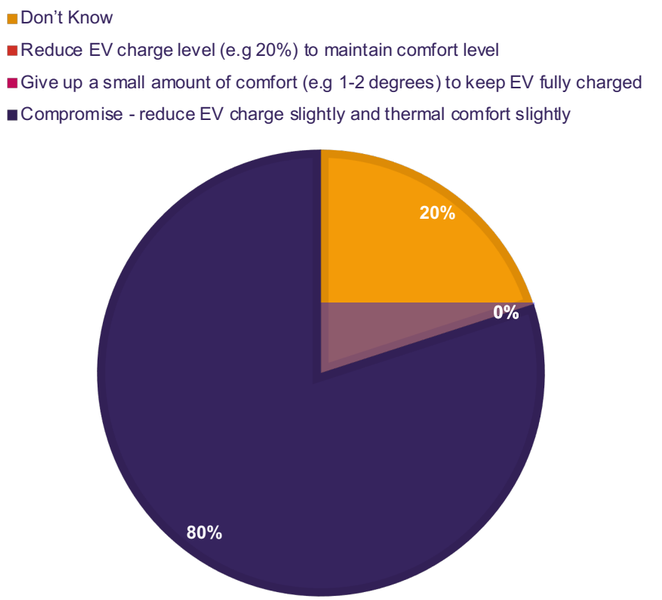
Trade-off between EV charging and heating

The MADE trial participants would choose to ensure they maintain comfort levels in their home rather than ensuring their EV is fully charged.

When the MADE trial participants were asked what they would do if on a cold day there was not enough electricity to run their heating system and charge their EV, the majority would compromise on the charge level of their EV (55%) rather than having to give up some warmth to keep their EV charged (32%), as the graph shows:

Those willing to give up thermal comfort were significantly more likely to be younger. It is worth noting that 20% responded ‘I don’t know’ to the question. This likely indicates that the MADE trial participants that don’t own either an EV the question posed is too far removed from their current circumstances to give a meaningful response.

TRADE-OFF BETWEEN EV CHARGING AND HEATING



INTERVIEW 1 (INTERIM HEATING SEASON) - OUTCOMES WERE POSITIVE

Interviews with pilot trial participants at post-installation were undertaken to understand and learn from the installation process to help the full trial run more smoothly. Overall, customers were happy, although they wanted more input into the location of their LCTs and more direct information. They also expressed that they expected systems to be “more economic” a theme that came out strongly in our further research.

Each customer interview took between 45 minutes and 1 hour. The interview covered:

- **Why participants joined the trial,** including any improvements that could be made.
- **Installation experiences,** including how this could be improved and experience of the installation company.
- **Information provision,** including the type of information they received at all stages of the installation process, the format and the quality of this installation
- **Engagement expectations,** including how often to talk to them, the type of communication they prefer and incentives they’d like
- **Any concerns participants had,** regarding the technology or the trial process and companies involved and the LCTs operation.

Recruitment

In general, the pre-installation stage went well with no problems

- The nature of the trial customers (interested and wanting to innovate) means that they may not be “typical” customers, but they all had a good experience and felt that they were suitably well informed.
- All the customers were happy with the primary approach being from the installer, although more information would have been useful.

Installation success?

All installations went well, but the installation of LCT locations were a problem

Customers were happy with all the installers and felt they did a good job overall and would recommend them.

- Location of equipment was a common theme and customer liked having input to where items are located including pipework and cabling.

Happy customer?

Post installation, apart from a few teething problems, customers appear happy

- The trial customers all appear happy with the installations and performance, and accept a few teething problems (mostly to do with controls and sensing) as part of the trial.
- However they all stated that the real test will be whether the systems are more economic, and all stated that they would be carefully monitoring energy bills to ensure that they would see an economic benefit.

INTERIM INTERVIEWS (1) – INITIAL OUTCOMES

Initial findings have been positive with free LCTs acting as a strong incentive. Some teething problems have been encountered and are understood by the customers to be part and parcel of the pilot trial.

"Up-front information was very good – especially the presentation"

"Liked being able to help decide where equipment would be located including battery, cables, etc."

"Very happy to participate in surveys – online would be good. A financial incentive won't drive me but may help with some people".

"It would be useful to leave customers with more written information prior to installation to remind them of the presentation"

"Issues around noise, visual impact, air flow, addressed well by the installer"

"I wasn't given much choice over the location of the EV charger and the battery"

"Installers did a very good job – polite, careful of people and property including the garden areas"

"Everybody individually during the installation was very helpful, more trial information could be better".

"I feel very lucky to have the opportunity to have this installed for free – big incentive!"

INTERIM INTERVIEWS (1) - PRE-INSTALLATION OTUCOMES

In interview 1 the main feedback was around installation concerns and LCT performance, although there was also some positive feedback on the installation process, there were also indications that more information could be provided to customers at this time (in terms of who to contact and how to control the LCTs.

"Make sure the system is fully functional before you go"

"Really happy with the installation process and the fact that everyone is happy to answer questions and explain what's happening. Thank you"

"Initial communication could be better"

"Happy with everything"

"Thank you- it does help a lot"

"I would have to say Phone staff amazing but installers were eager to leave without providing a full control brief"

"Still getting used to new settings. Too early too judge whether more economical as charging and heating not been on much yet"

"Pretty happy with the service and recommend it"

"The fan when on vibrates and is loud in the living room"

"At the moment my electricity bill is £5 a week more"

"Still having some troubles setting controls"

INTERIM INTERVIEWS (1) - PARTICIPANT FEEDBACK - INSTALLATION

Interview 1 the main additional feedback was around the LCTs in operation. Some customers were not sure if it was working, which could indicate successful install as they do not notice when optimised control is running. Better provision of information is required for some, and some reported operational problems. Overall the feedback on installers was positive.

“I am not happy with the location of thermostat”

“it was all good”

”its not worked properly from day one because of thermostat box breaking wi-fi signal continuously”

“good installation in the end”

“Would be a nice touch to see what form of heating is used. Shown in the app”

“We don't know if the heat pump has worked since its been installed”

“There is air in the system. So it rattles from time too time”

“We still don't know if the smart controls even works”

“overall the system works well other than the night time issues we are pleased with the system.”

“Very good and warm”

“Hard working team”

“I’m not too sure if the heat pump is supposed to be working yet but I will get in touch with Passiv to check”

“I was given a few different explanations on what the system was about and none of them the same”

INTERIM INTERVIEWS (1) - PARTICIPANT FEEDBACK - WINTER HEATING, AND DSR

Interview 1 the main additional feedback was around running costs: By this stage of the trial it appears that respondents are questioning whether the LCTs will save them money longer term and seeking to understand this point. Those with operational problems are more likely to 'opt-in' to this question in order to get redress. There was also some positive feedback here, and some suggestions that more information would be useful to participants.

"I think it's been great"

"I would have appreciated more instructions and support"

"I am very pleased apart from all the pipe work that has been left exposed in my kitchen"

"Costing me more money"

"in the opinion of the study, is the system functioning efficiently? are we saving money over our old system?"

"For the first 3 months I believe it remained using the heat pump more than it should've done; when at colder periods it should've switched to the gas boiler more quickly"

"The worst thing is not being able to get away from the heat if the house is too hot, turn down the stat, but still the heat source fires....there needs to be a way of turning it off "

"Very happy now system is working"

"The main problem we have had as stated before is the boiler coming on during the night unnecessarily (warming for next period)"

"It would have been better if we were more informed about the whole thing and shown how to use the app and an explanation on how to save money and an explanation on how it works to help the environment"

"Wish I knew how to use it correctly and could save money?"

CUSTOMER EXPECTATIONS FROM SURVEY 1 AND INTERVIEW 1 - CONCLUSION

Customers taking part in the trial showed they were extremely satisfied with their existing system, and primarily joined the trial because the LCT equipment was free, and they believed they would save money on their energy bill. Despite the latter, not being a key objective of the trial – respondents to the surveys claimed an excellent understanding of the goals and objectives and felt positive at the outset.

Key focus	Key findings
1 Attitudes towards their current fossil fuel system and controls.	**Shifting customers away from conventional fossil fuel systems will be a challenge** - customers are overwhelmingly positive about their existing vehicle and heating system.
2 Reasons for joining the trial and expectations	**Financial motivations were the main reason for joining the trial, customers liked having "free" equipment, and expected to save money on their energy bill.** The expectations around this latter point need to be carefully managed given fossil fuel and electricity prices.
3 Awareness and appeal of LCTs	**There is an awareness gap for LCTs** – LCTs have high appeal once explained, but, as expected awareness is low.
4 Understanding of the project goals and objectives.	**Respondents claimed to have a good understanding of both the project goals and the objectives** – this indicates the pre-trial information was high quality and well explained.

Recommendations

- **Awareness raising of LCTs is required:** both to installers who engage with customers and customers themselves. It is hard for customers to request or learn more about a technology that they are unaware of. Its high appeal shows it has potential.
- **LCTs for free business models should be explored:** free equipment was a critical driver for the trial, leasing, or LCT for free models should be explored to maximise future opportunities.
- **Running cost savings are also important to customers, exploring how best to deliver these is critical. Options include:**
  - **Focus on carbon conscious homeowners:** LCTs make most sense for carbon conscious customers who might be more open to a new technology / less satisfied with their current systems.
  - **Lobby / support / encourage development of different energy tariffs** – if energy prices were to change, or tariffs based on DSR become available LCTs would be more appealing.

CUSTOMER EXPERIENCES FROM SURVEY 1 AND INTERVIEW 1 - CONCLUSION

Overall all respondents had a very positive customer experience throughout the pre-trial and phase one of the trial. There are some simple steps that could be taken to ensure customer satisfaction remains high, for example, ensuring that everything is neat and tidy before the installer leaves the home, and providing a follow up visit as standard to check everything is ok with the homeowner and that they understand how to operate LCTs.

Key focus	Key findings
1 Pre-trial expectations of the LCTs and of the installation process	**The pre-trial phase can be considered a success,** respondents had few concerns about whether the LCTs would work, and felt confident going into the installation process.
2 Feedback on the installation process	**On the whole the installation process went well. A majority were problem free and there was a high level of customer trust.** Where there were issues, improvements could be made to how quickly these were followed up on to improve satisfaction.
3 Initial user experiences of the LCTs	**The initial customer experience of LCTs were very positive.** Reassuringly systems performed well on requirements but customers were uncertain about potential running cost savings.
4 Operational 'problems' and running cost saving concerns	**There was a high number of 'operational problems' reported but a majority of these were easily dealt with to a high standard.** Some of the faults were the result of customers not understanding how to use the system properly.

Recommendations

- **Installer training is critical:** a competent and professional installer, that can 'hold the customers hand' could support increased uptake of LCTs by being able to reassure customers about both the reliability and maintenance requirements of LCTs, and the installation process (minimising the hassle, time and stress of the system install for the customer).
- **Providing a follow up visit a week after the install (as standard):** this could be a way to iron out any of those customer 'niggles' early on before the escalate into major issues. You can check that customer still understand the smart controls too as they may have questions now the system is in use – **additional 'user-education' may also help to minimise operational problems.**
- **Provide the customer with advice on how to operate their system,** and provide information on any tariffs, or incentives that they might be able to utilise. Most of all, be up-front and realistic about what they can expect.

CUSTOMER ATTITUDES AND APPEAL TOWARDS LOW CARBON TECHNOLOGIES FROM SURVEY 1 AND INTERVIEW 1 - CONCLUSION

Overall during the course of the trial, respondents were positive about the LCTs and their experiences with it. Unsurprisingly the up-front and running costs would likely be critical barriers to LCTs outside of the trial conditions, so industry needs to innovate. However there are also simpler things, like bundling with smart controls that could improve customer appeal.

Key focus	Key findings
1 Participants experience of the LCTs	**Overall participant satisfaction remained consistently high** throughout the trial. A majority of respondents would be likely to recommend an LCT to a friend.
2 If participant expectations met and would they recommend their LCTs to a friend	**Ease of use, requirement, comfort, reliability and upfront and running cost are the primary aspects of a vehicle and heating system which customers value**. The LCTs with optimised controls perform well with respect to ease of use and comfort provided but the up-front costs and operating costs of LCTs today are likely too high for many customers.
3 Primary likes and dislikes of the LCTs	**The optimised smart controls/app was a top rated feature** of the LCTs as customers really like the ability to remotely manage and monitor their LCTs.
4 Aesthetics of the LCTs	**The aesthetics of the LCTs should not act as a deterrent to uptake.** Although there are minor improvements which could be made to external units, correct siting of the unit was more important.

Recommendations

- **Economic** factors are a key criteria for mass market success, **business models will be needed in the near term** to ensure that LCTs can offer cost-comparable solutions to existing fossil systems.
- **The reliability of the system is critically important**, providing more data on how the system is working may ensure that confidence on this point is improved.
- **Including a smart controls/app in any bundle when LCTs are purchased would improve customer confidence**, both in terms of convenience (and making it more existing for them) and in reassurance (so they can see the systems is working as it should).
- **Involving customer** in the siting of the LCTs is important for gaining acceptance of the outside unit and should be standard procedure at installation to improve satisfaction.

CUSTOMER ATTITUDES AND APPEAL TOWARDS THE CONTROLS AND THE APP FROM SURVEY 1 AND INTERVIEW 1 - CONCLUSION

Overall the controls and (in particular) the app were a key success of the trial. Customers engaged with them readily and easily and the remote control aspect had high appeal. In the future the app could go further, and act as reassurance to the customer to help them understand when and how different parts of LCTs are working. This may minimise concern over future billing and maintenance call outs (by e.g. reassuring them over the responsiveness to temperature changes).

Key focus		Key findings
1 Participants attitudes and experience of using the controls		**The in-home controls and app were consistently rated highly by customers** – both were considered easy to use.
2 Participants recommended improvements for the controls		**The in home controls, were not used as frequently as the app**. Their main purpose is a secondary control if the app was to fail to connect. However, due to their potential infrequent use, **they need to be simple and easy to understand** – customers forgot the instruction they received at install.
3 Participants attitudes and experience of using the app		**The app has been one of the customers favourite features of the whole LCTs**. In particular remote control has high appeal.
4 Participants recommended improvements for the app		**Both the controls and the app can play a role in improving customer confidence**. They need to provide enough data that reassures customers their system is working correctly without being overly complex.

Recommendations

- **As previously mentioned – a ‘smart’ app should be included in any bundle sale** for a LCT as it may support increased uptake.
- **The inclusion of the app can also reassure customers their system is working,** especially if it includes information on the fuel being used or when the charge point or heat pump is operating.
- **Consider introducing different ‘levels’ of control.** Some customers are really engaged and want a lot of information, it might be possible to have different ‘levels’ of control for different types of user. This could include a basic control where those less engaged are confident that they won’t somehow ‘break the system’ (this might appeal to RSLs).
- **Sometimes simple is best – in particular for the in-home control, customers would like an instruction booklet**. A single side, user-guide would be sufficient and could be attached to the control itself.

CUSTOMER ATTITUDES TO AND OPINIONS OF DSR AND FUEL SWITCHING FROM SURVEY 1 AND INTERVIEW 1 - CONCLUSION

In phase 1 of the trial, Demand-Side-Response (DSR) including fuel-switching was undertaken on the customers behalf and for many this had high appeal. However, the indications are that DSR could go much further than this and customer are open, with the right conditions, to other types of DSR which might benefit the networks, and customers. Today the biggest barrier is the 'trust' and 'risk' they associate with DSR, but the right business models, incentives and accountability can overcome this.

Key focus

1. Awareness of and willingness to accept DSR.
2. Who customers would trust to perform DSR and how it should be performed.
3. What rewards and incentives (if any) might be required.
4. Customers experiences of fuel switching during the trial compared to their perception of fuel switching as DSR.

Key findings

Overall the respondents were more aware of DSR compared to the commissioned Delta-ee 750 survey, but there is room for improvement. It is likely raising awareness would result in improved acceptance.

The biggest barrier to DSR is customers feeling confident to trust a third-party to perform DSR. At the moment this is reflected in their strong requirement to maintain ultimate control over the system, and the fact they would prefer a big brand name (like their energy company) to perform it.

Energy bill savings was the most appealing incentive to allow DSR. Overall it is likely some sort of financial reward would be required for it to be accepted by customers.

There is a disconnect between customer experiences of fuel switching on the trial and what they say they would like - a majority of respondents liked the fuel switching feature of LCTs on the trial, but less than a quarter of participants found the fuel switching as a form of DSR appealing.

Recommendations

- **Invest in increasing customers knowledge and awareness of the benefits of residential DSR**. It is still a new concept and so customers associate a great deal of 'risk' to it.
- **Focus on building and improving customer's trust in DSR and DSR companies**. This could be via **"aligned incentives"** (e.g. creating a business model where the customer receives a percentage of the DSR company's income providing DSR services) or by simply **ensuring you provide transparency and accountability** by notifying customer on how, when, and why DSR is being performed.
- Provide customers with the following critical DSR criteria:
  - **Ultimate control of their LCTs**
  - **Tangible benefits/incentives for enabling DSR to be performed** (e.g. savings on their energy bills or monthly payments)