

Celsius

Customer Focus Groups Lessons Learned

21 December 2017



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VERSION HISTORY

Version	Date	Author	Status	Comments
0.1	23 November 2017	Impact Research	Draft	
0.2	9 December 2017	Tracey Kennelly	Draft	
1.0	21 December 2017	Tracey Kennelly	Final	

REVIEW

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GLOSSARY

Abbreviation	Term
C ₂ C	Capacity to Customers
CEP	Customer engagement plan
CLASS	Customer Load Active System Services
DNO	Distribution network operator
ECP	Engaged customer panel
FAQ	Frequently asked question
GB	Great Britain
LCN Fund	Low Carbon Networks Fund
LCT	Low carbon technology
NIC	Network Innovation Competition
Ofgem	Office of Gas and Electricity Markets
RIIO-ED1	Electricity distribution price control 2015 to 2023
RIIO-ED2	Electricity distribution price control 2023 and beyond
SME	Small and medium-sized enterprises

FOREWORD

This report documents part of the learning from Electricity North West's Celsius project (referenced hereafter as 'Celsius'), which is funded via the Office of Gas and Electricity Markets' (Ofgem's) Network Innovation Competition (NIC).

The project received formal notification of selection for funding on 30 November 2015 and is due to be completed by 31 March 2020.

Celsius explores new ways of monitoring and managing the thermal capacity of assets at distribution substations so that capacity can be maximised and reinforcement costs minimised. The approach can be used by distribution network operators (DNOs) to prepare their networks to meet new requirements arising from the expected increase in the adoption of low carbon technologies (LCTs).

The analysis herein is derived from a customer engagement methodology submitted as part of the Celsius customer engagement plan (CEP), which was designed by Electricity North West and its specialist market research provider, Impact Research.

The key findings form part of the project dissemination and specifically reference the learning from strategic qualitative market research carried out with an engaged customer panel (ECP). The research was designed to test the effectiveness of communication materials in educating customers about the need for Celsius and the benefit of the method.

A subsequent report will be published in September 2019 that will summarise the learning from a customer survey. The survey will test the acceptability of innovative retrofit cooling techniques.

This report and related learning materials have been published on the project [website](#).

1 EXECUTIVE SUMMARY

1.1 Background and business objectives

Celsius is an innovative, cost-effective approach to managing potentially excessive temperatures at distribution substations that may constrain the connection of LCTs. It will be the first application of a coordinated approach to managing the temperature of electrical assets in distribution substations across Great Britain (GB).

The project will enable DNOs to identify the internal operating temperatures of assets through a Thermal Ratings Tool. This information will allow DNOs to release the maximum capacity from the assets without degrading their health and reliability.

Celsius will also enhance the capacity of assets by demonstrating when and how to utilise a range of retrofit cooling techniques. Customer engagement will be undertaken to establish the acceptability of the retrofit cooling techniques and if the application of these techniques is as acceptable as traditional reinforcement, therefore establishing their suitability for rolling out across GB. A level of acceptability will be established for each type of retrofit cooling technique which will make it possible to differentiate between the various interventions based on customer feedback.

Customer engagement will also ascertain whether customers who are educated on the need for and benefits of Celsius are significantly more likely to find it acceptable. This research will evaluate the hypothesis linking the investment in education to an increase in acceptability of Celsius. Electricity North West is unaware of previous studies that have tested customer engagement in this way to demonstrate investment on return.

It is envisaged that the Celsius method will enable DNOs to release capacity at a fraction of the cost of traditional reinforcement, reducing long-term costs for customers and avoiding unnecessarily early asset replacement.

1.2 Customer engagement objective

To test the hypotheses that 'customers within the Celsius trial areas will find the implementation of innovative retrofit cooling techniques as acceptable as traditional reinforcement' and that 'customers who are educated as to the need for and benefits of Celsius are significantly more likely to find it acceptable', a two-stage programme of customer engagement was developed.

The first stage involved convening an ECP to test general perceptions of the Celsius project and initial reactions to the retrofit cooling techniques. The objective of this ECP consultation was to address two key questions:

- Which materials are most effective in engaging customers about Celsius?
- Which key components of the Celsius method need to be communicated to customers?

The second stage will involve the administration of a customer survey to a representative cross-section of customers. The data collected from this activity will enable the evaluation of the hypothesis linking investment in education to an increase in acceptability of Celsius.

This report disseminates the results and learning associated with testing Celsius communication materials, intended to be assimilated as part of a suite of educational resources in the survey instrument, which will be utilised in the second stage of customer engagement.

1.3 Research approach

The research objectives were exploratory by nature and required a methodology that elicited deeper understanding of customers' perceptions. Focus groups have proven to be a suitable platform for exploring complex concepts and encouraging informed discussions, and were seen as an appropriate mechanism for this research activity.

The ECP comprised ten domestic customers who met on two occasions.

Discussion guides supported by a suite of stimulus materials were utilised to facilitate the group meetings, all of which are referenced in the project replication appendices to this report and a sample of which are available to view and download on the Celsius website.

1.4 Summary of key findings

1.4.1 Which materials are most effective in engaging customers about Celsius?

The primary objective of the communication materials evaluated by the ECP is to support the customer survey in explaining Celsius in an effective and engaging manner. Consultation with an ECP established that the most effective materials in achieving this were:

- **A Q&A briefing document:** to clarify the role of Electricity North West and its position within the electricity sector, and to explain what substations are, where they are found and what they look like
- **Low carbon showcards:** to contextualise the anticipated increase in demand for electricity and the implications of using traditional methods to meet this demand
- **Technique showcards:** to describe potential Celsius interventions through a mixture of annotation and imagery, which depict: possible solutions to meeting future electricity demand, potential audio-visual effects associated with the techniques, and the benefits of implementation to customers

- **A customer leaflet:** to summarise the material contained within the Q&A and information showcards, and to include: further information about the Celsius trial and customer research, frequently asked questions (FAQs) and other pertinent information about Electricity North West.

The project team's decision not to adopt a 'one size fits all' approach for educating customers was validated by the ECP, which demonstrated that customers have different communication needs, preferences and expectations. This process demonstrated that a range of communication materials are required to balance varying levels of customer awareness and experience in the subject matter.

The broad range of communication materials evaluated by the ECP was deemed appropriate to satisfying a spectrum of differing requirements in the target survey audience. The customer leaflet in particular was perceived as a clear, engaging and accessible communication tool, which contained an appropriate breadth and depth of information.

Other communication materials evaluated, included but were not limited to, an animated video and a project infographic. These were also demonstrated to be suitable materials to engage and educate customers, with the caveat that some refinements are required to provide greater clarity, avoid misconceptions and address unanswered questions.

1.4.2 Which key components of the Celsius method need to be communicated to customers?

Learning from the Celsius ECP indicated that, before taking part in the customer survey, the majority of participants are unlikely to have given any consideration to where the nearest electricity substation is in relation to their home/place of work, or if it has recently changed in appearance. Therefore, communication materials need to be pitched appropriately to facilitate effective engagement and stimulate participation in the quantitative questionnaire.

Pending the successful outcome of the trial, Celsius will look to maximise the value of the smart meter programme by using smart meter data, aggregated at substation level, to indicate where to deploy the Celsius method in the future. However, this future objective is unrelated to the trial or associated customer research. Therefore, to avoid confusion, all communication materials must clearly explain that Celsius is an innovation project, which is being delivered by Electricity North West and is not linked to the smart meter rollout. To help emphasise this distinction, communication materials will emphasise the Celsius logo, and Electricity North West branding. Materials will also be shared which articulate the project's requirement to disseminate 'important information from your electricity network operator' and feedback demonstrates the need for this message to be clear and prominent.

It is important to contextualise the need for alternative solutions to the traditional methods of meeting increased demand for electricity by explaining the drivers for increased consumption; specifically, the decarbonisation of heat and transport. References to the Climate Change Act 2008 and the 2050 government mandate are generally considered, by customers, as too distant a prospect to be relevant and this is particularly the case when consulting older members of society. Therefore instead of a legislative focus, communication materials should convey that although the speed with which people will switch from gas to electric central heating is unknown, notable changes are anticipated over the next ten years.

Images of pole-mounted transformers and ground-mounted transformers in a variety of housings are effective in prompting customers to identify the type of substation nearest to their property. Imagery should be embedded into the customer survey to improve the accuracy of responses obtained and enhance the robustness of analysis undertaken. Reassurance should also be provided to survey participants that Celsius does not introduce any safety risks to customers who live in close proximity to trial substations.

Communication materials must explain that Celsius seeks to avoid the early replacement of assets and that the benefit of the technique, in terms of additional capacity release, will be

measured through trialling a range of cooling solutions at 100 substations. In the absence of evidence indicating the benefits of the various Celsius retrofit cooling techniques at this stage of the project, customers need to be told the approximate cost of the base case scenario (traditional reinforcement) versus an estimate of how much less it would cost to implement an alternative. Materials must also make explicit any possible audio-visual effects associated with the implementation of Celsius techniques and the potential customer benefits of these alternatives. This will allow customers to make informed decisions when comparing new interventions with the traditional solution.

1.5 Next steps

The quantitative surveys represent a significant proportion of the customer engagement activity associated with the Celsius project. These will start with a baseline survey in January 2018 before the retrofit cooling techniques are applied. The data collected from the baseline will serve as a benchmark with which to compare the results of a second customer survey, conducted after the interventions have been applied, thus acting as a measurement of any change in perception.

In total, 600 baseline surveys will be conducted, split 50/50 among those who have, and those who have not, been given additional education on the need for and benefits of Celsius. The subsequent test survey (after the cooling techniques have been applied) will comprise 600 customer surveys. Of these, 450 respondents will be completely new to the engagement, having not taken part in the baseline survey or received any prior education related to the project.

There will be ongoing knowledge sharing and dissemination as the project progresses.

2 ANALYSIS AND RESULTS

This section of the report disseminates the key findings of the ECP, as summarised in Section 1.4, with greater granularity.

2.1 ECP meeting 1

The initial focus group meeting was structured to meet the first objective of the research, as outlined in Section 5.6 of the [Celsius CEP](#):

'Test and refine education information that will be presented to selected participants as part of a suite of materials during the customer survey.'

The analysis answers two key questions:

- Which materials are most effective in engaging customers about Celsius?
- Which key components of the Celsius method need to be communicated to customers?

The focus of this appraisal was to determine the elements that assisted or hindered the explanation of the Celsius project to the ECP. Feedback regarding the communication materials is summarised using a number of key insights, followed by any action taken as a result of the consultation before the ECP was reconvened for a second meeting.

2.1.1 A Q&A document serves as a useful explanation of Electricity North West's role as a DNO and will support engagement with customers

Insight

Data collected from ECP members as part of the initial recruitment process indicated that only two participants were previously aware of Electricity North West, and neither of these individuals had ever made contact regarding a supply interruption or any other matter. This

finding was verified during the first meeting, where it was established that this prior awareness of the DNO was simply the result of having observed Electricity North West-branded vehicles around the region and recollection of an LED bus superside digital brand awareness advertisement:

“I’ve just actually seen a bus going past with it. It had all these lights on the side of the bus with an advertisement on.” Female.

The implication of this finding was that the ECP collectively had a relatively low, surface-level awareness of Electricity North West. Low customer awareness of, and limited interaction with, Electricity North West suggests that customers’ expectations may be ill-defined, which can influence perceptions of the quality of the service provided. Communication and education are therefore important ways to address these challenges and maximise the impact of customer engagement.

In Electricity North West’s previous Second Tier Low Carbon Networks (LCN) Fund projects [C₂C](#), [Smart Street](#) and [CLASS](#), a key learning outcome was that participants, particularly domestic customers, were unfamiliar with Electricity North West and struggled to understand the role of the DNO in the electricity industry. This obstacle initially required a comprehensive briefing exercise to explain the identity and role of Electricity North West. Only then were participants able to understand the challenges facing the energy sector and to fully comprehend project awareness material. This learning influenced how customers were introduced to the role of key industry players and resulted in a basic Q&A leaflet, a version of which has been successfully used in previous projects to provide information about Electricity North West and the structure of the electricity industry. This Q&A was issued to participants before the first Celsius ECP meeting, along with supplementary (and previously untested) information regarding electricity substations, which explained what they do, where they are found and what they typically look like. The materials shared with the panel, prior to the initial focus group meeting, can be seen in Appendix 6.4.

The ECP’s limited base level of awareness underlay its assumption that energy suppliers should be contacted in the event of a supply interruption. The consensus among the panel was that the Q&A briefing document addressed this misconception by effectively distinguishing the role of Electricity North West from energy suppliers in a simple yet informative manner.

The panel found the information regarding substations helpful in explaining that the function of this equipment is to safely transform high voltage electricity to much lower voltages:

“When electricity is produced, it’s a huge voltage, so it needs to go from that to 230–240 into your house. The substation, as I understand, regulates it down to a power rating into your house so that you can use it.” Male.

The ECP professed to not having previously thought about substations or other electricity-related street furniture in any detail. However, the majority of the panel were able to identify utilise the type of substation located nearest to their home using the images provided. The Q&A helped to instil the ECP’s confidence by affirming that they already knew more than they had previously thought. It then served to advance their understanding through the provision of information about various types of substations in different environments:

“I’ve seen quite a few of the different ones around. Most of the time they’re in very nice buildings, commensurate with the area of course.” Male.

Further deliberation uncovered concerns, among some of the group, about the appearance, or perceived health and safety issues linked to substations in close proximity to housing:

“A couple of years ago my sister was looking to buy a house and [the substation] was a big reason that it put her off buying it. There used to be a lot of stories that you could get sickness from the electricity that comes off them. They don’t look pretty either. It’s not

attractive to have it next door to your house, and I don't think they knew what the repercussions were living next to it with three young kids." Female.

The panel was conflicted on the subject of health and safety. A minority had made a conscious decision not to purchase a property in close proximity to a substation, due to perceived detrimental health effects. However, this was offset by the view of the majority, who implicitly believed that asset owners must know, beyond reasonable doubt, that equipment installed near to customers' homes and businesses do not pose any significant threat.

Action

The Q&A (see Appendix 6.4) provides pertinent educational and contextual information. The ECP's evaluation of the Q&A substantiated that this information will assist the majority of survey participants to attain a similar understanding, relatively quickly. The ECP's response to this document provides confidence that, when introduced early in the survey, it will negate responses to questions being erroneously influenced by any inaccurate understanding of the role of Electricity North West.

Images of various types of substations in a range of urban and rural environments are effective in prompting customers to identify the type of substation nearest to their property. The implication of this finding is that substation imagery should be embedded in the customer survey to improve the accuracy of responses.

Evaluation of the draft Q&A raised previously unarticulated attitudes to risk. For example, the document stated that 'all substations have an identifying nameplate, with the name of the operator along with 'Danger of Death' signage'. This furthered a desire for information and reassurance about the safety of customers who live in close proximity to substations.

Raising safety awareness around electricity, specifically in relation to distribution equipment, is an integral part of Electricity North West's [customer engagement and communication strategy](#). Therefore, feedback from the ECP will be utilised to modify the Q&A, with relevant information to reassure customers.

2.1.2 Showcards are an effective method of introducing the low carbon challenge and the factors underlying changes in future electricity demand

Insight

During the initial focus group meeting, panellists were asked to contemplate a suite of materials (see Appendix 6.5). This included a problem statement showcard that introduced the anticipated increase in electricity demand of 60% by 2050, primarily associated with decarbonisation of heating and transportation. It was important for the panellists to consider the challenges facing the energy sector, from the transition to a low carbon future, to develop an informed opinion about the need to find acceptable, alternative solutions.

The ECP accepted the extent of anticipated future demand. The majority of panellists were aware of innovations in LCTs and recognised, from their own observations, a significant increase in their adoption over recent years, in particular electric or hybrid vehicles:

"You see it happening, don't you? More and more electric cars. There are more cars charging at the side of the road, and the buses say that they're all going hybrid and electric. So it's going that way." Male.

Although members of the panel fundamentally appreciated that there would be an increase in future demand, they hypothesised whether the introduction of smart meters would instigate behaviour change and if this, combined with advancements in technology, would facilitate greater energy efficiency to meet energy demand:

“There are two sides, isn’t there? We’ve just got a smart meter fitted and now that that’s in the house you’re like, get out of the shower right now. You turn it off.” Male.

“In 33 years’ time, just reading the news with what’s going on, the chances are we’re not even going to use cars.” Male.

Consistent with previous LCN Fund projects C₂C, Smart Street, CLASS and [Respond](#), customers’ main concern in response to the problem statement was the likely impact or benefit (if any) for them. The ECP was primarily concerned about whether there would be any change or disruption in service or increase to their bills. The implication of this shared mindset recognises the likelihood of increasing public concerns about the potential for significant costs to be passed on to customers, should DNOs continue using only traditional methods to expand and reinforce the network to meet future demand:

“I’m just thinking obviously it will lead to higher bills.” Female.

“They need to find ideas. They’ve got enough people on board. They need to find ways to do it using new methods. Use better equipment. Produce better cables.” Female.

In relation to any upward pressure on bills, panellists were also sceptical of the validity of decarbonisation targets:

“Just because the government has said that’s the forecast, I bet there’s somebody who’s come up with a forecast that it’s not going to be increasing. So it’s who you believe really on what the prediction is going to be. You’ll talk to five different people and they’ll come up with five different percentages of how electricity is going to up.” Female.

Action

The low carbon showcards assisted the evolution of the ECP’s understanding about the need to consider alternative methods to meet future electricity demand. It is therefore recommended that problem statement/low carbon showcards are presented to selected survey participants (the educated sample) to contextualise the research. Consultation with the ECP has demonstrated that this information is best presented before introducing Celsius-focused materials.

Minor amendments were made to the communication materials to reflect concerns that for some, the 2050 government mandate is regarded as too distant to be considered relevant. However, the Celsius project team believe that this assessment belies the immediacy of the challenge faced and has therefore focused refinements to the materials around anticipated, but unpredictable, uptake of LCTs by customers, rather than government targets. These modifications included an explanation about the potential for LCT clusters to cause thermal constraints, which necessitate the early replacement of equipment. It is critical that these materials are able to convey that, while it is difficult to forecast the speed of LCT uptake, notable changes are anticipated over the next ten years. In light of ECP feedback, it is anticipated that this message will be more readily accepted by survey participants than any reference to climate change targets.

2.1.3 The Celsius project video has the potential to be confused with the smart meter rollout programme, if viewed in isolation by a domestic audience

Insight

In Electricity North West’s previous Second Tier LCN Fund projects, videos were found to be particularly effective in explaining the projects’ respective concepts to customers in a simple manner. Therefore, an animated video, produced to explain how Celsius will address the issue of ‘thermal pinch points’, was shared with the ECP. While this video demonstrated the solution in relatively simple terms, it was intended for an industry, rather than a customer audience.

A customer specific video had not been produced for the Celsius project because there are no network impacts associated with the trials that require dissemination. Additionally, only a small number of customers will be approached to take part in any form of customer research and therefore, exposed to project information. Part of this customer research evaluates the impact of education on acceptability and therefore, a targeted awareness campaign was evaded, to negate the risk of sensitising the uneducated sample of survey respondents.

The video was nonetheless shown to the ECP with the intention of identifying key concepts, messages, language and images that aid or detract from customers' understanding of Celsius.

The ECP's initial reaction to the video was to query whether Celsius was an organisation in its own right, or if it was a project being presented to them on behalf of Electricity North West:

"Who is Celsius, is that them? Is that part of Electricity North West?" Female.

The video clarified that participants had already digested information from the literature that had been previously shared, such as Electricity North West's aim to future-proof the network by increasing capacity without investing in expensive new infrastructure, and its objective of achieving this by utilising existing equipment more effectively, without reducing the life of assets:

"Celsius will save the expense on new equipment, so they haven't got to start building new substations and new cables." Male.

It was anticipated that the video would help to introduce the Celsius concept to the ECP and demonstrate the relationship between an increase in electricity demand and an increase in electrical current; which correspondingly, raises the operating temperature of cables and transformers. It also explained that the temperature of equipment can be affected by the substation environment. Introducing these basic but fundamental concepts was important to expand the ECP's understanding of the Celsius solution. However, while some found the video and the information it contained engaging, it was apparent that the animation failed to resonate with other participants, who were preoccupied by the perceived role of smart meters and the extent to which the rollout programme will enable the project.

The video did not promote the adoption of smart meters or the rollout programme; it merely suggested that in the future, smart meter data may be used to help identify where network equipment is potentially at risk of exceeding its operating temperature. This short reference was misconstrued by the majority of the panel:

"It looks like a promotion for a smart meter to me. It was selling to me the need for a smart meter." Male.

"Smart meters identify local areas and potential pinch points of where they need to do some work. So they're identifying the pinch point areas to do developments." Male.

Videos can be an ideal format for sharing unfamiliar, complex concepts and delivering a message with consistency to a range of audiences, via multiple devices. Feedback on the Celsius video confirmed that, in its current format, it was not ideal for a domestic audience and consequently, it failed to significantly enhance the ECP's understanding of the project. However, it was appreciated as a visual means of cementing what the panel had already learned from less technical, customer focused literature introduced earlier in the process.

Action

In light of the key findings, the video will not be used as a primary method of communicating the Celsius project to survey participants. However, it should be included as part of the suite of materials, available to the educated sample of survey participants, to enhance the overall accessibility of information via a range of channels.

In response to this feedback, all materials will be amended to clearly explain the relationship between Celsius and Electricity North West, and to delineate Celsius from the smart meter rollout. This is in the spirit of Section 3 of the Celsius CEP, which sets out certain requirements for DNOs undertaking projects funded by the NIC, including reference to:

'Hav[ing] regard to the implementation of the smart meter rollout to ensure that the project does not impede the implementation in any way.'

ECP feedback highlights the need for Celsius materials to clarify that the project does not involve the installation of equipment or any other intervention work at customer premises. As stated in Section 2.1.3, there is no general awareness campaign associated with the Celsius project, meaning that there is little (if any) risk that Celsius will be confused with implementation of the smart meter rollout. However, additional information (refer to Section 2.2.6) will be handed to the educated sample of survey respondents to ensure that distinction is made between the two programmes. As the materials will also be published online, appropriate links will be included to pertinent information, where there is a need for further clarity.

2.1.4 Supplementary infographic information is useful for clarifying key concepts; however, duplication across materials should be minimised

Insight

An infographic was produced to disseminate Celsius specific project-related information to the ECP (see Appendix 6.5). There was some overlap in the information provided in the one-page document and other briefing materials such as the Celsius video, including:

- What is Celsius?
- Why do we need Celsius?

The infographic presented to the ECP sought to avoid the use of jargon and language that may have been unfamiliar, and included imagery relevant to the project, such as a thermometer. These factors contributed to its success in helping participants tease out the relationship between higher demand, increased electrical current and the operating temperature of electrical equipment:

"I understand that the cables at the moment obviously can't cope, and if they put more electricity through them they're going to get too hot." Male.

The infographic also resonated with the ECP by explaining that, through a programme of customer engagement, the project seeks to demonstrate that new Celsius cooling techniques are acceptable to customers as traditional solutions. The information clarified the need to engage in customer research and assisted in the panel's perception about Electricity North West taking its duty of care seriously:

"They're gathering evidence. To make decisions you've got to gather evidence, and that's what this is about." Male.

"You want to make sure that it's acceptable and not something that's being done against our wishes." Female.

The gradual dissemination of information among the panel enabled discussion to evolve and prompted more challenging questions regarding the longevity of the solution:

"It's all right saying they'll save us money now, and that all sounds really good, and that's fine. But are we thinking in 33 years' time or whatever it is, are we just going to go through all this again." Male.

“You’re always going to have to dig up something, even if you do cool the substation down.”
Female.

This feedback suggested an information gap in the infographic reflecting uncertainty around the extent to which, in the long term, Celsius can feasibly delay or avoid the need for traditional reinforcement. It is important to recognise that this long-term frame of reference had been influenced by the showcards which were used to introduce the low carbon challenge (Section 2.1.1).

The ECP was asked to debate the merits of the infographic and video to summarise the Celsius method. The panel was divided, with some preferring the engaging, visual nature of the video and others preferring to read information at their own pace:

“I’m that sort of person, though. I’d rather read than look at a video. I’d rather read and have the information in front of me.” Female.

“I prefer to see things visually. You can read stuff, but I think the video explains it.” Male.

The ECP identified that a range of communication materials, differing in technical complexity and level of detail, would be required to disseminate important components of Celsius to a range of survey participants, and hypothesised that the optimal communication strategy may consist of a hybrid of the two techniques, combining clear and concise information with engaging visuals.

“I think both of them put together makes you understand better.” Male.

Action

Information in communication materials needs to be pitched appropriately to facilitate effective engagement and stimulate participation in the customer survey; specifically it must maintain the focus of respondents through to completion of the survey. Customer information requirements are likely to be influenced by individuals’ own experience, expertise and educational preferences. The broad range of communication materials evaluated by the ECP was deemed appropriate to satisfy the differing requirements of the target audience, with the caveat that improvements were made to provide greater clarity, avoid misconceptions and address unanswered questions.

In response to ECP feedback in meeting 1, a stand-alone customer leaflet was designed which was able to capitalise on the most effective information, images, diagrams and concepts tested across the suite of communication materials. This was subsequently shared in the second meeting (see Section 2.2). The information it contained included, but was not limited to, the following topics:

- Introduction to Electricity North West
- Explanation as to why and how electricity usage is changing
- How future electricity needs can be met
- Description of the Celsius technique
- How Celsius will benefit customers
- Why Electricity North West is engaging with customers.

The project team sought to directly address the following questions in the form of an FAQ section in the leaflet:

- How will Celsius affect me?
- Will you need to replace the equipment anyway?
- Is Celsius the only solution to meeting the electricity needs of the future?
- How soon is Celsius required?
- Can I opt out of the project?

- Why are you telling me this?
- I rely on electricity for special medical needs – will I be affected by the trials?
- What do I do if I have a supply interruption?

Learning from previous Electricity North West innovation projects, was influential in the design of the customer leaflet and the protocol for its evaluation through customer engagement. The transfer of this learning highlighted the importance of the format, style, type and amount of information included on the cover and internal leaves. Crucially this learning engendered an understanding of how small but critical components of the design are likely to determine how much (if any) of the material is read and absorbed by the recipients.

Based on previous experience, text outlining the role of Electricity North West, as distinct from electricity suppliers, was prominent on the front cover. This prominence was achieved through clear branding and the use of large, bold print. Previous insight also highlighted the value of drawing attention to positive messages and therefore the cover's title was used to deliver 'good news' for customers, linking Celsius to an improvement in service.

In recognition of customers having diverse communication needs, which influences how much information they may require about a subject, the rest of the front cover was devoted to a concise project Q&A. This was designed to provide readers with key, high level project information. This will enable those who require greater detail to consider the internal leaves of the document more thoroughly. This strategy was successfully used in previous projects to distinguish general awareness leaflets from marketing mail. This consideration was less important in Celsius than previous projects, as communication materials will be handed directly to research participants. However the design followed the same format used in previous projects because of its proven benefits in delivering clear and concise information. The Q&A included reference to:

- Who is Electricity North West?
- What are we doing?
- Why are we doing this?
- How will I benefit?

2.1.5 Customers wish to be informed of the likely scale of investment into traditional reinforcement relative to alternative techniques

Insight

Initial discussion with the ECP substantiated that before attending, participants had given little if any consideration to where their nearest substation was located, or if it had ever changed in appearance. However, the effect of being invited to take part in the research had increased interest in the structures and participants had generally become more inquisitive:

"I pass it every day, a few times a day, but through this research I became aware that this must be the substation, obviously, with the signs saying 'Keep out'. So it definitely is one." Male.

"I know what they look like and I've seen them about, but I don't know where the one closest to us is. I've kept my eye out, but nothing." Male.

To robustly quantify the acceptability of new innovative retrofit cooling techniques, in the forthcoming survey, respondents will need to understand and compare and contrast alternative scenarios with traditional reinforcement. The importance of ensuring that materials can effectively communicate information, which enables previously unengaged customers to achieve this understanding, was underlined by insightful feedback from the ECPs that initially had a relatively low level awareness of substations.

An information showcard was produced, which outlined what was involved in the traditional solution to a thermal rating problem. Separate showcards, designed and presented in the same format, were produced for each alternative technique. Each showcard included imagery associated with the technique, and explanatory information that addressed four key questions:

- What is the technique called?
- How does the technique work?
- Potentially, what are customers likely to notice?
- What are the benefits of the technique?

The traditional reinforcement showcard template was very effective in communicating the key components of the technique in a concise manner, providing sufficient information for the ECP to make an informed judgement without requiring extraneous detail. Critically, this showcard enabled the ECP to form an accurate understanding of what a traditional method involves ie investment in additional electrical infrastructure, such as transformers and the potential disruption associated with the installation of new assets:

“It’s what they’ve always done, replace things and put new ones down.” Male.

The ECP interpreted the reference in the traditional reinforcement showcard to it being a ‘costly, lengthy and disruptive undertaking’ as concerning. However, the reference to ‘costly’ was perceived as overwhelmingly negative, generic and subjective. They similarly believed that the Celsius solution was subjectively positioned as reducing long-term costs in an exclusively positive manner:

“There’s nowhere here that says how much it’s going to cost. So that’s all really positive and this is all doom and gloom.” Male.

Neither the reinforcement showcard, nor those showing proposed alternative Celsius techniques gave any information about their respective individual or comparable costs, other than a statement that an overall investment of £10 billion would be required to upgrade the network, using traditional methods, should electricity usage double by 2050. The effect of this omission was that participants were unable to truly conceptualise the financial impact of traditional reinforcement on their household or the extent to which this could be offset by alternative methods:

“So I don’t think you can stack the two up against each other because you don’t know the cost and how long it’s going to last.” Male.

The panel was highly attuned to the possible social and emotional impact of disruption caused by excavation work, associated with reinforcement, that could result in noise disturbance and inconvenience to customers living or working in the immediate vicinity of a substation. Participants enquired about the typical duration of installation works, given that roadworks/barriers and road closures can disrupt traffic flow and parking, as well as impact the trade of local businesses:

“It doesn’t tell you how long it will take. If it’s only going to take three hours, I know that’s pushing it a bit, but that’s not going to bother me, is it?” Male.

“It also depends on how much it affects me; if it affects where I can park my car at night or it affects how long it takes me to get to work in the morning.” Male.

The ECP’s overall assessment of Celsius was influenced positively by the principle of the technique extracting greater value from existing infrastructure, negating the need for premature asset replacement. They also recognised that this would negate avoidable investment, the cost of which would ultimately be borne by the end-customer:

“If this traditional method is how we’ve been doing it for the past 50 years, obviously technology has gone on. So if they’ve figured out a way of cooling down these substations in the meantime to prolong the life of what’s already in existence, then crack on.” Male.

Action

Communication materials were amended to provide more specific detail regarding the costs associated with traditional reinforcement.

The financial benefit of Celsius will be achieved through offsetting increases in the thermal capacity of assets against reinforcement costs associated with the early replacement of assets. As such, cost benefits of alternative interventions go beyond like-for-like comparisons of capital cost.

In order to provide a reasonable indication of the cost of traditional reinforcement, the project team adopted a base case scenario of replacing a 500kVA transformer with an 800kVA transformer, involving an indicative cost of between £15,000 and £25,000 per site. This figure was quoted in the communication materials, supported by a statement explaining that reinforcement costs vary significantly depending on the complexity of installation at each site, and that costs increase or decrease relative to the replacement transformer’s, size, type and specifications.

The communication materials were also amended to provide a means of comparing the cost of traditional reinforcement to alternative techniques. However, because the various Celsius retrofit cooling techniques have not been trialled previously, it was only possible to provide the best possible estimates of forecasted costs currently available. To assist the panel in comparing the investment expenditure associated with the various techniques, the project team decided to indicate the costs of each by relative scale, rather than specifying absolute values. As such, the cost associated with each retrofit cooling technique was expressed by highlighting pound symbols as a ratio of the cost of traditional reinforcement, as illustrated in Figure 2.1.

Figure 2.1: Cost comparison



2.1.6 Alternative retrofit cooling techniques

This section of the report disseminates initial reactions to a range of proposed Celsius retrofit cooling techniques that were presented on individual showcards, using the same design format as the traditional reinforcement base case scenario.

The ECP appraised the style and layout of the communication as accessible, clear and informative. Therefore, the key findings focus on participants’ perception and interpretation of the content rather than the way in which the information was delivered.

Shading substations

The simplicity of installing insulated, perforated panels over pole-mounted transformers to provide shading, appealed to the ECP, who regarded the information provided as clear and easy to understand:

“It’s not rocket science though, to be fair.” Male.

While the showcard specified that this technique would result in a change to the appearance of the substation, the ECP was not unduly concerned that this represented a significant negative visual impact, relative to the status quo:

"They're usually in rural positions, so less people experience an impact. However, they're also in areas where people do take leisurely walks and use the countryside, so there is a small pollution there." Male.

"Sticking a cap on it, you're not going to be bothered, are you?" Male.

The technique was acceptable to the ECP due to the perceived minimal audio-visual impact and it was suggested that the relatively small aesthetic impact might be mitigated by some form of camouflage to help disguise the installation within its natural environment.

Heat exchange- and air conditioning-related solutions

A showcard depicting the installation of a heat exchange unit, which uses fans and pumps to cool transformers, prompted significant concern among the panel, who speculated that the audio impact may be excessive and unacceptable:

"Yeah, it's like putting an air conditioning unit in every substation basically, isn't it?" Female.

The ECP doubted the assertion of the showcard that the technique would result in just a small audible difference, which was described as being similar to a desk fan in an adjacent room:

"Yeah, the one thing I picked up from that is it says a small audible difference. That wouldn't be small. That would drive me mad, living next to that." Female.

In addition to the suspected noise pollution aspect, the panel's concerns also extended to the visual impact of these installations:

"Stick a couple of big fans on the outside of it and all of a sudden it draws attention to it and looks a bit rough." Male.

There was a consensus among participants that heat exchange-/air conditioning-related solutions would introduce a significant and negative audio-visual impact. These concerns were compounded by the perceived long-term cost of implementing this type of cooling technology:

"That's going to cost a fortune. Constantly using electricity to cool it down". Female.

The ECP also questioned the ongoing cost of the technique, associating air conditioning units with the need for routine maintenance and repairs:

"There is the maintenance of them then as well, replacing parts." Male.

Heat exchange and air conditioning solutions were perceived as unacceptable by participants when compared with other solutions. This judgement was based purely on the information provided on the showcard, without exposure to any additional information qualifying the cost associated with the proposed solution or the audio impact.

Solar reflective paint

Although the panel found the concept of solar reflective paint very easy to understand, they both:

- Erroneously assumed that solar radiation was the primary cause of thermal constraints on operational assets

- Struggled to assimilate the extent to which solar radiation may increase the temperature of transformers and how application of this simple deflection technique might help to reduce the impact:

“I’m a bit confused, because reading this it sounds like the only problem we’re having is there is too much sun on these buildings, heating it up.” Female.

“I was going to say that these are all heading towards the weather conditions. We don’t get very much sun, so it makes you wonder how much it actually affects things, especially in Manchester.” Male.

The implication of this finding is the need to enhance the information provided to customers regarding Celsius retrofit cooling techniques to explain that:

- Thermal constrains at substations are not only affected by electrical current but also environmental factors, especially heat from the sun
- Celsius will trial a range of solutions that can be deployed to cool the equipment inside substations and improve air flow to help with cooling
- Celsius will also trial some modifications to equipment to absorb or deflect solar heat.

The panel was asked to consider a change in the colour of the substation from dark grey or green to white or beige, to exploit the reflective qualities of these light pigments in deflecting solar heat gain. Such a modification was generally perceived as acceptable and straightforward. However, this technique prompted some concern that such changes would be noticed by the general public and would provide a blank canvas that might generate unwelcome graffiti:

“Think at the moment [that] half the people in the room don’t know where their nearest substation is because they don’t jump out at you.” Female.

“The only thing that comes to mind is that if you lived near to one like that, especially where I used to live, you’d just get kids and graffiti.” Male.

“But then if it did go white and it was covered in graffiti, and it was something that you’ve never really noticed before and then suddenly it’s covered in graffiti, you’re not going to be impressed, are you?” Female.

Despite some apprehension regarding the potential visual effects, solar reflective paint was positively received and accepted as a relatively low-cost and unobtrusive solution.

Solar reflective materials or grating

Reflective material placed on the top of substations to reduce internal solar heat gain was perceived as expensive:

“It screams expensive to me. It’s more expensive than a tin of paint.” Male.

However, the ECP’s primary concern with the technique was the potential for possible glare when looking down on the substation roof from the upper storeys of buildings:

“What about the glare as well? If you looked down on that from your house and it keeps shining up in your windows, that’s going to be a bit of a pain.” Male.

The implication of this finding is the importance of considering the substation environment when determining the overall impact of the technique on customers, particularly those living and/or working in sight of the asset:

“This is just polishing your shoes before you buy a new pair of shoes. These are things that you do to extend the life. So if you can put that on a roof, crack on, but it’s not going to make

a massive difference to us. I would probably say that this one sounds more suitable for places where it's out of the way, rather than a built-up housing estate where you might get reflections and stuff in people's bedroom windows. But it says they're for exposed substations, ie out of the way. So pick and choose where you put them." Male.

Cable backfill

From the suite of cooling techniques presented to the ECP, cable backfill was resoundingly considered to be the method that had the greatest potential to provide an effective solution, despite an expectation that it would be one of the most costly to implement. Participants associated the method with getting to the root cause of the problem by removing heat from cables through the deployment of materials that have extremely high thermal conductivity:

"This is more comparable to the traditional methods, whereas the others were all about the weather and the heat. This is more about the heat in the actual cables, so I think this is more of the right option. The others are just obvious." Male.

The network and customer benefits from managing thermal constraints via this technique resonated with the ECP. Participants assumed that excavation work to remove traditional cable backfill materials (aggregate, sand and earth) would achieve long-term benefits:

"You're going to get more longevity out of it, rather than some of the other options potentially. This is something that will last." Female.

Identical images of Electricity North West engineers working adjacent to liveried vehicles and safety barriers were used to illustrate the cable backfill and traditional reinforcement showcards. The deliberate use of the same images was designed to demonstrate the connection between the techniques and the requirement for excavation work.

The ECP was advised that most excavation work would occur in the substation compound and that this would entail only limited noise disturbance and inconvenience to customers living or working in the immediate vicinity of the substation. The panel was also advised that roadworks, involving the erection of barriers, could disrupt parking the day the solution is implemented. This information was sufficiently reassuring to ECP members, some of whom had assumed such work would result in greater disruption, involving long-term road closures and temporary supply interruptions. This understanding served to desensitise participants to potential audio-visual impacts:

"I thought it may affect our electricity supply, but it didn't. I was concerned that they would have to switch everything off, but they didn't." Male.

"It's only in the grounds of the substation. It's going to have minimal impact." Male.

While the impact of the cable backfill technique was perceived as negligible in isolation, the ECP voiced general frustration about the cumulative effect of un-coordinated, cross-utility excavation works and detrimental social impacts, specifically inconvenience and repeated periods of traffic disturbance:

"That's the only thing I would be concerned for, because the amount of times they dig something up and then they come back the next week and dig it up again, and you think what the point in that is?" Male.

The panel were unanimous in their belief that the various utility companies needed to collaborate and develop a more cohesive approach to asset replacement and maintenance schemes that involve excavation in the public highway, to mitigate customer impact.

Solar panels installed on the roof

The information presented in this showcard outlined dual benefits of the technique: preventing the building/housing and the equipment inside from overheating, while generating

electricity. The ECP was intrigued as to the extent to which generation could offset the cost of installing the equipment:

“I think the initial outlay would probably be more, but like you’ve just said, maybe you’d rein it back in the long term.” Female.

The technology behind photovoltaic (PV) solar cells is well established, and ECP participants were all familiar with its existence and purpose. Technical advances have greatly improved the efficiency of solar panels in recent years; however, participants suspected that the PV panels they currently recognise will become obsolete and superseded by new technology in the future:

“It’s a progressive thing. 2050 we’re talking about, and this won’t be around then. This technology is almost obsolete now.” Male.

Interestingly, the panel’s familiarity with PV appeared to lessen their apprehension around visual impact and potential glare, when compared with concerns raised over the impact of other reflective materials, earlier in the meeting (see above). This may also have been influenced by a perception of tangible customer benefits from an investment in renewable generation helping to keep the cost of bills low.

“I think people would get over the visual thing because surely the electricity that generates would then impact on their bills, not massively, but you’d like to think you’d get something back. Probably minimal for the amount of people it serves, but you’d like to think it wouldn’t go anywhere higher.” Male

Other internal substation cooling techniques

The ECP had no concerns regarding the installation of additional wall or door vents, which they recognised already exist as part of the structure of ground-mounted substation housings. Similarly, they had no concerns about the addition of flues or small chimneys on substation roofs to expel heat and aid their cooling. The technique is reported to have no obvious visual or audible effects and is acceptable to customers.

Other sensitivities

The retrofit cooling trial will be undertaken at a subset of 100 distribution substations, selected from a total of 520 that have been fitted with monitoring equipment as part of the broader Celsius trials. Each cooling technique will be deployed at several substations, in different environments, to deliver learning about how much capacity release can be realised, and will define installation methodologies for optimal performance. Given that the techniques were previously untested, it was not possible to provide any evidence to panellists of forecasted capacity release, making it difficult for them to trade off the cost-benefit of each technique, relative to traditional reinforcement:

“You need to have values. You need to see what the gain is for doing this against painting it white, against installation of reflective materials. A lot of the questions are in the dark. It’s very difficult to give an answer because they’re a bit nebulous.” Male.

The ECP was reminded that the core objective of reviewing the communication materials describing the retrofit cooling techniques was to evaluate the general acceptability of each, particularly in relation to potential audio-visual effects. However, the learning from introducing the traditional reinforcement scenario to participants (see Section 2.1.5) was the apparent high sensitivity to potential bill increases, to cover the investment. The outcome of this key finding was to introduce a cost comparator on all technique showcards, indicating the approximate scale of investment required, relative to that of traditional reinforcement.

2.2 ECP meeting 2

The second focus group meeting was structured to test education information that had been refined based on the outputs of the initial consultation with the ECP.

The ECP's primary task in this session was to evaluate a new customer leaflet encapsulating the key components of the Celsius project that need to be communicated to customers (Appendix 6.6).

A key learning from the first focus group meeting (Section 2.1.5) was that customers need to understand the cost of traditional reinforcement and the relative scale of investment associated with alternative Celsius techniques, before they can make judgments about comparable solutions. On the basis of this finding, the ECP was asked to re-appraise refined communication materials which included this information.

The focus of this section of the report is to determine the effectiveness of these materials in explaining the Celsius service to customers.

2.2.1 Leaflets must be designed to focus customers' attention on key messages in order to encourage them to engage with the literature

Insight

The ECP affirmed the effectiveness of the customer leaflet as an appropriate medium to bring together the most important components of the Celsius project in a clear, engaging and accessible format:

"It does explain everything. It's simple language, easy reading." Female.

"When I was reading it, I was thinking even my children – I've got twins who are 12 – they could pick that up and even they would understand it." Female.

"I think there's a lot of information, but it's very easy to read and understand, and it's in layman's terms. I think it gives you everything you need to know." Female.

Based on previous leaflet design activities for C₂C, Smart Street and CLASS, it was recognised that the front cover needed to clearly distinguish the Celsius leaflet from:

- Energy supplier sales-related information
- Other advertising and marketing literature.

The ECP agreed that the front cover of the leaflet needed to be designed in such a way as to prevent customers from immediately discarding it, and that this would be a major challenge. This consideration was key to the design of general awareness materials in Electricity North West's previous innovation projects. However, because the Celsius leaflet will be handed directly to survey participants by the interviewer, the need to distinguish it from marketing material is less of a concern in this project.

To maximise potential learning, the panel was not initially informed about the intended method of delivering the leaflet and therefore, made an assumption that it would be posted. This intentional approach helped to focus the ECP's attention on ideal requirements, which had to be met by the document, to communicate key messages to a broad range of customers. As a consequence, the panel vocalised that the design needed to deliver clear and concise information, which avoided any images or text that might result in it being construed as 'junk' mail or content perceived by the customer as having no relevance to them.

Participants were clear that unless the leaflet's cover instantly struck them as important and, more specifically, relevant to their household, they were likely to immediately discard it or, would at best, only skim-read the content.

The ECP made a number of suggestions that they believed might help focus customers' attention and encourage them to read the literature:

- Make 'important information from your electricity network operator' and Celsius more prominent and larger on the front cover
- Carefully select imagery specifically related to electricity substations
- Personalise the leaflet's cover by adding the postcode or street name, to demonstrate that the leaflet is relevant to the individual or local area.

In Electricity North West's previous Smart Street project, ECP participants had been involved in a similar activity and had tested the most appropriate image to place on the cover of a general awareness leaflet, that was subsequently distributed to all customers on trial networks. That panel had favoured an image of an engineer climbing a pylon against the backdrop of a cloudy sky, which they believed served to enhance Electricity North West's brand identity and helped to differentiate it from marketing leaflets. This image had less resonance among the Celsius ECP, who felt that the leaflet might be misconstrued as informing customers of maintenance work on electricity pylons:

"Interestingly, there's not a substation on here which is recognisable by people as substations. The picture says to me that they're doing work on the pylons." Male.

"It's rural, it's techy, it's a bloke climbing pylons, and it's a turnoff." Male.

The ECP perceived the depth and breadth of information provided about Celsius was appropriate. The format and style of the leaflet was seen as appealing to a broad spectrum of recipients. They believed it provided sufficient detail on the front cover for those interested only in a high-level summary, while enabling those who require greater detail to consider the internal leaves of the document more thoroughly. This format was successfully used in leaflets produced for previous innovation projects, to effectively deliver pertinent information and help distinguish it from marketing leaflets.

Action

Key components of the Celsius method were made more prominent on the front cover to clearly delineate who the communication was from and why the information was being shared with survey participants.

- The size of the Celsius logo was increased
- The method was referred to as 'Project Celsius', rather than 'Celsius'
- The size of the 'important information' title and 'good news' subtitle was increased.

While feedback from the panel recommended replacing the cover of the leaflet with substation-related imagery that had been positively evaluated in the previous focus group session, the project team recognised that the panel had only fully identified with these images after a period of education and as such, considered them inappropriate to use on the cover. Therefore, an alternative picture of a pylon was used as the cover image, on the basis of previous and extensive customer research, which demonstrates that, as a general principal, customers find it easier to relate messages associated with electricity distribution with these large, familiar and easily identifiable assets. Substation imagery will be included in the inner leaves, with explanatory text to assist the reader's understanding.

Further consideration was given to the colours used in the leaflet, in particular that of the background masthead. The final colour scheme will be restricted to Electricity North West's brand pallet. However, it is recognised that minor variations in tone and the careful

placement of text in relation to background blocks of colour can play an important part in the overall aesthetic quality of a document and influence whether or not it appeals to a reader. The ECP felt that some dull tones detracted from the visual quality and other colours were overpowering, making carefully selected images appear out of place. Therefore, a slightly softer tone of green was introduced for the masthead making the black text within it appear more prominent.

As the leaflet will be hand delivered there was no requirement to follow the panel's suggestion to include individual postcodes or town names on the front cover. However, this feedback reflects that of ECP's convened in previous projects. Notwithstanding the significant costs associated with personalising communication literature; the consistency of feedback demonstrates the value customers place on personalisation and the potential return on investment needs to be assessed when DNOs consider how best to effectively deliver important information to customers.

On the basis of this feedback the 'good news' subtitle was updated to read: 'We are improving the electricity network that supplies your home and the rest of your street.' This broader geographical reference is intended to demonstrate that the leaflet is relevant to the individual recipient as well as other residents in close proximity to them.

2.2.2 The use of appropriate imagery is a critical component of leaflet design

Insight

A stylised illustration of an energy efficient house, depicting appliance ratings and cost saving was included in the leaflet. This was placed alongside a reference to trialling smarter, more affordable techniques to use the existing network more efficiently, which will reduce costs for all electricity customers in the future. The ECP understood the association of this image with reducing costs and responded positively towards it:

"I think what it shows is like the energy rating for your house; it's going to be a greener house and money is going back into your house. That's what it's trying to show." Male.

"I just think that image is saying we're thinking about what it's costing the end user. They are trying to reduce it." Female.

The inclusion of an image showing an electric vehicle, connected to a charging point, was also perceived as relevant within the context of increasing adoption of LCTs and a requirement to meet the electricity needs of the future. The ECP appreciated the image being presented alongside factual information highlighting the number of electric vehicles currently registered in GB:

"I thought the electric car was interesting, because I would never have thought there was 87,000 electric cars. So it's making you think: there's that many now, they need to do something about that. I quite like that." Male.

Conversely, the ECP was confused about the relevance of a picture showing an iPad, displaying a photograph of 'hot spots' within a transformer, taken on a thermal imaging camera. Some of the panel misattributed it to detecting heat losses within the home and/or smart meters:

"It's one of those heat detector type things. It's showing where your room loses heat and where the heat is in your house." Female.

"Maybe people could get mixed up thinking that this is Celsius, that it's an app of some sort or part of smart meters." Female.

The ECP suggested that the confusion associated with this image could be mitigated by either replacing it with an alternative image or by introducing it in a different way:

“You could do with a little subheading, like that one’s got for the cars.” Male.

Action

The image, while succinctly conveying the fundamental problem that Celsius seeks to address, was considered too complicated for previously uneducated customers to appreciate. It was therefore removed and replaced with the image of a thermometer, which was instantly recognised by the panel.

In the draft leaflet, a test image was included of an engineer stood underneath a pole-mounted transformer but it was anticipated that the ECP may not recognise this equipment and this was confirmed in their ambivalence to the image.

To ensure that a range of substations are represented in the leaflet, which satisfy the experience of customers in urban and rural locations, the photograph of a pole-mounted transformer was retained along with the addition of a new image of a more recognisable, brick built substation building to help illustrate the diversity. However, these, and all other key images used in the leaflet, were qualified with a brief descriptive to provide background and context to the photograph and assist the reader’s understanding.

2.2.3 Communication materials should make customers aware of alternative channels available for seeking further information

Insight

The leaflet reported that Celsius would trial a variety of cooling techniques, referred to as ‘a range of simple solutions’. The ECP acknowledged the omission of information concerning the nature of the techniques, and on balance considered this to be practical:

“It doesn’t say ‘we’re going to do air conditioning’ or ‘we’re going to do ...’ It doesn’t give you any idea of what they might do. So does it lead to asking more questions?” Male.

“I think you can give people too much information sometimes. If that came through the door, my wife would just give it to me and say what do I need to know?” Male.

The ECP suggested that the leaflet should contain pointers to where further information is available, such as the project website, should it be required by the reader:

“Yeah, because where you say ‘simple solutions’, if that website was at the bottom, you might log on to the website and that could show you the simple solutions. If you want to know what they are, please look at the website.” Female.

“Yeah, so that should be on every page. The website and the thing about social media should be on every single page.” Male.

Action

The draft customer leaflet reviewed by the ECP during the second focus group included only one relatively inconspicuous reference to accessing further information via a ‘stay connected’ banner at the bottom of the FAQ rear page. The banner design included various social media channels, and the project team enhanced the final draft of the leaflet by replicating this banner in other prominent parts of the leaflet.

2.2.4 References to engaging with customers attract positive sentiment

Insight

The leaflet stated an intention to engage with customers:

'Understanding what you think is important to us. We will be contacting customers who live or work near to substations where we are trialling cooling techniques to ask for their feedback.'

Without prompt, ECP participants picked out this component of the leaflet as a positive action being taken by Electricity North West to mitigate the impact of its activities, and suggested it served to reinforce a perception that the organisation was genuinely interested in customer feedback:

"I just think in this part of the trial, they'd want to understand how customers feel and what customers think of the techniques. They may ask have you noticed any difference and if so, how disruptive was it?" Female.

Action

Positive feedback demonstrated that no changes were required to content informing customers about the proposed customer engagement and it was not considered necessary to include any generic imagery to reinforce this message.

2.2.5 It is important to qualify that Celsius seeks to avoid the *early* replacement of electrical equipment

Insight

The literature asserted that trialling Celsius retrofit cooling techniques would enable the benefits of each method to be established, It would also enable customer research to determine which (if any) of the solutions are preferable to replacing equipment. The reference to replacing equipment caused some confusion and earlier debate resurfaced among participants regarding the ability of the Celsius techniques to delay and/or defer the need for traditional reinforcement:

"Twice it's said about 'preferable to replacing equipment', and it says there as well, 'delays or prevents the need to replace substation equipment'. Are any of these things going to stop them being replaced anyway?" Male.

"They should remove 'prevent' and just leave it at 'delay' if you're going to be truthful, or remove the whole statement, leave it to the imagination." Male.

"The methods aren't going to suddenly make these cables last forever, because a cable will need replacing. So it is just delaying the inevitable." Male.

Action

To negate any confusion, the wording was amended to reflect the reality that the Celsius technique is intended to primarily avoid the *early* replacement of equipment.

2.2.6 An FAQ is an efficient mechanism for increasing customers' overall understanding of the project

Insight

The FAQ on the rear page of the leaflet served as a useful summary and briefing document. It addressed questions that the panel had asked about Celsius when they had first been introduced to the concept and that are therefore likely to be the key concerns of customers approached to take part in the survey. The FAQ sought to enhance customers' understanding of the Celsius technique by providing information about the scope of the project. It clarified the objectives of avoiding early replacement of equipment and whether Electricity North West might need to resort to the traditional approach of replacing equipment in certain circumstances. The FAQ also clarified that Celsius represents one of a number of solutions to meet the electricity needs of the future.

In Electricity North West's previous Second Tier LCN Fund projects, it was considered appropriate to explain that it was not possible for customers to opt out of the trial. This had been appreciated by previous ECPs as a means of directly managing expectations. The Celsius ECP didn't share this perspective and suggested removing the question:

"I get that it's a frequently asked questions, but is it then quite obvious that you can't opt out because it's not your individual substation?" Male.

A smaller segment of participants within the group also misinterpreted this FAQ as being in relation to opting out of customer engagement rather than the trial itself:

"This survey is part of the project. So you're thinking they say I can't opt out so I'm going to have to do this survey, and you might not want to do it." Female.

Action

Information in communication materials needs to be pitched appropriately to facilitate effective engagement through the provision of clear, accessible and useful data, which must quantify any issue where there is the potential for misinterpretation or misunderstanding. Therefore, the question regarding opting out of the trial was removed in its entirety and for the following reasons, was replaced with a new FAQ to quantify whether the project has anything to do with smart meters.

With the exception of the Celsius video (Section 2.2.1), no other materials presented to the panel made any reference to smart meters. The video simply stated that in the future, Celsius will look to maximise the value of the smart meter programme by using smart meter data, aggregated at substation level, to indicate where to deploy the method. Despite the deliberate omission of any reference to smart meters in all other materials, the statement in the video appears to have caused the ECP to make an association between Celsius and the smart metering programme.

Section 3 of the Celsius CEP sets out a requirement of '*Having regard to the implementation of the smart meter rollout to ensure that the project does not impede the implementation in any way*'.

The insight leveraged from testing and refining Celsius communication materials with an ECP demonstrated the need for explicitly distinguishing the role of Celsius from smart meters. The following information was included in the optimised FAQ:

'Celsius is not related to smart metering, so we don't need to fit a smart meter or any other kind of equipment at your home. It's extremely unlikely that you'll notice any of the work that we'll be conducting on our network that's linked to the Celsius project.'

2.2.7 An A5 leaflet is less likely to be misconstrued as sales and marketing literature compared to a smaller DL format

Insight

Two versions of the customer leaflet were introduced to participants during the second meeting of the focus group.

The two leaflets utilised a similar colour scheme, style and tone. However, due to their different sizes, they contained different levels of detail and imagery. The dimension and format of the leaflets are provided in Figure 2.2.

Version 1a (Appendix 6.6.1) was modelled on the [Smart Street customer leaflet](#) and contained detailed information about Electricity North West, how electricity usage is changing, the need to meet the electricity needs of the future, why and how the trials are being conducted and how Celsius will benefit customers. The leaflet also included an FAQ

section based on the most anticipated enquiries and learning from previous customer engagement activities.

Version 1b (Appendix 6.6.2) was a concise leaflet, which provided more basic, high level information about why the trials are being conducted. Version 1b omitted supplementary contextual information about how the trial will be conducted, the benefits of the trial to customers and FAQs.

Figure 2.2: Leaflet size

Leaflet	Description	Size
1a	Half of an A4	210 x 148.5mm
1b	DL: a third of an A4 (compliment slip size)	210 x 99mm

The first, more informative version of the leaflet (1a) was unanimously preferred to the abridged version (1b). While some panellists considered there to be more information than required to meet their information needs, the layout of the leaflet meant that they were able to access pertinent information quickly. This reduced the risk that it would be simply discarded and increased the likelihood that at least the key messages would be read by less interested recipients.

The ECP expressed concern that leaflet 1b had the look and feel of sales and/or direct marketing literature, such as a leaflet intended to encourage customers to switch energy supplier, which could serve as a barrier to other recipients truly engaging with the content:

“It’s the front page, straight away. ‘Good news, we are future-proofing electricity networks and reducing costs.’ If I don’t know who they are, they’re trying to get me to move away from my supplier.” Female.

“If we’d not been here before, I’d have thought that was Scottish Power, Eon or someone like that trying to get me to switch.” Male.

Despite a negative reaction to the size and format of the leaflet, the imagery utilised in version 1b was regarded positively, specifically a picture of a thermometer. The panel believed this image adequately signifies that the Celsius project is looking at ways of managing temperatures, even though the image is unrelated to substations. They also felt it was more appropriate for the intended audience than the thermal image of a transformer:

“You know what it’s talking about, heat and temperature.” Male.

“It shows a thermometer, so at least people are starting to identify from Celsius that it’s something to do with heat, and there it is.” Male.

Action

The implication of the intrinsic correlation established between the size of the leaflet and perception of its purpose is that the A5 leaflet was adopted as the most appropriate format for educating customers taking part in the Celsius customer survey.

The image of a thermometer was adopted from version 1b into the [final version of the leaflet](#).

2.2.8 In the absence of a cost-benefit analysis, customers prefer to understand the likely cost

Insight

Further to consultation with the ECP during its first meeting, action was taken to refine communication materials(see Section 2.1.5), which were amended to provide more specific detail regarding the costs associated with traditional reinforcement.

Indicative rather than precise cost estimates were provided on information showcards, with the relative scale rather than the absolute cost of the retrofit cooling technique presented as a ratio of the cost of traditional reinforcement.

The ECP appreciated the additional information provided at its request. However, it raised further questions beyond the cost of implementation regarding the likely benefit of the cooling techniques and therefore the overall net impact to customers’ bills on a household level:

“I think we all said that needs to be on [the leaflet], so we can see what it’s like. But thinking about it, if that one substation costs, let’s say, 25 grand, what if it says 25,000 people and it costs you an extra pound. How relative is that cost [to the other techniques]? It doesn’t really tell the full story”. Male.

“It needs to be cost versus impacts, though.” Male.

The ECP was reminded that an accurate measurement of the benefit of Celsius retrofit cooling techniques could only be established through comprehensively trialling them, and therefore such information was unknown. The panel accepted this and understood that a cost-benefit analysis could not be provided as part of the communication materials.

With the focus returning to the information provided about expenditure, a subtle change was recommended by the panel to the terminology used regarding the relative cost of each retrofit cooling technique, in order to influence a more positive interpretation:

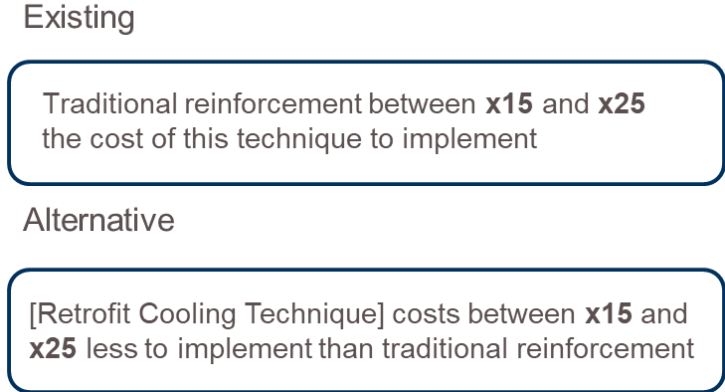
“It would be better if it said how much we would save per site, 15 or 20 grand.” Male.

“I’d just like it to say, ‘This will cost 10% less than traditional reinforcement.’” Female

Action

A series of information showcards designed to demonstrate the purpose, potential audio-visual impacts and benefits of each Celsius retrofit cooling technique were updated to reflect customer feedback. Figure 2.3 illustrates a subtle change to the text that is anticipated to influence the way in which information about the relative cost of each technique is presented to survey participants in the next steps of the project (see Section 5).

Figure 2.3: Reporting the relative cost of retrofit cooling techniques



3 LESSONS LEARNED FOR FUTURE INNOVATION PROJECTS

This section of the report disseminates the learning outcomes from the customer research activity with a previously unengaged ECP. The learning is focused on describing how DNOs and their stakeholders can capitalise on this process by identifying and responding to challenges that may arise in future customer engagement activities of a similar nature.

The lessons learned are as follows.

3.1 Customers are increasingly likely to accept the extent of future electricity demand due to rising awareness of LCTs

In a previous project, the [Value of Lost Load](#), an important lesson learned was that customers appear to find it extremely difficult to imagine or are unwilling to accept the extent of future demand and consequent increased dependence on a reliable electricity supply.

The Celsius ECP, which was comprised of Electricity North West customers residing in urban areas, readily accepted the extent of predicted future demand, citing increased adoption of electric vehicles, greater awareness of other forms of LCTs and higher dependency on electricity generally, to power everyday household appliances and devices.

Despite ECP members not being early adopters of electric vehicles or other forms of LCTs, members speculated that they were likely to switch to decarbonised methods of transport and heat in the future.

The trend of increasing awareness, understanding and acceptance is likely to continue, and is being aided by increased media attention. Shortly after convening the Celsius ECP, the UK government announced that new diesel and petrol vehicles are to be banned from 2040,¹ the Scottish government later announced that it will 'phase out' new petrol and diesel cars by 2032.² International focus on a range of environmental issues relating to pollutants, emissions and air quality are expediting behavioural change, and support increased awareness and acceptance of low carbon messages.

Reference to government forecasts in literature should be checked and where appropriate updated to reflect the most recent government announcements or policy changes before any materials are published or a customer survey commences.

3.2 An A5-size customer leaflet is significantly less likely to be misconstrued as sales or direct marketing literature than a DL format

DL stands for 'dimension lengthwise', and three DLs make up an A4 page. DL is commonly used for creating brochures and menus and is a convenient size for inserting into envelopes.

The ECP associated the DL version of the Celsius customer leaflet format as communication material more akin to what they would expect to see promoting a takeaway food menu or direct mail campaign, and on this basis recommended against using it to communicate important, factual project information.

The final customer leaflet adopts the ECP's preferred A5 format, and this learning should be transferred to future innovation projects.

¹ <http://www.bbc.co.uk/news/uk-40723581>.

² <http://www.independent.co.uk/news/uk/politics/scotland-petrol-diesel-cars-phase-out-ban-2032-nicola-sturgeon-snp-environment-air-pollution-a7930781.html>.

3.3 Customers value being treated as individuals and when it is necessary to impart important information, personalised communication is the most effective method of securing the attention of the intended recipient

ECP feedback has consistently demonstrated the value that domestic customers place on receipt of personally addressed mail over that sent simply to the occupant. Recognising that personalisation involves a significant cost, it is unlikely to represent an effective return on investment when disseminating general awareness information to customers. However, it is important that DNOs do not underestimate the potential of personalisation in extending the readership of direct mail, when delivering important information to customers by post.

4 CONCLUSIONS

This report sets out the key findings from one phase of strategic qualitative market research conducted with the Celsius ECP. The findings of the customer surveys will be documented separately and will form a series of project dissemination documents supplementing the final conclusions and recommendations report, due to be published in September 2019.

Electricity North West worked with Impact Research to determine the communication materials that may be required to educate customers and how this information should be presented.

The ECP provided an influential forum for collecting constructive, independent feedback on the initial draft of communication materials, including:

- A Q&A document
- A project infographic
- Information showcards
- A video
- A leaflet.

Re-engaging with the original participants during the second phase of focus groups was essential to assess their reaction to the changes made as a result of their initial feedback.

ECP consultation was successful in guiding the development of a suite of communication materials that were clear, informative and engaging. The final suite of refined materials is available on the Celsius website.

5 NEXT STEPS

Impact Research will carry out a significant number of quantitative surveys with customers to reliably prove or disprove the hypothesis:

‘Customers within the Celsius trial areas will find the implementation of innovative retrofit cooling techniques as acceptable as traditional reinforcement.’

A level of acceptability will be established for each type of retrofit cooling technique that will make it possible to differentiate between the various interventions based on customer feedback.

Based on previous experience of engaging with customers, Electricity North West will commit to educating customers about the need for Celsius and the benefits of the method to them. This should prove or disprove a secondary hypothesis that:

‘Customers who are educated as to the need for and benefits of Celsius are significantly more likely to find it acceptable.’

The methodology will seek to quantify the value of educating customers about the problem, the solution and the benefits, in regards to influencing the acceptability of Celsius.

A baseline survey will be conducted with domestic customers on the trial substations prior to the retrofit cooling techniques being applied. The data collected from the baseline will serve as a benchmark with which to compare the results of the customer survey conducted after the changes have been applied, thus acting as a measurement of any change in perception.

Feedback received from customers, stakeholders and partners may be used to revise plans throughout the project life to continually improve the customer engagement strategy.

Enquiries to the customer contact centre will continue to be monitored throughout the trials to detect any customer impact resulting from the method’s application.

In line with the vision of the NIA, all outputs and learning from customer engagement activities will be made available to other DNOs. Specifically, all communication materials developed during the project will be publicised on the Celsius website.

The project findings, lessons learned and implementation recommendations will be documented in a final report that will be submitted to Ofgem September 2019.

As part of the recruitment process, ECP panellists were required to sign a consent form, the details of which are provided in the Celsius [Data Privacy Statement](#). Panellists’ explicit permission was sought and granted for the use of soundbites and video footage from the group discussions at industry learning events. The use of such recordings has been found to provide an engaging means of demonstrating the outcomes and intrinsic value of the ECP, and will be utilised as part of the project’s dissemination.

6 APPENDICES

6.1 Terms of reference

6.1.1 Overall objectives of the ECP

The key research objectives of the ECP were to:

- Test initial reactions to the retrofit cooling techniques
- Test and guide the content of the communication materials required to educate survey participants and how this information is presented.

The customer engagement method designed to meet the research objectives for this project is set out in Section 5.6 of the Celsius CEP.

6.1.2 Addressing the objectives with an ECP

An ECP comprising ten residential customers was convened, and met on two separate occasions in July 2017.

During the ECP, a professional, independent moderator asked participants semi-structured questions relating to a predefined list of topics. During these meetings, information was shared and evaluated by the participants, who were encouraged to provide feedback and share their unique experience in relation to the discussion topics. This format allowed the moderator the flexibility to question participants further on issues arising from open discussion. It also encouraged the natural evolution of the ECP’s understanding of the role

and responsibility of Electricity North West, the low carbon agenda and the benefits of Celsius.

The iterative approach adopted allowed the project team to develop, test and evaluate communication materials to support the development of the customer survey instrument. This customer engagement approach follows the successful deployment of similar techniques by Electricity North West in its previous LCN Fund projects.

6.1.3 Reconvened ECP meetings

The focus areas of the two meetings are outlined in Figure 6.1.

Figure 6.1: ECP meetings

ECP meeting	Research objective
ECP meeting 1	<ul style="list-style-type: none"> • Introduce Electricity North West, its role as a DNO in the electricity industry and its relationship to National Grid and suppliers • Clarify awareness and knowledge of electricity substations • Establish customers’ understanding and perception in relation to acceptability of the base case scenario (traditional reinforcement) • Establish customers’ understanding and perception in relation to the credibility and acceptability of the Celsius proposition (alternative technologies) • Evaluate how Celsius might best be communicated to customers in trial areas, who take part in the survey
ECP meeting 2	<ul style="list-style-type: none"> • Evaluate and optimise refined Celsius communication materials

The initial ECP meeting included an introduction to Electricity North West, ensuring that the role of the DNO within the electricity sector was understood. It then introduced relevant contextual information such as the challenges associated with distribution networks facilitating the forecast uptake in LCTs.

Supplementary educational materials to inform the focus group debate were also produced. These communication materials were designed to aid understanding of the retrofit cooling interventions. The materials gave equal weight to developing participants’ understanding of traditional reinforcement (against which acceptance of the new techniques will be measured) and of the proposed retrofit cooling interventions.

These materials were evaluated by the ECP during the first meeting and then further refined before the second meeting. Repeated engagement with the ECP maximised the effectiveness and clarity of the education materials.

This approach will facilitate final enhancements before the launch of the final survey instrument in phase three of the project.

The learning outcomes from the reconvened ECP meetings are documented in Section 2.1.1.

6.1.4 Membership of the ECP

The ECP comprised a group of ten individuals who were recruited to participate in two focus group meetings.

Recruitment was on the basis that participants would attend both scheduled meetings. Participants were geographically clustered to enable easy access to the meeting venue.

The ECP was recruited to reflect a broad domestic customer demographic reflective of age, gender, social grade, region and household composition, as demonstrated in Figure 6.2.

Figure 6.2: ECP composition

Key customer segment	Region	Customer type	Gender	Age
Domestic	Manchester	Domestic	Equal proportion of males and females	five <45 years old and six >45 years old

6.2 Frequency of meetings and attendance

Each ECP met on two separate occasions (see Figure 6.3). The meetings lasted approximately 90 minutes each and were facilitated by an accredited Interviewer Quality Control Scheme qualitative moderator.

Figure 6.3: ECP meeting dates

Meeting	Date
ECP meeting 1	4 July 2017
ECP meeting 2	11 July 2017

The ECP was expected to attend both meetings and to secure this, participants were advised of the dates before committing to take part.

A target attendance level of at least eight customers was set for each meeting. Based on previous customer engagement, it was anticipated that the attrition rate of customers who no longer wished to participate would be approximately 10%, or one person, between the two meetings. Recruiting ten customers allowed sufficient mitigation for non-attendance.

The minimum attendance of eight people per group was achieved on all occasions as set out in Figure 6.4.

Figure 6.4: ECP attendance

ECP Meeting	Domestic
ECP meeting 1	10
ECP meeting 2	9

6.2.1 Administrative support and facilitation

The ECP research was conducted by Impact Research, an independent market research agency, on behalf of Electricity North West. All research was carried out in accordance with the professional standards set out in the Market Research Society Code of Conduct.

Impact Research was responsible for the day-to-day management of the ECP, booking of venues, associated arrangements and moderating the group discussions. It was also responsible for the provision of analysis, and for documentation of the findings.

6.2.2 Incentives

Domestic participants were offered a cash payment of £40 for attending the first meeting and £60 for attending the second. This tiered payment was recommended by Impact Research based on previous experience of recruiting customers to take part in similar multi-session panels. Customers were required to sign a claim form to document receipt of the payments, and could elect to make an equivalent donation to a registered charity of their choice if they preferred.

6.2.3 Meeting the requirements of the CEP

The Celsius CEP placed a commitment on Electricity North West to engage appropriately with relevant customers taking part in this study. This was achieved by:

- Providing customers with appropriate communication materials from the outset. This included general information about Electricity North West, the project objectives and reasons for conducting customer engagement
- Effective communication strategies in focus group meetings and tailored communication channels, including written, audio and visual mediums
- Delivering these materials in such a way that Celsius is not confused with engagement associated with the smart meter rollout
- Being guided by feedback from the ECP in refining the customer communication approach.

6.3 Project replication

The list of physical components required to replicate this activity is shown below:

- Database of customers in the geographical area of interest
- Recruitment screener
- Recruitment quotas
- Discussion guide
- Stimulus materials
 - **A Q&A briefing document:** to clarify the role of Electricity North West and its position within the electricity sector, and to explain what substations are, where they are found and what they look like
 - **Low carbon showcards:** to contextualise the anticipated increase in demand for electricity and the implications of using traditional methods to meet this demand
 - **A project infographic:** to explain what Celsius is, why it is needed and how it works
 - **A project animated video:** to explain how Celsius will address the issue of 'thermal pinch points'
 - **Technique showcards:** to describe potential Celsius interventions through a mixture of annotation and imagery, which depict: possible solutions to meeting future electricity demand, potential audio-visual effects associated with the techniques, and the benefits of its implementation to customers

- **A customer leaflet:** to summarise the material contained within the Q&A and information showcards, and to include: further information about the Celsius trial and customer research FAQs and other pertinent information about Electricity North West
- Focus group venue
- Web streaming technology
- Transcripts and audio recordings.

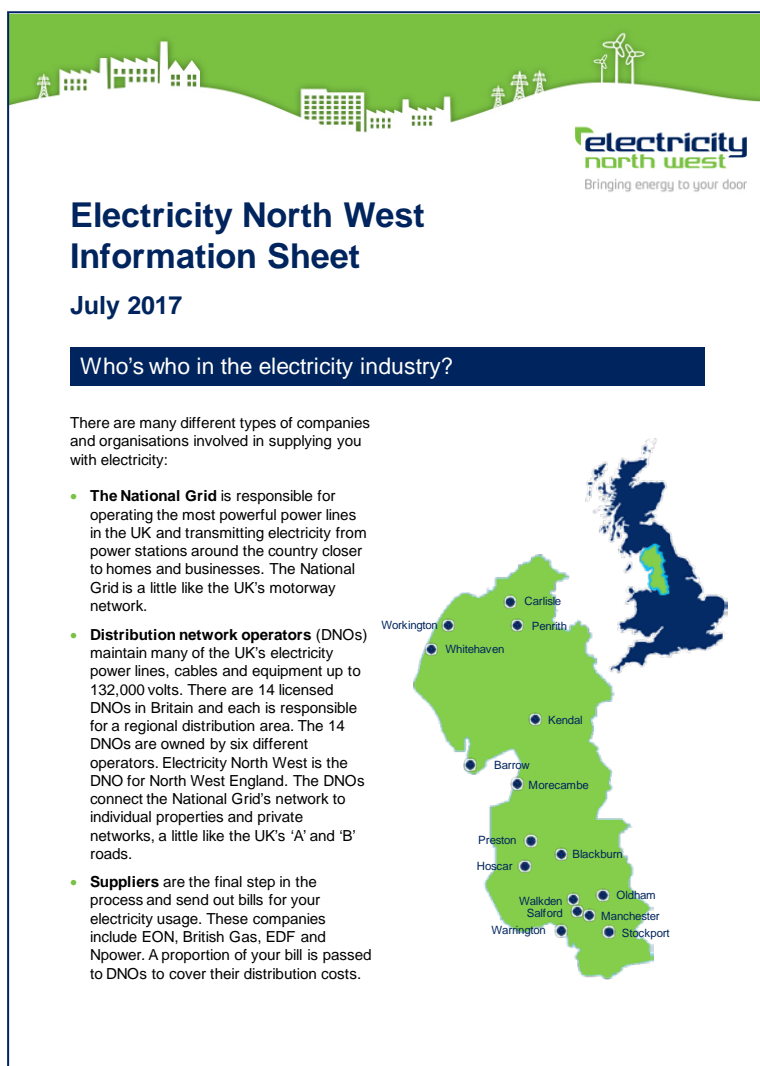
The knowledge required to replicate the outcome of this activity is as follows:

- Knowledge of the geographical area of interest
- Knowledge of customer profiles
- Knowledge of various methods of recruiting customers for ECPs
- Knowledge of qualitative research methods required to produce the physical components listed above for recruitment, ie design, moderation, analysis and reporting
- Knowledge of quantitative research methods required to produce the survey instrument and FAQs.


The anticipated project replication costs are in the region of:

- Conducting an ECP (ten customers taking part in two focus groups in one location): £18,000, of which incentivisation: £1,000.

6.4 Materials sent to the ECP prior to meeting 1 ([Celsius customer information sheet](#))



6.5 Materials shared with the ECP during meeting 1



Celsius: A co-ordinated approach to managing the temperature of electrical assets

What is Celsius?





- The first solution of its kind in Great Britain, Celsius will deliver a method to monitor and manage the temperature of cables and equipment in electricity substations
- This will release additional capacity from these assets and defer the need for traditional network reinforcement
- This will reduce long term costs for customers
- Celsius is funded by Ofgem's Network Innovation Competition and the project will run from 2016 until March 2020.



Why do we need Celsius?

- As we face the challenge of making the transition to a low carbon future and meeting mandatory government carbon reduction targets, demand for electricity in Great Britain is set to rise significantly
- This will present challenges to network operators like Electricity North West who will need to invest heavily in new network infrastructure to meet this increased demand. This would involve a massively disruptive programme of work and could mean much higher bills for customers
- To minimise potential cost, disruption and carbon emissions, we need to develop smarter and more flexible ways of managing electricity networks.



How does Celsius work?

- The first stage of the Celsius project is to gather temperature related data from 520 substations
- Secondly, a range of cooling techniques will be trialled on 100 of these substations to demonstrate the benefits of each technique
- Through a programme of customer engagement the project seeks to demonstrate that these cooling techniques are acceptable to customers and can be rolled out across Great Britain.

<p>TECHNIQUE E: Cable backfill</p>	
<p>Solution description:</p> <p>This technique involves removing the traditional backfill materials (aggregate, sand and earth), in the ground, around electric cables, with materials that have extremely high thermal conductivity. This removes the heat from the cable and there are different materials which can be used for this purpose.</p> <p>This technique will only be applied to cables very near, and going into the substation.</p>	 
<p>Potentially, what am I likely to notice?</p> <ul style="list-style-type: none"> This technique will involve excavation work but most will occur in the substation compound. There could be limited noise, disruption and inconvenience to customers living or working in the immediate vicinity of the substation and barriers/roadworks could disrupt parking the day the solution is implemented 	<p>What are the benefits?</p> <ul style="list-style-type: none"> ✓ Long term network and customer benefits from removing thermal constraints on equipment ✓ No change to the appearance or noise from the substation ✓ No supply interruption would occur during installation

6.6 Materials shared with the ECP during meeting 2 (screen shot)

<p>TECHNIQUE E: Cable backfill</p>	
<p>Solution description:</p> <p>This technique involves removing the traditional backfill materials (aggregate, sand and earth), in the ground, around electric cables, with materials that have extremely high thermal conductivity. This removes the heat from the cable and there are different materials which can be used for this purpose.</p> <p>This technique will only be applied to cables very near, and going into the substation.</p>	 
<p>Potentially, what am I likely to notice?</p> <ul style="list-style-type: none"> This technique will involve excavation work but most will occur in the substation compound. There could be limited noise, disruption and inconvenience to customers living or working in the immediate vicinity of the substation and barriers/roadworks could disrupt parking the day the solution is implemented 	<p>What are the benefits?</p> <ul style="list-style-type: none"> ✓ Long term network and customer benefits from removing thermal constrain on cables and equipment ✓ No change to the appearance or noise from the substation ✓ No supply interruption would occur during installation <p>Cost to implement relative to traditional reinforcement:</p> <p>£ £ £ £ £ Traditional reinforcement between x15 and x25 the cost of this technique to implement</p>

6.6.1 Leaflet 1a

Frequently asked questions

How will Smart Street affect me?
You will not notice any difference in the reliability of your electricity supply as a result of the Celsius project and we don't need to install any equipment in your home. It is unlikely that you will be aware that we have carried out any work, in a small number of cases, we may need to turn off your electricity supply for a short period while we install one of the cooling techniques. We need to do this as we will contact you before the work is carried out and ensure the time you are off supply is kept to a minimum.
If a Celsius cooling technique is applied at your local substation as part of this trial, you may notice a small change in its appearance or the noise it makes.

Will you need to replace the equipment anyway?
Sometimes the problems caused by increased demand and generation are too great to prevent the replacement of equipment. But in other instances we can make better use of our existing equipment by taking simple steps which mean we can defer or avoid the need to replace it altogether. This is great news for customers because it means bills don't go up.

Is Celsius the only solution to meeting the electricity needs of the future?
Overheating of substations is just one of a number of network problems caused by increased demand and generation. We are constantly striving to improve how we manage our network with new research, innovation and technology. Celsius is just one technique that we are currently trialling.

How soon is Celsius required?
We already monitor our network in areas where there are large numbers of solar panels because this can cause overheating and other types of problems. In the future we expect more customers to install solar panels, there will be more electric vehicles on our roads and more customers changing from gas to electric central heating. It's not easy to predict how quickly these technologies will become the norm but we expect to see notable changes over the next ten years.

Can I opt out of the project?
The substations where we are installing the cooling techniques serve thousands of customers, so it is not possible for individual customers to opt out of the trial.

Why are you telling me this?
Our industry regulator (Ofgem) expects us to communicate this information to you. Ofgem provides funding for local electricity operators like Electricity North West to develop innovative solutions to meet the predicted increase in electricity usage. It's our responsibility to make you aware of any action we are taking to prepare your local electricity network for a sustainable future and how that might affect you.

I rely on electricity for special medical needs - will I be affected by the trials?
The techniques will not directly affect you or your electricity supply but you may want to consider joining our priority services register. We have set up this service for our more vulnerable customers who may need additional support in the unlikely event of a power cut. As part of our priority service we work in partnership with the British Red Cross who can help you with practical necessities when things go wrong. To find out more about our services for vulnerable customers or to join our priority services register call us on 0800 190 4141 or visit our website at www.enwl.co.uk/priority.

What do I do if I have a power cut?
The electricity supply in Electricity North West's region is extremely reliable but from time to time problems can arise. Celsius will not affect your electricity supply but in the unlikely event that you have a power cut or need to report an emergency we have to help you 24 hours a day, 365 days a year. You can call us on 190 0000 190 4141 (Monday 0900-1800 24/7).
You can also get advice about what to do in a power cut by visiting our website at www.enwl.co.uk/power-cuts.

Electricity North West
Bringing energy to your door

Electricity North West
Bringing energy to your door

Celsius

Important information from your electricity network operator

Good news, we are improving the electricity network that supplies your home.

Who is Electricity North West?
We operate the local electricity network and distribute electricity to all 2.4 million homes and businesses in the North West.

What are we doing?
We are looking at smarter ways of managing high temperatures at substations, by trialling a range of cooling techniques. These could be modifications to equipment fitted inside our substations, or small changes to a substation's structure which will cool it down. This will help reduce costs for all electricity customers. The project is called Celsius.

Why are we doing this?
To help protect the environment we need to use fewer fossil fuels like gas and oil and use cleaner sources of power. This means that in the future we will need more electricity for running electric cars and heating systems. The more electricity that flows through our network, the hotter the equipment in our substations becomes.

How will it benefit?
By cooling our existing substation equipment we can make it last longer which helps us operate the network more efficiently. This will help us to meet the increased demand for electricity, without increasing customers' bills.

Stay connected...

www.enwl.co.uk/celsius

This leaflet is also available in Braille, large print and a number of different languages on request.

CITIPPOST
DSA

Electricity North West
Bringing energy to your door

At Electricity North West it's our job to deliver a safe, reliable supply of electricity from the national grid to your home through our network of overhead lines, underground cables and substations. You may not have heard of us before, as you normally only need to contact us if you have a power cut. In many ways we are a 'behind the scenes' company. We don't send you a bill for our services. Instead, your supplier passes on part of what you pay them and we use this to maintain your power supply.

Celsius

Electricity North West
Bringing energy to your door

Changing the way we use electricity

It's also our job to plan for the future and help reduce the impact of fossil fuels like gas and oil on the environment. As we use fewer fossil fuels, we will start to use more electricity for heating and for running electric vehicles. This means that demand for electricity will rise significantly, placing a huge demand on our network. The cost of upgrading the network to meet this demand will mean higher bills for customers. So we are trialling smarter, more affordable techniques to use the existing network more efficiently, which will reduce costs for all our electricity customers in the future.

There are already 67,000 electric vehicles registered in Great Britain.

Meeting the electricity needs of the future

Greater electricity usage will lead to an increase in current flowing through the network. This increased current can cause our equipment to be at risk of overheating. Usually, when this happens, we replace the equipment which is costly and disruptive to customers.

We have developed new ways of monitoring our substations that will help us to identify where equipment is in danger of overheating. The monitoring will enable us to:

- Identify parts of the network where high demand is causing our cables or equipment to overheat. This type of monitoring will become increasingly important as more customers replace petrol and diesel cars with electric ones and change from gas to electric heating systems.
- Understand the effect of solar panels and other forms of renewable and low carbon generation on our network.
- Measure how much substation temperatures are influenced by environmental factors, especially heat from the sun.

In Celsius, we are trialling a range of very simple solutions that we can deploy quickly and cheaply to cool the equipment inside substations.

Trialling the cooling techniques

An important part of the project is to trial the various Celsius cooling techniques and how they affect our customers. The first stage is to gather temperature data from 520 substations. We will then trial a range of cooling techniques at 100 of these substations so we can understand the benefits of each technique.

These simple solutions won't be suitable for all substations. As part of the trial we want to understand where they can be used, how our customers feel about them and whether customers think these quick, simple solutions are preferable to replacing equipment.

How Celsius will benefit you

As a customer, your supply will continue to be as safe and reliable as usual.


By delivering new cooling solutions to manage temperature at substations, Celsius:

- makes the best use of our substation equipment
- enables customers to connect low carbon technologies to the electricity network, including electric vehicles and solar panels
- delays or prevents the need to replace substation equipment
- reduces long-term costs for customers.

Engaging with our customers

Understanding what you think is important to us. We will be contacting customers who live or work near to substations where we are trialling cooling techniques to ask for their feedback.

6.6.2 Leaflet 1b



Priority service register

The Celsius techniques will not directly affect you or your electricity supply but you may want to consider joining our priority services register. We have set up this service for our more vulnerable customers who may need additional support in the unlikely event of a power cut. As part of our priority services we work in partnership with the British Red Cross who can help you with practical necessities when things go wrong. To find out more about our services for vulnerable customers or to join our priority services register, call us on 0800 195 4141 or visit our website at www.enwf.co.uk/priority

What do I do if I have a power cut?

The electricity supply in Electricity North West's region is extremely reliable but from time to time problems can arise. Celsius will not affect your electricity supply but in the unlikely event that you have a power cut or need to report an emergency, we're here to help you 24 hours a day, 365 days a year. You can call us on 195 (8000 195 4141) Minicom 0800 458 9767

You can also get advice about what to do in a power cut by visiting our website at www.enwf.co.uk/power-cuts

Stay connected...


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www.enwf.co.uk/celsius

Important information from your electricity network operator

Electricity north west
Bringing energy to your door

Good news
We are futureproofing the electricity network and reducing costs



Celsius

Electricity North West logo and icons of power lines and a house.

Hello.
We are Electricity North West and we are proud to operate your local electricity network.

It's our job to deliver a safe, reliable supply of electricity from the national grid to your home through our network of overhead lines, underground cables and substations.


It's also our job to invest in the future of the electricity network and plan for the extra demand that we are likely to need in the North West. As we start to use less fossil fuels like oil and gas we will start to use much more electricity for heating and electric vehicles.


Instead of building new overhead lines, cables and substations, which is disruptive and expensive for electricity customers, we are trialling new, smarter and cheaper ways of using the existing network to cope with the extra demand.

One of the problems caused by an increase in demand is that the more electricity that flows through our network, the hotter the equipment in our substations becomes. More solar panels will also cause our equipment to overheat.

Our Celsius project is looking at ways of managing high temperatures at substations by trialling a range of simple techniques to cool the equipment inside them. This could be by modifying equipment fitted inside a substation or making small changes to its structure.

By cooling our existing equipment we can make it last longer which helps us operate the network more efficiently. This will help us to meet the increased demand for electricity, without increasing customers' bills.





Why are you contacting me?

We have sent you this leaflet because we are trialling new technology at a substation near to your home or business. This means you may notice a small change in its appearance or the noise it makes.

At the end of the trials we will contact some of our customers who live near the substations where the cooling technology has been installed to ask for their feedback.

