



Smart Street Engaged Customer Panel Mid-trial Customer Impact Report

31 March 2017

A large white sign with a grey border and the words "SMART STREET" in bold green capital letters is mounted on two white posts. Below the sign is a stylized white silhouette of a cityscape on rolling hills. The cityscape includes various buildings, a bus, a train, and two wind turbines on the right. In the background, three power line towers are visible on the left. The entire scene is set against a green background with hanging white clouds and a bird in flight at the top.

SMART STREET

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GLOSSARY

Abbreviation	Term
CEP	Customer engagement plan
CLASS	Customer Load Active System Services (Second Tier LCN Fund Electricity North West project)
CVR	Conservation voltage reduction
DNO	Distribution network operator
ECP	Engaged customer panel
GB	Great Britain
HV	High voltage
LCN Fund	Low Carbon Networks Fund
LCT	Low carbon technology
LV	Low voltage
Ofgem	Office of Gas and Electricity Markets
SDI	Short duration interruption
SDRC	Successful delivery reward criteria

FOREWORD

This report is submitted as part of the Electricity North West Smart Street project, which is funded through Ofgem's Second Tier Low Carbon Networks Fund (LCN Fund) mechanism. The project received formal notification of selection for funding on 29 November 2013 and it commenced in January 2014. Smart Street is being undertaken by Electricity North West, in collaboration with key project partners and is due to be completed in April 2018.

The Smart Street trials test innovative technologies and will demonstrate how distribution network operators (DNOs) can augment the performance capabilities of existing networks by integrating these new technologies, to prepare their networks to meet new requirements arising from the expected increase in the adoption of low carbon technologies (LCTs).

Smart Street combines the concepts of network interconnection, developed within the Capacity to Customers (C₂C) project and voltage control, developed within the Customer Load Active System Services (CLASS) project. New technologies and techniques will be trialled to optimise network voltages and configuration in real time. The trials will also demonstrate how these techniques can be incorporated with conservation voltage reduction (CVR) techniques, to ensure both networks and customers' appliances operate as efficiently as possible. This solution will reduce reinforcement costs, improve carbon efficiency and reduce energy costs for customers.

This document and the analysis therein forms part of the project's dissemination. The research was undertaken with an engaged customer panel (ECP) to ascertain domestic customer reactions to the application of Smart Street techniques.

The research approach referenced within this document was submitted as part of Electricity North West's Smart Street customer engagement plan (CEP), which was approved by Ofgem on 16 July 2014.

1. EXECUTIVE SUMMARY

1.1 Background and business objective

Electricity demand in Great Britain (GB) is expected to increase significantly as the adoption of LCTs grows. This, combined with the increased uptake of renewable and low carbon energy generation, presents new challenges to operators of electricity networks. Traditionally, these trends would require major capital investment to meet the energy needs of GB. This would be expensive, carbon-intensive and lead to considerable customer impacts such as traffic disruption.

Innovative approaches to managing electricity networks are required to minimise disruption to customers, carbon emissions and financial costs, which would inevitably be passed on to customers. Smart Street is one such approach that has the potential to minimise the need for expensive, asset-based interventions and make a positive contribution to a low carbon future.

1.2 Customer engagement objective

The customer hypothesis for Smart Street is that:

Customers within the Smart Street trial areas will not perceive any changes in their electricity supply.

This hypothesis will be tested through a range of customer engagement activities during the trials. Consultation with an ECP forms one of the most important of these activities and this

research is being conducted in two distinct stages, to achieve separate customer engagement objectives:

- The first stage focused on developing effective communication to inform customers in the trial areas about Smart Street and its potential benefits/impacts. It also ensured that customers had a means of contacting Electricity North West with any enquiries about the project. This culminated in the distribution of a customer leaflet in October 2014. The key findings of this stage of research are summarised in the ECP interim report, published on the [Smart Street website](#) in December 2014.
- The second stage of ECP consultation was designed to elicit customer feedback about any perceived effects on the electricity supply, providing evidence to test the customer hypothesis. This involves two phases of customer research; the first having been conducted mid trial, with the second following completion of the trials.

This report documents findings from focus group meetings conducted in the middle of the trial period in early 2017. An addendum to this report will be published in April 2018, following the final phase of ECP consultation.

1.3 Research approach

Recruitment of the panel and moderation of the focus groups was conducted by Impact Research, an independent market research agency and project partner. All research was carried out in accordance with the professional standards set out in the Market Research Society Code of Conduct.

The ECP participants were selected to reflect an appropriate cross-section of customers in each of the trial areas of Wigton and Egremont in Cumbria, Wigan in Lancashire and Manchester. The recruitment and selection process for ECP members is included in Section 3. The objectives of the ECP meetings are set out in Section 3.1.

1.4 Summary of key findings

Perceptions of power quality at mid-trial

Customer perception of power quality was most often associated with the absence or presence of unplanned interruptions. Reliability of supply was generally very high among ECP members and consequently, they considered their power quality to be extremely high.

When the panel was specifically prompted to consider dips or spikes in supply and encouraged to think about how these conditions might manifest in flickering or dimming of lights or changes in appliance performance, customers recalled a few examples. However, these events had no negative impact on the ECP's perception of power quality at their respective properties.

Participants perceived that power quality was very high and they had not detected any change in power quality or a decline in service since the Smart Street trials started in January 2016.

Experience of short duration interruptions

The ECP was asked about their experience of short duration interruptions (SDIs) and how these impacted their perception of power quality, if at all. It was only when educated and specifically prompted to consider SDIs, that some panellists were able to recall short or momentary disturbances to their supply during the Smart Street trial period. SDIs were not generally regarded as constituting a supply interruption, which the panel defined as a much longer and notable power cut that might last up to one or several hours. Therefore their experience of SDIs did not impact overall perception of power quality.

Assessing the likelihood of perceived changes to power quality (mid-trial) being due to Smart Street

A small number of respondents described particular events, such as changes to appliance performance or SDIs, which occurred during the trial period. To establish if any of these changes could have been caused by the trials, the project team conducted an investigation which compared feedback with fault records and the technical data continuously recorded by Smart Street technologies. This established that some events, specifically SDIs, could be linked to the operation of Smart Street apparatus. However, most were associated with unanticipated refinements to technologies during the installation phase and early in the trial period. These events had no impact of customer perception of power quality or a decline in service. The issues that caused these SDIs have since been resolved and therefore, are not expected to impact customers in the latter phase of the trials, or if the Smart Street method was to be rolled out as business as usual.

Awareness of installation works or street furniture associated with Smart Street

Customers within the Smart Street trial areas were sent a general awareness leaflet in October 2014, which provided information about the project and the associated trials. It outlined the expected customer benefits and impacts, particularly in relation to the installation of new equipment. The leaflet is available to view and download on the Smart Street website. When the ECP was convened in early 2017 its members had little or no recollection of having received this leaflet and as such, were not alerted to the project or the associated technology installation works. Consequently, the panellists had not related new street furniture and the subsequent site works with the project.

Perceived customer benefits of Smart Street

The ECP generally perceived that Smart Street would have a positive or at least a neutral implication for network efficiency as a whole, and for the energy efficiency of their individual households. Participants appreciated the idea that Smart Street will deliver shorter supply interruptions than under traditional operating arrangements but the frequency of SDIs could increase. However, some customers assumed that Smart Street would save them money by reducing bills, rather than curtailing future rises in bills, as a result of delayed or deferred infrastructure investment. Some customers were more cynical and believed they were unlikely to benefit from any cost savings. However, a few hoped that they would see a difference if they compared pre-trial bills with those they had received since the trials began.

Future expectations as a result of Smart Street activity

Future expectations varied considerably among customers, particularly by age. Younger panel members, who represent those most to likely adopt LCTs at some point in the future, were the group most engaged with the idea that Smart Street would address future challenges of meeting increased demand in an efficient manner. Older customers largely considered these challenges were unlikely to present problems that would affect them personally during their lifetimes. Nevertheless, the older participants were more inclined to take general technological advances, which deliver solutions to problems, for granted because they had experienced significant improvements in reliability of supply in recent decades and consequently, expected incremental improvements to continue.

Application of CLASS findings to Smart Street

The CLASS project, also funded by the LCN Fund mechanism, was underpinned by extremely robust customer research, which demonstrated that customers did not notice the application of voltage control techniques, which were similar in magnitude to those being implemented as part of the Smart Street trials. Some areas of the network included in the CLASS trials were selected to form part of the Smart Street trial regions. Overlapping trial areas in this manner makes it possible to analyse customer feedback from networks served by three primary substations, and assess the consistency of these results with those elicited at an overall level for CLASS, which was applied at 60 primary substations, representing 17% of Electricity North West's network.

The customer research methodologies for each project differ and are not directly comparable; however, the approach demonstrates consistency in the research results, in so far as only a negligible proportion of customers were likely to notice a change in appliance performance or lighting as a result of the application of Smart Street (however, these observations were more likely to be the result of SDIs, rather than actual voltage optimisation). This negligible impact is consistent with that likely to be attributable to CLASS voltage control techniques. In both CLASS and Smart Street, customers who claimed to notice a change perceived no negative impact on satisfaction with Electricity North West's service.

1.5 Conclusions

Consulting an ECP provided a suitable platform to explore customer perceptions about power quality at the mid-trial stage of Smart Street and demonstrated that application of voltage optimisation techniques had no negative impact on these perceptions. Overall, participants perceived a slight improvement in power quality since the trial had commenced, although this was because of other factors not directly attributable to the trial.

The final stage of customer engagement, with an ECP, will take place following completion of the trial in January 2018. It is expected to provide further evidence to support this conclusion and prove the hypothesis that customers will not perceive a change in their electricity supply from the application of the Smart Street method. This customer research will support technical learning to validate the method and assess the suitability of extending the deployment of Smart Street across Electricity North West's network and more widely across GB.

2. BACKGROUND AND OBJECTIVES

2.1 Project background

Electricity demand is forecast to increase and potentially double by 2050 as GB transitions to a low carbon economy and reliance on fossil fuels for transport and heat diminishes and is replaced with LCTs such as heat pumps and electric vehicles. This will create significant thermal and voltage challenges in the DNO's management of high voltage (HV) and low voltage (LV) networks, particularly when coupled with the anticipated increase in embedded low carbon and renewable generation sources. DNOs must connect new LCTs to facilitate customers' transition to a low carbon future, while maintaining statutory voltages, reducing network losses and managing power quality. This must be achieved while striving to reduce costs for customers.

To address the problems created by new LCTs, DNOs would have historically employed traditional network reinforcement measures, which involve major capital investment. This option is no longer appropriate because of the high financial cost, the carbon intensity of the works and the associated customer disruption.

Smart Street is a novel solution which makes effective use of network interconnection combined with voltage control techniques. New technologies integrate with existing network assets to deliver benefits to customers by releasing latent capacity and voltage headroom. This will accommodate the connection of LCTs and low carbon generation more quickly and at less cost than traditional reinforcement methods.

By implementing innovative Smart Street techniques, to maintain customer voltage close to the minimum for optimum CVR performance, the method will enable the network and customers' appliances to operate more efficiently and consequently, may reduce customers' energy consumption.

2.2 Customer engagement objectives

The key Smart Street customer hypothesis is that:

Customers within the Smart Street trial areas will not perceive any changes in their electricity supply.

This hypothesis will be tested through a range of customer engagement activities during the trials. ECP consultation forms one of the most important elements of these activities and this research was designed to be conducted in two distinct stages to achieve separate customer engagement objectives:

- The first stage focused on developing effective communication to inform a targeted awareness campaign about Smart Street aimed at customers, stakeholders and the wider community in the trial regions. This culminated in the distribution of a customer leaflet in October 2014, ensuring customers in all the trial regions were informed about the project and critically, the associated trials. The leaflet summarised the scope, size and regions included in the Smart Street trials. It also set out the objectives, potential customer benefits (within the context of GB's low carbon agenda) and indicated that the installation of enabling technology might, on occasion, require planned supply interruptions. The leaflet provided reassurance that customers were unlikely to notice any impact of the trials in terms of supply quality or reliability and distinguished the project from the smart meter rollout. Importantly, it also provided contact details for Electricity North West, should customers require any additional information or have an enquiry about the project. The key findings of this initial stage of research are summarised in the ECP interim report, published on the Smart Street website in December 2014.
- The second stage of ECP consultation was designed to elicit customer feedback about any perceived effects of the live trials on the electricity supply, providing evidence to test the customer hypothesis. This comprises two phases of customer research; the first having been conducted mid trial, with the second due to take place following completion of the trials. This report documents ECP findings from focus group meetings conducted during the middle of the trial period in early 2017. An addendum to this report will be published in April 2018, following the final phase of ECP consultation.

The Smart Street project will generate outputs and learning in a number of key areas. These will be of particular interest to other DNOs, Ofgem, the Department for Business, Energy and Industrial Strategy (BEIS) and other stakeholders. Various dissemination activities will be undertaken to share relevant learning from Smart Street with all of these stakeholders.

2.3 Customer impact

A range of Smart Street technologies are currently being trialled on circuits fed by six primary substations and 38 related distribution substations across three counties in Electricity North West's operating region. The trial regions serve approximately 67,000 customers and were selected to demonstrate the application of the Smart Street approach across a representative spectrum of network types.

Four groups of customers were engaged or impacted as part of Smart Street, these are briefly outlined below. More information about these customer groups and the potential impact of the project on each is provided in the CEP, which is published on the Smart Street website.

Customers in the trial areas

A targeted awareness campaign (involving the distribution of an explanatory leaflet) informed customers in the trial areas about Smart Street, its benefits and the issues that the project is seeking to address. Regular updates about the project are also regularly published on the Smart Street website and via social media.

Customers on the trial networks who experienced planned interruptions for the installation of the network equipment

It was originally anticipated that approximately 5% of customers on trial networks might be subject to planned supply interruptions associated with installation of the enabling technology. However, this was avoided by utilising back-feeds, live line techniques and other temporary generation sources. The small number of customers who were affected by planned supply interruptions received appropriate notification, as set out in the CEP. Where supply was maintained with generation during technology installation, some customers experienced a short duration interruption (SDI) of less than three minutes when the generator was connected and again when it was subsequently disconnected on completion of the work.

Customers on the trial networks who could experience short duration interruptions

Due to the application of interconnected configurations to low voltage (LV) networks, there is a possibility that any normally occurring fault on an LV feeder circuit may lead to other customers in a Smart Street trial area being affected. In this instance, the network is reconfigured remotely and the majority of impacted customers have their supply restored within approximately three minutes. However, to balance this, it is expected that there will be an improvement in the overall reliability of circuits involved in the trials resulting from the combination of advanced circuit breaker technology and automation software.

Customers on the trial networks who agreed to participate in customer focus groups (ECP)

Customers who agreed to participate in the ECP were fully informed by the research partner, Impact Research, how their data would be utilised and shared before signing up. Customers were asked to sign a consent form and by doing so agreed to their information being used for research purposes.

2.4 Objectives met

An ECP was convened at the midpoint of the technological trials for Smart Street, consisting of three groups of customers, representing dense urban, urban and rural trial networks. Interim research with an ECP has delivered a representative measure of customers' perceptions of power quality during the first year of the trials.

Figure 2.4 below indicates how each of the project's successful delivery reward criteria (SDRC) has been met to date. This report forms the evidence for Criterion 5: 'produce interim report of customer surveys'.

Figure 2.4: SDRC for the customer engagement work stream of the Smart Street project

Criterion	Required evidence	Actual evidence
1. Develop CEP and data privacy statement (DPS)	1. Send the CEP and DPS to Ofgem for approval by June 2014	1a. CEP 1b. DPS
2. Produce appropriate campaign materials to raise awareness about Smart Street	2. Deliver general awareness materials and publish on the Smart Street website by October 2014	2a. Customer leaflet 2b. Technology installation customer letter
3. Test the customer survey materials using the ECP	3. Deliver ECP workshop by September 2014. Publish lessons learned on the Smart Street website by October 2014	3. ECP lessons learned report

Criterion	Required evidence	Actual evidence
4. Customer contact centre briefing and training materials created and delivered	4. Deliver customer contact centre training and publish materials on the intranet by July 2015	4a. Customer contact centre briefing 4b. Customer contact centre briefing (slide show)
5. Produce final report on all customer surveys	5. Publish a final customer survey report on the Smart Street website by April 2018	5. Available April 2018

2.5 Required modifications to the planned approach during the course of the project

No changes were required to the planned approach, other than the minor postponement of ECP consultation, which took place four months after the originally proposed timeframe. This delay was associated with an extension of the project as a whole, because of technology issues which set back the trials. This resulted in a four month deferment of all SDRCs due after September 2015. As a consequence the final customer report, originally due in December 2017, will be published in April 2018.

3. CUSTOMER ENGAGEMENT METHODOLOGY

Within the confines of the scope of customer research agreed by Ofgem, the methodology required for this stage of engagement was designed to elicit an understanding of customers' perceptions of power quality during the Smart Street trials, their sensitivity to changes in voltage and if perception differs in relation to normal operating conditions.

The level of voltage changes experienced by customers in Smart Street trial areas will be very similar to that of customers involved in the CLASS trials and as such, the customer survey work already funded through CLASS is used in this study to support the findings. This is discussed in further detail in Sections 3.1 and 4.7.

To achieve this, a professional, independent moderator asked the ECP semi-structured questions relating to a predefined list of topics. This approach was consistent with that successfully adopted in previous customer engagement activities in Smart Street and other innovation projects. This gave the moderator the flexibility to question participants further on issues arising through open discussion and fostered the natural evolution of the ECP's understanding of Smart Street and its likely implications for customers.

The remainder of this section briefly describes the method used for the mid-trial phase of ECP consultation. Information about the method employed for the first stage of ECP consultation (which informed the general awareness campaign) is documented in the ECP interim report, dated 14 December, which is available on the project website.

3.1 Objectives of the ECP meetings

Understanding whether customers perceived any adverse impact on power quality as a result of the application of Smart Street techniques is crucial to the viability of the solution. The aim of this phase of customer consultation was to test whether an ECP had observed any change in their electricity supply as a result of the Smart Street trials. This phase of research was conducted halfway through the trial regime and will be repeated with a newly convened ECP on completion of the trials.

While this approach was designed to elicit a detailed understanding of customer perception of any changes in supply provision from a broad and representative sample across each of the trial regions, the research methodology is not directly comparable or as robust at that of

the CLASS study, which conducted detailed customer surveys aligned to coincide with specific trials (details of the method are available in the customer survey report on the [CLASS website](#)). A comparable research approach was proposed for Smart Street.

However, as the techniques being applied ensure that LV supply voltage is maintained well within statutory limits, the voltage effects are similar in magnitude to CLASS and that study had definitively established no customer impact; it was not possible to justify the return on investment for such a rigorous piece of research. The more generalised sampling approach documented in this report was sanctioned by Ofgem and assessed to be sufficiently robust to gauge customer perception of impact, when considered alongside the rigorous measures that the project team have implemented (in collaboration with Electricity North West’s customer contact centre) to ensure that enquiries and complaints associated with any aspect of Smart Street are captured, managed and appropriately documented.

The ECP was convened in January 2017. The key objectives and learning outcomes agreed for the ECP meetings were:

- To understand whether customers within the Smart Street trial areas have perceived any changes in their electricity supply since the start of the trials
- To understand whether any perceived changes to customers’ supply are a result of the trials or due to external factors
- To establish if customers have experienced SDIs during the trials that are directly associated with Smart Street and understand the impact of these
- To assess if perceived effects have detrimentally impacted overall satisfaction with service.

3.2 To understand likely changes in expectations of future power quality as a result of Smart Street membership of the ECP

A maximum of ten customers were recruited in each of the three Smart Street trial areas of Cumbria, Lancashire and Manchester. Participants were geographically clustered to enable easy access to the meeting venues.

The recruited panellists were all domestic customers, on the basis that the trial circuits predominantly serve residential properties. The recruitment screening process ensured that a broad cross-section of customer demographics were included, to reflect age, gender, social grade, region and household composition, as shown in Figure 3.2.

Figure 3.2: ECP group definitions

Trial area	Network type	Customer type	Gender	Age
Cumbria	Rural	Domestic	Equal proportions of males and females	60+
Lancashire	Urban	Domestic	Equal proportions of males and females	33-70
Manchester	Dense urban	Domestic	Equal proportions of males and females	31-70

3.3 Frequency of meetings and attendance

The ECP met on 25 and 26 January and 1 February 2017. The meetings each lasted approximately 90 minutes and were facilitated by an accredited Interviewer Quality Control

Scheme qualitative moderator. Questions were framed around a qualitative discussion guide (Appendix A).

The attendance at each group is set out in Figure 3.3.

Figure 3.3: ECP attendance

ECP meeting	Cumbria	Lancashire	Manchester
Number of attendees	7	8	8

3.4 Incentives

Customers were each offered a cash payment of £60 for attending a focus group meeting. This was recommended by Impact Research based on previous experience of recruiting customers to take part in similar panels. Customers were required to sign a claim form to document receipt of the payments or, if preferred, could elect to make an equivalent donation to a registered charity of their choice.

4. MID-TRIAL CUSTOMER IMPACT OF SMART STREET TRIALS

4.1 Perceptions of power quality at mid-trial

In order to evaluate the key objective of this phase of research (as outlined in Section 3.1), it was necessary to explore customers' perceptions of their power quality since the Smart Street trials began in January 2016. This was subsequently compared to their experience before the trials started. The expectation, based on the Smart Street hypothesis and previous CLASS research, was that customers would perceive little or no change in power quality, since application of the Smart Street method.

Customers were first asked to consider their definition of power quality and how an improvement or deterioration might manifest itself. The majority of customers defined power quality in terms of reliability and consistency of supply. Examples provided by the panel included: always having power and everyone receiving the same, consistent quality of supply. When asked to define or provide an example of poor power quality, the ECP referred only to unplanned interruptions, which customers generally regard as the most extreme form of outage because they cannot be anticipated and therefore, usually cause some degree of inconvenience. Where panellists had little or no experience of unplanned supply interruptions and consequently, assumed that a continuously available supply was assured, they considered supply to be of good quality, as would be expected.

"We're always getting it...It's just there, it's unconscious. You switch something on and it operates." Male, Lancashire

The distribution industry has a much wider definition of power quality than availability of supply; and as such the ECP was encouraged to think about spikes and dips and asked to evaluate how these might affect their perception of power quality. As none of the panellists spontaneously mentioned this type of effect, they were explicitly prompted to consider how flickering or dimming of lights, changes to charging rates or the performance of appliances might affect their perception. Few panellists had observed these kinds of effects but the small number that had, reported that this did not adversely influence their perception of power quality. The panel members who claimed to have noticed these effects were most likely to attribute them to issues with their own property, such as: old wiring in the home; a faulty appliance; a problem with light bulbs; the effect of some low energy lighting reaching full

luminosity or simply too many appliances drawing on the supply at once, particularly at times of peak demand.

“I’ve noticed if you plug a phone charger in and it doesn’t work that day you have to pull it out and swap it. So you think ‘Is it the cable? Is it the phone?’ You don’t put it down to the power coming out the wall.” Female, Lancashire

“At festive times like Christmas I think everybody’s using their oven, and I’m sure mine’s a little slower. I don’t know if there’s any reason to it, I’ve got my double oven and I think with everybody cooking, mine’s a bit slow.” Female, Manchester

Panellists collectively only perceived a decline in power quality when associated with power cuts, irrespective of their exposure to them. Nevertheless, those who had experienced interruptions also tended to accept that they are largely unavoidable, outside the control of the DNO and as such, they would accept a small number without any detrimental impact on their overall perception of power quality.

Once the various definitions of power quality had been discussed, the ECP was asked to consider their power quality over the previous year. However, they were not explicitly advised that this was the period during which the Smart Street trials had been taking place. Panellists were asked to consider whether they felt power quality had improved or declined during that time. In general, customers felt their power quality had been consistent, in some instances had improved, and in general, they did not spontaneously mention power quality effects other than supply interruptions. When asked to rate their power quality, the majority of customers rated it as ten out of ten.

“You don’t think about it, do you? When you look back you can’t think of the last time the electricity was off, I can’t.” Female, Cumbria

Customers were then asked to think about power quality before the trials commenced (prior to January 2016). Inevitably, recall of specific events that might have occurred over 12 months ago was not as strong as for the more recent period. However, panellists frequently recounted issues with supply many years or even decades previously and drew comparisons with the reliable and consistent service that they now receive as the norm. As a consequence, they drew on this experience as a benchmark to articulate their perception of a significant improvement in electricity supply provision over time.

“We did at one time get quite a few, about 25, 26 years since, something like that. We had a burglar alarm and I had emergency lighting wired in with it.” Male, Manchester

“I can remember when I was a kid, which is quite a while ago, we used to always have candles lit because of the power cuts [that] used to come maybe because of strikes, various things. You could have one a week.” Male, Cumbria

“I’ve never heard anybody complain about their power. ‘The power’s down.’ I can’t remember the last time I heard that to be honest.” Male, Cumbria

During the year preceding the Smart Street trials, customers could only recall unplanned interruptions caused by significant events, such as Storm Desmond around Christmas 2015, which resulted in extensive damage to the electricity distribution network and prolonged loss of supply across much of Electricity North West’s operating region. Customers did not recount other changes to power quality. Several customers described the series of storms occurring around that period as ‘a force of nature’, and regarded occasional interruptions, resulting from extreme weather conditions to be both inevitable and acceptable. However, when perception in the pre-trial period was compared with that since implementation of Smart Street techniques, customers tended to rate pre-trial power quality a little lower. When asked to articulate the reason, the ECP confirmed this was the result of disruptive supply interruptions in the pre-trial period.

4.2 Experience of short duration interruptions

Overall perception of power quality since the trials started is extremely encouraging and in line with the hypothesis that customers would not notice any detrimental effects of Smart Street. However, when prompted to specifically think about SDIs, a number of panellists did recollect occasional short or momentary supply interruptions that were observed as a change in lighting or appliance functionality.

The ECP was informed how Smart Street technology interconnects neighboring circuits which, in the event of a fault, allows electricity to be restored more quickly than is possible on traditional networks and normal operational conditions. The panel was then advised that connecting circuits in this manner, theoretically introduces the risk of a slight increase in SDIs of less than three minutes. The ECP had generally not considered SDIs up to that point in the discussion. When encouraged to think about their experience of SDIs, the majority of panellists reported that they had never previously associated a momentary loss of supply, or an incident lasting just a few minutes to be an actual supply interruption. In their opinion, a supply interruption lasts much longer, perhaps hours. After considering SDIs, the consensus was that: they occur so infrequently; have such little impact; cause no adverse intrusion on customers' lives and are so quickly forgotten that they have no negative effect on overall satisfaction with service or perception of power quality. After giving the matter consideration, some panel members believed that their property might have been subject to an SDI, but understandably, none could be specific about when these occurred. The members who thought that they could have experienced an SDI reported that these interruptions were often only apparent after the event, for example when waking or coming home to flashing digital displays on clocks and other electronic equipment.

"They've been short and they've been cuts that you haven't noticed because mostly they've been at night. So I really don't know how long." Male, Cumbria

"I have got up in the morning and the clock's been flashing in the bedroom. It's been off at some point during the night, but I'm asleep so I don't know. You just get up and get ready for work – you just carrying [sic] on going." Female, Lancashire

The ECP tended to attribute SDIs to spikes in demand and based on this assumption, they accepted that these were to be occasionally expected at times of unusually high demand. After being given the opportunity to read the general awareness leaflet (originally distributed in 2014) and considering the moderator's explanation about the interconnectivity of LV networks, some customers were spontaneously able to link the overall benefits of the solution provided by Smart Street in terms of improved reliability and efficiency, balanced by the theoretical risk of a slight increase in the frequency of SDIs in the future.

"The key thing here, it does say what it's doing. By introducing new technology, Smart Street will balance voltage through their network and make your appliances be far more efficient'." Male, Wigan

In summary, although a number of customers recalled having experienced SDIs, they were infrequent, did not negatively impact perceptions of power quality and customers were unlikely to have remembered them without having been specifically prompted and sensitised.

4.3 Assessing the likelihood of perceived changes to power quality (mid-trial) being due to Smart Street

The discussion guide used by the ECP moderator (Appendix A) allowed for unprompted debate with subsequent prompted questioning around the timing of the SDIs mentioned by customers. While recollection was generally vague, this feedback allowed the project team to conduct further investigation into these events by scrutinising Electricity North West's historic fault records and trial data, captured by Smart Street technologies. This investigation aimed to distinguish events that were directly associated with Smart Street from those that may

have occurred because of other conditions. This technique is similar to that successfully used in customer research during the CLASS project.

Figure 4.3 summarises power quality issues reported by the ECP, after sensitisation and prompting, along with the results of investigations into the likely cause.

Figure 4.3: Power quality issues associated with Smart Street trials

Trial area	Description of fault/power quality issue	Investigation results	Attributable to Smart Street
Manchester	One panellist recalled the momentary flickering of lights early one morning (at approximately 7.00am) and believed this occurred around April 2016, mid-week	Weezap (Smart Street technology) on this circuit tripped and reclosed on 12 March 2016. This resulted in an SDI, which to the customer, was observed as a flicker	Likely
Manchester	One panellist recalled a mains connected radio turning off for approximately two minutes during the summer, at about 3.00pm on a Sunday	Weezap on this circuit tripped and reclosed on 8, 15, 19 and 20 March 2016	Likely (observed by the panellist on 20/03/16)
Manchester	One panellist recalled having observed their digital alarm clock flashing on two separate occasions. Once early one morning and once on returning home from work. No recollection of the specific day or time of year for either event, but the individual believed they occurred in the past 12 to 18 months	Nothing identified.	Unlikely – potentially attributable to minor voltage dips associated with HV switching outside the trial period
Lancashire	Six out of seven panellists in the Lancashire focus group meeting recalled a supply interruption lasting up to three hours, one evening. This was assumed to be in autumn, because it was dark. One panellist made an enquiry at the time and was advised that the incident was associated with a relay at a substation	Some of the panel members were subject to an LV transient fault in October 2015. This occurred on a Smart Street circuit; however, it was pre-trial (but during the technology installation phase) This incident was unrelated to the trial regime Many customers in this region were also affected by a pre-trial HV fault on 13 August 2015, which occurred during daylight hours but caused reduced voltage well into the evening	Unlikely

Trial area	Description of fault/power quality issue	Investigation results	Attributable to Smart Street
Wigan	One panellist reported repeated faults with her electric oven since October 2016	This is believed to be a problem with the appliance and is unrelated to the trials. The individual reported no coinciding power quality problems or issues with other appliances or lighting	Unlikely
Wigan	One panellist recalled a problem with newly installed plug sockets in August 2016, which did not initially work	Fault on private installation - not associated with trials	Unlikely
Cumbria	One panellist remembered his power going off for about ten minutes, mid-week, at approximately 9.30 am/10 am. He recalls the street having power on one side and not on the other	Weezap tripped and reclosed on 14 March 2016	Likely

Where panellists believed that they might have experienced an SDI, the project team interrogated technical data from the corresponding circuits. This is being collected by intelligent switching devices (Weezaps) deployed as part of Smart Street. The consent form, signed by the ECP (Appendix B) provided for the sharing of customer data, to facilitate this investigation. The study identified that the majority of customers who reported SDIs had experienced at least one such event, resulting from the trip and reclose of a Weezap. The majority of these events were found to have occurred early during the trials, around March 2016, and coincided with technical issues identified with the remote interface of this technology and the associated communications platforms. This resulted in integration issues with Electricity North West's network management system and firmware updates were required to resolve the problem. A small number of customers were unavoidably subject to SDIs during this period. However, customers on trial circuits have not been subject to any further problems of this nature since the matter was remedied. Despite this experience, there was no impact on customers in terms of diminished perception of power quality or customer satisfaction. Participants confirmed that they paid little attention to them at the time, and would have given them no further thought, without the specific exploration in the focus group meeting. The ECP generally reported an increase in the quality of their supply during the trials compared with the previous year.

The project team anticipates that overall perception of power quality is likely to improve when the customer engagement exercise is repeated at the end of the project because initial technology issues, outlined above, have been resolved. Therefore, the expectation is that any future SDIs (linked to Smart Street LV circuits) will be the result of actual faults. Customer impact in the early phase of the trials was negligible and the refinements made during that period will negate similar issues if the Smart Street method is to be rolled across Electricity North West's operating region and across GB.

4.4 Awareness of installation works or street furniture associated with Smart Street

Customers on Smart Street circuits were sent a leaflet in October 2014 informing them of likely impacts of the trials, including the appearance of new street furniture required to house enabling technologies.

Unsurprisingly, only one member of the ECP had recollection of the leaflet, and most failed to recognise it when shown a copy. The one panellist who vaguely recalled seeing it could not remember any details about the project, acknowledging that it was most likely to have been read only briefly and then discarded on the assumption that it would have no impact on themselves or their household. This supports the findings of a survey conducted shortly after the leaflets were distributed, which demonstrated that recollection of receipt was around one in three customers.

“You get so much bumph through the post that you possibly didn’t look properly and it got thrown out with the rest.” Female, Cumbria

“From what you’ve said it’s already happened for us. We weren’t aware of it. It’s been there for 12 months, so what was about to happen has already happened.” Male, Lancashire

It can also be assumed, as the ECP were generally unaware of the trials taking place, that they were not alerted to the installation of street furniture as part of Smart Street

Smart networks of the future are likely to require more local street furniture and as such, the ECP was encouraged to express their views on the subject. While this questioning was outside the scope of research to test the hypothesis, it was useful in the context of the discussion and enhances learning about customer perception of DNOs installing more street furniture to facilitate improvements in service.

When questioned, only a small number of panellists had noticed new cabinets; however; none had attributed them to Smart Street. These individuals had given no particular thought to the presence or appearance of the new street furniture and had assumed it was associated with the telecoms sector.

This feedback is encouraging and supports learning attained during the technology installation phase of the project, when it became apparent that any objection to the presence of new equipment is only likely to arise when apparatus is located in the immediate vicinity of a customer’s property. There is also evidence of a greater potential for resistance among domestic customers than from businesses and the likelihood of objections to new street furniture appears to be higher in more affluent residential areas. Customer concerns largely relate to aesthetics, specifically when cabinets are visible from their property. The location of new equipment, housed in small cabinets, can also cause anxiety where the perception is that it could present a congregation point for youths and thereby encourage antisocial behaviour.

Reassuringly, these considerations were not raised by the ECP, even when it became apparent that some of the new street furniture they had noticed was very likely to be associated with Smart Street.

4.5 Perceived customer benefits of Smart Street

The panel was asked what benefits, if any, they perceived as a result of the Smart Street trials and the potential wider rollout of the method. Overall, the project was seen as beneficial as it was designed to increase the efficiency of the existing network and lower bills for customers.

“Everything’s improving all the time, isn’t it? And to me the only thing this is doing is improving it again. They might be monitoring the electricity, but what do you want? Do you want to be off for three hours or do you want it back on in twenty minutes?” Male, Cumbria

“If they’re going to manage something better, so less breakdowns and conserve the energy, you’re going to have less power cuts, they’re going to get you up and running sooner, then there isn’t a case against it. If you’re managing it better and everything is improving, who’s going to argue with that?” Male, Cumbria

The ECP generally assumed that Smart Street will save them money by lowering bills, rather than the most likely outcome, which is the curtailment of increases in distribution costs, through delaying or deferment of investment in infrastructure that would ultimately cause bills to rise. Some panellists indicated that they would review their bills to see if they had decreased since the trials had commenced.

“Some people might have checked their bills to see if they are a little lower, knowing they were in the trial period thinking ‘I wonder what my bill was in 2015 in winter, what it was in 2016.’” Female, Manchester

The ECP was not unilaterally convinced that they would see clear benefits, either because the financial savings would not be passed on by electricity suppliers, or because power quality is already so high that they struggled to see how Smart Street could improve it further.

“Electricity North West are not charging anybody in this room for their electricity, it will be British Gas or E.ON, or whoever. Are they going to reduce their bills to us or are they just going to pocket the difference?” Male, Manchester

“I don’t know whether you could make it better, that’s what I’m saying, because I don’t see any faults at the moment, how could you improve it?” Male, Lancashire

4.6 Future expectations as a result of Smart Street activity

The ECP’s expectation and acceptance of the view that electricity demand will significantly increase in the future was varied. There was particular differentiation by age, based on past experiences and future concerns. Some older customers stated that the projected changes in demand were unlikely to present a problem in their lifetimes and were a greater consideration for younger generations. Because they felt that they were unlikely to be affected personally, these members were generally unconcerned about future energy challenges. Older panellists also tended to believe that supply had already improved significantly over the years and they no longer expected blackouts. This older demographic also no longer expect to call on the DNO to respond to blown fuses, as a result of having overloaded their own service. This assumption was generally not because of improvements made to their own installations, but a supposition that the network had been upgraded to accommodate more appliances and therefore greater demand. As such, these panellists generally assumed that technological advances would continue this trend for increased reliability and continuous supply.

“So you assume that the electricity is used in the house more and more than we used ten years ago to what we have now, and we’re still getting the same supply. So it must be that they’re improving somewhere because if you plug more in it’s not tripping.” Female, Lancashire

Younger panel members (those most likely to adopt LCTs in the future) were more inclined to engage about the expected challenges of meeting demand in the future and were therefore, more receptive to initiatives that support improved reliability of supply and greater efficiency from avoidance or deferment of costly network reinforcement.

“I’m interested in what you were saying about. I’m going to get an electric car probably in the next 18 months, and I’m going to get a charge point, and by that time it will be probably about 11 kilowatts. I’m thinking is my supply line enough coming in? I don’t want to upgrade it. What are the issues? It’s 18 months away, but all these things infrastructure and if everybody’s doing it...” Male, Lancashire

“The country is struggling for power, so it’s going to affect everybody, it does now. We use more power and it’s only going to get worse. There are going to be more people living in this country and people living longer.” Male, Cumbria

4.7 Application of CLASS findings to Smart Street

CLASS investigated the impact of voltage control on customer perceptions of power quality. Trials were conducted on the HV network and reduced voltage in the range of 3%-5%.

Quantitative data collected during extensive and robust customer surveys, which were aligned to the trials, confirmed beyond reasonable doubt the hypothesis that: *'Customers within the CLASS trial areas will not see, observe or notice an impact on the power quality when these innovative techniques are applied'*. Full details of the research, method and findings are published in the customer survey report, published on the CLASS website. These results were supported by the absence of any customer enquiries or complaints in relation to power quality, that could be attributed to the CLASS method. A small proportion of customers who participated in the survey (approximately 3%) claimed to notice a change to their supply that could potentially have been related to the CLASS method. However, this had no detrimental impact on their satisfaction with service.

Half of the primary substations selected to trial Smart Street, and critically to prove the hypothesis that customers will not perceive any changes in their electricity supply, overlap with the CLASS trial sites. The overlapping primary substations are Denton East (Manchester); Longsight (Manchester) and Egremont (Cumbria).

As outlined in Section 3.1, the Smart Street customer research methodology is not directly comparable to the more robust qualitative study conducted in CLASS. However, the CLASS research, and specifically that relating to the populations served by the overlapping primary substations, provides a frame of reference to evaluate feedback elicited from customer engagement during the Smart Street trials. This approach allows general comparisons to be made when assessing customer perception of changes in power quality and levels of satisfaction that might potentially be attributed to the application of Smart Street techniques.

The results of the CLASS research, specific to the three primary substations referenced above, are briefly summarised below:

- 29% of survey respondents claimed to have noticed a recent change in their supply or in the operation of an appliance (working faster or slower) or lighting (brighter or dimmer luminosity) in the 'pre-trial' CLASS baseline survey ie prior to any trials taking place.
- 27% claimed to notice a change to an appliance or lighting during the CLASS trial period (no significant change from the baseline).
- 4% noticed a change to an appliance or lighting during an actual test and were confirmed to be at the property during the test period. This key group represents those that noticed a change in power quality that could, potentially, have been attributable to CLASS; however:
 - Such a small proportion of the survey sample is statistically negligible and
 - This 4% sample rated their overall satisfaction with the service provided by Electricity North West as ten out of ten.

In summary, customers served by these primary substations did not notice an impact on power quality as a result of the CLASS trials and the negligible proportion of customers who claimed to notice an effect, were not negatively influenced in terms of their overall satisfaction with service. The voltage control effects in Smart Street are similar in magnitude to CLASS and as such, it is possible to reasonably conclude that customers in the Smart Street trial areas are also unlikely to notice an adverse affect on power quality, reduction in satisfaction with supply or perceive a decline in service from Electricity North West. The consistency of responses will be assessed at the end of the Smart Street trials, in relation to the overlapping primary substations, and at a cumulative level, which will consider the

customer findings across the entire CLASS trial area, which was applied at 60 primary substations, representing 17% of Electricity North West's network.

5. CONCLUSION

Feedback from the ECP was valuable in gauging customer perception of power quality and how it might have changed since implementation of the Smart Street trial regime. The only perceived changes to power quality were positive, with a substantive number of the panel citing a slight improvement since the trials began. This tended to be associated with the negative effect that Storm Desmond had on perceptions before the trials began. It was only after sensitising the panel with information about SDIs and prompting them to carefully reflect on changes, with detailed questioning, that customers were able to recall any changes in power quality. Panel members who reported a change after prompting, stated these were insignificant and so infrequent as to have had no impact on themselves or their household and did not adversely affect perception of power quality, which was already very high before the Smart Street trial period. These findings, along with the absence of any enquiries or complaints directly associated with application of the trials support the conclusion that, at this stage in the project, the hypothesis that '*customers within the Smart Street trial areas will not perceive any changes in their electricity supply*' is upheld.

The short duration interruptions that could potentially have been associated with Smart Street enabling technologies occurred early in the trial period when issues arising from the integration of enabling technologies and communications platforms were identified. This regrettably resulted in some customers experiencing one, or a small number, of SDIs. The problem was quickly resolved by implementing firmware updates and customers on trial circuits have experienced no further problems of this nature. The accounts of SDIs, early in the trial period, combined with the failure of the ECP to recall more recent events, substantiates that any early impact was associated with technology refinement and interconnectivity issues, rather than application of the voltage optimisation trial regime. However, even when SDIs, more prolonged supply interruptions or power quality issues, such as slight voltage dips were reported, they had no negative influence on customer satisfaction with supply.

6. NEXT STEPS

These findings represent the first phase of customer research during the Smart Street trials, to proactively assess perceived changes to power quality as a consequence of implementing voltage optimisation techniques. The next phase of research with an ECP will be conducted following completion of the trials and will focus on perceived customer impact over the entire trial period and changes following cessation of the technique. An addendum to this report will be published in April 2018, following the final phase of ECP consultation.

The project team will continue to work closely with Electricity North West's customer contact centre to ensure that enquiries associated with any aspect of Smart Street are captured, appropriately managed and reported. In line with the hypothesis, it is not anticipated that there will be any issues relating to power quality resulting from the method's application in the remaining trial period; however, any issues that may arise will be documented in the final report.

Key learning will continue to be reviewed to reflect customer feedback.

In accordance with the vision of the LCN Fund mechanism, all outputs and learning acquired from Smart Street customer engagement activities will be made available to other DNOs. All communication and learning materials developed in the project have been published and can be downloaded from the Smart Street website. There will be on-going learning and

dissemination as the project progresses via Smart Street learning events, stakeholder updates, trade magazines and in other appropriate forums.

7. APPENDICES

Appendix A: Discussion guide



IMP256 ECP 3 Research Objectives

ECP Meeting 3	25th, 26th January and 1st February 2017	Objective - to understand if customers within the Smart Street trial areas perceive any changes in their electricity supply
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GROUP STRUCTURE (1½ HOURS):

AREA OF DISCUSSION	TIME ALLOCATION
(1) Introduction / Warm Up	5 minutes
(2) Smart Street Leaflet	15 minutes
(3) Current power quality perceptions	30 minutes
(4) Power quality perceptions BEFORE Smart Street Trials	20 minutes
(5) Short Duration Interruptions	10 minutes
(6) Future power quality	5 minutes
(7) Summary	5 minutes

1 Moderator Introduction (5 minutes):

- Introduce yourself
- Explain that the research is being conducted on behalf of Electricity North West
- Explain purpose of discussion (*"To understand overall perceptions of their electricity supply"*)
- Confidentiality is guaranteed, no right / wrong answers, interested in everybody's opinions, in as much detail as possible
- Explain moderator's role and set out 'rules' (speak loudly / clearly / not all together)
- Explain audio and video recording, one-way mirror and presence of observers
- Any questions?

Warm-up

EACH RESPONDENT WILL BE ASKED TO INTRODUCE THEMSELVES TO THE GROUP IN TERMS OF:

- First name, work and who lives in their household - were they aware of the Smart Street project before we approached them to take part in today's meeting?

2 SMART STREET Leaflet (15 minutes):

Moderator Info:

Leaflet to be emailed to group in advance, and copies given out upon arrival to read again before starting the group.

ASK THE GROUP

- This leaflet was sent to all customers within the Smart Street Trial areas in October 2014. Does anyone recall receiving it through the post at that time?
- **If anyone recalls receiving it:**
 - Can they remember reading the leaflet at that time and if not why was that likely to be?
 - Can they recall their impressions/response to the leaflet at that time?
 - Can they recall if it raised any questions or concerns for them?
 - Do they recall if receipt of the leaflet prompted them to speak to family members, neighbours etc. about Smart Street?
 - What did they do with the leaflet (was it retained for future reference)?
 - What action, if any, did they take as a result of receiving the leaflet?
- Having been sent the leaflet prior to this meeting and reading it again today....what are your overall impressions and thoughts about it: **DEPENDENT ON RESPONSE, PROBE ON:**
 - If so...**
 - What did they think it was?
 - What had they heard about it?
 - What impact did they think it might have for them?
 - Probe on:
 - Likes and dislikes of the leaflet
 - General impressions about being involved in the Smart Street trials
 - Understanding and clarity of the subject matter (**CHECK UNDERSTANDING ON THESE POINTS BEFORE CONTINUING**)
 - Clarity on the difference between Electricity North West, suppliers and National Grid
 - Clarity as to what Electricity North West does (*does the panel understand it is Electricity North West that should be contacted in the event of a power cut?*)
 - Clarity on electricity bill charges (*DNO vs. supplier*)
 - Understanding of 'low carbon' terminology
 - Interpretation and associations of the name 'SMART STREET'

PAUSE / BREAK – WRITE DOWN ANYTHING NOT UNDERSTOOD – IF HAVE ANY QUESTIONS, THROW OPEN TO THE GROUP TO SEE WHAT THEY THINK AND CORRECT IF NECESSARY. ENSURE ALL ARE ANSWERED BEFORE MOVING ON.

3 Current power quality perceptions (25 mins)

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- Ask the group to contemplate what **power quality** means to them

LIST DEFINITIONS ON A FLIP CHART

- What might you see/experience with an **improvement** in power quality? E.g. changes to the way appliances work? Lighting? Others?
- What might you see/experience with a **decrease** in power quality?

IF POWER CUTS ARE MENTIONED:

- Frequency of power cuts
- Duration of power cuts

- **Establish perception of the current quality of their electricity supply**

- Have the panel seen any evidence of on-site works over the last 12 months that they suspected might be associated with the trials (ie Electricity North West personnel working in the region, new cabinets? BRIEFLY elicit general impressions.

- Has quality **improved**, **stayed the same** or **deteriorated** over the last 12 months?

- What, if anything, has changed? **PROBE** for perceptions, changes to appliances etc.

PROBE FOR EACH OF THESE IF NOT MENTIONED:

- More power cuts?
- Fewer power cuts?
- Longer/shorter power cuts
- Changes to way appliances work ie kettles boiling faster/slower
 - Probe for specific appliances where a change has been observed
 - Quantify the changes)
- Changes to charging rates for mobiles etc?
- Flickering/dimming or brightening of lights?
- Better power quality?
- More consistent supply?
- Why do you think this might be? (**PROBE** to check what is likely to have caused any changes e.g. storms, fault on the line, routine repairs (pre-notified) change in personal circumstances, societal changes such as population numbers etc rather than Smart Street?)
- Did you report or were you proactively given any explanation for the changes to power quality?
- **IF RECALLED RECEIVING/READING THE LEAFLET IN OCT 14** - Do they think that receiving the leaflet might have sensitised them to look for changes?

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- **IF EXPERIENCED ANY CHANGES TO POWER QUALITY:** Have you made any adjustments to your behaviour, appliances or anything else as a result of the changes to your power quality experience over this time? If so, what?

- o How might the trials have affected not just them, but other members of their household?
 - Or anyone else e.g. neighbours?
 - Local shops/businesses?
- o Any change to their satisfaction with power quality as a result of Smart Street trials? Has it improved or got worse? Why?

SUMMARISE: On a scale of 1-10 where 1 is completely unacceptable and 10 is completely acceptable, how would you rate your power quality over the last year?

RECORD RESPONSES ON A FLIP CHART

4 Power quality perceptions BEFORE Smart Street Trials– (25 mins)

EXPLAIN: The Smart Street trials mentioned in the leaflet earlier, started in January 2016.

- o Establish perception of the quality of their electricity supply (before January 2016)
 - Was quality **better**, **worse** or **the same** before January 2016 than it is now (thinking back only 1-2 years before, not decades!)?
 - **KEY OBJECTIVE TO EXPLORE ANYTHING NOTICED:** What, if anything, was different? **PROBE** for perceptions, changes to appliances etc.
 - Why do you think this might be? (**PROBE** to check what is likely to have caused any changes e.g. storms, fault on the line, routine repairs (pre-notified) change in personal circumstances, societal changes such as population numbers etc rather than Smart Street?)
 - Before January 2016, had you ever had cause to report / or were you proactively given any explanation about issues concerning power quality?

SUMMARISE: On a scale of 1-10 where 1 is completely unacceptable and 10 is completely acceptable, how would you rate your power quality before January 2016?

RECORD RESPONSES ON A FLIP CHART

5 Short Duration Interruptions (10 mins)

EXPLAIN – Smart Street technology interconnects neighbouring circuits and means that, if your property is affected by a local fault, your electricity will be restored much more quickly than before. However, connecting circuits in this way theoretically introduces the risk of a slight increase in short duration power cuts, which last less than 3 minutes.

- In the last 12 months have you experienced any short power cuts, lasting just a few minutes or less?
CLARIFY THAT THESE CAUSED A TOTAL LOSS OF SUPPLY, AFFECTING ALL APPLIANCES AND LIGHTING IE THEY WERE NOT JUST VOLTAGE DIPS
- If so, can you recall, approximately, how many of these short interruptions you experienced in the last 12 months?
- How long, on average, did they tend to last?
PROBE: a few seconds/minutes/ranged between a few seconds and a few minutes
- Thinking about the last 12 months, do you recall any kind of pattern to the short interruptions?
 - sporadic and difficult to see a pattern?
 - tended to be in very wet or windy weather conditions?
 - all occurred within a short period?
 - –something else?
- Approximately, when did the last one occur?
- **To the best of your recollection, do you think that you experienced more short power cuts over the last 12 months than in previous years?**
 - Yes / no / about the same?
- Do they seem to have followed a similar pattern in terms to previous years

6 Future power quality – (5 mins)

- Do you expect your power quality to change in future (next 5 years say)?
 - If so how, and why?

Show concept board:

- *What do they think of the solution?*
- *Can they understand the “how”? What’s in it for them? Do they agree? Anything else? Is it credible?*

7 Summary (5 minutes)

- Does Smart Street seem like a benefit to you? Something worse? Or the same as the current situation?
RECORD ANSWERS ON FLIP CHART
- Thank respondents & depart

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Customer Engagement Consent Form

You may find the following questions and answers helpful in understanding what data will be collected from you and how it will be used. **Please read this information and indicate your consent at the bottom of the form.**

Who is Impact Research?

Impact Research is an independent market research agency whose registered address is 3 The Quintet, Churchfield Road, Walton on Thames, Surrey, KT12 2TZ.

What is the purpose of market research?

Market research attempts to generate understanding and knowledge about customer behaviour within it, by gaining information (*data*) from specific samples of customers and extrapolating results to the population as a whole.

Market research is scientifically-conducted research where the identity of respondents, and all personal data they give to the researchers, are kept fully confidential, and cannot be disclosed or used, for any non-research purpose.

Market research is not a commercial communication or a selling opportunity. Market research has no interest in the individual identity of respondents.

What data will you collect from me?

You will be asked to provide Impact Research with your contact details so that we are able to confirm your attendance at the focus group meetings.

You will also be asked to take part in two group discussions and share your perception, attitudes and behaviour with respect to the electricity supply at your property.

How will data be collected and stored?

The group discussion or interview you take part in will be:

- Audio recorded
- Video recorded
- Observed by people in the room/from another room/location

Will data be shared with 3rd parties?

The Data Protection Act requires that Impact Research collects and uses the information you provide to it in a manner that respects and protects your confidentiality. Your personal details (name, address, phone number) will not be disclosed to any other 3rd parties without your permission.

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In most cases the audio and video recordings will be heard/watched and the transcription read **only by the transcriber and researchers from Impact Research** for research purposes. Excerpts from the transcripts or tapes may be used to illustrate the research findings. This will always be done in a way to protect your identity (eg comments will not be attributed to you personally).

The tapes will not be used for non-research purposes, such as direct sales activities. The tapes will be dated and deleted, at the latest, two years after the research is completed.

In exceptional cases the audio tape will be listened to/the transcription read/the video tape watched by employees at Electricity North West working on this project. Anyone from Electricity North West who reads the transcript or listens to/watches the audio/video tape will sign an undertaking that they will respect the anonymity of those taking part. Any other material or information generated by you, such as ideas written down on paper, will be subject to the same strict controls.

We would like to ask your permission to use soundbites and/ or video footage from the group discussions at industry learning events about this project. This may range from anonymized sounds bites of what people at the groups were saying to actual clips from the video recording.

You will not be identified by name or by the name of the company you work for. It will not be possible to protect the anonymity of those who can be seen or heard in the video footage eg by blurring out people's faces.

The tapes will not be used for commercial purposes, such as promotion or direct sales activities. Are you happy for us to use:

Audio clips of your comments	Yes	No
Video clips of your comments	Yes	No

I am happy to have the feedback I give through participating attributed to me so that Electricity North West are aware that I have taken part in this market research.
Please circle: YES/NO

I am happy for Impact Research to get in touch with me again in the future to discuss the service I receive from Electricity North West for market research purposes?
Please circle: YES/NO

I am happy for my data to be passed to Electricity North West in order that they can discuss with me any aspect of my electricity supply in the future?
Please circle: YES/NO

I agree that after the above explanation, I was given the option not to take part in the engaged customer panel, if I had any reservations.

Name Signed

Date.....

