

# **The Value of Lost Load (VoLL) 2**

## **Pilot Survey – key findings report**

**18 February 2020**



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## VERSION HISTORY

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## APPROVAL

Name	Role	Date

## GLOSSARY

Abbreviation	Term
BWS	Best-worst scaling
CE	Choice experiment
CV	Contingent valuation
DNO	Distribution network operator
EV	Electric vehicle
GB	Great Britain
GDPR	General Data Protection Regulation
LCT	Low carbon technology
MNL	Multinomial logit
NIA	Network Innovation Allowance
Ofgem	Office of Gas and Electricity Markets
PV	Photovoltaic
RIIO-ED1	Electricity distribution price control 2015 to 2023
SME	Small to medium enterprise
VoLL	Value of Lost Load

## FOREWORD

In Great Britain (GB) a single, uniform Value of Lost Load (VoLL) is used to evaluate 'disbenefit' to customers of a supply interruption of average duration. It can be expressed as the value that customers would be willing to pay to avoid an interruption or what they would be willing to accept in compensation if they experience an interruption. A uniform VoLL assumes that all customers are impacted equally as a consequence of the loss of power and attach the same value to their supply reliability. Investment in electricity networks is thereby, at least partly, driven by a factor which currently fails to recognise any differentiation in customer need, or valuation of service.

Recent [Network Innovation Allowance](#) (NIA)-funded research conducted by Impact on behalf of Electricity North West (ENWL010) has demonstrated that VoLL is now notably higher than observed in the previous major GB study in this area, conducted by London Economics for Ofgem, in 2013. This increase, as reported on the [VoLL webpage](#), is thought to reflect a greater dependency on electricity and changing customer needs and expectations. The study also robustly concluded that a uniform VoLL significantly undervalues the needs of certain customer segments, most notably the fuel poor and early adopters of low carbon technologies; whilst others are over represented, driving potentially inappropriate investments. An output of the VoLL research is a new segmentation model, which will theoretically enable Distribution Network Operators (DNOs) to make smarter investment decisions that are more reflective of divergent customer needs.

To move towards the practical implementation of a differentiated VoLL it is recognised that further detailed analysis is required to explore the requisite level of sophistication needed in a credible decision making tool, and the appropriate mechanism for practicable implementation, at scale. ENWL010 also highlighted the need for further empirical customer research to test the impact of different scenarios. This includes the 'multiplier' effect on VoLL of scale and duration, when assessed on the basis of the entire community, rather than the individual, ie assessing the overall impact of a large-scale outage affecting a significant number of people versus that of a smaller, more localised interruption. This understanding will inform smarter decisions based on the relative value of proactive investment, aimed at preventing or minimising the severity of unplanned interruptions, versus the ability to mitigate VoLL by deploying appropriate support mechanisms to manage the consequence of an event.

This follow up project comprises two distinct pieces of research: a strategic piece of statistical analysis and industry consultation to explore the practicalities and regulatory implications for implementation of an alternative, segmented VoLL model and its applicability (Phase A); and empirical customer research to provide insight into the multiplier effect and socialisation of cost arising from a revised model (Phase B). The methodology for Phase B was designed by Electricity North West and its market research partner, Impact, and was set out in the VoLL2 Methodology Statement which encompasses five key stages of customer and stakeholder engagement:

- Stage 1: Desk research and stakeholder engagement
- Stage 2: Qualitative exploration
- Stage 3: Quantification
- Stage 4: Implementation scale analysis
- Stage 5: Validation.

This report and the analysis therein reference the key findings from the pilot phase of Stage 3 designed to evaluate the survey instrument and identify any issues that may affect data quality before the large scale quantitative stage. This comprised a quantitative pilot conducted with Electricity North West customers, supplemented with cognitive exploration of their responses.

The VoLL2 project is funded by the NIA, which was introduced as part of the RIIO-ED1 price control and provides an allowance for network licensees to fund research with the potential to improve network operation and maintenance, and to deliver financial benefits to the licensee and its customers. The project commenced in November 2018 and will be conducted over an 18-month period.

All documents relating to the project are published on the [VoLL2 webpage](#).

## **1 EXECUTIVE SUMMARY**

### **1.1 Changes from the previous VoLL study**

The draft survey instrument tested in this pilot was based on the survey instrument utilised in the original VoLL study, but incorporating a number of changes, to answer related but different questions, using an alternative research methodology. The VoLL2 instrument included the addition of new questions specific to the objectives of this project and the removal of other questions which were not relevant to the research. The changes were:

- The removal of questions in the screener section designed to establish the type of electricity meters that respondents' have were removed
- New questions were added to the section on respondents' experiences of supply interruptions
- All questions specific referencing planned supply interruptions were removed
- Questions referencing electric vehicles (EVs) in the low carbon technology (LCT) adoption section were adjusted to focus on the respondent's primary charging location
- The choice experiment (CE) was redesigned to be easier to complete, with options rearranged to be read horizontally from left to right
- Some attributes were removed from the CE which now only tested options relating to the duration, frequency and scale of the interruption
- The willingness to pay (WTP) and willingness to accept (WTA) tasks were removed and replaced with a new contingent valuation (CV) task
- The number of show cards was reduced
- The VoLL2 pilot survey was administered entirely face-to-face.

### **1.2 Peer review of the pilot survey instrument**

Professor Iain Fraser, Professor of Agri-Environmental Economics at University of Kent, advised on the development of the pilot survey instrument. Involving him in these early stages enabled the final survey instrument to meet expected standards.

Professor Fraser reviewed the VoLL2 Methodology Statement and provided commentary on the main CE using best-worst scaling (BWS), and on the CV task.

### **1.3 Key findings**

As a result of the pilot, the following refinements were made to the survey instrument to increase its effectiveness and enhance the associated research methodology:

- Elements of the CE were simplified
- The layout and formatting were improved
- The CV scale was adjusted for domestic and SME
- Removed socialisation of costs questions relating to different charging structures due to lack of respondent understanding

- Added willingness-to-pay questions with a benchmark to understand variability of support for reinforcement for particular groups i.e. electric vehicle (EV) or solar panel (PV), those in fuel poverty, and vulnerable customers.

#### 1.4 Lessons learned

Two lessons were learned for future customer engagement research of its nature:

- Socialisation of costs is a complex topic for customers to comprehend in this format
- Simpler CEs are beneficial for respondent comprehension and also for data quality and clarity of analysis.

#### 1.5 Next steps

The quantitative survey, which represents a significant proportion of the customer engagement activity associated with the VoLL2 project, will commence with a winter season survey during January and February 2020.

A total of 2,000 surveys will be conducted with domestic and SME customers, half from within Electricity North West's operating region and the remainder from elsewhere across GB.

## 2 INTRODUCTION

This report disseminates the results and learning associated with a pilot of the quantitative survey instrument, prior to the rollout across a GB wide survey population. This approach is a direct learning from previous customer engagement and ensures that the final survey instrument and supporting materials are correctly understood by research participants and hence will allow accurate and relevant data to be obtained to meet the project's research objectives.

The quantitative research findings and lessons learned are documented below.

Details of the methodology used to administer the pilot survey are set out in the VoLL2 Methodology Statement, which can be found on the [project webpage](#), with other related documents. This comprehensively explains the background of the VoLL2 project and the analysis protocols utilised.

The original VoLL project (ENWL010, hereafter referred to as VoLL1) sought to address the following research questions:

1. What is the impact on customers of lost load?
2. What is the value of this impact, expressed as the financial and social cost to customers in £ per KW?
3. How does this vary by customer type and supply interruption components eg duration?
4. How can Electricity North West and key stakeholders mitigate the costs of lost load to customers?
5. How will this vary with LCT adoption?

The findings of this research demonstrated that VoLL was notably higher than observed by the last major study in this area, conducted by London Economics in 2013. This increase was attributed to greater dependency on electricity and changing customer needs. VoLL1 also noted that VoLL varied by customer segment, eg it was above-average for fuel poor and vulnerable customers, in addition to early adopters of LCTs. A simple VoLL calculation tool was developed under VoLL1 to demonstrate how DNOs can utilise the established values, to calculate a bespoke VoLL for the customers served by a particular network asset, based on

their characteristics to support smarter investment decisions that are more reflective of divergent customer needs.

The original study recognised that additional research was required to further develop the segmentation model and better understand other variables, such as the multiplier effect. VoLL2 will therefore assess the impact of large-scale supply interruptions affecting a significant number of people compared with smaller scale events affecting a more localised area. VoLL 2 involves further development of the calculation tool into a functional prototype segmentation model. This work is outside the scope of the customer research and being conducted by another project partner. However, the customer objectives will support the development of the model and further facilitate Electricity North West and other DNOs in making investment decisions based on the relative values of preventing an event versus managing the consequences.

Phase B of the VoLL2 project seeks to address the following research questions:

1. How does VoLL vary by the volume of customers affected and by duration of supply interruption?
2. How can the VoLL multiplier be integrated with the VoLL calculation tool to guide DNOs in making investment decisions?
3. What importance do customers place on supporting different customer segments in an interruption?

Customer sentiment towards the socialisation of costs will also be explored in VoLL2 to understand the value they place on reliability, supporting fuel poor customers, supporting customers in vulnerable circumstances, and preparing the network for greater adoption of LCTs.

### 3 DIFFERENCES IN THE VOLL1 TO VOLL2 SURVEY INSTRUMENT

Although a proportion of the questions and educational content from the VoLL1 customer survey instrument were carried over to VoLL2, new questions specific to the objectives of VoLL2 were added. Other questions which were not relevant to this study were removed to prevent respondents becoming fatigued and overloaded. Additionally, some refinements were made based on feedback from the main VoLL2 customer survey. These changes were:

- In the **screening section** of the survey instrument, questions designed to establish the **type of electricity meters** that respondents have (eg. smart or pre-payment for domestic customers, 'single-phase' or 'maximum demand current transformer' metered supply for SME customers) were removed as respondents fed back that these could be difficult to answer and were not a key analysis variable during VoLL1.
- In the section on respondents' **experiences of supply interruptions**, a new question was added in VoLL2 for respondents who had experienced an interruption in the last three years. They were asked whether they had experienced three or more unplanned interruptions per year to identify **worst served customers** (for more information, see Section 6.2).
- The **LCT adoption** section was largely identical across both pieces of research but the questions referencing EV use were slightly altered to move the focus away from respondents' expectations of having an EV and journey planning, to place greater emphasis on their primary charging location.
- The **CE** design for VoLL2, informed by ECP feedback, was redesigned in response to the pilot, to be easier to comprehend and complete. The options were rearranged to be read horizontally from left to right, rather than vertically from top to bottom, as presented in the pilot. Although a vertical layout is typical for CE studies, it is usually associated with the process of comparing new options against a 'current' option to which respondents



generally default. As there was no ‘current’ option for the large-scale interruption scenarios, it was considered that the proposed format, which is common in another type of exercise, would avoid any left-right ‘status quo’ bias and fit more intuitively with the idea of ordering the scenarios by best to worst.

- The **variables and levels** in the CE were also changed. The VoLL1 CE focused on the type (planned/unplanned), duration, length, and frequency of supply interruptions, in addition to advance warnings, compensation, and the customer service received during an interruption. The VoLL2 CE was specifically focused on the multiplier effect therefore, all attributes other than **duration and frequency**, were removed and replaced with the **scale** of the incident.
- The **WTP and WTA tasks** were removed and replaced with a new **CV activity** (see Section 6.3 for more details on CV).
- Learning from VoLL1 indicated that the large number of informational **show cards** presented to participants led to some of them struggling with respondent fatigue. The number of show cards was therefore reduced in VoLL2 and this method was only used to illustrate key points.
- The **method of administration** was altered between the two projects. In VoLL1, the pilot survey was administered face-to-face and via telephone. However, there were limitations with this approach as some participants found the survey too confusing and complex to complete this way. The VoLL2 pilot survey was therefore administered entirely face-to-face, mindful that when rolled out, the survey would be conducted primarily online.

## 4 PEER REVIEW OF THE PILOT SURVEY INSTRUMENT

Professor Iain Fraser, Professor of Agri-Environmental Economics at University of Kent, advised on the development of the survey instrument. Involving him in these early stages enabled the final survey instrument to meet expected standards.

Professor Fraser reviewed the VoLL2 Methodology Statement and provided commentary on the main CE using best-worst scaling (BWS), and on the CV task. This is shown in the tables below along with our responses which include amendments made to some aspects of the research design and the pilot survey instrument.

*Figure 4.1: Choice experiment commentary and responses*

Professor Fraser’s commentary		Our response
BWS design	The proposed BWS ‘type 3’ is a standard choice experiment that gets to rank or rate best and/or worst. It is less common than standard choice experiments but, as you explain, it does reveal more information. When not concerned with directly measuring willingness to pay (WTP) or willingness to accept (WTA) £ values, it is a useful approach to take.	As the study is designed to measure the multiplier effect of large scale supply interruptions and not elicit monetary VoLL, the BWS approach is justified. It has the potential to allow more precise measurement of the extremes.

Professor Fraser's commentary		Our response
Interactions (eg the combined effect of the duration of supply interruptions and their frequency)	<p><u>Two-way and three-way interactions</u> Main effects designs will frequently result in at least 80% explanatory power.</p> <p>Two-way interactions are easy to explain but I question whether the increase in design complexity required for three-way interactions is warranted.</p> <p>Assuming large sample size and sufficient blocks then two-way interactions can be easily accommodated.</p>	<p>The design contains 1,440 scenarios arranged in 120 blocks. Each respondent sees one block of 12 scenarios, each containing three options. The design was created to require a trade-off decision in every scenario (ie no one option is obviously better or worse than the others in any one scenario).</p> <p>The scenarios in each block were arranged to minimise correlation between attributes when measuring main effects. Correlations for two-way interactions were minimised across the whole design.</p>
	<p>Given the task in hand you might go with four options, although three keeps the cognitive demand down.</p>	<p>After internal discussion, it was decided to keep the number of options at three. Four options would increase the information that needed to be processed by each respondent without greatly improving the statistical properties of the design.</p>
	<p>12-16 choice cards seems OK but you might think about including a couple of repeat cards to check for choice consistency.</p>	<p>The aim was to create as simple an exercise as possible. 12 scenarios were therefore used with no repetitions.</p>
Clarity of content / layout	<p>In terms of the text within the survey instrument, why do you include the phrase "you and your community"...the choice task will in this case conflate attitudes/preferences of the individual with those of society so this will "clutter" the interpretation. If you want to ask about the community I would advise you do this separately.</p>	<p>On this advice the test was changed to read: "Which of these situations (A, B or C) would be MOST disruptive for you and which would be LEAST disruptive?" This enabled the response to be related to the impact on the individual.</p>
	<p>In terms of the choice task, everything is set up left to right whereas the standard template would be vertical. What is the reason for this approach here?</p>	<p>The vertical layout that is typical for choice experiment studies is usually associated with the process of comparing new options against a 'current' option, to which respondents generally default. As a suitable 'current' scenario did not apply to the large outage scenarios, it was considered that the proposed format, which is commonly used in other, similar approaches, would avoid any left-right 'status quo' bias and fit more intuitively with the idea of ordering the scenarios by best versus worst.</p>
	<p>In the choice task there is reference to "your whole town" but then the attribute level is the whole region. What if a</p>	<p>The text was modified to refer to "town/village" and the region related to their specific supplier region (eg 'the Electricity North West region'). More</p>

Professor Fraser's commentary	Our response
<p>respondent doesn't live in a town: how will they frame or contextualise the meaning of whole region? Does it mean county or village or something else...and if they live in the countryside how do you think they will define "immediate neighbourhood"?</p>	<p>appropriate visual material was also introduced, to be shown prior to the exercise.</p>

*Figure 4.2: Contingent valuation task commentary and response*

Commentary	Response
<p>The section "Socialisation of Costs" is essentially presenting several dichotomous choice double bounded contingent valuation type questions, but why use a five-point Likert scale? Why not keep it simple as Yes/No/Indifferent?</p>	<p>Although the responses will be treated as dichotomous choices in the analysis, it was considered that a more sensitive scale could be useful as a way of better gauging customers' sensitivity.</p>

Once the research has been completed, Professor Fraser will conduct a peer review of the final analysis of this study which will be published, as part of the main findings report, on the VoLL2 webpage. This critique will assess the robustness of the VoLL2 customer findings.

## 5 ANALYSIS AND RESULTS

The peer reviewed survey instrument was then quantitatively tested with 91 customers. This section of the report details the relevant analysis and results of 91 surveys administered during the quantitative pilot pilot. This sample size was much smaller than that utilised for the corresponding pilot in VoLL1. Consequently, the results gathered do not provide robust answers to the research questions, and are only analysed with relation to how the survey instrument (specifically those aspects of it which are different from the VoLL1 survey) should be refined.

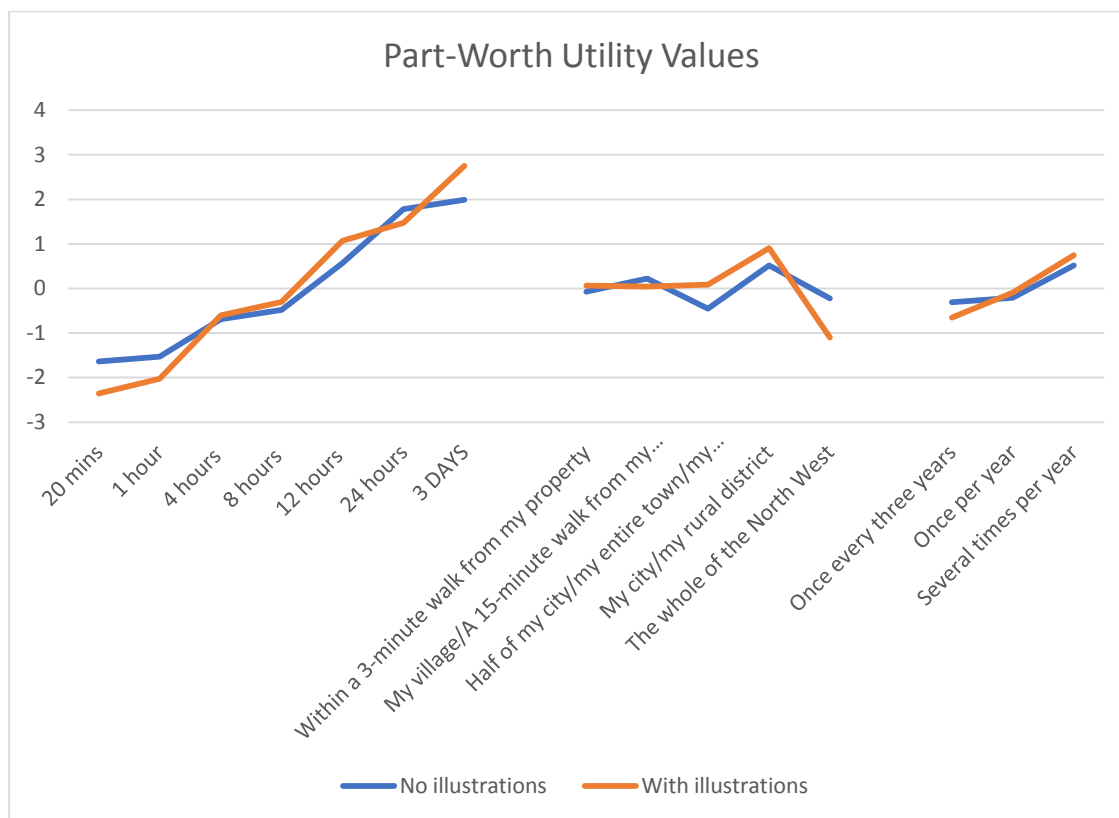
The following attributes and levels were tested in the CE:

*Figure 5.1: CE attributes and levels*

Attribute	Levels						
Length of power cut	20 mins	1 hour	4 hours	8 hours	12 hours	24 hours	3 days
Scale of power cut	Within a 3-minute walk from my property	My village/ a 15-minute walk from my property	Half of my city/my entire town/my village and surrounding areas	My city/my rural district	The whole of the North West		
Frequency of power cut	Once every three years	Once per year	Several times per year				

The figure below illustrates the utility values estimated from the CE BWS responses to which a multinomial logit (MNL) model was fitted using the Sawtooth Software package. Each attribute level is represented by a part-worth utility value, using the standard Sawtooth convention where the sum of levels within each attribute equals zero.

Figure 5.2: CE part-worth utility values



The main observations from these results were:

- ‘Length of power cut’:** The values for a 20 minute supply interruption and a one hour interruption, and for a four hour interruption and an eight hour interruption are very similar. Given that the main focus of the research is on the longer durations, this result suggested that the 20 minutes level could be removed and the four hours and eight hours levels replaced with a single six hours level.
- ‘Scale of power cut’:** There was little difference in values observed when illustrations of scale levels were included and when they were not. This suggested that pictures may be helpful when introducing the exercise but play little role in the actual choices. This allayed a concern that attaching pictures to one attribute (scale of power cut) and not to others (length and frequency of power cut) could introduce bias towards the former. It also made a case for removing the illustrations altogether.
- Feedback from the respondents suggested that they found the complex middle level of **‘scale of power cut’** (‘Half of my city/my entire town/my village and surrounding areas’) potentially confusing. The modelling results suggested that it did not attract a different value from the second level so it was removed.

A number of CV questions were included in the survey instrument to measure customers’ WTP for prioritising restoration of power to different groups. This method essentially invites customers to express their willingness to pay for investment in specific areas of the network to support specific customer groups.

Additional questions were also developed, in which customers were invited to prioritise investment in greater reliability of supply for different customer groups and to express views on fair charging. Customers were provided with information on the charging mechanism adopted by the energy market to ensure that they could make informed decisions.

It was identified during the qualitative phase (Stage 2) of this project that customers find this topic complex and difficult to comprehend. As such, explanatory text was included in the pilot survey instrument to provide contextual information. This included, for example, information on charging

mechanisms applied in the water and insurance sector as a point of comparison to charging mechanism applied by the electricity industry.

The monetary levels in the willingness to pay exercise were associated with customers' average annual bill to make it more relevant to them. Respondents appeared to comprehend the task which required them to indicate whether or not they would be willing to pay more on their bill for different groups to be prioritised.

The results for the different groups that were offered are shown below.

*Figure 5.3: Customers' willingness to pay for prioritisation of power restoration to different groups*

Restoring power after a power cut...	Mean WTP	
	Domestic	SME
Prioritise restoring power to you	£10.06	£148.53
Prioritise vulnerable customers	£9.54	£146.63
Prioritise those in fuel poverty	£8.85	£134.71
Prioritise those with electric vehicles/ photovoltaic panels	£6.35	£117.78

## 6 KEY FINDINGS

The pilot survey, conducted in line with the VoLL methodology, constituted a critical part of the review and endorsement of the proposed instrument. The pilot was extremely valuable in providing clear and objective feedback, which will guide refinements to the instrument, optimising data capture and results.

The key findings of this piece of customer engagement are presented below through a number of insights and associated actions taken as a result of the engagement.

### 6.1 Simplification of the CE

#### *Insight*

There was a concern that seven levels for 'length of power cut' would be excessive. One objective of the pilot survey, therefore, was to identify whether there were points of inflection in the utility that respondents placed on each level and which would mean that any levels that appeared to be close to linear between these inflection points could be removed.

Analysis of the duration and scale attributes demonstrated that the number of levels appraised could be reduced without significant implications for the granularity of the data, provided the main inflections or thresholds were covered. This is because the impact of interruptions does not change linearly with time as a result of adaptations or other changes. For example, food in a refrigerator would start to spoil if an interruption lasted longer than five to six hours, but if it extended over several days, the customer is likely to adapt and purchase food supplies not in need of refrigeration.

#### *Actions*

Typically, it is preferable that the number of variables in a model is minimised, provided that additional variables do not improve the performance of the model. The survey instrument was therefore amended so that:

- The number of levels tested for 'length of power cut' was reduced from seven to five
- The number of levels for 'scale of power cut' was reduced from five to four.

The table below shows the revised attribute levels following analysis of the pilot results.

Figure 6.1: Updated attributes and levels

Attribute		Levels			
Length of power cut	Up to 1 hour	6 hours	12 hours	24 hours	3 days
Scale of power cut	Just my property	My street or several local streets	My town/ village and surrounding areas	The whole of [QHIDREGION]	
Frequency of power cut	Once every three years	Once per year	Several times per year		

## 6.2 Worst served definition

### Insight

Identifying the VoLL for customers who are classified as worst served by their DNO was a crucial element in VoLL1 which sought to establish how VoLL varied by customer group. Worst served customers were identified by postcode information provided by the respondent which was cross referenced with Electricity North West's worst served database to establish whether they were connected to a feeder which met Ofgem's RIIO-ED1 definition of a worst served customer: *someone who 'experiences 12 or more higher voltage unplanned interruptions over a three-year period, with a minimum of three higher voltage unplanned interruptions in each year'*.

In a number of cases respondents refused to provide this information. Furthermore, respondents outside of Electricity North West's region could not be classified this way and the definition of worst served for other DNOs was subjective based on the information supplied.

Hence, in VoLL1, we carried out additional surveys to strengthen the findings for worse served customers, targeting a further 100 'worse served' respondents from within the Electricity North West region, based on postcodes, where available fault data enabled us to objectively classify these customers as meeting the Ofgem worst served definition. Since the VoLL1 survey was administered, General Data Protection Regulation (GDPR) has been enacted (in May 2018), placing more stringent regulation on the collection and handling of personal information. For this survey, this meant that the data processor would have to gain explicit consent from the participant to collect this data and for it to be passed on the data controller.

### Action

In light of the recent GDPR regulation, Impact decided against collecting postcode or MPAN data in this survey because the project timescales might not have allowed the time required for the legal approval to be obtained from appropriate personnel. Furthermore, it was considered that a greater proportion of respondents might refuse to provide this information due to awareness of GDPR regulations.

It was also recognised that respondents would be extremely unlikely to comprehend the difference between high voltage and low voltage interruptions or have an insight into the type of faults, resulting in outages that have affected their homes or businesses. As such,

respondents 'self-classified' themselves as worst served by answering a number of questions based on the Ofgem RIIO-ED1 definition.

Customers could opt-in to state whether they had experienced 12 or more outages in the last three years (in comparison to 7 to 14 outages in VoLL1) and those who responded that they had experienced 12 or more interruptions in the last three years were then asked a follow up question to confirm whether they had experienced at least three outages every year over the three year period.

Where respondents specify they have experienced the relevant number of any type of interruption meeting the specified time periods, they will be considered to qualify, subjectively, as a worst served customer for the purpose of this research.

As the accuracy of this approach in identifying worst served customers is unknown, the data will need to be diligently reviewed in the analysis stage.

### **6.3 Willingness to pay (CV questions)**

#### *Insight*

Feedback from the pilot study demonstrated that some aspects of wording and layout would enhance task clarity for respondents.

#### *Action*

The following minor modifications were made:

- The incremental value is shown in blue to differentiate it from the surrounding text
- 'Your bill is' placed on a separate line from the values
- For SME customers, a value representing a percentage of the bill value they supplied in an earlier question is specified in to the CV question; the percentages being different for domestic versus SME
- Lowest level on scale changed to 50p/0.5% rather than zero to differentiate customers who would be pay a nominal amount vs not willing to pay at all
- Midpoint of SME bill is rounded to nearest £100.

### **6.4 Removal of charging structure questions – socialisation of costs**

#### *Insight*

One of the new research objectives in VoLL2 was to better understand how customers consider the costs of network improvements and maintenance should be fairly recovered.

This socialisation of costs is a complex area. Ideally, research into customer sentiment would begin with detailed education about the various options available and their pros and cons so that respondents can make an informed assessment of the fairness of each one. The pilot survey instrument briefly explained each scenario and provided examples of each recovery mechanism, but it was only possible to include a very limited amount of education material, particularly as this topic was not the main focus of the survey.

Despite having deliberately limited the educational information framing these question, feedback provided to interviewers during the pilot demonstrated that the descriptions were too long and too numerous for respondents to absorb in sufficient detail to make informed decisions about the fairness of the different options. Analysis of responses raised concerns about the validity of some responses to these questions, suggesting respondents may have been confused.



## *Action*

This section was reduced to two basic tasks:

- A simple ranking of which customer groups (such as worst served, vulnerable or LCT users) should take priority for investment
- Clear, one sentence summaries of different factors that DNOs should prioritise, relative to cost socialisation of cost were presented. Respondents were asked to rank the importance of each one.

This considerably reduced the time required to complete this section and the amount of information respondents were expected to read or remember before answering the questions. The data will not be as detailed as it might have been had there been an opportunity to provide more in-depth education materials, but it is expected that the data quality associated with the simplified approach will be more meaningful, compared with the pilot results.

## **6.5 Region-specific questions**

### *Insight*

During VoLL1, postcode data was used to identify the DNO region to which each respondent belonged. This information was then referenced throughout the survey instrument in questions relating specifically to the respondent's DNO. However, as referenced in Section 6.2, postcode information could no longer be collected due to GDPR constraints so show card images would have to be utilised to enable respondents to self-identify their DNO.

### *Action*

Two different show cards were tested during the pilot to ascertain which image enabled participants to answer most accurately. The pilot interviews were conducted in two separate locations; with an additional showcard used in the second location. The card which enabled respondents to identify their DNO most successfully classify was selected by measuring the proportion of 'don't know' responses at each location. The successful image broke each DNO region down into area. This allowed respondents to identify their DNO and the specific distribution area where they lived or worked (SME customers).

By identifying the respondent's DNO/distribution region, this information could be included in questions relating to their locality, making them more targeted and relevant to the individual. For example, the scale of interruption variable in the CE names the respondent's whole region when shown that specific level.

## **6.6 Clarity over the survey length**

### *Insight*

A substantial amount of briefing material was embedded into the survey to provide respondents with an appropriate level of education, and to assist in participation of respondents not living in the Electricity North West region. This information included, but was not limited to:

- Background information about why supply interruptions occur
- Explanatory information about the importance of the market research being conducted and how it may be utilised in the future.

Following multiple pre-launch tests, it was anticipated that the pilot survey would take approximately 25 minutes for a participant to complete if they read all of the questions and educational material thoroughly and considered their responses diligently.

During the pilot itself, the median duration to complete the survey was 19 minutes and the first quartile of responses was 14 minutes.

### *Actions*

Initially, the analysis data file was sorted from quickest to slowest response time and the first quartile of responses was discounted because of concerns that these participants may not have paid sufficient attention to reading and understanding the full suite of survey materials. Analysis was subsequently conducted to compare the discounted responses with those which were retained (having been completed by customers who took longer to respond to the exercise).

It was concluded that retaining the first quartile of the data set would not adversely affect the reliability of the VoLL model. The implication of this finding is that participants were able to complete the survey accurately without reading or by skim-reading a significant proportion of the embedded educational material.

To ensure that pertinent information is accessible to respondents but does not overwhelm them, selected reading material and visual stimuli will be embedded in the final survey instrument as hyperlinked pop-up windows. This means that all information that a respondent might require is available, but it is presented as an optional rather than an implied mandatory reading requirement. This modification will have the further benefits of reducing the length of the survey and improving its aesthetic.

## **6.7 Refinement of the survey administration approach**

### *Insight*

The pilot customer survey was conducted face-to-face with the assistance of a professional interviewer in a 'hall test' format.

The hall tests took place in two different locations (Manchester city centre and Lancaster) to ensure that responses were obtained from both urban and rural areas. Lancaster is also an area that has, in recent years, experienced severe weather conditions, that caused significant damage to the electricity distribution network, resulting in large scale, long duration unplanned supply interruptions. The pilot comprised 48 interviews in Manchester and 43 were conducted in Lancaster. Previous experience in piloting comparable research has demonstrated that conducting a hall test was the most efficient way to conduct a significant number of interviews in a short space of time.

### *Action*

The approach used enabled the interviewer to feedback on how stimulus materials could be refined for face-to-face interviews in the main study. It also allowed survey administration to be tested, specifically, how an offline link (not dynamic in the moment and data uploaded after administration) functioned in comparison to an online link (allows for dynamic quota monitoring and immediate upload of data), so that digitally disengaged customers would not be excluded from the study.

## **7 LESSONS LEARNED FOR FUTURE INNOVATION PROJECTS**

This section of the report disseminates the learning outcomes from this piece of customer research with a previously unengaged survey population. 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.

*Socialisation of costs is a complex topic for customers to comprehend in this format*

This pilot demonstrated that a compromise must be reached between the type and quality of data required and the depth of engagement possible within a small section of a quantitative survey. In this case, the data quality is likely to be optimal using shorter descriptions and education materials to produce high-level prioritisation only. Providing more detailed education in this format with the aim of informing more granular prioritisation was apparently counter-productive as respondents became confused.

Should further detail be required on this topic, in depth qualitative engagement should be undertaken, focused only on the socialisation of costs. In this format education materials can be discussed at length, questions asked and interviewers can easily identify where customers are confused or do not comprehend the materials.

*Simpler CEs are beneficial for respondent comprehension and also for data quality and clarity of analysis*

The pilot highlighted areas in the CE where levels could be consolidated, or wording clarified. These changes meant less information for the respondent to process and trade off. In addition, in the case of clearer descriptions of region, the new descriptions were less informative but had enhanced differentiation which leaves less room for misinterpretation during administration and analysis.

## **8 CONCLUSIONS**

This report sets out the key findings from a pilot phase of strategic quantitative market research and its subsequent analysis. This research successfully met the objective of thoroughly testing the survey instrument and new questions introduced to extend the learning attained from the original VoLL1 study. Overall, these were proven to be robust, but some areas of concern were identified which led to refinements being made prior to launching the full customer survey.

The results of the pilot were consistent with VoLL1 in showing that customer VoLL varies according to the duration and scale of the interruption, even at much longer durations and greater scales than those tested during the previous study. Furthermore, the refinements made as a result of the pilot will be critical to improved data quality and reliability of results. These results provide confidence that the subsequent quantitative stage will now be robust and provide accurate and credible results on a complex subject matter with multiple objectives.

## **9 NEXT STEPS**

### **9.1 Measuring the VoLL multiplier**

The next stage of VoLL customer engagement will be conducted during the third phase of the project and will involve a large-scale quantitative survey. This will take place in January-February 2020.

A total of 2,000 interviews will be completed by customers from across GB (1,500 domestic customers and 500 SME representatives) and will be administered via a mixed approach of online, face-to-face, and telephone.

The subsequent analysis and results will be discussed with Electricity North West and their stakeholders at a dedicated workshop to review and challenge the results. These findings are expected to influence further development of the VoLL decision making tool. Stakeholders will be consulted on how this data should be used to inform improved decisions, particularly

between investments to avoid supply interruption based on condition based risk of asset failure versus impact mitigation measures if a disruption occurs.

## **9.2 Dissemination of findings**

In line with the vision of the NIA funding mechanism and the project commitments documented in the VoLL2 Methodology Statement, all outputs and learning acquired from VoLL2 customer engagement activities will be made available to other DNOs. Specifically, all communication and survey materials developed as part of this project will be publicised on the [VoLL2 webpage](#).