



Department for  
Business, Energy  
& Industrial Strategy

# ELECTRICITY DEMAND REDUCTION PILOT

Appendices



February 2017

# Contents

Annex 1: HLQs and EQs _____	2
Annex 2: Full methodology _____	5
Realist Evaluation _____	5
Weighting _____	8
Limitations _____	8
Collating the data: analysis framework grids and amalgamated dataset _____	9
General analysis _____	9
QCA _____	9
Process tracing _____	12
kW impacts _____	18
Annex 3: References _____	20

## Annex 1: HLQs and EQs

This annex concludes the findings above by providing summary responses to each of the HLQs and EQs for the evaluation. These responses are based upon previous fieldwork (evaluation stages 1 through 5b) and the evaluation team will be able to enhance the analysis in subsequent phases with additional field work. **Red text represents HLQ / EQ areas expected to be more fully addressed in subsequent stages of the evaluation.**

High Level / Evaluation Question		Evaluation Approach
HLQ1: What outcomes can be attributed to the EDR Pilot scheme and were they as intended?		Addressed across the 'Scheme Impact' and 'Scheme Contribution' chapters of the main report.
1.1	To which organisations did the scheme appeal and which are able to participate and progress in the scheme? Did the EDR Pilot scheme have wide appeal/participation as intended?	Addressed in the 'Participation' chapter of the main report.
1.2	What were the capacity savings and annual electricity demand reductions and were these reliable <sup>[1]</sup> and additional <sup>[2]</sup> ?	Mainly addressed in the 'Scheme Impact' chapter of the main report.
1.3	What kinds of projects/technologies were implemented through the scheme-related investments and were these additional?	Mainly addressed in the 'Technology Selection' sub-section of the 'Process Evaluation' chapter of the main report.
1.4	What outcomes were the results of market activity from aggregators?	Addressed across the 'Scheme Impact' and 'Scheme Contribution' chapters of the main report.
1.5	What, if any, were the wider outcomes of the scheme?	Addressed in the 'Wider Benefits' sub-section of the 'Scheme Impact' chapter of the main report.
1.6	How can we demonstrate that the above changes are causally linked to the scheme and that it made a difference?	Addressed in the 'Scheme Contribution' chapter of the main report.
1.7	Were there other potential explanations of these outcomes?	
1.8	What was the impact of any outcomes that BEIS had not intended?	<b>This EQ is likely to be more effectively answered after CBA analysis of organisational time spent on the scheme – and any detrimental effects of that – based on final reports and planned in subsequent phases.</b>
HLQ2: Through what levers and mechanisms has the scheme contributed to these outcomes? For whom and under what circumstances?		Addressed in the 'Scheme Contribution' chapter of the main report.
2.1	Through what means did the scheme influence which organisations participated, did not participate or dropped-out?	The answers to this HLQ and EQs will be further developed following the wider population survey conducted at a later stage of the evaluation.
2.2	Through what means did the scheme influence the outcomes identified (i.e. capacity savings, annual electricity demand reduction, new technologies, behavioural changes, etc.)?	
2.3	What characteristics of participating organisations – e.g., management capacities, decision making arrangements/governance,	

## Annex 1: HLQs and EQs

	sectors, equipment, socio-technical organisation, energy efficiency maturity, etc. – were necessary for the scheme to influence participation and outcomes?	
2.4	What broader contextual factors – e.g., markets, activities, location, premises, technologies, etc. – were necessary for the scheme to influence participation and outcomes?	
2.5	Did other policies including other BEIS policies and building regulations reinforce, undermine or in any other way affect the scheme's effectiveness and how?	Addressed across the 'Scheme Contribution' and 'Process Evaluation' chapters of the main report.
HLQ3: Was the EDR Pilot scheme cost-effective? EQs 3.1 to 3.5.		This HLQ and EQs will be answered in subsequent phases of the evaluation.
HLQ4: Which aspects of the scheme's design and implementation account for the findings of HLQ2 and HLQ3?		This HLQ cannot be answered in this phase as it is reliant upon HLQ3 and will be answered at a later stage of the evaluation.
4.1	Did the scheme rules (e.g. eligibility, bid size, payments and penalties) attract and retain the participants able to deliver required savings and exclude those that couldn't?	Addressed across the 'Participation' and 'Process Evaluation' chapters of the main report.
4.2	Were the M&V methods tested appropriate and effective at estimating and verifying savings?	This EQ cannot be answered in this phase as it is reliant upon the provision of the Deemed Metering Report data from BEIS.
4.3	How did the type of auction influence participation and price?	Addressed across the 'Participation' and 'Process Evaluation' chapters of the main report.
4.4	How did EDR design influence the range of technologies coming forward?	Addressed across the 'Participation' and 'Process Evaluation' chapters of the main report.
4.5	Which aspects of EDR design encouraged the implementation of measures/projects and secured reliable savings and electricity demand reduction at least cost?	This EQ cannot be answered in this phase as it is reliant upon HLQ3, in turn reliant upon the provision of CBA data from BEIS sources.
4.6	How did scheme design and implementation differentially affect different organisations and why?	Addressed across the 'Participation' and 'Process Evaluation' chapters of the main report.
HLQ5: What can we conclude about the viability of EDR in the CM and what lessons can we draw about any future electricity demand reduction scheme?		This HLQ is set to be answered following further evaluation work across 2016-17.
5.1	Is EDR as currently conceived viable in the CM, either immediately or eventually? Assessment of viability will be on the basis of: Whether the scheme can work at scale (volume of savings not number of participants) Predicted savings from the scheme are additional and reliable The scheme represents value-for-money.	These EQs are set to be answered following further evaluation work across 2016-17.
5.2	Is EDR, with some changes to the existing scheme design, viable in the CM and what would those changes be?	
5.3	What can we learn about whether EDR would be viable in the CM in another form, such as being part of secondary trading or a separate auction?	
5.4	What can we learn from the EDR Pilot scheme and supplementary analysis about the potential size of the market for electricity	

## Annex 1: HLQs and EQs

---

	demand reduction schemes and how it is characterised?	
5.5	What would encourage a broader range and greater number of organisations participated in any future scheme?	Addressed across the 'Participation', 'Process Evaluation', and 'Lessons Learned' chapters of the main report.
5.6	What changes in design and implementation of any future scheme would be likely to result in greater and more reliable additional electricity savings at a lower cost to the public purse?	This EQ is likely to be more effectively answered after the data collection activity planned later in phase 5.
5.7	What can we learn about how a more effective and cost efficient electricity demand reduction scheme could be delivered in different ways?	This EQ is likely to be more effectively answered after the data collection activity planned later in phase 5.

## Annex 2: Full methodology

This annex provides an overview of the research design, building upon the description in the introduction to the report.

### Realist Evaluation

Most HLQs in this evaluation comprise assessment of the contribution of the scheme to peak demand reduction, both in terms of the extent to which it influenced (i.e. the volume of kW reduction that can be attributed) and the nature of that contribution (who did the scheme help and how).

Contribution analysis provides evidence and a line of reasoning from which we can draw a plausible conclusion as to where, how and why the scheme has (or has not) made an important contribution to outcomes. The TF provides a foundation for developing hypothetical scheme contribution stories, informed by realist evaluation<sup>1</sup> principles. These stories describe:

- The range of **intended and unintended outcomes** that organisations may reach in relation to the scheme;
- A set of **mechanisms** representing organisational / individual reasoning which may either fire (i.e. occur for that organisation / individual) or not, thus determining the specific outcome achieved;
- **Contexts** in which specific mechanisms are anticipated to fire or not.

Examples of contribution include:

- **Project(s) unlikely to have happened without EDR:** Either EDR may trigger reconsideration of pre-existing projects that were not economically viable / did not meet required payback requirements and tip the balance in favour of proceeding with the project, or organisations developed projects from scratch in response to EDR.
- **Project(s) would have progressed anyway, but EDR influences changes to it that enable greater peak demand reduction:** EDR may encourage organisations to increase the scale of a project, focus more upon peak demand, or include technology that has a greater impact.
- **Project(s) that would have happened anyway occur sooner, bringing forward reductions in peak demand:** organisations may reason the benefits of EDR justify focusing their resources on accelerating projects that have an impact on peak demand (or aspects of projects that have an impact on peak demand).

The way in which each of the CMOs relating to EDR stages (registration, application, bidding, implementation, and attribution) were tested, and the sample sizes involved, is summarised in the table below:

---

<sup>1</sup> As per Tilley & Pawson (1997)

CMO Hypothesis Stage	Techniques	Samples from which primary or secondary data is analysed <sup>2</sup>
Registration	<ul style="list-style-type: none"> <li>General analysis [<i>descriptives, frequencies, cross-tabulations etc.</i>]</li> <li>QCA</li> <li>Participatory analysis</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative survey responses from the wider population and those invited to participate but not registering: Phase I = 190, Phase II = 120.</li> <li>Qualitative interview responses from those invited to participate but not registering: Phase I = 9, Phase II = 10.</li> <li>Quantitative survey responses from those that registered but did not apply: Phase I = 28, Phase II = 70.</li> <li>Qualitative interview responses from those that registered but did not apply: Phase I = 43, Phase II = 15.</li> <li>Registration form content for qualitative interview respondents.</li> <li>Qualitative interview responses from those organisations that were either unsuccessful applicants or dropped out pre-auction: Phase I = 31, Phase II = 5.</li> <li>Application documentation content on the portal.</li> <li>Qualitative interview responses from those who participated or dropped out post-auction: Phase I = 11, Phase II = 18.</li> <li>Application and participation documentation content on the portal.</li> </ul>
Application		
Bidding		
Implement-ation		
Attribution	<ul style="list-style-type: none"> <li>General analysis</li> <li>QCA</li> <li>Participatory analysis</li> <li>Process tracing<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Qualitative interview responses from organisations that implemented projects that delivered peak demand reduction, whether inside or outside the scheme: Phase I participants = 11, Phase I other action takers = 19, Phase II participants<sup>4</sup> = 18</li> <li>Application and participation documentation content on the portal.</li> </ul>

All primary data collection was conducted via telephone interviews, whether quantitative survey or in depth qualitative discussion.

A key caveat regarding the CMOs (for implementation in particular) is that even if proven, these are only true for the participants, a small sample in comparison to the wider ‘in-principle eligible’ population. This means that whilst the CMO analysis generated inferences as to how the wider eligible population may respond to future schemes like EDR, due to the small sample these CMO combinations are not necessarily representative ‘truths’ applicable to this wider population.

The table below provides a summary of when each element of the evaluation has been / will be conducted:

<sup>2</sup> Quantitative and qualitative data will contribute to the general analysis, whilst qualitative and portal data will contribute to the Process Tracing, QCA and overall assessment of the CMOs.

<sup>3</sup> The current proposed Process Tracing hypotheses to test focus around

<sup>4</sup> Phase II non-participants will only be interviewed in 2017, meaning the precise size of this sample is not yet known, and they will not inform the findings in the stage 5 October output.

Duration	Activity and outputs
October 2014 – December 2014	<ul style="list-style-type: none"> <li>• Review of BEIS data (applications, EOIs, etc.).</li> <li>• Phase I non-applicant research.</li> <li>• Phase I 'lessons learned' report.</li> </ul>
January 2015 – March 2015	<ul style="list-style-type: none"> <li>• Phase I non-applicant, rejected applicant and participant research.</li> <li>• Early findings reports.</li> </ul>
April 2015 – October 2015	<ul style="list-style-type: none"> <li>• Update theoretical framework.</li> <li>• Evaluation plan.</li> <li>• Interim evaluation report.</li> </ul>
November 2015 – March 2016	<ul style="list-style-type: none"> <li>• Phase I participant (post-installation) and external project research (various stages of implementation).</li> <li>• Phase II non-participant, reject applicant, non-applicant research.</li> <li>• Early findings report.</li> <li>• International comparisons research and report.</li> </ul>
April 2016 – Present	<ul style="list-style-type: none"> <li>• Phase I participant research (post WCSR and final questionnaire).</li> <li>• Phase II participant research (after signing a participant agreement but before installation).</li> <li>• EDR potential study.</li> <li>• Participatory analysis of stage 4 findings and emerging stage 5 findings.</li> <li>• Summary report of evaluation findings to date.</li> </ul>
Present – March 2017	<ul style="list-style-type: none"> <li>• Continuing phase I participant research (post WCSR and final questionnaire).</li> <li>• Phase II external project research (various stages of implementation).</li> <li>• Surveying of the wider population.</li> <li>• In depth interviewing of Aggregators.</li> <li>• In depth interviewing with the programme team.</li> </ul>
April 2017 – December 2017	<ul style="list-style-type: none"> <li>• Phase II participant and external project research.</li> <li>• Updating of summary report and EDR potential study</li> </ul>
January 2018 – December 2018	<ul style="list-style-type: none"> <li>• Phase II participant and external project research.</li> <li>• Update EDR potential study as needed.</li> <li>• Participatory research.</li> </ul>



	<ul style="list-style-type: none"><li>• Final report of all evaluation findings.</li></ul>
--	--

The evaluation to date has drawn upon secondary data (BEIS portal forms) and primary interview data from all previous stages of the evaluation as well as data gathered in stage 5. This excludes post-project implementation interviews with phase II organisations working both within and without the scheme, though there was extensive detail in the BEIS portal to draw upon. The portal is a repository of application forms and supplementary data submitted with those, documents containing BEIS team case notes that include updates and clarifications from organisations, and post-project winter capacity savings reports and final reports (where available). This data provided substantial profile information feeding into the coding of contexts and conditions (see below) as well as providing additional evidence for process tracing.

### Weighting

None of the data were weighted. The reasons for this differ by respondent group:

- For participants, a census of the whole population has been conducted for both phases, meaning that weighting is unnecessary.
- For other groups, there is either no data that we have sought to report in a quantitative way and not as a cumulative population whereby we would need to account for the weight of the different non-participant groups. Within groups, there is no basis upon which we would weight as for those not interviewed – especially for those not registering – the level of information held on the organisation is minimal.

### Limitations

The following are the limitations of the evaluation; either inherent or newly encountered throughout implementation of the approach:

- Whilst efforts have been made to obtain data from a variety of sources and triangulate responses (e.g. process tracing), a substantial proportion of the information collected on each organisation is from one lead contact (and self-reported). Where we have sought opinions on questions such as motivations for take up and attribution, this is generally based upon one organisation representative's view.
- Non-response bias is a potential limitation for the larger non-participant groups (those that did not register and those that did not apply), though we sought to minimise this through multiple approaches to the same organisations in the database (rather than only speaking to the first organisations that would answer). For participants, a census was conducted and therefore non-response bias has not been a concern, though some organisations have taken a substantial amount of time and effort to engage.

### Collating the data: analysis framework grids and amalgamated dataset

We established an analysis framework to undertake the majority of analysis described in this document. These grids were in an Excel document and required both interviewer and analyst input – one sheet per respondent organisation. In summary, these grids:

- Contained existing / secondary data pertaining to the organisation e.g. quantitative surveys and potentially IDIs from stages 2 and / or 4 of the evaluation, as well as BEIS EDR portal data. As noted above, data from application forms, case notes, and post-project reporting provided substantial profile information to feed into the coding of contexts and conditions as well as providing insights and additional evidence for process tracing. In addition, portal data was mined for application and claimed kW savings, cost savings, project cost, participation costs, financing costs, M&V information, and non-energy benefits as required.
- Included a code frame for certain in depth interview questions, to better enable analysis of the responses and assessment against the CMOs and QCA matrices.
- Enabled a drawing together of ‘case level’ data, synthesising it and testing of it e.g. through weekly downloads, and through further analysis of the whole data set.
- Included coding showing the presence of realist contexts, mechanisms and outcomes (the latter in terms of action, attribution and progression through the scheme, including unintended outcomes), and QCA conditions.

The completed grids were collated into one dataset for analysis.

### General analysis

The first step upon population of the analysis grids was to analyse the coded data and open ended data in the amalgamated dataset to generate frequencies and cross-tabulations and analyse the qualitative / open ended data to summarise open ended responses and draw out key themes. Overall this ‘general’ analysis fulfilled several important functions:

- Generated top line findings on key question areas; although the evaluation is primarily realist, there was a need to report top-line findings to provide context for the more detailed findings and help to answer some of the EQs through frequencies and crosstabs e.g. the number of organisations in each attribution band.
- Once contexts, mechanisms and outcomes were coded for each organisation, general analysis identified linkages between CMOs prior to QCA and process tracing further verifying these.
- Enabled the team to explore the data and identify any additional mechanisms, contexts, or QCA conditions prior to conducting QCA or assessing the CMOs.

### QCA

Qualitative Comparative Analysis (QCA) is a means of systematically considering the extent of association between different ‘conditions’ (e.g. aspects of an intervention and the

wider context) and an outcome of interest. QCA starts with the documentation of the different configurations of conditions associated with each case of an observed outcome (in this case coded in the interview and checked / revised during general analysis). These are then subject to a minimisation procedure that attempts to identify the simplest set of conditions<sup>5</sup> that can account for an observed outcome.

QCA as it is traditionally practiced is not fully aligned with the realist perspective, typically looking at contextual information of interest (which from a realist perspective are most likely to be ‘contexts’) vs outcomes observed. It also only comprises two layers as compared to three for realist CMOs. The focus of realist evaluation is to identify the underlying mechanisms of relevance, so, as such, analysis seeks to understand and demonstrate the relationship between contextual factors and mechanisms that fire or do not (lines of reasoning in those circumstances), and the relationship between mechanisms, and outcomes.

We applied QCA in its own right, including using it in ways not fully aligned with realist evaluation principles. That said, the outcomes of such analysis, especially when looking at the relationship between contexts and outcomes, provided supporting evidence / clues to the existence of pre-defined mechanisms or mechanisms that may not have been considered, and still tested some of the original TF assumptions.

Implementing QCA required a very structured approach to interviewing – with assumptions about likely important conditions - so that all of the same information was captured in each interview. The challenge of this in the EDR context was where interviews towards the end of data collection identified additional contextual factors and/or mechanisms. Each IDI write up / analysis grid contained a simple QCA grid where the interviewer selected an outcome and plotted conditions present. On completion of data collection, evaluation team staff collated these rows into one database whereby each row equated to an organisation. The team could then analyse these both within the respondent groups (i.e. to identify potentially different conditions that still correlate with similar outcomes) and more simply to observe differences between phase I participants (A1Ps) and others. The following is an example grid:

Organis ation / case	Outcome [specific stage of process]	Outcome [Participat ing or not]	Condition 1	Condition 2	Condition 3	Condition 4
1	X	X	1	1	1	1
2	Y	X	1	1	0	0

<sup>5</sup> Conditions in QCA are not the same as contexts in CMO configurations. For example, one could consider a mechanism to be a condition.

3	Z	Y	0	0	0	1
---	---	---	---	---	---	---

For outcomes, there were a number of different groupings to explore; we focused upon:

- A binary ‘participated’ vs ‘did not participate’ comparison.
- A binary ‘attributed’ vs ‘non-attributed’ comparison i.e. the scheme influenced the demand reduction or it did not.
- Comparison of more specific attribution groups i.e. those attributing quicker outcomes vs those attributing larger outcomes vs those attributing in full.
- Those that reliably delivered vs. those that did not.

An ‘outcome’ variable and a number of ‘condition’ variables were plugged into Stata software to more efficiently analyse correlations. These were as follows:

Outcomes	Conditions
A = full participation B = any attribution C = acceleration attribution	D = lighting only? E = org has a formalised and active commitment to tackling energy F = org had access to external expertise / support G = org has a dedicated energy resource H = org has previous experience of schemes like EDR I = org has previously delivered projects like the EDR funded one J = the EDR funded project was already at some stage prior to engaging with the scheme K = the project was multi-site L = the project was deemed only M = the project had a short payback N = senior representatives of the org invested a significant amount of working time in the process O = the org found the process easy to complete

## Process tracing

Process tracing is a case-based approach to causal inference that focuses on the use of clues within a case to adjudicate between alternative possible explanations. Process tracing can be used both to see if results are consistent with the program theory (theory of change) and to see if alternative explanations can be ruled out. Process tracing involves four types of causal tests on cases to assess the validity of explanations:

		SUFFICIENT FOR AFFIRMING CAUSAL INFERENCE	
		No	Yes
NECESSARY FOR AFFIRMING CAUSAL INFERENCE	No	<b>1. Straw-in-the-Wind</b> <b>a. Passing:</b> Affirms relevance of hypothesis, but does not confirm it. <b>b. Failing:</b> Hypothesis is not eliminated, but is slightly weakened. <b>c. Implications for rival hypotheses:</b> <b>Passing</b> <i>slightly</i> weakens them. <b>Failing</b> <i>slightly</i> strengthens them.	<b>3. Smoking-Gun</b> <b>a. Passing:</b> Confirms hypothesis. <b>b. Failing:</b> Hypothesis is not eliminated, but is somewhat weakened. <b>c. Implications for rival hypotheses:</b> <b>Passing</b> <i>substantially</i> weakens them. <b>Failing</b> <i>somewhat</i> strengthens them.
		<b>2. Hoop</b> <b>a. Passing:</b> Affirms relevance of hypothesis, but does not confirm it. <b>b. Failing:</b> Eliminates hypothesis.	<b>4. Doubly Decisive</b> <b>a. Passing:</b> Confirms hypothesis and eliminates others. <b>b. Failing:</b> Eliminates hypothesis.
		<b>c. Implications for rival hypotheses:</b> <b>Passing</b> <i>somewhat</i> weakens them. <b>Failing</b> <i>somewhat</i> strengthens them.	<b>c. Implications for rival hypotheses:</b> <b>Passing</b> <i>eliminates</i> them. <b>Failing</b> <i>substantially</i> strengthens.
	Yes		

Table from: Understanding Process Tracing: David Collier, University of California, Berkeley – Political Science and Politics 44, No. 4 (2011); 823-30.

The principal way in which we used PT was in relation to attribution, specifically testing the hypothesis that ‘EDR contributes to a reduction in peak demand’; the alternative explanation would be that these organisations would be taking the same action within the same timescales anyway.

The main clues the team attempted to asses to enable, on a case-by-case basis, conclusions as to whether this hypothesis or the alternative explanation were endorsed were as follows:

Evidence	Type of causal test	Probability of seeing evidence if hypothesis is true	Probability of seeing evidence if hypothesis is false / alternative is true	Rationale for probabilities

Evidence	Type of causal test	Probability of seeing evidence if hypothesis is true	Probability of seeing evidence if hypothesis is false / alternative is true	Rationale for probabilities
The organisation implements a project / action following the launch of EDR that reduces peak demand (whether within EDR or outside)	Hoop test	Very likely	Very Likely	If an organisation has not implemented a project then there is nothing to attribute. A number of organisations will be taking forward peak demand reduction projects anyway, or at least energy efficiency projects that happened to be delivering savings in the winter peak timing slot.
The peak demand reduction project was in place to some degree prior to the organisation becoming aware of the scheme	Straw in the wind	Inconclusive	Likely	Evidences wider market forces influencing organisations to act on this anyway; on the other hand, not all contributions of the scheme are intended to be binary anyway (e.g. quicker).
The respondent reports that that changes were made to the project subsequent to involvement in the scheme i.e. new ideas from BEIS or at the request of BEIS / to tie in with the scheme rules. This could encompass a range of changes (bigger, more impactful tech, quicker, OR even smaller but more viable); the rationale is that the scheme	Smoking gun	Likely	Unlikely	If there was a very definite plan which then changed post-involvement then this strongly implies at least some influence. The challenge here is the extent to which project plans were finalised prior to application anyway i.e. if they were not, relying on respondent assessment as to what extent the scheme influenced any change (that may have occurred anyway).

Evidence	Type of causal test	Probability of seeing evidence if hypothesis is true	Probability of seeing evidence if hypothesis is false / alternative is true	Rationale for probabilities
has influenced the project design and / or delivery in some way to make it more efficient and / or effective.				
There is documentation to support the claim that the project was different in some way prior to engagement with the scheme.	Smoking gun	Very likely	Unlikely	Same as above but slightly stronger as documented at the time. Reason for limited probability is that the scheme influence was not always in a form likely to be documented (e.g. documenting 'quicker').
The project was struggling to make progress prior to the scheme.	Smoking gun	Likely	Inconclusive	If this is the case and the project is then progressed, indicates the scheme had a catalyst / unblocking effect. Need to consider that it may have been resolved in similar timing for another reason without the scheme.
The organisation has put substantial time into the process (i.e. more than typical)	Smoking gun	Inconclusive	Unlikely	This may be an indication of the importance of the scheme / the need for the organisation to be successful. However, this may be linked to importance as per CSR or reputation as opposed to needing scheme money for the project to succeed (especially when considering that the VFM becomes weaker the more time invested).
The respondent states that the project would not have happened without the	Smoking gun	Likely	Unlikely	Some risk of respondents (deliberately or otherwise) overstating the value of the scheme / underestimating their organisation's ability to deliver

Evidence	Type of causal test	Probability of seeing evidence if hypothesis is true	Probability of seeing evidence if hypothesis is false / alternative is true	Rationale for probabilities
scheme, or would have been smaller / less impactful / slower.				anyway. In addition, some respondents may not have much conviction in / evidence for their attribution ("it MIGHT have sped the project up a bit"; "we MIGHT have taken a few months longer"). Confidence in interview responses can be improved by triangulating them with other evidence and by probing the respondent to understand the logic underpinning their response. Overall though, relatively strong as evidence based upon the challenge of identifying a true control group.
The respondent states that the same project would have happened anyway in the same timescales.	Smoking gun	Unlikely	Likely	Some risk of respondents over-claiming their own organisational ability to deliver. In addition, some respondents may not have much conviction in / evidence for their claim ("we PROBABLY would have done it the same anyway"). Overall though, relatively strong as evidence.
The organisation has implemented projects like the supported one on other sites recently without subsidy.	Straw in the wind	Inconclusive	Likely	Evidences wider influences upon organisations to act on this anyway and demonstrates that they can do it; on the other hand, not all contributions of the scheme are intended to be binary anyway (e.g. quicker).
The organisation had very minimal interaction with the scheme	Straw in the wind	Unlikely	Likely	The scheme could still have influenced an organisation regardless of the level of formal involvement in the process, but the opportunity to influence – and the strength of that influence – can be supposed to



Evidence	Type of causal test	Probability of seeing evidence if hypothesis is true	Probability of seeing evidence if hypothesis is false / alternative is true	Rationale for probabilities
				be much smaller if there was very little involvement.
The project was outside the organisation's typical required rate of return prior to EDR Scheme support.	Straw in the wind	Inconclusive	Inconclusive	Whilst this may indicate the scheme helping the project over the RoR 'hump', there may be other reasons for organisations to progress activities that don't meet the RoR, and potentially other ways of meeting the RoR in the absence of the scheme.
The project is outside the organisation's typical required rate of return but they have progressed it anyway through the scheme.	Straw in the wind	Inconclusive	Unlikely	Whilst this may indicate the value of the scheme such that orgs waive their usual RoR, there may be other reasons for organisations to progress activities that don't meet the RoR.
The relevant BEIS ops team representative feels that the project was materially affected / benefitted in some way by the scheme (made better / quicker, happened when it wouldn't otherwise have done).	Smoking gun	Likely	Unlikely	Whilst it cannot be ignored that the ops team have a reason to emphasise the value of the scheme, this evidence equally triangulates / cancels out respondent potential to claim they 'would have got there eventually anyway'.

The cases put through the tests were participant cases. The evidence feeding into PT came from several sources in combination to determine the result for each participant in the auction; this helps to triangulate evidence and reduce bias.

- Interview responses.

- Documents produced prior to scheme involvement e.g. showing initial plans and therefore enabling assessment of how these might have changed.
- Information / responses on documents in the Portal (e.g. application data and reporting to BEIS), which also help to show level of involvement.
- Public statements and other public domain data.

### Process Tracing Results

The following table summarises the results against each of these pieces of evidence, and then summarises the Process Tracing Findings overall:

Evidence	Summary of results (from 12 Phase I and 20 Phase II participants)
The organisation implements a project / action following the launch of EDR that reduces peak demand (whether within EDR or outside)	True for all Phase I; Inconclusive for all Phase II as they have yet to implement the projects. Phase I indicates potential for at least some to withdraw without implementing.
The peak demand reduction project was in place to some degree prior to the organisation becoming aware of the scheme	True of all but one Phase II participant, for whom this was inconclusive.
The respondent reports that changes were made to the project subsequent to involvement in the scheme i.e. new ideas from BEIS or at the request of BEIS / to tie in with the scheme rules. This could encompass a range of changes (bigger, more impactful tech, quicker, OR even smaller but more viable); the rationale is that the scheme has influenced the project design and / or delivery in some way to make it more efficient and / or effective.	This was felt to duplicate a clue lower down the table and so discounted.
There is documentation to support the claim that the project was different in some way prior to engagement with the scheme.	True of 7 Phase I cases and 15 Phase II cases, though documentation was often limited to content on the BEIS EDR Portal.
The project was struggling to make progress prior to the scheme.	True of 3 Phase I cases and 5 Phase II cases.
The organisation has put substantial time into the process (i.e. more than typical)	True of 9 Phase I cases and 18 Phase II cases.
The respondent states that the project would not have happened without the scheme, or would have been smaller / less impactful / slower.	True of all Phase I cases and 17 Phase II cases.
The respondent states that the same project would have happened anyway in the same timescales.	This was effectively an opposite to the preceding clue and therefore discounted.

Evidence	Summary of results (from 12 Phase I and 20 Phase II participants)
The organisation has implemented projects like the supported one on other sites recently without subsidy.	True of 9 Phase I cases and 11 Phase II cases.
The organisation had very minimal interaction with the scheme	This was effectively an opposite to a preceding clue and therefore discounted.
The project was outside the organisation’s typical required rate of return prior to EDR Scheme support.	True of 1 Phase I cases and 4 Phase II cases.
The project is outside the organisation’s typical required rate of return but they have progressed it anyway through the scheme.	True of 1 Phase I cases and 4 Phase II cases.
The relevant BEIS ops team representative feels that the project was materially affected / benefitted in some way by the scheme (made better / quicker, happened when it wouldn’t otherwise have done).	Discounted for this report as BEIS ops team interviews will be conducted later in the year.

Overall, the results equated to the hypothesis being – on balance – true in 29 cases and not true in 3 cases, aligning with the results of the general attribution / contribution analysis, though ops team interviews may led to a re-appraisal of some individual cases.

## kW impacts

As initially presented in the main report, there are four categories of savings in this report, defined below in additional detail:

- Participant agreement ex ante<sup>6</sup> savings.** These were calculated by participants using BEIS provided spread sheet calculators. Participants input information on count of items installed (motors, light fixtures, etc.), power draw of existing and replacement equipment, hours of operation and other general characteristics. These savings were calculated before equipment installation as an estimate of what will happen (ex ante). The evaluation team summed the Participant Agreement savings reported in BEIS’s database to determine overall participant agreement ex ante savings.
- Additional ex ante savings.** Additional savings are savings that can be directly attributed to the EDR pilot. The evaluation team used interviews, case notes and other sources to determine if a project’s savings are attributable to the EDR pilot or if the project would have happened even without EDR support. The evaluation team calculated total additional ex ante savings by summing the Participant Agreement ex ante savings of projects that were considered additional. For more information on how the evaluation team determined additionality, see the “Attribution” section below and “Scheme Contribution” section of Volume 1.

<sup>6</sup> Ex ante describes savings that are predicted to occur, generally before a project is installed (translated as ‘before the event’).

- **Reliable ex post<sup>7</sup> savings.** Not all participants delivered their projects as planned. Some dropped out of the EDR pilot, some delivered smaller or larger projects, and some used different equipment than what was originally planned. The result is that savings post-installation (ex post) for some projects were different than what was agreed in the participant agreements. EDR participants submitted updated M&V plans and a winter capacity savings report (WCSR) after the completion of their project(s). These estimate savings for the project as it actually happened – so they take into account changes to project size or equipment choice (or 0 savings in the case of projects that didn't go forward). The evaluation team summed the savings reported in the WCSRs and BEIS's final savings database to determine the overall reliable ex post savings.<sup>8</sup>
- **Additional and reliable ex post savings.** Like the previously described additional ex ante savings, this calculation only included savings from projects that would not have happened in absence of the EDR pilot. The difference is that this sum used the reliable, ex post savings rather than the initial participant agreement (ex ante) estimates. This calculation estimates the savings that actually occurred and that are attributable to the EDR pilot. The evaluation team summed WCSR savings for attributable projects to determine the additional and reliable ex post savings.

---

<sup>7</sup> Ex post described savings based on the project as it was installed, rather than project plans (translated as 'after the fact').

<sup>8</sup> There were some cases where the participant reported a larger project than planned or a project with higher savings than planned. BEIS did not pay for these additional savings (over what was agreed in the Participant Agreement) and therefore they are not shown in their final databases. However, these savings are reported in the WCSRs and we have included them in our calculations as they should be attributable to the EDR scheme. Therefore, our totals for reliable savings will not match BEIS's.

## Annex 3: References

- Cadmus Group, Inc. 2016. Focus on Energy Calendar Year 2015 Evaluation Report. Madison, WI: Public Service Commission of Wisconsin.
- Stern, Elliot, et al. 2012. Broadening the Range of Designs and Methods for Impact Evaluations. Department for International Development.
- Energy & Resource Solutions. 2014. Con Edison EEPS Programs – Impact Evaluation of Large Commercial & Industrial Program Group. New York: Consolidated Edison Company of New York.
- Itron, Inc. 2014. Verification of Reported Program Impacts from 2013 EmPOWER Maryland Energy Efficiency Programs with Recommendations to Improve Future Evaluation Research. Baltimore: EmPOWER Maryland Utilities and the Maryland Public Service Commission.
- Itron, Inc. 2015. 2013 Custom Impact Evaluation Industrial, Agricultural, and Large Commercial. San Francisco: California Public Utilities Commission.
- Summit Blue Consulting, LLC. 2009. Commonwealth Edison Company Energy Efficiency/Demand Response Plan Year 1 Evaluation Report: Business Custom Program. Oak Park, IL: Commonwealth Edison Company.
- Tetra Tech. 2014. Annual Statewide Portfolio Report for Program Year 2013 – Volume 1. Austin TX: Public Utility Commission of Texas.