



# Electricity Demand Reduction Pilot Scheme Phase II



Measurement and Verification Manual

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# 1. Introduction

## 1.1. What is in this Manual?

Guidance on:

- how to choose the correct Measurement and Verification (M&V) approach(es) for your project;
- how to complete the relevant M&V Documents and the supporting information you need to provide as part of your application; and
- the information that you must provide following the auction to receive EDR payments.

While there is a lot of information contained in this manual don't be put off by the length. You are unlikely to need to read all of it and many pages are taken up with screenshots to show you how to do things.

### What you should have done before you continue to read this Manual

The EDR Pilot is open to a large number of projects and measures, however there are some exceptions. Before continuing through this manual you should ensure you have read the Participant Handbook and confirmed that your project is eligible to participate in the pilot. If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488, Mon-Fri, 9.30am-5pm. You can leave a message if you are unable to get through.

## Measurement and Verification is a three step process

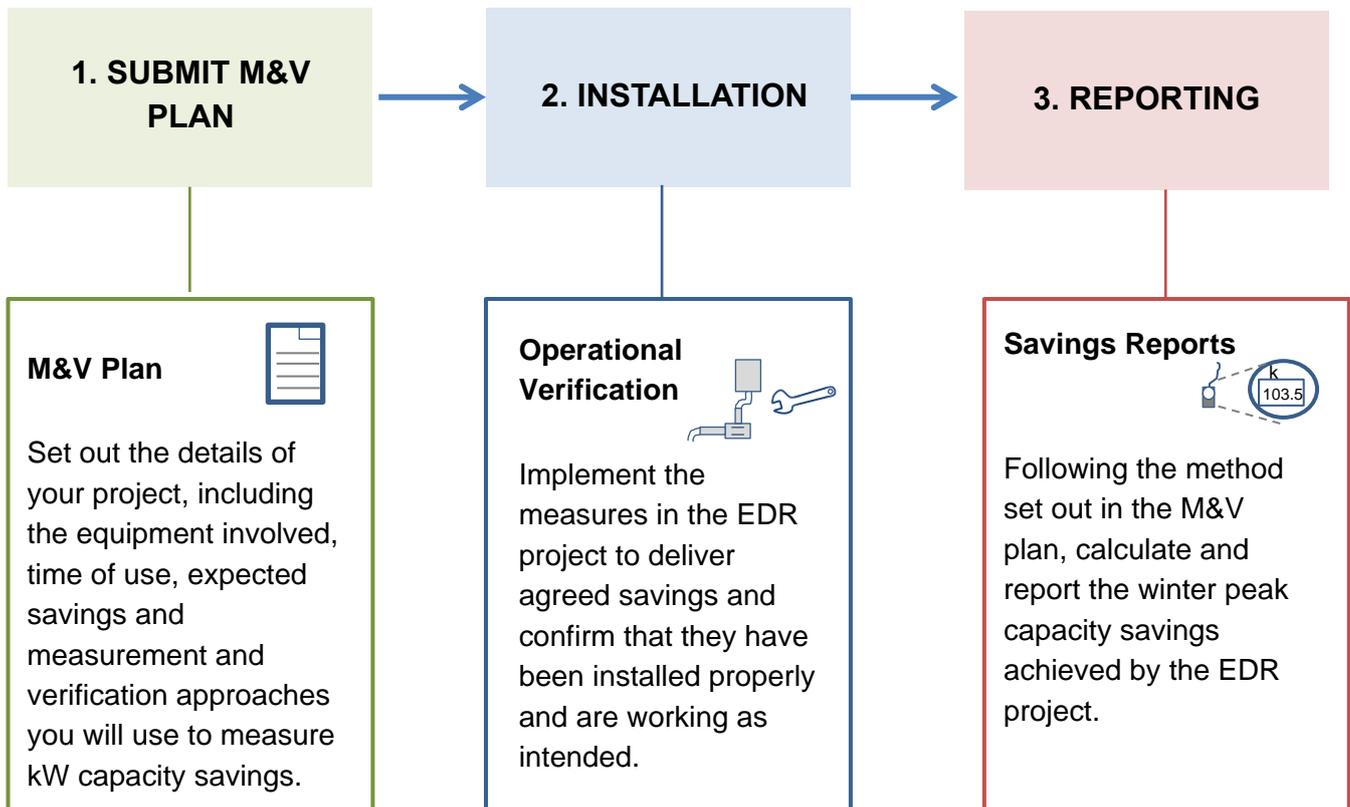


Figure 1.1 – Measurement and Verification Process

## **How this manual is structured**

This manual is organised in the order in which you should carry out M&V activities and is divided into eight sections:

### **Section 1: Choosing your M&V Approach**

Section 1 provides guidance on how to choose the M&V approach(es) for your project and an overview of the information you have to provide and a timetable of key M&V activities.

### **Section 2: Deemed Savings**

Section 2 gives an overview of the Deemed Savings approach and the M&V Documentation you need to submit if you are using a deemed approach to measure savings in your project.

### **Section 3: Metered Savings**

Section 3 gives an overview of the Metered Savings approach and what you need to submit if you are using a metered approach to measure savings in your project. This section also contains information on sampling.

### **Section 4: Completing the 'M&V Summary Sheet'**

Describes how you should complete the M&V Summary Sheet to calculate the total expected savings of your project.

### **Section 5: Uploading your M&V Documents**

Provides instructions on how to upload your M&V Documents and includes a checklist of what you need to provide.

### **Section 6: Making revisions to your project**

Describes the processes involved in making revisions to your M&V Plan(s) should you need to make changes.

### **Section 7: Post auction activities**

Section 7 describes the M&V requirements for participants who have been successful in the EDR Auction. It covers Operational Verification (OV), reporting requirements and the evidence you will need to submit. The data submitted via the guidance in this section will determine your payment.

### **Section 8: Appendices**

Gives an overview of other M&V Documentation that you may need to consult.

## EDR at a glance

You should read the Participant Handbook for more detail on the scheme. A summary of key elements is provided below:

- Projects that can deliver lasting reductions in electricity demand, typically by installing more efficient electrical equipment e.g. replacing an old inefficient chiller with a new more efficient model, can bid the capacity savings their project will deliver into an auction to receive financial support.
- To be eligible for EDR, projects must deliver at least 50kW of winter peak capacity savings averaged over the winter peak period, weekdays 4-8pm, November – February.
- Those bidding into the auction, bid in a price per kW of capacity savings their project will deliver. The EDR Pilot is based around a competitive auction – you can win money for each kW of electricity capacity you save over the Winter Peak, but there are no guarantees that you will be successful in the auction.
- Those wishing to bid must submit the detail of their project(s), including the measurement and verification approaches they will use to measure and verify the capacity savings of their project(s) to DECC for approval prior to being accepted into the auction. At least 60% of winter peak capacity savings from your project must be specified in your M&V documents at application stage, 40% can remain unspecified until a later point.
- Payments are based on the actual kW capacity savings that are delivered as demonstrated by the chosen measurement and verification approaches for your project. Payments are linked to three milestones:
  - Up to 20% is linked to operational verification evidence that is provided
  - Up to 60% on demonstration of savings through a Winter Capacity Savings Report (WCSR)
  - Up to 20% on provision of a final report and participation in evaluation activities (if your project is selected to participate in the evaluation).

## 1.2. Before you start....

To complete the M&V Documents, whichever approach you are using, you will need to have to hand:

- the details of the existing and replacement measures in your project including equipment type and model, kW values, location, quantity being installed and replaced;
- details of the expected time of use of your EDR measures during the winter peak over which your project will deliver capacity savings (November - February, weekdays 4-8pm); and
- evidence to substantiate the kW values of the replacement equipment you are installing e.g. manufacturer's specifications. You should gather this evidence if you haven't already done so.

To be accepted into the EDR Auction you must complete an online application form and upload supporting M&V documents as set out in this manual. Only projects that are approved by DECC will be able to submit bids into the Auction.

Based on participants experience of the first phase of the EDR Pilot it took an average of around 7 working days to complete an application and collect the required information, so please make sure you budget time in accordingly and try not to leave it too late.

Those bidding into the EDR Pilot have the choice of bidding projects that will deliver winter peak capacity savings over two different winter peaks (please note you must choose only **one** winter peak over which you will deliver capacity savings for your project):

- Year-ahead delivery: November 2016 – February 2017, weekdays 4-8pm
- Two-year ahead delivery: November 2017 – February 2018, weekdays 4-8pm

At least 60% of your total capacity savings must be specified upfront in your M&V Documents at application stage, the remaining portion of up to 40% capacity savings can remain unspecified but will need to be specified no later than 30 June of your delivery year (see below).

If you wish to make any changes to your project these must be formally approved by DECC, the cut off points for making changes are set out below. While you can make changes to your project after the auction the kW capacity savings that you have agreed to deliver in the auction cannot be changed.

If your project will be delivering savings for:

- **Year-ahead delivery (Nov 2016 – Feb 2017)** then you must submit any major changes by 30 June 2016 (this includes changes to sites in your project and providing details of any portions of your project not specified at application stage) or by 12 August 2016 for more minor revisions including changes within existing sites and technologies that affect less than 50% of your agreed kW capacity savings.
- **Two year-ahead delivery (Nov 2017 – Feb 2018)** then you must submit any major changes by 30 June 2017 (this includes changes to sites in your project and providing details of any portions of your project not specified at application stage) or by 11 August 2017 for more minor revisions including changes within existing sites and technologies that affect less than 50% of your agreed kW capacity savings.

The dates described above are cut off points. You are encouraged to submit any revisions for approval sooner where feasible to enable sufficient time for changes to be approved and for you to install your EDR Measures following approval prior to the winter peak period. Please note that you are **only allowed to make one major and one minor update to your project** so please ensure your project has reached a level of stability before notifying us of any changes. Further detail is set out in Section 6 of this Manual and Chapter 13 of the Participant Handbook.

The deadline for final applications is 15 October 2015. However you can submit your completed M&V Documents and supporting evidence to DECC for feedback until 17 September 2015. DECC will review your documents and will aim to provide feedback within 15 working days from the date you send it to us. The feedback will include a general check including; the eligibility of the project, any issues identified with the information provided in your M&V Plan(s) or supporting evidence and any discrepancies that are identified. The review does not guarantee that your project will qualify or that every single issue with your application will be identified at the review stage, so please ensure you read and understand the scheme requirements and complete your application as fully as possible. It is still your responsibility to provide the necessary information to comply with scheme requirements. Key milestones and deadlines are summarised in figure 1.2 below.

If you have any questions on the above then you can contact us on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

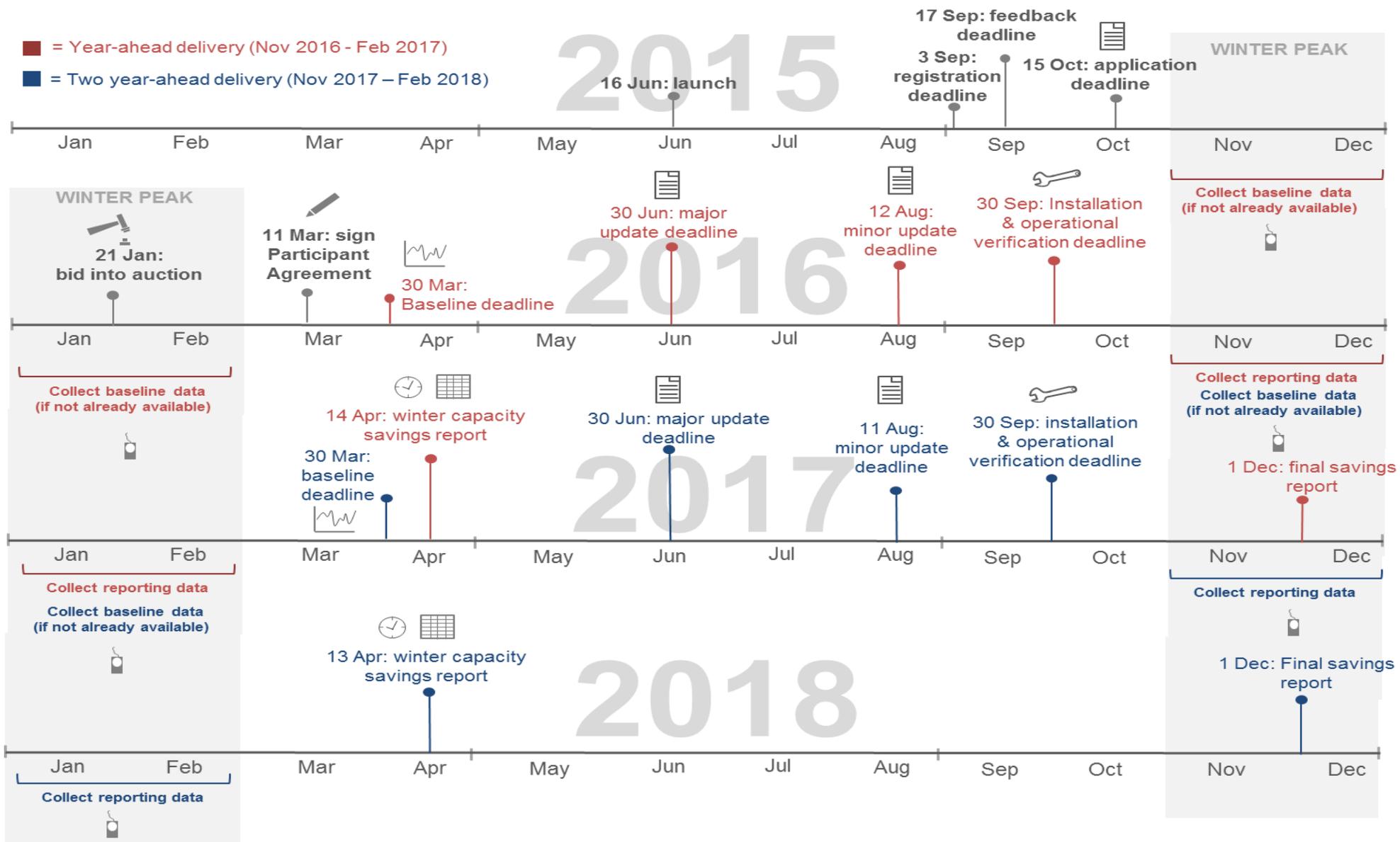


Figure 1.2: Key Milestones & M&V Activities

### 1.3. Steps involved in submitting Measurement & Verification (M&V) Documents

Figure 1.3 below provides an overview of the five steps involved in submitting your M&V documents.

#### **5 Steps to submitting your M&V Documentation**

1. **Choose which M&V approach(es)** you will use for your project (section 1.4 of this Manual)



2. **Complete the relevant M&V documents** with details of existing and replacement equipment and time of use (sections 2&3 depending on which M&V approach(es) you choose for your project)



3. **Collect M&V evidence** to substantiate the kW values of the replacement equipment in your project. Make sure it matches the information provided in your M&V plan, if it doesn't your application won't be accepted (see sections 2 & 3 of this Manual).



4. **Complete the 'M&V Summary Sheet'** to calculate the total expected savings of your project (see section 4 of this Manual)



5. **Review and upload your documents.** Review your documents to check you have everything. Upload your M&V documents via the EDR portal (see section 5)

*Figure 1.3: Five steps involved in submitting your M&V Documents*

## 1.4. Choosing the approach for Measuring and Verifying savings of your project

You will need to choose which approach to Measurement and Verification you are using for your project. There are two broad approaches that you can choose from:

**Deemed savings** – for simple projects involving a replacement of one piece of equipment for a more efficient version participants can use ‘deemed savings’ for a limited list of technologies. Under this approach technology-specific spreadsheets are used to calculate savings based on information you provide. Only technologies on the list below can be deemed. You cannot deem savings yourself. You must use one of the seven available Deemed M&V Plan(s) to calculate deemed savings, as follows:

- Lighting (whole luminaires only, bulb-only replacements must use a metered approach)
- Lighting controls
- Motors & Variable Speed Drives (VSDs)
- Process Chillers
- Heating controls
- Retail Display Cabinets (RDCs)
- Professional Refrigerated Storage Cabinets (PRSCs)

**Metered Approaches** – for more complex projects involving multiple electricity-saving measures, industrial processes or where technologies are not covered by the deemed savings list you must choose from three metered approaches available. These are all based on the International Performance Measurement & Verification Protocol (IPMVP) and include:

- **Partial measurement:** a discrete set of readings are taken before and after implementation, often using a temporary or clamp meter;
- **Full measurement: sub-metering:** continuous readings are taken from a sub-meter linked to the equipment being replaced before and after implementation; and
- **Full measurement: total building electricity:** continuous readings are taken from a site meter before and after implementation.

Please refer to section 3.8 for information regarding sampling and how this can help reduce the measurement burden in your EDR project.

For some projects, it is possible that more than one approach is suitable, or that different approaches could be taken to measure different technologies within the project. For example if you had a project that includes deemed lighting, deemed heating and partial measurement of a pump replacement you would submit information on three separate spreadsheets (Deemed M&V Plan - lighting replacement, Deemed M&V Plan - heating controls and a Metered M&V Plan).

You should use the decision tree (see figure 1.4 below) to decide which of the approaches above you want to use for each site included in your project (see definition below).

### **Site definition**

A site is defined as an area of land falling within a continuous boundary which encloses the land used in connection with the operation of an EDR measure. For this purpose, however, an area of land may still be regarded as a single site even if it is dissected by a road, railway line or river. Other non-adjacent parcels of land would not, however, constitute a single site.

Typically this means the site will be either a building or group of adjacent buildings on the same piece of land.

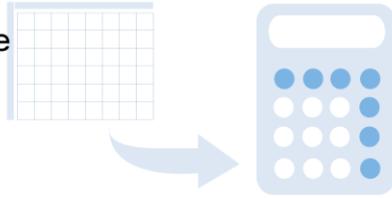
The definition of site is designed to support the functioning of the Pilot. It is not intended to act as a barrier to participation. If you have any problems defining the site(s) in your project please get in contact with us to find a mutually convenient solution. You can do this via [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

# OVERVIEW OF M&V APPROACHES IN THE PILOT

## Deemed savings

Savings are calculated through the use of spreadsheets. No meter data is collected. Only technologies on the deemed list can be deemed, this includes:

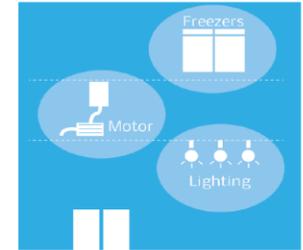
- Lighting
- Lighting controls
- Motors & Variable Speed Drives (VSDs)
- Process Chillers
- Heating controls
- Retail Display Cabinets (RDCs)
- Professional Refrigerated Storage Cabinets (PRSCs)



## Partial measurement

Savings are measured by taking a set of meter readings before and after implementation. Levels of demand must be stable (i.e. consistent over time) to make this approach viable. Time of use is applied to calculate savings.

**Measurement boundary:** drawn around the load type affected by the efficient equipment e.g. lighting, freezers and motors would all have separate boundaries as shown above.

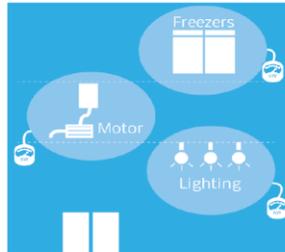


## Full measurement: submetering



Demand is variable so it is necessary to take continuous readings throughout a full operating cycle to calculate savings. Sub-meters are used to record consumption for different equipment types.

**Measurement boundary:** drawn around the sub-meters used to collect metered data e.g. the three separate sub-meters shown above.



## Full measurement: whole site

**Savings >10% of total site electricity use**

A site meter is used to calculate savings at a site level. Continuous readings are taken before and after implementation. Expected electricity savings must be greater than 10% of total electricity use at the site to make this approach suitable.

**Measurement boundary:** drawn around the building as shown. The site meter captures the consumption from all electrical equipment included in the building as shown above.

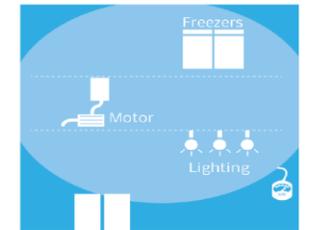


Figure 1.4 – Overview of M&V Approaches

## M&V approach decision aid tool

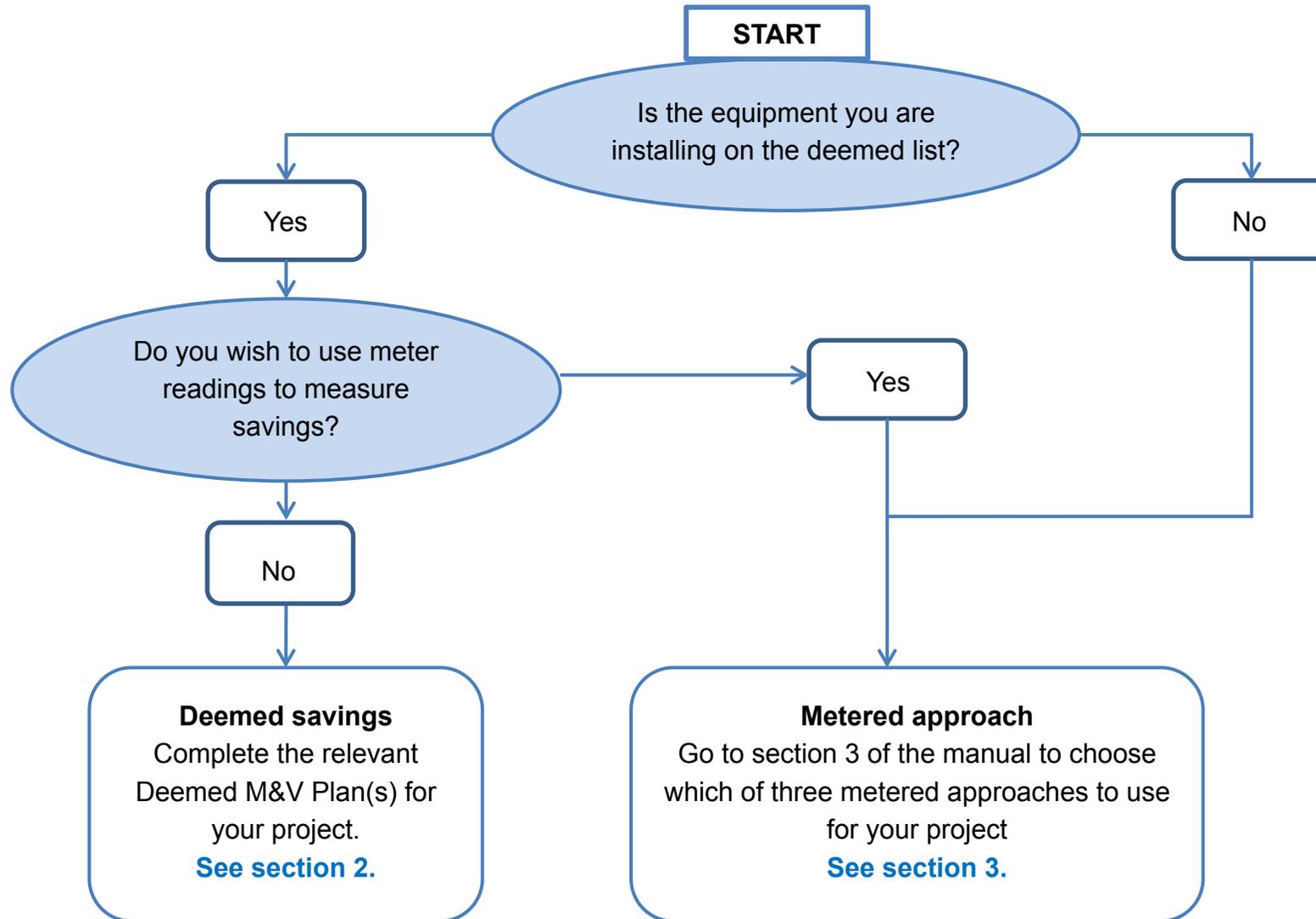


Figure 1.5: M&V Approach, Decision Aid Tool

## 1.5. What you need to provide

### Deemed Savings - what you need to provide:

- The correct technology-specific Deemed M&V Plan(s) for your project, taken from the following list:
  - Deemed M&V Plan - Heating Controls
  - Deemed M&V Plan - Lighting Controls
  - Deemed M&V Plan - Lighting Replacement
  - Deemed M&V Plan - Motors & Variable Speed Drives (VSDs)
  - Deemed M&V Plan - Process Chillers
  - Deemed M&V Plan - Professional Refrigerated Storage Cabinets (PRSC)
  - Deemed M&V Plan - Retail Display Cabinets (RDC)

The Deemed M&V Plans highlighted above can be found here: [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot). Scroll down until you see the link 'supporting information and documents page'.

- Evidence to support the kW consumption values for each EDR Measure included in your project that will be installed. This must include:
  - **Technical Specification or Manufacturer Brochure** (e.g. if you are installing two types of pumps then a technical specification for each pump type showing their kW value e.g. 8kW and 12kW.)

You do not need to provide kW evidence for existing equipment. If you are unable to provide technical specifications for replacement equipment contact DECC to discuss if an alternative form of evidence would be acceptable.

Please note that ultimately if there is a discrepancy between the information provided in your deemed M&V Plan(s) and the evidence described above (e.g. in kW saving values of equipment being installed or the quantity of units being installed) **your application will not be accepted.**

### Metered Savings Projects – what you need to provide:

- A Metered M&V Plan with information about the parts of your project where you are using meters to measure savings; and
- Evidence to support the kW consumption values for each equipment type included in your project that will be installed. This must include either:
  - **Technical Specification or Manufacturer Brochure** e.g. if you are installing two types of pumps then a technical specification for each pump type showing their kW value e.g. 8kW and 12kW.
  - **Supplier quotation**, which underpins the estimated kW savings for each equipment type being installed in your project. You do not need to provide kW evidence for existing equipment.
- **Baseline data:** for each measurement boundary (the boundary encompassing all the equipment that is captured by a meter) in your project you must provide meter readings of electricity use prior to installation of your project, you enter this information into one of the three baseline calculation spreadsheets (further detail can be found in section 3). This has to be provided prior to the winter peak in which your project will deliver savings.

Once you have completed your M&V Documents you must also complete and upload an '**M&V Summary Sheet**' with the total expected kW savings of your project (see section 4).

## 1.6. Common errors

Below is a summary of the common errors that emerged during Phase I of the EDR Pilot. Please bear these points in mind when preparing your application.

- **Not attaching technical specifications to support the kW savings of a project** – make sure you attach either technical specifications or a manufacturer’s brochure to substantiate the kW savings for each replacement technology type and model included in your project e.g. if you are installing two different types of pump, pump A and pump B make sure you attach technical specifications which substantiate the kW consumption of each e.g. pump A is 18kW, pump B 14kW. Also make sure your entries in your M&V Plan(s) match the technical specifications, if they don’t your application won’t be accepted.
- **Not uploading the required M&V Documents** e.g. not providing a completed Deemed M&V Plan and using your own calculations to ‘deem savings’ (this is not allowed)
- **Submitting an M&V Plan that did not meet eligibility criteria** for example using the Deemed M&V Plan - lighting replacement for projects involving the replacement of lamps only (not eligible). The Deemed M&V Plan - lighting replacement can only be used in projects involving the replacement of the entire luminaire (lamp, fixing and control gear).

The deadline for final applications is 15 October 2015. However you can submit your completed M&V Documents to DECC for feedback until 17 September 2015. DECC will review your documents and will aim to provide feedback within 15 working days from the date you sent it to us. The feedback will include a general check including: the eligibility of the project, any issues identified with the information provided in your M&V Documents and any discrepancies that are identified. The review does not guarantee that your project will qualify or that every single issue with your application will be identified at the review stage, so please ensure you read and understand the scheme requirements and complete your application as fully as possible. It is still your responsibility to provide the necessary information to comply with scheme requirements.

## 1.7. Naming Conventions

You must ensure that for any files submitted as part of your application you use the following naming convention:

### **Application ID, category, description of file**

**Application ID:** You will be allocated an Application ID by DECC at the start of the application process. This will be in the form of your Participant ID (4 letters and 4 numbers – provided on submission of your Registration Form) followed by three numbers e.g. GH000708-876

Record Category and Description of File:

Category	Description of file
Metered M&V Plan	No description is required
Deemed M&V Plan	Please use the name of the M&V document you have used e.g. Lighting Controls, PRSCs etc.
Metered M&V Evidence	Please describe the evidence you are submitting to support your kW savings estimates e.g. supplier audit.
Deemed M&V	Please state the type of evidence e.g. technical spec, supplier

Evidence	quote etc.
Baseline	Please use your Boundary ID for Template Calculation Spreadsheets or your Boundary ID plus “raw data” for raw meter data e.g. B1, B1 raw data etc.
Reporting	Please use your Boundary ID for Template Calculation Spreadsheets or your Boundary ID plus “raw data” for raw meter data e.g. B1, B1 raw data etc.

Please see example file names below:

- Metered M&V Plan  
E.g. GH TT0708-876 Metered M&V Plan
- Deemed M&V Plan  
E.g. GH TT0708-876 Deemed M&V Plan - Heating Controls

Details of how and where to attach files can be found in Section 5.

## 2. Submitting Deemed M&V Documents

Under the deemed savings approach the details of the existing and replacement measures and time of use are entered into a deemed M&V Plan and the estimated winter peak capacity savings for the project are automatically calculated. There is no need to collect metered data.

Savings are calculated based on a mixture of input data e.g. type of technology being replaced, time of use and assumed values such as load factors, cycle times, which are incorporated within the calculators based on research, historical experience and expert guidance. Appendix A 'Deemed Measure Overview and Data Calculations' provides more detailed information on the assumptions and technical information underpinning the calculations for each technology type.

Only technologies on the list can be deemed. You cannot deem savings yourself or amend the total kW saving calculated in the deemed M&V Plan(s). You must use one of the seven technology-specific spreadsheets to calculate deemed savings.

If you are installing technologies not found on the deemed savings list please consult the Metered Approach in Section 3.

Please note that you are not compelled to use the deemed savings approach for technologies on the list; you can use a metered approach instead if, for example, you want to use meter readings to measure savings (see section 3). You can contact us if you are unsure if the deemed saving approach is suitable on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

### 2.1. Which Measures are eligible for the deemed methodology

The full list of measures suitable for using the deemed savings methodology within the EDR Pilot is as follows:

- **Heating controls** – installing controls which improve the control of electrically powered heating systems, including both direct electrical heating systems, and heat pump based systems.
- **Lighting controls** – installing controls to turn off or dim lighting based on occupancy detection. Please note that if you are only installing lighting controls you must use the Lighting Controls M&V Plan, if you are installing both lighting controls and lighting replacement you **must** use the Lighting Replacement M&V Plan.
- **Lighting Replacement** – replacement of existing lighting with efficient, high frequency fluorescent, LED, induction or efficient high intensity discharge lighting. This must involve replacement of the whole luminaire i.e. the entire fitting, lamp and control gear. Replacement of lamps only within existing luminaires is not eligible as in situ-performance is too variable to be incorporated into the deemed approach (though you can use a metered approach instead).

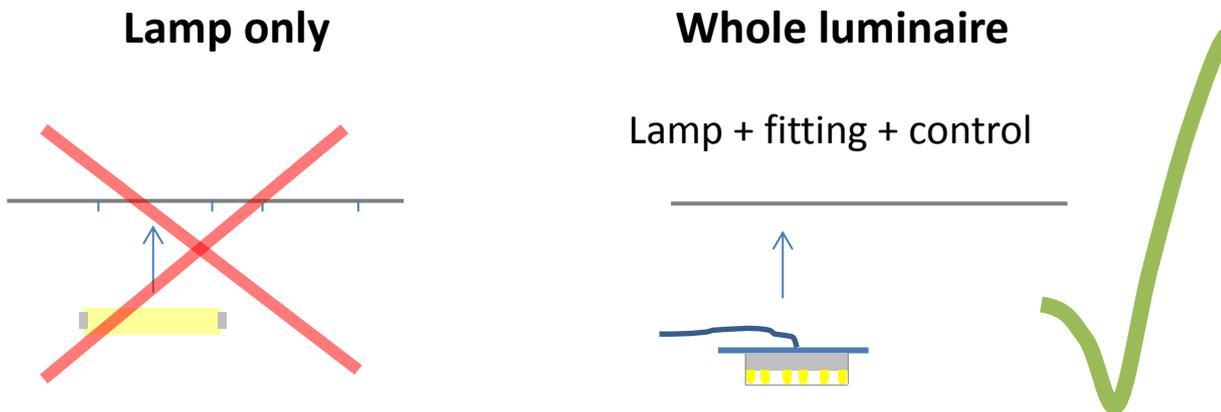


Figure 2.1 – Lamp vs Luminaire Eligibility

- **Motors & Variable Speed Drives (VSDs)** – replacing existing AC single speed induction or permanent magnet synchronous motors with more efficient models and/or adding variable speed drive control to a motor installation. This measure only applies to replacing the same number of motors as already installed.
- **Process Chillers** – replacement of packaged chillers used for process cooling to produce chilled water or other liquids.
- **Professional Refrigerated Storage Cabinets (PRSCs)** – replacement of refrigerated storage cabinets. PRSCs are specifically designed to store, but not to display, chilled and/or frozen foodstuffs.
- **Retail Display Cabinets (RDCs)** – replacement of retail display cabinets specifically designed to store and display chilled and/or frozen foodstuffs. RDCs enable the customer to view the foodstuff either through an opening in the cabinet, or through a transparent door or lid.

Detailed information regarding each type of technology on the deemed savings list including exclusions, applicability and definitions can be found in Appendix A ‘Deemed Measure Overview and Data Calculations’. You should consult this before proceeding with filling in your deemed M&V Plan(s).

## 2.2. How to Complete your Deemed M&V Plan

**Step 1:** download the relevant Deemed M&V Plan and take a look at ‘Appendix A: ‘Deemed Measure Overview and Data Calculations’ to check the equipment being replaced in your project is eligible for the deemed approach. All of the M&V guidance and forms, including Appendices to this Manual, and M&V Documents can be downloaded from [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot). Once you are on this page scroll down until you see one of the links titled ‘supporting information and documents page’ (see figure 2.2. below). Clicking on this link will take you through to a page which contains all the M&V Documents you might need to download. If you are struggling to find a document or the formats don’t work with your software, please send us an email letting us know at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk).

Guidance

## Electricity Demand Reduction Pilot

From: Department of Energy & Climate Change  
 Preview  
 Part of: Energy demand reduction in industry, business and the public sector

Organisations could receive financial support for implementing energy efficiency projects through the Electricity Demand Reduction Pilot if they deliver electricity savings at peak times.

Contents

- What is the EDR Pilot?
- Further help
- Timelines

### What is the EDR Pilot?

We're testing whether projects that deliver lasting electricity savings at peak could in future compete for funding with generation, demand side response (DSR) and storage in the GB Capacity Market.

If you're thinking of improving your motor or pump systems, replacing your old light fittings with LED's or making any other improvement to your building or electrical equipment which would deliver lasting peak time electricity savings you could be eligible to take part.

To find out your project is eligible, start by checking our short guide to the pilot on our [supporting information and documents page](#). The rules have changed a bit since the previous phase so even if you couldn't take part last time, it's worth taking

Figure 2.2 – EDR Website – where to download M&V documents

### Step 2: Complete the Deemed M&V Plan

Each deemed technology has an associated deemed M&V Plan: they all have embedded formulae and deemed factors. Instructions are provided within each spreadsheet, detailing what data you are required to input.

The deemed M&V Plan(s) use a combination of dropdown lists (in **red**) and free text boxes (**blue**) and are locked so that you can only enter information into valid input fields.

Please do not:

- attempt to enter data into cells which aren't valid input fields;
- enter data which does not meet the validation criteria. For example entering free text into a cell that requires you to select from a drop down list; or
- attempt to unlock the formulae and reference data.

If you have any problems please contact us on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488. If the spreadsheet is substantively altered as described above this will likely invalidate your application.

For illustrative purposes the steps involved in completing the Deemed M&V Plan - Lighting Replacement are set out in this section. The same basic steps and principles apply to all Deemed M&V Plan(s).

All of the Deemed M&V Plans including lighting replacement have four types of tabs:

- 1) **Cover Sheet**
- 2) **Data Input tabs (for the existing and replacement equipment)**
- 3) **Help tab**
- 4) **Actual Time of Use**

You need to complete the Cover Sheet and all Data Input Tabs at application stage, please note in some of the deemed M&V Plan(s) there is more than one data input tab.

- 1) Cover Sheet:** provide your details (such as your participant ID) and a brief summary of the project including the technology types included, quantity being installed and the number of sites involved in the project. The total kW and existing and proposed kW values will be calculated automatically and displayed once you have completed the data input tabs.

Electricity Demand Reduction		PROJECT SUMMARY	
<b>Deemed - Lighting Replacement Plan v1.0</b>		<b>TOTAL kW Saving</b>	
		0.00	
Participant ID (from your M&V Plan):	ABCD1234	Existing kW:	-
Application ID (from your M&V Plan):	ABCD1234-222	Proposed kW:	-
Organisation:	Organisation Name		
Completed by:	A.N.Other		
<b>Description of project:</b>			
Replacement of 10,000 fluorescent T8 HF Standard lights including fixtures and control gear with LED alternatives. The lighting upgrade will take place across 50% of our estate which equates to 50 medium sized shops distributed across England, Scotland and Wales.			
<b>Exclusions</b>			
<ul style="list-style-type: none"> <li>• This measure does not apply to replacement of failed lighting systems or the introduction of new lighting systems where a system didn't exist before</li> <li>• This measure only includes replacement of whole luminaires. Replacement of lamps within existing luminaires are not eligible</li> <li>• This measure does not apply to new buildings or currently un-lit spaces of existing buildings</li> <li>• This measure does not apply to projects which solely introduce photocell/daylight controls</li> </ul>			

Figure 2.3 – Cover Sheet of the Deemed M&V Plan – Lighting Replacement

## 2a) Existing Lighting System

In this tab you will need to provide information on your existing lighting, including:

- Building type & location within building of the proposed installation
- Site Code – e.g. 'S1' for site 1, 'S2' for site 2 etc.
- Existing lighting source types
- The number of existing luminaires
- Wattages of existing luminaires
- Lighting control details (if part of the existing system)
- Time of use of your equipment during the winter peak (see below for more detail on how to provide this information)

The example text in **red** illustrates the kind of information needed for each column. The column headers are colour coded to highlight which cells are free text (**blue** columns) or require you to select from a drop down list (**red** columns). Please complete separate lines for distinct areas and different luminaire types within each area.

Existing Lighting System						
Key - Column Format						
Enter Free Text						
Choose Option from Drop Down List						
<b>Instructions</b>						
Complete all fields as detailed in the example below. Please complete separate lines for distinct areas and different luminaire types within each area. For each group of lighting filled out on the existing lighting system sheet, corresponding lines on proposed lighting system sheet must also be filled out. Please refer to the <b>Help Tab and Appendix A</b> for further information regarding the completion of the "Existing Lighting System Tab"						
Lighting	Building Name, Site Location	SITE CODE (follows the format S1, S2, S3 etc)	Building Type	Location within Building	Luminaire Description (free text)	Light Source Type
<b>Example</b>	<b>Warehouse A - High Bay Lighting - Derby site</b>	<b>S1</b>	<b>Warehousing</b>	<b>War - Main Warehouse</b>	<b>ACME ABC123-2-58-T8 Twin 58W T8 Fluorescent Batten</b>	<b>Fluorescent - T8 Switch Start</b>
1	Store 1 - Location 1	S1	Retail	Rtl - Main Store	6ft twin T8 fluorescent Light (including fittings)	Fluorescent - T8 HF Standard
2	Store 1 - Location 2	S1	Retail	Rtl - Offices	6ft twin T8 fluorescent Light (including fittings)	Fluorescent - T8 HF Standard
3	Store 2 - Location 1	S2	Retail	Rtl -Customer Toilets	6ft twin T8 fluorescent Light (including fittings)	Fluorescent - T8 HF Standard
4	Store 2 - Location 2	S2	Retail	Rtl - Offices	6ft twin T8 fluorescent Light (including fittings)	Fluorescent - T8 HF Standard
5	Store 2 - Location 3	S2	Retail	Rtl - Main Store	6ft twin T8 fluorescent Light (including fittings)	Fluorescent - T8 HF Standard

Figure 2.4 – Existing Lighting System tab of the Deemed M&V Plan – Lighting Replacement

### Time of use

To calculate the kW capacity savings of the measures being deemed you must provide details of the expected time of use of the equipment over the winter peak period (November-February, weekdays, 4-8pm). You do this by providing the total number of business days (excluding GB bank holidays) over the winter peak (up to a maximum of 83 days) and the typical operating hours that your equipment is expected to be operational during that period between 4-8pm.

To provide information on time of use of your existing equipment you will:

- Enter the number of days the equipment is operating for over the winter peak period, November to February (up to a maximum of 83 days). You will need to describe how you arrived at this estimated number of days using the free text box.
- Use dropdowns to indicate the time period that the equipment is in operation between 4-8pm (the whole hour, first half hour or second half hour or not operational) for each hourly interval. Please note that the equipment must be in operation for the full periods (e.g. half-hour or a full hour) to select these options, if you are only in operation for 25 minutes then you cannot select the half-hour option.
- A separate line should be provided for each technology and time of use grouping. While multiple installations of the same technology types will often have the same time of use and so can be grouped together there may be occasions where the same technology type (e.g. lighting) may have different hours of use within the same site because it has a different application (e.g. used in different parts of a building). In such cases the same technology will need to be entered on separate rows according to the time of use grouping (e.g. the different pumps would have different entries with their own time of use).

**Time of Use Example:**

**Site A**  
 200 luminaires of the same type that are all operating for the entire peak period.  
 Complete 1 line for all 200 luminaires.

**Site B**  
 100 luminaires of the same type except 50 are in an underground car park and 50 are in an office. Complete 1 line for the first 50 luminaires and one line for the second 50 luminaires.

Figure 2.5 – Time of use example

Please select the time period that the equipment is in operation from 4 to 5pm.	Please select the time period that the equipment is in operation from 5 to 6pm.	Please select the time period that the equipment is in operation from 6 to 7pm.	Please select the time period that the equipment is in operation from 7 to 8pm.	No. DAYS APPLICABLE ACROSS PEAK PERIOD (Nov-Feb)
4:00 to 5:00pm	5:00 to 6:00pm	6:00 to 7:00pm	7:00 to 8:00pm	83
4:00 to 5:00pm	5:00 to 6:00pm	6:00 to 7:00pm	7:00 to 8:00pm	83
4:00 to 5:00pm 4:00 to 4:30pm 4:30 to 5:00pm Not Operational	5:00 to 6:00pm	6:00 to 7:00pm	7:00 to 8:00pm	83
4:00 to 5:00pm	5:00 to 6:00pm	6:00 to 7:00pm	7:00 to 8:00pm	83

Figure 2.6 – Existing Lighting System tab of the Deemed M&V Plan – Lighting Replacement (Time of use example columns)

**2b) Proposed Lighting System:** Follow exactly the same principles as described above for your existing equipment but this time provide information on the proposed system. As before, the column headers are colour coded, columns highlighted in blue are free text cells and those that require you to select from a drop down list are in red.

Proposed Lighting System						
Key - Column Format						
Enter Free Text						
Choose Option from Drop Down List						
<b>Instructions</b>						
Complete all fields as detailed in the example below. Please complete separate lines for distinct areas and different luminaire types within each area. For each group of lighting filled out on the existing lighting system sheet, corresponding lines on proposed lighting system sheet must also be filled out. Please refer to the <b>Help Tab and Appendix A</b> for further information regarding the completion of the "Proposed Lighting System Tab"						
Lighting	Building Name, Site Location	SITE CODE (follows the format S1, S2, S3 etc)	Building Type	Location within Building	Luminaire Description	Light Source Type
Example	Warehouse A - High Bay Lighting - Derby site	S1	Warehousing	War - Main Warehouse	ACME LED123-48 LED Ceiling luminaire	LED Lightsource
1	Store 1 - Location 1	S1	Retail	Rtl - Main Store	X Type 4ft LED Light (including fixtures and fittings)	LED Lightsource
2	Store 1 - Location 2	S1	Retail	Rtl - Offices	X Type 4ft LED Light (including fixtures and fittings)	LED Lightsource
3	Store 2 - Location 1	S2	Retail	Rtl -Customer Toilets	X Type 4ft LED Light (including fixtures and fittings)	LED Lightsource
4	Store 2 - Location 2	S2	Retail	Rtl - Offices	X Type 4ft LED Light (including fixtures and fittings)	LED Lightsource
5	Store 2 - Location 3	S2	Retail	Rtl - Main Store	X Type 4ft LED Light (including fixtures and fittings)	LED Lightsource

Figure 2.7 – Proposed Lighting System tab of the Deemed M&V Plan – Lighting Replacement

For the replacement technology, you must provide technical specifications or manufacturer brochures to substantiate the kW value for each replacement technology type included in your project. For example, if you were replacing an existing lighting type with two different lighting types then you would need to provide technical specifications for both of the replacement lighting types. Make sure the technical specifications or manufacturer brochures matches the information provided in your Deemed M&V Plan(s) (e.g. if the technical specification says the replacement technology is 6kW then your entry in the calculator should also say 6kW). If they do not match, your application will **not be accepted**.

You will need to send the technical specifications alongside your completed spreadsheet (see section 2.2.1 for a checklist of what you need to provide).

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <u>Technical Specification</u>  <span style="border: 1px solid red; border-radius: 50%; padding: 2px;">States - 30W</span> </div>	
Lamps / Lightsources per Luminaire	Lamp /Lightsource Rating (W)
1	48
1	30

Figure 2.8: Technical specifications or quotes must be provided to substantiate the kW values of replacement equipment in your M&V documents.

**3) Help Tab** – this provides more information on the information required for each of the different input fields.

Help Sheet	
Completing the fields on the Existing Luminaires and Proposed Luminaires	
Item	Numerical reference
Building Type	Please select the type of building from the drop-down menu.
Site Code	Enter the site code for where the measure is being installed, this should follow the format S1, S2, S3
Area of Building	Please select the area of your building which is to be upgraded.
Luminaire Description	Free text entry - please provide your description of the luminaire type.
Light Source Type	Please select your existing and proposed light sources from the drop-down menu. Refer to the overview guide for more information on light source types.
Quantity of luminaires	The number of luminaires of the type described within the area.
Lamps/Light sources per luminaire	Quantity of individual lamps or light sources present in each luminaire.

Figure 2.9 Help Tab of the Deemed M&V Plan – Lighting Replacement

Once you have completed the existing and replacement equipment tabs the total peak kW saving, existing peak kW and proposed peak kW values will be calculated automatically and displayed on the cover sheet, the total kW capacity saving is circled in red in the below screen shot.

Electricity Demand Reduction		PROJECT SUMMARY			
<b>Deemed - Lighting Replacement Plan v1.0</b>		<table border="1"> <tr> <td><b>TOTAL kW Saving</b></td> <td>640.00</td> </tr> </table>		<b>TOTAL kW Saving</b>	640.00
<b>TOTAL kW Saving</b>	640.00				
Participant ID (from your M&V Plan):	ABCD1234	Existing kW:	880.00		
Application ID (from your M&V Plan):	ABCD1234-222	Proposed kW:	210.00		
Organisation:	Organisation Name				
Completed by:	A.N.Other				
<b>Description of project:</b>					
Replacement of 10,000 fluorescent T8 HF Standard lights including fixtures and control gear with LED alternatives. The lighting upgrade will take place across 50% of our estate which equates to 50 medium sized shops distributed across England, Scotland and Wales.					
<b>Exclusions</b>					
<ul style="list-style-type: none"> <li>• This measure does not apply to replacement of failed lighting systems or the introduction of new lighting systems where a system didn't exist before</li> <li>• This measure only includes replacement of whole luminaires. Replacement of lamps within existing luminaires are not eligible</li> <li>• This measure does not apply to new buildings or currently un-lit spaces of existing buildings</li> <li>• This measure does not apply to projects which solely introduce photocell/daylight controls</li> </ul>					

Figure 2.10: Example of completed Cover Sheet Deemed M&V Plan – Lighting Replacement.

Full instructions for each individual deemed M&V Plan(s) can be found in 'Appendix A: Deemed Measure Overview and Data Calculations'.

- 4) Actual time of use:** this tab should be completed as part of your "Winter Capacity Savings Report (WCSR)". The aim of the tab is for you to confirm the actual time of use of your equipment during the winter peak. *Ignore this tab at the application stage.*

If you have any questions regarding the completion of the Deemed M&V Plan(s) you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

### 2.2.1. Summary and checklist

The completed M&V Plan(s) should be saved for your own records using the correct naming convention and submitted as part of your application.

[Application ID, Deemed M&V plan – Technology type]

E.g. GHTT0708-876 Deemed M&V Plan - Heating Controls

Make sure you have also saved technical specifications or manufacturer brochures for each replacement technology type in your project and the entries in your Deemed M&V Plan(s) match the information in the technical specifications. If they do not your application will not be accepted.

See Section 5 for details on how to upload your M&V Documents onto the portal.

## 3. Submitting Metered M&V Documents

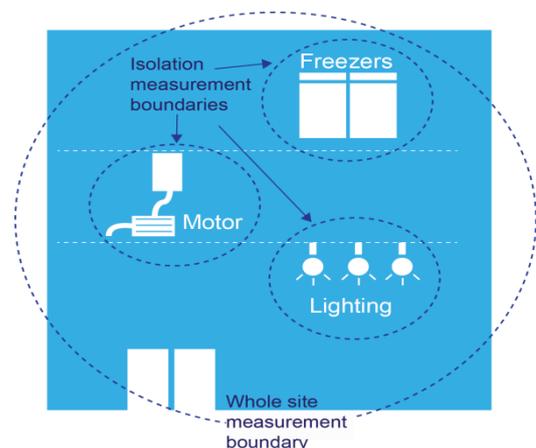
There are three steps involved in using a metered approach to measure savings:

1. Choose which of the three-metered approaches you will use for each measurement boundary in your project (a measurement boundary includes all equipment linked to a meter, see below).
2. Provide details of the existing and replacement equipment, time of use and the measurement approaches you will use in the Metered M&V Plan for all parts of your project using a metered approach to calculate the total expected savings of the metered part(s) of your project.
3. Provide baseline data for each measurement boundary included in your project in the relevant baseline spreadsheet(s). If you don't have baseline data already you can provide this at a later point.

The section below walks you through each step in turn.

### Measurement boundary

A measurement boundary refers to a notional boundary drawn around the equipment that will be measured to calculate kW capacity savings, i.e. what is captured by your metering. The measurement boundary could be just the technologies being installed as part of the project e.g. a sub-meter linked to a pump or a wider boundary such as a site meter that captures electricity use of everything in a building.



### 3.1. Choose your M&V approach

There are three metered approaches that you can choose from, these are:

- **Partial measurement:** a discrete set of readings are taken before and after implementation, often using a temporary or clamp meter
- **Full measurement: sub-metering:** continuous readings are taken from a sub-meter linked to the equipment being replaced before and after implementation
- **Full measurement: total building electricity:** continuous readings are taken from a site meter before and after implementation.

It may be that you have to use more than one approach depending on the nature of the project you are undertaking (e.g. different approaches may be needed for different parts of your project).

Figure 3.1 below provides an overview of each metered approach and the conditions that must be satisfied to make them viable. Figure 3.2 provides a decision tree to help you decide which approach is suitable for each site where you are considering using a metered approach.

Further information on each approach is provided in sections 3.3. to 3.7 in this Manual. Once you've chosen your approach using a decision tree you should read the more detailed information on each approach to check your approach is suitable and check you have the meters in place to collect the required data.

Approach	What is involved	Conditions when approach can be used	Example of types of projects where it might be suitable
Partial measurement	A set of discrete meter readings (often using temporary or clamp metering linked to the equipment being installed) are taken before and after the installation of EDR measures. Time of use is then applied to calculate savings.	Level of demand must be stable i.e. consistent over time. If electricity consumption is variable when the equipment is in use a full measurement approach must be used.	Lighting in an underground car park where one type of lighting is being upgraded to a more efficient alternative. A stable level of demand will be reduced to a lower stable level of demand. A set of discrete clamp meter readings are taken before and after installation and time of use applied to calculate savings.
Full measurement: sub-metering	Readings (typically half-hourly) are taken continuously from a permanent sub-meter that is linked to the equipment being replaced.	Levels of demand are variable over time so it is necessary to take readings continuously over a full operating cycle before and after implementation to calculate savings.	Replacement of a cooling pump. Electricity consumption of the pump varies over a production cycle (e.g. 8 month period) so half-hourly readings are taken from a sub-meter linked to the pump before and after the pump is replaced. The baseline period used is from 1 <sup>st</sup> July 2015 to 29 <sup>th</sup> February 2016.
Full measurement: total building electricity	Readings (typically half-hourly) are taken continuously from a site meter.	Levels of demand are variable over time so it is necessary to monitor equipment over a full operating cycle before and after implementation to calculate savings. Total expected savings must be greater than 10% of total electricity use to make this approach viable otherwise savings will be lost in the background noise of electricity use of other equipment linked to the site meter .	Replacement of a set of chillers within a site where the upgrade is expected to reduce demand by at least 30%. Readings are taken over a 6-month period as chiller intensity varies over that period before and after the upgrade from a site meter.

Figure 3.1: Overview of metered approaches

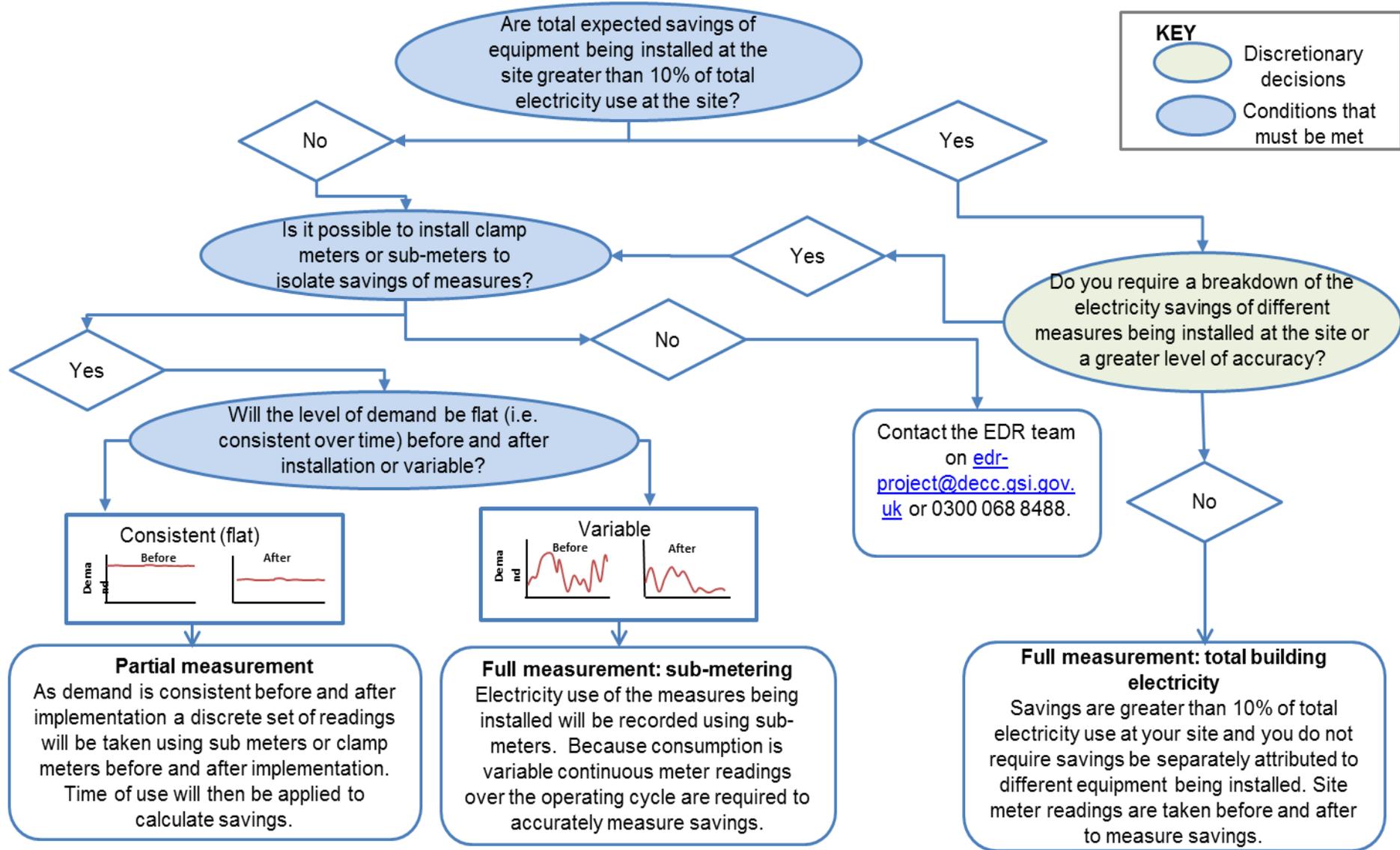


Figure 3.2: Choosing the right metered approach for each site in your project

Once you have chosen which metered approach you are going to use for each site in your project the next steps are to:

- Complete the spreadsheet ‘Metered M&V Plan’ with the details of your existing and replacement equipment to calculate the total expected savings for the metered part of your project. You only need to complete one Metered M&V Plan for the parts of your project that will be measured using meters.
- Provide baseline data for each measurement boundary (see page 26 for a definition of a measurement boundary) included in your project in the correct baseline calculation spreadsheet. Baseline data is a set of meter readings that are taken prior to the installation of more efficient equipment. You may choose to supply baseline data before or after the auction, further information is set out in the Participant Agreement and section 3.3 of this manual.

### 3.2. Completing the Metered M&V Plan

To complete the ‘Metered M&V Plan’ you will need to have details to hand of:

- Existing and replacement equipment in your project including kW values, location, quantity being installed and replaced
- The expected time of use of your equipment over the winter peak that your project will deliver savings (Nov-Feb, weekdays, 4-8 p.m).

You can download the ‘Metered M&V Plan’ from the EDR website. All of the M&V guidance and forms, including Appendices to this Manual, and M&V Documents can be downloaded from [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot). Once you are on this page scroll down until you see one of the links titled ‘supporting information and documents page’. Clicking on this link will take you through to a page that contains all the M&V documents you might need to download.

Guidance

## Electricity Demand Reduction Pilot

From: Department of Energy & Climate Change  
Preview  
Part of: Energy demand reduction in industry, business and the public sector

Organisations could receive financial support for implementing energy efficiency projects through the Electricity Demand Reduction Pilot if they deliver electricity savings at peak times.

Contents

- [What is the EDR Pilot?](#)
- [Further help](#)
- [Timelines](#)

### What is the EDR Pilot?

We're testing whether projects that deliver lasting electricity savings at peak could in future compete for funding with generation, demand side response (DSR) and storage in the GB Capacity Market.

If you're thinking of improving your motor or pump systems, replacing your old light fittings with LED's or making any other improvement to your building or electrical equipment which would deliver lasting peak time electricity savings you could be eligible to take part.

To find out your project is eligible, start by checking our short guide to the pilot on our [supporting information and documents page](#). The rules have changed a bit since the previous phase so even if you couldn't take part last time, it's worth taking

Figure 3.3: EDR Website – where to download M&V documents

## Overview of the Metered M&V Plan

There are a total of five tabs in the Metered M&V Plan:

- Cover sheet:** enter your contact information and a brief summary of the part(s) of your project that will be metered (e.g. technology types, quantities involved and the number of sites etc.). This tab also displays the total expected kW reduction of the metered elements of your project; this is automatically calculated once you have provided information about the existing and replacement equipment.
- Expected savings:** you will need to supply the details of existing and replacement technologies included in the metered part of your project and their time of use. This is used to calculate the total peak kW reduction of the metered parts of your project.
- M&V Approach & baseline:** here you provide more detailed information on the baseline for each measurement boundary included in your metered project. You will need to consult the more detailed guidance on providing baseline data for each approach in section 3.3 in order to do this to make sure your chosen approach is viable.
- Actual time of use:** this tab is to confirm the actual time of use of your equipment during the winter peak that your project delivers savings (*please ignore this tab at the application stage*)
- Help:** provides more detailed help and guidance on the information required for each section

## Instructions for completing the Metered M&V Plan

- Coversheet:** provide your details (e.g. Participant ID, organisation etc.) and a brief summary of the metered part of your project (e.g. technology types and quantities involved, number of sites etc). The estimated total kW reduction will be automatically calculated once you have completed the 'expected savings' tab and displayed on this sheet.

Electricity Demand Reduction		PROJECT SUMMARY	
Version 2.0 Metered M&V Plan		Estimated TOTAL kW Reduction	Actual TOTAL kW Reduction
Participant ID:	ABCD1234		
Application ID:	ABCD1234-567		
Organisation:	Organisation Name		
Completed by:	A.N Other		
<b>Description of project:</b>			
Replacement of 120 motors with 120 high efficiency motors at three sites in England, the sites that the equipment is installed on are similar and are under the same operating regimes. The sites are in operation from 4 to 7pm for all business days and are in operation for the full 83 days over the winter peak period (from 1st November 2016 to 28th February 2017).			
<b>Instructions</b>			
*Cover Sheet - Use this tab to enter information regarding your Participant ID, Application ID and Organisation. Please also provide a brief project. Please note: the information in the box entitled "Estimated Total kW Saving" is completed automatically using information you enter Savings tab".			

Figure 3.4: Coversheet tab of Metered M&V Plan

**2. Expected savings:** you will need to supply the details of the existing and replacement equipment included in the metered part of your project and their time of use. *Step by step instructions on how to complete the tab are provided in the Help Tab of the Metered M&V Plan.* A few points to note:

- To calculate the winter peak capacity savings of the measure being installed you will provide details of the expected time of use of the equipment over the winter peak period (November-February, weekdays, 4-8pm). You do this by providing the total number of days (excluding weekends and bank holidays) over the winter peak November to February (up to a maximum of 83 days) and the typical operating hours that your equipment is expected to be operational during that period between 4-8pm.

To provide information on time of use you will:

- Enter the number of days the equipment is operating for over the winter peak period, November to February (up to a maximum of 83 days). You will need to describe how you arrived at this estimated number of days using the free text box.
- Use dropdowns to indicate the time period that the equipment is in operation between 4-8pm (the whole hour, first half hour or second half-hour or not operational) for each hourly interval.
- A separate line should be provided for each measure and time of use grouping. For example if you have different pump types with different kW values these should be split out on separate lines.
- Please note that while multiple installations of the same measure types will often have the same time of use and so can be grouped together there may be occasions where the same technology type (e.g. pumps) may have different hours of use within the same site because it has a different application (e.g. used in different parts of a production process). In such cases the same measure will need to be entered on separate rows according to the time of use grouping.

**Time of Use Example:**

**Site A**

20 pumps that are all operating for the entire peak period

Complete 1 line for all 20 pumps.

**Site B**

20 pumps, 10 of which are operating for the entire peak period and 10 of which are operating for the first 2 hours only.

Complete 1 line for the first 10 pumps and one line for the second 10 pumps.

*Figure 3.5: Time of use example*

There are two columns where you can enter the expected kW reduction of your equipment, columns H or I. If you already have calculated the peak kW reduction complete column H. You still need to complete columns K-O and Q. If you know the kW demand reduction but haven't taken into account how many peak hours it will apply to, complete column I. The values will be adjusted for peak applicability. You need to complete all columns from J to Q.

Once you have completed all the relevant information in each column of the Expected Savings tab Cell C5 (circled in red in the below figure) will automatically populate. The figure in cell C5 is your total estimated kW savings for the metered parts of your project.

Expected Savings						
Estimated EDR Saving (total kW saving for metered)		340.0	Sum of kW from column J			
<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 40px; height: 15px;"></div> White boxes with black outlines indicate where values should be entered by the applicant  <div style="background-color: #e1f5fe; width: 40px; height: 15px;"></div> Light blue boxes indicate the output of an automatic calculation  <div style="background-color: #f5f5f5; width: 40px; height: 15px;"></div> Grey boxes provide additional information </div>						
Site Code (Free Text)	Existing Technology (Free Text)	Replacement Technology (Free Text)	Technology Category (Drop Down List)	Implementation Start & End Dates (Free Text)		EITHER COMPLETE COLUMN H OR I, (PLEASE SEE INSTRUCTIONS BELOW)
Expected Demand Reduction (kW) - Accounting for applicable hours (Free Text)	Expected Demand Reduction (kW) - Not accounting for applicable hours (Free Text)					
Please enter a site code, use a different site code (e.g. S1, S2, S3) for each site Use the format: number, make and product description. Use the format: number, make and product description. Please choose an item from the dropdown list. Enter the range of dates between which you intend to implement your project. If you know the kW demand reduction taking into account the number of peak hours the reduction will apply to, complete this column. If you know the kW demand reduction but haven't taken into account how many peak hours it will apply to, complete this column.						
<i>Example S1</i>	<i>2500 X 50W GU10 Spotlight</i>	<i>2500 X 5.5W GU 10 LED Spotlight</i>	<i>Lower Energy Lighting with LEDs</i>	<i>01/04/2016</i>	<i>01/07/2016</i>	<i>110</i>
S1	40 x ACME ABCX1-15 - pump motor, plant room B, Midlands site	40 x ACME ABCX1-11 high efficiency pump motor	Motors, Replacement by High Efficiency Motors	01/06/2016	01/09/2016	160.0

Figure 3.6: Expected savings tab of Metered M&V Plan

To support your application you must provide evidence to support the kW estimates of savings for your bid provided on this tab, this must include at least one of the following:

- Supplier audit/specifications for replacement equipment
- Direct measurement of existing equipment
- Calculations used to estimate electricity usage and savings

You should make sure the evidence provided substantiates the kW value for each replacement technology type in your project e.g. if there were three different types of pumps being installed then calculations or specifications of the kW value of all three would be required. Make sure that the evidence matches the information provided in the spreadsheet; if they don't match your application will not be accepted. If you have any problems or questions you can contact us on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

**3. M&V Approach & Baseline:** A measurement boundary refers to the boundary encompassing all the equipment that is captured by a meter. In this tab you must provide information regarding the proposed baseline for each measurement boundary included in your project. For example, if you have six separate measurement boundaries across three different sites you would have to provide information regarding your baseline for six boundaries to measure and verify the savings from your project. You can provide your baseline data by the end of March prior to your delivery year. See section 3.3 for more detailed guidance on defining your baseline.

Step by step instructions on how to complete the tab are provided in the Help Tab of the Metered M&V Plan. A few important points to note:

- **Measurement boundary duration:** you will have to provide detail on the length of time over which baseline data is collected for each measurement boundary in your metered project and a summary of why the duration chosen for each baseline is sufficient to accurately measure savings of equipment included in the boundary. You also need to have checked that your baseline meets minimum accuracy requirements (full details on how to complete the baseline spreadsheets are provided from Section 3.3. in this Manual).

- **The approach to adjustments:** in Column J within the M&V Approach & Baseline tab state whether you will be making any adjustments to the baseline and in Column K you will need to justify the approach chosen e.g. why no adjustment is required or where it is required why and describe the variable(s) that will be used to adjust the baseline and data that will be collected for the independent variable. More detailed guidance on adjustments is set out in section 3.7.

M&V Approach & Baseline					
Boundary Code (Free Text)	Site Code (Free Text)	MPAN (Free Text)	Project Component (Free Text)	M&V Approach (Drop Down List)	Measurement Boundary Description (Free Text)
Boundary Code (representing each Measurement Boundary) follows the format B1, B2, B3 etc.	Use the site codes from the "Expected Savings" tab. You may have more than one boundary per site.	Enter the MPAN of the meter that will be used	Describe the part of the project you are measuring, either individual technology or a selection of technology types or all of the measures on the site.	Select the M&V approach you are using for this boundary	Describe the measurement boundary you are using for your M&V Approach
B1	S1	1800046591695	Upgrade of 4 motors used in the manufacturing process.	Full Measurement: Sub metering	Full Measurement: Sub metering - details of the submeter used the capture equipment demand, and the equipment it covers
B1	S1	1111000022223	Measuring the upgrade of 40 motors used in the manufacturing process at the site, as the savings are expected to be over 10% we are using the site meter	Full Measurement: Whole Site	The measurement boundary is the whole of Site 1, this is everything covered by the main site electricity meter

Figure 3.7: M&V Approach & Baseline tab of Metered M&V Plan

4. **Actual Winter Peak Post Install:** this tab should be completed as part of your "Winter Capacity Savings Report (WCSR)". The aim of the tab is for you to confirm the actual time of use of your equipment during the winter peak. *Please ignore this tab at the application stage.* Please see section 7.2.2 of this M&V Manual for detailed information about the completion of this tab.

### How to Calculate your Total kW Capacity Savings

Please note, once you know the total capacity saving from the metered elements of your project (at application stage) you must complete "M&V Summary Sheet". Within this spreadsheet you will enter your total kW figure from your metered and deemed parts of your project. Please refer to section 4 for full details of how to complete this spreadsheet.

### Summary & checklist

The completed Metered M&V Plan(s) should be saved for your own records and submitted as part of your application using the following naming convention:

[Application ID, Metered M&V plan]

E.g. GHTT0708-876, Metered M&V Plan

Make sure you have also saved technical specifications or manufacturer brochures for each replacement technology type in your project and the entries in your Metered M&V Plan match the information in the technical specifications. If they don't your application won't be accepted.

See Section 5 for details on how to upload your M&V Documents onto the portal.

### 3.3. Submitting baseline data

If you haven't already collected baseline data for the winter peak period you can provide it to DECC at a later point. The deadline for providing your baseline data is:

- **30 March 2016:** if you are installing your equipment to deliver savings over the winter peak Nov 2016 – Feb 2017.
- **30 March 2017:** if you are installing your equipment to deliver savings over the winter peak Nov 2017– Feb 2018

*If you do not provide baseline data by the deadlines set out above the metered elements of your project will no longer be eligible and will be ruled out of the EDR Pilot.*

You should already have used the decision tree on page 29 to decide which of three different measurement approaches you are using for each site in your project. Each measurement approach has its own baseline spreadsheet in which you provide your baseline data. Use this section to:

- Check the approach you have chosen is appropriate for the part of your project where you are considering using a metered approach
- Fill out the relevant baseline spreadsheet with your baseline data, once you have done this you can also fill out the 'M&V Approach and Baseline' tab of your Metered M&V Plan (see previous section) with the details of your baseline.

**Step 1:** First read the guidance in this Manual at the start of the Section 3 to make sure the metered approach you have chosen is suitable for your project.

**Step 2:** Once you are sure, download the relevant baseline spreadsheet from the EDR website. All of the M&V guidance and forms, including Appendices to this manual, and M&V Documents can be downloaded from [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot).

Once you are on this page scroll down until you see one of the links titled 'supporting information and documents page'. Clicking on this link will take you through to a page which contains all the M&V documents you might need to download. If you are struggling to find a document or the formats don't work with your software, please send us an email letting us know at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk).

Now go to the relevant part of the Manual and follow the instructions for the metered approach(es) you have chosen for your project:

- For partial measurement go to section 3.4 (see below)
- For either full measurement approaches (whole site or sub-meter) go to section 3.5

### 3.4. Partial measurement

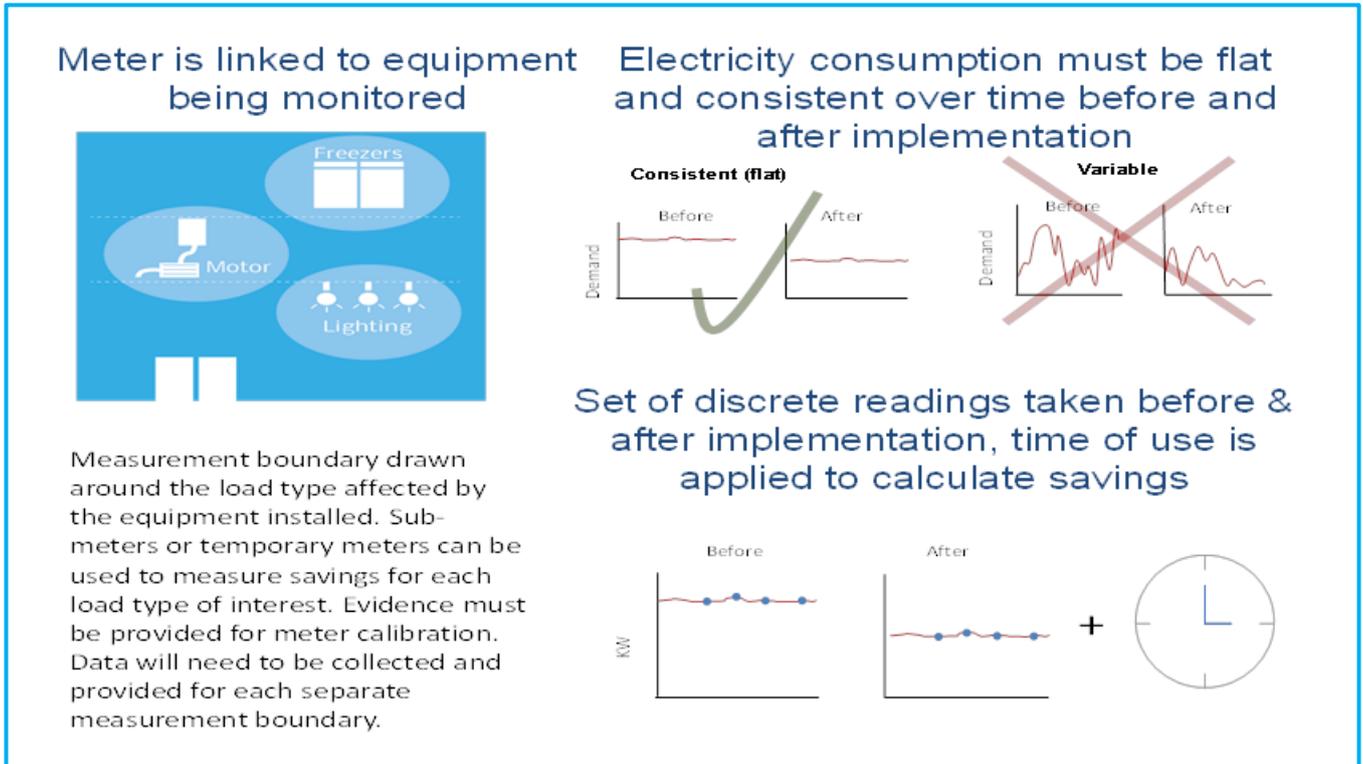


Figure 3.8 Partial Measurement Overview

In order to use partial measurement approach the demand profile (load profile) for the equipment must be stable i.e. consistent over time. It may be that the hours of equipment usage changes throughout the year, for example longer operating hours. However there must not be any significant variation (including seasonal variation) in the level of demand.

An example where partial measurement would be suitable would be lighting in an underground car park as the draw from the lighting will be constant and not affected by external variables such as daylight levels.

#### Overview of the Baseline Spreadsheet for Partial Measurement

There are a total of seven tabs in the Baseline Spreadsheet for Partial Measurement:

- 1) **Cover sheet:** enter your contact information. This tab displays the total kW capacity saving once you have completed the 'baseline' and 'baseline peak applicable hours' tabs.
- 2) **Baseline:** in this tab you will need to provide information about where you are getting your data from, if you are using a sampling approach and provide the meter readings of your existing equipment. This tab will tell you if you've entered enough readings to meet accuracy requirements and have a valid baseline. Information regarding sampling can be found in 3.8.
- 3) **Baseline peak applicable hours:** here you provide time of use information for your existing equipment.
- 4) **Winter Peak Reporting:** meter readings once you have installed your equipment (ignore this tab at the application stage).
- 5) **Winter Peak Applicable Hrs:** the time of use of your replacement equipment (ignore this tab at the application stage).

- 6) **Final Data Request:** this tab allows you to enter information to support your final report. (ignore this tab at the application stage).
- 7) **Help:** provides more detailed help and guidance on completing the partial measurement baseline spreadsheet.

In the spreadsheet:

- white boxes are where you should provide input
- grey boxes provide more information (click on them to reveal the info)
- light blue boxes are automatically calculated
- green boxes indicate when the information you have provided is acceptable
- red boxes indicate when the information you have provided is not acceptable

**Instructions for completing the Baseline Spreadsheet for Partial Measurement:**

- 1) **Coversheet Tab:** use this tab to enter your details (Participant ID, Application ID etc.). Once you have entered your meter readings before and after installation it will also display the predicted total kW capacity savings of equipment that the baseline spreadsheet represents.

**Baseline Spreadsheet for Partial Measurement**  
Version 2.0

<b>Participant ID:</b>	ABCD1234
<b>Application ID:</b>	ABCD1234-123
<b>Organisation:</b>	Organisation Name
<b>Completed by:</b>	A.N. Other

PROJECT SUMMARY

Predicted TOTAL kW Saving	Actual TOTAL kW Saving

---

**Instructions**

**Cover Sheet** - Please complete cells C8:C11 above

**Baseline & Baseline Peak Applicable Hrs tabs:**  
Complete all the sections in both of these tabs  
Further details on how to fill in each column is given on the [Help tab](#)

**Winter Peak Reporting & Winter Peak Applicable Hrs tabs:** These tabs should be completed after installation, ignore these tabs at the application stage  
Complete all the sections in both of these tabs  
Further details on how to fill in each column is given on the

<div style="border: 1px solid #003366; width: 100%; height: 15px; background-color: white;"></div>	White boxes with blue outlines indicate where values should be entered by the applicant
<div style="background-color: #ADD8E6; width: 100%; height: 15px;"></div>	Light blue boxes indicate the output of an automatic calculation
<div style="background-color: #D3D3D3; width: 100%; height: 15px;"></div>	Grey boxes provide additional information – those marked “Click here for More Information” need you to click on them
<div style="background-color: #008000; width: 100%; height: 15px;"></div>	Green boxes indicate when the information you have provided is acceptable
<div style="background-color: #FF0000; width: 100%; height: 15px;"></div>	Red boxes indicate when the information you have provided is not acceptable and you need to review the information you have entered

Figure 3.9: Coversheet tab of Baseline Spreadsheet for Partial Measurement

- 2) **Baseline Tab:** in this tab you will need to provide information about where you are getting your data from, if you are using a sampling approach and where you provide the meter readings of your existing equipment.

Calculating your kW Baseline															
<a href="#">Click here for More Information</a>															
<table border="1"> <thead> <tr> <th>Tab</th> <th>Section</th> </tr> </thead> <tbody> <tr> <td>Baseline</td> <td>B.1.0 General Information</td> </tr> <tr> <td>Baseline</td> <td>B.2.0 Sampling</td> </tr> <tr> <td>Baseline</td> <td>B.3.0 Calculating your kW Baseline</td> </tr> <tr> <td>Baseline</td> <td>B.3.1 Baseline Data</td> </tr> <tr> <td>Baseline</td> <td>B.3.2 Baseline Data Summary</td> </tr> <tr> <td>Baseline Peak Applicable Hrs</td> <td>B.4.0 Peak Applicable Hours</td> </tr> </tbody> </table>		Tab	Section	Baseline	B.1.0 General Information	Baseline	B.2.0 Sampling	Baseline	B.3.0 Calculating your kW Baseline	Baseline	B.3.1 Baseline Data	Baseline	B.3.2 Baseline Data Summary	Baseline Peak Applicable Hrs	B.4.0 Peak Applicable Hours
Tab	Section														
Baseline	B.1.0 General Information														
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Baseline	B.3.0 Calculating your kW Baseline														
Baseline	B.3.1 Baseline Data														
Baseline	B.3.2 Baseline Data Summary														
Baseline Peak Applicable Hrs	B.4.0 Peak Applicable Hours														
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<b>B.1.0 General Information</b>															
<table border="1"> <tr> <td style="background-color: #003366; color: white;">What is the source of your kW data?</td> <td style="text-align: center;"><a href="#">Click here for More Information</a></td> </tr> </table>	What is the source of your kW data?	<a href="#">Click here for More Information</a>													
What is the source of your kW data?	<a href="#">Click here for More Information</a>														
<table border="1"> <tr> <td style="background-color: #003366; color: white;">M&amp;V Approach</td> <td style="text-align: center;">Partial Measurement</td> </tr> <tr> <td colspan="2">The Partial Measurement method requires that the number of applicable hours be input into the table in section B.4.0 Peak Applicable Hours</td> </tr> </table>	M&V Approach	Partial Measurement	The Partial Measurement method requires that the number of applicable hours be input into the table in section B.4.0 Peak Applicable Hours												
M&V Approach	Partial Measurement														
The Partial Measurement method requires that the number of applicable hours be input into the table in section B.4.0 Peak Applicable Hours															

Figure 3.10: General Information section of Baseline Tab

- B.1.0 General Information:** In this section you need confirm to the source of your baseline readings e.g. readings from a clamp meter. The raw data you are using must be attached as part of your submission.
- B.2.0 Sampling:** it may be that rather than taking readings from all the units you have (e.g. pumps) you decide to take readings from a sub-set of the pumps to reduce burden. If you are using sampling you will need to provide details of the size of your sample and the overall population that it represents (e.g. 51 pumps are sampled representing a wider population of 200 pumps). The spreadsheet is set up so that it automatically calculates the sample required for the size of your population. Once you have entered the required information about you sample cell C37 states if you sample size is acceptable (in green) or too small (in red). This needs to be green to be accepted. Please note further information regarding sampling can be found in Section 3.8.

B.2.0 Sampling		
Does the data, entered into section B.3.1 (below), correspond to a sample from a wider population of existing units included within this project?	Yes	<a href="#">Click here for More Information</a>
<i>Note that if you are not sampling because you have several submeters which capture all the changes that are being made, separate baselines should be calculated for each submeter.</i>		
<b>Sample Size Calculator</b>		
What number of units (e.g. number of pumps) are in the measurement boundary (represented in this baseline spreadsheet)	2000	
Sample Size Calculator - Based on the information you have entered into Cell C31. The following sample size should be used as a minimum	68	<a href="#">Click here for More Information</a>
What are the number of units in your sample?	68	
How many units do each of the baseline readings below represent?	68	<a href="#">Click here for More Information</a>
Sample Size acceptable?	Sample Size Acceptable	<a href="#">Click here for More Information</a>

Figure 3.11: Sampling section of baseline tab

Please note - if you are not sampling please select “No” in cell C26 and continue to section ‘B.3.1 Baseline data’.

- **B.3.1 Baseline data:** in this section you will enter your meter readings including the date and the kW value for each reading. To note you need to provide a minimum of six readings, too few readings and your baseline will not be acceptable and the box circled in red in the below screen shot will indicate that you do not have enough readings. That means a minimum of six readings but you may need more.

**B.3.0 Calculating your kW Baseline**

**You Must Ensure that the below Cell says Yes"**

Have you Entered Enough Readings?	Yes	Click here for More Information
-----------------------------------	-----	---------------------------------

**B.3.1 Baseline Data**

Reading date	Baseline kW	Baseline kW	Total Average Baseline kW
01/01/2015	64.000	64.00	64.50
02/01/2015	66.000	66.00	64.50
03/01/2015	63.000	63.00	64.50
04/01/2015	63.000	63.00	64.50
05/01/2015	62.000	62.00	64.50
08/01/2015	64.000	64.00	64.50
09/01/2015	66.000	66.00	64.50
10/01/2015	68.000	68.00	64.50

Figure 3.12: Baseline Data section of baseline tab

Please note you must complete the ‘Baseline Peak Applicable Hrs’ tab before the baseline section calculates correctly. Therefore once you have completed the above information please go to the ‘baseline peak applicable hours’ tab.

**3. Baseline peak applicable hours:** in this tab you enter information on the time of use for your equipment represented in the partial measurement baseline spreadsheet. This information is used to calculate the expected peak kW saving of your existing equipment. Please note that you must complete this tab or the baseline tab will not work correctly.

- Use dropdowns to indicate the time period that the equipment is in operation between 4-8pm (the whole hour, first half hour or second half-hour or not operational) for each hourly interval. Please note that the equipment must be in operation for the full periods (e.g. half hour or a full hour) to select these options, if you are only in operation for 25 minutes then you cannot select the half hour option.
- If the peak applicability is the same across the population (e.g. 100 motors running from 4pm to 7pm, you are only required to complete one line).
- Detailed instructions can be found on the Help tab within the Partial Measurement Baseline spreadsheet.

<b>Sections for completion in the Baseline Peak Applicable Hrs tabs</b>					
Tab	Section				
Baseline Peak Applicable Hrs	B.4.0 Peak Applicable Hours				
<b>B.4.0 Peak Applicable Hours</b>					
What number of items correspond to each number of peak hours?					
Sum of applicable hours				332	
Total possible applicable hours				332	
Total number of units				2000	
Percentage of total possible applicable hours				100.00%	
Peak Applicable Hours				No. of days applicable across peak period (Nov-Feb)	No. of Units Each of the Peak Applicable Hours Rows Applies to
4 - 5pm?	5 - 6pm?	6 - 7pm?	7 - 8pm?		
Click here for <b>More Information</b>	Click here for <b>More Information</b>	Click here for <b>More Information</b>	Click here for <b>More Information</b>	Click here for <b>More Information</b>	Click here for <b>More Information</b>
4:00 to 5:00pm	5:00 to 6:00pm	6:00 to 7:00pm	7:00 to 8:00pm	83	2000

Figure 3.13: Baseline Peak Applicable Hrs tab

Now you have completed the baseline peak applicable hours tab you can continue completing the baseline tab.

## 2. Baseline Tab

- B.3.2 Baseline data summary:** in this section summary statistics such as standard error are shown, this section tells you what the total average baseline kW value is and if accuracy requirements have been met. Further details regarding the accuracy requirements are provided in ‘Appendix B- Checking the Accuracy of your Baseline’ and within the spreadsheet.
- The only values you need to enter are ‘Estimated kW Savings’ and ‘Meter Relative Precision’. Detailed instructions can be found on the help tab within the Partial Measurement Baseline spreadsheet.

<b>B.3.2 Baseline Data Summary</b>		
<b>Total Average Baseline kW</b>	64.50	Click here for <b>More Information</b>
<b>Standard Error</b>	2.00000	Click here for <b>More Information</b>
<b>Estimated kW Savings</b>	10.00	Click here for <b>More Information</b>
<b>Meter relative precision</b>	0.01	Click here for <b>More Information</b>
<b>Standard Meter Error</b>	2.632701438	
<b>Combined standard error</b>	3.306223958	
<b>Baseline Demand (kW)</b>	64.50	
<b>You Must Ensure that the below Cell says Yes"</b>		
<b>Have You Met Accuracy Requirements</b>	Yes	Click here for <b>More information</b>

Figure 3.14: Baseline data summary

- A visual representation of your data is also provided. If there is too much variability it may suggest that the basic condition required to make partial measurement approach viable (consistent demand) is not met. In which case you should use a full measurement approach instead.

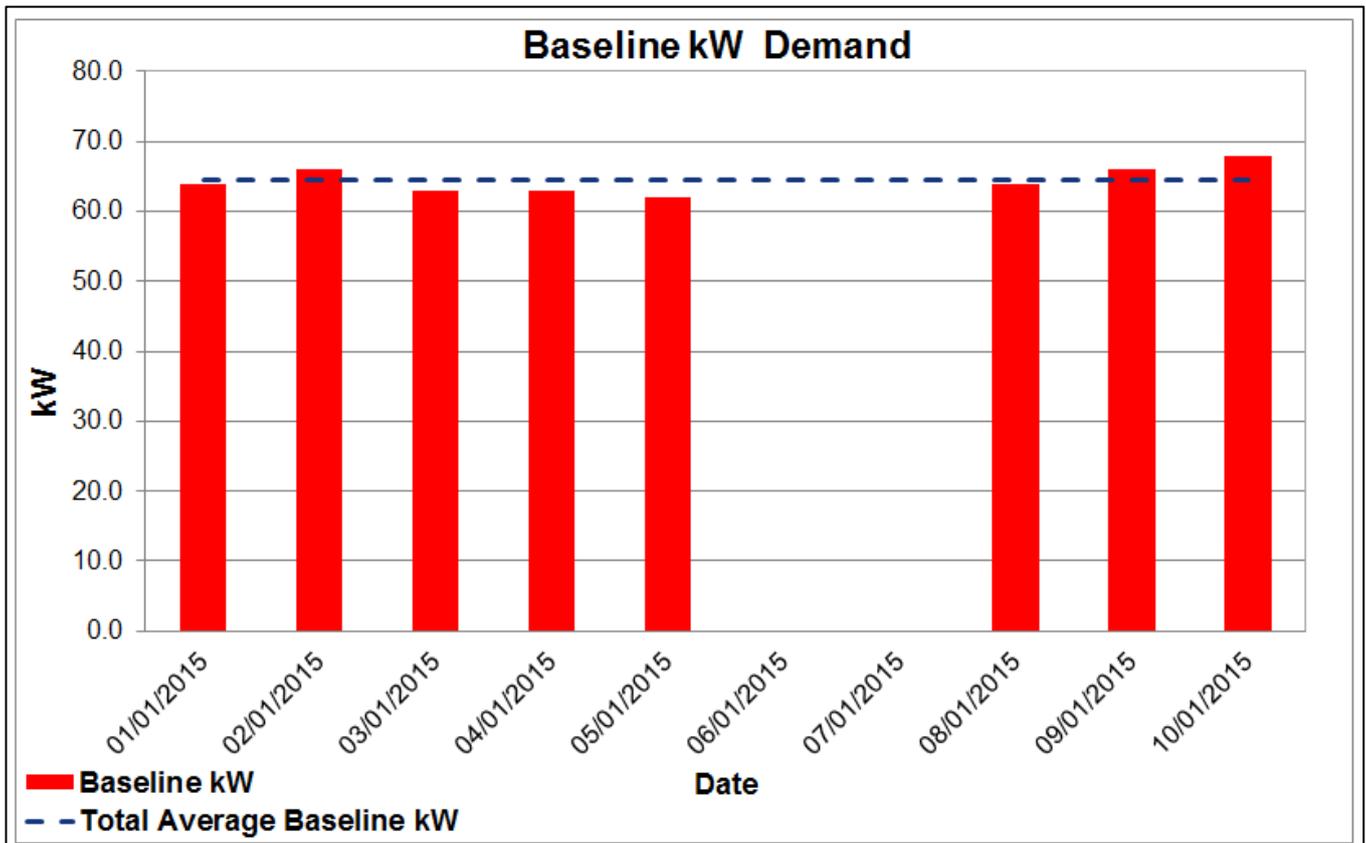


Figure 3.15: Baseline kW Demand chart

**4. Winter Peak Reporting:** use this tab to provide meter readings once you have installed your equipment.

**5. Winter Peak Applicable Hrs:** the actual time of use of your equipment during the winter peak that your project delivered savings.

You only need to fill in tabs 4 and 5 after you have installed your new equipment. You repeat the steps outlined above for the baseline and baseline peak applicable hours tabs (taking meter readings) after you have installed your equipment.

Once you have completed the above tabs a total kW capacity saving value will be displayed on your coversheet.

**6. Final Data Request:** this tab allows you to enter information to support your final report (ignore this tab at the application stage). Please see section 7.2.3. For guidance on how to complete this tab.

**7. Help tab:** Detailed guidance on how to complete the Baseline Spreadsheet for Partial Measurement is within the help tab.

## Summary & checklist

The completed partial measurement baseline spreadsheet should be saved for your own records using the naming convention shown below and submitted as part of your application or by 30 March prior to the winter peak in which your project will deliver capacity savings.

[Application ID, Partial Measurement – Boundary number]

E.g. GHTT0708-876 Partial Measurement – B1

See Section 5 for details on how to upload your M&V Documents onto the portal.

If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

## 3.5. Full Measurement: Sub-meter or Whole Site meter?

### Full measurement approaches

As explained at the beginning of Section 3 there are two Full Measurement metered approaches, either sub metering or total building electricity (where you use a site meter). With a full measurement approach you will take continuous readings before and after implementation over a full typical operating cycle of the equipment. The continuous readings taken before implementation will be compared to those taken after to calculate savings.

You can use a **site meter** if:

- Total expected savings are equal or greater than 10% of total electricity use at the site; otherwise savings will be lost in the background noise of other equipment linked to the site meter; and
- You don't need to isolate the savings of particular equipment.

The advantage of this approach is that you can use an existing site meter and only use one set of readings for the site, the downside is that it may be less accurate at attributing savings.

You should use a **sub-meter** if:

- Expected savings are less than 10% of total electricity use at the site; or
- You want to isolate the performance of specific equipment e.g. motors on a production line.

With this approach you need to collect meter readings for each sub-meter but it should enable you to more accurately isolate and measure savings.

### When you should provide your baseline data

If you haven't already collected baseline data for the winter peak period you can choose to collect data baseline data over a forthcoming winter peak and provide it to DECC at a later point. The deadline for providing your baseline data is:

- **30 March 2016:** if you are installing your equipment to deliver savings over the winter peak Nov 2016 – Feb 2017.
- **30 March 2017:** if you are installing your equipment to deliver savings over the winter peak Nov 2017– Feb 2018

If you do not provide baseline data by the deadlines set out above the metered elements of your project will no longer be eligible and will be ruled out of scope of the pilot.

Irrespective of which option you go for you will need to decide whether you need to take account of other factors that could affect demand as this will determine which baseline spreadsheet you need to use. Further detail is set out in figure 3.16 below.

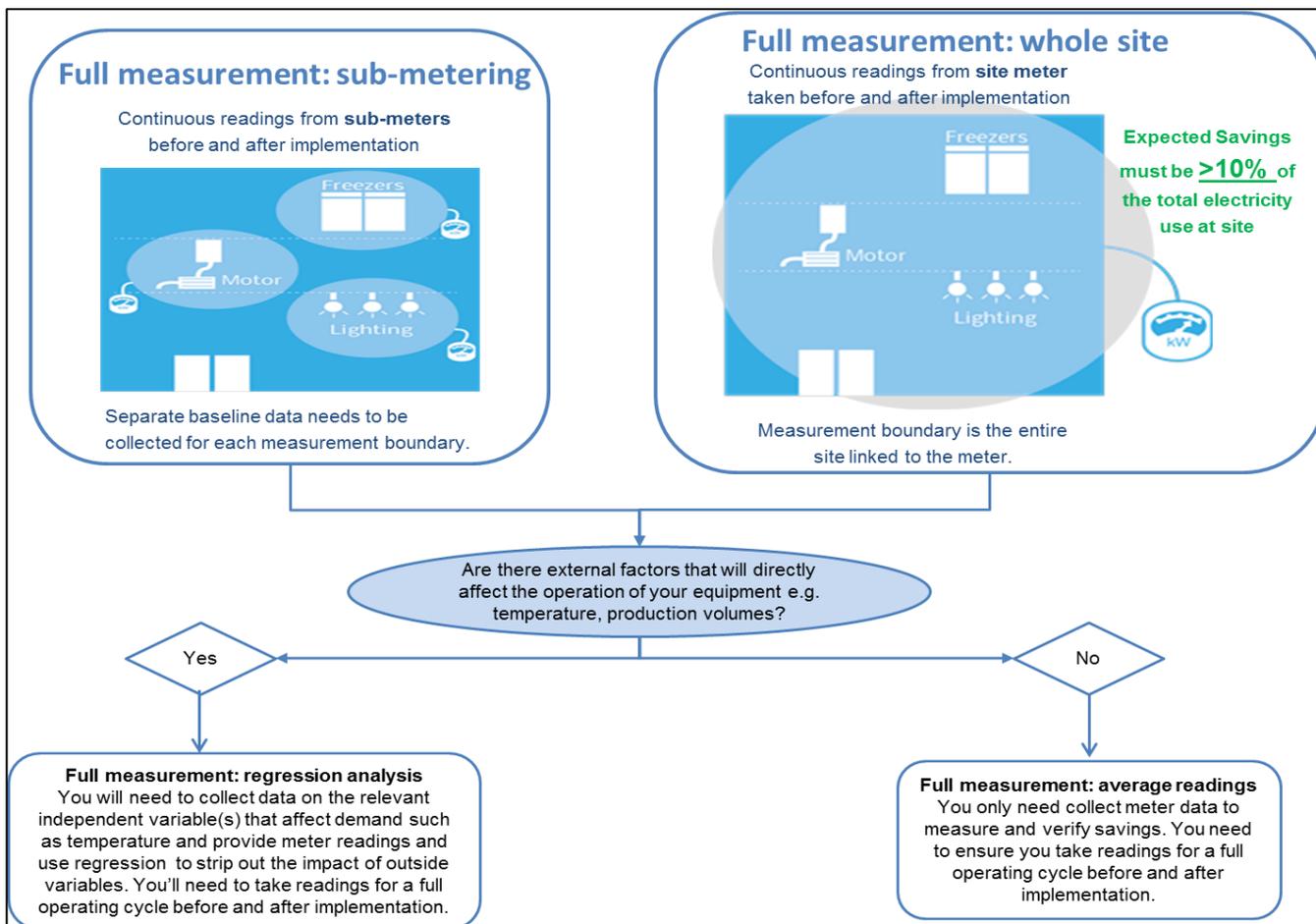


Figure 3.16: Determining if regression analysis is needed

### Regression analysis

If it is likely that the performance of your equipment is likely to be affected by external factors such as temperature e.g. an air conditioning system may work harder in hotter temperatures then you will need to collect data on the variables that could affect demand alongside your meter readings. Regression will then be used to strip out the impact of the external variables and calculate savings. You will need to provide your baseline data and data for the independent variable(s) in the full measurement: regression analysis baseline spreadsheet in order to calculate savings. See section 3.7 for more detail. You can contact us if you have any questions.

### Average readings

If your equipment is unlikely to be affected by external factors (e.g. lighting in the basement of a building) then you need only focus on collecting meter readings. You should input your baseline readings into the full measurement average readings baseline spreadsheet.

If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

### How long do you need to take readings for?

Whichever approach you use it is important that the baseline period is representative of normal operation during peak hours (weekdays, 4 - 8pm). If there are variations in demand, you should include a full cycle of operation.

A cycle in this context refers to the amount of time between successive similar operating modes, either of a whole building or individual technology.

The length of a full cycle of operation will be determined by the amount of time needed to elapse for a full range of operating modes to be experienced. At the total site level, buildings such as offices, hospitals or retail sites, a full cycle is taken as a calendar year if there are seasonal variations.

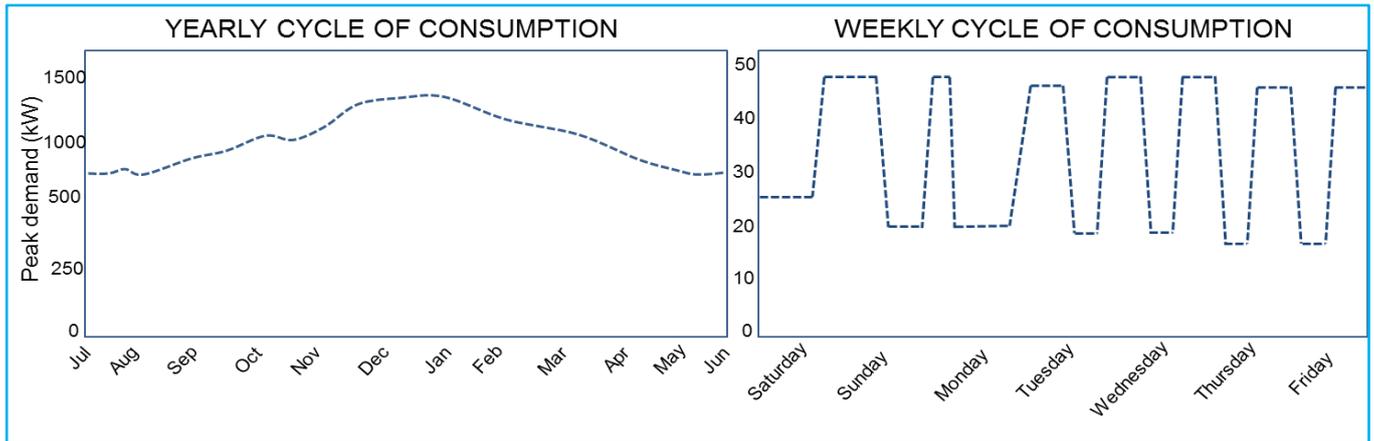


Figure 3.17 Cycles of operation

For individual technologies, it may be shorter, for example, motors used in an industrial process or lighting in a retail site with a weekly cycle. Where there is no seasonal variation (i.e. operating cycles are the same throughout the year) then the cycle of operation does not have to coincide with winter peak as use of the equipment would confidently not be expected to be any different over this period. However, the operating cycle must be representative of the full range of normal equipment operation.

Examples of Cycle Lengths		
Project	Cycle	Rationale
HVAC replacement in a hotel	1 calendar year	The HVAC system electricity demand is dependent on external temperatures, therefore a calendar year captures a full cycle of conditions
Variable speed drive in a production plant	1 month	The equipment affected by the variable speed drives is dependent on production volumes. A full range of expected production volumes would be experienced at the plant over the course of a month.
Lighting upgrade in a windowless office	1 week	Lighting patterns are not impacted by the external environment and follow the same weekly pattern throughout the year and are not expected to change during the baseline and reporting periods.

Figure 3.18 Examples of Cycle Lengths

For certain technology installations including Voltage Optimisation a full 12 months of baseline data is required. This is because voltage supplies will tend to vary throughout the year and so measuring equipment at only times of high voltage would give an over optimistic assessment of performance.

### 3.6. Full Measurement Average Readings baseline spreadsheet

To complete the 'Full Measurement Average Readings' baseline spreadsheet you need to provide baseline data over a full operating cycle of the equipment and provide the sum of kWh or kW recorded over peak hours (4pm-8pm business days) for the defined period.

Download the full measurement average readings spreadsheet from the EDR website. All of the M&V guidance and forms, including Appendices to this Manual, and M&V Documents can be downloaded from [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot).

Once you are on this page scroll down until you see one of the links titled 'supporting information and documents page'. Clicking on this link will take you through to a page which contains all the M&V documents you might need to download. If you are struggling to find a document or the formats don't work with your software, please send us an email letting us know at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk).

#### Overview of the Full Measurement Average Readings baseline spreadsheet:

There are a total of five tabs in the Full Measurement Average Readings baseline spreadsheet

1. **Cover sheet:** enter your contact information. The cover sheet also displays the total kW capacity saving once meter readings have been provided.
2. **Baseline:** in this tab you will need to provide information about where you are getting your data from (submeter or whole site meter), you need to state if you are using a sampling approach and you will provide the baseline readings from the relevant meter prior to installation of the new equipment
3. **Winter Peak Reporting:** meter readings from the same meter used to calculate the baseline once you have installed your equipment
4. **Final Data Request:** this tab allows you to enter information to support your final report. *(ignore this tab at the application stage).*
5. **Help:** provides more detailed help and guidance on completing the Full Measurement Average Readings baseline spreadsheet

In the spreadsheet:

- white boxes are where you should provide input
- grey boxes provide more information (click on them to reveal the info)
- light blue boxes are automatically calculated
- green boxes indicate when the information you have provided is acceptable
- red boxes indicate when the information you have provided is not acceptable

#### Instructions for completing the Full Measurement: Average Readings spreadsheet

1. **Coversheet Tab:** use this tab to enter your details (Participant ID, Application ID etc.). Once you have entered your meter readings before and after installation it will also display the total kW capacity savings of equipment represented in the baseline spreadsheet.

# Baseline Spreadsheet for Full Measurement - Average Readings

Version 2.0

Participant ID:	ABCD1234
Application ID:	ABCD1234-222
Organisation:	Organisation Name
Completed by:	A.N.Other

PROJECT SUMMARY	
Predicted TOTAL kW Saving	Verified TOTAL kW Saving

Instructions											
<p><b>Cover Sheet</b> - Please complete cells C9:C12 above</p> <p><b>Baseline Tab</b> - Complete all the sections in this tab (B1.0 to B3.2). Further details on how to fill in each column is given on the <a href="#">Help tab</a></p> <ul style="list-style-type: none"> <li>Please provide the RAW metered data which has been used to calculate the figures entered into section B.3.1.</li> </ul> <p><b>Winter Peak Reporting</b> - Once the Peak Applicable Reporting Period has passed, following the project implementation, the Reporting tab can be completed. Please:</p> <ul style="list-style-type: none"> <li>Complete sections R.1-3 in the Reporting Tab.</li> </ul> <ul style="list-style-type: none"> <li>Please provide the RAW metered data which has been used to calculate the figures entered into section R.3.1.</li> </ul>	<table border="1"> <tr> <td></td> <td>White boxes with blue outlines indicate where values should be entered by the applicant</td> </tr> <tr> <td></td> <td>Light blue boxes indicate the output of an automatic calculation</td> </tr> <tr> <td></td> <td>Grey boxes provide additional information – those marked "Click here for More Information" need you to click on them</td> </tr> <tr> <td></td> <td>Green boxes indicate when the information you have provided is acceptable</td> </tr> <tr> <td></td> <td>Red boxes indicate when the information you have provided is not acceptable and you need to review the information you have entered</td> </tr> </table>		White boxes with blue outlines indicate where values should be entered by the applicant		Light blue boxes indicate the output of an automatic calculation		Grey boxes provide additional information – those marked "Click here for More Information" need you to click on them		Green boxes indicate when the information you have provided is acceptable		Red boxes indicate when the information you have provided is not acceptable and you need to review the information you have entered
	White boxes with blue outlines indicate where values should be entered by the applicant										
	Light blue boxes indicate the output of an automatic calculation										
	Grey boxes provide additional information – those marked "Click here for More Information" need you to click on them										
	Green boxes indicate when the information you have provided is acceptable										
	Red boxes indicate when the information you have provided is not acceptable and you need to review the information you have entered										

Figure 3.19: Coversheet tab of Average Readings Baseline Spreadsheet

**2. Baseline Tab:** in this tab you will need to provide information about where you are getting your data from, if you are using a sampling approach and provide the meter readings of your existing equipment.

**B.1.0 General Information:** in this section you provide information about where you are getting your data from (sub meter or whole site meter) and the name of the data file containing the raw kW or kWh data you are submitting to support the application.

Calculating your kW Baseline											
<p><a href="#">Click here for More Information</a></p>											
<p><b>Sections to be Completed in this Tab</b></p> <p><b>B.1.0 General Information</b></p> <p><b>B.2.0 Sampling</b></p> <p><b>B.3.0 Calculating your kW Baseline</b></p> <p><b>B.3.1 Baseline Data</b></p> <p><b>B.3.2 Baseline Data Summary</b></p>											
<p><b>B.1.0 General Information</b></p> <table border="1"> <tr> <td> <p>What is the source of your kW or kWh data i.e what meter is it from?</p> </td> <td> <p><i>e.g. sub-meter recording half hourly kWh for 70 of the lights</i></p> </td> <td> <p><a href="#">Click here for More Information</a></p> </td> </tr> <tr> <td> <p>What is the name of the data file containing the kW or kWh information used to complete this application? (This should be attached to your application)</p> </td> <td> <p><i>'Half hourly data file - sub meter data 70 lights.xls'</i></p> </td> <td> <p><a href="#">Click here for More Information</a></p> </td> </tr> <tr> <td> <p><b>M&amp;V Approach</b></p> </td> <td colspan="2"> <p>Full Measurement: Total Building Electricity</p> </td> </tr> </table>			<p>What is the source of your kW or kWh data i.e what meter is it from?</p>	<p><i>e.g. sub-meter recording half hourly kWh for 70 of the lights</i></p>	<p><a href="#">Click here for More Information</a></p>	<p>What is the name of the data file containing the kW or kWh information used to complete this application? (This should be attached to your application)</p>	<p><i>'Half hourly data file - sub meter data 70 lights.xls'</i></p>	<p><a href="#">Click here for More Information</a></p>	<p><b>M&amp;V Approach</b></p>	<p>Full Measurement: Total Building Electricity</p>	
<p>What is the source of your kW or kWh data i.e what meter is it from?</p>	<p><i>e.g. sub-meter recording half hourly kWh for 70 of the lights</i></p>	<p><a href="#">Click here for More Information</a></p>									
<p>What is the name of the data file containing the kW or kWh information used to complete this application? (This should be attached to your application)</p>	<p><i>'Half hourly data file - sub meter data 70 lights.xls'</i></p>	<p><a href="#">Click here for More Information</a></p>									
<p><b>M&amp;V Approach</b></p>	<p>Full Measurement: Total Building Electricity</p>										

Figure 3.20: General information section of the Average Readings Baseline Spreadsheet

**B.2.0 Sampling:** it may be that rather than taking readings from all the units you have you decide to take readings from a sub-set of meters to reduce burden. If you are using sampling you will need to provide details of the size of your sample and the overall population that it represents e.g. 51 lights are sampled representing a wider population of 200 lights. The spreadsheet is set up so that it automatically calculates the sample required for the size of your population. Once you have entered the required information about you sample cell C32 states if you sample size is acceptable (in green) or too small (in red). Please note further information regarding sampling can be found in section 3.8.

Please note - if you are not sampling please select “No” in cell C26 and continue to section ‘B.3.1 Baseline data’.

<b>B.2.0 Sampling</b>		
Does the data, entered into section B.3.1, correspond to a sample from a wider population of existing units included within this project?	Yes	<a href="#">Click here for More Information</a>
<b>Sample Size Calculator</b>		
What number of units are in the measurement boundary (represented in this baseline spreadsheet)	2000	<a href="#">Click here for More Information</a>
Sample Size Calculator - Based on the information you have entered into Cell C27. The following sample size should be used as a minimum	68	<a href="#">Click here for More Information</a>
What number of units are in your sample?	70	<a href="#">Click here for More Information</a>
How many units does each of the baseline readings in section B.3.1 represent?	70	
Sample Size acceptable?	<b>Sample Size Acceptable</b>	<a href="#">Click here for More Information</a>

Figure 3.21: Sampling section of av. readings baseline spreadsheet

- Baseline data B3.0:** in this section you will enter your kWh energy usage or kW demand levels recorded over the specified period. You must state in cell C41 if you are using kW or kWh readings. The readings entered should be for winter peak hours only (Nov-Feb, 4-8pm weekdays). You can select a suitable time period between entries, however the longest period cannot be more than a weeks’ worth of aggregated data (i.e. the kWh values would be calculated by summing the half-hourly data from 4 to 8pm Monday to Friday) and the shortest period is a day. Please note that as the EDR Pilot is interested in kW demand levels, you must state whether you are providing your readings in kW or kWhs (if kWhs the spreadsheet will automatically convert this to kW once you have specified the format of your readings).

<b>B.3.1 Baseline Data</b>						
Have you Entered Enough Readings?	Yes	<a href="#">Click here for More Information</a>				
State if your readings are kW or kWh?	kWh	<a href="#">Click here for More Information</a>				
Please enter the details of the kW or kWh values over the peak period (you should use kW or kWh values for the period 4-8pm for business days only) for the baseline period you have determined Readings entered can be at a weekly or daily resolution. The template will calculate the daily equivalent to prevent any bias if there are different numbers of days between readings and will convert the readings in kW values so that these can be used within the kW savings calculation.  You <u>must</u> ensure that RAW data, from which the totals in the chart below are calculated, is submitted with your application						
Start date	End Date	Baseline kWh (weekdays 4-8pm)	Days	Average kW per day from 4 to 8pm only	Total Average Baseline kW from 4 to 8pm only	
<a href="#">Click here for More Information</a>		<a href="#">Click here for More Information</a>		<a href="#">Click here for More Information</a>	<a href="#">Click here for More Information</a>	
03/11/2014	03/11/2014	244.00	1	61.00	1764.97	
04/11/2014	04/11/2014	230.00	1	57.50	1764.97	
05/11/2014	05/11/2014	260.00	1	65.00	1764.97	

Figure 3.22: Baseline data section of av. readings baseline spreadsheet

- To note you need to provide a minimum of six readings, too few readings and your baseline will not be acceptable and the box circled in red in the above screen shot will indicate that you do not have enough readings. That means a minimum of six readings but you may need more. It must go green to be accepted.
- Baseline data summary B3.2:** in this section summary statistics such as standard error are shown, this section tells you what the baseline kW demand figure is and if accuracy requirements have been met. Further details regarding the accuracy requirements are provided in 'Appendix B - Checking the Accuracy of your Baseline' and within the spreadsheet.

<b>B.3.2 Baseline Data Summary</b>		
<b>Average kW</b>	59.78	<a href="#">Click here for More information</a>
<b>Standard Error</b>	1.213	<a href="#">Click here for More information</a>
<b>Meter Relative Precision</b>	0.01	<a href="#">Click here for More information</a>
<b>Standard Meter Error</b>	2.440	
<b>Combined standard error</b>	2.725	
<b>Estimated kW Savings</b>	25	<a href="#">Click here for More information</a>
<b>Have You Met Accuracy Requirements</b>	Yes	<a href="#">Click here for More information</a>
<b>Baseline Demand (kW)</b>	59.78	

Figure 3.23: Baseline data summary section of av. readings baseline spreadsheet

- The only values you need to enter are 'Estimated kW Savings' and 'Meter Relative Precision'. Detailed instructions can be found on the help tab within the Average Readings Baseline spreadsheet.
- A visual representation of your data is also provided in the chart entitled 'Baseline kW Demand Weekdays (4-8pm only)'. If the bars are not of equal height this tells you there is some variability in the readings. If there is too much variability it may suggest that there are drivers of consumption that need to be accounted for using the Full Measurement-Regression Analysis spreadsheet.

**Note** that you will also have to provide the full raw data on which the baseline spreadsheets are based. For example if you took metered readings for 6 months continuously and provide a total of 200 readings in your spreadsheet you would need to provide both the spreadsheet and the full raw data readings for the six month period.

- Winter Peak Reporting:** use this tab to provide meter readings once you have installed your equipment.
- You only need to fill in the reporting tab after you have installed your new equipment.

- Once you have completed the above tabs the actual total kW saving value will be displayed on your coversheet.
- 4. Final Data Request:** this tab allows you to enter information to support your final report. (ignore this tab at the application stage). Please see section 7.2.2. for guidance on how to complete this tab.

To complete the reporting tab you follow the same process as you did for providing meter readings for your baseline data as described in this section but provide your reporting data instead. Detailed instructions can be found on the [help tab](#) within the Average Readings Baseline spreadsheet.

### Summary & checklist

The completed average readings baseline spreadsheet should be saved for your own records using the naming convention specified below and submitted as part of your application or by 30 March prior to the winter peak in which your project will deliver capacity savings.

[Application ID, Full measurement av – Boundary number]

E.g. GH TT0708-876 Full Measurement av – B1

See Section 5 for details on how to upload your M&V Documents onto the portal.

If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

## 3.7. Full Measurement: Regression Analysis

With regression analysis because electricity consumption of the equipment in your project is directly affected by one or more external factors, you need to collect both meter readings and data for the key variable(s) that affect demand.

### Routine Adjustments

Routine adjustments refer to factors that would be expected to change frequently over time, for example external temperature, daylight levels, or production volumes. These factors are known as “independent variables”.

An independent variable is a factor that would be expected to change frequently, but also have a measurable impact on electricity use of a building or individual technologies within that building. Common examples are as follows:

- External temperature e.g. temperature will often affect how hard heating and cooling systems need to work.
- Daylight hours may affect how frequently equipment is activated
- Production volumes, variations in production schedules may cause variation in levels of demand use
- Building occupancy, some equipment may be affected by the level of occupancy in a building e.g. lighting or cooling demand.

Once you have identified and obtained data for independent variables you can begin to complete the Full Measurement Regression Analysis baseline spreadsheet. Please note the spreadsheet only allows you to enter data for one independent variable if you wish to use multiple regression please contact us on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

Use of any seasonal variables in a regression model would require baseline data for a full calendar year because a full year will provide a more rigorous baseline.

### Non-Routine Adjustments (NRA)

NRA Refer to a major unexpected change within the measurement boundary, for example the closure of a whole floor of an office block or the addition of further electrical equipment. You should assign someone on site to monitor if there are any major changes to load on the site, they should record the source of the change, the expected kW impact and if the change was temporary or permanent.

Accounting for non-routine adjustments is dependent on the nature of the change in load.

- **Additional Electrical Equipment** - If you experience a major change in load within the measurement boundary you will need to identify the exact source of the additional load and use a monitoring instrument to measure the change in demand.
- **Change In Operating Hours** - If changes to operating hours occur within the measurement boundary occur (specifically changes during peak hours), you will need to calculate and document the resulting impact on demand.

If you think you need to make a non-routine adjustment then you must notify us of the changes being made on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

## Full Measurement - Regression Analysis Baseline Spreadsheet

Download the Full Measurement: Regression Analysis baseline spreadsheet from the EDR website. All of the M&V guidance and forms, including Appendices to this manual, and M&V Documents can be downloaded from [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot).

Once you are on this page scroll down until you see one of the links titled 'supporting information and documents page'. Clicking on this link will take you through to a page which contains all the M&V documents you might need to download. If you are struggling to find a document or the formats don't work with your software, please send us an email letting us know at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk).

### Overview of the Full Measurement: Regression Analysis baseline spreadsheet:

There are a total of 5 tabs in the Full Measurement: Regression Analysis baseline spreadsheet

- 1. Cover sheet:** enter your contact information. The cover sheet also displays the total kW capacity saving once meter readings have been provided.
- 2. Baseline:** in this tab you will need to provide information about where you are getting your data from (submeter or whole site meter), if you are using a sampling approach and provide the baseline readings and readings for the chosen independent variable from the relevant sources prior to installation of the new equipment
- 3. Winter Peak Reporting:** meter readings from the same meter used to calculate the baseline once you have installed your equipment and independent variable data for the same period.
- 4. Final Data Request:** this tab allows you to enter information to support your final report. *ignore this tab at the application stage.*
- 5. Help:** provides more detailed help and guidance

In the spreadsheet:

- white boxes are where you should provide input
- grey boxes provide more information (click on them to reveal the info)
- light blue boxes are automatically calculated
- green boxes indicate when the information you have provided is acceptable
- red boxes indicate when the information you have provided is not acceptable

### Instructions for completing the Full Measurement: Regression Analysis spreadsheet

- 1. Coversheet Tab:** use this tab to enter your details (Participant ID, Application ID etc.). Once you have entered your meter readings before and after installation it will also display the total kW capacity savings of equipment that is covered in the Full Measurement: Regression Analysis baseline spreadsheet.

## Full Measurement - Regression Analysis

Version 2.0

Participant ID:	ABCD1234
Application ID:	ABCD1234-124
Organisation:	Organisation Name
Completed by:	A.N.Other

PROJECT SUMMARY	
Predicted TOTAL kW Saving	Verified TOTAL kW Saving

**Instructions**

**Cover Sheet** - Complete cells C8:C11 above

**Baseline Period** - Complete all the sections in this tab

Further details on how to fill in each column is given on the [Help tab](#)

**Winter Peak Reporting** - Once the Peak Applicable Reporting Period has passed, following the project implementation, the Reporting tab can be completed.

Please:

- Complete sections R.1-3 in the Reporting Tab.
- Please provide the RAW metered data which has been used to calculate the figures entered into section R.3.1.

**Final Data Request** : Complete these tabs as part of your final report. Full details regarding the completion date for this tab is in Section 4.1.3 of the M&V Manual

	White boxes with blue outlines indicate where values should be entered by the applicant
	Light blue boxes indicate the output of an automatic calculation
	Grey boxes provide additional information – those marked “Click here for More Information” need you to click on them
	Green boxes indicate when the information you have provided is acceptable
	Red boxes indicate when the information you have provided is not acceptable and needs to be reviewed

Figure 3.24: Coversheet tab of Regression Analysis baseline spreadsheet

**2. Baseline Tab:** in this tab you will need to provide information about where you are getting your data from, if you are using a sampling approach and provide the meter readings of your existing equipment.

**B.1.0 General Information:** in this section you provide information about where you are getting your data from (sub meter or whole site meter) and the name of the data file containing the raw kW or kWh data you are submitting to support the application.

**Calculating your kW Baseline Model**

[Click here for More Information](#)

**Sections to be Completed in this Tab**

- B.1.0 General Information
- B.2.0 Sampling
- B.3.0 Calculating your kW Baseline
- B.3.1 Independent Variable
- B.3.2 Baseline Data
- B.3.3 Baseline Data Summary

	White boxes with blue outlines ind
	Light blue boxes indicate the output
	Grey boxes provide additional infor need you to click on them
	Green boxes indicate when the infc
	Red boxes indicate when the inform to review the information you have

---

**B.1.0 General Information**

<b>What is the source of your kW or kWh data?</b>	Whole Site Electricity Meter	<a href="#">Click here for More Information</a>
<b>What is the name of the data file containing the kW or kWh readings used to complete this spreadsheet? (This should be attached to your application)</b>	Site X - Half Hourly Data kWh	<a href="#">Click here for More Information</a>
<b>Which M&amp;V approach has been used?</b>	Full Measurement: Total Building Electricity	

Figure 3.25: Baseline tab of Regression Analysis spreadsheet

**B.2.0 Sampling:** it may be that rather than taking readings from all the units you have (e.g. number of lights) you decide to take readings from a sub-set of units to reduce burden. If you are using sampling you will need to provide details of the size of your sample and the overall population that it represents e.g. 51 lights are sampled representing a wider population of 200 lights. The spreadsheet is set up so that it automatically calculates the sample required for the size of your population. Once you have entered the required information about you sample cell C34 states if you sample size is acceptable (in green) or too small (in red). Please note further information regarding sampling can be found in section 3.8.

Please note - if you are not sampling please select “No” in cell C25 and continue to B.3.1 Baseline data.

<b>B.2.0 Sampling</b>		
Does the data, entered into section B.3.2, correspond to a sample from a wider population of existing units included within this project?	Yes	Click here for <b>More Information</b>
<b>Sample Size Calculator</b>		
What number of units are in the total population?	15	
Sample Size Calculator - Based on the information you have entered into Cell C30. The following sample size should be used as a minimum	13	Click here for <b>More Information</b>
What number of units are in your sample?	13	
Sample Size acceptable?	<b>Sample Size Acceptable</b>	Click here for <b>More Information</b>

Figure 3.26: Sampling section of Regression Analysis spreadsheet

**Baseline data B3.0:**

**B.3.1 Independent Variable:** in this section you will enter information regarding the independent variable you have used and its source. A few examples of independent variables are Degree Days, daylight minutes and daily footfall figures.

**B.3.2 Baseline Data:** in this section you enter the kWh energy usage or kW levels recorded over the specified period. You must state in cell C59 if you are using kW or kWh readings.

The readings entered should be for winter peak hours only (November to February, 4-8pm weekdays). You can select a suitable time period between entries, however the longest period cannot be more than a weeks’ worth of aggregated data (i.e. the kWh values would be calculated by summing the half-hourly data from 4 to 8pm Monday to Friday) and the shortest period is a day. Please note that as the EDR Pilot is interested in kW demand levels, you must state whether you are providing your readings in kW or kWhs (if kWhs the spreadsheet will automatically convert this to kW once you have specified the format of your readings).

To note you need to provide a minimum of six readings, too few readings and your baseline will not be acceptable and cell C56 will indicate if you have enough readings. That means a minimum of six readings but you may need more.

**B.3.1 Independent Variable**

What independent variable has been used in section B.3.2?	Heating Degree Days - London	Click here for <b>More Information</b>
What is the source of independent variable data	http://www.degreedays.net/?gclid=CKKb1r3y5sQCFQOy2wodkgYAYw	Click here for <b>More Information</b>

**B.3.2 Baseline Data**

Please enter the details of the kW or kWh values **over the peak period** (4-8pm for business days) for the baseline period you have determined

Readings entered can be at a weekly or daily resolution. The template will calculate the daily equivalent to prevent any bias if there are different numbers of days between readings and will convert the readings in kW values so that these can be used within the kW savings calculation.

Variable data should be entered for either the full reading period identified (i.e. Degree Days or occupancy values for a given day or week) or for the only peak applicable period during the stipulated readings (i.e. production volumes 4-8pm). The primary requirement is that a sensible approach is chosen to provide a baseline which meets the accuracy requirements of section B.3.3.

Have you Entered Enough Readings?	Yes	Click here for <b>More information</b>
-----------------------------------	-----	--

State if your readings are kW or kWh?	kWh	Click here for <b>More information</b>
---------------------------------------	-----	--

Start Date	End Date	Baseline kWh (weekdays 4-8pm)	Independent Variable Data	No. of days period
<a href="#">Click here for More Information</a>		Click here for <b>More Information</b>	Click here for <b>More Information</b>	
01/10/2014	01/10/2014	300	2	1
02/10/2014	02/10/2014	240	4	1
03/10/2014	03/10/2014	280	6	1

Figure 3.27: Baseline data and independent variable section of Regression Analysis spreadsheet

Enter the values for the independent variable you are using. Once you have entered your readings the chart entitled “Correlation between the Independent Variable and kW Demand” will populate. This allows you to visualise the relationship between your chosen independent variable as shown in figure 3.28 below.

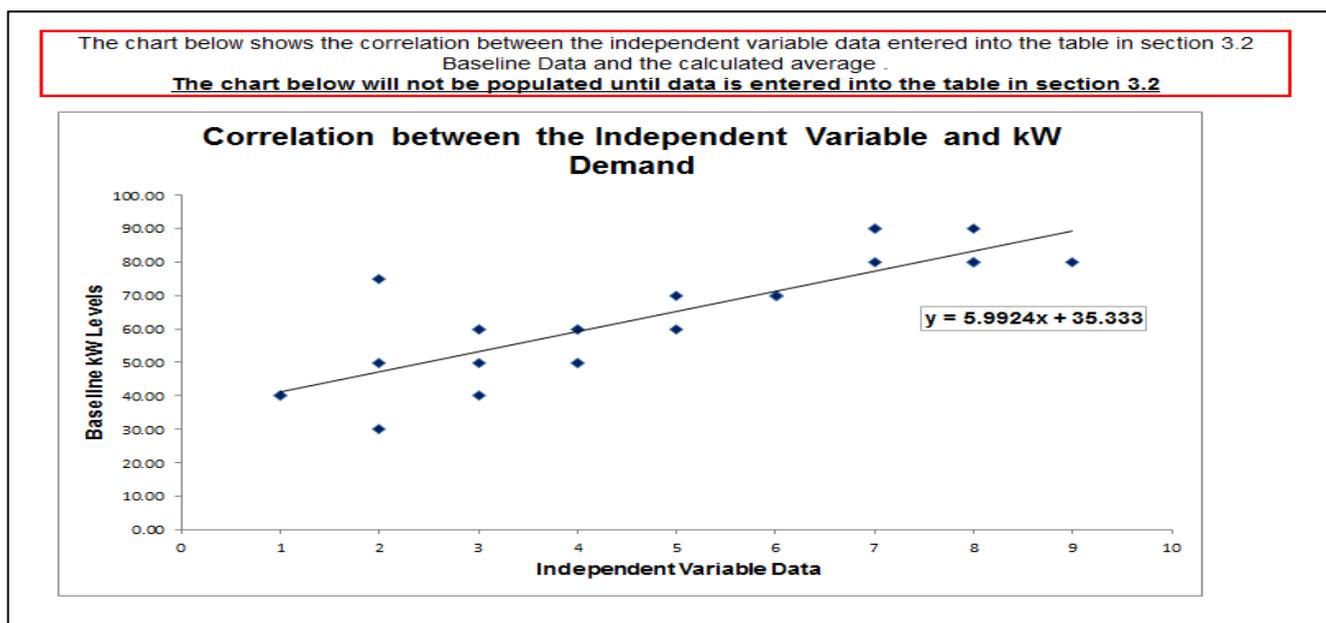


Figure 3.28: Correlation between independent variable and kW demand

**Baseline data summary B.3.3:** in this section summary statistics such as standard error and the outputs of the equation ( $y=mx+c$ ) are shown, this section also tells you if accuracy requirements have been met. Further details regarding the accuracy requirements are provided in 'Appendix B - Checking the Accuracy of your Baseline' and within the regression analysis spreadsheet.

B.3.3 Baseline Data Summary		
<p>The components of the Baseline model equation are detailed below and are given in the form of the equation "<math>y = mx + c</math>". The values of <math>m</math>, <math>x</math> (the variable value) and <math>c</math> are used to calculate the "Expected Level" of kW demand for a given day for a given independent variable value. The Baseline Expected Level is shown as a blue line in the <i>Baseline Data and Model</i> chart below</p>		
Constant (c)	35.33	Please click here for <b>More info</b>
Variable Co-efficient (m)	5.99	Please click here for <b>More info</b>
P-Value	2.59E-08	Please click here for <b>More info</b>
Standard Error	9.121	Please click here for <b>More info</b>
Meter Relative Precision	0.01	Please click here for <b>More info</b>
Combined standard error	12.75	
Estimated kW Saving	26	Please click here for <b>More info</b>
<b>Have You Met Accuracy Requirements</b>	<b>Yes</b>	<b>Click here for More information</b>

Figure 3.29: Baseline data summary section of Regression Analysis spreadsheet

To note that you need to check that the accuracy requirements are met, if they are not it may indicate that you have not entered enough meter readings or it may indicate that the independent variable you are using does not have a significant relationship with the baseline readings you have entered.

The chart entitled "Baseline Data and Model" provides a visual representation of your data and the calculated baseline model. If the blue line (the calculated baseline model) closely maps the red bars (the baseline data) then this shows that the independent variable chosen is a key driving factor for consumption. If there is too much variability it may suggest that the independent variable considered is not a significant driver of consumption.

Note that you will also have to provide the full raw data on which the baseline spreadsheets are based. For example if you took metered readings for 6 months continuously and provide a total of 200 readings in your spreadsheet you would need to provide both the spreadsheet and the full raw data readings for the six month period.

- 3. Winter Peak Reporting:** use this tab to provide meter readings once you have installed your EDR Measures.
  - Once you have completed the above tab the actual total kW saving value will be displayed on your coversheet.

- 4. Final Data Request:** this tab allows you to enter information to support your final report. (ignore this tab at the application stage). Please see section 7.2.2. for guidance on how to complete this tab.

To complete the reporting tab you follow the same process as you did for providing meter readings for your baseline data as described in this section but provide your reporting data instead. Detailed instructions can be found on the [help tab](#) within the Average Readings Baseline spreadsheet.

### Summary & checklist

The completed regression analysis baseline spreadsheet should be saved for your own records using the naming convention shown below and submitted as part of your application or by 30 March prior to the winter peak in which your project will deliver capacity savings.

[Application ID, Full measurement reg – Boundary number]

E.g. GHTT0708-876 Full Measurement reg – B1

See Section 5 for details on how to upload your M&V Documents onto the portal.

If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.

### 3.8. Sampling Guidance

Sampling can help reduce the burden involved in administering measurement and verification approaches by reducing the number of units from which you need to take measurements. Providing the part(s) of your project where you are considering using meters meet the conditions set out below you can use sampling.

#### When should you consider using sampling?

- Your project involves multiple installations of the same type of measure e.g. same type of motor. Using a sample will reduce the burden as you avoid having to measure the entire population.
- Site conditions must be sufficiently similar across the site(s) to enable a sample to act as a reliable and reasonable proxy of savings across all of the sites.

#### How to calculate the correct sample size

In order to determine the correct sample size please use the Sample Size Calculator which can be downloaded from the EDR website. Please note that the sample size calculator is also embedded in each of the baseline spreadsheets.

**Sample Size Calculator**

White boxes with blue outlines indicate where values should be entered by the applicant

Light blue boxes indicate the output of an automatic calculation

Grey boxes provide additional information

<b>Population size:</b>	100	The total number from which your sample will be taken.
<b>Precision</b>	10%	This is error around the true value of for the whole population - plus or minus 10% should be used as a minimum.
<b>Confidence</b>	90%	This is the probability that the population mean will fall within the range of precision - 90% should be used as a minimum.
<b>Coefficient of Variation</b>	0.5	This is equal to the standard deviation of the results divided by the mean. It is recommended that you use 0.5

**Recommended sample size:** 41

Figure 3.30: Sample size calculator

You will need to enter the following into the white cell:

- Population Size - how many fittings or pieces of equipment of the same type are in the project you would like to sample

The sample size is calculated using the following parameters: a Precision Level of 10%, Confidence Level of 90% and a Coefficient of Variation of 0.5. These are the recommended levels. If you would like to adapt these figures please contact us at [edrproject@decc.gsi.gov.uk](mailto:edrproject@decc.gsi.gov.uk)

- Precision – refers to the error around the true estimate of the measure. A level of 10% is used in the sample size calculator
- Confidence – refers to the probability that the estimate will fall within the selected range of precision, 90% confidence is used in the sample size calculator

- Coefficient of Variation – This is equal to the standard deviation of the data set divided by the average (mean). A level of 0.5 is used in the sample size calculator

Once you have entered your population size a recommended sample size will automatically calculate in cell B25 (light blue cell).

### Examples of Sampling for Metered Approaches:

#### Example 1 – Partial Measurement Sampling, Motor installation

EDR Project: Replacement of 50 motors on a production line with more efficient models, the question is how many motors need to be metered to calculate savings for the whole production line.

The speed of the production line is fixed, so the motors have a constant load profile. The replacement motors will also have a constant load profile.

Sample Size - Using the sample size calculator (precision 10%, confidence levels 90% and Coefficient of Variation 0.5) it was determined that an accurate sample of 29 from the 50 motors should be taken.

Baseline: Using a calibrated clamp meter, each motor in the sample was measured for 10 seconds.

Population Size	50
Sample Size	29
Average demand readings	4 kW
Total baseline	200 kW

For this example, the baseline is the average demand of the existing motors multiplied by the number of motors of the same type, i.e.  $50 \times 4\text{kW} = 200 \text{ kW}$ .

This example has assumed that the motors will be in full operation from 4:00 to 8:00pm over the whole winter peak (83 days).

#### Example 2 – Full Measurement: Whole Building Sampling, Pump Installation

EDR Project: Installation of Pumps at 20 sites. The sites are considered to be homogenous and operate under the same operating conditions. You can use the sample size calculator to calculate how many sites you would need to measure to calculate a baseline for all sites.

Measurement Boundary – The boundary was drawn around the whole building (at each of the 20 sites) as the installation of the pumps will impact the electricity usage of the whole site.

Sample Size - Using the sample size calculator (precision 10%, confidence levels 90% and Coefficient of Variation 0.5) it was determined that an accurate sample of at least 16 sites from the 20 sites should have individual baselines calculated.

Baseline: Using half-hourly data from the site meter at each of the 16 sites, a baseline was determined for 16 of the 20 sites that pumps would be installed. The baseline was determined using 12 months of pre installation kWh consumption data, this is because the sites usage will tend to vary throughout the year so a full year is required to ensure an accurate baseline.

Please note the kW demand over the winter peak period is calculated using kWh consumption data for the time period 4:00pm to 8:00pm.

Population Size	20
Sample Size	16

### Using Sampling in Deemed Projects

Sampling can be used for a Deemed Savings project to substantiate the kW values entered into the Deemed M&V Plan(s).

#### Example 3: Deemed Savings - Sampling

EDR Project: A council is looking to replace 1000 street lights within a single local authority but needs to establish the kW consumption of the replacement lighting. The sample size calculator can be used to work out how many lights need to be sampled.

All of the existing street light fixtures will be replaced with a single type of street light fixture. All of the street lights are under the same operating conditions and operate on automatic timers throughout the year (e.g. over the winter period operate from 4:00pm to 8:00am and over the summer from 9:00pm to 5:00am).

Sample Size - Using the sample size calculator (precision 10%, confidence levels 90% and Coefficient of Variation 0.5) it was determined that an accurate sample of 64 from the 1000 street lights should be measured.

Population Size	1000
Sample Size	64

*In this example the applicant will need to take measurements of 64 of the street lights kW usage to substantiate the kW values they enter into the Deemed M&V Plan - Lighting replacement.*

## 4. Completing the M&V Summary Sheet

The final step once you have completed the relevant M&V plan(s) is to complete an 'M&V Summary Sheet' for your project. This sheet summarises the total winter peak capacity savings of your project, breaks down total savings by M&V approach and enables you to set out how much of your project is specified at application stage in your M&V Documents. **Your application will not be accepted unless this sheet is provided.**

To complete the summary sheet you will need to sum the total kW capacity savings (remember it is kW savings not kWh savings that are being bid into the pilot) of your project broken down by deemed and/or metered approaches.

As set out in Chapter 7 of the Participant Handbook, in recognition of the fact that you may not have all of the details of your project by the application deadline, you can choose to leave up to 40% of the total kW capacity savings of your project unspecified at application stage. This is equivalent to 2/3<sup>rd</sup> of savings in the specified or 'core' part of your project. The unspecified part of your project is the portion of your project where no details of measures have been provided in your M&V Documents at the application stage. Any unspecified parts of your project must be specified by 30 June prior to the winter peak in which your project will deliver savings. You do this by submitting your updated M&V plan(s) (please see Section 5 for full details) with the details of the unspecified parts included e.g. location, type of equipment, time of use etc. Note that all elements of your project (both specified and unspecified) must meet all the same eligibility criteria as set out in Chapter 13 of the Participant Handbook. It is up to you if you choose to include any unspecified elements in your project at application stage. If you have chosen not to include any unspecified parts you simply need to provide the details of your project as set out in your M&V Documents.

To complete the 'M&V Summary Sheet' you will need to have to hand:

- Your completed deemed and/or metered M&V plan(s); you will need to input the total expected savings from your plans to calculate the expected savings of your project for the deemed and/or metered sections respectively
- The portion of your project that is specified and not specified (if relevant) in your M&V Documents.

Once completed, the M&V Summary Sheet will give a total expected capacity saving figure for your project. Download the 'M&V Summary Sheet' from the EDR website [www.gov.uk/electricity-demand-reduction-pilot](http://www.gov.uk/electricity-demand-reduction-pilot).

Once you are on this page scroll down until you see one of the links titled 'supporting information and documents page'. Clicking on this link will take you through to a page which contains all the M&V documents you might need to download. If you are struggling to find a document or the formats don't work with your software, please send us an email letting us know at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk).

The 'M&V Summary Sheet' has three parts:

1. **Expected savings from the specified part of your project:** here you provide the total kW capacity savings of all of the equipment that is included in your M&V Documents. In this section you will also state if any of your project kW capacity saving is unspecified at application stage.
2. **Expected savings from the unspecified part of your project:** if you have stated that you are not leaving any part of your project kW capacity savings unspecified then please ignore

this section. If you have stated that you are leaving part of your project unspecified you will use this section to confirm the proportion of your project that you will leave unspecified.

3. **Overall project summary:** this section displays the total kW capacity savings of your project for both the specified and unspecified (if relevant) portions of your project giving you a total expected kW savings for your project.

In the spreadsheet:

- white boxes are where you should provide input
- grey boxes provide more information (click on them to reveal the info)
- light blue boxes are automatically calculated
- Green boxes indicate when the information you have provided is acceptable
- Red boxes indicate when the information you have provided is not acceptable and you need to review the information you have entered

<u>1.0 Expected savings of the specified part of your project</u>			<u>3.0 Overall Project Summary</u>	
<b>TOTAL DEEMED kW SAVINGS:</b> (is using a deemed approach sum the Total kW reductions from the cover sheet of your completed Deemed M&V plans)		Please Click for More Information	<b>TOTAL PROJECT kW SAVINGS:</b>	
<b>TOTAL METERED kW SAVINGS:</b> (if using a metered approach provide the 'Estimated TOTAL kW Reduction' figure that is found on the cover sheet of your completed Metered M&V plan)		Please Click for More Information		
<b>TOTAL kW SAVINGS FOR YOUR PROJECT:</b>	0.0	Please Click for More Information		
<b>IS ANY OF YOUR PROJECT UNSPECIFIED AT APPLICATION STAGE?</b> (You can leave up to a maximum of 40% of the total kW capacity savings unspecified at application)	Please select	Please Click for More Information		
<u>2.0 Expected savings of the unspecified part of your project</u>				
<b>MAXIMUM UNSPECIFIED kW:</b> (this is the maximum kW value you can leave unspecified, equivalent to 40% of total capacity savings)		Please Click for More Information		
<b>TOTAL UNSPECIFIED kW:</b> (input the total unspecified kW savings for your project, this cannot be larger than the maximum shown above)		Please Click for More Information		

Figure 4.1: M&V Summary Sheet

The following sections provide information on what you need to enter into each part of the spreadsheet. There are two examples, the first you should refer to if you are not leaving any part of your project unspecified and the second you should refer to if you are leaving part of your project unspecified.

## 4.1. Completing the M&V Summary Sheet – No unspecified parts

This section explains how to complete the M&V Summary Sheet if you do not intend to leave any part of your project unspecified. Therefore you will have to provide information within the relevant M&V documentation for 100% of your project at the application stage.

### Section 1 - Expected Savings of the Specified Part of your Project

- In this section of the spreadsheet you need to enter the total deemed kW capacity savings and total metered kW capacity savings from your project. As you are not leaving any part of your project unspecified this must be 100% of the total expected savings of your project.

<u>1.0 Expected savings of the specified part of your project</u>		
Below kW information is taken from the M&V documentation that you will have completed at application stage		
<b>TOTAL DEEMED kW SAVINGS:</b> (is using a deemed approach sum the Total kW reductions from the cover sheet of your completed Deemed M&V plans)	100.0	Please Click for More Information
<b>TOTAL METERED kW SAVINGS:</b> (if using a metered approach provide the 'Estimated TOTAL kW Reduction' figure that is found on the cover sheet of your completed Metered M&V plan)	100.0	Please Click for More Information
<b>TOTAL kW SAVINGS FOR YOUR PROJECT:</b>	200.0	Please Click for More Information

Figure 4.2: M&V Summary Sheet –Section 1

**Total Deemed kW Savings** – you need to sum all the total kW capacity savings calculated on the cover sheet of all your completed deemed M&V Plan(s).

**Total Metered kW Savings** – you need to enter the total kW capacity savings that can be found on the cover sheet of your completed M&V Plan(s).

- The Total kW Savings for you project are calculated automatically in the light blue cell that is circled in the below screen shot.
- Is any of your application unspecified at application stage?** As you are not leaving any proportion of your project unspecified at application stage then you need to select No from the drop down list in cell G15 (shown in the below screen shot).

<p><b>IS ANY OF YOUR PROJECT UNSPECIFIED AT APPLICATION STAGE?</b>          (You can leave up to a maximum of 40% of the total kW capacity savings unspecified at application)</p>	No	<p><b>Please Click for More Information</b></p>
	Please select Yes No	

Figure 4.3: M&V Summary Sheet – Is any part of your project unspecified?

Please note once you select 'No', **Section 2** is no longer relevant and is removed from the spreadsheet.

**Section 3 - Expected Savings of the Specified Part of your Project**

**Total Capacity Savings for the entire project** – Cell O11 (the light blue cell circled in red in the below screen shot) automatically calculates the total kW capacity savings for your entire project in kW, this is 100% of your project (therefore includes both specified and unspecified parts).

<h2 style="color: #003366; text-decoration: underline;">3.0 Overall Project Summary</h2>	
<p><b>TOTAL PROJECT kW SAVINGS:</b></p>	<div style="border: 2px solid red; border-radius: 50%; width: 100px; height: 100px; margin: auto; display: flex; align-items: center; justify-content: center;"> <span style="font-size: 24px;">200.0</span> </div>

Figure 4.4: M&V Summary Sheet – Total Project Capacity Savings

The figure calculated is the total winter peak capacity saving figure that you must enter in your application form.

Once you have completed the M&V Summary Sheet save and upload the spreadsheet along with all the other M&V Documents via the EDR Portal.

See Section 5 for instructions on how to do this.

## 4.2. Completing the M&V Summary Sheet – If you are leaving parts of your project unspecified

This section explains how to complete the M&V Summary Sheet if you do intend to leave a portion of your project unspecified at application stage. You can choose to leave up to 40% of the total kW capacity savings of your project unspecified at application stage, equivalent to a further 2/3<sup>rd</sup> of savings in the specified or 'core' part of your project. Therefore in the M&V Summary Spreadsheet you will need to provide information on both the specified and unspecified parts of your project. Any unspecified parts of your project must be specified by 30 June prior to the winter peak in which your project will deliver savings.

### Section 1 - Expected Savings of the Specified Part of your Project

- In this section of the spreadsheet you need to enter the Total Deemed kW Savings and Total Metered kW Savings from your project. As you are leaving part of your total kW capacity unspecified the total of these two entries must be at 60% of the total kW capacity savings as a minimum.

**Total Deemed kW Savings** – you need to sum all the total kW capacity savings calculated on the cover sheet of all your completed deemed M&V Plan(s).

**Total Metered kW Savings** – you need to enter the total kW capacity savings that can be found on the cover sheet of your completed Metered M&V Plan.

- The Total kW Savings for you project are calculated automatically in the light blue cell that is circled in the below screen shot.

<u>1.0 Expected savings of the specified part of your project</u>		
Below kW information is taken from the M&V documentation that you will have completed at application stage		
<b>TOTAL DEEMED kW SAVINGS:</b> (is using a deemed approach sum the Total kW reductions from the cover sheet of your completed Deemed M&V plans)	100.0	Please Click for More Information
<b>TOTAL METERED kW SAVINGS:</b> (if using a metered approach provide the 'Estimated TOTAL kW Reduction' figure that is found on the cover sheet of your completed Metered M&V plan)	100.0	Please Click for More Information
<b>TOTAL kW SAVINGS FOR YOUR PROJECT:</b>	200.0	Please Click for More Information

Figure 4.5: M&V Summary Sheet – Total Project Capacity Savings

- **Is any of your application unspecified at application stage?** As you are going to leave a portion of your project unspecified at application stage then you need to select Yes from the drop down list in cell G15 (shown in the below screen shot).

<b>IS ANY OF YOUR PROJECT UNSPECIFIED AT APPLICATION STAGE?</b> (You can leave up to a maximum of 40% of the total kW capacity savings unspecified at application)	<div style="border: 2px solid red; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">Yes</span> </div>	Please Click for More Information
<div style="border: 1px solid black; padding: 2px; display: inline-block;">           Please select  <span style="background-color: #0070c0; color: white; padding: 2px;">Yes</span>            No         </div>		

Figure 4.6: M&V Summary Sheet – Is any part of your project unspecified?

## Section 2 - Expected savings of the unspecified part of your project

- **Maximum Unspecified kW** – based on the information you entered into Section 1 regarding your total kW capacity savings for the specified part of your project, cell F20 (circled below), automatically calculates the maximum kW capacity savings that you can leave unspecified in your project at application stage. Please note that this cell has calculated 40% of the total kW capacity savings of your project unspecified at application stage, equivalent to 2/3<sup>rd</sup> of savings in the specified or ‘core’ part of your project.

### 2.0 Expected savings of the unspecified part of your project

<b>MAXIMUM UNSPECIFIED kW:</b> (this is the maximum kW value you can leave unspecified, equivalent to 40% of total capacity savings)	<div style="border: 2px solid red; border-radius: 50%; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">133.3</span> </div>	Please Click for More Information
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Figure 4.7: M&V Summary Sheet – expected savings of the unspecified part of your project?

- **Actual Unspecified kW** – This is where you enter the actual amount of total kW capacity savings of your project that you would like to leave unspecified. Please note that this must be less or equal to the kW value automatically calculated in Cell F20 (shown above). You can therefore enter any kW value as long as it is less 2/3<sup>rd</sup> of savings in the specified or ‘core’ part of your project.

In this example we have entered the maximum unspecified kW amount that can remain unspecified based on the information entered in Section 1.

- **Portion of Project that is Unspecified:** once you have entered the actual unspecified kW that you would like to include in your project Cell F22 (shown in the below screen shot) automatically calculated the actual portion of your overall project (in percentage terms) that you are going to leave unspecified.

<b>ACTUAL UNSPECIFIED kW:</b> <input type="text" value="133.3"/> (input the total unspecified kW savings for your project, this cannot be larger than the maximum shown above)	133.3	Please Click for More Information
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Figure 4.8: M&V Summary Sheet – Actual unspecified kW capacity savings of your project

An automatic calculation (shown in the screens shot below) confirms the % that you are leaving unspecified. Please note that the cell will turn green if the portion is less than or equal to 40%, if you enter an Actual Unspecified kW figure that equates to more than 40% of total kW capacity savings then the cell shown above will turn red and the spreadsheet will signal that you have breached the 40% threshold. You can contact us if you have questions or are having problems.

<b>PORTION OF PROJECT THAT IS UNSPECIFIED:</b> This calculation is calculated based on the unspecified capacity that you entered in cell F21	40.0%	Please note that if this cell has turned green then the amount of kW that you have not specified at application stage is acceptable i.e. it is less than or equal to 40%
---	-------	--

Figure 4.9: M&V Summary Sheet – portion of your project that is unspecified

### Section 3 - Expected Savings of the Specified Part of your Project

**Total Capacity Savings for the entire project** – Cell O11 (the light blue cell circled in red in the below screen shot) automatically calculates the total kW capacity savings for your entire project in kW, this is 100% of your project (therefore includes both specified and unspecified parts).

<h2><u>3.0 Overall Project Summary</u></h2>	
<b>TOTAL PROJECT kW SAVINGS:</b>	<div style="border: 2px solid red; border-radius: 50%; padding: 20px; display: inline-block;">           333.3         </div>

Figure 4.10: M&V Summary Sheet – Overall project summary

The figure calculated is the total winter peak capacity saving figure that you must enter in your application form.

Once you have completed the M&V Summary Sheet save the spreadsheet using the naming convention below and upload it along with all the other M&V Documents via the EDR Portal.

[Application ID, M&V summary sheet]

E.g. GHTT0708-876 M&V summary sheet

See section 5 for instructions on how to do this.

## 5. Uploading your M&V Documents

Once you have completed the M&V Documents for your project you must upload them on the portal alongside any supporting evidence. Before you upload your documents:

- Review the checklist below to make sure you have all the documents you need
- Make sure you have saved your documents using the correct naming conventions.

You should then collate all the saved M&V documents you need to upload.

- If using a **deemed approach** this should include:
  - the relevant deemed M&V plan(s) for the equipment you are installing in your project e.g. if using the chillers and lighting deemed M&V plans then uploading two separate deemed M&V plans
  - technical specifications or a manufacturer's brochure to substantiate the kW values for each replacement equipment type included in your project
  - the 'M&V Summary Sheet' setting out the total saving of your project. If you are also using a metered approach you should include the savings from the metered parts of your project in this sheet to calculate the total expected savings of your project as set out in section 4 of this Manual.
- If using a **metered approach** this should include:
  - the 'Metered M&V plan' which captures the detail of the parts of your project where you are using a metered approach to measure savings
  - evidence to support the estimated kW savings values for each equipment type included in your project that will be installed. This can be technical specifications, a manufacturer's brochure or a supplier quotation that clearly specifies expected savings for each of the technologies being installed.
  - if you have already collected baseline data the relevant baseline spreadsheets for each measurement boundary in your project. If you have chosen to provide baseline data a later point you will need to provide it no later than 30 March prior to the winter peak in which your project will deliver savings.
  - the 'M&V Summary Sheet' setting out the total saving of your project. If you are also using a deemed approach you should also include the savings from the deemed parts of your project in this sheet as well to calculate the total expected savings of your project as set out in section 4 of this manual.

If you have the above documents you are now ready to upload them onto the portal.

**Step 1:** First log into the portal using your Participant ID and password and then click 'Login' as shown below.

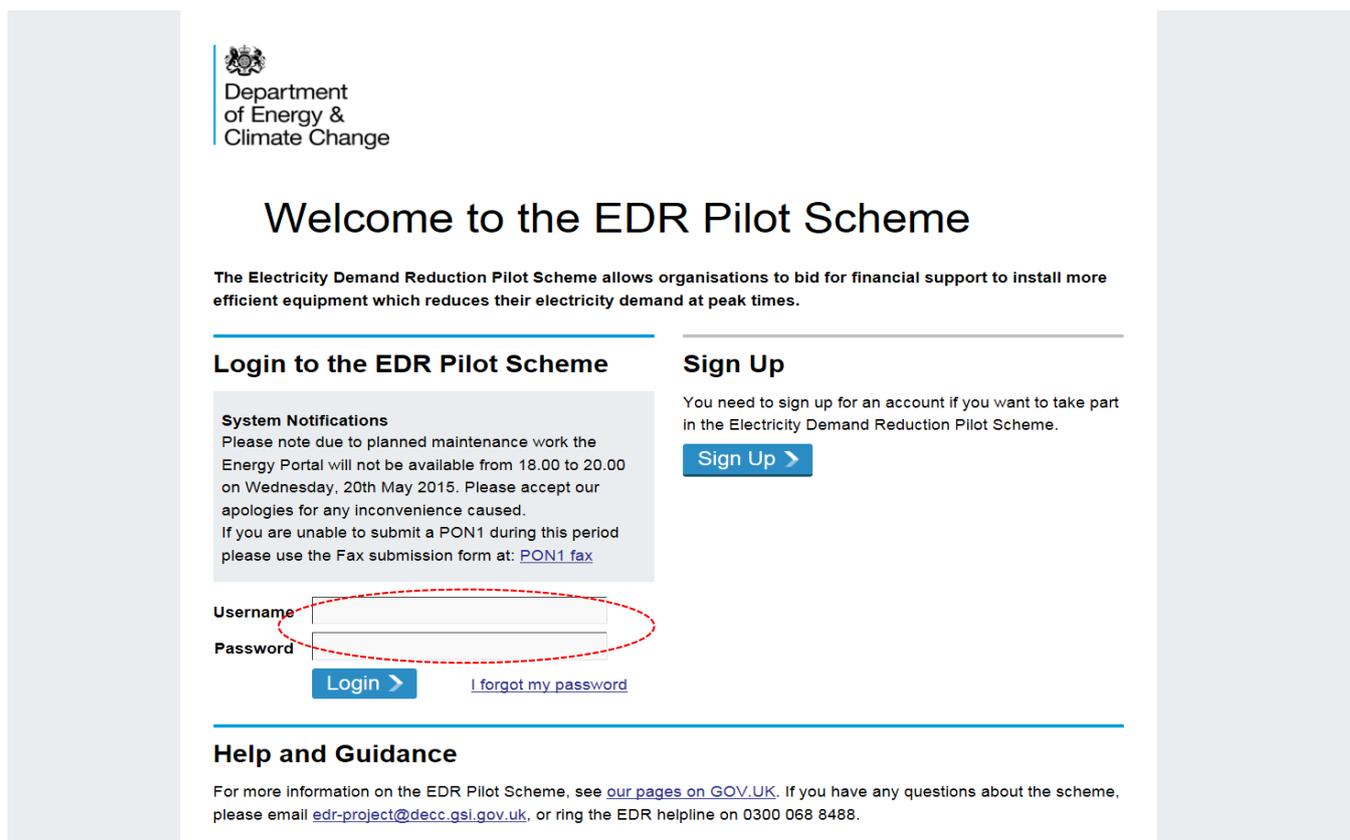


Figure 5.1: Portal log in screen

**Step 2:** You will be taken to your workbasket. Click on 'Resume Draft' on your application as shown below to go back into your application.

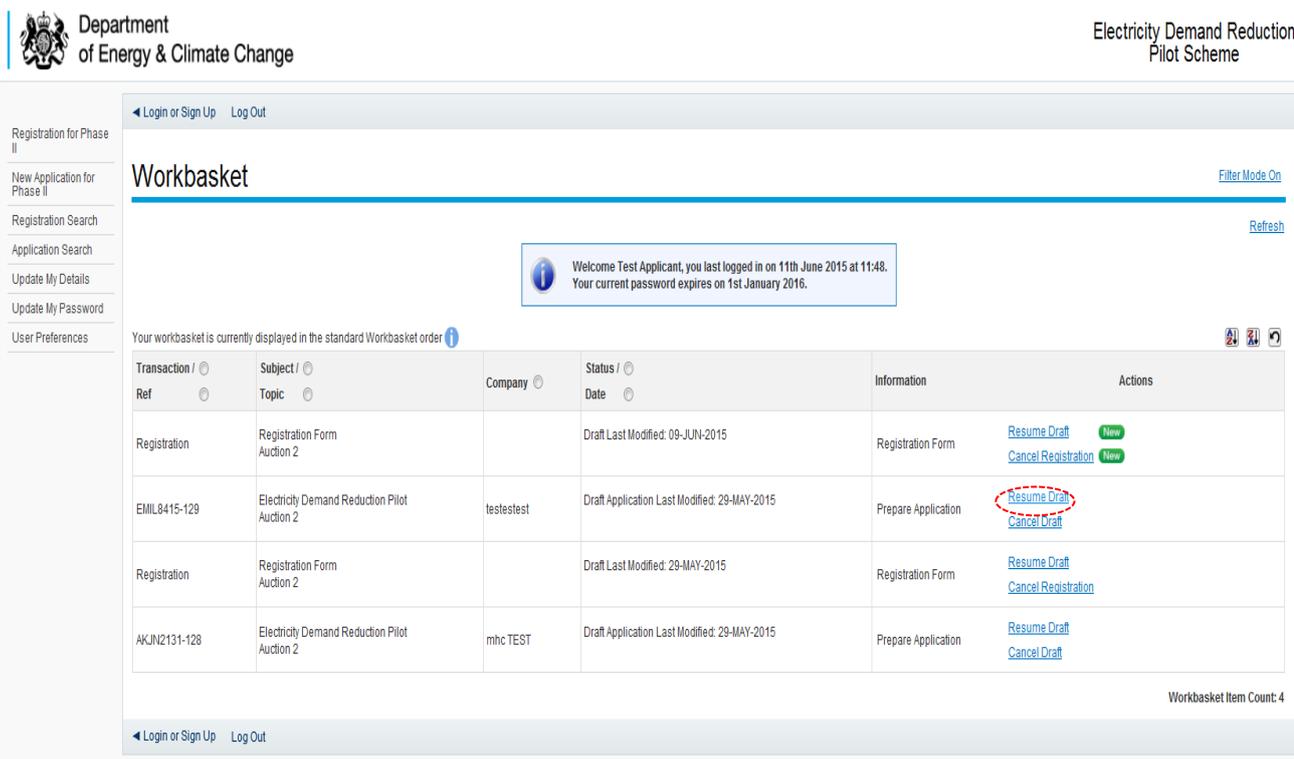


Figure 5.2: Portal - workbasket

**Step 3:** You will now see your application as shown below.

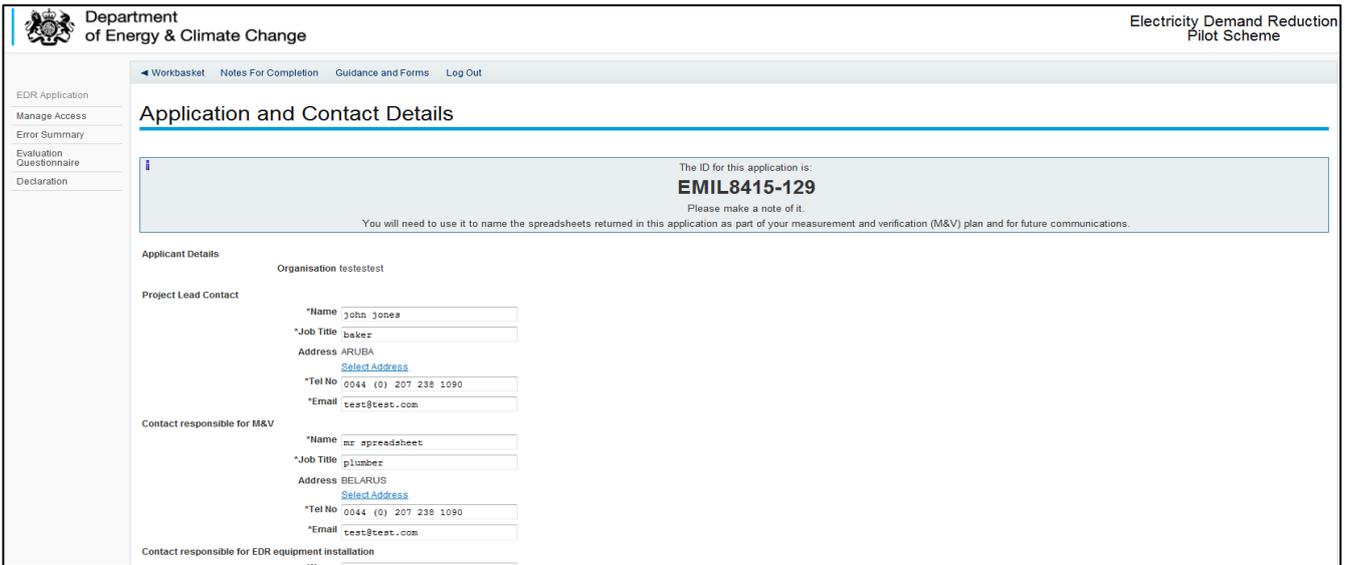


Figure 5.3: Portal – Application screen

Scroll down until you reach the heading 'Measurement and Verification Plan' as shown below. This is where you upload your M&V plan(s). Note that if you have indicated in the drop down list under the 'Summary of proposed project' that your project is deemed only then you will only have an option to upload deemed M&V plans in this section (the metered section will not show). If you have indicated you are using both deemed and metered approaches then you will have the option of uploading both a metered and deemed M&V plan(s). If you have selected that you are using metered only then only a metered option will show here. For illustrative purposes all download options are shown below.

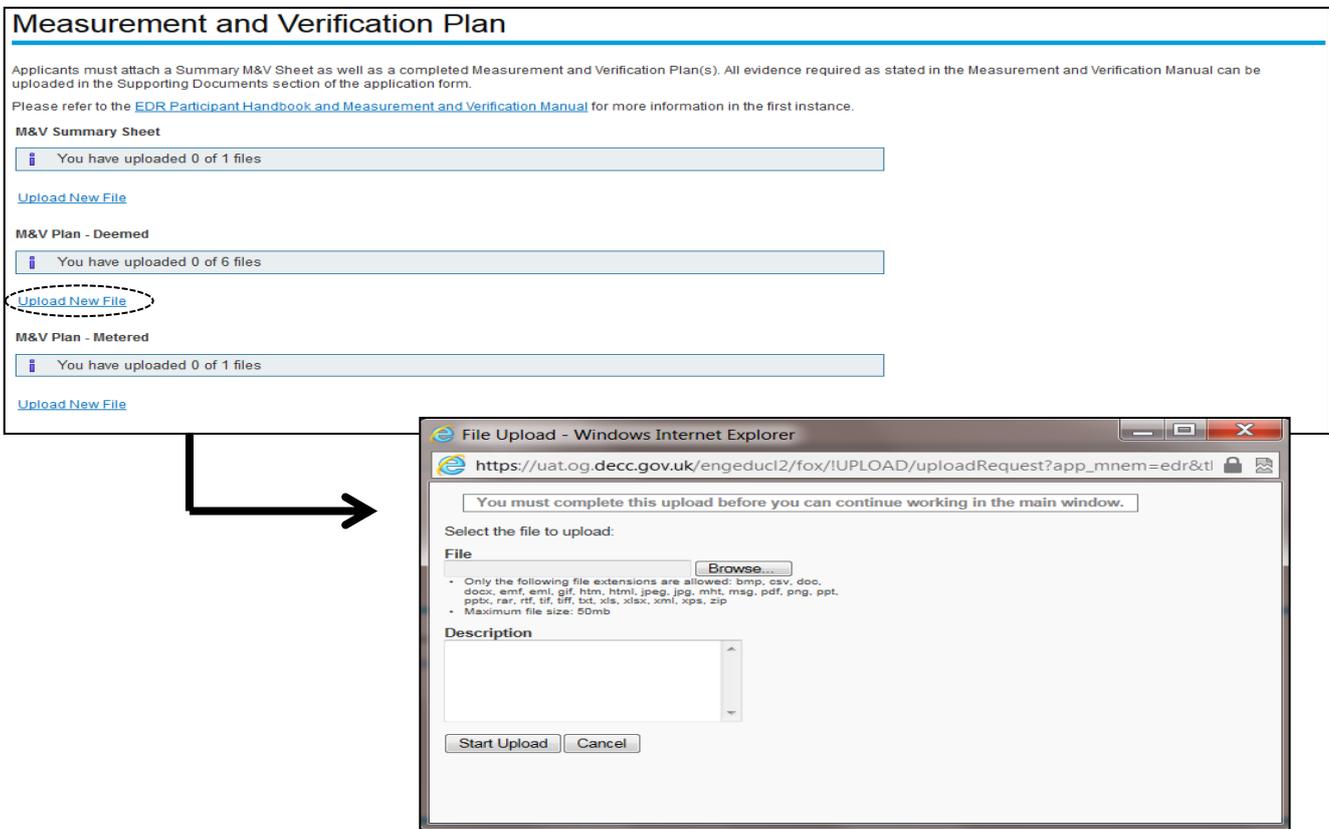


Figure 5.4: Portal – Uploading you Measurement and Verification plan

**Step 4:** Click on 'Upload new file' beneath either the 'M&V plan - Deemed' or 'M&V plan - Metered' section depending on the M&V plan you are uploading. A dialogue will appear as shown above. First click on 'browse' to locate the M&V plan you wish to upload, then click on 'open' once you've found it. In the 'Description' box provide a short description of the attachment e.g. 'Deemed M&V plan' then click on 'start upload' to upload the document. You also upload your 'M&V Summary Sheet' by clicking 'Upload New File' beneath the 'M&V Summary Sheet' section.

**Step 5:** Next you need to upload your M&V evidence. If you are using a deemed approach this will include the evidence to substantiate the kW values of replacement in your project. If you are using a metered approach this will include the evidence to substantiate the kW values of replacement equipment in your project and baseline spreadsheets for baseline data if you haven't chosen to provide baseline data at a later point. Scroll down to the section entitled 'Supporting Documents' as shown below. As before click on 'upload new file', locate the file on your system using the 'Browse' button, click 'open' on the relevant file, provide a short description and click on 'start upload' to upload the file(s). Repeat this for each file you need to upload.

## Supporting Documents

Please attach any other supporting documents and all evidence required as stated in the Measurement and Verification Manual.

Please refer to the [EDR Participant Handbook and Measurement and Verification Manual](#) for more information in the first instance.

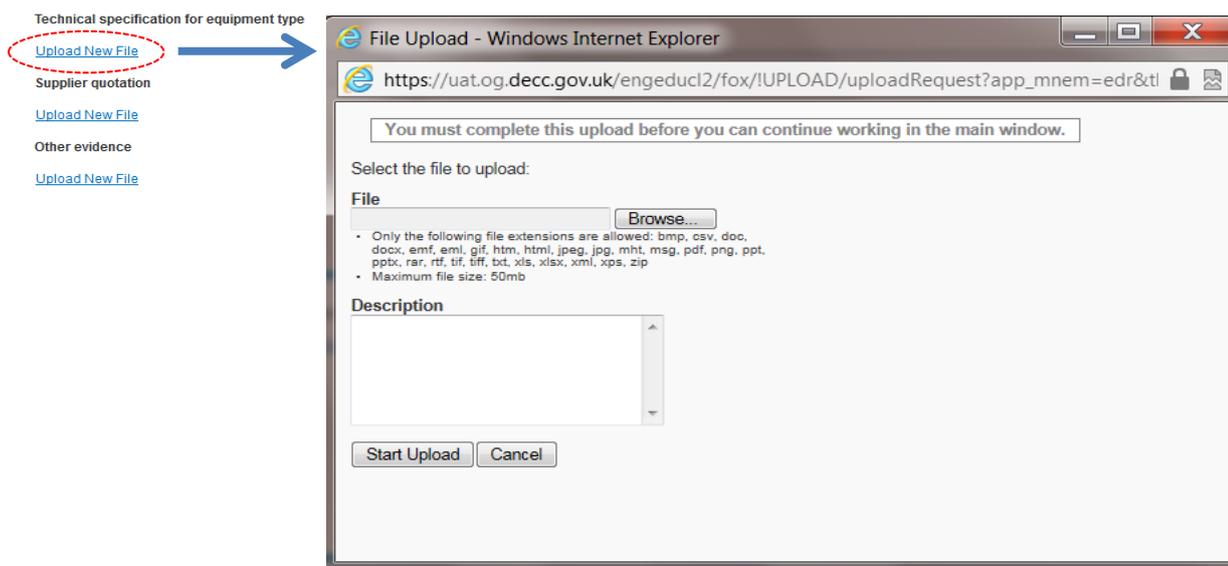


Figure 5.5: Portal – Uploading supporting documents

You should now have uploaded all of the M&V documentation, this should include;

- all of the M&V plan(s) for your project (deemed or metered or both)
- M&V Evidence to support the kW values of the replacement equipment in your project
- baseline data if you are using a metered approach and have already collected data
- a completed 'M&V Summary Sheet' setting out the total expected capacity savings of your project

Do a final check to make sure you have uploaded all of the required documentation.

If you have any questions you can contact the EDR team on [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or 0300 068 8488.



## 6. Making revisions to your project

As detailed in Chapter 13 of the Participant Handbook after you've signed your Participant Agreement but before you install your measures there is an opportunity to make limited changes to your project. If you make changes you have to provide:

- a M&V revisions template: a short template that you use to summarise the changes you are making to your project (e.g. location, technologies, kW savings, M&V approaches)
- A revised version of your measurement and verification documents with the updated details of your project – this involves both an M&V Plan and supporting evidence where required.

The date for submitting this information is dependent on the nature of your change and your delivery year (full details can be found in Chapter 13 of the Participant Handbook).

If you wish to make any changes to your project these must be formally approved by DECC, the cut off points for making changes are set out below.

Whatever the reason for you to update your M&V Plan, any revisions or updates must meet the same eligibility criteria for the pilot e.g.;

- your project must continue to have an overall payback of 2 years or more;
- all measures must have a minimum 2 year replacement cycle;
- measures must deliver winter peak capacity savings (typically through the installation of more efficient equipment)
- your project must still be fully installed by the year in which you committed to start delivering winter peak capacity savings in the Participant Agreement and all revised M&V Plan(s) and M&V Evidence will need to be provided and agreed in advance of installation.

While you can make changes to your project after the signing your Participant Agreement the kW savings that you have agreed to deliver in the auction cannot be changed.

The precise amount of time available for updating will be confirmed when you have signed your participant agreement, as the volume of participants in Phase II of the Pilot will impact on the amount of time we are able to offer. Our anticipation is that the deadlines will be as follows.

If your project will be delivering savings for:

- **Year-ahead delivery (Nov 2016 – Feb 2017)** then you must submit any major changes by 30 June 2016 (this includes changes to sites in your project and providing details of any portions of your project not specified at application stage) or by 12 August 2016 for

more minor revisions including changes within existing sites and technologies that affect less than 50% of your agreed kW capacity savings.

- **Two year-ahead delivery (Nov 2017 – Feb 2018)** then you must submit any major changes by 30 June 2017 (this includes changes to sites in your project and providing details of any portions of your project not specified at application stage) or by 11 August 2017 for more minor revisions including changes within existing sites and technologies that affect less than 50% of your agreed kW capacity savings.

The dates described above will be absolute cut off points. You are encouraged to submit any revisions for approval sooner where feasible to enable you to have the maximum possible time to install the equipment following approval prior to the winter peak period. Please note that you are **only allowed to make one major and one minor update to your project** so please ensure your project has reached a level of stability before notifying us of any changes.

Once you have submitted your revised M&V Documents DECC will review it and inform you of a decision within 20 working days. If successful you will be notified that the revised M&V Documentation has been accepted and that you are 'cleared' to commence with installation of the measures. You should not install any measures until you have this clearance; if you do so it will be at your own risk.

Please refer to the Participant Handbook Chapter 13 for detailed information regarding permissible changes. If after reading this section you still have questions contact the EDR team at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) or on 0300 068 8488 before making any final decisions on amending your projects.

## 6.1. How to notify us of an M&V revision

To notify us of either a major or minor change you are required to provide:

- **The M&V revisions template:** this is a short template that you will use to summarise the any changes you are making to your project including providing details of any unspecified portions of your project e.g. location, technologies, kW savings, M&V approaches etc. This will be made available in due course.
- **A revised version of your measurement and verification documents** with the updated details of your project – this involves both an M&V Plan and supporting evidence (e.g. as with your original application you will need to provide manufacturer specifications for each replacement equipment type that is being installed in your project and/or a supplier quote to substantiate the kW savings of the equipment being installed).

Once you have determined the changes that you would like to make to your project you need to notify us by emailing us at [edr-project@decc.gsi.gov.uk](mailto:edr-project@decc.gsi.gov.uk) . On receiving your email we will then release your original application within the portal. Once your application is released back to you will be able to log in and upload any revised M&V Documents by following the steps outlined in Section 5 of this Manual. i.e. clicking in 'Upload New File' to upload updated documents in the relevant sections. When making changes to your project you will also need to upload an 'M&V revisions template' in the 'Supporting Document's section' of your application. The M&V revisions template will be made available in due course.

# 7. Post installation Activities



## 7.1. Reporting Operational Verification

As a condition of your Participant Agreement, prior to the winter peak in which your project will deliver savings, you have to provide:

- a commissioning certificate *for each type of equipment* included in your project, including information on all the equipment installed and installation dates at each site.
- a completed operational verification template that summarises the evidence you are providing and how it relates to your project

If your project will be delivering savings over the winter peak:

- **Nov 2016 – Feb 2017** then you must provide operational verification evidence by 30 September 2016.
- **Nov 2017 – Feb 2018** then you must provide operational verification evidence by 30 September 2017.

If the evidence provided is satisfactory you will receive up to 20% of the funding you have been allocated through the auction. If you fail to provide the required evidence this will result in reduced or non-payment and in some cases could result in exclusion from the scheme.

### 7.1.1. Operational Verification requirements

If you are successful in securing funding through the EDR auction you will need to provide evidence that the equipment in your project is correctly installed prior to the winter peak in which you are delivering savings.

The purpose of operational verification is to ensure that equipment is installed and operating as intended. This is a key step in ensuring expected savings are achieved. Up to 20% of the funding secured through the auction will be contingent on the provision of operational verification evidence.

Evidence to demonstrate the purchase and installation of your measures must include:

- For **each type of equipment** included in your project you will need to provide a commissioning certificate. This should include as a minimum:
  - Registered company name and address, and site addresses where the equipment was installed
  - A full list of the equipment installed with the date of installation
  - The customer's printed name and signature, on behalf of their company
  - The equipment supplier's name and address
  - The installation engineer's printed name and signature

We are aware there are other types of operational verification evidence such as inspections, meter readings etc. If you wish to provide an alternative form of operational verification evidence that is not a commissioning certificate you must contact DECC to confirm the operational verification evidence is appropriate.

Please note that we reserve the right to ask for the receipts/proof of purchase covering the equipment included in your project. Make sure you keep hold of the relevant paperwork so that it is available if requested. This information should be dated after you signed the Participant Agreement.

You will also need to complete and upload the 'Operational Verification template'. The operational verification template will be made available in due course. It will include information on the operational verification evidence you have provided and how it relates to your project. Please let us know if you would like to review the template that was used for the previous phase of the pilot.



## 7.2. Reporting Savings from Your Project

### Section overview

This section explains reporting requirements you need to comply with. Using the guidance in this section, you should:

- Confirm the actual time of use of your equipment over the winter peak in which your project delivered savings (for both deemed and metered projects)
- If using a metered approach, report the documented savings using meter readings as set out in the 'Winter Peak Reporting' tab in each of the baseline spreadsheets
- Provide a Winter Capacity Savings Report (up to 60% of allocated funding) and a Final Report (up to 20% of funding that has been allocated)

If your project will be delivering savings over the winter peak:

- **Nov 2016 – Feb 2017** then you must provide your Winter Capacity Savings report between 1 March and 14 April 2017 and your Final Report by December 2017
- **Nov 2017 – Feb 2018** then you must provide your Winter Capacity Savings report between 1 March and 13 April 2018 and your Final Report by December 2018

### 7.2.1. Reporting requirements

Following implementation, there are two reporting milestones to which payments are attached. Sections 14 and 15 of the Participant Handbook sets out more detail, the two milestones are:

1. **A Winter Capacity Savings Report (WCSR)** Up to 60% of payment is contingent on the demonstrated savings of your project which are submitted through this report, it will include:
  - Confirmation of the actual time of use of the equipment installed over the winter peak period for which your project delivered savings (either Nov 2016 – Feb 2017 or Nov 2017 – Feb 2018).
    - If you are using a deemed approach this involves confirming the actual time of use of equipment installed in the 'Actual Time of Use' tab within your Deemed M&V Plan
    - For metered projects this involves confirming the actual time use of equipment installed in the "Actual Time of Use" tab within your Metered M&V Plan
  - For those using metered approaches the documented demand reduction is derived from your meter readings. Your report should be prepared once data that is representative of

electricity use over the winter peak is available and submitted by completing the “Winter Peak Reporting” tab within your baseline spreadsheet(s).

- Payments will be determined by the kW savings delivered as evidenced through measurement and verification documents. See Chapter 5 of the Participant Handbook for more detail.
2. **A Final Report.** The remaining 20% of payment is contingent on completion of the Final Report. The Final Report has two components:
- the Final Data Request (for metered schemes only) and
  - completion of evaluation activities culminating in the Final Evaluation Questionnaire.
- The Final Data Request collects, for most metered projects, a full 12 months of savings data to support further evaluation of the scheme. Payment of the Final Report 20% payment is contingent on provision of this data as requested but the data is used for evaluation purposes only and the data values will not affect the size of the EDR payment.

### 7.2.2. Winter Capacity Savings Report

#### Confirming actual time of use

- As part of the Winter Capacity Savings Report, all projects (including those using deemed approaches) will be required to confirm the time of use of their equipment over the winter peak in which savings are delivered, and whether this has changed from the expected time of use submitted at the time of the auction. This will be used to calculate actual savings delivered and will determine the level of payment that is made. For metered projects you should use the ‘Actual Time of Use’ tab within the Metered M&V Plan spreadsheet for this purpose. For deemed projects you should state if there has been any changes in the time of use on the ‘Actual Time of Use’ tab in your Deemed M&V Plan(s).

If any changes have occurred you must provide a detailed breakdown in the relevant text box in the ‘Actual Time of Use’ tab.

For deemed approaches:

- if you are using a deemed approach and time of use varied from the expected time of use set out at the time of the auction you will need to select ‘Yes’ in cell C7 in the ‘Actual Time of Use’ tab within the relevant deemed M&V Plan(s) and then provide a detailed breakdown of the changes in actual time of use in the relevant text box in the ‘Actual Time of Use’ tab. On completing this you must then re-complete the ‘Data Input’ tabs of the relevant deemed spreadsheet(s) calculators with the updated time of use to re-calculate the savings achieved from your project. If there were no changes in time of use you must select ‘No’ in cell C7 in the ‘Actual Time of Use’ tab and this will confirm that your operating hours were as set out in your original submission.

For partial measurement approaches:

- you will need to input the actual time of use in the 'Winter Peak Applicable Hrs' tab of the Partial Measurement baseline spreadsheet.
- you should also describe any changes in time of use compared to the expected time of use in the 'Actual Time of Use' tab in the Metered M&V Plan and complete K to O in the 'Actual Time of Use' tab.

For full measurement approaches:

- If there were no changes and the equipment operated as intended you can simply complete columns K to O in the 'Actual Time of Use' tab in the Metered M&V Plan.
- Where changes in the times of use of equipment compared to that expected did occur you will need to complete columns K to O in the 'Actual Time of Use' tab in the Metered M&V Plan and provide detail about the changes in the relevant text box within the 'Actual Time of Use' tab

Please note for both full and partial measurement approaches you must also provide your metered data, any data for independent variables and complete the 'Winter Peak Reporting' tab of the relevant baseline spreadsheets for your metered projects.

### **Data reporting (for those using M&V approaches involving the use of metering)**

If you are using a metered M&V approach, as you have already done for your baseline period, for the reporting period you will need to:

- Collect raw metered data over the reporting period in half-hourly format. Partial measurement approaches using manual application of clamp meters can provide data in a different format (e.g. less than half-hourly).
- Extract the peak relevant kWh or kW savings over the peak period from the raw data and input this into the 'Winter Peak Reporting' tab of the baseline spreadsheet you are using for your metered project. This will be used to calculate the average peak kW savings. You will also need to attach your raw metered data for the whole period (i.e. not just the peak period but the full data). This is so it is possible to verify the savings figures used.

The period of time and the exact reporting process will be dependent on the M&V approach, as described in the following tables:

M&V Approach	Reporting Process
<p>Partial Measurement</p>	<p>As there is no seasonal variation in demand, reporting can be carried out as soon as the new equipment is in place and operating as it will be during peak relevant hours. Using the same metering process to measure the baseline, you will need to take demand readings of the new equipment and enter the readings into the “Winter Peak Reporting” tab of the template for Partial Measurement baseline spreadsheet. You should take a similar number of readings to those used for the baseline.</p> <p>Any change in the peak relevant hours should be documented when reporting savings, including evidence of the change, as provided for the original hours of operation.</p> <p>The template for Partial Measurement baseline spreadsheet will automatically calculate the winter peak capacity savings and show the reduction on the Cover Sheet tab of the Partial Measurement baseline spreadsheet. You must then enter this number in the “Actual TOTAL kW Reduction” in cell F5 on the Cover Sheet of your Metered M&amp;V Plan template.</p>

M&V Approach	Reporting Process
<p>Full Measurement: Submetering or Total Building</p>	<p>Reporting can be carried out once a full cycle of consumption has elapsed. As described in on page 45, the duration of a full cycle is dependent on the operating conditions of the equipment or building being measured.</p> <p>Where seasonal variables have been used to calculate adjustments, a full winter peak will need to elapse before savings can be measured and reported for the peak months. Where other variables are used, shorter periods are acceptable provided that a range of typical operating conditions is captured.</p> <p>Data should be captured using the same metering used to calculate the electricity baseline, i.e. either a submeter, or a utility meter for the whole building.</p> <p>If the baseline is an average value, then the new average value with EDR project implemented should be compared to the original. The Average Readings baseline spreadsheet has a “Winter Peak Reporting” tab where readings can be entered once the project has been implemented.</p> <p>Where adjustments have been calculated from a regression analysis, the reporting period data will need to be compared to the adjusted baseline data. The Regression Analysis baseline spreadsheet has a “Winter Peak Reporting” tab, allowing electricity and variable data to be entered.</p> <p>Please refer to sections 3.5, 3.6 and 3.7 and the Average Readings baseline and Regression Analysis baseline spreadsheets for instructions on how to fill out the Winter Peak Reporting tab.</p>

Where your project has more than one measurement boundary (e.g. multiple sites or technologies) you will need to report the saving of each boundary and sum all the Verified Total kW Saving that will be automatically calculated on the Cover Sheet in the baseline spreadsheets. You must then enter the “Actual TOTAL kW Reduction” in cell F5 on the Cover Sheet of your Metered M&V Plan template.

### 7.2.3. Final Report

#### Final Data Request

If you are using a deemed approach only you do not need to submit a Final Data Request but all participants need to complete a Final Evaluation Questionnaire.

For projects using metered M&V approaches the content of the Final Data Request depends upon the specific M&V approach you are using and the length of the operating cycle of measures being installed. In addition, where you have used a regression analysis you will need to submit the data for your independent variable(s) alongside your meter readings. The table below sets out the requirements.

	Deemed schemes	Metered – whole building approach	Sub-metered – operating cycle > 4 months	Sub-metered – operating cycle equal to or < 4 months	Partial metering
Data requirement at Final Report stage	No further requirement	<ul style="list-style-type: none"> <li>12 months of meter data</li> <li>12 months data series for any independent variable</li> <li>Information on any anomalies for example significant unusual production outages</li> </ul> <p>If it is not feasible to provide this data please discuss with DECC</p>		<p>Where possible, please provide data as requested for other metered projects</p> <p><i>Where data can be provided it will add a valuable component to our ability to evaluate the performance of the pilot</i></p>	

The data requirements for the Final Data Request are similar to, but not identical to, those in the Winter Capacity Savings Report. You will need to:

- Collect metered data over the full 12 months since installation of the EDR equipment. Where the sub-metered approach or the whole building approach has been used, it is expected the data will be half-hourly kWh readings. Where a partial measurement approach has been used we’d be happy to receive any readings as long as the date and time of those readings is clear to us.
- If you have adjusted the baseline and winter peak reporting data using regression analysis you will also need to provide independent variable data for the same reporting period.

- Fill out the ‘Final Data Request’ tab in each of the Baseline spreadsheets you have previously submitted as part of your metered application and your Winter Capacity Savings Report. There should be one Baseline spreadsheet for each of your measurements boundaries. Guidance can be found in the help tab within each of the baseline spreadsheets. Below is a summary of the ‘Final Data Request’ tab in the Regression Analysis baseline spreadsheet for reference:

**Final Reporting Tab**

Click here for **More Information**

**Sections to be Completed in this Tab**  
 FR.1.0 General Information Regarding Metered  
 FR.2.0 General Information Independent  
 FR.3.0 Sampling  
 FR.4.0 Information on Any Anomalies During  
 the Final Reporting Period

White boxes with blue outlines indicate where values should be entered by the applicant  
 Light blue boxes indicate the output of an automatic calculation  
 Grey boxes provide additional information – those marked “Click here for More Information” need you to click on them

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**FR.1.0 General Information Regarding Metered Data**

	Start	End		Metered – whole building approach	Sub-metering
Final Reporting Period - Start and End Dates			Click here for More Information	Data requirement at Final Report stage	12 months of 12 months data independent variable information on any and significant unusual production
<p><b>Please note:</b> if you using a "Full Measurement: Total Building Electricity" or Full Measurement: Sub metering" approach and your operating cycle is more than 4 months, then your final reporting period will have to be 12 months after the installation of your EDR project. Figure FDR 1 to the right of this box outlines all the final data requirements for each metered approach. Detailed information can be found in Section 4.1.3. of the M&amp;V Manual</p>					

Figure 7.1: Final Reporting Tab – General Information

**Regression Analysis: Baseline Spreadsheet - Final Data Request tab:**

- **FR.1.0 General Information Regarding Metered Data:** in this section you provide information about final reporting period you have used and where you are getting your data from (sub meter or whole site meter) and the name of the date file containing the raw kW or kWh data for your final reporting period.
- **FR.2.0 General Information Independent Variable Data:** in this section you provide information about the independent variable and the period it covers over your final reporting period.
- **FR.3.0 Sampling:** in this section you confirm if you have used sampling. It may be that rather than taking readings from all the units you have e.g. for lighting you decide to take readings from a sub-set of meters to reduce burden. If you are using sampling you will need to provide details of the size of your sample and the overall population that it represents.
- **FR.4.0 Information on Any Anomalies during the Final Reporting Period:** in this section you need to record if there were there any major changes in your electrical consumption pattern. For example a major change or fault on the production line, major refurbishment works, an un-planned store closure or shut down.

**FR.4.0 Information on Any Anomalies During the Final Reporting Period**

During your Final Reporting Period that you entered in Section FR.1.0 General Information were there any major changes in your electrical consumption pattern? For example a major change or fault on the production line, major refurbishment works, an un planned store closure or shut down?	-- Please Select --
---	---------------------

If you answered yes to the above question please provide further detail on major changes that impacted the electrical consumption pattern at the site(s) covered by the measurement boundary in this baseline spreadsheet.

Log of Major Changes Impacting Electrical Consumption at the site		
Period Changes Occurred		Cause of the Major change in on site electrical consumption
Start Date	End Date	Free Text

*Figure 7.2 - FR.4.0 Information on Any Anomalies*

Once you have finished upload your completed baseline spreadsheet(s) along with file(s) containing your metered data (and if relevant you independent variable data) via the portal.

Please also remember that you also need to do the Final Evaluation Questionnaire.

**Final Evaluation Questionnaire**

The second component of the Final Report is the completion of evaluation activities, culminating in the completion and submission of the Final Evaluation Questionnaire. Further detail on the Final Report, including information on the evaluation activities and how to complete and submit a Final Evaluation Questionnaire, is provided Chapter 16 of the Participant Handbook.

# 8. Appendices and spreadsheet files

## 8.1. Appended documents:

Appendix A - Deemed Measure Overviews and Data Calculations

Appendix B - Checking the Accuracy of your Baseline

## 8.2. Spreadsheet files

### **Metered Approach Spreadsheets**

1. Metered M&V Plan
2. Partial Measurement - Baseline
3. Full Measurement – Average Readings Baseline
4. Full Measurement – Regression Analysis Baseline
5. Sample Size Calculator

### **Deemed Approach Spreadsheets**

6. M&V Plan for Deemed - Heating Controls
7. M&V Plan for Deemed - Lighting Controls
8. M&V Plan for Deemed - Lighting Replacement
9. M&V Plan for Deemed - Motors and VSD
10. M&V Plan for Deemed - Process Chillers
11. M&V Plan for Deemed - PRSCs
12. M&V Plan for Deemed - RDCs

### **Examples (will be published when available)**

13. Example M&V Plan for:
  - a. Partial Measurement Approach
  - b. Full Measurement: Submetering
  - c. Full Measurement: Total Building
14. Worked Example for Regression Analysis – Baseline & Reporting
15. Worked Example for Average kW Readings – Baseline & Reporting

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