

The Rules

# Metering and Consumption

Version 1.0 – November 2020



Cover photo: A gas meter servicing a CHP unit of an office building. Used with permission by Better Buildings Partnership Ltd.

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# 1 Introduction

## 1.1 Summary

NABERS UK is a performance-based rating scheme that operates across England, Wales, Scotland and Northern Ireland. It is managed by the Building Research Establishment (BRE), referred to as the **Scheme Administrator**. The scheme is owned and licensed by NABERS, who also own and administer the Australian NABERS rating scheme.

NABERS ratings are expressed as a number of stars, for example:

NABERS rating		Performance comparison
6 stars	★★★★★★	Market leading building performance
5 stars	★★★★★	Excellent building performance
3 stars	★★★	Market average building performance

NABERS UK currently offers one type of rating, NABERS Energy for Offices, which measures and rates the **Base Building** energy efficiency of an office. While in Australia there are also tenancy and whole building options, these are not yet available as part of NABERS UK.

An accredited NABERS Energy for Offices rating is awarded when the **Scheme Administrator** certifies a rating completed by an **Assessor**. The **Scheme Administrator** may independently audit the rating and assist in resolving complex technical issues.

This document presents the metering and consumption **Rules** that are common for NABERS Energy for Offices ratings. It is intended that this document be read alongside *NABERS UK The Rules – Energy for Offices*. Its purpose is to provide the standard for the collection and assessment of metering and consumption data for energy. As such, it presents the minimum requirements of what **Assessors** must adhere to when they are conducting a NABERS rating.

In addition to the **Rules**, an **Assessor** is to make use of relevant **rulings** and the **NABERS rating input form**.<sup>1</sup> A list of the documentation required in relation to this document is given in Chapter 9.

## 1.2 Interpretations of the Rules

Assessments for an accredited rating must comply with the version of the **Rules**, and any relevant **rulings**, current on the day the rating application is lodged to NABERS UK, unless—

<sup>1</sup> **Rules** texts are amended as required by additional **rulings** which are published on the NABERS UK website: [www.nabers.gov.au/nabers-uk](http://www.nabers.gov.au/nabers-uk).

- a) the **Scheme Administrator** has specifically approved otherwise in writing, or
- b) the assessment is conducted under the terms of a NABERS Design for Performance Agreement which specifies an earlier version of the **Rules**.

A **ruling** takes precedence if there is any conflict with the **Rules**. If there is a conflict between **rulings**, the most recent takes precedence.

## 1.3 Situations not covered by the Rules

These **Rules** are intended to cover most ratings. If an exceptional situation is encountered and the **Rules** are not easily applicable, the **Assessor** must contact the **Scheme Administrator** for assistance.

Where an **Assessor** is unsure how to apply the **Rules**, the **Scheme Administrator** may resolve the issue by making an interpretation of the **Rules** or by advising the use of a specific procedure that aligns with the intention of the **Rules**. Written correspondence from the **Scheme Administrator** is required as evidence if this occurs.

Procedures not contained within these **Rules** may only be used for a particular rating with prior written approval from the **Scheme Administrator**. Approval to use the same procedure must be sought from the **Scheme Administrator** each time it is proposed to be used. Approval is entirely at the discretion of the **Scheme Administrator**.

## 1.4 How to use this document

### 1.4.1 Overview

**Table 1.1** below is an overview of what is presented in this document. Each step contains important information in the process of determining energy usage and conducting a NABERS rating.

**Table 1.1: Overview of metering and consumption requirements**

	Summary step	Reference
1	Identify all the sources and supply points of energy and confirm that they are permitted by NABERS UK.	Section 3.2
2	Check the sources and supply points to confirm that the required minimum energy coverage can be met.	Section 3.3
3	Confirm the types of supply points and meters that are present and adhere to <b>validation</b> requirements as applicable.	Section 3.4
4	Calculate the consumption from each of the <b>utility metering systems</b> to be considered when calculating the rating, including correction for any estimates or missing data.	Chapter 4

Summary step		Reference
5	Calculate the consumption from each of the <b>non-utility metering systems</b> to be included in the rating, including correction for any estimates or missing data.	Chapter 5
6	Where <b>non-utility metering systems</b> have been used to calculate consumption, validate these meters in accordance with these <b>Rules</b> .	Chapter 6
7	Calculate the consumption from any small <b>end use</b> estimations and batch supplies.	Chapter 7
8	Calculate the consumption from any renewable energy on-site.	Chapter 8

## 1.4.2 Formatting conventions and referencing

The term '**Rules**' refers to a body of works produced by NABERS UK that specify what must be examined, tested and documented when an **Assessor** conducts a rating. Wherever the term is used in this document from Chapter 3 onwards, it refers to this particular document, *NABERS UK The Rules - Metering and Consumption, v1.0, 2020*. Other **Rules** documents mentioned in the text are distinguished from the present document by the inclusion of their title.

**Notes and examples:** Text appearing with a grey tint in the background is explanatory text only. It is not to be read as part of the **Rules** and/or is not essential for the proper use of this document.

Text appearing **dark green and bold** is a defined term (see Chapter 2).

All main references to documentation requirements appear *italicised and in aqua font*.

Internal cross references appear as numbered sections (e.g. Section 4.2) or chapters (e.g. Chapter 6) and are hyperlinked. Cross references to an individual **Rules** text (e.g. *NABERS UK The Rules - Energy for Offices*) are numbered appropriately together with the title of the specific text.

## 1.5 Related documents

### 1.5.1 Documents specific to NABERS UK

*NABERS UK The Rules - Energy for Offices, v1.0, 2020*

### 1.5.2 NABERS Australia documents relevant to NABERS UK

**Note:** These documents are NABERS Australia documents which are relevant to NABERS ratings under the NABERS UK scheme.

*NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions, v2.0, 2008*

*NABERS Ruling – On-site Renewable Electricity Generation Systems, v1.0, 2020*

*Interim Methodology for the treatment of Cogeneration and Trigenation Systems in NABERS ratings, v1.1, 2013*

## 2 Terms & definitions

This chapter lists the key terms and their definitions that are integral to the proper use of this document.

Term	Definition
<b>acceptable data</b>	Data which meets the applicable accuracy and validity requirements of these <b>Rules</b> .
<b>acceptable estimate</b>	<p>The values derived from an estimation method permitted by these <b>Rules</b> in place of incomplete or uncertain data.</p> <p>Estimates that do not satisfy the above specifications are deemed unacceptable and cannot be used in the rating.</p>
<b>Assessor</b>	An accredited person authorised by the <b>Scheme Administrator</b> to conduct NABERS ratings.
<b>Base Building</b>	The technical entity defined by the services within the minimum energy coverage defined in <i>NABERS UK The Rules – Energy for Offices</i> .
<b>billing period</b>	The continuous 12-month period of data which is used for an individual meter in the rating.
<b>cloud metering system</b>	An electrical <b>metering system</b> where voltage, current and phase data is gathered from an electrical network by sensors. This data is then transmitted via the cloud (this is a type of <b>RMRS</b> ) to software that calculates energy usage. Cloud meters are considered “non-cumulative” meters for the purposes of NABERS UK.
<b>embedded network</b>	<p>A private electricity network that is connected to the parent electricity network or ‘grid’.</p> <p><b>Note:</b> Most office buildings in the UK use <b>embedded networks</b> for supplying office tenants and the <b>Base Building</b> systems.</p>
<b>end use</b>	A purpose or activity (or a group of related purposes and activities) that energy is used for.
<b>metering system</b>	A system of one or more devices providing an individual measurement.
<b>NABERS rating input form</b>	The rating input form provided by the <b>Scheme Administrator</b> for use by <b>Assessors</b> in the calculation of accredited ratings.

Term	Definition
<b>Net Internal Area (NIA)</b>	The floor area, determined in accordance with the measurement standard for rated area, of spaces that can be used as offices within the <b>rated premises</b> . <p data-bbox="509 421 1321 483"><b>Note:</b> This is essentially the space within the permanent walls of the building, but excluding spaces for:</p> <ul data-bbox="539 499 1334 680" style="list-style-type: none"> <li>a) Public access and use (including stairs, escalators, lift lobbies and passageways);</li> <li>b) Building mechanical, air conditioning, electrical and other utility services;</li> <li>c) Staff and cleaning facilities (including toilets, tea rooms, and cleaners' cupboards).</li> </ul> <p data-bbox="509 696 1321 786">The <b>Assessor</b> should refer to the relevant measurement standard for rated area documents for a definitive list of inclusions and exclusions.</p>
<b>non-utility metering system</b>	An energy <b>metering system</b> that is owned or operated by a third party other than a <b>utility</b> .
<b>potential error</b>	The total of all <b>acceptable estimates</b> (including assumptions, approximations, and unverified data) included in the rating assessment. The <b>NABERS rating input form</b> automatically calculates the <b>potential error</b> based on the data provided.
<b>rating period</b>	The 12-month base period for the rating, requiring at least 12 contiguous months of <b>acceptable data</b> upon which the rating is based.
<b>rated premises</b>	The building to be rated.
<b>Remote Meter Reading System (RMRS)</b>	System whereby meter readings and other crucial meter data are sent to a data collection system. Such a system provides virtual meter access when physical access is not possible.
<b>Rules</b>	Authoritative document produced by the <b>Scheme Administrator</b> that specifies what must be covered by an <b>Assessor</b> in order to produce a rating.
<b>ruling</b>	An authoritative decision by the <b>Scheme Administrator</b> which acts as an addition or amendment to this document.
<b>Scheme Administrator</b>	The body responsible for administering NABERS UK, in particular— <ul data-bbox="521 1697 1394 1944" style="list-style-type: none"> <li>a) establishing and maintaining the standards and procedures to be followed in all aspects of the operation of the system, and</li> <li>b) determining issues that arise during the operation of the system and the making of ratings, and</li> <li>c) accrediting Assessors and awarding accredited ratings in accordance with NABERS UK standards and procedures.</li> </ul> <p data-bbox="491 1960 1394 2031">The functions of the Scheme Administrator are undertaken by the Building Research Establishment (BRE).</p>

Term	Definition
	<b>Note:</b> The term ‘Scheme Administrator’ applies to the UK context and should not be confused with the term ‘National Administrator’ that appears in NABERS Australia publications.
<b>utility</b>	An organisation or company that holds a licence to retail electricity, or gas, and that sells energy as its primary business. Building owners, and their agents, who onsell electricity or gas to tenants are not considered to be utilities for NABERS UK purposes.
<b>utility metering system</b>	An energy <b>metering system</b> that is owned and operated by a <b>utility</b> .
<b>validation</b>	The process of checking the configuration of a <b>metering system</b> for a NABERS rating, and if necessary, adjusting and re-checking, to ensure the configuration is correct.

# 3 Supply points and minimum coverage

## 3.1 Summary

This chapter focuses on **Steps 1, 2 and 3** of **Table 1.1**:

**Step 1:** *Identify all the sources and supply points of energy (e.g. meters and batch delivery) and confirm supply points used in the rating are permitted by NABERS UK.*

**Step 2:** *Check the sources and supply points to confirm the required minimum energy coverage can be met.*

**Step 3:** *Confirm the types of supply points and meters that are present, and adhere to validation requirements as applicable.*

*For documentation requirements, see Section 9.2.*

## 3.2 Energy sources and supply points

### 3.2.1 Conducting a site visit

The **Assessor** must identify all energy sources and supply points to the premises. A thorough site inspection must be conducted in order to ensure that all instances of energy have been considered in the **Assessor's** analysis for the rating.

The **Assessor** must identify all sources of supplied external energy to the building, including—

- 1) electrical including renewable,
- 2) gas,
- 3) diesel,
- 4) geothermal,
- 5) thermal (chilled, heating or condenser water).

The **Assessor** must also identify and report on all energy exported from the premises for other uses.

Notes and photos must be kept as evidence of the inspection. All of the following steps must be taken to ensure that no instances of energy supply have been missed:

- i) Ask the building managers/facilities managers to identify all the energy sources and associated accounts for the premises, including batch-delivered supplies.
- ii) Review service drawings, where available, to identify all supply points (e.g. single line diagrams, electrical circuit schedules).

- iii) Review the premises (including plant rooms and switchboards) to check all equipment requiring different types of energy supply is covered by the identified supply points (e.g. electricity, gas, diesel, chilled water, heating hot water).
- iv) Review the premises to check for any unmetered sources of energy to the premises.
- v) Ask building managers/facilities managers to identify all the services on site that may be shared with other premises, and the energy supplies and associated accounts for those services.
- vi) Collect all details of **end uses**, sources and meters relevant to the inspection.

*For documentation requirements, see Section 9.2.1.*

### 3.2.2 Supply points permitted by NABERS UK

Supply points are used to determine consumption. The following supply points are permitted by NABERS UK:

- a) **Utility metering systems.** These are to be used in preference to **non-utility metering systems** and do not need to be cumulative meters.
- b) **Non-utility metering systems.** These must meet the requirements of Section 3.4 and Chapter 5;
- c) Batch delivery supply bills where the supplier has stated the quantity supplied; and
- d) Thermal meters (see *NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions.*)

In some cases, an **Assessor** may not be able to determine consumption from a supply point. If this occurs, other methods, such as estimation, are allowed in specific situations in accordance with these **Rules**. These are described further in Chapter 7.

## 3.3 Minimum energy coverage

### 3.3.1 General

Once the sources and their supply points have been determined, **Assessors** must ensure that all the required energy **end uses** for each rating are covered. These are listed in the **Rules** documents and are not repeated here.

If an **end use** is required to be included in the rating but is not covered by one of the supply points identified, then the **Assessor** must use one of the alternative allowable methods listed in Chapter 7 to ensure the minimum energy coverage requirements can be met.

The energy associated with electric vehicle charge points does not form part of the minimum energy coverage and is not required to be included. Emissions associated with moving vehicles are not included in the scope of ratings.

*For documentation requirements, see Section 9.2.2.*

### 3.3.2 Checks of sources and supply points – Excluded sources

Sources that supply energy exclusively to **end uses** that are outside the required minimum energy coverage can only be excluded from the rating if permitted by these **Rules**.

*For documentation requirements, see Section 9.2.3.*

### 3.3.3 Checks of sources and supply points – Offices

**Assessors** must also undertake the following checks, where relevant, of all sources and supply points.

- a) All tenant meters must initially be considered as sources to the **Base Building**. They must only be excluded in accordance with these **Rules**. Tenant distribution boards must be reviewed to ensure that none of the **Base Building end uses** have been connected. The common instance of components of **Base Building** HVAC plant being on the tenant meters is covered under Section 7.2.1. Other instances of connected **Base Building** power and lighting might include cleaner's power points, lifts or lobby lighting on whole floor tenancies.
- b) **Assessors** must check all **end uses** to be included for the rating. This includes **end uses** that are located in spaces not included in the **rated area** calculation.

## 3.4 Confirmation of metering systems and validation requirements

### 3.4.1 General

Data from **utility metering systems** is to be used in preference to data from **non-utility metering systems**.

**Utility metering systems** do not need to be validated for a NABERS rating.

Data from **utility metering systems** can be used for inclusions or exclusions, regardless of whether they are non-cumulative or cumulative.

*For documentation requirements, see Section 9.2.4.*

### 3.4.2 Use of non-utility metering systems

**Non-utility metering systems** can be used in the following circumstances:

- a) In the absence of a complete set of **utility** data; or
- b) Where the data from **non-utility metering systems** provides more reliable data, such as when **utility** reads are too infrequent and require adjustment or the **utility metering systems** are on the high-voltage side of the transformers (see Section 3.4.5); or
- c) Where a **non-utility metering system** is a more direct source of consumption data, for example where the alternative would be a **utility meter** and a significant number of exclusions.

Where a **non-utility metering system** is used as primary data source, it is entered into the **NABERS rating input form** as if it were a **utility metering system**. Normal **validation** requirements for the **non-utility metering system** still apply.

Where **non-utility metering systems** are used, the **Assessor** must record and retain documentation that identify all **non-utility metering systems**. This include written reports and diagrams.

*For documentation requirements, see Section 9.2.4.*

**Note 1:** Where a rating is carried out based on inputs from only **non-utility metering systems**, **Assessors** should, where possible, reconcile all meters against a **utility** meter.

**Note 2:** Advice from **utility** companies about which meters service the building always needs to be cross-checked on site to ensure errors that have not been made. It is recommended that the meter reading on each meter is recorded at the time of the site inspection.

### 3.4.3 Meter accuracy for non-utility metering systems

NABERS UK does not provide specific requirements on the accuracy class for meters. However, it does require that **metering systems** are validated in accordance with Chapter 6.

**Assessors** must ensure that meters installed will accurately read data at the levels expected. For example, if low or variable gas flows are expected, the gas meters installed must be able to measure at these low flows. Particular care should be taken with turbine gas meters and electricity meters rated for much higher currents than are actually being recorded.

The following section (3.4.4) provides further information on different metering types permitted in NABERS ratings.

### 3.4.4 Types of non-utility meters

#### 3.4.4.1 General

The following sections outline the different types of non-utility meters and how data from these meters can be treated for the purpose of a NABERS rating.

#### 3.4.4.2 Cumulative meters

Cumulative **metering systems**, for the purposes of NABERS UK, have a permanent on-board counting mechanism which accumulates consumption data.

Data from these meters, when used as non-utility meters, can be used for allowable inclusions or exclusions in a NABERS rating.

**Non-utility metering systems** relying solely on records created from pulse readings are considered cumulative if the pulse meter has an on-board counting mechanism to permanently store accumulated consumption data (otherwise known as an absolute count).

#### 3.4.4.3 Non-cumulative meters

Non-cumulative **non-utility metering systems** are meters which do not meet the definition of a cumulative meter.

Data from non-cumulative meters must not be adjusted to fill in missing data.

When using data from these meters for an inclusion, the following rules apply:

- a) The data must be reconciled against an energy balance from a parent **utility metering system**; and

- b) Virtual meters must not be used in this reconciliation.

If the data from these meters cannot be confirmed to be 100 % complete using the above rules (e.g. full interval data is available), then the data must only be used for exclusions.

It is the expectation of the **Scheme Administrator** that this data reconciliation is undertaken by metering providers and not by NABERS UK **Assessors**.

#### 3.4.4.4 “Soft” meters or equipment sensors

“Soft” meters or equipment sensors include sensors, fan speeds and data output from variable speed drives. Readings from these meters must convert detected current, phase and voltage into an energy reading (measured in kWh). This data is only considered **acceptable data** for exclusions in a NABERS rating.

Readings calculated from current and voltage only (apparent power) or sensor data such as fan speeds are unacceptable. Energy readings that are based on intermittent instantaneous power measurements rather than integrated power are also unacceptable.

#### 3.4.4.5 Virtual meters

Virtual meters are effectively not physical meters. Virtual meters refer to calculating consumption data, typically by subtracting the data of one meter from another to obtain the difference. They may also include a sum of smaller meters downstream to create a virtual meter.

Virtual meters cannot be used where an energy balance against a parent **utility metering system** is required. This includes:

- a) Non-cumulative **non-utility metering systems**, where the data is used for inclusions (see Section 3.4.4.3);
- b) High-voltage meters (see Section 3.4.5).

All **non-utility metering systems** used for virtual meter calculations must be validated in accordance with these **Rules**.

Virtual meter calculations must be conducted using the **NABERS rating input form**. This means that all non-virtual meter data must be entered, without manipulation, into the **NABERS rating input form**.

**Note:** For premises with a very large number of virtual meters, there are certain situations where entry of individual virtual meters into the **NABERS rating input form** may not be necessary. Advice should be sought from the **Scheme Administrator** to confirm if these situations apply to your premises.

*For documentation requirements, see Section 9.2.4.*

### 3.4.5 High-voltage electricity metering

NABERS ratings are based on low-voltage metering.

It is acceptable to use **non-utility metering systems** on the low-voltage (LV) side for the energy use measurements if—

- a) a premises’ main electricity **utility metering systems** are situated on the high-voltage (HV) side of the transformers, and

- b) there are no connections to energy uses within or outside the premises that bypass the LV meters. The LV meters must cover 100 % of the electricity **end uses**.

The **Assessor** must reconcile the LV meters against the HV meters to ensure that no meters are missing or reading incorrectly. Virtual meters (Section 3.4.4.5) cannot be used in this reconciliation.

As a guideline, transformer losses are expected to be less than 10 %. Losses above this figure must be re-investigated to find the source of the discrepancy and ensure the losses are not caused by unaccounted power used from the premises.

The **Assessor** may use values above 10 % losses if they have obtained evidence that the losses are not from electricity used by the premises. The HV metering is to be used in absence of this evidence.

The high-voltage **utility metering system** must be used in the absence of non-utility low-voltage meters which comply with these **Rules**. No allowance is made for losses in this situation.

*For documentation requirements, see Section 9.2.5.*

# 4 Utility metering consumption data

## 4.1 Summary

This chapter focuses on **Step 4** of **Table 1.1**:

**Step 4:** Calculate the consumption from each of the **utility metering systems** to be included in the rating, including corrections for any estimates or missing data.

**Assessors** must comply with the following process to calculate consumption from **utility metering systems** as defined in **Table 4.1**.

**Table 4.1: Process to calculate consumption from utility metering systems**

Sub-Step		Reference
1	Check the <b>utility metering system</b> data format and units, converting where necessary	Section 4.2
2	For each <b>utility metering system</b> , ensure that <b>acceptable data</b> is available for the 12-month <b>rating period</b>	Section 4.3
3	Where required, correct <b>utility metering system</b> data in accordance with these <b>Rules</b>	Section 4.4

*For documentation requirements, see Section 9.3.*

## 4.2 Data unit and format checks

### 4.2.1 General

**Assessors** must check the data units and formats for each **utility metering system** and convert them where necessary.

Billed quantities may be provided by utilities as either hard copy **utility** bills or an electronic consumption record. **Assessors** should refer to Section 9.3.1 for specific requirements on acceptable billing formats.

Some utilities provide a “headline” consumption figure separately from the billed quantities. In the event of conflicting information, the billed quantities always take precedence.

*For documentation requirements, see Section 9.3.1.*

### 4.2.2 Units

The units of consumption that **Assessors** should seek on **utility** bills are outlined in **Table 4.2**.

**Table 4.2: Units of consumption for utility bills**

Utility	Units
Electricity	kWh (kilowatt hours) or MWh (megawatt hours); GJ (Gigajoules)
Natural Gas	m <sup>3</sup> (cubic metres) at standard temperature and pressure; MJ (Megajoules), GJ (Gigajoules) or kWh
LPG	LPG must be entered into the <b>NABERS rating input form</b> as Gas and the units are in MJ, not in L (litres) or m <sup>3</sup> (cubic metres).
Fuel oil (diesel, heating oil, etc.)	L (litres); GJ

### 4.2.3 Energy bill formats

NABERS ratings utilise metered site energy. Any modifications by the **utility** or any other party to the metered energy for any reason other than the accurate representation of metered site energy must be ignored.

## 4.3 12-months of acceptable data for each utility metering system

### 4.3.1 General

Consumption data from each **utility metering system** must be reviewed by the **Assessor**. The **Assessor** must ensure that **acceptable data** covers one complete and continuous year, allowing for estimated and missing data as specified in Section 4.3.2 and Section 4.3.3 below.

*For documentation requirements, see Section 9.3.1.*

### 4.3.2 Check if any of the bills have been estimated

Consumption from estimated **utility** bills is not considered **acceptable data** and must be corrected before use in NABERS ratings.

It is also considered good practice to ensure that the preceding bill does not contain estimated data. If the preceding bill contains estimated data or is non-existent, guidance should be sought from the **Scheme Administrator**.

For requirements on correcting estimated data, refer to Section 4.4.

### 4.3.3 Check the data for anomalies

The **Assessor** must review the monthly or periodic data from each **utility metering system** over the **rating period** and scan the data for anomalies such as—

- a) meter rollovers – where the readings return to 0,
- b) meter changes,

- c) meter faults,
- d) **Remote Meter Reading System (RMRS)** faults,
- e) irregular readings, or
- f) disproportionate consumption values.

In some cases, consumption may not be an estimate but may still be inaccurate. The **Assessor** must use their experience and judgement to identify any anomalies in the data (accounting for seasonal variation) and investigate any significant anomaly. Any investigation must be documented for audit (*see documentation requirements in Section 9.3.1*).

The **Assessor** must contact the **Scheme Administrator** before proceeding if the anomaly cannot be explained as the rating may not be able to proceed.

For requirements on correcting missing data, refer to Section 4.4.

#### 4.3.4 Billing periods

**Assessors** are required to enter the **billing period** for each **utility metering system** into the **NABERS rating input form**.

For each **utility metering system**, the **billing period** must align with one of the following:

- a) The start date of the **billing period** with the start date of the first bill or reading; or
- b) The end date of the **billing period** with the end date of the last bill or reading.

**Assessors** must also align the **billing period** as closely as possible with the **rating period**, subject to the balance of requirements in this section.

**Note:** This is to avoid apportioning of the consumption data at the beginning and end of the **rating period**.

Each separate bill provided by the **utility** must be recorded as a separate line item into the **NABERS rating input form** to show the pattern of consumption throughout the **billing period**, along with the exact dates and consumption values for the respective bill.

Where data cannot be gathered for exactly the same period for different **metering system** accounts:

- a) The **rating period** must align exactly with the **billing period** for the primary **utility** account, or the meter reading dates of the primary non-utility account where there is no **utility** account; and
- b) The **billing period** for each **utility** account must match the dates on the bills.

If the billing dates of the other accounts do not align with the **rating period**, then **Assessors** must ensure:

- 1) Consumption data that accounts for at least 80 % of the total rating result (in kWh<sub>e</sub>) falls within the **rating period**; and
- 2) Consumption data is as close to the **rating period** as possible, with a maximum of two months displacement of data from the **rating period** allowed.

## 4.4 Adjusting for missing or estimated utility metering system data

### 4.4.1 General

The **Assessor** must check that the data from **utility metering system** readings do not rely on estimates by the **utility**. If it does, then the method outlined in this Section 4.4 must be followed.

The frequency of meter readings should be both—

- a) at least as frequent as the **utility** meter's billing frequency, and
- b) at least quarterly (i.e. four readings spaced evenly throughout the year).

*For documentation requirements, see Section 9.3.1.*

### 4.4.2 Adjusting for gaps at the start or end of the billing period

A **utility metering system** may be missing a valid meter reading at the start and/or end of the **billing period** because the bills are missing, or the reading was estimated by the **utility**. To resolve this, meter data can be used if no bills are available.

All meter readings used for this adjustment must comply with the data requirements of Section 4.2.

Where they are available, the **Assessor** should check these readings against **utility** readings.

### 4.4.3 Adjusting for gaps during the billing period – where cumulative meter readings are not available

Where there is an unresolvable gap in the billing data, (e.g. due to a change of supplier or meter), the **Assessor** may calculate an **acceptable estimate** of the unrecorded consumption by interpolating between adjacent bills. The interpolation must be based on the average daily consumption figures of the adjacent bills.

The **Assessor** must add the entire **acceptable estimate** of unrecorded consumption to the relevant **potential error**.

Under no circumstances is it permissible to extrapolate outside the available data. The premises cannot be rated if the data does not cover a full continuous 12-month period.

### 4.4.4 Adjusting for gaps during the billing period – where cumulative meter readings are available

#### 4.4.4.1 General

In some cases, an energy source can be missing a valid **utility metering system** reading during the **billing period** (e.g., if the bill was not available or if the reading was estimated by the **utility**).

The total consumption for the missing period can be accurately determined using the method(s) below (Sections 4.4.4.2 and 4.4.4.3) when valid **metering system** readings are available for the period immediately before and immediately after the missing readings.

The calculated consumption is considered to be **acceptable data** and may be used in the assessment without being added to the relevant **potential error**.

#### 4.4.4.2 Energy sources other than natural gas

For energy **sources** other than natural gas, the **Assessor** must:

- a) Calculate the total metered consumption in the period by using the meter readings before and after the missing or estimated reading(s); and
- b) Obtain any relevant factor required to convert the metered consumption to actual consumption; and
- c) Use the actual consumption, as calculated using the relevant factor, as the total consumption for the period.

**Note:** **Assessors** are to exercise care when performing these calculations and obtain written documentation to confirm the use of any conversion factors if not documented on the relevant **utility** bills.

#### 4.4.4.3 Natural gas

Missing gas consumption can also be determined using **metering system** readings. However, additional consideration is required due to the complexities of converting gas **metering system** readings to energy consumption.

Where a bill is missing or estimated but valid **metering system** readings are available before and after the missing period, the gas consumption can be determined using the following method:

- a) Calculate the total metered gas flow in the period by using the readings before and after the missing or estimated reading(s).
- b) Obtain the correction factor (CF) for the gas meter from the following, in order of preference:
  - 1) The estimated bill for the period (if available); or
  - 2) The **utility** bills before or after the missing period; or
  - 3) Written documentation provided by the **utility**.

**Note:** The correction factor is used to convert the metered consumption from the meter pressure to standard atmospheric pressure. It is sometimes in **utility** bills under an alternative name, such as “pressure correction factor” or “conversion factor”.

- c) Obtain the gas Heating Value (HV) at atmospheric pressure during the period between the valid readings. This value must be obtained from one of the following sources listed, in order of preference:
  - 1) Written documentation provided by the **utility** for the period between the two readings or, if not available;
  - 2) The average heating value for the period between the two readings, in the case there are **utility** bills (estimated or actual) fully covering such a period or, if not available;
  - 3) The default Heating Value of 38.5MJ/m<sup>3</sup>.
- d) Gas consumption can be calculated using the following formula:

$$\text{Gas Consumption} = (R_E - R_B) \times CF \times HV$$

where:

$R_B$  = the cumulative meter reading at the beginning of the missing bill period, in  $\text{m}^3$ ;

$R_E$  = the cumulative meter reading at the end of the missing bill period, in  $\text{m}^3$ ;

$CF$  = the correction factor; and

$HV$  = the heating value ( $\text{MJ}/\text{m}^3$ ).

#### Example:

Two consecutive monthly bills have been estimated by the **utility**. Estimated readings were taken on 31 March and 30 April. Valid meter readings for the period immediately before and immediately after the estimated readings were available in adjacent **utility** bills. The reading for 1 March was  $10,000 \text{ m}^3$  and the reading for 31 May was  $12,150 \text{ m}^3$ .

The pressure correction factor was obtained from the **utility** bills and was equal to 1.1. The average heating value for all the bills between the two accurate readings (including the two estimated bills) was  $39 \text{ MJ}/\text{m}^3$ .

The total gas consumption between 1 March and 31 May can be calculated as:

$$(12,150 \text{ m}^3 - 10,000 \text{ m}^3) \times 1.1 \times 39 \text{ MJ}/\text{m}^3 = 92,235 \text{ MJ}$$

#### 4.4.5 Use of interval meter data from a utility

Some utilities will bill a **metering system** based on a **Remote Meter Reading System (RMRS)** that transmits the consumption data but not the cumulative readings. This makes it impossible to reconcile an estimated bill as meter readings before and after are not available. The method below outlines the procedure for using this data.

The **RMRS** will detect when it does not receive a certain amount of data from the **metering system** and the bill will be listed as an 'estimate'. Where this is the case, the **Assessor** must use the following method:

- a) Obtain written confirmation from the **utility** that the reason the bill was 'estimated' was because of missing data. If it is any other reason, contact the **Scheme Administrator** to obtain approval to use this method.
- b) Obtain the complete data set of interval meter readings from the **utility** for the estimated month. Identify all the days where there is missing data (typically a '0' read).

**Note 1:** Actual consumption on weekend days may be '0' and therefore care must be taken to ensure data identified as missing is actually missing.

- c) For day(s) with missing data which occur on:
  - i) A weekday:
    - A) Remove the entire 24-hour period of the day(s) that have a missing data point.

- B) The consumption data for removed days are to be interpolated using adjacent weekdays that have complete data.
- ii) A weekend and the consumption data is to be used for an inclusion:
  - A) Remove the entire 24-hour period of the day(s) that have a missing data point.
  - B) The consumption data for removed days are to be interpolated using adjacent weekdays that have complete data.
- iii) A weekend and the consumption data is to be used for an exclusion, no alteration to the consumption data is to be made.
- d) All consumption data is to be entered into the **NABERS rating input form** as individual line items for the actual and interpolated values.

**Note 2:** This means that for an estimated bill, there will be a minimum of three entries for that bill – the actuals on either side of the interpolated value and the interpolated value.

- e) The interpolated data is an **acceptable estimate** and must be added to the **potential error**.

**Note 3:** This method is only usable for **utility** bills received from **utility metering systems**. For **non-utility metering systems**, see Section 6.5.4.

# 5 Non-utility metering consumption data

## 5.1 Summary

This chapter focuses on **Step 5** of [Table 1.1](#):

**Step 5:** Calculate the consumption from each of the **non-utility metering systems** to be included in the rating, including correction for any estimates or missing data.

**Assessors** must comply with the following process to calculate consumption from **non-utility metering systems** for the rating as defined in [Table 5.1](#).

**Table 5.1: Process to calculate consumption from non-utility metering systems**

Sub-Step		Reference
1	Check the <b>non-utility metering system</b> data format and units, converting where necessary	Section 5.2
2	For each <b>non-utility metering system</b> , ensure that <b>acceptable data</b> is available for the 12-month <b>rating period</b>	Section 5.3
3	Where required, adjust <b>non-utility metering system</b> data in accordance with these <b>Rules</b>	Section 5.4 and Section 5.5

*For documentation requirements, see [Section 9.4](#).*

## 5.2 Data unit and format checks

**Assessors** must check the data units and formats for each **non-utility metering system** and convert them where necessary.

If data from **non-utility metering systems** is included in a NABERS rating, data defined in [Table 5.2](#) must be recorded and retained for audit.

*For documentation requirements, see [Section 9.4.1](#).*

**Table 5.2: Data required for non-utility metering systems**

Data required	Acceptable record or format	Unacceptable record or format
<b>All meters</b>		
Date and time of reading or interval	Day/month/year (Optional) Time in 24-hour format (HH:MM)	Month/year; day/month; month Hour only
Meter identification	Meter number or label that can be directly cross-referenced to the single-line diagram	No identification; label not clearly identifiable on single-line diagram
Meter reading from cumulative meters	Cumulative meter reading, either direct from the meter or from the metering interface	No meter reading
Consumption data from non-cumulative meters	Consumption data with clear units and time period. Refer to Section 3.4.4.3 for more information.	No consumption data or consumption data without clear units.
<b>Electricity meters</b>		
k-factor (CT multiplier)	Meter k-factor	No k-factor
Calculated electricity reading	Calculated consumption figure in kWh, based on meter readings and k-factor	Any consumption figure that cannot be derived from the meter reading and k-factor; any consumption figure without units
<b>Gas meters</b>		
Meter pressure	Meter pressure, with units	No meter pressure; no units
Meter pressure correction factor for inclusions	The <b>utility</b> pressure correction factor	No meter pressure correction factor
Meter pressure correction factor for exclusions	Pressure correction factor of '1' <sup>2</sup>	No meter pressure correction factor
Monthly energy density	Energy density or heating value of gas (MJ/m <sup>3</sup> ) from <b>utility</b> bill (see Section 4.4.4.3)	No energy density data; no units on energy density data; energy density data not supported by evidence from the <b>utility</b> .
Calculated gas reading	Calculated gas consumption figure in MJ or kWh	Any figure that cannot be derived from the gas meter reading, pressure correction factor and monthly energy density; any figure without units

<sup>2</sup> To ensure accuracy of calculations, it is recommended that a measured meter pressure correction factor be used where available.

**Note:** Where current transformer ratios (CT ratios) are taken into account in the consumption data, it is acceptable to enter a CT ratio of 1 into the **NABERS rating input form**.

Where non-cumulative data is used from a validated non-cumulative meter, the initial meter reading can be set to “0” in the **NABERS rating input form**.

## 5.3 12-months of acceptable data for each non-utility metering system

### 5.3.1 General

Consumption data from each **non-utility metering system** must be reviewed by the **Assessor**. The **Assessor** must ensure that **acceptable data** covers one complete and continuous year, allowing for estimated and missing data as specified in Section 5.3.2 and Section 5.3.3 below.

*For documentation requirements, see Section 9.4.1.*

### 5.3.2 Check if any of the data has been estimated

Consumption from estimated **non-utility metering system** data is not considered **acceptable data** and may not be used for NABERS ratings.

Where there is estimated data, refer to Sections 5.4 and 6.4.

### 5.3.3 Check the data for anomalies

The **Assessor** must review the monthly or periodic data from each **non-utility metering system** over the **rating period** and scan the data for anomalies such as:

- a) Meter rollovers – where the readings return to 0;
- b) Meter changes;
- c) Meter faults;
- d) **Remote Meter Reading System (RMRS)** faults;
- e) Irregular readings; or
- f) Disproportionate consumption values.

In some cases, consumption may not be an estimate but may still be inaccurate. The **Assessor** must use their experience and judgement to identify any anomalies in the data (accounting for seasonal variation) and investigate any significant anomaly. Any investigation must be documented for audit (*see documentation requirements in Section 9.4.1*).

The **Assessor** must contact the **Scheme Administrator** before proceeding if the anomaly cannot be explained as the rating may not be able to proceed.

For requirements on correcting missing data, refer to Section 5.4.

### 5.3.4 Meter reading dates for cumulative meters

**Assessors** are required to enter the meter reading dates for each **non-utility metering system** into the **NABERS rating input form**.

**Assessors** must have a record of readings that is both—

- a) at least as frequent as the **utility meter** under which the **non-utility meter** lies, and
- b) at least quarterly (i.e. four readings spaced evenly throughout the year).

Where a cumulative meter is not connected to an **RMRS** that has been validated in accordance with Section 6.3.3, it must be read on-site and a record of these readings must be kept in case of audit.

**Note:** Cumulative meter readings can be recorded by personnel other than the **Assessor**.

### 5.3.5 Consumption data for non-cumulative meters

**Assessors** are required to enter the consumption data for each **non-utility metering system** into the **NABERS rating input form**. This can be entered as a '0' for the first "meter reading" and the total consumption amount for the last "meter reading".

Data from non-cumulative meters must comply with Section 3.4.4.3.

### 5.3.6 Billing periods

A rating may have multiple **metering system** accounts. Where the **billing periods** for different **metering system** accounts do not align, the **billing period** of the largest **utility** account must align with the **rating period**.

If the **billing period** of the other accounts do not align with the **rating period** then **Assessors** must ensure the **billing period** is as close to the **rating period** as possible, with a maximum of two months displacement allowed.

### 5.3.7 Ensure all non-utility meters are validated

If **non-utility meters** are used in the assessment, the **Assessor** must check that all necessary **validation** (and correction of data) is complete (see Chapter 6).

**Note:** If the **non-utility metering system** is part of an **embedded network**, **validation** might be required. Refer to Section 6.2.3.

## 5.4 Adjusting for gaps in non-utility cumulative metering system data

### 5.4.1 General

This section only applies to consumption data from cumulative metering systems.

The **Assessor** must check that the data from **non-utility metering system** readings does not rely on estimates. If it does, then the method outlined in this Section 5.4 must be followed.

*For documentation requirements, see Section 9.4.1.*

## 5.4.2 Gaps at the start or end of the rating period

If the meter data is used for an exclusion and there are gaps at the start and/or end of the **rating period**, then the data must be entered without adjustment.

If the meter data is used as for an inclusion, then the data must be adjusted as described below:

- a) If cumulative **Remote Meter Reading System (RMRS)** or manual readings, which comply with the data recording requirements of Section 5.3.4 are available, the **Assessor** may use the cumulative meter readings to calculate the consumption.
- b) If the meter readings match the frequency of data recording requirements in Section 5.3.4, the readings can be entered into the **NABERS rating input form** on the day they were taken.
- c) If the readings were taken less frequently, cumulative reads available before and after must be treated as if they were taken on the first and/or last day (as appropriate) of the **rating period**. This is to prevent unrealistic apportioning of data where regular reads are not available.

## 5.4.3 Gaps during the rating period

### 5.4.3.1 Energy sources other than natural gas

Where missing consumption can be calculated from meter readings, **Assessors** can include this data and must follow the process listed in Section 4.4.4.2.

### 5.4.3.2 Natural gas

Where missing consumption can be calculated from meter readings, **Assessors** can include this data and must follow the process listed in Section 4.4.4.3, except for part (b) which refers to the correction factor to be used. For **non-utility metering systems** the **Assessor** must assess the correction factor as follows:

- a) If the measured meter pressure correction factor is known, this figure must be used.
- b) If the measured meter pressure correction factor is not known and cannot be easily obtained, then the **Assessor** can:
  - i. Use the default pressure correction factor of '1' where data is used for an exclusion; or,
  - ii. Use the **utility** meter pressure correction factor in conjunction with a heating value where data is used for an inclusion.

**Note:** It is preferable to obtain the pressure correction factor through measurement as this will result in more accurate gas consumption at the **rated premises**, although the **Scheme Administrator** recognises this may be a costly endeavour.

For new installations, the pressure correction factor would be provided as part of gas meter commissioning documentation.

## 5.4.4 Adjusting for gaps in non-utility non-cumulative metering system data

Consumption data from non-cumulative metering systems must not be adjusted (see Section 3.4.4.3).

# 6 Non-utility metering system validation

## 6.1 Summary

This chapter focuses on **Step 6** of **Table 1.1**:

**Step 6:** Where **non-utility metering systems** have been used to calculate consumption, validate these meters in accordance with these **Rules**.

**Note: Validation** is required for **non-utility metering systems** due to the potential for issues with software and/or hardware configuration which can directly influence the measurement of energy consumption. Common problems include incorrect wiring of the meter and incorrect meter multipliers (CT ratios). **Remote Meter Reading Systems (RMRS)**, such as Building Management Systems (BMS), can vary significantly in how they interpret the measured consumption of a **non-utility metering system**.

**Assessors** must comply with the following process to validate **non-utility metering systems** for the rating as defined in **Table 6.1**.

**Table 6.1: Process to calculate validation in non-utility metering systems**

Sub-Step		Reference
1	If data from <b>non-utility metering systems</b> is included in a NABERS rating, then the <b>Assessor</b> must check if these meters need to be validated	Section 6.2
2	If the meters need to be validated, then the <b>Assessor</b> must ensure that all <b>metering systems</b> are properly recorded and validated according to these <b>Rules</b>	Section 6.3
3	If adjustment is required for <b>non-utility metering systems</b> as a result of <b>validation</b> checks, the <b>Assessor</b> must investigate whether the correct values can be calculated (not estimated)	Section 6.4

*For documentation requirements see Section 9.5.*

## 6.2 Metering systems requiring validation

### 6.2.1 General

**Assessors** must check that all necessary **validation** (and correction of data where required) is complete.

**Non-utility metering systems** require **validation** if they include the following:

- a) A meter with a Current Transformer (CT) (even where the CT ratios are applied internally to the meter face readings); or
- b) A gas meter; or
- c) A **Remote Meter Reading System (RMRS)**, including an interface to a Building Management System (BMS) used to transmit meter data.

**Note:** Whilst not required for a rating, NABERS UK recommends **validation** of—

- a) direct connect meters with no **RMRS**, and
- b) pulse meters with no **RMRS**.

It cannot be assumed that newly installed **non-utility metering systems** have been validated. Evidence of **validation** must be obtained by the **Assessor**.

### 6.2.2 Treatment of non-utility metering systems with CTs

All **non-utility metering systems** (inclusions or exclusions) with CTs require **validation** (and adjustment, if necessary) by a licensed electrician or electrical engineer. This is to ensure that the CT ratio (meter multiplication factor) and wiring are correctly configured and, where applicable, programmed into the meter.

For **validation** requirements relating to **non-utility metering systems** with CTs, see Section 6.3.

### 6.2.3 Combined Heat and Power Schemes

Combined Heat and Power Schemes (CHP) that can provide evidence of certification under the UK Government CHP Quality Assurance scheme are not required to validate metering.

Where no such certificate is available, all metering associated with the scheme is considered to be non-utility and thus requires **validation**. **Validation** requirements for thermal metering systems are covered in *NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions*.

*For documentation requirements, see Section 9.5.1.*

**Note:** Information on the CHP Quality Assurance Scheme is available from <https://www.gov.uk/guidance/combined-heat-power-quality-assurance-programme>

### 6.2.4 Validation of meters in embedded networks

An owner of a premises may install, own and manage the meters in an **embedded network**. The owner is not considered a **utility** and NABERS UK requires the **Assessor** to check these meters against the NABERS UK meter **validation** requirements.

The **Scheme Administrator** must be contacted if other arrangements are encountered or there is any uncertainty regarding assessment.

## 6.3 Validation of metering systems

### 6.3.1 Non-utility metering system validation requirements – Electricity

#### 6.3.1.1 General

For electrical **metering systems**, **Assessors** must determine if the meters used in the assessment are ‘whole current’ (direct connect) where all the electricity flows through the meter, or current transformer (CT) meters where the transformer reduces the current flow through the meter by a defined ratio.

**Note:** CT ratios are expressed as a ratio of the primary current to the secondary current. For example, a ratio of 300:5 means that when 300 amps flows through the CT then 5 amps flows through the meter. If the meter does not have the ability to program this ratio through some configuration, then the meter reading would need to be multiplied by this ratio to arrive at the actual consumption recorded by the meter.

This ratio is also known as the ‘meter multiplier’, ‘meter factor’ or ‘k-factor’. In the case of a CT ratio of 300:5, the multiplier or k-factor would be 60. All CTs have a ratio of the ‘value’:5 with the ‘value’ generally indicating the maximum current for the circuit that is metered.

#### 6.3.1.2 Manually read whole current meters

**Validation** of manually read whole current (direct connect) meters without CTs is not required for NABERS UK.

#### 6.3.1.3 Checking the Current Transformer (CT) ratio and meter wiring

For CT meters, the **Assessor** must record the CT ratio and verify that the meter is correctly configured to this ratio.

A qualified and licenced electrician must be engaged to cross check the wiring of the meter and the CTs for the following issues:

- a) CTs are not connected;
- b) Reverse CT connection errors, which will significantly reduce the recorded consumption;
- c) Cross phase CT connection errors, where CTs are not matched to the same phase voltage;
- d) Phase sequence connection errors; and
- e) Faulty or missing potential fuses, which can significantly reduce the recorded consumption and may cause failure of the meter.

Where the CT ratio is not programmed into the meter, it must be verified that the CT ratio has been correctly applied to the meter readings to arrive at the actual consumption.

Where the CT ratio is programmed into the meter and a separate multiplier does not need to be applied to the meter face reading, the meter programming must be reviewed, and the internal ratio recorded. Any discrepancy between the internally programmed ratio and the physical CT ratio must be treated as an installation error. Where the meter multiplier can be reviewed, the figure should be photographed on the meter face and attached to the meter **validation** form for evidence.

Where the meter's internal ratio is not able to be reviewed, a licensed electrician should verify the meter programming indirectly. This can be done via measurement with a handheld power meter or by tong testing.

When undertaking this check, the electrician should record the load current on each phase and the corresponding meter current on each phase. Discrepancies between the readings on respective phases indicate that the internal ratio has not been programmed correctly and thus must be treated as an installation error.

Where the reading from the meter face does need to be multiplied by the CT ratio to calculate the true consumption, the CT ratio or multiplier that is required to convert the meter reading to kWh should be recorded.

If it is not possible to identify the CT ratio, a qualified electrician can use a power meter to confirm the required multiplier by measuring the actual current flow through the circuit being metered and the corresponding phase to the meter. The following calculation can then be used to determine the CT ratio and the multiplier to be applied to the meter face reading:

$$\begin{aligned} \text{The CT ratio ('value':5)} &= \frac{\text{measured circuit amps (e.g. 120 amps)}}{\text{measured meter amps (e.g. 2 amps)}} \times 5:5 \\ &= 300:5 \\ &\Rightarrow \text{A meter multiplier of 60 is required to} \\ &\quad \text{convert the meter face reading to actual} \\ &\quad \text{kWh consumption} \end{aligned}$$

#### 6.3.1.4 Validating cloud metering

If the **metering system** does not have self-identifying CTs then the CT ratio and wiring need to be confirmed as per a normal CT meter (see Section 6.3.1.3).

If the system has self-identifying CTs (i.e. where the CTs have high level communications with the **cloud metering system** rather than a wire) then CT ratio **validation** is not required, and the **Assessor** should enter this into the **NABERS rating input form** as having no CT ratio.

For wireless CTs, a check must be performed to confirm that the CTs—

- a) have been correctly identified with the **end use**; and
- b) the voltage and current measurement correspond to the **end use**.

It must be confirmed that the system has both voltage and current measurement within the same distribution board as the CTs, separately for each phase.

### 6.3.1.5 Checking meters in place to avoid shutdown

A qualified and licenced electrician must be engaged when electrical wiring and Current Transformers (CTs) cannot be accessed without partial or complete shutdown of the electrical network.

The engaged electrician must verify that each **non-utility metering system** has been properly installed, is functioning correctly and is being interpreted correctly. They must also fill out the NABERS UK **validation** record for electrical **non-utility metering systems** (see Appendix A).

The acceptable methods for verification include:

- a) Use of a portable power meter to record consumption of the metered circuit over a period of time; and,
- b) Use of a clamp-on ammeter or similar device to identify the average current in the circuit being metered.

The CT ratio and meter multiplier programmed in the **non-utility metering system** must also be recorded in the NABERS UK **validation** record.

**Note:** If a qualified and licenced electrician is unable to undertake this check, guidance should be sought from the **Scheme Administrator**.

### 6.3.2 Non-utility metering systems – Gas

All non-utility gas meters require **validation** (and adjustment, if necessary) by a competent person with an understanding of gas meters. This ensures that the pressure correction factor corrects the measured volume of the **non-utility metering system** to the same pressure conditions used by the **utility metering system**.

Where the pressure factor cannot be physically tested or there is no data available for the meter pressure and the correction factor cannot be determined, the following values can be used:

- a) Inclusion meters: **utility metering system** pressure correction factor;
- b) Exclusion meters: 1.

Record the meter pressure and the correction factor required to adjust the reading to m<sup>3</sup> under standard pressure. This data can be collected from the **non-utility metering system** and compared with the **utility metering system** or obtained from the gas supplier.

**Note:** **Validation** of the gas meter includes measuring the gas pressure at the meter to calculate the pressure correction factor. The pressure correction factor is used to adjust the volume of gas by the amount it has been compressed to accurately calculate the energy content.

$$\text{Pressure Correction Factor} = \frac{\text{Measured pressure (absolute)}}{\text{Atmospheric pressure}}$$

The meter pressure and pressure correction factor must be recorded for non-utility gas meter inclusions.

All readings and any adjustments must be documented using the meter **validation** template in Appendix A – Non-utility metering system validation records.

### 6.3.3 Remote Meter Reading Systems

**Note 1: Remote Meter Reading Systems (RMRS)** are used to read the meters from a remote location. They are used to simplify the reading process, or because of accessibility issues with manually reading a meter. **RMRSs** are common for both electricity, gas and water metering.

The **RMRS** can record the consumption of the meter by counting a pulse output or through a protocol that directly reads the meter register. The connection to the meter can be through a hard-wired, wireless or radio frequency connection.

Most remote gas and water reading systems use pulse output type meters, either hard-wired or via radio frequency transmitters. Electricity meters use either pulse output or direct reading of metering consumption.

The **RMRS** can be part of an existing Building Management System (BMS) or a dedicated system.

All **Remote Meter Reading Systems (RMRS)** connected to **non-utility metering systems** require **validation** to ensure the final consumption amount is correct. This must be conducted by a competent person with an understanding of the meters and the **RMRS** to ensure the meter data is correctly interpreted. At minimum, the person must:

- a) Confirm that consumption on the **RMRS** corresponds to meter readings as measured at the meter; and
- b) Take a minimum of two readings at different time periods and document the results. For each time period, a reading from both the **non-utility metering system** and the corresponding **RMRS** is to be taken simultaneously.
- c) For **RMRS** used for counting pulses from a meter:
  - 1) If an on-board counting device is present, the **RMRS** and the on-board counting device must be read during the site inspection. The consumption on the meter face must be shown to correlate to the accumulated pulse counting on the **RMRS** over the same period.
  - 2) If an on-board counting device is not present, the **RMRS** and the **metering system** must be read during the site inspection. Interval data taken from the **metering system** must be shown to correlate to the pulse counting on the **RMRS**.

**Note 2:** For **RMRS** used for counting pulses from a meter without an onboard counting mechanism, it is considered good practice to undertake a validation check multiple times over the course of a **rating period** to ensure the system is operating correctly.

All readings and any adjustments must be documented using the meter **validation** templates in Appendix A.

If there is little or no consumption during the testing period, the time for taking the second reading should be extended until reasonable consumption is recorded.

Where the results identify a discrepancy between the **non-utility metering system** and the **RMRS**, the **RMRS** must be adjusted and at least two more readings taken to confirm the consumption measurement is the same.

**Note 3:** It is considered good practice to validate a **metering system** at the start of a **rating period** to ensure the data generated in the **rating period** is valid.

## 6.3.4 Validation frequency for all metering

### 6.3.4.1 Discounted methodology for existing buildings and metering systems

This methodology applies where the Certificate of Completion covering the **metering system** is dated before 1 January 2021.

Until 31 December 2023, a discounted methodology for **validation** is provided to allow the industry to prepare for the impact of full **validation** requirements. It is not permitted to bypass this discounted methodology.

Under the discounted methodology, the **Assessor** must undertake the following checks of **metering system** validity:

- a) Confirm that the overall balance of sub-meters and **utility** meters is credible.

For each **utility** meter where sub-metering data is used in the rating, the sum of all sub-metered energy used for the **rating period** should be credible relative to the associated **utility** meter. If the sub-metered energy use is not credible (e.g. the sum of sub-meters is greater than the total **utility** meter energy use by more than 10 %, or the balance of un-sub-metered energy is unfeasibly small relative to the un-metered energy **end uses**) then meter **validation** is required.

- b) For tenant electricity meters, calculate the energy intensity associated with each meter in terms of kWh (in the **rating period**) per m<sup>2</sup> of tenancy **NIA** and identify the following:
  - 1) Any tenancies that have an intensity more than three times the median energy intensity of the tenancies in the building. For each of these high energy intensity spaces, the **Assessor** must conduct further enquiries to establish whether there is a plausible explanation for the high intensity. Where no plausible explanation is available, the associated meter must be validated.
  - 2) Any tenancies that have an intensity of more than five times the median energy intensity of the tenancies in the building. For these tenancies, the associated meter must be validated.

**Note:** The **Assessor** should contact the **Scheme Administrator** with any queries in relation to this methodology, including what is deemed credible under item a) above.

### 6.3.4.2 Standard methodology for existing buildings and metering systems

This methodology also applies where the Certificate of Completion covering the **metering system** is before 1 January 2021. This methodology does not come into force until 1 January 2024 but is provided for information and/or discretionary use prior to that date.

If **validation** of **non-utility metering systems** is required, the **Assessor** must randomly select at least 10 % of the following types to be validated each year:

- a) Meters with a Current Transformer (CT);
- b) Gas meters; and
- c) Meters connected to a **Remote Meter Reading System (RMRS)**.

**Assessors** must not select a **non-utility metering system** that has previously been validated within the last 10 years if—

- a) the **Assessor** has conducted a rating on the premises previously, or
- b) information on previous meter **validation** is available.

Where a **non-utility metering system** requires adjustment, see Section 6.4.

#### 6.3.4.3 Methodology for new buildings and metering systems

This method applies where the Certificate of completion covering the **metering system** is on or after 1 January 2021.

If **validation** of **non-utility metering systems** is required, all **non-utility metering systems** used in the rating must be validated. Any **validation** that is compliant with the requirements of Section 6.3 and is less than 10 years old at the date of the rating submission may be used.

Where a **non-utility metering system** requires adjustment, see Section 6.4.

#### 6.3.5 Standard for acceptable data

The **Assessor** may only accept evidence of **validation** of a **non-utility metering system** in the form of a certificate of currency or other written evidence that demonstrates the following:

- a) Confirms that a **metering system** requiring **validation** has been checked in accordance with this Chapter, and found to be correctly recording consumption; and
- b) Confirms that the check the date of **validation** took place within the last 10 years; and
- c) Applies to the present condition and configuration of the **metering system** without any alteration; and
- d) Provides details of the **validation** performed.

## 6.4 Adjustments resulting from validation checks

Where a **non-utility metering system** has been found to require adjustment as a result of **validation** checks, the **Assessor** must investigate the type of fault and the consumption data. This investigation will determine whether it is possible to accurately calculate (not estimate) the correct values for the consumption data from the **non-utility metering system**. If adjustment is found to be needed, the following requirements apply:

- a) All **metering systems** that have never been validated, or have no proof of being validated, must be validated so as to ensure that correct data is collected in the 12-month period before the next NABERS Energy rating. In this case, the **Assessor** cannot follow the schedule in Section 6.3.4.
- b) The **Assessor** must determine any correction to be applied to the data collected from the **metering systems** which are found to be incorrect; otherwise the data from the meter cannot be used and the rating cannot proceed.

All adjustments to **metering systems** must be done by appropriately qualified and licensed persons according to the applicable standards and procedures that apply within that jurisdiction for the equipment.

The rating can proceed where the **Assessor** can calculate the correct values for the consumption data. The **Assessor** must retain full documentation of the error found, the incorrect records from the **metering system**, and the calculations used to correct the data for audit.

In the absence of any other evidence, a correction must be based on the assumption that the error in the **metering system** is applied to all data collected for the current rating assessment.

**Example:** If the CT ratio for an electricity meter was out by a factor of +20 %, the overall electricity consumption data for that meter must be corrected by -20 %. Similarly, if the CT wiring of an electricity meter was incorrect but the consumption for each phase was recorded by the meter, this can be used to reconstruct the actual consumption and the reconstructed data can be used as **acceptable data**.

However, consumption data cannot be reconstructed if the CT wiring of an electricity meter was incorrect and the meter also did not record the energy consumption for each phase.

Where it is not possible to calculate the correct values from incorrect **metering system data**, then—

- 1) for data relating to exclusions, the rating can proceed if the consumption is not excluded from the rating, or
- 2) for data relating to inclusions, the rating can proceed if the consumption is an **acceptable estimate**, created using the method in Chapter 7.

If neither of these options are possible, the rating cannot proceed, and the premises cannot be rated until a full **rating period** of accurate data has been obtained.

*For documentation requirements, see Section 9.5.2.*

# 7 Small end use estimation and batch supplies

## 7.1 Summary

This chapter focuses on **Step 7** of **Table 1.1**:

*Calculate the consumption from any small **end use** estimations and batch supplies.*

*For documentation requirements, see Section 9.6.*

## 7.2 Methods for estimating small amounts of data

### 7.2.1 Base Building HVAC equipment on the tenant's meter

It is common for some components of the **Base Building** HVAC within the minimum energy coverage of the rating to be metered under the tenant's meter. Where this is identified, the **Assessor** must identify the **Net Internal Area (NIA)** served by the following items of HVAC plant if they lie with the tenant's electricity metering and are not sub-metered:

- a) Fan coil fan motors;
- b) Pumping for on-floor circulation of chilled and/or heating hot water;
- c) On-floor fans for outside air and exhaust to the general **NIA**.

Entering this data in the **NABERS rating input form** causes adjustments to be made to energy data to compensate for the missing energy. Owing to the common nature of this issue, these adjustments do not contribute to the **potential error**.

**Note:** The adjustments made under this provision, based on 60 hours per week operation, are as follows:

- a) Fan coil motors 6.5kWh/m<sup>2</sup>;
- b) pumps 6.5kWh/m<sup>2</sup>;
- c) outside air and exhaust fans: 10.5kWh/m<sup>2</sup>.

Where hours h are not equal to 60 these figures are multiplied by h/60.

### 7.2.2 Other small un-metered electricity uses

A small amount of un-metered electricity from equipment can be included in the **acceptable estimates**, and therefore can be added to the **potential error**. This may be necessary where an un-metered item is required for inclusion under the **energy coverage** requirements.

This method applies to inclusions only. It must not be used for exclusions or where acceptable metered data is available for the equipment.

Large equipment or a high number of small pieces of equipment may not fit within the **potential error**. If this occurs, the rating cannot proceed until appropriate metering is installed and acceptable energy use data is available to cover the **rating period**.

Electricity use is estimated using the following procedure:

- a) Identify all un-metered equipment or plant to be estimated.
- b) Determine the power consumption in kW at maximum capacity from nameplate data or equipment specifications.
- c) Calculate the annual hours – typically 24 hours a day. Some equipment may modify the annual hours as they are either on timers or demand-based equipment. **Assessors** must provide full justification for any reduction in hours.
- d) Determine an appropriate duty cycle based on the annual hours as determined in c) for the equipment from suitable specifications or records.
- e) Estimate the annual energy use as:

$$\text{Energy use (kWh)} = \text{nameplate power (kW)} \times \text{duty cycle (\%)} \times \text{annual hours (h)}$$

*For documentation requirements, see Section 9.6.1.*

## 7.2.3 Energy exclusions based on financially reconciled utility costs

### 7.2.3.1 General

The **Assessor** may estimate the consumption for the **end uses** outside the coverage by applying the fixed proportion to the metered consumption if the following applies:

- a) A **utility metering system** measures the aggregate consumption for a variety of energy **end uses**, some inside the coverage of a rating but others outside it; and
- b) **Non-utility metering systems** which only measure those **end uses** inside or those outside the scope of coverage are not present; and
- c) The **utility** costs associated with the meter are allocated to the various **end uses** according to a fixed proportion of the meter readings, as specified in Section 7.2.3.2 below.

The estimated consumption may be excluded from the assessment if it is added to the relevant **potential error**. The estimated consumption may be reduced to meet the **potential error** requirements; however, an estimate must not be increased under any circumstances.

### 7.2.3.2 Determining the fixed proportion

If Owner/Tenant Agreement (OTA) documentation allocates a proportion of the relevant energy use, then this proportion must be used in calculating the exclusion. Otherwise, it is acceptable to determine the proportion from documentation, signed by the parties affected by the **end uses** in question. Such documentation must identify the **end use**, the meter to which this it applies, and the proportion of allocation.

If the fixed proportion cannot be determined from acceptable documentation, then no exclusion is allowed, and the entire consumption measured by the meter(s) covering the **end uses** in question must be included in the assessment.

*For documentation requirements, see Section 9.6.1.*

#### 7.2.4 Energy exclusions based on area weighting

If an energy **end use** within a space could be excluded but is not adequately sub-metered, the **Assessor** may estimate the consumption within that space by undertaking the following:

- a) Taking the ratio of the floor area of the excludable space to the total floor served by the relevant meter(s) (ignoring all spaces not included in office **NIA**); and
- b) Applying the ratio to the total consumption measured by the meter(s).

**Note:** In the total floor area calculation, **Assessors** can choose to ignore spaces not included in office **NIA**. This is to prevent unnecessary measurement for an estimate which must already fit within the **potential error**.

The **Assessor** may then exclude the **estimated** consumption, provided that—

- 1) the **Assessor** clearly explains the calculation method used and assumptions made in the submitted documentation, and
- 2) the **Assessor** adds the estimated consumption to the relevant **potential error**.

If these requirements are not met, then the energy **end use** within the space cannot be excluded.

This method can be used for small retail spaces on the ground floor and for small educational or medical spaces.

*For documentation requirements, see Section 9.6.1.*

## 7.3 Batch-delivered supplies

### 7.3.1 Real consumption measurement

Energy supplies delivered in batches, such as diesel fuel or bottled gas must be included within an assessment if they are within the scope defined for the rating.

Quantity data for batch deliveries must be taken from supplier invoices or similar documentation or from measurement systems (such as meters, scales or unit counting) at the point of delivery.

To ensure that all applicable deliveries during the **rating period** are included in the assessment for a rating, the **Assessor** must identify the supervisors or managers responsible for each batch-delivered source and obtain the following:

- a) A written statement of which deliveries were received during the **rating period** or, if applicable, a statement that there were no deliveries; and
- b) Copies of the bill(s) from suppliers showing the details of the deliveries; and
- c) Descriptions of the measurements and/or methods used.

If all the bills are available, then the total consumption from the bills can be used in the rating.

**Note:** A single bill is adequate to establish the energy or water supplied by batch to a premise.

*For document requirements, see Section 9.6.2.*

### 7.3.2 Calculating an alternative estimate

Where real consumption measurements cannot be determined as per Section 7.3.1, an **alternative estimate** must be calculated for the quantity of a batch-delivered supply from capacity measurements of storage.

**Alternative estimates** can be determined through the use of a dipstick, sight gauges or other methods.

The **Assessor** must ensure that all commissioned tanks servicing the **rated premises** are included in the following measurements, including reserve tanks.

For the purposes of a rating, the order of preference is:

- a) One reading taken at the beginning of the **billing period** and one reading taken at the end of the **billing period**, covering a continuous 365-day period and displaced by no more than two months from the **rating period**, and calculating the difference between the two readings in order to determine the **alternative estimate**.
- b) One reading taken at the end of the **rating period** and calculating the difference between the total tank capacity and the reading in order to determine the **alternative estimate**.
- c) The total capacity of the tanks.

*For document requirements, see Section 9.6.2.*

# 8 Generated energy

## 8.1 Combined heat and power and district heating and cooling

For externally supplied electricity, chilled water and hot water from a combined heat and power plant or district heating/cooling plant that is not operated by—

- a) the building owner,
- b) an organisation that the building owner has a controlling interest in, or
- c) an organisation that has a controlling interest in the building owner,

the kWh<sub>e</sub> figures are default figures automatically applied when the relevant data is added to the **NABERS rating input form**.

Where such services are provided from a CHP or district heating/cooling plant that is operated by one of the above organisations, the performance of the CHP/district heating system must be calculated in accordance with the *Interim Methodology for the treatment of Cogeneration and Trigeration Systems in NABERS ratings*, v1.1, 2013 and the Standard Methodology in *NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions*, v2.0, 2008.

Where a cogeneration or trigeneration system is located with the **rated premises**, the rating is determined from the energy inputs to that system, irrespective of ownership. If such a system exports electricity, chilled water or hot water to a third party, then the reduction in energy inputs relating to that export must be calculated using the *Interim Methodology for the treatment of Cogeneration and Trigeration Systems in NABERS ratings*, v1.1, 2013 and the Standard Methodology in *NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions*, v2.0, 2008.

For further information please contact the **Scheme Administrator**.

**Note:** The default figures for CHP supplied services are 0.4 kWh<sub>e</sub>/kWh<sub>th</sub> for chilled water, 0.9 kWh/kWh<sub>th</sub> for hot water and 1 kWh<sub>e</sub>/kWh for electricity.

*For documentation requirements, see Section 9.7.1.*

## 8.2 Other on-site generation systems

Energy generated on-site for use entirely within the **rated premises** will reduce the amount of grid-energy supplied.

As such, on-site energy generation must not be included in the external sources as defined in *NABERS UK The Rules - Energy for Offices*. This will most likely result in an improved rating when low-emission or renewable energy technologies are used.

Energy generated on-site but exported to an external user (such as a nearby building or the electricity grid) does not improve the energy performance of the **rated premises**. The exported energy must not be subtracted from the **utility**-supplied consumption as it has no impact on the energy consumption of the premises being rated.

In situations where renewable electricity is generated on-site but apportioned to different users within an **embedded network**, the rules applicable to determine the apportionment are to be found in the *NABERS Ruling – On-site Renewable Energy Generation Systems*.

Externally supplied energy sources (such as gas, fuel oil or electricity used by heat pumps) used to generate on-site energy must be included with the energy assessment.

*For documentation requirements, see Section 0.*

# 9 Documentation required for accredited ratings

## 9.1 Summary

**Assessors** must keep all records on which an assessment is based. Data retained for audit must be in a form which facilitates reviews and makes anomalies easily apparent.

Access to original documents is highly desirable if they are available. Copies of original documents may be used as evidence as long as the **Assessor** is satisfied that they are, or can be verified to be, true and complete records of the original documents or files.

The information in the tables below is required for a rating. It is organised based on the divisions of previous chapters (Chapter 3 through to Chapter 8). All the required information should be obtained from the premise's owner/manager before a site visit, and then confirmed during the site visit and subsequent assessment. A site inspection helps to verify that the information provided is accurate, current and complete.

Individual ratings may require additional information or documentation depending on the individual circumstances of the **rated premises**.

## 9.2 Documentation required for Chapter 3: Supply points and minimum energy coverage

Topic	Requirements	Documentation
9.2.1 Conducting a site visit	Section 3.2.1	<p>Evidence that identifies all energy and/or water sources supplied to the premises, shared services or facilities must be retained by the <b>Assessor</b>. This evidence can include single line diagrams and/or metering schematics, photos, <b>Assessor</b> site notes and other relevant documents.</p> <p>The <b>Assessor</b> must keep notes and photos as evidence of their site visit, and collect all information available relating to <b>end uses</b>, sources and meters relevant to the inspection.</p>
9.2.2 Minimum energy coverage required	Section 3.3.1	<p>To confirm minimum energy coverage requirements have been met, the <b>Assessor</b> must retain evidence identifying all supply points and the distribution of energy and/or water through the premises, including at the main switchboards and distribution boards throughout the premises.</p> <p>In addition, the <b>Assessor</b> must retain evidence of checks which confirm how each of the required <b>end uses</b> are covered by the supply points included in the rating.</p> <p>Such evidence is expected to include single line diagrams, metering schematics, <b>Assessor</b> site notes and/or site photos. All documents may be marked up by hand.</p>

<p><b>9.2.3 Checks of sources and supply points</b></p>	<p>Section 3.3.2 Section 3.3.3</p>	<p>The <b>Assessor</b> must retain evidence that confirms any source or <b>end use</b> to be excluded from the rating, and substantiates the grounds for the exclusion</p> <p>The evidence supporting the above should be summarised in a single document, such as a marked up single line diagram, metering schematic or reticulation diagram, or otherwise a list of sources/supply points to the building with notes to confirm whether they are included or excluded. Evidence supporting the grounds for exclusion of supply points is expected to include site photos, notes and other reticulation documentation.</p> <p>It is acknowledged that access to and labelling of distribution boards may not always be sufficient to fully substantiate the grounds for exclusion of a supply point. In these cases, the <b>Assessor</b> may need to make educated assumptions regarding coverage of individual distribution boards. The bases of these assumptions should be fully documented. If an <b>Assessor</b> is uncertain, they should contact the <b>Scheme Administrator</b>.</p>
<p><b>9.2.4 Confirmation of metering systems</b></p>	<p>Section 3.4.1 Section 3.4.2 Section 3.4.4</p>	<p>The location of all <b>utility</b> and <b>non-utility metering systems</b> used in the rating must be identified on a single line diagram, metering schematic or reticulation diagram which is retained by the <b>Assessor</b>.</p> <p>Where no documentation is available for a <b>metering system</b>, the <b>Assessor</b> must document this information (by hand or otherwise), to the best of their knowledge. Note that this information is required to satisfy the requirements of the <b>Rules</b> and if the <b>Assessor</b> is unable to document it based on their site observations then it is expected that a third party would be engaged by the building owner to draft a single line diagram, metering schematic or reticulation diagram. The document must also include a mark-up (by hand or otherwise) of the meter identification used when entering the <b>metering system</b> into the <b>NABERS rating input form</b>.</p> <p>The type of each <b>non-utility metering system</b> should be confirmed and recorded by the <b>Assessor</b> in their site notes. The types to be recorded are those listed in Section 3.4 (e.g. cumulative, non-cumulative, soft, virtual or high voltage).</p> <p><b>Note:</b> It is sufficient for the <b>Assessor</b> to confirm “all <b>non-utility metering systems</b> used in the rating are cumulative meters” in their site visit notes.</p>

<p><b>9.2.5 High-voltage electricity metering</b></p>	<p>Section 3.4.5</p>	<p>For HV electricity metering, the following must be provided:</p> <ul style="list-style-type: none"> <li>a) Where LV meters are used in place of a <b>utility</b> HV meter, a single line diagram showing the locations of the LV meters used respective to the HV meter; and</li> <li>b) The energy balance used to justify the use of LV meters.</li> </ul>
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### 9.3 Documentation required for Chapter 4: Utility metering consumption data

Topic	Requirements	Documentation
<p><b>9.3.1 Data for each utility metering system</b></p>	<p>Section 4.2 Section 4.3 Section 4.4</p>	<p>Billed quantities provided by the <b>utility</b> must be retained by the <b>Assessor</b> and take the form of either of the following:</p> <ul style="list-style-type: none"> <li>a) <b>Utility</b> bills for a minimum of 12 months showing consumption records for the <b>billing periods</b>; or</li> <li>b) A spreadsheet or other electronic record from the <b>utility</b> showing consumption for the <b>billing periods</b>, with a clear indication of the meter identification and reading, and at least one <b>utility bill</b> that can be shown to reconcile against the electronic data. Where the <b>utility</b> provides an online portal with billing information, actual bills for reconciliation are not required. However, the billing information from the portal must still be provided as documentation.</li> </ul> <p>The <b>Assessor</b> must also retain evidence of estimated bills (where applicable) and document how these estimates were resolved, if this is not evident in the <b>NABERS rating input form</b>.</p> <p>Documentation of any related investigation and resolution of anomalies or estimations in the data should be retained by the <b>Assessor</b> if it is not evident from the data entered into the <b>NABERS rating input form</b>.</p>

## 9.4 Documentation required for Chapter 5: Non-utility metering consumption data

Topic	Requirements	Documentation
9.4.1 Data for non-utility metering systems	<p>Section 5.2</p> <p>Section 5.3</p> <p>Section 5.4</p>	<p>All relevant data from <b>non-utility metering systems</b> as listed in <b>Table 5.2</b> must be provided for a minimum period of 12 months.</p> <p>Documentation of any related investigation and resolution of anomalies or estimations in the data should be retained by the <b>Assessor</b> if it is not evident from the data entered into the <b>NABERS rating input form</b>.</p>

## 9.5 Documentation required for Chapter 6: Non-utility metering system validation

Topic	Requirements	Documentation
9.5.1 Validation of metering systems	<p>Section 6.2</p> <p>Section 6.3</p>	<p>Evidence of <b>validation</b> for each <b>non-utility metering system</b> must be retained. Where applicable, evidence of CHP Quality Assurance certification must also be retained.</p> <p>The <b>Assessor</b> must review the evidence of <b>validation</b> provided by the building owner or their contractor and check them for completeness. If the document is completed correctly, and does not contain any obvious errors, then the <b>Assessor</b> can accept the evidence and use it in the rating.</p> <p>Templates for <b>validation</b> of <b>non-utility metering systems</b> can be found in Appendix A.</p>

<p><b>9.5.2</b> Adjustment resulting from validation checks</p>	<p>Section 6.4</p>	<p>For all <b>non-utility metering systems</b> needing adjustment as a result of <b>validation</b> checks, the following must be provided:</p> <ul style="list-style-type: none"> <li>a) Type of fault found and the consumption data;</li> <li>b) Full documentation of the error found, the incorrect records from the <b>metering system</b>, and the calculations used to correct the data for audit;</li> <li>c) A record of the <b>validation</b> of any altered <b>non-utility metering systems</b>.</li> </ul>
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## 9.6 Documentation required for Chapter 7: Small end use estimation and batch supplies

Topic	Requirements	Documentation
<p>9.6.1 Methods for estimating small amounts of data</p>	<p>Section 7.2</p>	<p>The documentation required for instances of <b>end use</b> estimation includes the following:</p> <ul style="list-style-type: none"> <li><b>a) Base Building HVAC in the tenant demise</b> <ul style="list-style-type: none"> <li>1) Documentation demonstrating what <b>Base Building</b> HVAC is on the tenant meter</li> <li>2) Documentation for the <b>NIA</b> of affected spaces</li> </ul> </li> <li><b>b) Small end use electricity inclusions:</b> <ul style="list-style-type: none"> <li>3) The calculations, including a clear explanation of method and all assumptions; and</li> <li>4) Photos/records of name plate capacities; and</li> <li>5) Documentation used to determine duty capacity if it is not 100 %; and</li> <li>6) Documentation used to determine annual hours, including full justification for any reduction in hours.</li> </ul> </li> <li><b>c) Exclusions based on financially reconciled utility costs:</b> <ul style="list-style-type: none"> <li>1) Documentation of any estimated consumption outside the coverage; and</li> <li>2) Any associated documentation or agreements that outlines mutual agreement signed by the parties affected by the <b>end uses</b> that identifies the proportion of allocation.</li> </ul> </li> <li><b>d) Energy exclusions based on area weighting:</b> <ul style="list-style-type: none"> <li>1) Marked up <b>NIA</b> plans and calculations showing the proportion of <b>NIA</b> excluded to arrive at the area weighted excluded energy and metering arrangements associated with the excluded energy.</li> </ul> </li> </ul>

<p><b>9.6.2 Batch-delivered supplies</b></p>	<p><b>Section 7.3</b></p>	<p>The documentation required for batch-delivered supplies includes the following:</p> <ol style="list-style-type: none"> <li>1) Record of the measurement method or estimation for each source entered into the <b>NABERS rating input form</b>;</li> <li>2) Supplier invoices or similar documentation which states the quantity data delivered;</li> <li>3) The written statements of what deliveries occurred during the <b>rating period</b>, including contact details for the responsible person who supplied the information;</li> <li>4) A description of the measurement or estimation method(s) used.</li> <li>5) All data used to calculate the measurements or <b>acceptable estimates</b>; and</li> <li>1) Details of all calculations, including those for alternative estimates.</li> </ol>
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## 9.7 Documentation required for Chapter 8: Generated energy

Topic	Requirements	Documentation
<p>9.7.1 Combined heat and power and district heating and cooling</p>	<p>Section 8.1</p>	<p>Refer to the documentation requirements in:</p> <p><i>NABERS Energy for Offices – Validation Protocol for Thermal Energy Exclusions, v2.0, 2008</i></p> <p><i>Interim Methodology for the treatment of Cogeneration and Trigeneration Systems in NABERS ratings, v1.1, 2013</i></p> <p><b>Note:</b> These documents are NABERS Australia documents which are relevant to NABERS ratings under the NABERS UK scheme.</p>
<p><i>For documentation requirements, see Section 9.7.1.</i></p> <p>9.7.2 Other on-site generation systems</p>	<p>Section 0</p>	<p>Refer to the documentation requirements in:</p> <p><i>NABERS Ruling – On-site Renewable Electricity Generation Systems, v1.0, 2020</i></p> <p><b>Note:</b> These documents are NABERS Australia documents which are relevant to NABERS ratings under the NABERS UK scheme.</p>

# Appendix A – Non-utility metering system validation records

The following templates are examples of **validation** records for electrical, gas and **RMRS non-utility metering systems**.

Example of a validation record for electrical non-utility metering systems

**Validation record for electrical non-utility metering systems**

*See Section 6.3.1 on requirements for validating electrical non-utility metering systems*

Name of premises:	Name of person undertaking validation:
Address of premises:	Qualification and/or certified licence number:
	Date of validation:

ID (meter no. or tenancy / unit no.)	Description (meter brand and type)	Wiring check*	CT Ratio (of the installed CTs)	For externally multiplied meters:		For meters with internal multipliers:					
				Does the meter face reading need to be multiplied to calculate the true consumption?	If so, confirm the multiplication factor to be applied to account for the CT Ratio:	Can the meter multiplier be interrogated on the meter face?	If so, record the meter multiplier and attach photographic evidence	If not, use tong-testing or a hand-held meter to compare measured current and meter face current per phase			
								Sub-meter current per phase	Comparison meter current per phase		
				Yes / No		Yes / No		/	/	/	/
				Yes / No		Yes / No		/	/	/	/
				Yes / No		Yes / No		/	/	/	/
				Yes / No		Yes / No		/	/	/	/

\* Wiring check including reverse CT connection errors, cross phase CT connection errors, phase sequence connection errors and faulty or missing potential fuses.

Signed to record that the above **non-utility metering systems** are correctly configured and have been validated:

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Example of a validation record for gas non-utility metering systems

<b>Validation record for gas non-utility metering systems</b>			
<i>See Section 6.3.2 on requirements for validating gas non-utility metering systems</i>			
<b>Name of premises:</b>		<b>Name of person undertaking validation:</b>	
<b>Address of premises:</b>		<b>Qualification and/or certified licence number:</b>	
		<b>Date of validation:</b>	
<b>Non-utility meter ID</b> (meter no. or tenancy / unit no.)	<b>Non-utility meter description</b> (meter brand and type)	<b>Meter pressure (kPa)</b>	<b>Correction factor</b>

Signed to record that the above **non-utility metering systems** are correctly configured and have been validated:

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### Example of a validation record for Remote Meter Reading Systems (RMRS)

**Validation record for Remote Meter Reading Systems (RMRS)**

*See Section 6.3.3 on requirements for validating Remote Meter Reading Systems (RMRS)*

<b>Name of premises:</b>		<b>Name of person undertaking validation:</b>	
<b>Address of premises:</b>		<b>Qualification and/or certified licence number:</b>	
		<b>Date of validation:</b>	
<b>ID of meter connected to RMRS</b> (Meter no. or tenancy / unit no.)			
<b>Description of meter connected to RMRS</b> (Meter brand and type)			

**Remote Meter Reading System readings**

Confirmation of the accurate interpretation of system reading the non-utility meter at the same two time periods (where applicable)

<b>Time A</b>		<b>Time B</b>	
Remote Metering Reading System readings	Corresponding manual non-utility meter readings from meter face	Remote Metering Reading System readings	Corresponding manual non-utility meter readings from meter face
Time A:		Time B:	
Time A:		Time B:	
Time A:		Time B:	
Time A:		Time B:	

Signed to record that the above **non-utility metering systems** are correctly configured and have been validated:

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# Contact us

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