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Renewable Heat Incentive

Frequently Asked Questions – Metering (Non Domestic scheme)

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This question and answer factsheet assists applicants who **applied on and after 24 September 2013** for the Non Domestic Renewable Heat Incentive (RHI). For further guidance, please refer to our **RHI guidance documents, volumes one and two**. Chapter thirteen of volume one deals with metering requirements.

Some of the answers in this document are necessarily technical in nature; if you are unclear on any information provided here, you are advised to review the RHI Guidance (in particular Chapter thirteen of Volume One). This provides a comprehensive treatment of metering issues, including an overview of the requirements and examples of where meters would be required in particular example scenarios.

This document comprises part of a general RHI Frequently Asked Questions document available on the Ofgem RHI website (www.ofgem.gov.uk/rhi).

A. Metering overview and background

1. What is the purpose of metering?

The RHI only supports renewable heat where the heat generated is usable and useful (heating a room, heating water or heat used for a process). Meters are required to provide the data necessary to calculate the correct payments.

2. What types of meters are required for the Non Domestic RHI?

In the RHI, two types of meters are permissible: heat meters (used for measuring the heat contained in a liquid) or steam meters.

***Heat meters*:**

Heat meters are devices used to measure the thermal energy provided by a source, or delivered to a use by a liquid. In order for this to be achieved a heat meter requires components that are able to measure two quantities:

- Flow rate of the liquid, this is measured by a 'flow sensor' or flow meter'
- The temperature difference between the relevant pipes (the "flow" and "return"). This is measured by a pair of temperature sensors or thermocouples.

In addition to the temperature and flow sensors, a heat meter also needs a 'calculator' or 'integrator'. This uses the quantities provided by the other components to calculate amount of heat generated or used, this is typically given in kWhth.

Heat meters may be purchased and installed as a single 'packaged' heat meter, or as separate components.

Steam meters:

For larger or industrial uses, heat is often delivered in the form of steam, rather than a liquid. In order to measure the thermal energy provided or used, a steam meter requires:

- flow sensor,
- temperature sensor,
- integrator/calculator,
- a pressure sensor.

A steam meter will use only one temperature sensor, with a second reference temperature (typically 0 °C). This is because the integrator will use empirical steam table to calculate the energy of the steam, and these tables typically use 0°C.

Please note that domestic properties with a heat pump that utilizes a shared ground loop will require electricity metering of the electrical input into the installation.

3. Are the rules complicated?

As scheme administrator, Ofgem is required to follow the requirements as set out in the Regulations when

deciding the approach to metering under the scheme. The Regulations clearly set out a rigorous set of conditions concerning metering that need to be met by applicants.

Incentive payments under the scheme are based on metered heat – as such accurate metering is essential to ensure that participants are being paid the correct amount. This necessitates the metering requirements to be strict.

Given the importance of correct metering arrangements under the scheme, some applicants are required to provide an Independent Report on Metering Arrangements as part of their application. Only installations that have a capacity of 1MWth or above, or classed as multiple for RHI metering purposes (see below) are required to provide a Report.

B. Simplified metering applicable from the 24/09/2013

1. What are the benefits of the simplified metering requirements?

The 'simplified metering requirements' will allow applicants to:

- disregard heat loss from external pipework in certain circumstances where the pipework is *properly insulated* to the heat loss rates outlined in BS5422
- submit heat loss calculations in place of additional meters in certain circumstances
- only install meters necessary to calculate the 'eligible heat output' from the installation.

By allowing applicants to follow the above, the preceding regulatory requirements that necessitate all eligible heat generated to be used within the same building in order to be classed as **simple** where there are no **ineligible heat uses** will now be removed and replaced with the term **standard**. This means that a higher proportion of applicants will be accredited with having a 'standard' metering arrangement in line with revised criteria:

A standard metering arrangement: this applies to a system which does not deliver heat by steam and requires only one 'quantity'* to be measured for RHI payment purposes. The one 'quantity' can either be the 'eligible heat generated' by the plant where there are no ineligible heat uses; or the 'eligible heat used' on the system where there is no ineligible heat generation plant.

A multiple metering arrangement: does not fall within the definition of a standard installation (i.e. more than one quantity must be measured).

*The term **quantity** is used for RHI payment calculation purposes and is defined as any individual point of 'heat use' (eligible or ineligible) or 'heat generation' (from the eligible installation or from a supplementary ineligible plant). The number of 'quantities' being measured on a heating system will define whether a system needs to follow the 'standard' or 'multiple' payment formula route.

2. What additional information do I need to submit if I want to take advantage of the simplified metering requirements?

If your installation uses external pipework and you want to take advantage of either of the following:

(a) 'disregard' associated heat loss where the pipework is 'properly insulated' in certain circumstances; or
(b) submit a heat loss calculation in place of additional metering in certain circumstances;

you will be asked to complete a 'heat loss assessment'. This 'heat loss assessment' will request you to

answer specific questions (or provide certain pieces of evidence pertaining to your situation. This could be in the form of pictorial evidence, a copy of a manufacturer's specification, correspondence from a manufacturer or other requirements as detailed as part of the **Heat Loss Assessment Questionnaire**.

3. What happens if I was part way through my *preliminary* application when the new metering requirements came into force and it would be beneficial for me to take advantage of them?

Since your application is already part way through the process, to take advantage of the new metering requirements you will need to withdraw your application and reapply so that your applications reflects these revised/ simplified requirements.

4. What happens if I was part way through my *full* application when the new metering requirements came into force and it would be beneficial for me to take advantage of them?

You will need to cancel your application as it stands and re-start the entire process. The reason for this being that the new 'metering questions' that you will be required to answer will not appear within your existing application and will only appear when a new application is started after the date on which the new regulations come into force.

5. What happens if I was part way through my application when the new metering requirements came into force and it is *not* beneficial for me to take advantage of them?

You do not need to do anything but continue with your application and submit as you would have done previously.

6. If I have already installed meters in line with the pre 24 September 2013 regulations but don't apply to the scheme until *after* the new regulations come into force will this mean I'll need to re- install/ position my meters?

If you have installed meters in line with the pre 24/9/13 regulations you will still be eligible for the RHI under the revised regulations. You may however have more meters than is mandatory to calculate the 'eligible heat output' or you may have been able to 'disregard' some heat loss or submit a heat loss calculation instead of metering if you have external pipework. These are only optional however, and do not mean that your installation would be ineligible [*NB: it must meet all other eligibility requirements*].

7. What is the difference between a heat loss assessment and a heat loss calculation?

A **heat loss assessment** is a mandatory assessment for completion in certain instances where an installation uses external pipework. This includes being able (in certain circumstances) to:

- 'Disregard' some or all of the associated heat loss; and/or
- Use a 'heat loss calculation' in place of installing additional meters.

If you fall into one of these specific circumstances you will be asked to download and complete an RHI **heat loss assessment** as part of the accreditation process. This assessment is carried out in an excel spreadsheet document in which you will be requested to provide information and evidence pertinent to the properties of your pipework, associated insulation, pipe length etc. This will assist in determining whether your external pipework is 'properly insulated'.

You may also be requested to carry out a **heat loss calculation** if appropriate to calculate the associated heat lost from one or more individual lengths of external pipework. The preferred approach for carrying out this calculation is to use Ofgem's 'heat loss calculator' spreadsheet which upon the insertion of various parameters will automatically calculate the projected annual heat loss.

This 'heat loss calculator' is located *within* the 'heat loss assessment' spreadsheet as a separate excel worksheet.

8. In what circumstances can heat loss be disregarded?

Heat loss can be disregarded where an installation uses external pipework which is 'properly insulated' and falls into one of either of the following two instances:

- Each individual length of external pipework is 'properly insulated' and is less than 10m in length; or
- Each individual length of external pipework is 'properly insulated' and is greater than 10m in length where the associated annual average heat loss (kWhth) from the individual length of pipe is less than 3% of the projected annual output of the plant (kWhth). To prove that this is the case a 'heat loss calculation' should be completed.

C. Metering eligibility and evidence

1. What meter evidence do I need to provide with my application?

We need to see evidence, for each heat meter, that it conforms to the Measuring Instruments Directive (MID) or equivalent, and that it is accurate to Class 2 (or better).

For further details on these specific points, see also the following two questions.

The evidence requirements will vary depending on whether the meter is:

- *a single "packaged" unit*, with all the components permanently attached together; or
- a heat meter with *separate sub-assemblies*, being a:
  - flow sensor;
  - matched pair of temperature sensors; and
  - a calculator/digital integrator.

Note that, *even if all the sub-assemblies were purchased at the same time from the same manufacturer*, they will be regarded as separate components unless they were supplied as a single permanently attached unit (typically with the 'display' box directly attached to the pipe, and with one or two temperature probe leads 'hard-wired' into this box).

A summary of evidence requirements is presented in the following table:

Evidence requirements for non Domestic Renewable Heat Incentive (RHI) heat meters

Type of Meter	Component	MID evidence	+	Accuracy requirement
Packaged heat meter	**n/a**	Photo of label showing "***CE MXX XXXX***" and ***serial number*** ***OR*** "***Certificate of Conformity***"	+	Photo of label showing "Accuracy Class: 2" ***OR*** ***Test certificate stating accuracy class and serial number***

Heat meter with separate components	**Flow sensor**	Photo of label showing "***CE MXX XXXX***" and ***serial number*** ***OR*** "***Certificate of Conformity***"	**+**	Photo of label showing "Accuracy Class: 2" ***OR*** ***Test certificate stating accuracy class and serial number***
	Temperature sensors (matched pair)	**n/a***	**+**	**n/a***
	Digital integrator/ Calculator	Photo of label showing "***CE MXX XXXX***" and ***serial number*** ***OR*** "***Certificate of Conformity***"	**+**	Photo of label showing "***CE MXX XXXX***" and ***serial number*** ***OR*** ***Test certificate stating that accuracy meets Maximum Permissible Errors as defined by the MID***

Examples of what we need to see in the photos:

- CE MXX XXXX
- "Accuracy Class: 2"
    - [Note: ***NOT*** "Accuracy E1, M1" etc – E and M relate to electromagnetic and mechanical classes, but are not related to the accuracy of a meter or meter component]
- A serial number matching the RHI online application form

2. How do I prove that my heat meter meets the Class 2 accuracy requirement?

Ofgem require all heat meters to comply with the Class 2 accuracy requirement within EN 1434. Evidence in applications should explicitly illustrate that the heat meter adheres to the Class 2 accuracy standard. Often heat meter model brochures will not provide sufficient evidence, as they do not specify the accuracy standard.

Therefore Ofgem recommends that applications should also be supported by a photograph of the heat meter. The resolution of the image should be sufficient so that the accuracy class can be seen on the meter label, preferably also showing the opening meter reading (although this may need to be in a separate photo). The image should be uploaded to the further supporting evidence section of the application.

3. How do I prove that my heat meter meets the requirements of the Measuring Instruments Directive?

See table under question 1 above.

Examples of what certificates are acceptable:

- "Certificate of conformity"
- ***NOT*** *a "Type-examination certificate" [this relates to some of the technical requirements, and may be a precursor to a "Certificate of Conformity", but is not enough by itself]*

4. What are the requirements for meters measuring glycol, or other mixtures?

Ofgem administers the scheme in line with the RHI Regulations, which define heat meters as specified in Annex MI-004 of the Measuring Instruments Directive. We will, in general, require meters that conform to the Measuring Instruments Directive (MID) and meet Class 2 accuracy standards. As part of MID conformity, heat meters must be put into use such that the meter is "appropriate for the accurate measurement of consumption that is foreseen or foreseeable". This includes provision that the rated operating conditions are appropriate, and this is expected to be determined by the distributor or the person legally designated for installing the meter (the "distributor/installer").

In the case of non-standard heat-conveying liquid compositions (such as water/ethylene glycol or water/polypropylene glycol mixtures), for which meters have not been tested under recognised test standards which match the expected composition, Ofgem will be minded to regard as suitable any meter or sub-assembly, which:

- has been demonstrated to conform to the MID requirements for a standard liquid composition (such as water)
- would meet, for a standard liquid composition, the required MID and Class 2 accuracy requirements as set out in the RHI Regulations and Ofgem Guidance
- has been endorsed by the manufacturer as being "appropriate and accurate" for specified non-standard liquid compositions or ranges
- is placed on the market with these specified non-standard liquid compositions or ranges clearly communicated by the manufacturer (for example, through technical datasheets or other documentation supplied with the meter) so as to be readily available to distributor/installer and
- is suitably specified and installed by a distributor/installer such that, when put into use, the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.

Due to the complications of correcting both the flow meter and integrator for the properties of the additive, Ofgem would not be minded to accept the use of combinations of sub-assemblies from separate manufacturers. In addition, we are aware of the difference in physical properties that can occur between different mixtures. By way of example, the physical properties of ethylene glycol and propylene glycol are substantially different at high concentrations. In light of these observations, Ofgem would expect the following properties of each of the components of the meter:

- temperature sensors: exactly as used in a MID approved heat meter or sub-assembly
- flow meter: provides output in units of either mass flow or volumetric flow capable of correction to the precise glycol nature and concentration (unless this is included with the heat integrator)
- heat integrator: that takes either the mass or volumetric flow from the above and combines it with the temperature difference to produce a heat flow which would meet the criteria of the MID, again allowing for the nature and concentration of the glycol.

Applicants may also wish to consider meter positions such that heat meters are installed after any collector loop. In this case, the liquid being measured is water rather than a water/glycol mixture.

Applicants should take care when installing meters that all components are correctly specified for the liquid being measured. For solar thermal, this will include careful consideration of whether the meter is installed to measure water, or a mixture such as water/ethylene glycol.

5. Is there a list of Ofgem-approved meters?

Ofgem is not a standard-setting body for heat meters, and as such we do not endorse products, nor do we recommend particular manufacturers, distributors or suppliers. We continue to encourage meter manufacturers to provide evidence of how their meters meet the requirements set out in the RHI Regulations and Ofgem guidance, preferably within the documentation that accompanies a meter when sold, to assist prospective RHI applicants. Key eligibility requirements include that the meters conform to the Measuring Instruments Directive (MID), that they meet Class 2 accuracy, and that they are appropriately installed in line with manufacturer instructions.

6. What are the parts of a heat meter, and what evidence does Ofgem require for each part?

A heat meter is composed of:

- flow sensor;
- matched pair of temperature sensors; and
- a calculator/digital integrator.

Particularly for smaller systems, or for metering smaller individual heat loads, meters may be provided as a single packaged unit. In contrast, many larger meters consist of separate components, with each component chosen, specified for the particular conditions (pipe size, flow rates, temperature range) relating to that situation. So heat meters may exist as:

- a single "packaged" unit, with all the components ***permanently attached together***; or
- a heat meter with separate sub-assemblies, being a:
  - flow sensor;
  - matched pair of temperature sensors; and
  - a calculator/digital integrator.

For evidence requirements, see Table in the earlier question.

7. Where can I get guidance on correct installation of my meter?

You should always seek to identify a suitable person to install any heat meter(s), including all meters that will be used for RHI purposes. A suitable person will:

- Be experienced in correct installation of heat meters;
- Have access to proper materials, training, and other sources of support.

As part of following best practice metering installation, a suitable installer should install meters in accordance with all the manufacturer's instructions.

Your designer, heating system installer, contractor, or the author of an Independent Report on Metering Arrangements may be able to advise on a suitable individual or organisation to provide heat meter installation.

8. What about the requirements for flow meter positioning?

In general, we would be looking for meters to be installed according to manufacturer instructions.

Note that many flow sensors are only accurate when installed in particular orientations, configurations, or when sufficiently separate from common pipework components including bends, valves, and other fittings. Where these are addressed in manufacturer's documentation, we would expect meters to be installed in order to comply with manufacturer instructions. Where no such stipulations were given by the manufacturer, Ofgem would expect industry best practice installation standards to be followed.

D. Independent Reports on Metering Arrangements

1. Do I need to submit an Independent Report on Metering Arrangements with my application?

You are required to submit an Independent Report on Metering Arrangements (IRMA) as part for your application if your installation has a capacity of 1MWth or above, it is classed as **multiple** for Non Domestic RHI metering purposes, or uses steam as a heat transfer medium. Please note that we will generally **not** require an installation that has a capacity of 45kWth and below to submit an IRMA in the first instance. However, we may require this if, in our view, the installation and associated heating system warrants the provision of such a report.

For further information on the IRMA, and who we recommend an applicant uses to write it, please see Chapter Seven of Volume One of the Guidance document. The IRMA template can be found on the RHI website.

The author should complete it fully, including a schematic, and can delete the preceding guidance on its use prior to it being PDFd for upload to the RHI Register.

2. Do you have a list of persons who can provide the Independent Report on Metering Arrangements?

Ofgem does not provide a list of persons who are qualified to complete the Independent Report on Metering Arrangements (IRMA). As a starting point, you may wish to consult with your installer, meter provider or system designer as one of these may be able to assist. The Building & Engineering Services Association (B&ES) [Martina Stocker; martina.stocker@b-es.org; 020 7313 4933] may be able to provide lists of individuals who they assert to be competent, independent and adequately insured.
Other lists may also be available.

The competency criteria for the 'competent person' Ofgem recommend write this report for an applicant can be found in Chapter Seven, Volume One of our guidance document.

All applicants are encouraged to review the IRMA prior to its submission to ensure it is consistent with the rest of the application, and are reminded that they are responsible for the accuracy of all information submitted. They should bear this, and the guidance, in mind when selecting their iRMA author.

3. Am I a suitable person to author an Independent Report on Metering Arrangements?

Ofgem has provided guidance, following consultation, on what qualifications and experience we would recommend an applicant looks for in an IRMA author.

At present, mindful of the emerging nature of heat metering, Ofgem has interpreted 'competent person' to mean a person that meets all of the following criteria:

1. An experienced and suitably qualified engineer (at least HND or equivalent in an engineering discipline from a recognised academic institution)

2. Has demonstrable experience and expertise in flow measurement and heat/steam measurement systems demonstrated by training and development records;

3. Has a relevant background (involved in energy, utilities, building services, heating system design, heating system operation & maintenance)

4. Covered by Professional Indemnity Insurance of at least £1m (through employer or directly)

5. Is unbiased and impartial.

We will consider each case on its facts but we consider that a competent person is unlikely to be regarded as unbiased and impartial where, for example:

- He or she is, or is an employee, of the owner or heat user;
- He or she is related to the owner or heat user;
- He or she is contractually obliged to author Reports exclusively for a given owner
- The submission of the Report could have a material impact on a significant portion of his or her income.

For avoidance of doubt, this would allow the designer or meter installer to complete the Report, where they were in a normal arms-length commercial relationship with the applicant, and the bullet points listed above did not apply.

Applicants should review the content and quality of the report, and be satisfied with it, before it is submitted as part of their RHI application, as this will be a key document in our review.

E. Initial meter readings

1. Do I need to provide meter readings on my application?

On your application you are required to submit meter readings, to provide a baseline for payments made under the scheme. These meter readings must be taken within 3 days of your application submission. Therefore, please make sure the date that your meter readings were taken is within this window **before** you submit your application. If they are not within 3 days, new readings will be needed, and your date of accreditation will be affected by this later date.

2. What units do my meter readings need to be in?

In accordance with the RHI regulations, your meter readings must be submitted in kWh. If your meter is displaying the heat output "in MWh", you should **either** request your installer to change the mode of your meter to display the reading in kWh, **or** refer to your heat meter manual for instructions on how to do this yourself.

It may not be possible to change the mode of your calculator. If this is the case, see the following question.

3. My meter readings are in MWh; how can I convert this into kWh?

It may not be possible to change the mode of your calculator (but see previous question on how to achieve this). If this is the case you will need to convert your meter reading into kWh by

multiplying the entire display by 1000

e.g., if the meter reading is 138.21 MWh: 138.21 x 1000 = 138,210 kWh

F. Getting help with metering for the RHI

1. If I send in a copy of my specifications for my installation, can you tell me if I will be eligible?

In order to give you a definitive answer on the eligibility of your installation we will need to receive and assess your complete application for accreditation. Please consult the RHI Guidance Volumes One and Two for further detail on Ofgem's administration of the RHI. Chapter 14 of Volume 1 deals with metering requirements.