

Non-Domestic Renewable Heat Incentive (RHI)

Metering Placement Examples - Version 1

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Jan 2014

Non-Domestic



This guidance provides examples of possible meter placement for the Renewable Heat Incentive (RHI). It follows the new metering requirements that are now in place following the 2013 Amendment Regulations No. 2, which came into force on 24 September 2013. It should be read as an accompaniment to the metering eligibility requirements outlined in Volume One, Chapter Seven of the RHI guidance.

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1. Introduction

1.1. This guidance provides examples of possible metering placement schematics and should be used by RHI applicants who will or have applied for accreditation on or after 24 September. We recommend that you use the two flowcharts in the next section to help determine whether your installation has an ineligible heat use, and which examples are most relevant to your heating system. The examples will help you understand the metering requirements your installation will need to comply with in order to receive RHI payments.

1.2. These examples are illustrative only. Not all of the examples in this document will be applicable in your circumstance.

1.3. Meter configurations which differ from the arrangements described below may be permissible. In these cases, however, participants may need to justify with technical evidence how the requirements outlined in Volume One, Chapter Seven, of the RHI guidance are met by their alternative approach.

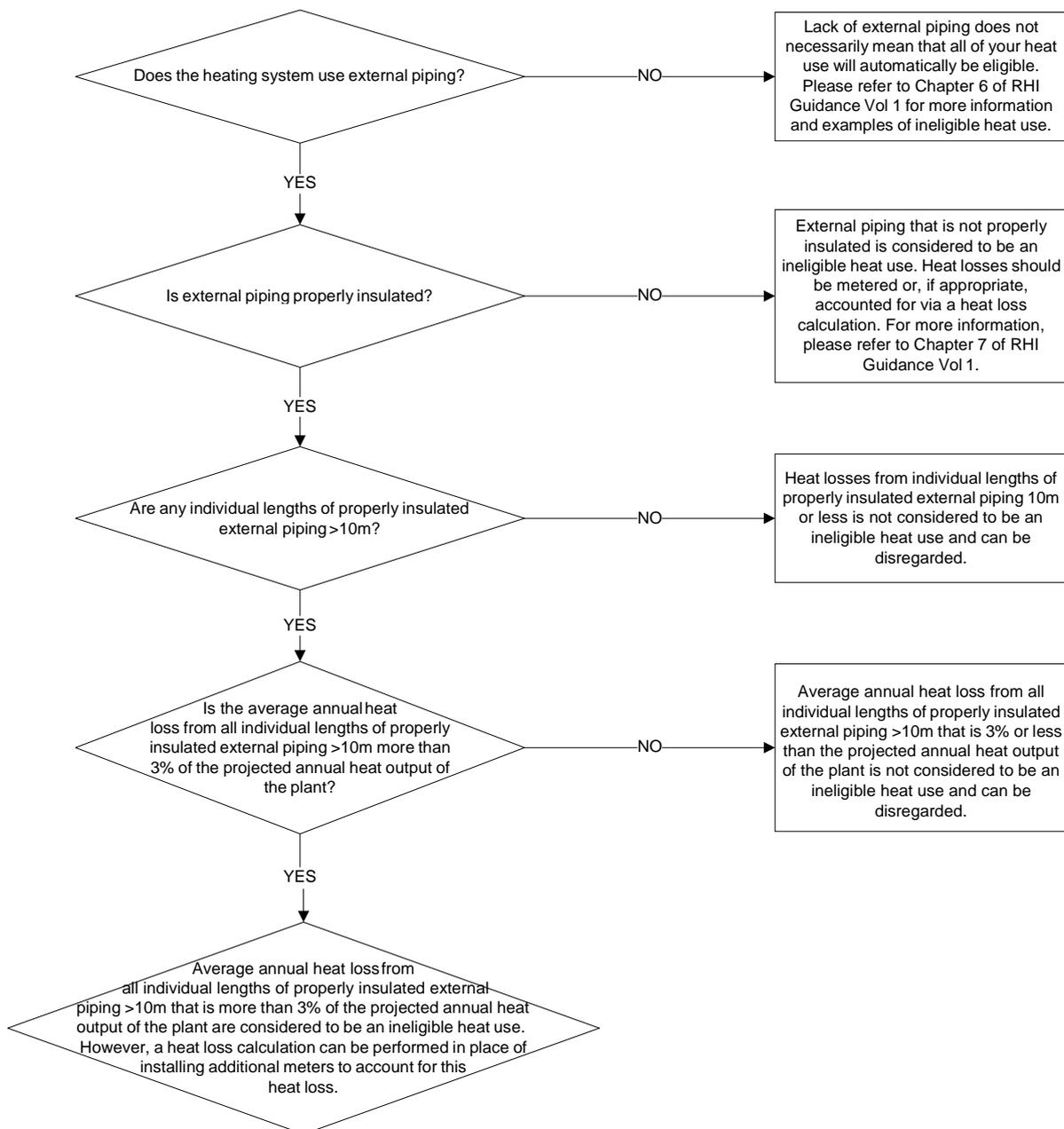
1.4. Further information about when and how to provide periodic data, ie meter readings and heat output figures, to us can be found in Volume Two, Chapter Three of the RHI guidance. Information about how periodic data is used to calculate payments is outlined in Volume Two, Chapter Five, of the RHI guidance.

2. Flowcharts

2.1. To determine which examples are most relevant to your installation, please start by using the flowcharts below.

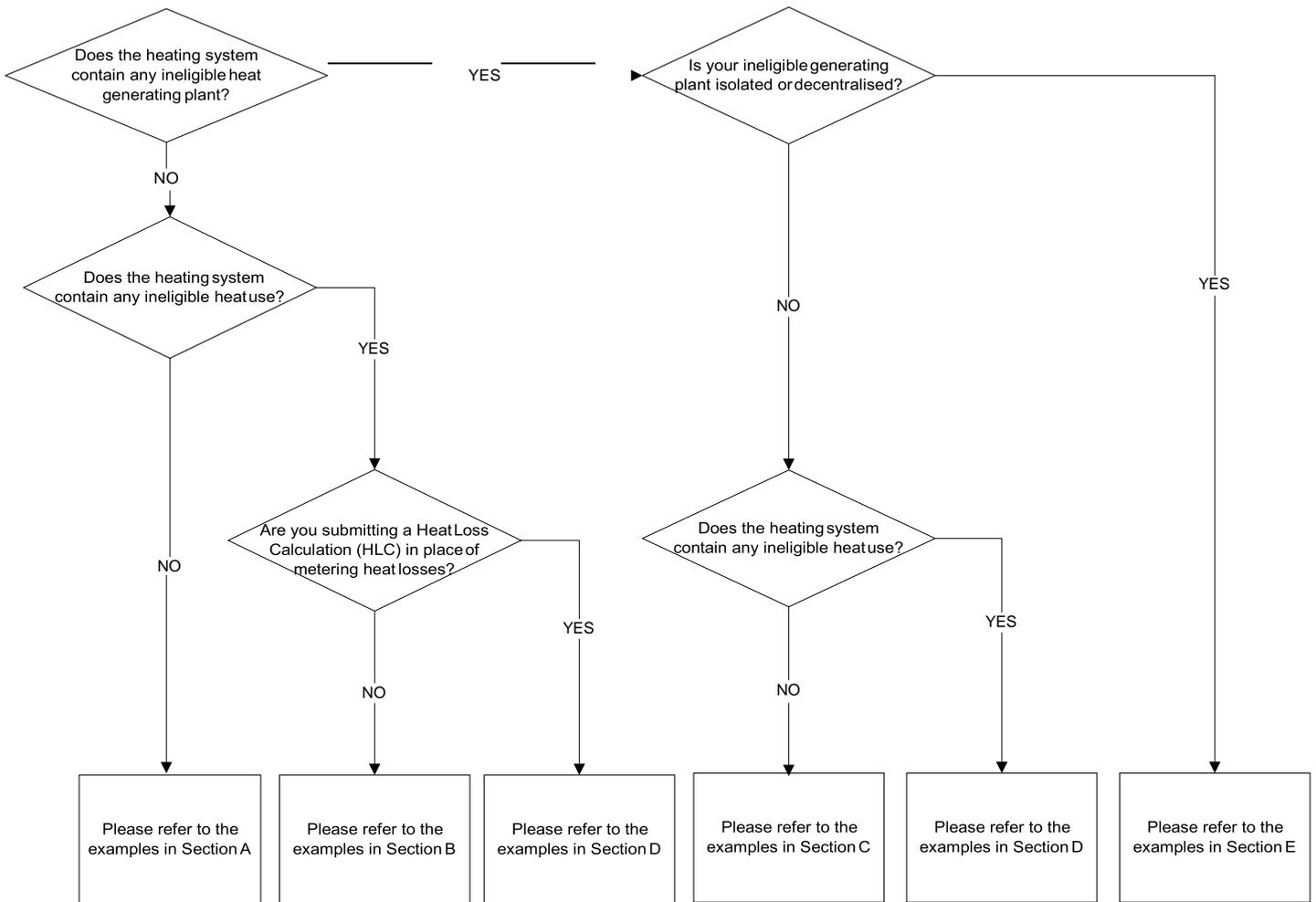
Flowchart A: Is any of my heat use ineligible?

2.2. Flowchart A will help determine whether we will consider any of your heat use to be ineligible for support under the RHI. It will also help determine when and how any heat losses from external piping should be measured. Please note that currently any heat loss from buried pipework is considered an ineligible heat use.



Flowchart B: Which examples are most relevant to my installation?

2.3. In conjunction with Flowchart A, Flowchart B will help you identify the worked examples in the next section that are most relevant to your installation. Please note that these examples do not necessarily represent optimal metering arrangements. That is, the minimum number of meters required to comply with the RHI. However, they should reflect real-world installations.



3. Worked examples overview

3.1. The worked examples are divided into five sections. These sections relate directly to the outcomes identified in Flowchart B above. Please refer to the list at the beginning of each section to determine which of the worked examples will be most relevant to your installation. The respective sections are:

Section A: Heating systems where the eligible installation alone feeds only eligible heat use. All the schematics use **standard** metering arrangements.

Section B: Heating systems where the eligible installation alone feeds a combination of eligible heat use and ineligible heat use. All the schematics use **standard** metering arrangements.

Section C: Heating systems where the eligible installation uses back-up ineligible heat generating plant. Heat produced in these examples feeds only eligible heat use. All the schematics use **standard** metering arrangements.

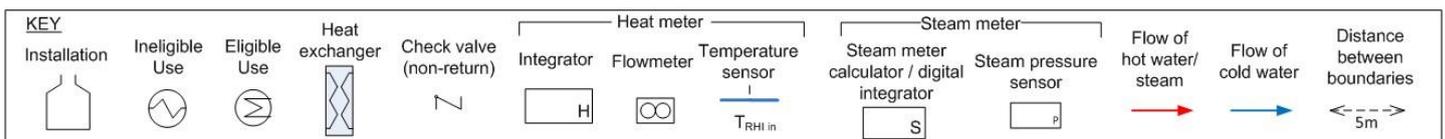
Section D: Heating systems where the eligible installation uses back-up ineligible heat generating plant. The heat used in these systems is then used to feed a combination of eligible heat use and ineligible heat use. All the schematics use **multiple** metering arrangements.

Section E: Heating systems where the eligible installation uses a back-up ineligible heat generating plant that could be considered decentralised or isolated from the heating system. For further information on this type of arrangement and its requirements please refer to Volume One, Chapter Seven of the RHI guidance. The schematics use **standard** and **multiple** metering arrangements.

3.2. The worked examples used in this document are simplified schematic diagrams. As such they could not be submitted in support of an RHI application. However, they will be useful in helping you to understand the metering requirements your installation will need to comply with in order to receive RHI payments.

Key for schematic diagrams

3.3. Please refer to the key below for an explanation of all the objects used in the schematic diagrams in the following sections. Please refer to Volume One, Chapter Seven of the RHI guidance for more information on individual metering components.



4. Section A

Examples where the eligible installation alone feeds only eligible heat use

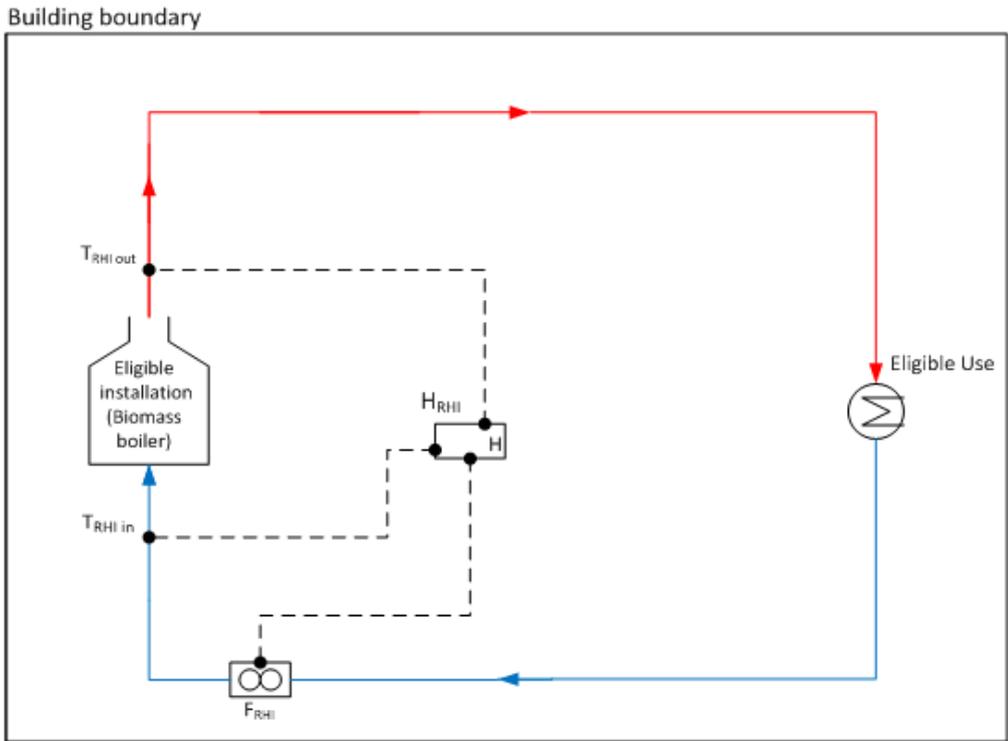
4.1. This section contains worked examples where the eligible installation alone feeds only eligible heat use. All the examples represent standard metering arrangements.

4.2. Not every schematic in this section will be relevant for your exact circumstances. Please find the most relevant examples based on the descriptions below:

- Example A.1: Where the eligible installation is providing heat to a single building. All heat use is considered eligible for RHI payment purposes.
- Example A.2: Where the eligible installation is providing heat to a single building. All heat use is considered eligible for RHI purposes. External piping but no individual length >10m and all piping properly insulated.
- Example A.3: Water used for industrial cleaning (process) other than in a building
- Example A.4: District heating example.

Example A.1:

- A biomass boiler (eligible generation)
- Space heating (eligible use) via liquid medium
- Single building

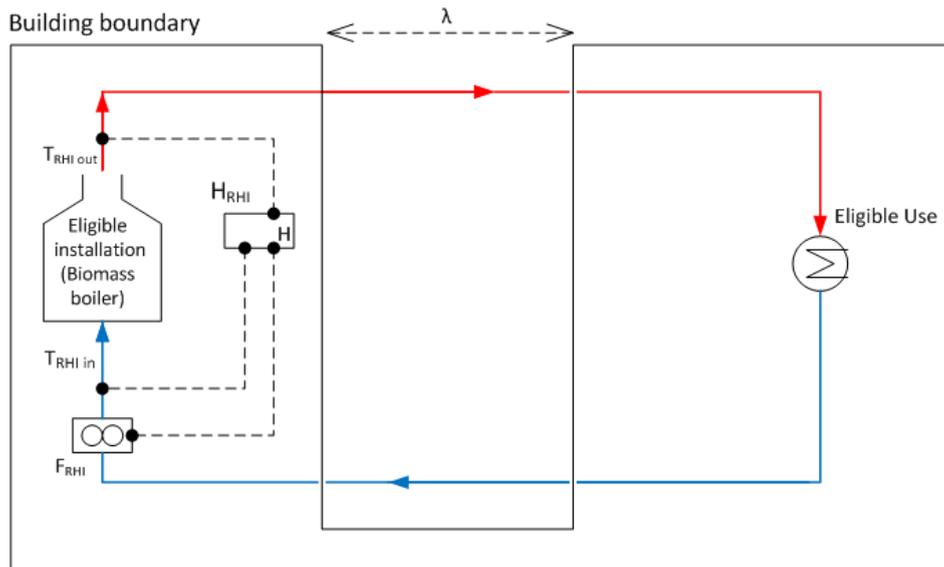


Details:

<p>Number of quantities to be measured?</p>	<p>One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.</p>
<p>What needs to be measured?</p>	<p>The heat generated by the installation is equal to the heat used for eligible purposes (ie there is no ineligible heat generation plant or ineligible heat uses) therefore to measure the EHO the meter can be placed at any suitable point between the generation and use.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses a 'standard' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 1 or 2: Biomass Tariff x HRHI</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example A.2:

- A biomass boiler (eligible generation)
- Space heating purposes (eligible use) via liquid medium
- Generation and use is in one building with external piping (λ)
- λ is $<10\text{m}$ and properly insulated OR λ is $>10\text{m}$, properly insulated, and heat loss $<3\%$ of the total annual average heat output and can therefore be disregarded.

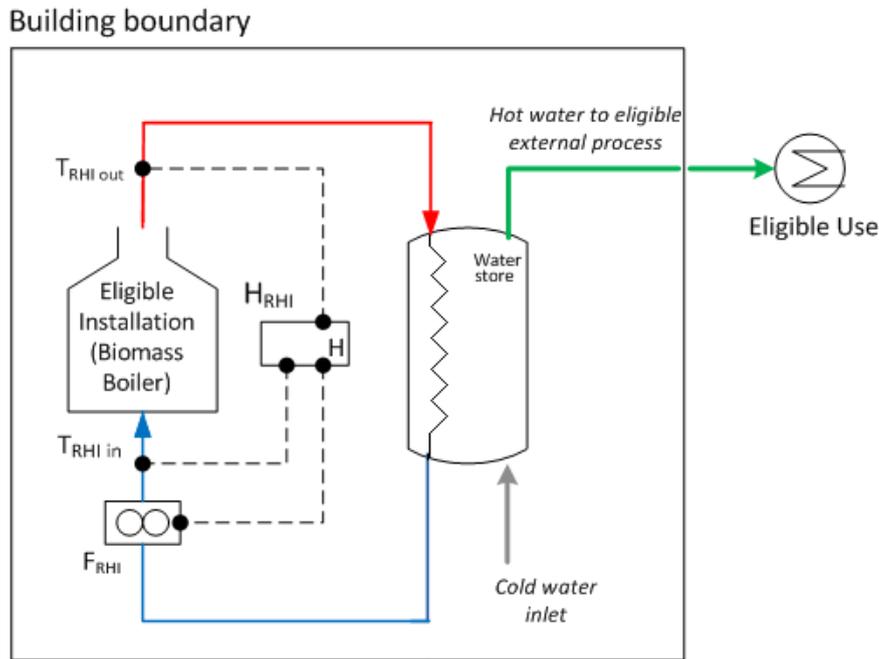


Details:

<p>Number of quantities to be measured?</p>	<p>One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated. Meter HRHI can be placed at the generation (as in the schematic) or at the eligible use.</p>
<p>What needs to be measured?</p>	<p>There are two individual external pipe lengths associated with this installation (flow and return). However because they are properly insulated and are $<10\text{m}$ the associated heat loss can be disregarded. This means that for RHI payment purposes the heat generated by the eligible installation is equal to the heat used for eligible purposes (ie there is no ineligible heat generation or ineligible heat uses). Accordingly, the EHO can be measured using one meter placed at either one of two possible quantities ie the eligible installation or the eligible heat use (NB external piping does not have to be properly insulated if the meter is installed at the eligible heat use: see examples B.3 & B.4).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses a '<u>standard</u>' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 1 or 2: Biomass Tariff x HRHI</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example A.3:

- A biomass boiler (eligible generation) is feeding a hot water storage tank (via a liquid medium) in a single building.
- The water in the tank is heated for use other than in a building for industrial cleaning (eligible use).
- Cold water is fed into the tank in order to top up the water store.

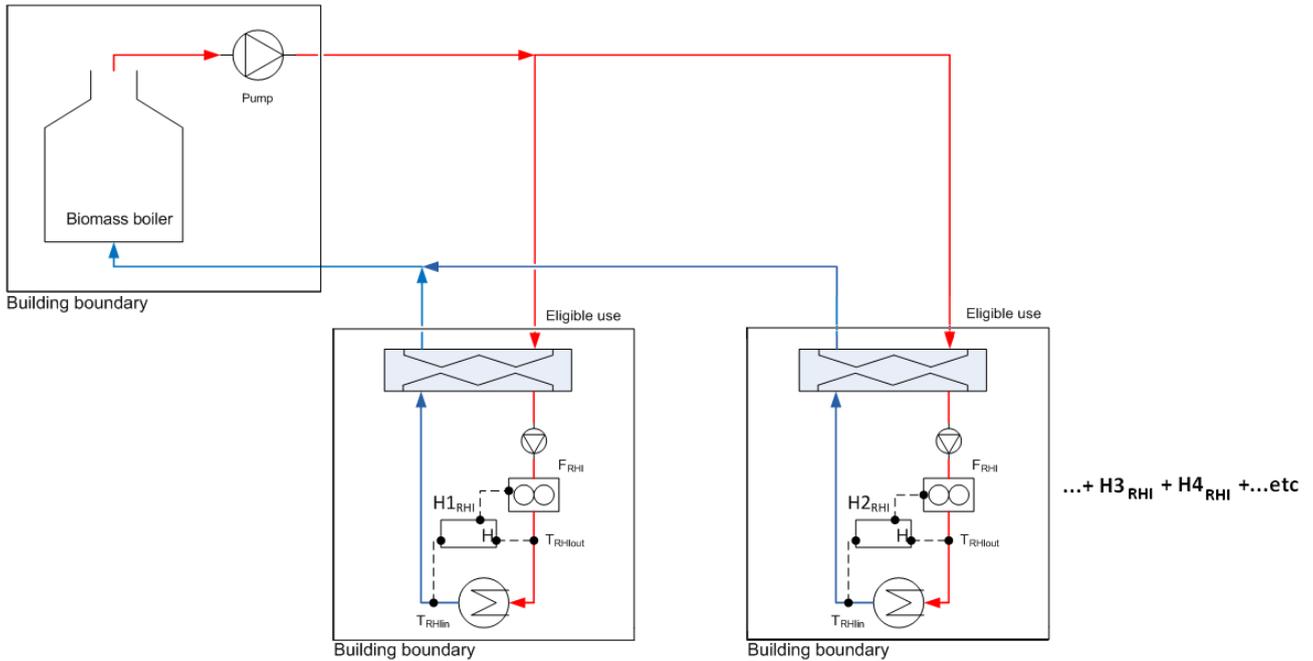


Details:

Number of quantities to be measured?	One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.
Which quantity or quantities need to be measured?	The heat generated by eligible installation is equal to the heat used for eligible purposes (ie there is no ineligible heat generation or ineligible heat uses) and therefore to measure the EHO the meter should be placed at the eligible generation.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation uses a ' standard ' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i>

Example A.4:

- A biomass boiler (eligible heat generation) is providing heat to a district heating network via liquid medium.



Details:

<p>Number of quantities to be measured?</p>	<p>In this example each of the installations which comprise the district heating network needs to be metered. One quantity needs to be measured which is the total of all the heat meters.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The heat meters should be positioned as shown in the schematic to measure the heat used for eligible purposes.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having 'standard' metering for RHI payment purposes because one quantity is being measured (heat used for eligible purposes)</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x eligible heat use x (heat generated by eligible installation/ total heat generated)</p> <p style="text-align: center;">Biomass tariff x (H1RHI + H2RHI + H3RHI...etc)</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

5. Section B

Where the eligible installation alone feeds a combination of eligible and ineligible heat use

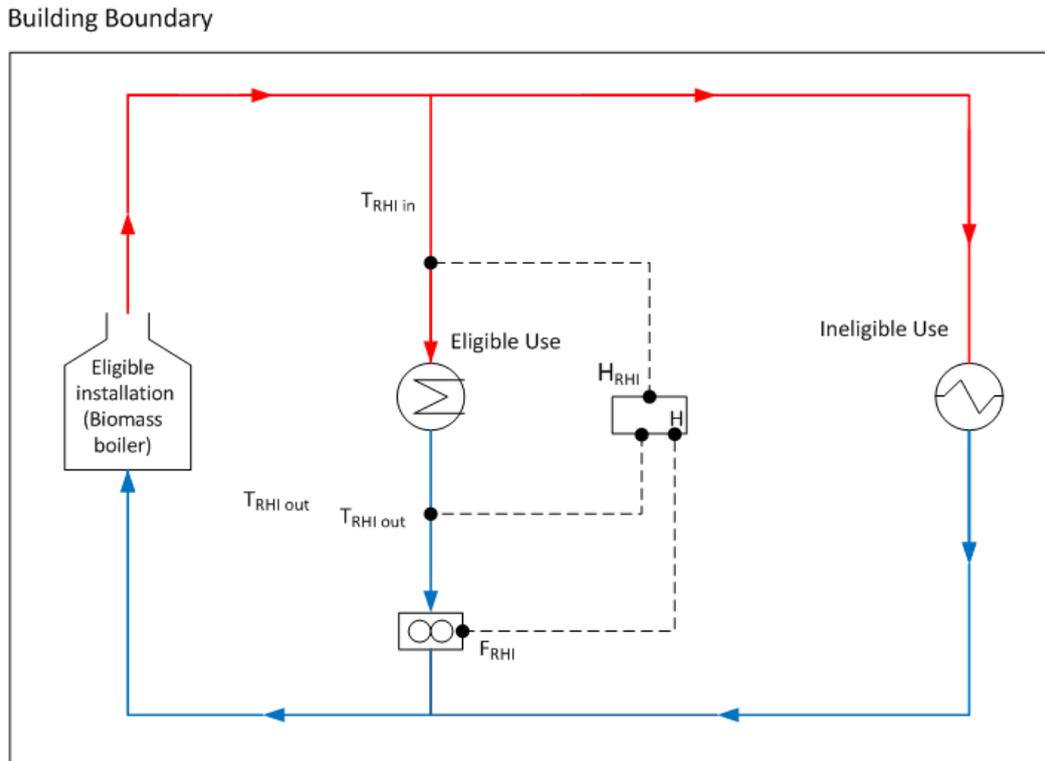
5.1. This section contains worked examples where only eligible installations are used to feed both eligible and ineligible heat use. All the examples represent standard metering arrangements.

5.2. Not every schematic in this section will be relevant for your exact circumstances. Please find the most relevant examples based on the descriptions below:

- Example B.1: Where one eligible installation is used to support both heat used for eligible purposes and ineligible heat use in a single building
- Example B.2: Where one eligible installation is used to support multiple eligible heat uses and one ineligible heat use in a single building
- Example B.3: Where one eligible installation is used to support an eligible heat use in a separate building.
- Example B.4: Where one eligible installation is used to support both an eligible heat use and ineligible heat uses across multiple buildings.

Example B.1:

- **A biomass boiler (eligible generation)**
- **Space heating (eligible use) via liquid medium**
- **Additional partially-outdoor swimming pool (ineligible use)**
- **Heat uses (eligible and ineligible) are located within the same building as the eligible generation**

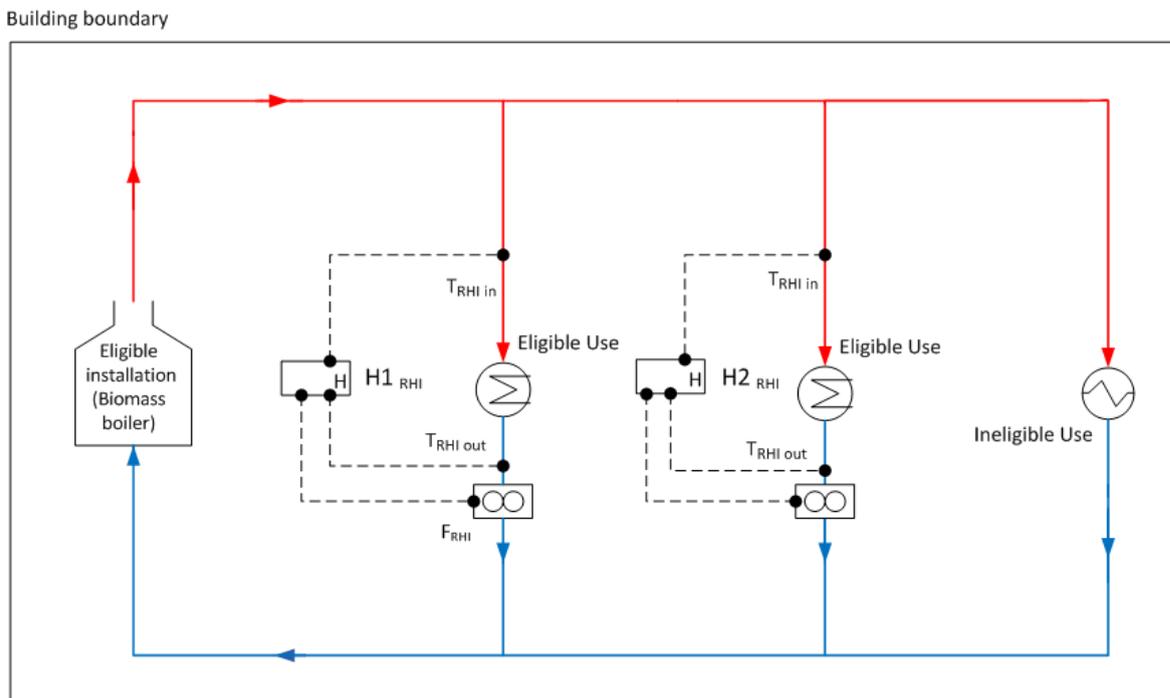


Details:

Number of quantities to be measured?	One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.
Which quantity or quantities need to be measured?	To measure the EHO the meter can only be placed where the heat is used for eligible purposes. It cannot be placed to measure the heat generated by eligible installation because this figure would also take into account the heat being supplied to the ineligible heat being used by the partially outdoor swimming pool.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation uses a ' standard ' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i>

Example B.2:

- **A biomass boiler (eligible generation)**
- **Space heating (heat used for eligible purposes) via liquid medium**
- **Additional ineligible heat use**
- **Heat uses (eligible and ineligible) are located within the same building as the eligible generation**

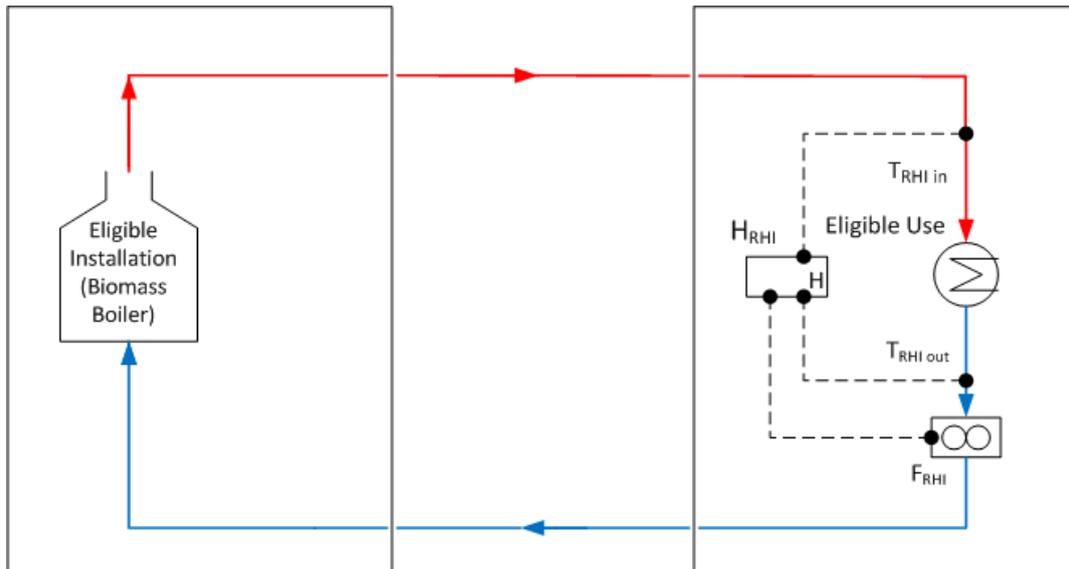


Details:

Number of quantities to be measured?	Two heat meters (HRHI 1 & HRHI2) are required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.
Which quantity or quantities need to be measured?	In this example, two meters have been placed to measure the 2 eligible heat uses to give the total heat used for eligible purposes ie the EHO figure. This equates to one quantity. One meter cannot be placed to solely measure the heat generated by eligible installation (ie by the biomass boiler) because this figure would also take into account the heat being supplied to the ineligible heat use.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation uses a ' <u>standard</u> ' metering arrangement because only one quantity needs to be measured. This is calculated using 2 meters
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x (H1RHI + H2RHI) <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i>

Example B.3:

- A biomass boiler (eligible generation) provides heat to a separate building for space heating (eligible use)
- There is external piping but it is not relevant as the RHI relevant heat meter is installed to only measure the eligible heat output.

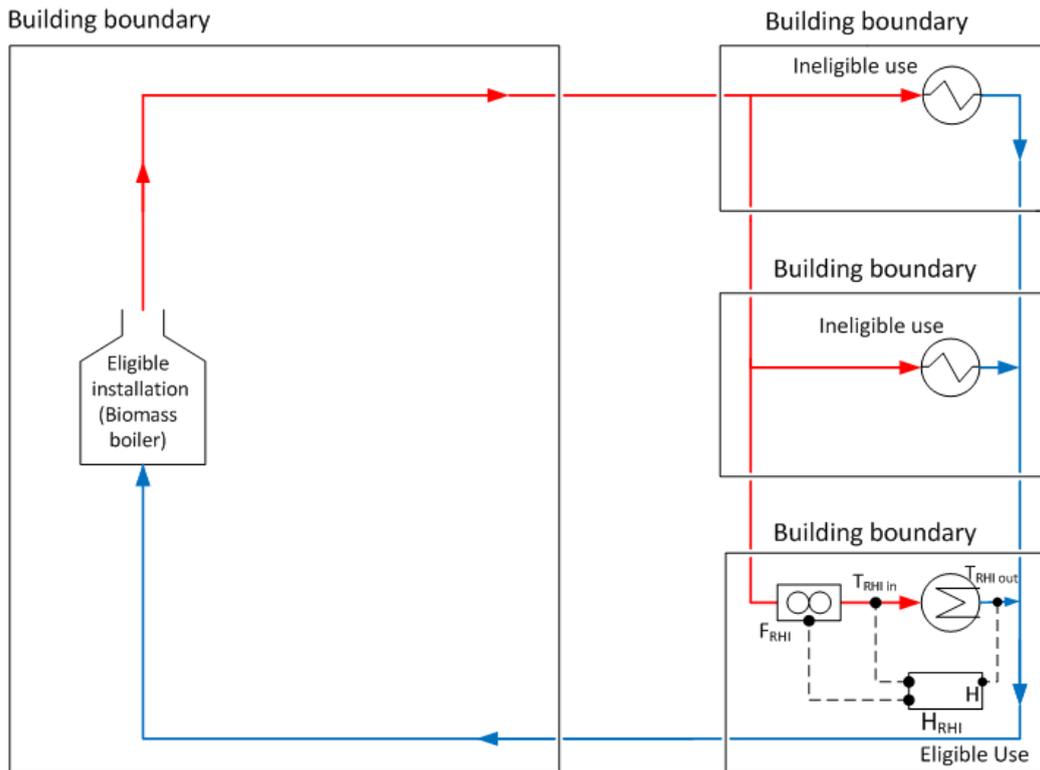


Details:

<p>Number of quantities to be measured?</p>	<p>One heat meter (HRHI) is required to measure one quantity (this being the heat used for eligible purposes) to enable the EHO (eligible heat output) to be calculated.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>There are two individual external pipe lengths that are not properly insulated and classified as an ineligible heat use. However, the meter can <i>only</i> be placed to measure the heat used for eligible purposes (one quantity). If it was placed at the heat generated by eligible installation this would include the heat loss from the external piping which cannot be 'disregarded' given that it is not properly insulated.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses a '<u>standard</u>' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 2: Biomass Tariff x HRHI</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example B.4:

- A biomass boiler (eligible use) housed in a stand-alone boiler house
- Heat supplied to one building (eligible use) and to two outdoor swimming pools in two further separate buildings (ineligible uses)
- There is external piping but it is not relevant as the RHI relevant heat meter is installed to only measure the eligible heat output.



Details:

Number of quantities to be measured?	In this case only one heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated.
Which quantity or quantities need to be measured?	To calculate the EHO a minimum of one meter is required which should be placed at the heat used for eligible purposes. It cannot be placed at the eligible plant (biomass boiler) as a proportion of this heat will feed the ineligible heat uses.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation using ' <u>standard</u> ' metering for RHI payment purposes because only one quantity needs to be measured to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 2: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments' for more details.</i>

6. Section C

Where the eligible installation uses a back-up ineligible heat generating plant and feeds only eligible heat use

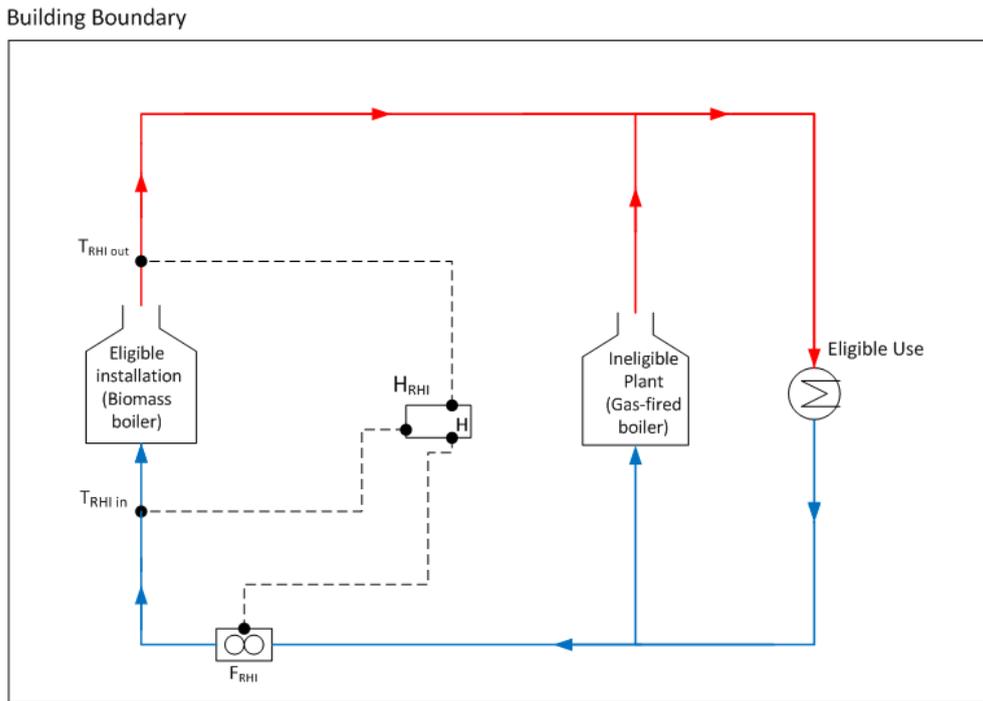
6.1. This section contains worked examples where the eligible installation uses back-up ineligible heat generating plant and feeds only eligible heat uses. All the examples in this section represent standard metering arrangements.

6.2. Not every schematic in this section will be relevant for your exact circumstances. Please find the most relevant examples based on the descriptions below:

- Example C.1: Where the eligible installation is supported by one ineligible back-up boiler providing heat to a single building. All heat use is considered eligible for RHI payment purposes.
- Example C.2: Where an eligible installation is located on the same heating system supported by ineligible plant (electric water heater) heating hot water in a common storage tank. All heat use is considered eligible for RHI payment purposes.
- Example C.3: Where the eligible installation is supported by an ineligible back-up boiler providing heat to multiple buildings. External piping is properly insulated and not >10m so heat loss can be disregarded. All heat use is considered eligible for RHI payment purposes.

Example C.1:

- A biomass boiler (eligible generation) plus a back-up gas-fired boiler (ineligible generation)
- Heat used for space heating (eligible use) in the same building as the heat generation.

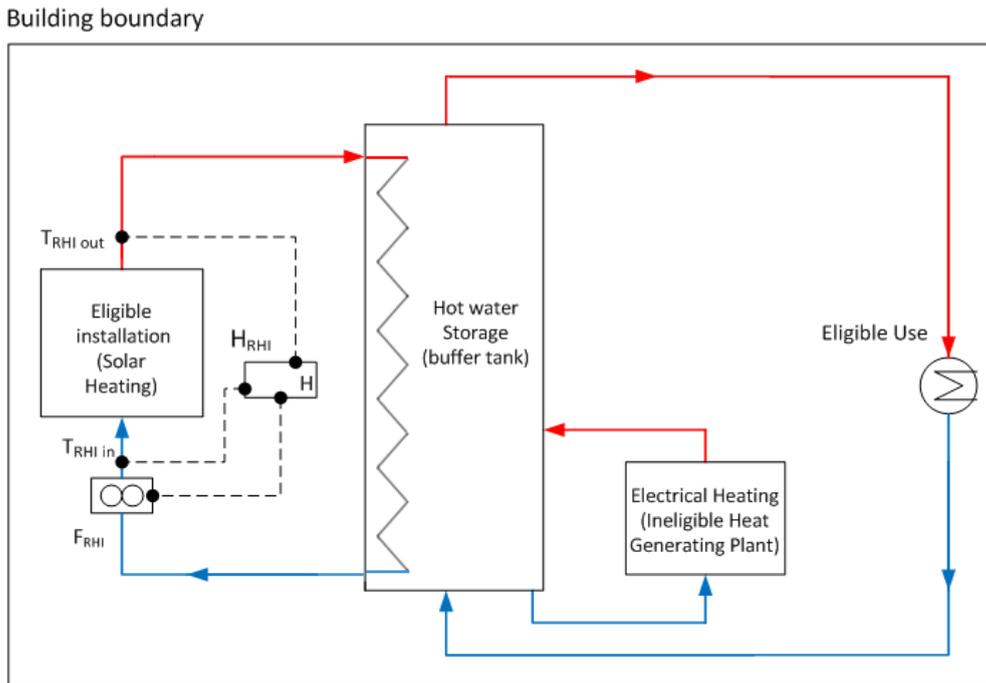


Details:

<p>Number of quantities to be measured?</p>	<p>In this example only one heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>To measure the EHO the meter can only be placed at the eligible installation (ie the biomass boiler) to measure one quantity (the heat generated by eligible installation). It cannot be placed to measure the heat used for eligible purposes because this figure would include the ineligible heat being generated by the back-up gas fired boiler.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses a 'standard' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 1: Biomass Tariff x HRHI</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example C.2:

- A solar thermal installation (eligible generation) plus a back-up electric element (ineligible generation) heat a hot water storage tank to supply hot water for space heating purposes (eligible use) via liquid medium.
- Both the heat generating plant (eligible and ineligible) and heat used for eligible purposes are located in the same building.

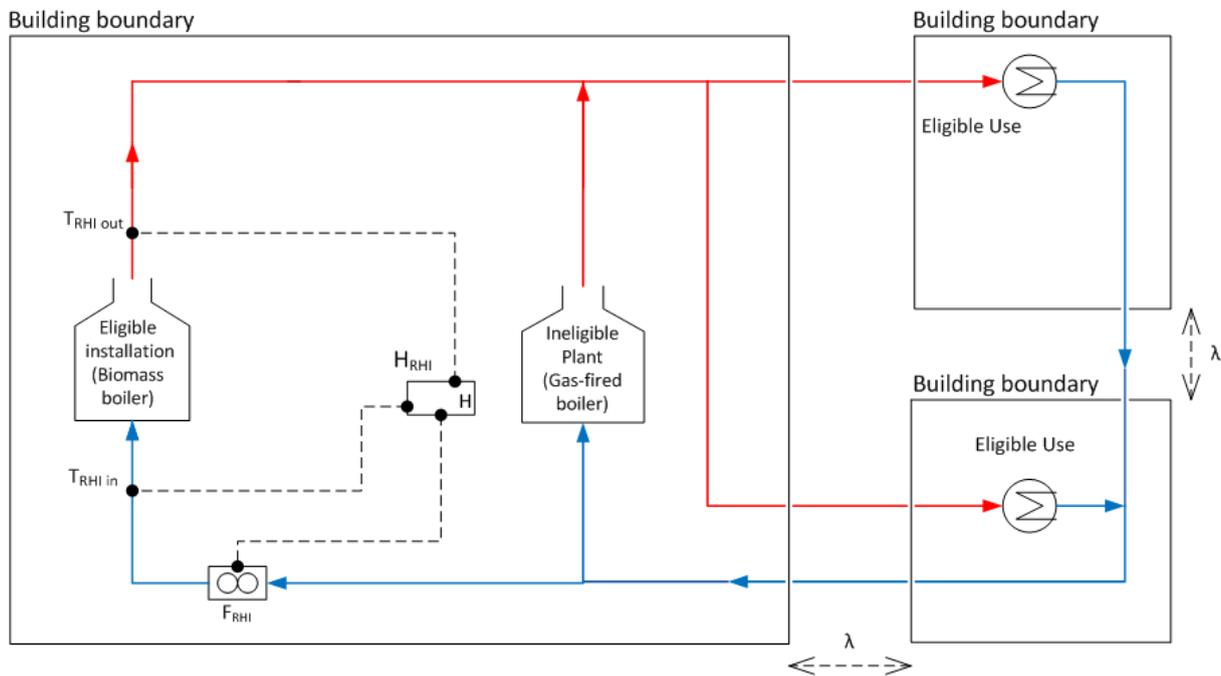


Details:

<p>Number of quantities to be measured?</p>	<p>One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated as shown in the schematic.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>To measure the EHO the meter can be placed to measure the heat generated at the eligible installation (ie the solar thermal installation); this is measuring one quantity which equates to the heat generated by eligible installation. It cannot be placed to measure the heat used for eligible purposes because this figure would include the ineligible heat being generated by the electric element in the hot water storage tank.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses a '<u>standard</u>' metering arrangement because only one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 1: Solar thermal Tariff x HRHI</p> <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example C.3:

- A biomass boiler (eligible generation) plus a supplementary back-up gas fired boiler (ineligible generation), housed in a 'stand-alone' boiler house, supplies hot water for space heating purposes (eligible uses) to two separate buildings.
- There is external piping to transport the hot water between the three buildings
- λ is $<10\text{m}$ and properly insulated OR λ is $>10\text{m}$, properly insulated, and heat loss $<3\%$ of the total annual average heat output and can therefore be disregarded.



Details:

Number of quantities to be measured?	One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated.
Which quantity or quantities need to be measured?	To calculate the EHO a minimum of one meter is necessary and would be placed at the eligible installation (ie the biomass boiler) to measure the one required quantity ie the heat generated by eligible installation.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation is classed having ' standard ' metering for RHI payment purposes because only one quantity needs to be measured to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments' for more details.</i>

7. Section D

Where the eligible installation uses back-up ineligible heat generating plant to feed a combination of heat used for eligible purposes and ineligible heat use

7.1. This section contains worked examples where the eligible installation uses back-up ineligible heat generating plant to feed a combination of heat used for eligible purposes and ineligible heat use. All the examples represent multiple metering arrangements.

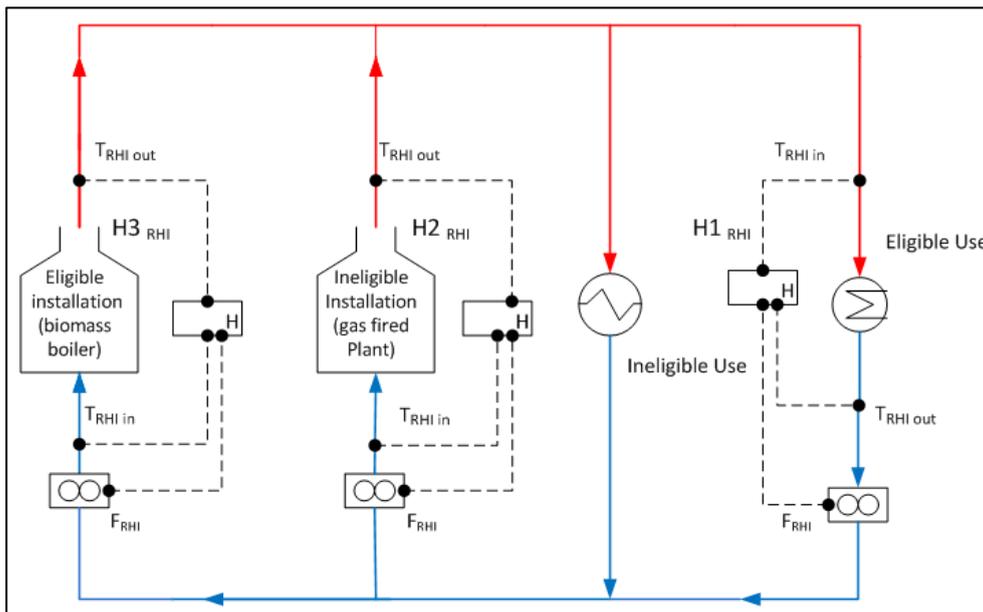
7.2. Not every schematic in this section will be relevant for your exact circumstances. Please find the most relevant examples based on the descriptions below:

- Example D.1: Where two eligible installations in series use an ineligible back-up boiler to feed a combination of heat used for eligible purposes and ineligible heat use in a single building.
- Example D.2: Where the eligible installation and an ineligible plant feeds an eligible and ineligible heat use in a single building. External piping is not >10m and is properly insulated so heat loss can be disregarded.
- Example D.3: Where the eligible installation and an ineligible plant feed an eligible heat use in a single building. External piping is >10m and properly insulated but heat loss is more than 3% and thus cannot be disregarded. In this instance, a heat loss calculation is used in place of meters to measure the ineligible heat use.
- Example D.4: Where the eligible installation and an ineligible plant feed an eligible and ineligible heat use across multiple buildings. External piping is not >10m and is properly insulated so heat loss can be disregarded.
- Example D.5: Where the eligible installation and an ineligible plant feed an eligible and ineligible heat use across multiple buildings. External piping is >10m and properly insulated but heat loss is $\leq 3\%$ so can be disregarded.
- Example D.6: Where the eligible installation uses an ineligible back-up boiler to feed an eligible and ineligible heat use in a single building. In this example, the heat transfer mechanism is steam.
- Example D.7: Where the eligible heat generation uses an ineligible back-up oil boiler in a separate building to feed an eligible heat use in another building. In this example, the heat transfer mechanism is steam.

Example D.1:

- A biomass boiler (eligible generation) plus a supplementary back-up gas fired boiler (ineligible generation) supplies hot water for space heating purposes (eligible use) and to an ineligible use.
- The heat uses (eligible and ineligible) are located within the same building as both the eligible and ineligible heat generating plant

(NB: an alternative metering arrangement for this is also possible where meters are placed at the eligible installation, the heat used for eligible purposes and the ineligible heat use to allow the RHI payment to be calculated using 'multiple' metering arrangement payment formula 2)

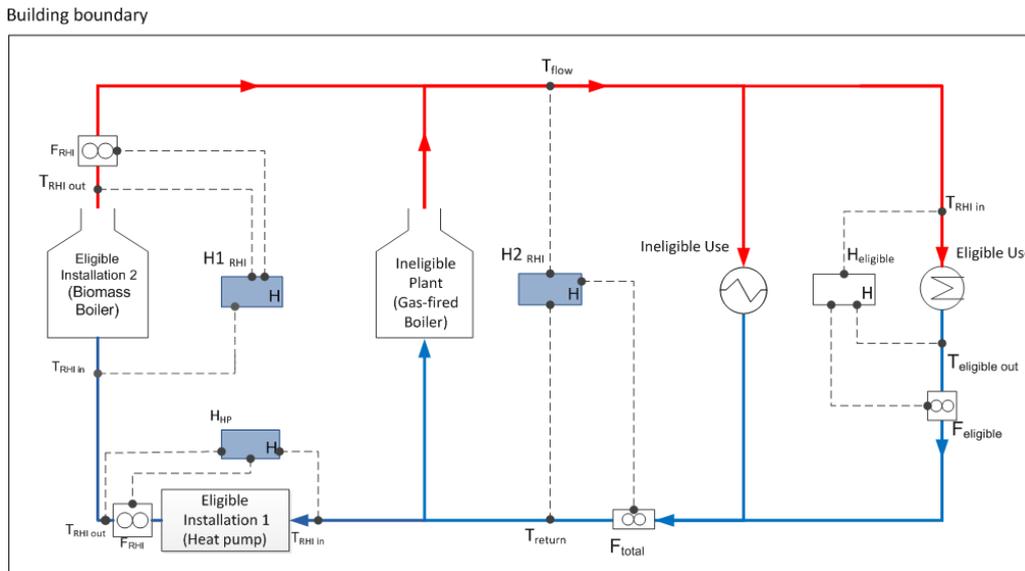


Details:

<p>Number of quantities to be measured?</p>	<p>Due to the fact that there is both eligible and ineligible heat generation plants (gas-fired boiler) and an ineligible heat use and eligible heat use, it is impossible to measure just one quantity to determine the EHO. As a result a minimum of 3 quantities will need to be measured to enable the EHO to be calculated [NB this could be done using two different meter arrangements to allow either of the two possible multiple payment formulae to be used].</p>
<p>Which quantity or quantities need to be measured?</p>	<p>For the purpose of this example, the meters should be positioned as shown in the schematic to measure: (1) the heat generated by the eligible heat generation plant) (Meter H3); (2) the heat generated by the ineligible plant (Meter H2); (3) the heat used for eligible purposes (Meter H1).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? (this is based on the number of quantities being measured)</p>	<p>This installation is classed as having a 'multiple' metering arrangement because more than one quantity needs to be measured for RHI payment purposes to enable the RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x heat used for eligible purposes x (heat generated by eligible installation /total heat generated)</p> $\text{Biomass tariff} \times \text{H1RHI} \times \frac{\text{H3RHI}}{\text{H3RHI} + \text{H2RHI}}$ <p>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</p>

Example D.2:

- A biomass boiler and a GSHP installed in series (eligible generation). Additional back up as fired boiler (ineligible generation)
- Heat supplied to an eligible and ineligible use in a single building via liquid medium
- Separate eligible installations on the same system each will need to be treated separately for RHI payment and periodic data submission data purposes.

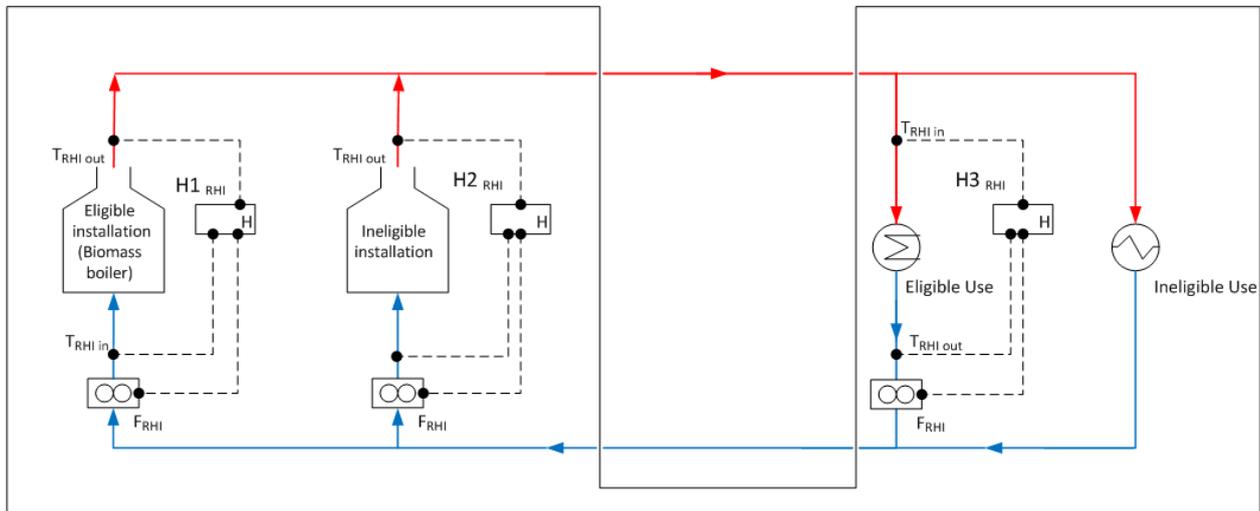


Details:

<p>Number of quantities to be measured?</p>	<p>One quantity cannot be measured alone to calculate the EHO for either the biomass boiler or the GSHP because there is a combination of eligible and ineligible heat generation plant feeding a combination of eligible and ineligible heat uses. 3 quantities will need to be measured to enable the EHO to be calculated.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The meters should be positioned as shown in the schematic: (1) the heat generated by the eligible biomass boiler (Meter H1 RHI); (2) the heat generated by the eligible GSHP (Meter HHP); (3) the total heat generated by all heat generation plant (eligible & ineligible) (Meter H2 RHI); and (4) the heat used for eligible purposes (Meter H eligible). This positioning allows 3 quantities to be measured for both the biomass boiler and GSHP RHI payment requirements (see below).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having 'multiple' metering for RHI payment purposes because more than one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Tariff x heat used for eligible purposes x (heat generated by eligible installation/total heat generated)</p> <p>(i) Biomass Boiler:</p> $\text{Biomass tariff} \times H_{\text{eligible}} \times \frac{H1_{\text{RHI}}}{H2_{\text{RHI}}}$ <p>(ii) GSHP:</p> $\text{GSHP tariff} \times H_{\text{eligible}} \times \frac{HHP}{H2_{\text{RHI}}}$ <p>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</p>

Example D.3:

- A biomass boiler (eligible generation) and an ineligible generation plant feed a combination of eligible and ineligible heat uses.
- All heat generation and heat uses are located in the one building and there is external piping.

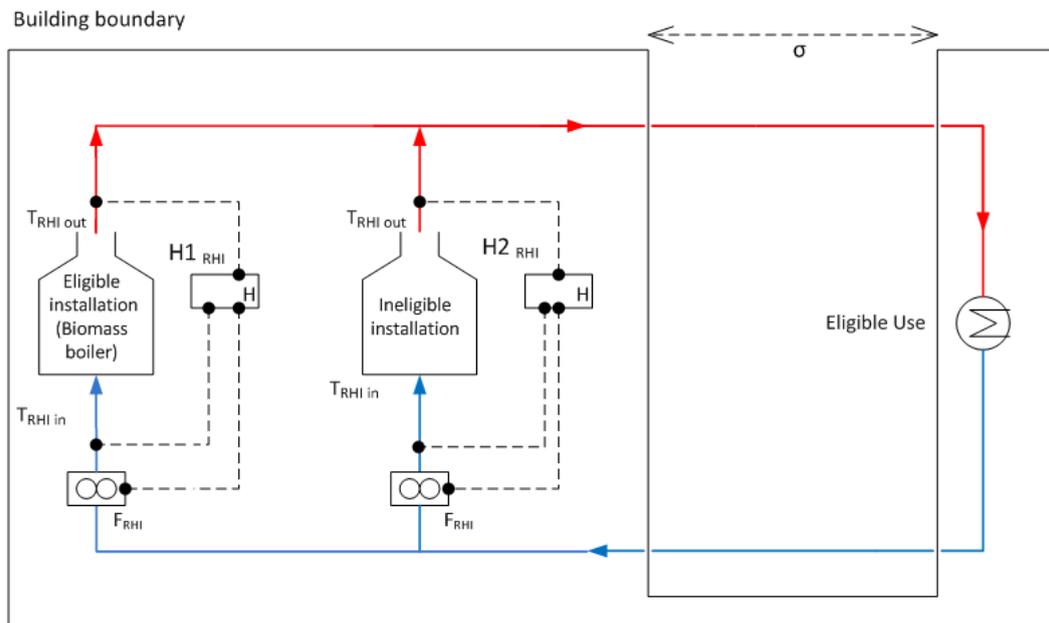


Details:

<p>Number of quantities to be measured?</p>	<p>3 quantities will need to be measured: the heat generated by eligible installation, the TOTAL heat generated and the heat used for eligible purposes</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The meters should be positioned as shown in schematic to measure the following three quantities: (1) the heat generated by the eligible plant (Meter H1); (2) the heat generated by the ineligible plant (Meter H2); and (3) the heat used for eligible purposes (Meter H3).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having 'multiple' metering arrangements for RHI payment purposes because more than one quantity needs to be measured to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 4: Biomass Tariff x eligible heat gen x (heat used for eligible purposes/total heat used)</p> $\text{Biomass tariff} \times H3_{RHI} \times \frac{H1_{RHI}}{H1_{RHI} + H2_{RHI}}$ <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example D.4:

- A biomass boiler (eligible generation) plus a supplementary back-up gas fired boiler (ineligible generation) supplying hot water for space heating purposes (eligible use). Heat use and generation are all in one building
- σ is not properly insulated OR >10m, properly insulated, and with losses >3%. In this example, a HLC is submitted in place of adding an extra meter at the eligible use. (Note that applicants wanting to use a HLC instead of additional metering will have to make a case).

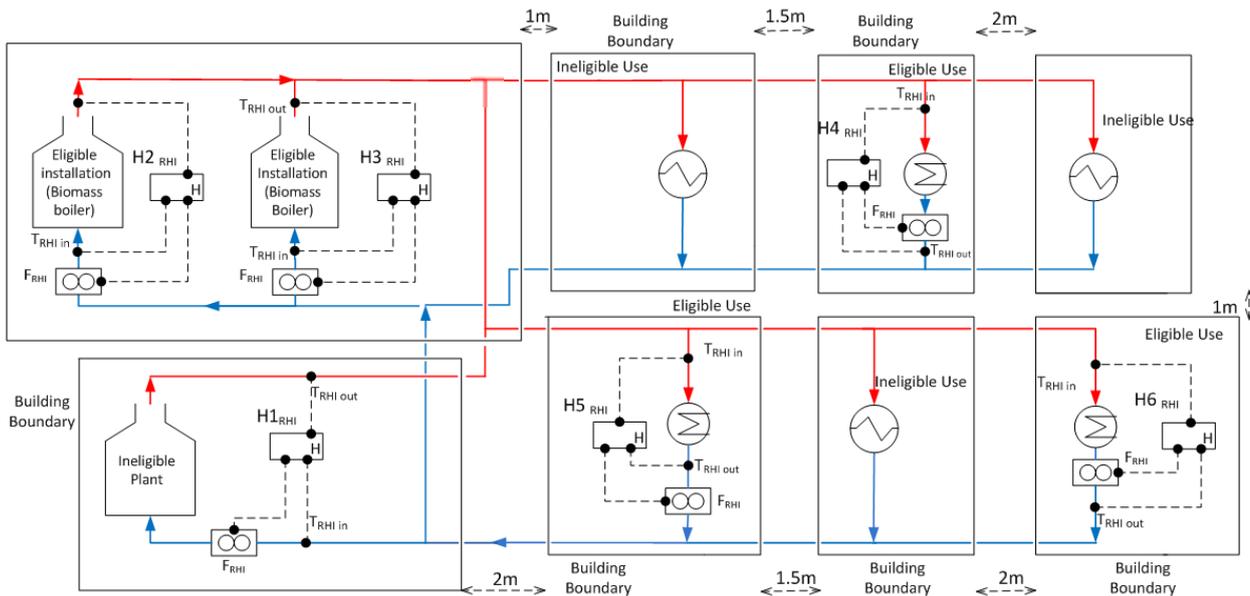


Details:

<p>Number of quantities to be measured?</p>	<p>The ineligible heat generation plant (gas-fired boiler) and heat loss from external piping (see associated reasons above) means that one quantity alone cannot be measured to determine the EHO. Instead 3 quantities will need to be measured.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The meters should be positioned as shown in schematic to measure the following three quantities (<i>NB a heat loss calculation will also need to be performed to calculate the 'quarterly heat loss figure' (QHLF) from the external piping</i>):</p> <p>(1) the heat generated by the eligible plant (Meter H1);</p> <p>(2) the heat generated by the ineligible plant (Meter H2); and</p> <p>(3) the heat used for eligible purposes [(Meter H1 + Meter H2) – QHLF] (<i>QHLF calculated using a heat loss calculation</i>).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having a 'multiple' metering arrangement for RHI payment purposes because more than one quantity needs to be measured to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x heat used for eligible purposes x (heat generated by eligible installation/total heat generated)</p> $\text{Biomass tariff} \times (H1_{RHI} + H2_{RHI} - QHLF) \times \frac{H1_{RHI}}{H1_{RHI} + H2_{RHI}}$ <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example D.5:

- Two biomass boilers (eligible generation) are located in a standalone building. A supplementary back-up gas fired boiler (ineligible generation) is contained within a separate building
- Combined they supply hot water to three standalone buildings for space heating purposes (eligible uses) and also to three ineligible uses.



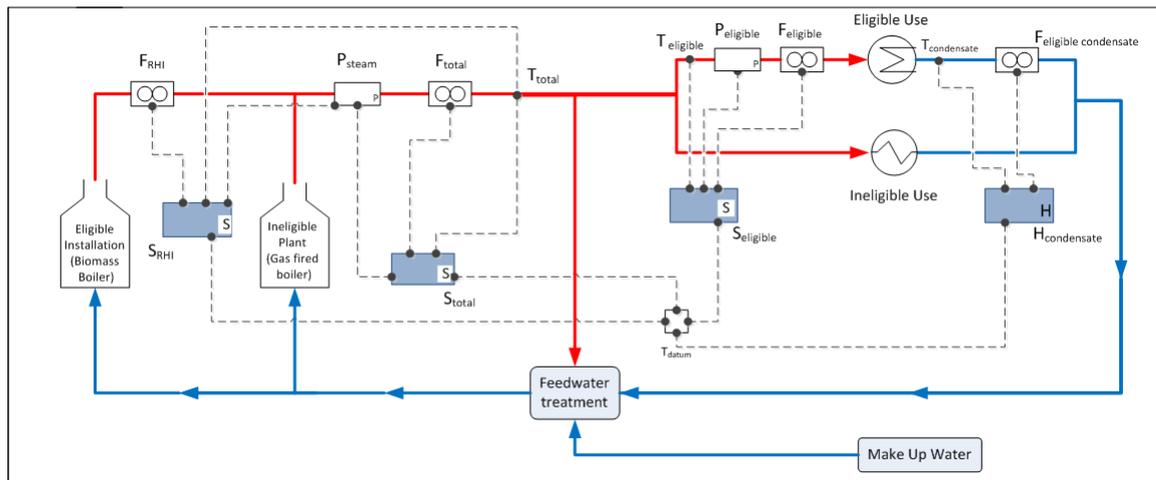
Details:

<p>Number of quantities to be measured?</p>	<p>In this example, because there are multiple buildings using external piping with a combination of eligible and ineligible heat generating plant feeding a combination of eligible and ineligible heat uses, 3 quantities will need to be measured as detailed below.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The meters (x 6) should be positioned as shown in schematic to measure:</p> <ul style="list-style-type: none"> (1) the heat generated by the 2 eligible biomass boilers (H2RHI and H3RHI); (2) the heat generated by the ineligible gas fired boiler (H1RHI); and (3) the heat used for eligible purposes (H4RHI, H5RHI and H6RHI) <p>This positioning allows the 3 quantities described above to be measured.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation uses 'multiple' metering for RHI payment purposes because more than one quantity needs to be measured to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x heat used for eligible purposes x (heat generated by eligible installation/ total heat generated)</p> $\text{Biomass tariff} \times (H4RHI + H5RHI + H6RHI) \times \frac{H2RHI + H3RHI}{H1RHI + H2RHI + H3RHI}$ <p>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</p>

Example D.6:

- A biomass boiler (eligible generation) plus a supplementary back-up gas fired boiler (ineligible generation) supplies heat to an eligible and an ineligible heat use.
- The heat uses are located within the same building as both the eligible and ineligible heat generating plant.

The heating is supplied via steam as a medium. The condensate from the eligible heat use is returned in the form of hot water; therefore the heat in the condensate must be subtracted from the heat in the eligible steam input.



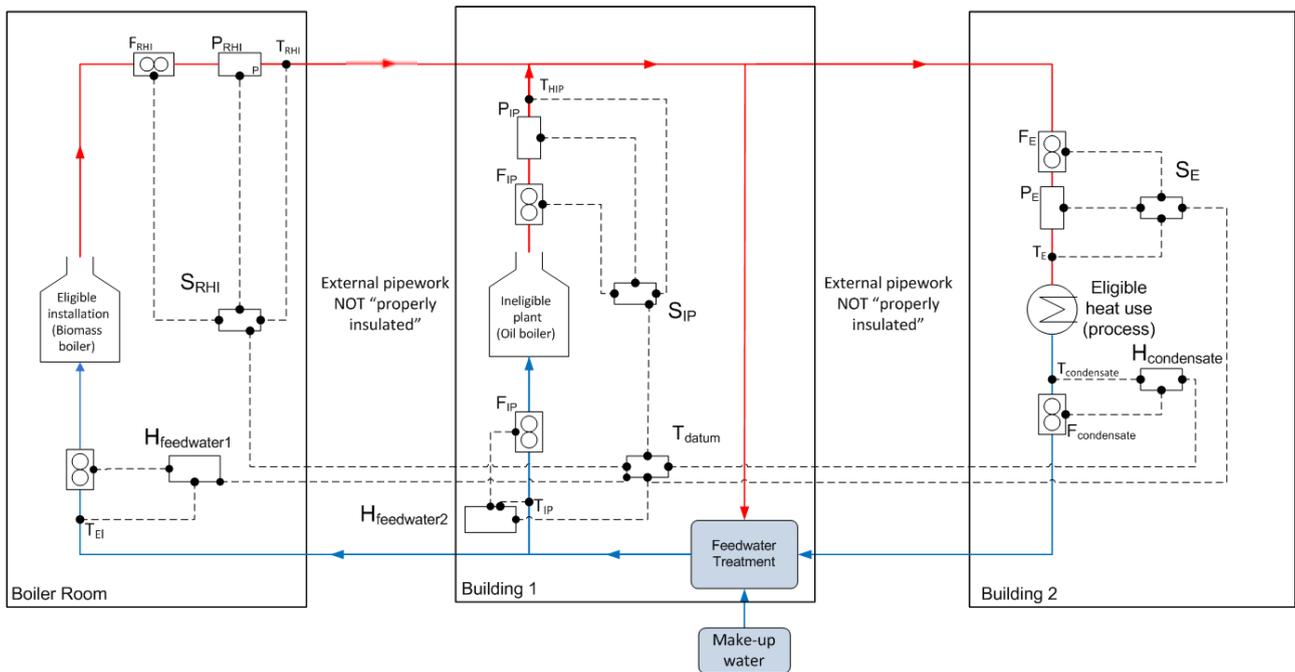
Building boundary

Details:

<p>Number of quantities to be measured?</p>	<p>In this example, because there is both an ineligible heat generation plant (gas-fired boiler), ineligible heat uses (including the condensate returned to the boiler in the form of hot water) 3 quantities will need to be measured using 3 steam meters and 1 heat meter to determine the EHO.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>The steam measuring equipment and heat meters should be positioned as shown in the schematic to measure:</p> <ol style="list-style-type: none"> (1) the heat generated by the eligible heat generation plant (biomass boiler) using steam measuring equipment (Steam Meter 'SRHI'); (2) the TOTAL heat generated by both eligible & ineligible plant using steam measuring equipment (Steam Meter 'STotal'); (3) the heat used for eligible purposes using steam measuring equipment (Steam Meter 'SEligible'); and (4) the ineligible heat energy contained in the condensate returned from the process using a heat meter ('HCond'). <p>This positioning allows the 3 quantities required for the payment formula to be calculated (see below).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having 'multiple' metering for RHI payment purposes because more than one quantity needs to be measured for RHI payment purposes to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x heat used for eligible purposes x (heat generated by eligible installation/ total heat generated)</p> $\text{Biomass tariff} \times (\text{SElig} - \text{HCond}) \times \frac{\text{SRHI}}{\text{STotal}}$ <p><i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</i></p>

Example D.7:

- A biomass boiler (eligible heat generation) plus an back-up oil boiler (ineligible heat generation)
- Carrying out a process (heat used for eligible purposes) via steam medium
- Heat generation (eligible and ineligible) and heat uses are located in different buildings



Details:

<p>Number of quantities to be measured?</p>	<p>Due to the fact that there are both eligible and ineligible heat generation plants and an ineligible use (external pipeworks non-properly insulated) and an eligible use, a minimum of 3 quantities will need to be measured to enable the EHO (Eligible Heat Output) to be calculated.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>For the purpose of this example, the meters should be positioned as shown in the schematic to measure: (1) the heat generated by the eligible heat generation plant (SRHI); (2) the heat generated by the ineligible plant (S IP); (3) the heat used for eligible purposes (SE); (4) the condensate returned from the process (Hcondensate).</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as having a 'MULTIPLE' metering arrangement because more than one quantity needs to be measured for RHI payment purposes to enable the RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Multiple RHI Payment Formula 3: Biomass Tariff x heat used for eligible purposes x (heat generated by eligible installation /total heat generated)</p> $\text{Biomass tariff} \times (S_E - H_{\text{condensate}}) \times \frac{(S_{\text{RHI}} - H_{\text{feedwater1}})}{(S_{\text{RHI}} - H_{\text{feedwater1}}) + (S_{\text{IP}} - H_{\text{feedwater2}})}$ <p>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments for more details.</p>

8. Section E

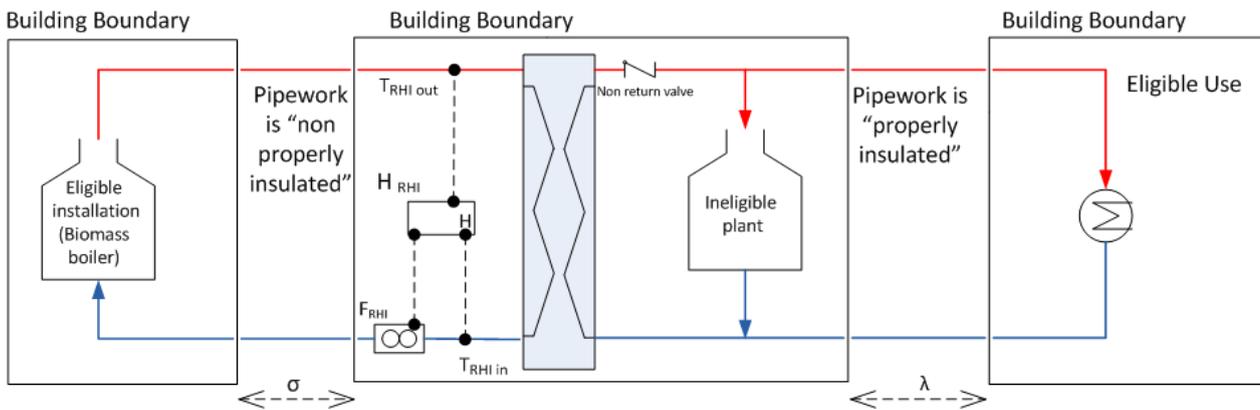
Where the eligible installation uses a back-up ineligible plant that could be considered decentralised or isolated from the heating system

8.1. These worked examples relate to heating systems where the eligible installations uses back-up ineligible heat generating plant that could be considered **decentralised** or **isolated** from the heating system. Not every schematic in this section will be relevant for your exact circumstances. Please find the most relevant examples based on the descriptions below:

- Example E.1: Where the eligible installation uses an ineligible back-up boiler class as decentralised from the heating system to feed an eligible heat use in a single building.
- Example E.2: Where the eligible installation uses an ineligible back-up boiler heat generated by eligible installation classed as isolated from the heating system to feed an eligible heat use in a single building.
- Example E.3: Where the eligible installation and an ineligible plant classed as isolated from the heating system feed an eligible and ineligible heat use in a single building. Heat loss cannot be disregarded.

Example E.1:

- A biomass boiler (eligible generation), housed in a stand-alone boiler house, supplies hot water for space heating to two further standalone buildings (eligible uses).
- In one building there is an additional decentralised back-up fossil fuel boiler (ineligible generation) providing supplementary hot water to the heating system in the separate building. The back-up fossil fuel boiler is installed in such a way that remains decentralised from the heating system.
- This system uses external piping to transport the hot water between the three buildings.
- σ is non properly insulated OR $>10\text{m}$ with losses $>3\%$
- λ is $<10\text{m}$ and properly insulated OR λ is $>10\text{m}$ and heat loss $<3\%$ of the total annual average heat output and can therefore be disregarded.

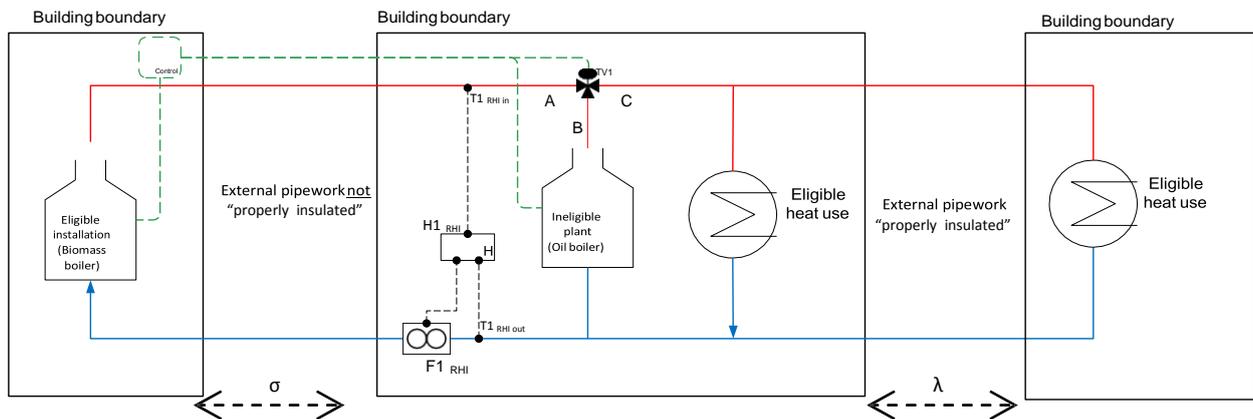


Details:

Number of quantities to be measured?	One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated.
Which quantity or quantities need to be measured?	To calculate the EHO a minimum of one meter is required which should be placed after the ineligible heat use (the non properly insulated pipe, σ). The meter cannot be placed where the heat is used for eligible purposes because it is in a separate building and additionally in one of the buildings there is a decentralised ineligible heat generating plant feeding into the system.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation uses ' standard ' metering for RHI payment purposes because only one quantity needs to be measured to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments' for more details.</i>

Example E.2:

- A biomass boiler (eligible generation), housed in a 'stand-alone' boiler house, supplies hot water for space heating to two further standalone buildings (eligible uses).
- In one building there is an additional a back-up fossil fuel boiler (ineligible generation) providing supplementary hot water to the heating system in the separate building. The back-up fossil fuel boiler is controlled in such a way that will not operate simultaneously at any time with the eligible installation (biomass boiler). Therefore it will not be possible for both boilers to provide heat at the same time to the where the heat is used for eligible purposes.
- This system uses external piping to transport the hot water between the three buildings.
- σ is non properly insulated OR $>10m$ with losses $>3\%$.
- λ is $<10m$ and properly insulated OR λ is $>10m$ and heat loss $<3\%$ of the total annual average heat output and can therefore be disregarded.



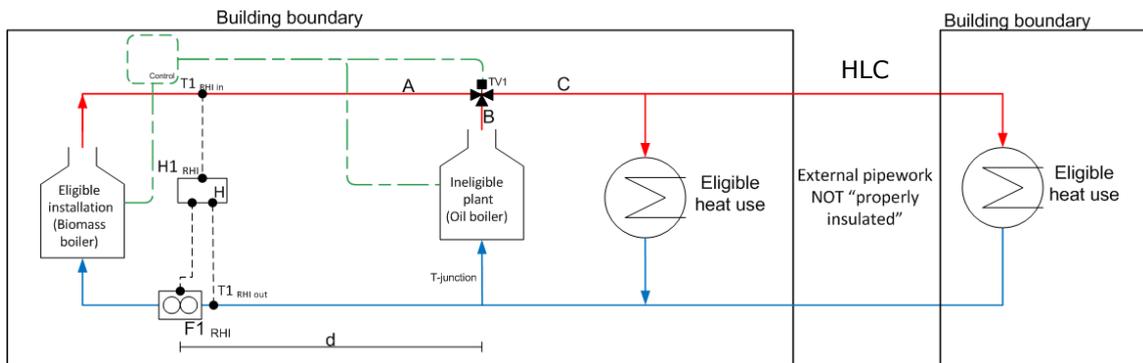
Details:

Number of quantities to be measured?	One heat meter (HRHI) is required to measure one quantity to enable the EHO (eligible heat output) to be calculated.
Which quantity or quantities need to be measured?	To calculate the EHO a minimum of one meter is required which should be placed after the ineligible heat use (the non properly insulated pipe, σ). The meter cannot be placed at where the heat is used for eligible purposes because it is in a separate building and additionally in one of the buildings there is a decentralised ineligible heat generating plant feeding into the system.
Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i>	This installation uses ' standard ' metering for RHI payment purposes because only one quantity needs to be measured to enable the quarterly RHI payment to be calculated.
Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]	Standard RHI Payment Formula 1: Biomass Tariff x HRHI <i>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments' for more details.</i>

Example E.3:

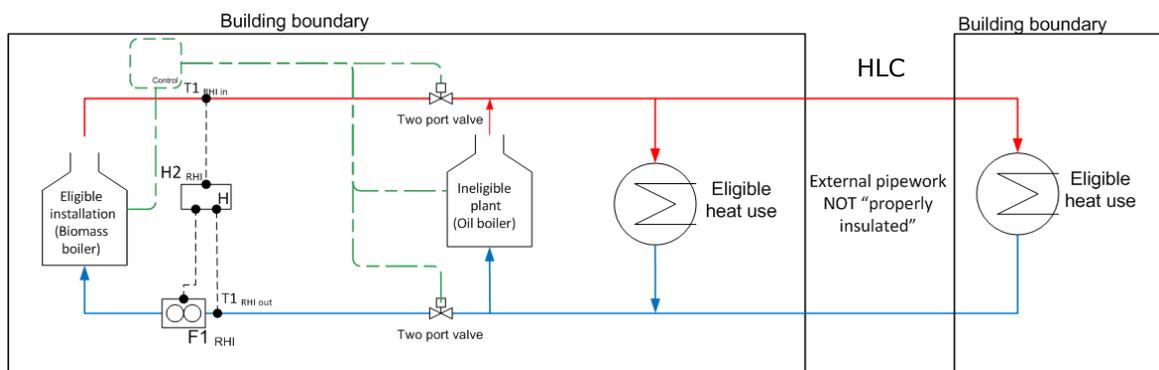
- A stand-alone boiler house contains a biomass boiler and an ineligible oil boiler. These supply hot water for space heating within the boiler house, as well as a separate building via external pipework.
- The back-up boiler is operated by a control system, such that it may only operate if the biomass boiler is not operating.
- Schematic E.3(a) shows a control system arrangement with a three port diverter valve (TV1) in the flow pipe. This is operated so that if the biomass boiler is operating, water will flow from pipe-run A to pipe-run C only, the ineligible plant remains off. Should the back-up boiler be operating (and so the biomass boiler not operating) TV1 will be set so that water will flow from pipe-run B to pipe-run C only. The ineligible plant will operate for back up purposes only, and not for topping up the heat from the eligible plant.
- The flow meter 'F1_{RHI}' is located distance 'd' from the T-junction between the return pipes to the oil boiler and the heat exchanger. This means 'd' is no shorter than the minimum distance from a junction as specified by the flow meter manufacturer.

Schematic E.3(a)



- Schematic E.3(b) shows a similar arrangement. During operation of the biomass boiler, the oil boiler cannot operate, and the two port valves are open. Should the back-up boiler be operating (and so the biomass boiler not operating) the two port valves will close.

Schematic E.3(b)



- Both systems use external piping to transport the hot water between the two buildings. None of the external piping is properly insulated and therefore none of the associated heat loss can be disregarded. A heat loss calculation will need to be presented and accepted so that this heat loss can be deducted from RHI payments.

Details:

<p>Number of quantities to be measured?</p>	<p>In this example, because there is a combination of eligible and ineligible generation and external pipework, 1 meter and a heat loss calculation are required. Note that heat generated by the ineligible oil boiler may be disregarded as sufficient controls are in place to ensure it does not contribute to any RHI relevant meter and, when operating, maybe considered a separate 'heating system'.</p>
<p>Which quantity or quantities need to be measured?</p>	<p>To calculate the EHO one meter is required which should be placed at the eligible installation to calculate the heat generated by eligible installation, heat loss calculations will then need to be deducted from this generation. The meter cannot be placed at the eligible heat uses because they are in separate buildings and additionally in one of the buildings there is an isolated heat generating plant feeding into the system.</p>
<p>Does the heating system use 'STANDARD' OR 'MULTIPLE' metering arrangements? <i>(this is based on the number of quantities being measured)</i></p>	<p>This installation is classed as 'multiple' for RHI payment purposes because 2 quantities need to be measured to enable the quarterly RHI payment to be calculated.</p>
<p>Calculating the RHI payment: [RHI Payment = Technology Tariff x EHO (eligible heat output)]</p>	<p>Standard RHI Payment Formula 3:</p> $\text{Biomass Tariff} \times (\text{H1 RHI} - \text{HLC}) \times \frac{\text{H1RHI}}{\text{H1RHI}}$ <p>See Guidance Volume 2, Chapter 5 'Tariffs & Periodic Support Payments' for more details.</p>