

# Renewable Heat Incentive – Emission Limits For Total Particulate Matter and Oxides of Nitrogen

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# Introduction

1.1 On 10 March 2011 the Government announced the detail of the [Renewable Heat Incentive](#) (RHI). Page 50 contained the following text on air quality:

The most significant air quality impacts are expected to come from particulate matter (PM10) and oxides of nitrogen (NOx) emissions from the combustion of biomass. Therefore, we will work with Defra and the relevant Devolved Administrations to introduce emissions limits of 30 g/GJ<sup>1</sup> for particulate matter and 150 g/GJ for NOx.

However, as this is a technically complex area we feel it is right to work with stakeholders to establish the most appropriate way of enforcing and administering emissions limits. Therefore, we will be introducing these limits for RHI biomass installations below 20MWth in the next set of RHI regulations in 2012 so that we develop the best possible long term solution and allow industry to get their products appropriately tested.

2.1 This paper sets out the mechanism for ensuring that RHI financial support is only given to biomass boilers capable of complying with these emission limits.

## Overall approach

3.1 Ofgem will be responsible for approving all installations for RHI funding. From phase 2 of the RHI (expected to begin in October 2012), for biomass boilers <20MW one of the criteria for obtaining approval will be that the appliance has a certificate from a test house accredited<sup>2</sup> in accordance with ISO 17025 for the required tests. The certificate must show that the boiler can comply with emissions limits of 30 g/GJ net for total particulate matter (PM) and 150 g/GJ net for NOx – henceforth referred to as an “RHI emissions certificate” (“RHI-ec”). All tests must be done using a biomass test fuel or fuels appropriate to the advertised usage of the product. Where a boiler may be operated with a broad range of fuels, the test fuels must represent the extremes of potential fuel use (eg that the PM limit can be complied with if a fuel with a high proportion of fine material could be used).

4.1 Manufacturers and suppliers of smaller boilers will be able to obtain an RHI-ec for a boiler type (see also paragraphs 11.1 and 11.2). Where a series of boilers ≤5MWth output has the same design (as defined in paragraph 11.2) and individual boilers only differ in the way they may be installed at different sites, these will also be eligible for type certification. For larger boilers with individual design characteristics and all those >5MWth output, the RHI-ec will be supplied by the test house based on testing carried out when commissioning the plant.

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<sup>1</sup> grams pollutant per GigaJoule net thermal input

<sup>2</sup> by a member of the European co-operation for Accreditation, or International Accreditation Forum Multilateral Recognition Agreement

4.2 There could also be cases where a type or same design of boiler can only comply with the 30/150 emission limits when fitted with abatement equipment. The same principles will apply in these cases, ie that an RHI-ec can be obtained for any specific combination of a particular boiler with a particular type and design of abatement plant; and in other cases, compliance to obtain an RHI-ec will need to be demonstrated by on-site testing. These latter cases could include existing boilers which are retrofitted with abatement equipment in order to secure RHI eligibility<sup>3</sup>.

4.3 If applicable, a current environmental permit for the particular boiler installation<sup>4</sup> will be an acceptable alternative.

## The detail

5.1 **Test procedures.** For smaller appliances (nominal heat output  $\leq 300\text{kW}$ <sup>5</sup>), different test procedures are specified in different countries at present. In future, the UK would like to see these being reconciled into a single, agreed methodology or, failing that, to devise a UK methodology for use in connection with the RHI and will be taking steps to achieve this. Pending this, non-harmonised standard EN303-5<sup>6</sup> provides a framework<sup>7</sup>. It is recognised that results from the different emission test methodologies applied under EN303-5 can produce significantly different results. However, it is the Government's view that all boilers tested to meet the 30/150 emission limits by any of the methodologies will be of a good quality such as will ensure that PM and NOx limits achieved are very substantially better than those secured under the Clean Air Act fireplace exemption arrangements.

6.1 For larger appliances (nominal heat output  $>300\text{kW}$ ) to which EN303-5 does not apply, and for any smaller "bespoke" appliances designed for the particular facility, commissioning tests should be undertaken in accordance with the following measurement standards in order to demonstrate compliance with the 30/150 emission limits:

NOx	- EN 14792:2005 <sup>8</sup>
PM	- EN 13284-1:2002 <sup>9</sup> or ISO 9096:2003 <sup>10</sup> .

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<sup>3</sup> NB this paragraph only applies to existing boilers which come within the scope of the RHI scheme, ie those that were new on or after 15 July 2009

<sup>4</sup> issued by a regulator for a Schedule 1 installation under the Environmental Permitting Regulations

<sup>5</sup> if, as expected, EN 303-5 is extended to cover appliances up to 500kW, 'smaller appliances' should be taken to mean those  $<500\text{kW}$  from the date the revision of EN 303-5 comes into force

<sup>6</sup> Heating boilers. Heating boilers with forced draught burners. Heating boilers for solid fuels, hand and automatically fired, nominal heat output of up to 300 kW. Terminology, requirements, testing and marking. Includes Annex A.

<sup>7</sup> for manually-stoked natural draught appliances, the EN303-5 testing must include measurement of condensable particulate matter for manual stoking, batch operating boilers because of their potential for significant emissions of these condensable PMs

<sup>8</sup> Determination of mass concentration of nitrogen oxides (reference method : Chemiluminescence)

<sup>9</sup> or method certified to be equivalent to EN 13284-1:2002 by a test house accredited to ISO 17025 for PM measurements to EN13284-1. The same equivalence certification approach may also be used in relation to EN 14792:2005 and ISO 9096:2003 provided that the test house is accredited under ISO 17025 for measurements to these standards for (respectively) NOx and PM

<sup>10</sup> Stationary source emissions – Manual Determination of mass concentration of particulate matter

6.2 The results shall be an average of a minimum of three PM tests each of at least thirty minute duration and the average NO<sub>x</sub> measurement determined from continuous measurements undertaken throughout the PM measurement period.

6.3 As regards testing output for the purposes of determining compliance with the 30/150 emission limits, if the test house is not specifically accredited for some aspects of output testing, it will be acceptable to submit an RHI-ec on the basis of unaccredited output testing until October 2013.

7.1 Any future change to the test methodology will not invalidate an approval given by Ofgem prior to the point of change.

8.1 **Test house certification.** Subject to paragraph 10.3, RHI emissions certificates will only be accepted from a test house accredited in accordance with ISO 17025<sup>11</sup> and the national requirements of the country in which it is located for the required tests. Thus, for example, the only UK test houses able to issue RHI-ecs will be those accredited by UKAS under ISO 17025 for measuring concentrations of total particulate matter and oxides of nitrogen; whilst in Germany the accrediting body will be DAkkS.

9.1 RHI-ecs must be in English or be accompanied by an appropriate translation, and must contain the following:

- a) the name of the test house and its official logo
- b) the organisation with which the test house was accredited at the time of testing, or by no later than 1 October 2012, in accordance with ISO 17025 for the required tests, and the accreditation number
- c) the name, model, manufacturer and output of the appliance(s) tested, and of any other appliance in the same 'family' judged by the test house (in accordance with this note) to have equivalent emissions without individual testing; and a statement whether or not this is a manually stoked, natural draught boiler (that is without a fan providing forced or induced draught)
- d) the test fuel(s) used, as defined by EN303-5 or EN14961 as appropriate, and, based on these tests, the range of fuels which can be used in compliance with the emission limits for particulate matter and oxides of nitrogen in paragraph h). The list of compliant fuels must be described using the classification in EN14961
- e) a statement that tests were conducted:
  - for smaller appliances to EN303-5 (including measurement of condensable PM in cases specified by footnote 5);
  - for larger appliances to EN 14792:2005 **and** either EN 13284-1:2002 or ISO 9096:2003, with the duration and averaging of test results in accordance with paragraph 6.2 .
- f) a declaration that the product tested was a production sample and is fully representative of the current production
- g) a declaration that the appliance was tested at ≥85% of its rated output
- h) a declaration that those tests showed that emissions were no greater than 30g/GJ total particulate matter and 150g/GJ oxides of nitrogen
- i) the actual measured emissions of total particulate matter and oxides of nitrogen
- j) the name and signature of the person authorised to issue the certificate
- k) the date of issue of the certificate

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<sup>11</sup> General requirements for the competence of testing and calibration laboratories

l) a certificate reference number for quoting in any correspondence.

9.2 This information will either be produced as a result of type approval testing, or as a result of testing when commissioning a 'bespoke' appliance.

9.3 For type-approved appliances, an RHI-ec can be a standard document which could, for example, be published on the website of a test house or be included in the material provided to installers with each boiler.

10.1 Where an appliance has been tested prior to October 2012 in accordance with paragraphs 5.1 and 6.1-3 above, and the information listed in paragraph 9.1 can be supplied without further testing, it will be acceptable to provide an RHI-ec based on those existing tests.

10.2 It will similarly be acceptable where any tests undertaken prior to October 2012 were conducted by a test house which was not at the time accredited in accordance with ISO 17025, but by 1 October 2012 was accredited to that standard.

11.1 **'Families' or 'ranges' of appliance.** Smaller appliances are often manufactured in families, with the same design being available in different sizes. In these cases, it will not be necessary to undertake separate testing of every appliance in the family. As per paragraph 9c), the responsibility will rest with the accredited test house to specify whether the tests undertaken on appliance A1 are applicable to A2 or perhaps A3 in accordance with the following provision in EN303-5:

"For boilers in a product range which has the same constructional design it is sufficient to test only the smallest and largest boiler provided the ratio of the nominal heat output of the smallest to largest boiler is less than or equal to 2:1. If, however, within the same product range, this range is larger than 2:1 then so many intermediate sizes shall be tested that the ratio of 2:1 is not exceeded."

11.2 Some larger boilers may also be eligible for type certification, where a series of boilers has the same design and the individual boilers only differ in the way they may be installed in different sites. By "same design" the following characteristics need to be equivalent, and this needs to be specified in the RHI-ec under item c) of paragraph 9.1: steam/hot water boiler, rated output, fuel, grate type, emission abatement equipment, and the dimensions of the furnace and heat exchange. For these cases, the 2:1 ratio for smaller boilers applies, but in addition, appliances must be separately tested if their output is >500kW different to the tested boiler.

**12.1 Installation, maintenance and fuels.** Proper installation and maintenance in accordance with manufacturers' instructions, using properly qualified installers and servicing personnel, and using only the fuels with which the testing was undertaken, are important for continuing to comply with the certificated emission limits. They are equally important in relation to achieving the benefits of the RHI, which is why Ofgem have systems in place to address this. These systems will suffice for emissions purposes as well.

13.1 **Certificates to be provided to Ofgem.** An RHI-ec for the appliance in question must be submitted to Ofgem with every RHI application for a biomass boiler <20MW. A copy of the RHI-ec may however be used. In accordance with paragraph 4.3, an environmental permit

may be submitted in place of an RHI-ec. Fraud will have been committed if, for the purposes of securing RHI funding or marketing a product as eligible for such funding, any person

- produces or knowingly submits a certificate or permit which has been falsely created, or
- submits a certificate or permit that does not apply to the appliance for which approval is sought, or
- otherwise produces or submits a certificate or permit that is false, misleading or a forgery or is in a form likely or intended to deceive.

14.1 **Ofgem role.** Ofgem's role will be to check that an application is accompanied by a valid certificate which contains the information set out in paragraph 9.1 or a valid environmental permit.

15.1 **List of certificated appliances.** A list of all type-approved certificated appliances will be held and published in their website by HETAS for convenience. But Ofgem approval will be solely based on whether or not an individual application is accompanied by a copy of an appropriately-completed, valid certificate or environmental permit.

## Queries

16.1 All queries relating to Ofgem approval procedures should be directed to [Ofgem]. All queries relating to certification of appliances should be directed to [Defra].

## Clean Air Act 1993

17.1 Consideration will be given in future to whether arrangements should be introduced whereby any appliance which is the subject of an RHI-ec is an exempted fireplace for the purposes of section 21 of the Clean Air Act 1993. A significant factor will be the extent to which testing for RHI-ec purposes will reliably demonstrate compliance with the standards used to determine suitability for exemption under the 1993 Act.

## Planning

18.1 Nothing in this paper precludes the setting of tighter emission limits or requirements under planning legislation.

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