

Strategy for the audit of Renewable Heat Incentive (RHI) installations

This paper sets out the means by which Ofgem will fulfil its responsibility to audit accredited RHI installations to ensure compliance within the Renewable Heat Incentive Scheme.	Author	Ade Obaye
	Audience	Audit Committee
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1. Introduction

- 1.1 Ofgem is responsible for administering the Government’s Renewable Heat Incentive scheme (RHI).
- 1.2 Plants will be accredited for the RHI based on information and declarations/statements provided by their owners. Participants will be required to submit annual declarations confirming that they continue to fulfil RHI eligibility criteria and obligations. RHI support payments are calculated by multiplying the appropriate tariff (depending on the technology and type and size of the installation) by the eligible heat use. The eligible heat use will be the actual metered amount and will be submitted to Ofgem by the participant on a monthly basis.
- 1.3 It is projected that up to £850million will be paid out under the RHI scheme by 2015. With a scheme of this size it is important that measures are put in place to protect available funds from fraud and ensure that payments are only made to those that are entitled. An on-going cycle of RHI installation audits is a key tool in ensuring this. The tables show the projected uptake of the scheme (installation numbers) and the projected subsidy amounts that will be paid out up to 2015.

Table 1: Projected RHI uptake

RHI Uptake				
Installation size	2011/12	2012/13	2013/14	2014/15
Large	110	175	239	304
Medium	1862	5068	9962	17183
Small	1769	15940	36812	76552
Total Cumulative	3,741	21,183	47,013	94,039
Total New	3,741	17,441	29,572	64,467

Table 2: Projected RHI subsidy values

RHI subsidy value				
Installation size	2011/12	2012/13	2013/14	2014/15
Small	917,062	5,192,765	11,524,688	23,052,563
Medium	4,218,487	23,886,720	53,013,566	106,041,792
large	4,035,075	22,848,167	50,708,629	101,431,279
Total	9,170,625	51,927,652	115,246,883	230,525,634

- 1.4 The purpose of the RHI audit strategy is to ensure that Ofgem has in place a robust and fit for purpose audit regime to monitor participant compliance with RHI eligibility criteria and obligations, detect fraud and non-compliance and act as a deterrent to participants that might be tempted to break the rules of the scheme.

2. The Audit Approach

2.1 Inspections of accredited RHI Installations are permissible under Regulation 50 of the Renewable Heat Incentive Regulations 2011¹ as follows:

The Authority or its authorised agents may request entry at any reasonable hour to inspect an accredited RHI installation and its associated infrastructure to undertake any one or more of the following—

- (a) verify that the participant is complying with all applicable ongoing obligations;
- (b) verify meter readings;
- (c) take samples and remove them from the premises for analysis;
- (d) take photographs, measurements or video or audio recordings;
- (e) ensure that there is no other contravention of these Regulations.

2.2 Ofgem have interpreted "reasonable hour" to mean that site inspections will generally be conducted between 9am - 5pm, Monday - Friday. In order to simplify access and ensure availability of key personnel and data, we will normally give prior notice of inspections. However, there may be occasions when we feel it is appropriate to conduct unannounced site inspections and we reserve the right to do so.

2.3 The overall objective of the audit process is outlined below:

- Check that participant information provided during accreditation is correct and that the installation is entitled to be accredited.
- Confirm on-going compliance with eligibility criterion and obligations.
- Check that meter reading/output volumes/fuel measurement data notified to Ofgem are correct and are such that the right amount of RHI support payments are being made.
- Check plausibility of eligible heat claims given capacity of installations.
[This will be expanded on once the technical specifications of the audit contract are finalised]
- Detect fraud and/or non-compliance with RHI eligibility criteria and obligations, and where appropriate, make recommendations for prevention of future occurrences.

Heat Uses on Third Party Premises

2.4 In some cases, such as district heating, the heat may be used by different parties to the participant with the heating installation. Ofgem intend to include as a condition of accreditation that where heat is supplied to a non-domestic third party the participant

¹ [The Renewable Heat Incentive Regulations 2011](#)

should secure rights from that party for Ofgem to be able to inspect that their heat uses are eligible.

- 2.5 However in domestic premises, served by a district heating system, Ofgem accept that inspection would be considered intrusive for people who are not direct beneficiaries of the scheme. Ofgem recognise that we will not be able to conduct site inspections the premises where the heat use will take place. In these instances, and as an alternative, we can accept and will seek evidence of heat use (such as site plans).

Biomethane production

- 2.6 Production of biomethane for injection into the gas network is treated differently in the RHI regulations. Ofgem is not required to accredit a plant as meeting eligibility criteria, instead we register the person producing the biomethane. In addition Ofgem pay biomethane producers on the basis of the amount of biomethane injected into the grid rather than the amount of heat generated by an installation which is used for eligible purposes. Ofgem do not have site inspection powers for biomethane plant and plan to accept and seek independently and professionally audited evidence on the source of the biomethane, its feedstock composition, measurement of any propane added and the final measurement of the energy content of biomethane injected.

Selection of the audit sample

- 2.7 RHI installations may be subject to audit both at the accreditation stage and throughout the duration of eligibility for incentive payments. In order to make best use of resources and be cost effective, the audit sample will consist of installations targeted due to:

- reasonable concerns raised by staff while processing accreditation applications or monthly output data;
- risk-based selection; and
- by random selection.

- 2.8 Table 1 shows some of the risk-based selection criteria and associated risks.

Table 3: samples of risk criteria for audit sample selection

	Selection criteria	Risk
1.	Potential size of RHI payments (determined by capacity of installation x number of hours it is used for): Large biomass used for 40hrs/wk – 500kW Large biomass used for 84hrs/wk – 250kW Heat pump used for 40hrs/wk – 500kW	Undetected non-compliance could lead to significantly large RHI payments being made for installations that do not meet eligibility criteria.
2.	Non-standard heat pumps	The manufacturer’s COP rating may not be set correctly (and may affect eligibility).
2.	Installations that deliver heat by steam	RHI payments for steam installations are larger as energy contained in steam is greater than that contained in hot water.

3.	<p>Data anomalies and exceptions:</p> <ul style="list-style-type: none"> Declared heat output is inconsistent with the size of the installation Submitted meter readings are the same month on month or are rounded numbers. Submitted meter readings are regularly outside of the tolerance threshold levels within the RHI scheme. Total installation capacity is slightly below tariff thresholds New installations that are replacing old ones and where the declared capacity of new equipment is inconsistent with the previous equipment's capacity 	<p>Participants may deliberately provide false information or place their meters incorrectly leading to higher RHI payments than would have normally been made.</p> <p>Participants may be 'heat dumping' (i.e. purposefully generating more heat than required purely to obtain increased support payments).</p>
4.	Installations with complex metering arrangements and/or schematic diagrams	The more complex the metering arrangements and/or schematic diagrams, the greater the risk of participants making errors when applying for accreditation. There is also a greater risk of not detecting fraud and non-compliance by operational staff.
5.	Biomass boilers	Participants may falsely declare that their installation is a stove with a back boiler when in fact it does not have a back boiler (which would render it ineligible for RHI).
6.	Participant identified as high risk following data-matching/joint working with law enforcement agencies	Risk of infiltration by organised criminal networks/organisations.

[Appendix of all high-risk criteria to follow once the technical specifications of the audit contract are finalised]

Audit sample size

2.9 As part of our work to determine the appropriate sample size for RHI audits, we commissioned Deloitte to investigate the most appropriate methodology for audit sampling based on industry best practice, and to produce data on appropriate sample sizes based on their findings. We have also liaised with colleagues in the Renewables Team to gain knowledge of approximate audit costs.

2.10 Deloitte recommended the Monetary Unit Sampling method for determining the RHI audit sample size. This method is based on the monetary value of RHI support payments and provides a direct relation between the total value of payments and the sample selected. It is also consistent with the method used in financial schemes within public sector organisations.

- 2.11 The method involves consideration of both the
- Confidence level – which is expressed as a percentage, and is a measure of how reliable a statistical result is indicating the probability of the result being correct; and
 - Precision otherwise known as materiality – which represents the maximum estimated error that would be acceptable in the population (in this case calculated as a percentage of the of the total annual support payments and expressed as a monetary amount).
- 2.12 Materiality is a matter of judgement and depends on the level of error that would be considered higher than acceptable. There are auditing guidelines regarding acceptable levels of materiality – financial statements are usually done using materiality of 0.5% whereas some EU grants audits are done using materiality of 2% and there is a range between both. Deloitte have recommended that the RHI materiality level should be within this range.
- 2.13 Taking into consideration the projected RHI payment figures for 2011 – 2015 (calculated based on the overall amount available for the scheme), Deloitte have recommended a sensible level of materiality compared to the size of the payment stream to generate reasonable audit sample sizes based on varying confidence levels. Based on the recommended materiality, specified audit work would be likely to detect errors in excess of £600,000 out of £52million projected to be paid out in 2012 rising to errors in excess of £1.5million out of £231million projected to be paid out in 2014.

Table 4: Materiality levels

	2011/12	2012/13	2013/14	2014/15
Materiality	2.18%	1.16%	0.87%	0.65%
Overall	£200,000	£600,000	£1,000,000	£1,500,000
Small	£64,000	£192,000	£320,000	£480,000
Medium	£110,000	£330,000	£550,000	£825,000
Large	£108,000	£324,000	£540,000	£810,000

*The materiality increases in absolute terms but declines as a percentage of payments over the years

- 2.14 We have asked Deloitte to calculate audit sample sizes using projected subsidy values (Table 2) for three scenarios:
- A uniform 95% confidence level across all installation sizes – meaning that we would be 95% confident that if we inspected the calculated number of installations during a specified period, the RHI scheme would not lose more than the corresponding overall monetary amount shown in Table 4 through fraud and non-compliance.
 - 86% confidence level at the large and small scale and 95% at the medium scale (to reflect the higher risk of bogus installations at the medium (>45kw and <1MW) scale due to the lack of either MCS certification or the requirement to provide a site report during accreditation). This would mean that if we inspected the calculated number of installations, at the small and large scale we would be 86% confident of not losing the corresponding overall monetary amount show in Table 4, but 95% confident regarding the medium scale for the same period.
 - A uniform 86% confidence level across all installation sizes. This would result in Ofgem being 86% confident that if we inspected the calculated number of installations during a specified period, the RHI scheme would not lose more than

the corresponding overall monetary amount shown in Table 4 through fraud and non-compliance.

- In the event that we would want to audit each segment of the audit population separately, Table 4 shows the monetary values if the materiality was applied to the different segments of the population (based on installation sizes). This shows for example that if we were to audit only small-scale installations during 2011, with a materiality level of 2.18%, we would be likely to detect errors in excess of £64,000 of the £917,062 projected subsidy payments at that scale.

2.15 In order to gain an acceptable level of assurance from applying a uniform confidence level of 86% across all technology sizes, we would need to implement additional controls to reduce the risk level at the medium scale. We are currently pursuing options for implementing these controls.

Table 5: Audit sample sizes with segmented confidence levels

Installation size	confidence level	Sample size				percentage of sample
		2011/12	2012/13	2013/14	2014/15	
Small	86%	29	55	73	97	13%
Medium	95%	116	218	290	386	53%
Large	86%	75	142	188	251	34%
Total sample size		220	415	551	734	

Table 6: Audit sample sizes with uniform 95% confidence levels

Installation size	confidence level	Sample size				percentage of sample
		2011/12	2012/13	2013/14	2014/15	
Small	95%	43	82	109	145	16%
Medium	95%	116	218	290	386	43%
Large	95%	113	212	282	376	41%
Total sample size		272	512	681	907	

Table 7: Audit sample sizes with uniform 85% confidence levels

Installation size	confidence level	Sample size				percentage of sample
		2011/12	2012/13	2013/14	2014/15	
Small	86%	29	55	73	97	16%
Medium	86%	77	145	193	258	43%
Large	86%	75	142	188	251	41%
Total sample size		181	342	454	606	

2.16 As an example, the information in the tables above show that for 2012/13, in order for Ofgem to be 95% confident that no more that £330,000 is lost through fraud or non-compliance at the medium scale, we would need to conduct 218 audits of medium installations. In order to gain that a 95% level of assurance that no more than £600,000 is lost in 2012/13 across all scales, we should conduct 512 audits in total.

Level of auditing required

- 2.17 Depending on the size and type of installation, there will be significant differences in the skill set and knowledge base required for audits.
- 2.18 For Smaller/less involved systems, including those classified as 'simple' systems for purposes of metering, we expect that an auditor would typically require the following skills/knowledge:
- Water supply operations
 - energy & mass balances
 - data handling
 - comparing records
 - fluid mechanics
 - thermodynamics
 - understanding of eligible heat use
 - hot water metering
 - meter installation and calibration
- 2.19 For more involved systems, including systems classified as 'complex' systems for purposes of metering, we would expect that an auditor would typically require the same skills/knowledge as for smaller systems and, in addition:
- As for smaller systems; and in addition,
 - steam system operations
 - steam metering
 - biomass / biogas handling
 - statistics (sampling theory; errors & uncertainty)
 - process engineering experience
 - interpreting system schematics
- 2.20 Generally, inspections of installations at the smaller scale are expected to require less comprehensive technical expertise. In order to achieve value for money and best use of resources, majority (80%) of audits at the small scale and 40% at the medium scale will be conducted as desk-based reviews by Ofgem staff. A typical desk-based review would involve some internet research and telephone/written contact with the participant to:
- Ascertain whether information that has been provided for accreditation is correct and that the installation is entitled to be accredited (including requesting that relevant documentary evidence be submitted for review).
 - Confirm installation details against MCS, installer (for installations up to up to 45kWth) and manufacturer records.
 - Check plausibility of eligible heat claims given capacity of installations.
 - Review schematic diagrams, check meter readings/output for consistency or any anomalies.
- 2.21 Small and medium scale installations (including those classed as 'simple'), that are identified due to concerns raised by staff while processing accreditation applications or monthly output data, or selected due to their risk category, will be considered for site visits as part of Ofgem's risk-based approach to detecting fraud and non-compliance.
- 2.22 Larger installations (including those classed as 'complex'), would be subject to site visits. The auditors conducting such visits would need a significantly higher level of

technical expertise and experience (for very large installations and biomass installations in particular for example, a background in chemical or mechanical engineering, chemistry of combustion/fuel science and experience of working on biomass plants would be desirable). A typical large installation site inspection would include:

- Ascertaining whether information that has been provided for accreditation is correct and that the installation is entitled to be accredited (including reviewing relevant documentary evidence)
- Ascertaining whether accurate and reliable fuel measurement data is being submitted to Ofgem (where applicable).
- checking plausibility of eligible heat claims given capacity of installations
- Confirming metering arrangements:
 - that meter readings/output volumes notified to Ofgem are correct and are such that the right amount of RHI support payments are being made quarterly
 - that meter numbers, positions, installation date calibration date, uncertainty are correct
- Confirming that the installation does not have a heat rejection facility or, if it does, that it is appropriately metered (to detect where a participant may be purposefully wasting heat).

2.23 The lists above are not exhaustive and only serve to give an indication of the type of audits that will be required. A more detailed list of audit requirements will be specified in the Audit Invitation To Tender (ITT) as part of the process for procuring audit services (see section 3).

Audit time frames

2.24 All accredited RHI installations and biomethane facilities will be subject to inspection during accreditation/registration and throughout the duration of eligibility for RHI payments. Audits will be conducted throughout the year with new audit 'cycles' commencing each quarter.

2.25 Participants will be able to both apply and be accredited for RHI from September 2011 and we aim to commence the first round of audits from April 2012.

3. Procurement of specialist auditors

3.1. The RHI team (in conjunction with Corporate Procurement), will appoint independent technical auditors to conduct site inspections on its behalf. This approach will ensure that we have the right level of technical expertise available and is also more cost effective and gives greater flexibility than using in-house staff for this function.

3.2. Due to the wide variance in the level of skills, knowledge and technical expertise required to conduct site inspections depending on the size and type of installation/biomethane facility, we realise that any one organisation may not be able to provide the appropriate level of resource across the board. Therefore, we will

allow for the prime contractor to sublet the contract to smaller suppliers where appropriate and will also tender the contract in three lots:

- Small/medium scale inspections – for installations that we expect require a lesser level of technical expertise/knowledge.
- Large-scale inspections – for larger/more complex installations that require a significant level of experience and technical knowledge/expertise.
- Large biomass installation site audits – these will require a specific level of expertise and technical knowledge eg a background in chemical or mechanical engineering, chemistry or combustion/fuel science and experience of working on biomass plants

3.3 This approach has been discussed with the Corporate Procurement Team and was been endorsed by the RHI Procurement Review Group² in March 2011. In order to achieve the widest response and ensure the delivery of value for money, we will approach suppliers under Ofgem’s Technical Consultancy and Economic & Financial Services Procurement Frameworks and the Buying Solutions Procurement Framework. We realise that we may be able to gain economies of scale if we are able to achieve one contract covering all three lots; therefore, suppliers will be able to tender jointly for all three lots.

3.4 The preferred contract option is for a 4-year call-off contract with a yearly option to extend. This option will enable us to achieve Value for money whilst affording us the flexibility to review (and if required, terminate) on an annual basis.

Table 8: proposed procurement timetable

Proposed timetable for the procurement RHI specialist Auditors	
Strategy signed off by RHI Implementation Board	August 2011
Audit Volumes agreed and Strategy presented at Audit Committee	14 September 2011
Pre-Qualification Questionnaire (PQQ) technical input from the RHI Generation Team	September 2011
Draft PQQ and Invitation to Tender (questions/scoring)	November 2011
Pre-Qualification Assessment	December 2011
Issue Invitation to Tender	December 2011
Supplier Presentations	February 2012
Supplier selection and award of contract	March 2012
Commence Audits	April 2012

4. Securing Value for money (VFM)

² Procurement Review Group members: Bob Hull, Matthew Harnack, Gareth Atkins, Liz Hillman, Geoff Hopper and Charles Hargreaves.

- 4.1 Due to constraints on Government resources and the continuing emphasis on cost effectiveness, it is important that Ofgem can demonstrate that the resources we are responsible for are being used appropriately. We will utilise existing framework agreements for the procurement of specialist auditors and will explore any synergies with Environmental Programmes audit regimes to assess any benefits/opportunities that may exist for unifying the audit tendering exercise.
- 4.2 We will attribute a value to the deterrent effect of audits by assessing the quantifiable value in terms of instances of non-compliance and fraud that are detected within the scheme through site inspections. This will be based on the value of potential RHI support payments that would otherwise have been made (based on assumptions on how much fraud is deterred due to audit activity and other fraud prevention measures).

5. Current position

- 5.1 Audit samples sizes have been calculated using estimated RHI support payment projections. Since we have not yet tendered for this service, we are unable to specify the cost impact. The budget currently agreed with DECC for site inspections is as shown below:

Table 9: RHI site inspection budget

	2011/12	2012/13	2013/14	2014/15
Budget	-	£291,000	£422,000	£709,000

- 5.2 Based on estimated audit costs for the Renewable Obligations scheme, and taking into account added complexity and economies of scale, we have assumed the following costs per RHI audit: small scale - £1000, medium scale - £2000, large scale - £3000.
- 5.3 Compared to the audit sample sizes recommended by Deloitte, the currently agreed budget shows a shortfall in the number of site audits that would be conducted as shown in the tables below:

Table 10: Current sample size as a percentage of the recommended sample size*

	2011/12	2012/13	2013/14	2014/15
(A) Current budget sample size	0	148	215	360
(B) Deloitte recommended sample size	220	415	551	734
(A) as a percentage of (B)	0%	35.6%	39%	49%

*using confidence levels of 86% at both small and large scale and 95% at medium scale

Table 11: Current sample size as a percentage of the recommended sample size**

	2011/12	2012/13	2013/14	2014/15
(A) Current budget	0	148	215	360

sample size				
(B) Deloitte recommended sample size	181	342	454	606
(A) as a percentage of (B)	0%	43%	47%	59%

**using a uniform 86% confidence level across all scales

6. Next steps

- 6.1 We are currently considering further controls that may help to mitigate the risk of bogus installations at the medium scale (by requiring participants to upload documentary evidence that their equipment/installation has been installed). We are also in the process of procuring an ID verification system that will enable us to verify the identity of participants and validate the bank account information they provide to us. These measures will have a positive impact on the overall control environment and we may wish to consider if they are sufficient to reduce the confidence level at the medium scale to 86%. Table 9 shows that if we do consider them sufficient, the shortfall between the number of audits allowed for in our budget and the number recommended by Deloitte would reduce.
- 6.2 However, in order to achieve this reduction, we will require additional funding from DECC to implement the necessary controls. The table below shows the estimated additional staff costs that would be required to deal with the extra documentation that would be received.

Table 12: additional staff costs required to review additional documents received.

	2011/12	2012/13	2013/14	2014/15	Total
Additional band A resource	£ 6,302 (0.2 FTE)	£37,762 (1.1 FTE)	£41,086 (1.3 FTE)	£69,524 (2.2 FTE)	£154,674 (4.8 FTE)

- 6.3 It should be noted that even at a uniform 86% confidence level (Table 9), there is still a considerable shortfall between the number of audits allowed for in our budget and the number recommended by Deloitte.
- 6.4 If it considered that the overall control measures we have in place to prevent and detect fraud and non-compliance are not sufficient to mitigate against this shortfall, we should consider requesting additional funding from DECC in order that we are able to meet the recommended figure.
- 6.5 This strategy will be reviewed by Deloitte, as auditors of Ofgem’s internal processes, to give an opinion on its adequacy and effectiveness. Deloitte are due to finalise their report on this by the 2nd of September 2011.
- 6.6 Once agreed, this strategy will be used to help develop Ofgem’s requirement for the Terms of Reference for the outsourced specialist auditors.
- 6.7 This strategy will be reviewed annually to ensure it remains effective.