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RHI Taskforce
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By post and email: richard.rodgers@economy-ni.gov.uk

8 March 2019

Dear Sir

Re: The Independent Public Inquiry into the Non Domestic Renewable Heat Incentive (RHI) Scheme
Provision of a Section 21 Notice requiring the provision of evidence in the form of a further written statement

I am writing to you in my capacity as Solicitor to the Independent Public Inquiry into the Non Domestic Renewable Heat Incentive (RHI) Scheme (known as 'the RHI Inquiry').

I assume that, by reason of your previous interactions with the Inquiry, you remain familiar with the Inquiry's Terms of Reference.

As you may be aware, the Inquiry continues to seek some further written evidence from witnesses and participants. The Inquiry Chairman also retains the right to require witnesses to attend to provide further oral evidence, and consideration will be given to whether that is necessary in light of additional written evidence which is received.

Chairman: **Rt Hon Sir Patrick Coghlin** | Secretary: **Andrew Browne** | Solicitor: **Patrick Butler**

Arising out of its continued investigations and its ongoing consideration of the available evidence, the Inquiry has a number of further questions for you in your capacity as Head of Energy. Please therefore find enclosed with this letter a further Section 21 Notice requiring you to provide, on behalf of DfE, further evidence to the RHI Inquiry Panel in the form of a written statement addressing the matters identified in the Schedule to the said Notice.

As the text of the Section 21 Notice explains, you are required by law to comply with it.

I also remind you, as before, of the Restriction Orders made by the Chairman of the RHI Inquiry, which affect how you may deal with this correspondence and its enclosures (which are also provided to you under a duty of confidentiality to the RHI Inquiry). You may, of course, share this correspondence and the enclosed Notice with your legal representatives and with any relevant servants or agents of DfE (including former servants or agents) but neither you nor they may show, communicate the contents of, or provide this correspondence or the Notice to any other person or organisation without the express permission of the RHI Inquiry. Any breach of this duty of confidentiality is actionable at the suit of the Inquiry Chairman.

Given the tight time-frame within which the RHI Inquiry must operate, the Chairman of the Inquiry would be grateful if you would comply with the requirements of the Section 21 Notice as soon as possible and, in any event, by the date set out for compliance in the Notice itself. The Chairman also requests that, if and insofar as your statement in response to the Notice relies upon information provided to you by other current or former servants or agents of DfE, you make that clear at the relevant points in your said statement.

A copy of this correspondence has also been provided to your legal representative, Laura McPolin, DSO, via email only.

Finally, I would be grateful if you could acknowledge receipt of this correspondence and the enclosed notice by email to Patrick.Butler@rhiinquiry.org.

Please do not hesitate to contact me to discuss any matter arising.

Yours faithfully

A handwritten signature in black ink that reads "Patrick Butler". The signature is written in a cursive style with a long horizontal stroke at the end of the name.

Patrick Butler

Solicitor to the RHI Inquiry

02890408928

SCHEDULE
[No 9 of 2019]

The work of Ricardo in respect of, and related to, RHI installation inspections

1. Provide the Inquiry with a summary table of all inspection findings to date (for example, using categories 'good' through to 'unsatisfactory').
2. Provide a summary of all serious examples of (a) non-compliance, (b) Scheme exploitation, and (c) any other significant concerns.
3. Provide a summary of any actions taken as a result of the RHI installation inspection programme (including, for example, statistics for revocation, suspension, and warning) as well as an estimate of any annual or lifetime Scheme savings that have accrued and/or are anticipated to accrue as a result of such actions.
4. Provide a summary of the findings from inspections of mixed-use installations with respect to the proportion of domestic versus non-domestic usage. Please also describe any actions taken, or proposed to be taken, to ensure that the non-domestic scheme is not exploited by mixed-use installations and any reduction in scheme payments that has resulted, or that is anticipated to result, from such actions.
5. Provide a summary of the findings of the inspection process with respect to the merits and demerits of each of (a) announced inspections and (b) unannounced inspections.
6. Provide a summary of any trends in the number and seriousness of findings when comparing inspections from prioritised installations with those from non-prioritised installations.

The work of Ricardo in respect of, and related to, its 2018 RHI tariff review

7. Provide a summary of evidence of changes in usage and/or of excessive heat production (for example, any changes to overall levels) following the RHI Scheme amendments which took effect in 2017, including a summary of any seasonal patterns and any significant industry/user group trends within these.
8. Provide a comparison of any significant changes in usage and/or of excessive heat production relating to:
 - a. Multiple boiler installations versus single boiler installations;
 - b. boilers with capacities at or near the banding thresholds, e.g. 90-99kW and 180-199kW versus others.
9. Clarify whether there has been any significant change to the cost and IRR analysis published in the Ricardo Tariff Review of 22 May 2018 ('the Tariff Review') and those established by the more recent and detailed RHI installation inspection process. In the event that there has been any significant change, please provide a summary of it.
10. Please provide a reconciliation of Table 1 on page 19 of the DfE 2018 Consultation Document '*The Future of the Northern Ireland Non-Domestic Renewable Heat Incentive Scheme*' ('the 2018 Consultation') and the table in Figure 2.2 on page 5 of the Tariff Review, both of which appear to show a breakdown of the CEPA tariff calculation for a medium biomass boiler.
11. Please explain which annuity factors were used in the tariff analysis calculations (e.g. calculation of the annuitized capital and up-front barrier costs) in each of the Tariff Review and 2018 Consultation and provide details of the reasons why such factors were used. In answering this question, please address the following points in particular:
 - a. Compare the approach taken in the aforementioned documents to the approach originally taken by CEPA, which formed the basis of the tariffs

and related IRRs subsequently approved for State Aid purposes (referenced in note b to Figure 2.2 of the Tariff Review);

- b. Clarify whether the results of the CEPA (on the one side) and the results of each of the Tariff Review and 2018 Consultation (on the other side) are comparable and, in the event that they are not comparable, identify the main differences and explain what the Tariff Review and 2018 Consultation would likely have concluded differently in terms of tariffs and IRRs if the said issues had been approached on the same basis as originally used by CEPA.
12. Provide a breakdown of the percentage of multiple boilers installed by the top ten installers (anonymised if necessary), including, if possible, boiler numbers per installer and total installed capacity per installer.
13. Provide a summary of the time taken to carry out the Tariff Review and summarised what the Tariff Review experience has shown about opportunities to focus, standardise and/or shorten such a process for future reviews, especially any emergency review process.
14. Provide an indication of (a) the resource demands (both 'in-house' and from external consultants) and (b) the actual or estimated cost involved in carrying out the Tariff Review process including details of what the Tariff Review experience has shown about opportunities to focus, standardise and reduce resource requirements and costs for future reviews.
15. In the updated draft of their submission to the Inquiry (**WIT-107833 to 107949**) CEPA makes clear (e.g. at section 4.2 at **WIT-107879 to 107880**) that their projected life-time present costs/values were based upon a population share of the GB budget, calculated with a discount rate of 3.5% and expressed in real terms (2010). Please address the following related issues:
 - a. Clarify whether this the same basis used by Ricardo/DfE for the figures quoted for tariffs, IRRs, and lifetime costs in the Tariff Review and 2018 Consultation (in 2016 money);

- b. (In any event) Please provide comparable figures (stated either in 2010, 2016 or 2019 money, with explicit reference to any discount rates, estimates of inflation, or other assumptions applied) for the following:
- i. Original lifetime budget expectations (from June 2011 and February 2012);
 - ii. Revised lifetime budget expectations in total and for April 2016 onwards only (from December 2015);
 - iii. Current lifetime budget expectations in total and for April 2019 onwards only;
 - iv. Original projected lifetime subsidy costs (from June 2011 and February 2012);
 - v. Projected lifetime costs had there been no interventions in 2017 and 2018;
 - vi. Projected lifetime costs assuming the 2017 and 2018 interventions were to continue (in total and for April 2019 onwards only);
 - vii. Projected lifetime costs assuming the proposed revised tariffs (in total and for April 2019 onwards only);
 - viii. Projected lifetime costs assuming the contingency buy-out option (in total and for April 2019 onwards only).

The Reconnect Programme

16. DfE has provided to the Inquiry an Evaluation Report prepared by KPMG in respect of DETI's 'Reconnect' incentive programme (**DFE-399565 to 399690**). The Inquiry seeks clarification and/or confirmation, from DfE, of the following matters relating to the Reconnect programme:

- a. The total cost of the programme (showing grants, administration, and marketing separately);
- b. The budget(s) for the programme (showing grants, administration and

marketing separately);

- c. The total cost of grants awarded to support renewable heat;
- d. The total cost of grants awarded to support biomass boilers;
- e. The total renewable heat capacity supported;
- f. The total biomass capacity supported;
- g. The average capital cost per kW of biomass capacity;
- h. The average grant support paid per kW of biomass capacity;
- i. The proportion of the total capital cost for (i) renewable heat and (ii) biomass that was, on average, met by grant and met by the householder.

(Please provide all costs in the money value of the KPMG report, in 2010 money and in 2016 money)

NOTE:

It is important for the efficiency of the RHI Inquiry that the issues identified above are addressed as fully as possible and by reference, where available, to the dates and locations of specific incidents to which reference is made. The statement should be broken down into paragraphs, which should be numbered sequentially from '1' to the end. The use of appropriate section headings or sub-headings is also encouraged. A template witness statement is provided with this Notice for your assistance and should be used as the format for your response.



INQUIRY INTO THE RENEWABLE HEAT INCENTIVE SCHEME

RHI REF: Notice 9 of 2019

DATE: 22 March 2019

Witness Statement of: Richard Rodgers

The work of Ricardo in respect of, and related to, RHI installation inspections

1. Provide the Inquiry with a summary table of all inspection findings to date (for example, using categories 'good' through to 'unsatisfactory').

In July 2017, Ricardo Energy & Environment was engaged by the Department for the Economy to complete a pilot exercise of 35 site inspections (Phase 1) of the Non-Domestic Renewable Heat Incentive (RHI) supported installations in Northern Ireland. The purpose of Phase 1 was to develop and test the inspection methodology in advance of the roll-out of a comprehensive programme (Phase 2).

The scope of the inspections broadly covered the following:

- Compliance with the regulations and Scheme guidance;
- Heat usage – eligibility and reasonableness of quantities;
- Projected return on investment;
- Quality of energy efficiency and energy management; and
- Compliance with other regulatory matters: planning regulations, building regulations and water regulations.

Over the period 21 August to 1 December 2017, 35 sites were inspected at which there were a total of 63 separate RHI installations.

Each site inspected was assigned one of four assurance categories, which provides an overall rating for the site.



The table below provides a summary of all inspection findings from the work of Ricardo

| Assurance Category | Sites | Assurance Category Description |
|--------------------|-------|--|
| Good | 0 | No issues found during Inspection. |
| Satisfactory | 6 | Inspection found minor issues or has recommended introduction of best practice |
| Weak | 19 | Inspection found moderate issues of non-compliance. |
| Unsatisfactory | 10 | Inspection found major issues of non-compliance. |

Informed by the work of Ricardo, the Department commenced Phase 2 site inspections in July 2018 which, in the first year, involves undertaking a programme of 250 site inspections and 200 desk inspections by 30 June 2019. Please note that there is not an overall report for Phase 2, rather compliance action is proceeding on a site by site basis as issues are identified.

2. Provide a summary of all serious examples of (a) non-compliance, (b) Scheme exploitation, and (c) any other significant concerns.

The Ricardo Reports for Phase 1 inspections identified a range of potential non-compliance issues and concerns. These, along with an indication of the specific regulation(s) that may have been breached, are as follows:

- Issues with heat measurement such as incorrect installation of heat meter flow and temperature sensors, and faulty meters, which are potential breaches of Regulations 20 and/or 34;
- Incomplete documentation and record keeping as required by Regulation 33 relating to participants' ongoing obligations;



- Erroneous external pipework heat loss assessment (HLA), which may be a breach of regulation 35(4) requiring participants to provide accurate information;
- Undeclared Carbon Trust Loan(s), which may be a contravention of Regulation 35(4), which requires participants to provide accurate information and Regulation 23 which makes installations supported by other public funds ineligible for support within the Scheme;
- Undeclared heat use;
- Excessive heat generation, which could be a breach of Regulation 33(p);
- Use of undeclared or potentially contaminated fuel, which may be in contravention of Regulation 33 requiring the participant to maintain and declare fuel records;
- Questionable validity of claimed commercial heat use from installations that also serve a domestic dwelling, potentially in breach of Regulation 15;
- Ineligible heat generation purpose or excluded plant, possibly in breach of one or more of Regulations 3(2), 12(1)(d) and 15; and
- Potential misrepresentation of an installation's commissioning date, which may be a breach of Regulation 35(4) requiring participants to provide accurate information and Regulation 23 if the installation had not been commissioned at the time of accreditation to the Scheme.

One of the most common causes of non-compliance, relating to nine installations inspected, was the misalignment of heat meter sensors.

Good record keeping was another common issue with the inspected installations. Whilst most participants were in the end able to provide the documentation requested of them, it was clear that very few of them had the records (as specified in the Regulations) collated in a structured manner so that they could easily be provided on request.

For eleven sites (covering 19 installations) the participants were unaware of the maintenance requirements of their heat meters, including recalibration



periods, and had no maintenance plan in place for the heat meters or procedures for dealing with meter failures.

The Ricardo Reports make no reference to examples of potential Scheme exploitation and the Regulations themselves do not refer to exploitation. There were however five cases of suspected excessive heat production, which would be a breach of Regulation 33(p). In these cases, it was not possible for the inspector to reconcile the heat production with its stated purposes, even when allowing for a conservative estimate of potential inefficiencies. In addition, five sites exhibited unexplained usage patterns or falls in heat generation following the April 2017 tariff change.

The Department and Ofgem considers each potential non-compliance on a case by case basis.

3. Provide a summary of any actions taken as a result of the RHI installation inspection programme (including, for example, statistics for revocation, suspension, and warning) as well as an estimate of any annual or lifetime Scheme savings that have accrued and/or are anticipated to accrue as a result of such actions.

During Phase 1 of the RHI installation inspection programme 63 boilers were inspected. While the subsequent compliance investigations were being carried out, payments to 58 of the boilers were temporarily withheld.

Of the 63 boilers subject to an inspection during Phase 1:

- No further action was required following the investigation of 16 of the boilers;
- Investigation of 19 of the boilers resulted in a data submission condition being put in place (e.g. boiler owner now has to submit weekly meter readings);
- Compliance action remains ongoing in respect of 13 boilers which were inspected during Phase 1;
- Following investigations 15 boilers were revoked from the Scheme.



A summary of the investigations which resulted in revocation from the Scheme, along with the estimated lifetime savings based on the April 2017 tariff, is set out in the table below

| Action taken | Number of boilers | Estimated lifetime savings (based on 2017 tariff) | Total recoupment amount requested |
|---|-------------------|---|-----------------------------------|
| Revocation from the scheme and request for recoupment of funds | 8 | £1.4M | £125K |
| Revocation from the scheme and permanent withholding of payments previously on hold | 3 | £386K | N/A |
| Revocation from the scheme | 1 | £61K | N/A |

There were a further three boilers revoked from the Scheme. The participants affected by these revocations requested Statutory Reviews of these decisions. Work in that regard is ongoing.

- 4. Provide a summary of the findings from inspections of mixed-use installations with respect to the proportion of domestic versus non-domestic usage. Please also describe any actions taken, or proposed to be taken, to ensure that the non-domestic scheme is not exploited by mixed-use installations and any reduction in scheme payments that has resulted, or that is anticipated to result, from such actions.**

Eight boilers which were subject to a site inspection in Phase 1 were determined to be domestic and non-domestic mixed-use.

The subsequent actions taken at the eight sites were:

- No action was taken as a result of the split between the domestic and non-domestic use of six of the boilers;
- There was insufficient evidence to confirm that one boiler was non-domestic in nature, this resulted in the boiler being revoked from the



Scheme and a request for the recoupment of funds. The amount requested to be recouped in this case is £6.8K and the estimated lifetime savings (based on the 2017 tariff) is £39.6K; and

- At one site there was insufficient evidence to prove that the use of the heat was for an eligible purpose. The use of heat for ineligible purposes was one amongst a number of factors that led to the boiler being revoked from the scheme and a request for the recoupment of funds. The amount requested to be recouped in this case is £37.5K and the estimated lifetime savings (based on the 2017 tariff) is £169.2K.

Mixed-use non-domestic and domestic cases continue to be considered by the Department on a case by case basis.

5. Provide a summary of the findings of the inspection process with respect to the merits and demerits of each of (a) announced inspections and (b) unannounced inspections.

The Phase 1 Ricardo Inspections report noted that there was no significant difference between the compliance issues identified between the announced and unannounced visits. The report also noted that a programme of announced visits is more efficient to organise and results in higher quality site visits.

The inspections report also recommended that unannounced inspections should normally be undertaken where there is a specific reason to justify why an unannounced visit would be merited, rather than this being part of the general selection of sites. Another observation was that unannounced inspections could require multiple attempts to gain access.

6. Provide a summary of any trends in the number and seriousness of findings when comparing inspections from prioritised installations with those from non-prioritised installations.

Phase 1A inspections were carried out on a non-prioritised basis, Phase 1B inspections were carried out on a prioritised basis. Phase 2 inspections are



being scheduled on a risk basis, with the higher risk sites being inspected first.

| Inspection Rating | Number of sites - Phase 1A | Number of sites - Phase 1B |
|--------------------------|-----------------------------------|-----------------------------------|
| Good | 0 | 0 |
| Satisfactory | 1 | 5 |
| Weak | 12 | 7 |
| Unsatisfactory | 7 | 3 |

Good – there were no inspection reports with this rating.

Satisfactory – recurring trends included a lack of building control confirmation or proper backflow prevention. In Phase 1B different issues that arose were meter maintenance, schematic errors and fuel records not being installation specific.

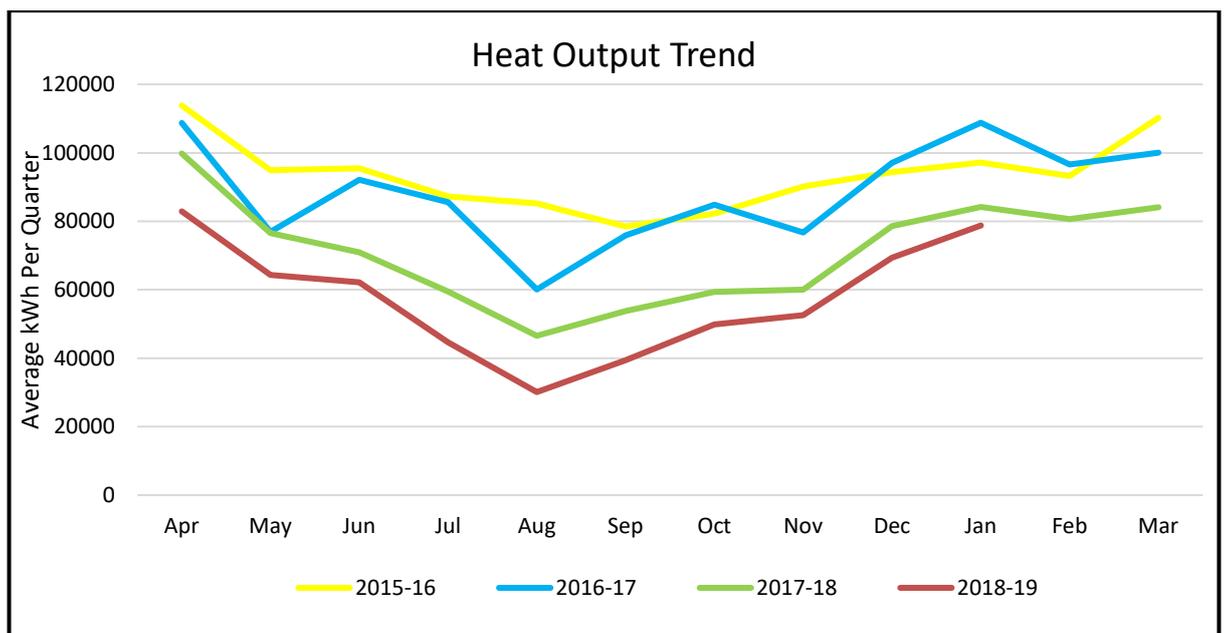
Weak – recurring trends included questions over the level of heat being used, poor record keeping, problems with schematics and heat loss calculations and a lack of building control confirmation or backflow prevention. In Phase 1A specifically, there were problems with the fitting of heat meter flow sensors. In Phase 1B specifically, there were issues with the fuel type used and the non-domestic nature of mixed use sites.

Unsatisfactory – recurring trends included heat being generated solely to increase periodic support payments, problems with meter maintenance and fitting, poor record keeping, problems with schematics, lack of appropriate planning permission and the non-domestic nature of mixed use sites. In Phase 1A specifically, there were problems with commissioning date information supplied. In Phase 1B specifically, there were issues with the receipt of Carbon Trust loans.

The work of Ricardo in respect of, and related to, its 2018 RHI tariff review

7. Provide a summary of evidence of changes in usage and/or of excessive heat production (for example, any changes to overall levels) following the RHI Scheme amendments which took effect in 2017, including a summary of any seasonal patterns and any significant industry/user group trends within these.

Most recent participant analysis shows that there has been a marked reduction in the Eligible Heat Output (EHO) for participants subject to the 2017 tariff change. The graph below shows the Eligible Heat Output trends over recent years and illustrates the significant behavioural impact of the introduction of the 2017 Regulations.



* EHO based on average quarterly output

Analysis of EHO data indicates that the actual year on year reduction from 2016-17 to 2017-18 is approximately 25%.

Further, year on year heat reduction continues to trend lower into 2018-19 with average participant heat usage currently showing an approximate reduction of 19% based upon 2018-19 compared with 2017-18.



Within these same periods participants accredited post-November 15 (unaffected by the 2017 Regulations) have actually marginally increased heat output reflecting the colder winter of 2017-18 compared to the previous year.

In addition, there is now the expected seasonality pattern (that is less heat being produced in the summer) which was much less apparent prior to April 2017.

Tariff Rate Variations

The table below provides a breakdown of the average EHO for each type of solid biomass boiler, during the 2016-17 and 2017-18 financial years, distinguishing between the respective dates of accreditation. These illustrate that for medium solid biomass boilers accredited prior to November 2015 (the most popular on the scheme) the average annual EHO reduced from 360MWh to 250MWh, a reduction of 30.5%. For the equivalent boilers accredited after November 2015, there was a modest average increase from 201MWh to 209MWh.

Average EHO per installation by energy type by accreditation period

| | Eligible Heat Output MWh | |
|---|--------------------------|---------|
| | 2016-17 | 2017-18 |
| Accredited Pre 18 November 2015 | | |
| Small Solid Biomass (0-19kW) | 28 | 21 |
| Medium Solid Biomass (20-99kW) | 360 | 250 |
| Large Solid Biomass (100-999kW) | 1,299 | 1,309 |
| Other | 56 | 59 |
| Accredited Post 18 November 2015 | | |
| Small Solid Biomass (0-19kW) | 18 | 18 |
| Medium Solid Biomass (20-199kW) | 201 | 209 |
| Large Solid Biomass (200-999kW) | 623 | 1,376 |
| Other | 48 | 40 |

These figures are also supported by the data for the average usage and load factors for accredited installations during the 2016-17 and 2017-18 financial years. In 2016-17 medium solid biomass boilers accredited prior to November 2015 operated on average for 3,855 hours (load factor of 44%).



During 2017-18 the average annual usage for the same installations was 2,690 hours (load factor 31%). During the same periods average annual usage for medium solid biomass boilers accredited after November 2015 remained largely unchanged, operating for 1,286 hours in 2016-17 (load factor 15%) compared to 1,326 hours in 2017-18 (load factor 15%). The usage levels for small and large solid biomass boilers were largely unchanged.

Industry Comparison

As illustrated there is a marked reduction in EHO post the 2017 Regulations in the pre-November 2015 ‘medium solid biomass’ installations (360MWh to 250MWh), but an increase year on year (reflecting the colder winter) in ‘large solid biomass’ and in post-November 2015 ‘medium solid biomass’. This indicates that there was likely to have been over-production of heat under the 2012 Regulations (most likely driven by what is often referred to as the ‘perverse incentive’; the incentive paid per kWh was higher than the cost of producing a kWh of heat, for all heat produced). The table below shows that this is most prevalent in the agriculture and forestry & wood sectors.

Average EHO for Medium Biomass Installations by industry group by accreditation period

| | Eligible Heat Output MWh | |
|----------------------------------|--------------------------|---------|
| | 2016-17 | 2017-18 |
| Accredited Pre 18 November 2015 | | |
| Agriculture | 421 | 298 |
| Forestry & Wood | 458 | 226 |
| Other Usage | 251 | 188 |
| Accredited Post 18 November 2015 | | |
| Agriculture | 246 | 255 |
| Forestry & Wood | 150 | 119 |
| Other Usage | 129 | 136 |

Annual Usage Cap 400,000kWh

In addition to a change in tariffs, the 2017 Regulations introduced a total annual usage cap of 400,000kWh, after which support payments would not be made.



Prior to the 2017 Regulations, approximately 40% of installations had an annual usage in excess of this amount. Following the introduction of the 2017 Regulations, for installations where a full yearly data cycle exists, approximately 15% of installations generated heat in excess of the annual cap. This reduction appears to be consistent with some users generating excessive amounts of heat in order to maximise support payments. The fact that a significant number of participants still generate more than the annual cap, even without support payments is also considered consistent with the adequacy of support payments under the 2017 Regulations.

8. Provide a comparison of any significant changes in usage and/or of excessive heat production relating to:

a. Multiple boiler installations versus single boiler installations;

Analysis of the average eligible heat output (EHO) data indicates that the average heat usage per installation, on single installation sites, was 43% lower than those at multiple installation sites in 2016-17 prior to the introduction of the 2017 Regulations. This figure decreased to 36% for the first full financial year under the new Regulations in 2017-18. The relevant energy usage data is summarised in the table below.

Average Eligible Heat Output per medium biomass installation summarised by individual or multiple installation sites

| | Eligible Heat Output MWh | |
|------------------------|--------------------------|---------|
| | 2016-17 | 2017-18 |
| Single Installations | 225 | 180 |
| Multiple Installations | 402 | 280 |
| % Difference | 44% | 36% |

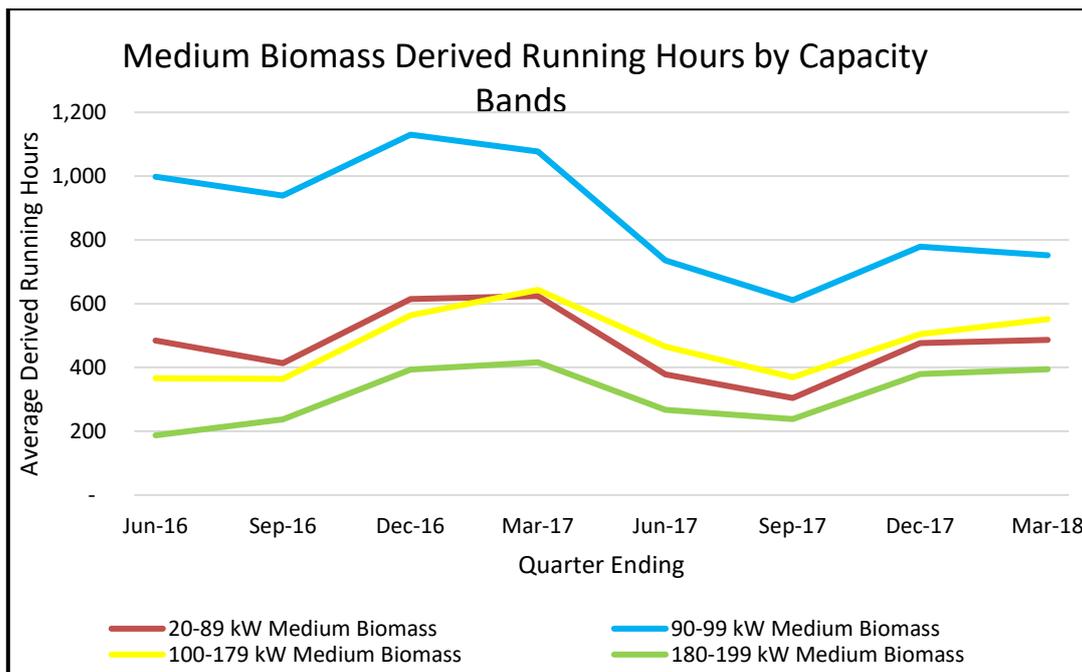
Although at this stage readings for the full year are incomplete, analysis indicates that the average EHO per installation at single install sites compared to those with multiple installs is 34% lower in 2018-19, this is in keeping with the trend shown in 2017-18.

b. Boilers with capacities at or near the banding thresholds, e.g. 90-99kW and 180-199kW versus others.

Behavioural impacts on the introduction of the 2017 Regulations for the 90-99kW installation capacity group show that the average EHO for the 90-99kW boilers has decreased from 409MWh in 2016-17 to 284MWh in 2017-18. This represents a decrease of 31%.

The energy usage of the 180-199kW capacity installations, unaffected by the 2017 Regulations, has remained relatively stable with an average EHO of 245MWh in 2016-17 compared to 254MWh in 2017-18.

These trends are illustrated further in the following graph illustrating derived running hours (at maximum boiler rated output) for the medium biomass capacity bands. Average running hours for the 90-99kW group have shown a decrease from 4,143 hours in 2016-17 (load factor of 47%) to 2,877 hours in 2017-18 (load factor 33%). Running hours for the 180-199kW capacity group have remained largely unchanged in the same period from 1,234 hours in 2016-17 (load factor 14%) to 1,279 hours in 2017-18 (load factor 15%).





9. Clarify whether there has been any significant change to the cost and IRR analysis published in the Ricardo Tariff Review of 22 May 2018 ('the Tariff Review') and those established by the more recent and detailed RHI installation inspection process. In the event that there has been any significant change, please provide a summary of it.

An objective of the Phase 1 inspections was to estimate for each installation/site the actual return on investment, expressed as an Internal Rate of Return (IRR) that would be achieved over the 20-year tariff period. The inspection process therefore included the gathering of actual data from participants on capital, fuel and maintenance costs.

A summary of the economic analysis of the sites inspected by Ricardo during Phase 1 is set out in the table below.

| Internal Rate of Return (IRR) | Number of Installations |
|-------------------------------|-------------------------|
| Less than 20% | 7 |
| 20% to 40% | 18 |
| Greater than 40% | 38 |
| Total | 63 |

As part of Phase 1 inspections, Ricardo estimated an individual IRR for each installation based on incentive payments received to date and projected payments under the tariff structure at that point. The purpose of this work was to inform the policy development of a long term tariff.

Ricardo was then contracted by DfE to undertake a review of the tariff structures for small and medium sized solid biomass boilers and combined heat and power (CHP) plants under NI RHI. This review therefore superseded the IRR calculations undertaken in Phase 1 and negated the requirement for IRR calculations to be carried out during Phase 2 Inspections.

The Department will monitor fuel prices on an ongoing basis from a



combination of publicly available data and that provided by participants as part of the inspections process. It also intends to monitor ongoing maintenance and repair costs. All of these costs will be taken into consideration as part of any future review of the tariffs.

10. Please provide a reconciliation of Table 1 on page 19 of the DfE 2018 Consultation Document ‘The Future of the Northern Ireland Non-Domestic Renewable Heat Incentive Scheme’ (‘the 2018 Consultation’) and the table in Figure 2.2 on page 5 of the Tariff Review, both of which appear to show a breakdown of the CEPA tariff calculation for a medium biomass boiler.

Figure 2.2 of the Ricardo Tariff Review Final report replicates the calculations undertaken by CEPA in the Excel spreadsheet model to derive the original single tier tariff. In contrast, the components of the 2012 tariff set out in the DfE 2018 Consultation Document are based on the CEPA input assumptions but using the DECC approach to the tariff calculation instead.

Set out in Table 1 below is a summary reconciliation of the two sets of calculations. Also included are the calculations from the associated 2012 CEPA report which are not consistent with the spreadsheet model, nor are they internally consistent.

Table 1: Reconciliation of CEPA and DfE Consultation Approach to calculation of original single tier tariff

| | CEPA Spreadsheet Approach | Consultation Document Approach | Difference | CEPA 2012 Report Approach |
|-----------------------|---------------------------|--------------------------------|-------------------|---------------------------|
| Capital costs | 4.0 | 4.5 | +0.5 ¹ | 4.5 |
| Upfront barrier costs | 0.9 | 0.4 | -0.5 ² | 1.0 |
| Ongoing barrier costs | 1.1 | 1.1 | - | 1.1 |
| Operating costs | 0.1 | 0.1 | - | 0.1 |
| Fuel costs | -0.1 | -0.1 | - | -0.0 |
| Total | 5.9 | 5.9 | - | 6.6/5.9 ³ |

1. $(£608.4/7.469-£96.75/6.811)*12\%/(8,760*17%)*100= 0.5p/kWh$

2. $(£5,364/20-£5,364/(7.469*(1*12\%)))/(8760*50*17%)*100= -0.5p/kWh$

3. Although the figures in Table A.26 of the 2012 CEPA report imply a 6.6p/kWh tariff, the summary tariff in Table A.27 is 5.9p/kWh.



In the Tariff Review Final report (Figure 2.2), Ricardo note that the approach adopted by CEPA to annuitising both Capital costs and Upfront barrier costs is different to the approach adopted in respect of the derivation of the tariff on the GB RHI Scheme (as set out in Annex 4 of the December 2011 DECC RHI Impact Assessment¹). The DECC approach was used by Ricardo when calculating the NI RHI long term tariff in Tables 2.19-2.21 of the Tariff Review Final report.

Under the approach in the CEPA spreadsheet (not reflected in the 2012 CEPA report) the annuity (or scalar) factor was uplifted by an additional 12% which reduces the required level of subsidy, resulting in the capital element of the subsidy being estimated as 4.0p/kWh compared with 4.5p/kWh under the DECC/Ricardo approach.

This was offset by CEPA applying a 12% rate of return to the upfront hassle cost which has the effect of increasing the associated tariff to 0.9p/kWh compared with 0.4p/kWh under the DECC/Ricardo approach where no rate of return is applied.

11. Please explain which annuity factors were used in the tariff analysis calculations (e.g. calculation of the annuitised capital and up-front barrier costs) in each of the Tariff Review and 2018 Consultation and provide details of the reasons why such factors were used. In answering this question, please address the following points in particular:

- a. Compare the approach taken in the aforementioned documents to the approach originally taken by CEPA, which formed the basis of the tariffs and related IRRs subsequently approved for State Aid purposes (referenced in note b to Figure 2.2 of the Tariff Review);**

The tariff analysis calculations in Table 2.19-2.21 of the Tariff Review Final report (as later reflected in the 2018 DfE Consultation Document),

1

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48241/3775-renewable-heat-incentive-impact-assessment-dec-20.pdf



including the choice of annuity factor, were undertaken by Ricardo reflecting the approach for the GB RH Scheme using the standard annuity formula:

$$A = \frac{1 - (1 + 12\%)^{-20}}{12\%} = 7.469$$

The CEPA spreadsheet model implies that they used the same basic formula (the equivalent factor for the counterfactual oil boiler is adjusted to reflect that it is assumed to have a 15 year lifespan i.e. 6.811) but with a 12% uplift. Ricardo suggest in Figure 2.2 of the Tariff Review Final report that the CEPA approach was to reflect an assumption that the capital investment is made in the same time period as the first period of accreditation.

In conducting the Tariff Review, Ricardo decided to not make this additional adjustment in line with the approach by DECC in respect of the GB RHI Scheme. This appeared reasonable to the RHI Taskforce. Whilst it would be reasonable to assume that the investment occurred in the same time period as the first period of accreditation if RHI payments were made on annual basis, this was less likely when payments were being made on a quarterly basis in the RHI.

In addition, in assuming that the investment occurred in the same time period as accreditation, CEPA should have also increased the multiplier used when converting from an annual to quarterly tariff from 0.958 to 1.043. However, CEPA do not appear to have made this adjustment which would have reduced the expected rate of return for the typical installation- see attached technical note.

In respect of upfront hassle costs, whilst CEPA applied the same annuity factor as for capital costs, Ricardo simply divided by 20 years in line with the DECC approach. This appeared reasonable to the RHI Taskforce because the cost items included relate more to operating



costs rather than capital investment, particularly in the context of the rate of return that was being applied.

- b. Clarify whether the results of the CEPA (on the one side) and the results of each of the Tariff Review and 2018 Consultation (on the other side) are comparable and, in the event that they are not comparable, identify the main differences and explain what the Tariff Review and 2018 Consultation would likely have concluded differently in terms of tariffs and IRRs if the said issues had been approached on the same basis as originally used by CEPA.**

Although the calculations using the different CEPA and Ricardo/DECC approaches result in the same level of tariff (5.9p/kWh) in respect of the CEPA input assumptions from 2012, the individual components of the tariff are different as set out above in response to Question 10 whilst CEPA appear to have made an incorrect adjustment in converting from annual to quarterly payments.

If the CEPA approach was adopted to the input assumptions (based on 2016 prices) in the Tariff Review, it is estimated that this would result in a Tier 1 tariff of 2.0p/kWh for the 20-99kW size band compared with the 2.2p/kWh tariff estimated by Ricardo in Table 2.20D of the Tariff Review Final Report. The reason for the lower figure is that Ricardo have assumed a lower level of upfront hassle cost which reduces the extent to which applying a lower annuity factor to this tariff component offsets the impact of a higher annuity factor being applied to the capital costs.

However, if the correct adjustment was subsequently made in converting the annual tariff under the CEPA approach to a quarterly basis, this would result in the same figure as for the Ricardo approach of 2.1p/kWh.²

² CEPA (2.0p/kWh*1.043) versus Ricardo (2.2p/kWh*0.958)



12. Provide a breakdown of the percentage of multiple boilers installed by the top ten installers (anonymised if necessary), including, if possible, boiler numbers per installer and total installed capacity per installer.

The table below details the total number of boilers installed by individual installers (anonymised)

| Installer Rank | No of Installations | % of Total Installations | Total Capacity Installed (kW) | % of Total Capacity Installed | Average Capacity Installed (kW) |
|----------------|---------------------|--------------------------|-------------------------------|-------------------------------|---------------------------------|
| 1 | 480 | 23% | 48,366 | 22% | 101 |
| 2 | 308 | 14% | 32,428 | 15% | 105 |
| 3 | 163 | 8% | 20,681 | 9% | 127 |
| 4 | 137 | 6% | 13,842 | 6% | 101 |
| 5 | 103 | 5% | 9,494 | 4% | 92 |
| 6 | 90 | 4% | 7,448 | 3% | 83 |
| 7 | 73 | 3% | 6,159 | 3% | 84 |
| 8 | 73 | 3% | 6,708 | 3% | 92 |
| 9 | 70 | 3% | 6,085 | 3% | 87 |
| 10 | 66 | 3% | 8,162 | 4% | 124 |

* Outside of the top 10, a further 565 installations were installed by approximately 117 installers

The table below shows these installation numbers where there is more than one boiler per site (multiple boilers).

| Installer Rank | No of Installations | % of Multiple Installations | Total Capacity Installed (kW) | % of Total Capacity Installed | Average Capacity Installed (kW) |
|----------------|---------------------|-----------------------------|-------------------------------|-------------------------------|---------------------------------|
| 1 | 349 | 26% | 35,145 | 24% | 101 |
| 2 | 247 | 18% | 26,254 | 18% | 106 |
| 3 | 135 | 10% | 17,465 | 12% | 129 |
| 4 | 99 | 7% | 10,012 | 7% | 101 |
| 5 | 56 | 4% | 5,100 | 4% | 91 |
| 6 | 50 | 4% | 4,833 | 3% | 97 |
| 7 | 44 | 3% | 5,397 | 4% | 123 |
| 8 | 43 | 3% | 4,863 | 3% | 113 |
| 9 | 40 | 3% | 4,078 | 3% | 102 |
| 10 | 35 | 3% | 3,206 | 2% | 92 |

*Top 4 installers common to both total and multiple boiler sites



The top 3 installers of boilers on multiple installation sites represent 731 installations across approximately 250 sites. This is illustrated in the table below.

| Installer Rank | Approximate No. of Sites | % of Total Sites |
|----------------|--------------------------|------------------|
| 1 | 125 | 28% |
| 2 | 82 | 18% |
| 3 | 43 | 10% |

**Sites based on installations rolled up by business name and location*

13. Provide a summary of the time taken to carry out the Tariff Review and summarise what the Tariff Review experience has shown about opportunities to focus, standardise and/or shorten such a process for future reviews, especially any emergency review process.

Ricardo Energy and Environment were appointed to undertake a Tariff Review of the NI RHI Scheme in September 2017, focused on biomass boilers and CHP plants, with an initial completion date of December 2017. Although the Final report was not delivered until May 2018, an Interim report was provided in November 2017 and the first draft of the Final report was provided in January 2018.

The delays experienced during the contract were envisaged and communicated at an early stage by the contractor and the delay in timescale was agreed as acceptable by the RHI Taskforce. The delays were due to the Project Manager for the contractor also undertaking parallel work for the RHI Taskforce in respect of the pilot programme of inspections of installations on the Scheme. However, this work provided the Project Manager with additional insight which enhanced the quality of analysis in the Tariff Review.

The Tariff Review considered all of the costs of installing and operating a biomass boiler. Going forward, the capital costs and upfront hassle costs have already been incurred, whilst ongoing hassle costs are not expected to change substantially over time. This means that any future review is expected to focus on changes in ongoing maintenance and repair costs as the boiler ages, and the relative fuel costs between biomass and the fossil fuel



counterfactual. The Department intends to monitor fuel prices on an ongoing basis from a combination of publicly available data and that provided by participants as part of the inspections process. It also intends to monitor ongoing maintenance and repair costs.

In the context of the short term volatility that is often seen in fuel prices, it would be expected that any future Tariff Review would only be undertaken in response to evidence, from ongoing monitoring, of a significant and persistent deviation in relative fuel prices from that observed in the Ricardo Tariff Review. In doing so there is a need to mitigate against the risk that the normal market pressure on prices is reduced because of the potential for increased fuel prices to be reflected in subsidy levels. Similarly a persistent and consistent increase in maintenance and breakdown costs would also have to be observed to trigger a future Tariff Review.

It should be noted that there have also been delays in the implementation of the long term tariff, due to the challenges involved in procuring external advice as well as the subsequent approvals process (Business Case, State aid, public consultation, legislative) due to the high profile and contentious nature of the NI RHI Scheme. As the Scheme moves towards 'business as usual' it would be hoped that these aspects of reviewing and amending tariff levels would be reduced. However, it is inevitable that amending tariff levels on the NI RHI Scheme will take a significant amount of time, highlighting the importance of them being set at the correct level at the outset.

14. Provide an indication of (a) the resource demands (both 'in-house' and from external consultants) and (b) the actual or estimated cost involved in carrying out the Tariff Review process including details of what the Tariff Review experience has shown about opportunities to focus, standardise and reduce resource requirements and costs for future reviews.

The flaws and associated cost to the NI Executive that have been identified in respect of both the original tariff structure on the NI RHI Scheme and the



tiered tariff structure, developed at short notice during the spring of 2015, highlight the need for appropriate time and resources to be devoted to Tariff Reviews, as well as for robust independent challenge of the findings.

The Ricardo Tariff Review cost the Department £78,000 in payments to the contractors. In respect of the in-house resources, the actual number of in-house days for the management of the project in respect of meetings with the consultants and reviewing draft reports is estimated to be:

| | |
|------------------|---------|
| Grade 3 | 3 days |
| Grade 5 | 1 day |
| Grade 6 | 10 days |
| Deputy Principal | 10 days |

15. In the updated draft of their submission to the Inquiry (WIT-107833 to 107949) CEPA makes clear (e.g. at section 4.2 at WIT-107879 to 107880) that their projected life-time present costs/values were based upon a population share of the GB budget, calculated with a discount rate of 3.5% and expressed in real terms (2010). Please address the following related issues:

a. Clarify whether this the same basis used by Ricardo/DfE for the figures quoted for tariffs, IRRs, and lifetime costs in the Tariff Review and 2018 Consultation (in 2016 money);

The figures in the Ricardo Tariff Review Final report for lifetime costs and IRRs were undiscounted and in 2016 prices.

The figures in the DfE Consultation document for lifetime costs were undiscounted and in current prices whilst the IRRs were undiscounted and in 2016 prices.

It would be inappropriate to discount cash flows as part of the tariff or IRR calculations as this would involve double counting in the context



that the IRR is calculated as the discount rate at which the sum of discounted cash flows equals zero.

The Ricardo Final report presented lifetime costs in 2016 prices because the recommendation that tariffs should be uplifted in line with CPI inflation was not made until a late stage in the Tariff Review, the March 2018 version of the draft Final Report suggested that there should be no inflationary uplift. In the context that the RHI Taskforce could apply inflationary uplifts to the payment projections it was decided that finalisation of the Ricardo Tariff Review report should not be delayed to allow the lifetime cost projections to match the recommendation on inflationary uplifts.

In the context that the NIAO June 2016 report had published figures in current prices and undiscounted, it was decided that there would be little value added in discounting the projected payments given that the budget was expected to have broadly the same timing profile as the payments.

b. (In any event) Please provide comparable figures (stated either in 2010, 2016 or 2019 money, with explicit reference to any discount rates, estimates of inflation, or other assumptions applied) for the following:

- i. Original lifetime budget expectations (from June 2011 and February 2012);**
- ii. Revised lifetime budget expectations in total and for April 2016 onwards only (from December 2015);**
- iii. Current lifetime budget expectations in total and for April 2019 onwards only;**

The budget for the NI RHI Scheme (domestic and non-domestic) is determined as a population based share of the budget for the GB RHI Scheme. The planned budget for the GB RHI Scheme



is normally set at each Spending Review for the subsequent 2-4 years. For example, as part of the 2015 Spending Review the GB RHI budget was set for the period from 2016-17 to 2020-21. As a consequence, the NI RHI budget for the period 2016-17 to 2019-20 was set as the GB RHI budget times the NI population as a % of the GB population (2.93%) times the VAT abatement factor (1-2.5%) i.e. 2.86%

The June 2011 and February 2012 CEPA reports do not appear to refer to the total lifetime budget for the NI RHI Scheme. Instead, the earliest reference to the projected lifetime budget for the NI RHI appears to be in the subsequent 2012 Business Case produced by the department. In particular, Paragraph 5.8 refers to £660 million as 3% of the £22 billion projection of the policy lifetime Subsidy cost (to consumers) set out in Table 5 of the March 2011 DECC Impact Assessment of the RHI. These figures were in 2010 prices and discounted.

However, Table 5 in the subsequent December 2011 DECC Impact Assessment of the RHI refers to a GB RHI subsidy cost of £20.8 billion which equates to £624 million if using 3% (£595 million if using approach from SR 2015).

Although DECC subsequently produced further Impact Assessments, none of these appear to have provided updated lifetime cost estimates.

It is in this context that DfE officials appear to have deducted the £660 million NI RHI budget figure in the 2012 Business Case from the £1,150 million projected payment figure (non-domestic NI RHI) in the June 2016 NIAO report to arrive at the £490 million figure referred to by CEPA at WIT-107879 as the projected level of over spend on the NI RHI Scheme.



The RHI Taskforce recognises that it was inappropriate for DfE officials to compare a budget that was discounted and in 2010 prices with projected payments that were in current prices. However, the other changes that had occurred in respect of the budget for the GB RHI Scheme project lifetime budget, since the 2011 DECC Impact Assessments, meant that the £660 million figure was broadly correct.

For example, the 2015 Spending Review had resulted in a significant reduction in the forecast level of spending on the GB RHI with a 37.5% reduction in the forecast for 2020-21³. This would suggest that whilst the use of undiscounted data in constant prices had understated the projected budget, this was offset by the use of the initial budget projections that had subsequently been reduced.

The latest publicly available data in respect of the projected lifetime level of spending for the GB RHI Scheme is from the February 2018 National Audit Office report, *Low-carbon heating of homes and businesses and the Renewable Heat Incentive*⁴. In particular, Figure 7 shows that the level of lifetime forecast spending on the GB RHI Scheme has fallen from an initial estimate of £47 billion (in current prices and undiscounted) to £23 billion.

This would equate to approximately £660 million on the NI RHI Scheme, based on a 2.86% share, but includes spending in the early years and at the end of the GB RHI Scheme when payments were/will not be made on the NI RHI. Instead, based on the budget to date and advice from the Department of Finance on the potential future budget (flat cash outcome from

³ https://obr.uk/docs/dlm_uploads/Renewable-heat-incentive_November2015.pdf

⁴ <https://www.nao.org.uk/wp-content/uploads/2018/02/Low-carbon-heating-of-homes-and-businesses-and-the-Renewable-Heat-Incentive.pdf>



2019-20 onwards), the working assumption of the RHI Taskforce currently is that the lifetime budget for the NI RHI Scheme will be approximately £600 million.

This implies that the £660 million figure used by DfE officials in 2016 was broadly reasonable, albeit that it was calculated on an incorrect basis. This is in the context that the £1,150 million projected level of payments in the June 2016 NIAO report appears to have been an underestimate.

In particular, whilst the prevailing rate of inflation of 1.6% at that time appears to have been used to project future payments, it would have been more appropriate to use the Office for Budget Responsibility (OBR) long term forecast of the rate of Retail Price Index (RPI) inflation of 3%⁵. This is part of the reason why the Department's estimate of the projected overspend on the NI RHI Scheme, if the 2017 Regulations had not been implemented, has increased from £490 million to approximately £700 million.

In respect of whether the projected budget and level of payments should both instead be set in constant prices and discounted, this approach would be more appropriate in considering the Value for Money of a project where payments are being compared with benefits. In this context, it is often necessary to adjust for the costs and benefits accruing over different time periods.

However, in the context that the level of payments is instead being compared with the budget, in terms of affordability, it is more transparent to set the comparisons in current prices and undiscounted as was the case in both the 2016 NIAO report and

⁵ <https://cdn.obr.uk/FSR-July-2018-1.pdf> Table 3.3



the 2018 NAO report as well as being the general approach to Budgets and Spending Reviews.

- iv. Original projected lifetime subsidy costs (from June 2011 and February 2012);**
- v. Projected lifetime costs had there been no interventions in 2017 and 2018;**
- vi. Projected lifetime costs assuming the 2017 and 2018 interventions were to continue (in total and for April 2019 onwards only);**
- vii. Projected lifetime costs assuming the proposed revised tariffs (in total and for April 2019 onwards only);**
- viii. Projected lifetime costs assuming the contingency buy-out option (in total and for April 2019 onwards only).**

The projected level of expenditure on small and medium sized biomass boilers on the NI RHI Scheme is projected to be £120 million by the end of 2018-19 based on the actual tariffs in place (undiscounted and based on actual rates of RPI inflation).

If the 2017 Regulations had not been implemented, and the flawed single tier tariff structure continued to apply, it is estimated that the equivalent payments would have been £170 million (undiscounted and based on actual rates of inflation).

Set out in Table 2 below are the projected payment levels from 2019-20 to the end of the NI RHI Scheme (undiscounted and current prices based on projected rate of inflation depending on which measure is used).

**Table 2: Projected level of payments on NI RHI Scheme from 2019-20 to end of Scheme**

| Tariff Option | Total payments (to nearest £5 million) | |
|---|---|-------|
| | CPI | RPI |
| Retain tariff structure under 2017 and 2018 legislation | 440 | 480 |
| Revert to tariff structure under 2012 Regulations | 945 | 1,020 |
| Proposed long term tariff | 70 | 75 |
| Compulsory Buy-Out | 35 | |

It should be noted that the payments to date and projected future payments set out above are based on small and medium sized biomass boilers only. There are additional costs in respect of the other technologies on the non-domestic NI RHI Scheme as well as the domestic NI RHI Scheme.

The Reconnect Programme

16. DfE has provided to the Inquiry an Evaluation Report prepared by KPMG in respect of DETI's 'Reconnect' incentive programme (DFE-399565 to 399690). The Inquiry seeks clarification and/or confirmation, from DfE, of the following matters relating to the Reconnect programme

(Please provide all costs in the money value of the KPMG report, in 2010 money and in 2016 money)

Given the passage of time since the Reconnect Scheme was in operation, and the time available to prepare the response, it has not been possible to view raw data. At the time, data for the Scheme was held on a secure database operated by the managing agents, Action Renewables. This database was removed and all data files permanently deleted from services in August 2009.

It would appear from records held that KPMG were given temporary access to the database at time of the evaluation. It is a reasonable assumption



therefore that the figures used in the KPMG evaluation were based on accurate information available at that time. Responses to the queries raised by the Inquiry have therefore been based on the information provided in the Evaluation.

Where the request is for figures on renewable heat the following technologies have been included:

- Air Source Heat Pump
- Ground Source Heat Pump
- Water Source Heat Pump
- Solar Water Heating
- Wood Fuel Boiler
- Wood Pellet Stove

Where the request is for figures on biomass the following technologies have been included:

- Wood Fuel Boiler
- Wood Pellet Stove

Costs have been converted to 2010 and 2016 prices using the GDP Deflators which can be found at: <https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-march-2019-spring-statement>.

Costs have been provided in both calendar and financial years.

a. The total cost of the programme (showing grants, administration, and marketing separately);

On the basis of information available, we believe that costs are as follows:

| | KPMG Report - Dec 2008 | Calendar Years | | Financial Years | |
|-----------|---------------------------|----------------|-------------|-----------------|-------------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| Admin | £615,530 | £634,979 | £698,047 | £623,250 | £698,833 |
| Grants | £10,532,023 | £10,864,812 | £11,943,933 | £10,664,121 | £11,957,371 |
| Marketing | £864,000 | £891,301 | £979,827 | £874,837 | £980,929 |



b. The budget(s) for the programme (showing grants, administration and marketing separately);

| Budget | KPMG Report - Dec 2008 | Calendar Years | | Financial Years | |
|------------------------|---------------------------|----------------|-------------|-----------------|-------------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| Admin per annum | £350,000 | £361,059 | £396,921 | £354,390 | £397,367 |
| Admin for total period | £875,000 | £902,648 | £992,301 | £885,975 | £993,418 |
| Grants | £10,800,023 | £11,141,280 | £12,247,861 | £10,935,483 | £12,261,641 |
| Marketing total | £950,000 | £980,018 | £1,077,356 | £961,915 | £1,078,568 |
| Marketing '06 | £350,000 | £361,059 | £396,921 | £354,390 | £397,367 |
| Marketing '07 | £600,000 | £618,959 | £680,435 | £607,526 | £681,201 |

c. The total cost of grants awarded to support renewable heat;

| | KPMG Report - Dec 2008 | Calendar Years | | Financial Years | |
|--------------------------------|---------------------------|----------------|------------|-----------------|------------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| Wood Pellet boilers and stoves | £7,584,770 | £7,824,432 | £8,601,575 | £7,679,902 | £8,611,253 |

d. The total cost of grants awarded to support biomass boilers;

| | KPMG Report - Dec 2008 | Calendar Years | | Financial Years | |
|-----------------|---------------------------|----------------|------------|-----------------|------------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| Biomass Boilers | £3,954,547 | £4,079,502 | £4,484,689 | £4,004,147 | £4,489,735 |

e. The total renewable heat capacity supported;

Estimated 52,468.68kW

f. The total biomass capacity supported;

- Wood Fuelled Boilers – 41.465.60 kW



- Wood Pellet Stove – 429.30kW
- Total – 41,894.90kW

g. The average capital cost per kW of biomass capacity;

| | KPMG Report Dec 2008 | Calendar Years | | Financial Years | |
|-------------------|------------------------------|------------------------------|---------|------------------------------|---------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| | £ per kW of biomass capacity | £ per kW of biomass capacity | | £ per kW of biomass capacity | |
| Wood Fuel boilers | £224.09 | £231.17 | £254.13 | £226.90 | £254.42 |
| Wood Fuel Stove | £316.49 | £326.49 | £358.92 | £320.46 | £359.32 |

h. The average grant support paid per kW of biomass capacity;

- Wood Fuel Boiler - £95.37
- Wood Pellet Stove - £145.12

i. The proportion of the total capital cost for (i) renewable heat and (ii) biomass that was, on average, met by grant and met by the householder.

| | KPMG Report Dec 2008 | Calendar Years | | Financial Years | |
|--|-------------------------|----------------|-------------|-----------------|-------------|
| | | 2010 | 2016 | 2010/11 | 2016/17 |
| Total capital cost for renewable heat met by grant (36%) | £7,584,770 | £7,824,432 | £8,601,575 | £7,679,902 | £8,611,253 |
| Total capital cost for renewable heat met by householder (64%) | £13,716,057 | £14,149,455 | £15,554,815 | £13,888,091 | £15,572,316 |
| Total capital cost of biomass met by grant (43%) | £4,016,846 | £4,143,770 | £4,555,340 | £4,067,227 | £4,560,465 |



| | | | | | |
|--|------------------|------------|------------|------------|------------|
| Total capital cost of biomass met by householder | £5,411,057 (57%) | £5,582,035 | £6,136,457 | £5,478,925 | £6,143,361 |
|--|------------------|------------|------------|------------|------------|

Statement of Truth

I believe that the facts stated in this witness statement are true.

Signed:

Dated: 22 March 2019

IMPACT OF CEPA ADJUSTMENT TO ANNUITY FACTOR WHEN CALCULATING RHI TARIFF

Introduction

1. The purpose of this note is to explain, by way of a worked example, why it would have been reasonable for CEPA to adjust the Annuity/Scalar factor when calculating the original biomass tariff on the NI RHI if payments had been made annually. However, this approach does not appear to be necessary or appropriate in respect of the actual approach which involved quarterly payments, in the absence of a further amendment to the adjustment factor used when converting from an annual to quarterly tariff.

Detail

2. In line with the actual experience of the NI RHI Scheme it is assumed that the additional capital investment on a biomass boiler is £25,000. This means that the annual required RHI payment to deliver a 12% rate of return over 20 years is £3,347 (£25,000 divided by Annuity factor of 7.469). This can be seen in Table A.1 below which sets out a summary of the cash flows in respect of the initial capital investment and RHI payments (capital element). If the investment is made in Year 0 and the RHI payments are received in Years 1-20 the unadjusted Annuity factor results in a 12% Internal Rate of Return (IRR).

Table A.1: Internal Rate of Return for Annual RHI Payments.

| (£) | Investment in Year 0 and Accreditation in Year1 | | Investment and Accreditation both in Year 0 | |
|------------|---|-------------------------|---|-------------------------|
| | Unadjusted Annuity Factor | Adjusted Annuity Factor | Unadjusted Annuity Factor | Adjusted Annuity Factor |
| Year 0 | -25,000 | -25,000 | -21,653 | -22,012 |
| Years 1-19 | 3,347 | 2,988 | 3,347 | 2,988 |
| Year 20 | 3,347 | 2,988 | 0 | 0 |
| IRR | 12.0% | 10.0% | 14.2% | 12.0% |

3. However, if the boiler is accredited onto the Scheme and starts to receive payments in the same year that the investment is made, then the IRR increases to 14.2%. It is in response to this issue that it appears that CEPA have made an adjustment to the Annuity factor by increasing it by 12% (8.366) resulting in a reduced annual required payment of £2,988. If the investment takes place in the same year that the boiler is accredited then this approach results in a 12.0% rate of return. However, if the investment takes place in the year before, the rate of return is only 10.0%.
4. RHI payments are made on a quarterly basis with CEPA reducing the tariff by 4.2% to reflect the impact of payment being received earlier than under an annual payment. This results in quarterly payments of £802

under an unadjusted Annuity Factor ($\pounds 3,347 \times 0.958 \times 0.25$) and $\pounds 716$ under the adjusted Annuity Factor as set out in Table A.2 below.

5. This shows that if the boiler is accredited one quarter after it is installed, the quarterly payment under the unadjusted Annuity Factor results in a 12% annual IRR. This would appear to be a more reasonable assumption under a quarterly payment approach given that it implies a much shorter period of time between installation and accreditation. However, even if the boiler is installed in the same quarter that it is accredited, then the annual IRR increases only moderately to 12.5%.

Table A.2: Internal Rate of Return for Annual RHI Payments.

| (£) | Investment in Year 0 and Accreditation in Year1 | | Investment and Accreditation both in Year 0 | |
|---------------|---|-------------------------|---|-------------------------|
| | Unadjusted Annuity Factor | Adjusted Annuity Factor | Unadjusted Annuity Factor | Adjusted Annuity Factor |
| Q0 | -25,000 | -25,000 | -24,198 | -24,284 |
| Q1-79 | 802 | 716 | 802 | 716 |
| Q80 | 802 | 716 | | 0 |
| Quarterly IRR | 2.9% | 2.4% | 3.0% | 2.5% |
| Annual IRR | 12.0% | 10.2% | 12.5% | 10.6% |

6. In contrast, if the required level of payments is calculated using the adjusted Annuity Factor, the result is that the annual IRR falls below the 12% target even if installation and accreditation take place in the same quarter. This appears to be because the annual payment is received before the quarterly payments if investment and accreditation are assumed to occur in the same period. Therefore, instead of reducing the level of tariff by 4.2% when converting from annual to quarterly payments, CEPA should instead have increased it by 4.3%.

Conclusion

7. It should be stressed that the analysis set out above is based on the RHI Taskforce interpretation of the original CEPA calculations. However, it would appear that whilst there may have been a need for the adjustment made to the Annuity factor if RHI payments had been made annually, there is less of a need in respect of quarterly payments. Moreover, it also appears that the CEPA adjustment may have resulted in a tariff that would not have delivered a 12% rate of return for the typical participant on the NI RHI.