Non Domestic Scheme Early Tariff Review

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The consultation [and Impact Assessment] can be found on DECC's website:
[link]

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Ministerial Foreword

The Government is driving ambitious action on climate change in the UK through our commitment to meeting our legally binding 2020 renewable energy targets, cutting carbon and improving the nation's energy security through diversifying our energy supply. To meet our ambitions we must change the way that we generate, distribute and use heat. Nearly half of the energy we consume in the UK is used to produce heat. Heat is the single biggest reason we use energy in our society. Currently we meet around 2% of this demand with heat from renewable sources. We have identified that we need to increase this proportion to up to 12% by 2020. The RHI is the principal mechanism for driving this transition.

The non domestic RHI scheme has been open to commercial, industrial, public sector, not for profit and community generators of renewable heat since November 2011. The scheme is designed to bridge the gap between fossil fuel heat sources and renewable heat alternatives through financial support for owners of participating installations. It is our ambition that this will drive a step change in the way we produce heat, paving the way for mass deployment of a host of renewable heating technologies by 2020. This is a challenging goal, but we have already taken the initial steps to get there.

I continue to be committed to the RHI, and DECC's work to broaden and improve the RHI continues apace. We have consulted on proposals for a domestic RHI scheme and on expanding the non domestic RHI scheme and have confirmed that we expect to publish responses to the consultations and our decisions on these aspects of the scheme this summer. We have also already seen significant deployment of renewable heat in households through the Renewable Heat Premium Payment (RHPP) scheme.

We have initiated an early review of the non domestic RHI tariffs as a result of our consideration of the uptake in the first year of the scheme, additional evidence gathered on the costs and performance of renewable heat technologies and feedback from the renewable heat industry and market on the tariff levels. It is vital that we get the level of support right so that the market can invest with confidence, cost reductions can be achieved and the market can grow sustainably. This short consultation sets out our proposals for improving the support that the non domestic RHI offers.

We are planning to deliver the proposals set out in this consultation as soon as possible following the conclusion of this consultation, to ensure that the industry and market receive improved support quickly. It is our intention that installations with an accreditation date of 21 January 2013 or after will receive any increased tariffs once they come into force. I look forward to hearing your views on these proposals.

Contents

General information

Purpose of this consultation

This consultation seeks views on the Government's conclusions from its review of the evidence underpinning the current tariffs for the non domestic Renewable Heat Incentive (RHI) scheme, proposed policy changes and, for some technologies, new tariff levels.

Issued: [xxxxxxxxxx]

Respond by: [xxxxxxxxx]

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Consultation reference: URN xxxxxx – [document name]

Territorial extent:
[England only or including devolved administrations; will devolved administration consult separately, etc.]

How to respond:
Your response will be most useful it is framed in direct response to the questions posed, though further comments and evidence are also welcome.
[Outline whether responses should be provided in a particular preferred format, where electronic responses should be emailed to, which address to send hardcopy responses to, whether to use different addresses for responses for the devolved administrations, etc.]

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[are hardcopies available?]

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(primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004).

If you want information that you provide to be treated as confidential please say so clearly in writing when you send your response to the consultation. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

We will summarise all responses and place this summary on our website at www.decc.gov.uk/en/content/cms/consultations/. This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

Quality assurance:
This consultation has been carried out in accordance with the Government's Code of Practice on consultation, which can be found here:
http://www.bis.gov.uk/files/file47158.pdf

If you have any complaints about the consultation process (as opposed to comments about the issues which are the subject of the consultation) please address them to:

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Executive Summary

Early tariff review proposals

1. The non domestic RHI has been available to applicants since November 2011. Though some technologies are deploying well through the scheme, up-take to date has on the whole been lower than expected.

2. In order to understand more about the costs and performance of renewable technologies, the key drivers for the scheme's tariffs, DECC tendered for new data in August 2012, when the non domestic Renewable Heat Incentive (RHI) scheme had been available for just under one year. We have now assessed this data, delivered by the Sweett Group, alongside other key evidence, including:

    - the data that was used to set the tariffs when the scheme was launched, supplied by AEA;

    - the data collected by the scheme's delivery partner, Ofgem, on the uptake of each technology supported by the scheme, including actual and forecast expenditure;

    - industry views and market intelligence: including the need for certainty, and the level of support that the renewable heat industry has stated is needed to stimulate up-take.

3. In reviewing these tariffs we have taken a different approach than that taken to date in setting non-domestic tariffs: rather they relying primarily on using modelled outputs to identify the required tariffs we have also drawn on market intelligence, stakeholder views and expert opinion to make judgements about the level that the tariff should be set at.

4. In light of our assessment of all available evidence we are proposing that:

    - the tariffs for ground source heat pumps (GSHP), and large biomass boilers need to be increased from their current levels to achieve a rate of return for investors that is sufficient to drive more widespread deployment;

    - the tariffs for small and medium biomass boilers should not be adjusted through this review and should remain a current levels unless automatically adjusted by the new budget management mechanism;

3. In reviewing these tariffs we have pursued a change in approach to setting non-domestic tariffs: informed by judgements which combine market intelligence, stakeholder views, expert opinion and modelled outputs;

4. Alongside, we believe there is a case for changing our current approach of capping tariffs at a rate equivalent to the cost of renewable energy from offshore wind, which we judged to be the marginal cost of renewable energy when the scheme was launched, above which subsidies should not be paid unless there is an exceptional strategic case. As part of a

transition strategy to a more cost effective set of DECC policies aimed at household energy efficiency and low carbon energy, we are proposing support some RHI technologies above the current level of offshore wind where evidence shows that this is required to incentivise 50% of the heat potential and drive cost reductions.

4. The primary intention of these proposals is to ensure that support is appropriate for each technology included, or proposed to be included, in the scheme, to contribute to the UK's effort to cost-effectively meet its legally binding 2020 renewable energy target. Table 1 summarises the proposals for reviewed tariffs

Table 1: Proposals for review of tariffs

Technology		**Current tariffs** (in 2014/15 prices)	**Reviewed tariffs** (proposed for 2014/15)
Biomass Boilers	**Small**	Tier 1: 8.8 Tier 2: 2.3	**NO CHANGE**
	Medium	Tier 1: 5.5 Tier 2: 2:3	
	Large	1.0	**2.0**
GSHPs	**Small**	4.9	**9.0**[1] Implemented as: Tier 1: **11.2**, Tier 2: **2.3**
	Large	3.6	**OR 8.2**[2] if capped at level of support for offshore wind Implemented as: Tier 1: **10.2**, Tier 2: **2.3**
Solar Thermal		9.5	**12.5** **OR 11.3** if capped at level of support for offshore wind

[1] this is equivalent to 12.5p/kWh of renewable heat

[2] this is equivalent to the current level of support for offshore wind in 2014/15 prices cap of 11.3p/kWh of renewable heat

5. All changes proposed in this consultation would be subject to Parliamentary and European State Aid approval.

Update to the September 2012 consultation

6. In September 2012 DECC consulted on expanding the non domestic RHI to:
    - air source heat pumps (ASHP) - both air to air (AAHP) and air to water (AWHP);
    - biomass direct air heating (BDAH)
    - deep geothermal;
    - medium and large biogas combustion, and
    - a specific tariff for biomass and bioliquid combined heat and power (CHP).

7. We are presenting updated indicative tariffs for AWHP and BDAH, as set out at Table 2, and in more detail at Annex A. These are the two tariffs where the following criteria have been met: we believe the relativities to other similar tariffs are important; we have new evidence to inform tariff setting; and we believe that there is a strong case for bringing forward support.

8. The contents of this consultation do not represent a conclusion on those proposals set out in September 2012. The interaction between these consultations is set out in detail at paragraphs xx – yy.

Table 2: indicative update to September 2012 tariffs for AWHP and BDAH – if supported

Technologies for which we have recalibrated tariffs according to new evidence Conclusion on RHI support has not yet been reached			
ASHPs (if supported)	**AWHP**	1.7	**2.5**
Biomass Direct Air Heating (BDAH) (if supported)	**Small and medium**	2.1	**2.5**
	Large	1.0	**2.0**

[Insert figure showing all tariffs and status etc]

Impacts of changes to tariffs

9. On 21 January 2013 the Government announced that, the non-domestic RHI tariffs were under review, and that, subject to State Aids approval, any new tariffs would apply to those installations with an accreditation date from 21 January 2013 onwards. The accreditation date of an installation is the date at which a fully completed application was first received by the scheme administrator, Ofgem, or the date of commission of the plant if that is later.

10. If an installation is accredited on or after 21 January 2013 and the tariff for that technology increases following the review, the plant will receive payments at the current tariff rates for heat generated until the implementation of new tariffs. After the changes are implemented, it

is DECC's intention that payments for any future heat generation would be made at the higher tariff level. We do not propose to backdate the higher tariff rate for heat generated before the changes are implemented (or for any heat generated by installations accredited before 21 January 2013).

Background and Introduction

About the RHI

11. In November 2011 the Government launched the non domestic RHI scheme. This scheme currently supports renewable heating in the commercial, public and industrial sectors and also includes support for district heating.

12. The principal objective of the RHI scheme is to help deliver the UK's target of generating 15% of energy from renewable sources by 2020, as set out in the Renewable Energy Directive 2009. The Government has identified indicative contributions of renewable energy from each energy sector, i.e. electricity, heat and transport, which would allow the UK to meet the overall target as cost effectively as possible. For heat we have identified that up to12% will need to be generated from renewable sources by 2020, increasing from around 2% currently. This is a significant challenge.

13. It is also our intention for the RHI to play a key role in bringing about a step change in the way we produce and use heat in buildings. The Government's 2013 policy document 'The Future of Heat: Meeting the Challenge'[3], explains how renewable heat fits in to the wider heat strategy which will enable us to decarbonise the heat supply by 2050.

14. The support delivered through the non domestic scheme is a tariff payment for each kilowatt hour of eligible heat produced by participating installations. The tariffs are intended to bridge the financial gap and barriers between fossil fuel heat and renewable heat alternatives and are based on estimates of the costs and performance of the technologies supported through the scheme. To minimise administrative burdens, payments are currently made on the basis of metered total eligible heat output.

Background to the review and scheme performance so far

15. In August 2012, we contracted a consortium led by the Sweett Group to provide new evidence on costs and performance assumptions of renewable heat technologies , and on 21 January 2013 we announced that we were reviewing the evidence base used to set the non domestic RHI tariffs in light of the new data and scheme performance so far.

16. We then announced on 27 February that the conditions for an early tariff review had been met. This announcement followed our proposals for tariff recalibrations set out in the July 2012 consultation, 'Renewable Heat Incentive: Providing Certainty, Improving Performance'. Apart from periodic recalibrations we also set out in response to that consultation that we would monitor deployment and, if the evidence required it, conduct an early tariff review. This included two conditions for such a review which had been met:

[3] https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

- If evidence suggests that data inputs to tariff setting methodology can be shown to have changed significantly, which is having an impact on deployment or other RHI objectives
- If the scheme is not incentivising deployment to the level we would anticipate, taking into account the late start of the scheme. This would require long term data to show that this was a real problem and not normal seasonal cycles.

19. Both conditions have been met due to the fact that we now have updated evidence on costs and performance of renewable heat technologies, from the work led by the Sweett Group, and that we have scheme uptake data for over one year which we can compare to original expectations that we set out when the scheme launched.

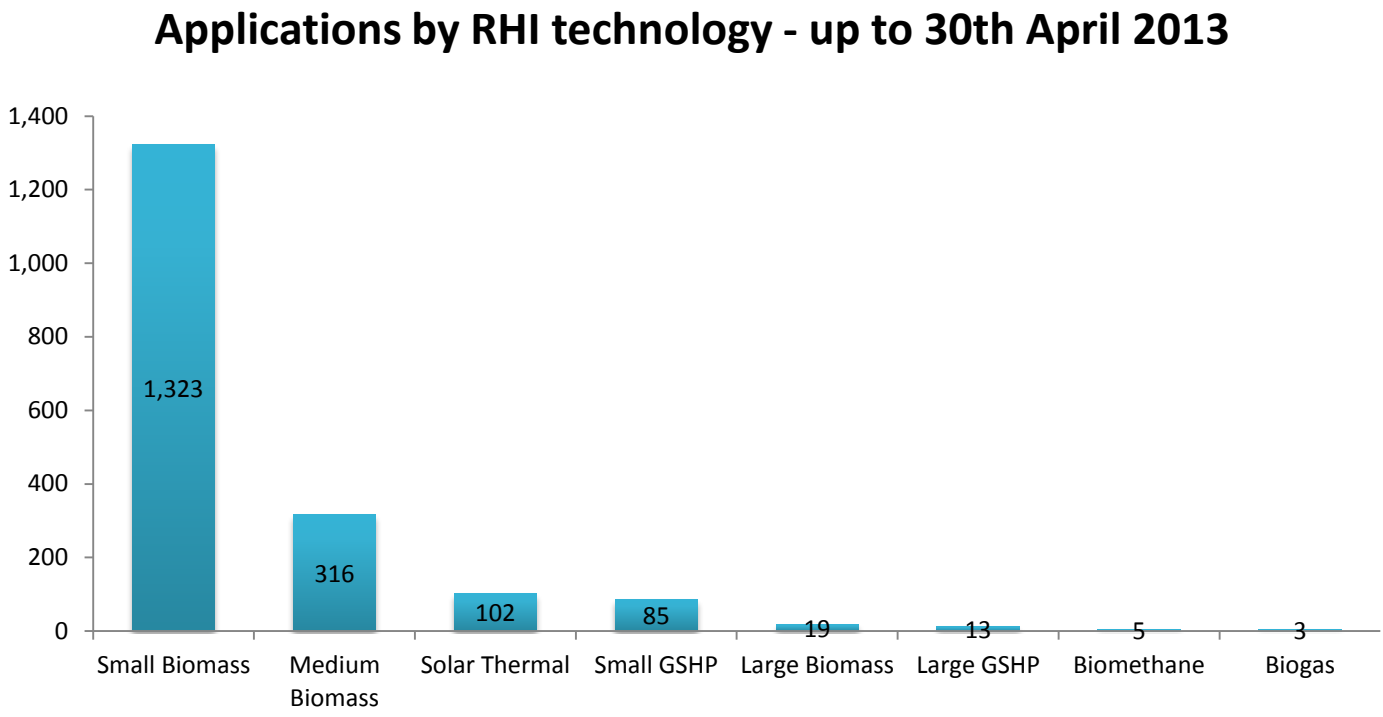
20. Table 4 below sets out the forecast spend over one year for each technology based on application data for up to 30th April, and how that forecast compares to anticipated levels. These figures are calculated as part of the budget management mechanism assessments, the first of which has been published to coincide with the review. [insert link].

Table 3: 12 month forecast spend based on data up to 30th April[SMS(&I1)]

Technology	A	B	C (=A/B)
	Forecast expenditure	**Anticipated expenditure**	**Forecast expenditure as % of anticipated**
Small Biomass	£16,891,112.06	£14,800,000.00	114.1%
Medium Biomass	£21,819,823.84	£13,400,000.00	162.8%
Large Biomass	£6,100,006.94	£23,100,000.00	26.4%
Small GSHP	£378,702.28	£28,900,000.00	1.3%
Large GSHP	£501,379.61	£4,900,000.00	10.2%
Solar thermal	£178,573.33	£4,900,000.00	3.6%
Biomethane and Biogas (not in scope of review)	£1,820,467.62	£12,000,000.00	15.2%
Total	**£47,651,609.17**		49%

21. Although the scheme started later than expected, this is the most indicative metric of how current deployment compares to levels that we expect are needed to meet the 2020 renewable energy target. It shows that take up of some technologies is below those expected levels, but that small and medium biomass are deploying very well.

20. This forecast is based on the applications that have been received up until 30th April 2013, shown in the chart below:



[SMS(&I2]

Scope of the review

24. The early tariff review covers tariffs for technologies currently supported in the scheme where deployment is lower than expected and where we now have updated evidence on costs and assumptions following the work carried out by the Sweett Group[4].

Table 4: Scope of the tariff review – technologies currently supported

Technology	In scope?	Status of evidence
Small and medium biomass	Yes	New evidence following Sweet Group research. Market intelligence and industry views on tariffs, appropriate support and scheme deployment data.
Small and large GSHP	Yes	
Solar Thermal	Yes	

[4] Insert reference to Sweett report

Large biomass	Yes	Some new evidence, although little new cost data available. Industry views on tariffs and scheme deployment data.
Biomethane and small biogas combustion	No	Tariffs based on best available evidence on biomethane. No new evidence available currently.

Tariff setting and the evidence base

Tariff setting methodology for current tariffs in the non domestic RHI

24. Most of the current tariffs in the non domestic scheme and those consulted on in September 2012 were calculated using a 'levelised cost' methodology. Simply put, this is determined by calculating the difference in average lifetime costs of a given renewable heat technology and its fossil fuel equivalent, and spreading those costs out over the total heat output of the installation, ensuring that a 12% rate of return is delivered on top of the average additional investment required for installations at the meidan cost of the supply potential. For a detailed description of the tariff setting process, please refer to paragraphs xx – yy at Annex B.

The evidence base

37. The tariffs currently offered through the scheme are the same as those which were available when the scheme launched in November 2011, apart from adjustments for inflation, and are based on the best available data on costs and performance of renewable heat technologies that was available at the time of developing the scheme.

38. It is important that DECC reviews the evidence used to set RHI tariffs in light of scheme deployment and any more recent evidence which we are able to obtain. This is good practice generally, but especially important in an emerging market such as renewable heat, where new developments can occur and the understanding and use of technologies can increase significantly over relatively short timeframes.

39. We therefore commissioned new data on costs and performance of renewable technologies in August 2012 which was delivered by a consortium led by the Sweett Group. A summary of the outcomes of this exercise can be found alongside a summary of the AEA data in Annex A, along with a description of the main differences between the two datasets. The full Sweett Group report has also been published alongside this consultation and can be found at [insert link].

40. However, a complete and detailed picture of heat demand in the UK non-domestic sector is not currently available, which makes determining tariffs on modelling assumptions alone more unreliable. For example, load factors (the percentage of hours that an installation is in use in a year) as a proxy for heat output vary hugely across different building types and heat uses, and it is therefore difficult to make generalisations which are applicable across the board. However, the tariff setting methodology is sensitive to assumptions on load factors, for example a heat pump which is operating 30% of the time would require around 1/3 of the tariff that it would require if operating only 10% of the time.

The approach to ensuring value for money (VfM) of the RHI

The current VfM cap

47. When the non-domestic scheme was launched in November 2011, tariffs were capped at the level of support provided to offshore wind, which was judged to be the marginal technology that must be deployed to meet the 2020 renewables target. Therefore paying more than this level was considered not to offer good value for money in terms of contributing to meet the 2020 renewable targets, which is the principal objective of the RHI.

48. The cap was estimated to be 8.5pkWh in 2011, based on the value of Government support for offshore wind, which after increases to take into account inflation would imply 9.5p/kWh in 2014/15 prices – when any new tariffs as part of this review will be delivered.. At the time the only technology affected by the cap was solar thermal as the rest of the tariffs were below this level.

49. An additional consideration in relation to the current definition of the value for money cap is that in identifying the original cap, the benefits of the carbon floor price floor and the EU Emissions Trading Scheme (EU ETS) on the wholesale electricity price were not take into account. There is no carbon price applied to natural gas. When this factor is taken into consideration in addition to adjustments by the RPI, the VfM cap is estimated to be around 11.3p/kWh (in 2014/15 prices).

Change of approach to VfM

50. The timeframe between now and 2020 is relatively short given the scale of increase in renewable heat required. We therefore must ensure that we act quickly and decisively where deployment is below expectation to maximise our chances of meeting the target. In addition we must also ensure that the renewable heat supply chain is in a position to begin mass deployment from the 2020's and through to our decarbonisation target of 2050, to which a contribution from renewable heat is indispensable, as outlined in 'The Future of Heating: Meeting the Challenge'[5].

51. The evidence review which we have conducted as part of this tariff review suggests that the cost of renewable heat technologies are higher than previously anticipated and that our current approach to define the value for money cap will constrain the support needed to incentive the necessary deployment of renewable heat technologies to achieve the indicative renewable heat contribution to the 2020 target - this has been defined as 12% of all heat demand to be met by renewable sources by 2020 (currently renewables represent around 2% of total heat demand). In particular, the highest tariff required for a technology which can make

[5] The Future of Heating: Meeting the Challenge' sets out the specific actions needed to help deliver low carbon heating across the UK in the decades to come: https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

a material contribution to the renewable energy target is that of Non Domestic GSHP at 12.5p/kWh renewable heat (or 9p/kWh total heat output). We therefore propose to cap support across the non domestic RHI scheme as a whole at this level. Solar Thermal is the only other technology which is affected by this as evidence suggests that it would need a higher tariff than 12.5p/kWh. We do not propose to support solar thermal beyond this level, however, as this technology is not likely to make as significant a contribution to the 2020 target as other technologies supported in the scheme.

52. Although this takes RHI support beyond the VfM cap of 11.3p/kWh, these tariffs can be judged as providing value for money as part of a transition strategy to a more cost-effective set of DECC policies aimed at household energy efficiency and low carbon energy with the potential for cost reduction. That is, in the long term, we will need renewable heat technologies to provide low carbon energy at an affordable price for the taxpayer and consumer. To achieve this, evidence suggests we need to drive deployment now to achieve cost reductions.

53. While the support cost of offshore wind would drop to an equivalent of 10.9p/kWh in 2015/16 and 10.5p/kWh in 2016/17 as a result of the number of Renewable Obligation Certificates (ROCs) being reduced - we do not propose to couple the RHI VfM cap to these falling costs. This is because offshore wind has been subsidised for a longer period and to a larger scale, so it is not reasonable to expect RHI cost reductions to happen on exactly the same timetable.

54. For comparison purposes, it is important to be aware that non-domestic RHI tariffs are paid on *all* heat output. Some technologies supported under the scheme, i.e. heat pumps, are not 100% renewable. This is because heat pumps extract heat from the sun stored in the air or ground and are powered by electricity. So for every unit of heat delivered by the device, electricity, which is currently largely generated from fossil fuel sources, is responsible for a certain proportion of this – the exact proportion being determined by a system's efficiency. The subsidy cost per unit of renewable heat output is therefore higher than that out on total heat output. The method of determining the renewable proportion of a heat pump's output is set out by the European Commission and can be found at [insert link].]

55. The assumption that has been used to calculate equivalency of GSHP tariffs paid on all heat output to p/kWh is that the average Seasonal Performance Factor (SPF), a measure of efficiency, of these systems is 3.6. This assumption is also used to calibrate modelled tariffs.

Consultation Question	
1	Do you support the approach to ensuring value for money in the RHI? If not please state why.
2	Do you agree that the assumption of an average SPF of 3.6 is correct for non domestic GSHP? Please provide any evidence you may have to support your answer.

Proposals for reviewed tariffs

Approach to reviewing tariffs

56. We are continuing to aim to incentivise up to the 50th percentile of the heat potential of each technology and to provide a rate of return of 12% for installations at the upper end of this range. To identify proposed tariffs we have moved from the tariff setting approach taken to date – which has relied primarily on model outputs – to an approach that combines model outputs with evidence from other sources. We believe that we should triangulate model outputs since we have limited evidence and data for some sectors and technologies and the sensitivity of the tariff setting methodology. Therefore the tariff levels proposed in this consultation have been identified from an assessment of both the quantitative and qualitative evidence currently available

57. In making this assessment, we have considered the following variables:

- forecast deployment, based on projected expenditure of current applications, for those technologies already supported;
- the range of modelling outputs resulting from different combinations of evidence set out in Table X in Annex B;
- the tariffs presented by the renewable heat industry in response to consultations and as part of our on-going engagements with them, the range of which is set out in Table X in Annex B;
- the recommendations of DECC engineering specialists;
- the behaviours currently resulting from tariff structures such as size banding;
- the nature of each technology in question and specific risks around over- or under-compensation of that technology;
- the relativities of tariffs, where there are clear parallels between the technologies and their applications, e.g. biomass boilers and biomass direct air heating and their relative costs.
- How each technology is used and therefore the deployment that can be achieved, or strategic role it has to play.[FM3]

Consultation Question	
1	Do you agree we should continue to focus on targeting a 12% rate of return on the additional capital investment on those installations on the upper end of the 50th percentile cost curve?
2	Do you agree our revised approach to identifying tariff levels is an improvement on the previous approach?
3	Are there other material factors we should consider in making judgements about the tariff levels needed?

Biomass: small (0 – 199kW) and medium (200 – 999kW) tariff bands

Proposed approach
58. We propose that the small and medium biomass tariffs should not be adjusted through this review since deployment is strong and the current tariffs are within the range of model outputs, xx – y. The tariffs will remain subject to the degression mechanism. 59. In addition any new tariffs as a result of this review will come into force from spring 2014 and it is possible that a degression for one, or both, tariffs could occur before then. Rapid fluctuations in tariffs would lead to further uncertainty in the industry and investor base and have a negative impact on the industry.
Forecast deployment
60. These technologies are currently deploying very well through the RHI scheme. As of 30th April, we forecast RHI expenditure on small and medium biomass to be 114% and 163% of their anticipated levels of deployment respectively, as set out in table 4..
Industry views and market intelligence
61. We are aware that a key consideration is providing certainty so that the current, strong deployment in small and medium biomass is able to continue. If an increase in tariffs were proposed as part of this review, this could lead to a short term reduction in investment as investors wait to ensure that they are able to capitalise on any new tariff, and therefore slow the market until the new tariffs were available. Any other adjustments, such as a change in banding, could also destabilise the market and negatively impact on uptake.
Range of updated model outputs
62. The current tariffs for small and medium biomass are in the range of updated model outputs: 6.2 – 10.6; and 3.9 – 8.3p/kWh respectively.
Other considerations
63. Measures to enforce biomass sustainability and air quality are due to come into force over the next year. The introduction of these measures has been the Government's published intention since the scheme was launched in 2011 – although implementation is occurring later than originally planned. This will mean that the industry faces higher costs, but these are already factored into modelled tariff levels. 64. Banding of tariffs: DECC is aware that there are some calls from the biomass industry to revise the banding of tariffs to ensure that appropriate rates return are available for installations of all sizes. In addition, DECC observes through application data that there are trends towards clustering of installations at the tariff band boundaries. This clustering could be explained by an incentive to undersize installations given the banding structure delivers higher tariffs for the smaller capacity bands. However, we are also aware that in some cases the tiered structure of the biomass tariffs, a higher tariff is paid to the first 15% of heat output, could result in an incentive to oversize installations – appropriate sizing is an important factor in system efficiency.

65. We accept that there will be a certain amount of behaviour to maximise the benefits of any step-change in boundaries which it may not be possible to manufacture completely out of the policy without introducing overly prescriptive levels of granularity. These issues have not been addressed in this tariff review as more work would be required to fully understand the interaction between incentives created by banding and tiering and determine if either, or both, has a distortive effect on RHI applicants' choice of installation size. [DECC will consider revisiting this issue in the 2014 review of the non domestic RHI scheme.]

Cost control and overcompensation implications

66. There is currently a degression mechanism in place which will ensure that where deployment goes above tariff triggers, tariffs will be brought down automatically to ensure that the budget is sustainable. Given that current deployment is strong, any increase in tariffs could result in overcompensation.

Relativities to other tariffs

67. If GSHP tariffs are increased this may to lead to some increased competition with the small and medium biomass sectors. Similarly, there may be some substitution as ASHPs are brought into the scheme.

68. Evidence suggests that costs per kWh reduce as capacity of biomass installations increases. Therefore, the tariff for small biomass is greater than medium, and medium greater than the large capacity band. Biomass boilers are also more expensive than biomass direct air installations, which do not heat water.

Consultation Question	
1	Do you agree that the small biomass tariff should not change from its current levels through this tariff review?
2	If not, why should the small biomass tariff be revised and what would be an appropriate tariff? Please provide any evidence you may have to support this view.
3	Do you agree that the medium biomass tariff should not change from its current level through this tariff review?
4	If not, why should the medium biomass tariff be revised and what would be an appropriate tariff? Please provide any evidence you may have to support this view.
5	Do you agree that the current approach of banding and tiering of tariffs is incentivising the installation of inefficient systems? If so, what evidence do you have, and do you have any suggestions on how this could be deterred?

Large biomass (over 1MW)

Proposed approach
69. Given current low deployment, and strong views from industry that the current tariff is too low, we propose that a significantly increased tariff of 2.0p/kWh would be sufficient to incentivise up to 50% of the heat potential of the large biomass tariff band and deliver a 12% rate of return for installations at the upper end of this range. We have targeted this proposal towards the middle of the range of industry views that have been shared with us, which lies at the upper end of the range of updated model outputs. 70. The model outputs, however, show a high degree of variance, and are based on a limited quantity of data, and we therefore consider the evidence of the weak effect of the current tariff and the evidence from industry to be stronger indicators of an appropriate tariff level. There is a low risk of cost control issues associated with this proposal (see below), and it still represents very good value for money as one of the lowest proposed tariffs in the scheme. Increased uptake of large biomass installations would lead to significant deployment of cost effective renewable heat.
Forecast deployment
71. As of 30th April, RHI forecast expenditure on large biomass will be 26.4% of anticipated deployment when the tariffs were modelled in 2011. However, there are other factors, apart from the tariff, which could be responsible for low deployment. Large installations, over 1MW, are likely to have long lead-in times and lack of certainty about the final level of RHI support received may also deter investment, at target 12% rate of return. We are continuing to explore options for addressing this issue through 2013 as set out in the February 2013 Government response.
Industry views and market intelligence
72. Following the reduction in tariff from 2.7 to 1p/kWh as required by the European Commission, prior to the scheme launch in 2011, some parties in the biomass industry fed back that of the projects they were aware of more than half which were planned at the 2.7p/kWh rate originally proposed were suspended or cancelled. Therefore, DECC issued a call for evidence to verify our assumptions about the capital and operating costs of large biomass boilers and their performance in September 2012. As well as asking for data on costs, in parallel with the Sweett Group work, we asked for specific examples where large biomass projects have not gone ahead. 73. That call for evidence prompted four responses, three of which provided some evidence of the following: • examples of projects that received a lower rate of return than 12%; • were not viable against the counterfactual; or, • provided cost estimates higher than the assumptions on which the current tariff is based. 74. The Sweett Group did not receive any new cost or performance data on installations of

above 1MW capacity.

75. The original proposal of a tariff off 2.7p/kWh tariff was intended to support both heating only and combined heat and power (CHP) installations. The majority of industry reaction to the 1p/kWh tariff related to the support not being adequate for CHP installations. However, we consulted in September on introducing a specific biomass CHP tariff of 4.1p/kWh and are now working on finalising this policy.

Range of updated model outputs

76. The range of updated modelled tariffs is inconclusive, 0 – 2.2p/kWh. There outputs relating to Sweett costs are based on an extrapolation of the data for biomass below 1MW as there is no new evidence for large scale installations.

Other considerations

77. As for small and medium installations, measures to enforce biomass sustainability and air quality are due to come into force over the next year.

Cost control and overcompensation implications

78. There is often a long lead in time for large biomass installations, usually 12 months or more. If a higher tariff resulted in an increase far beyond the level of expected deployment, it is possible that there would be a number of projects in the pipeline which DECC would not be aware of. However, given that degression assessments take place every three months, and that lead-in times for large installations could be over one year, it is unlikely that degression would not be sufficient to control spending on this type of installation.

79. On the other hand, there is a risk that overall deployment could be relatively low and there could be a sudden unexpected spike in deployment. In this case successive degressions would be likely to occur.

Relativities to other tariffs

80. The recommended large biomass tariff is around half the tariff proposed in September 2012 for the dedicated biomass/bioliquids CHP tariff of 4.1p/kWh. Heat pumps are rare at the capacities at which large biomass installations can be deployed. It is possible that some of the current deployment in the medium biomass tariff band is due to installations which are ‘under-sizing’ that is fitting boilers just below the 1MW threshold in order to gain a higher tariff. A higher large biomass tariff could therefore induce a switch from some medium biomass deployment to the larger band tariff. This would increase the cost effectiveness of the scheme overall. However, the effects of the banding structure are uncertain and will be explored further in the 2014 review of the non domestic RHI.

Consultation Question	
5	Do you support our rationale for a tariff of 2.0p to incentivise significant deployment of large biomass (specifically 50% of the heat potential) whilst avoiding

	overcompensation? Are there other factors we should consider? Please provide any evidence you may have to support your answer.

Small and large ground source heat pumps (GSHPs)

Proposed approach
81. Given that GSHPs can perform at relatively large scale to provide space and hot water heating in a variety of different building categories they can make a material contribution to the 2020 renewable energy target. The long-term strategic value of GSHPs is discussed in the Government's framework for low carbon heat: 'The Future of Heating: Meeting the Challenge'.[6] In particular, they are part of the Government's long term aim to increase energy efficiency, and the deployment of low carbon energy with the potential for cost reduction. 82. Given the current, very low, level of deployment, a substantial increase is likely to be required to incentivise up to 50% of the heat potential of this technology. Updated model outputs show that the tariff could need to be as high as 11.7 or 10.8p/kWh to target the 50th percentile of the small and large bands respectively. In addition, the industry has also submitted evidence which indicates that tariffs of up to 10.7 or 8.0p/kWh would be needed to incentivise the small and large bands respectively. We therefore propose a single tariff of 9.0p/kWh for 100% of the heat output of GSHPs, for both capacity bands of GSHPs, to target the upper end of the range of industry and market evidence, which is below the high end of the range of model outputs. 83. Single tariff: the modelled tariffs for small and medium GSHPs are relatively close to one and other and when using some data combinations the model suggests a higher tariff would be needed by large installations than for smaller ones. In addition, some key stakeholders (the GSHPA) have suggested a single tariff for GSHPs is needed (they suggest 9.4p). Given the lack of strong evidence for separate tariffs we have opted to consult on a single tariff. This may also have the additional benefit of not encouraging inefficient system design which may be occurring under the biomass tariff bands. 84. Tiering: if a tariff is substantially higher than the fuel costs of producing heat from an installation, a tiered tariff is appropriate to ensure that above a typical level of reasonable use there is no continued incentive to produce unneeded heat solely to gain payments from the RHI scheme. 85. We propose to tier the 9.0p/kWh tariff given it is well above the operating costs of GSHPs and ask for evidence through this consultation on the most appropriate way to do this. The way in which a tariff is tiered depends on the operating costs of the technology and the level of use, i.e. load factor. The small and medium biomass tariffs offered through the scheme are currently tiered based on the assumption that the minimum reasonable use is a load factor of 15% and that operating costs are 2.3p/kWh. We propose to extend this methodology to the GSHP tariff, but acknowledge that, given the differences between the technologies, there

6

may be a better solution for GSHPs. Table 6, below, shows the effect of tiering on the proposed GSHP tariff.

86. Value for money comparison: this tariff equates to paying 12.5p/kWh on the renewable heat component when the electricity used by the heat pump is accounted for[7]. This is beyond the current level of support for offshore wind at 11.3p/kWh. However, we expect that this tariff will help drive the transition to a set of policies aimed at low carbon energy with the potential for cost reduction. Costs of technologies can often come down over the long term, as deployment increases, through increased competition, innovation and economies of scale. The industry has already provided DECC with some evidence that up to 20% cost reductions could be achievable by 2020. A reduction of this size would result in a much greater reduction in tariff levels. We are seeking further evidence of the potential for cost reductions through this consultation.

87. We propose to apply contingent degression to this tariff as is already applied to the current GSHP tariff, to ensure value for money and control costs. [Another option that could be considered in future to ensure that relatively high tariff levels come down over time is to apply automatic degression to tariffs to bring them in to line with the level of support for offshore wind. That is, if deployment, and therefore cost reductions, were not to be stimulated to the extent that we expect, such a mechanism could ensure that relatively high tariffs were not made available for relatively little return in renewable heat. We do not consider that such a mechanism is necessary at this time as our focus is on working with the industry to ensure that growth can be achieved.]

Forecast deployment

25. As set out in paragraph xx, a key reason for carrying out this early review of tariff levels, was the take-up of individual technologies compared to the levels of deployment that are required to meet the 2020 renewable energy target. Low take-up may suggest that the market is not being incentivised sufficiently by the subsidy levels currently offered, although this is not the only factor which affects up-take.

26. RHI forecast expenditure at 30th March on small and large GSHPs will be 1.3% and 10.2%, respectively, of the level of anticipated expenditure, or expenditure we have prepared for in the case of large GSHPs.

Industry views and market intelligence

88. DECC has received significant feedback from the GSHP industry over the past 12 months that the input assumptions used in the RHI model have resulted in a tariff which is too low to result in the uptake that we have stated is necessary to reach the 2020 renewable energy targets. The industry has provided evidence that the current tariff does not provide a 12% rate of return for most potential installations primarily because assumed load factors and

[7] This is based on a seasonal performance factor (SPF) of 3.6. This SPF is assumed because…

capex assumptions are not realistic.

89. DECC has engaged with potential investors in GSHPs who have reinforced this view, which is also supported by the current low deployment of GSHPs in the scheme. Other factors, such as the high upfront cost of this technology during a period when capital is hard to obtain, could also be having an influence on the low deployment of this technology.

Range of updated model outputs

90. Current tariffs are at the bottom of, or outside, the range of updated model outputs, 5.2 – 11.7; and 3.2 – 10.8 kWh for small and large systems respectively. The updated model outputs also show that tariffs for both bands, that is up to 99kW and from 100kW and above, that are considerably closer together than the current tariffs.

Other considerations

91. Heating and cooling GSHPs: in line with the intention of the policy we intend to enable the tariff to be paid on the full amount of heat generated by all heat pumps, consistent with spreading the cost of the installation over all heat output. One of the benefits of GSHP systems is that they are capable of taking excess heat and 'storing' it in the ground, thereby increasing the performance of the heating function of the system, reducing the electricity consumed and resulting in carbon savings.

92. However, under EC guidance the heat derived from human activity (i.e. the heat extracted from the building and returned/stored in the soil) is not considered renewable and does not therefore count towards the Renewable Energy Directive targets. The current RHI regulations attempted to address this issue by constraining eligibility to "naturally occurring" sources of heat. A side effect of this approach has been to complicate the accreditation process for heating and cooling heat pump installations and a reduction in payments (to account for the non-renewable portion). Industry believes this is an additional factor in the low uptake levels.

93. This is inconsistent with the original policy intent of the RHI and has had the effect of discouraging low carbon and cost effective applications of renewable technologies. We therefore intend to work on a replacement for the 'naturally occurring' requirement that would enable us to pay out on all heat produced by GSHPs, without the need to reduce the payments. We intend for this replacement to be a simple safeguard which would exclude extreme behaviour such as direct heat recovery passed through the ground. We will be working with industry to develop this safeguard over the coming months so that if possible, it can be introduced into regulation in spring 2014.

94. Consequently, we intend that any increased tariff delivered through this consultation would be paid on all heat output of eligible GSHPs.

95. [The European Commission has recently confirmed that heat-driven heat pumps (e.g. gas fired) do contribute to renewable energy targets where equipment has a co-efficient of performance greater than 1.15 [insert link]. These technologies have very different cost and

performance characteristics to those we have modelled for the RHI to date and do not currently meet the minimum 3.5 COP set out in our regulations. DECC intends to work with industry to build the evidence base and complete the modelling and analysis necessary to evaluate the case for support for these technologies.]

Cost control and overcompensation implications

96. There is currently a degression mechanism in place for GSHPs. The risk of degression not being adequate to control RHI spending on GSHPs at this higher tariff is low, given the current low deployment, and the relatively small supply chain. If deployment were to increase significantly beyond expectations, then the current degression mechanism would apply. It is therefore unlikely that any persistent overcompensation could occur, despite the proposal of a higher tariff.

Relativities to other tariffs

97. Expert industry views suggest that the tariff for GSHPs should be between approximately 3 and 4 times higher than for AWHPs, taking into account the cost differences.

98. Currently, support for Deep Geothermal under the RHI is coupled to the large GSHP tariff. This approach was taken when the scheme was launched due to a lack of specific cost data for Deep Geothermal, but with the knowledge that there would not be any overcompensation due to the fact that Deep Geothermal usually has significantly higher capital costs than GSHPs.

99. In September 2012 we proposed a new, dedicated RHI tariff of 5.0p/kWh for Deep Geothermal, based on evidence from industry, to be paid on all heat output of a plant. Although we propose a significantly higher GSHP tariff in this consultation we do not think that there would be any adverse consequences to investment in Deep Geothermal due to the change in relativity of these tariffs, if that tariff were introduced.

100. This is due to the fact that the nature and use of GSHPs and Deep Geothermal vary significantly: GSHPs are usually deployed to supply space and hot water heating in single buildings, and typically have load factors of around 20%, while Deep Geothermal is often is often used to supply district heat schemes which have much higher load factors. We are proposing for the GSHP tariff to be tiered and that tier 1 payments are paid only on the first 15% of the heat output.

Table 6: Proposed tariff and VfM cap with tiering

Tariff **(p/kWh for all heat output)**		Tier 1 (first 15% of heat output only)	Tier 2 (any remaining heat output)
Proposed GSHP tariff	9.0	11.2	2.3

Consultation Question	
7	Do you support our rationale for a tariff of 2.0p to incentivise significant deployment of GSHPs (specifically 50% of the heat potential) whilst avoiding overcompensation? Are there other factors we should consider? Please provide any evidence you may have to support your answer.
8	Do you agree that a ground source heat pump tariff should be roughly about 3 and 4 times higher than a tariff for air-water heat pumps?
9	Can you provide any evidence on the potential for cost reduction so that support may reduce to the equivalent cost of offshore wind of [6.4p/kWh]?
10	Do you agree that the tiering methodology is the correct approach for GSHPs? If not, please provide evidence on: a. what the minimum reasonable usage should be; and b. what the tier 2 tariff, i.e. operating cost should be set at.

Solar thermal

Proposed approach
102. Through this review, we propose to raise the tariff for solar thermal under the non-domestic scheme to 12.5p/kWh. As set out in paragraphs xx – yy, our proposed approach to value for money is that we should not provide support above the highest tariff required for heat technologies which can make a material contribution to the 2020 target. Through this review we have identified that this is the tariff for GSHPs at 12.5p/kWh. 103. Although this is likely to be below the level required to incentivise 50% of the supply chain, industry have presented evidence of cost reduction for this technology which implies that installation costs could come down over time. There is therefore merit in increasing the tariff paid to solar thermal to help develop the market for this technology. 104. However, as we have set out that tariffs should be no higher than that of the most expensive, material heat technology, tariffs for Solar Thermal would have to reduce in line with non domestic GSHPs if that tariff was degressed. Nevertheless, the tariff would not reduce to below the level of support for the marginal cost of renewable energy, 11.3p/kWh in 2014/15 prices. 105. Industry has suggested that, given that additional investment in solar thermal is almost entirely due to up front capital costs, a shorter payback period may be more appropriate. For example a seven year tariff is under consideration in the domestic scheme but has not been an option that DECC has previously consulted on or modelled under the non-domestic solar thermal tariff. Tariff payment lifetimes have not been considered under the early tariff review for any technology, however this may be an option we look at as part of the 2014 review of the RHI, but will require further evidence through this consultation.
Forecast deployment
106. Forecast deployment of solar thermal is around 3.6% of the level of deployment we have prepared for, for this technology.
Industry views and market intelligence
107. Given the current tariff is set at the previous estimate of the marginal cost of renewable energy, 9.5p/kWh (in 2014/15 prices), which is around one third of the median of the range of the modelled tariffs, it is unsurprising that deployment is low as this level is unlikely to deliver a 12% rate of return . Industry stakeholders have stated that they do not expect to see significantly greater levels of uptake of solar thermal under the current tariff. 108. The Solar Thermal Industry has proposed an optional seven-year tariff for this technology on the grounds there are no excess fuel costs to reimburse over the lifetime of the product – all the excess costs are upfront – and a minimal risk of switch-back.
Range of updated model outputs
109. The updated model outputs continue to show that solar thermal would need a tariff well

beyond the current VfM cap, 24.2 – 27.8p/kWh.
Cost control and overcompensation implications
110. Given the high costs of solar thermal and the proposed tariff remains much lower than model outputs, the risk of overcompensation remains very low.
Relativities to other tariffs
111. The proposed approach would bring solar thermal in line with the support we propose for GSHPs on a per kWh of renewable heat basis.

Consultation Question	
11	Do you support an up-lift to the solar thermal tariff to 12.5p/kWh? If yes, please provide reasons.
12	Will increasing the tariff by this amount bring forward projects that would otherwise not have received investment? If yes, please provide evidence.
13	What do you perceive as the main opportunities and downside risks of the industry's proposal for a seven year tariff option?

Affordability constraints and budget management [SMS(&I4]

27. In February we announced a long-term, flexible budget management system for the non-domestic scheme, based on degression of tariffs. The Regulatory changes necessary to give effect to this mechanism came into effect in [April[8]]. Under a system of degression, tariffs will be reduced by a set amount for new applicants to the scheme, but only if deployment meets pre-determined expenditure limits, "triggers".

28. The triggers for the non-domestic RHI scheme are based on the level of deployment required to maintain a trajectory to deliver the 2020 renewables target. Details of how the mechanism operates have been published by DECC[9], [and Ofgem[10] will shortly publish guidance for applicants]. The first formal assessment of forecast expenditure against the degression triggers has also been brought forward to coincide with this consultation[11].

29. We intend that our degression-based system will be used to control spend for all new technologies as they are added to the non-domestic scheme, including those that we consulted on in September 2012[12]. In addition we will need to consider whether any changes made to existing support levels following this consultation require existing triggers to be revisited. Amended regulations would need to be presented to Parliament for their approval, and we expect this will take place in in the same set of regulations that implement the new tariffs.

Summary of proposed and existing non domestic tariffs

112. The proposed tariffs and updated indicative tariffs together with the tariff levels which have not been updated are set out below in order to provide a complete picture on the range of technologies and tariff levels under consideration.

[Insert Chart]

Next steps

Date	Milestone
20 June	Consultation closes

[8] The Renewable Heat Scheme (Amendment) Regulations 2013

[9] Insert relevant link

[10] Insert relevant link

[11] Insert relevant link

Summer 2013	Conclusion of RHI support for technologies proposed in September 2012: • AAHP • AWHP • BDAH • Biomass and Bioliquid CHP • Medium and large biogas • Deep Geothermal • Expansion of criteria for energy from waste
Autumn 2013	Announce confirmed revised tariffs for technologies in scope of the tariff review and AWHP and BDAH if included
Spring 2014	Implementation of extensions to non-domestic scheme and revised tariffs for existing technologies – subject to parliamentary and European State Aids approval.

Annex A: impact on tariffs consulted on in September 2012

How the review affects extensions and improvements to the scheme

25. In July 2012, DECC consulted on a number of improvements to the scheme, including the long term budget management system, as described in paragraphs xx – yy, mandatory air quality and biomass sustainability requirements, and simplifying metering arrangements for participants in the scheme. The budget management mechanism is now set out in regulation, with the first degression assessment and release of monitoring data published alongside this consultation[13]. We continue to progress work on biomass sustainability, air quality and metering simplifications which we expect to have in place by [mm/yy].

26. Following this, in September 2012, DECC conducted three consultations on extensions and expansions of the support available through the RHI. This included proposals for an RHI scheme in the domestic sector, i.e. to support renewable heat in individual households, as well as an expansion of the non-domestic scheme to include the following new technologies and tariffs:
    - Air to water heat pumps (AWHP);
    - Air to air heat pumps (AAHP);
    - Medium and large biogas combustion - for capacities greater than 200kW;
    - A specific tariff for biomass and bioliquid combined heat and power (CHP);
    - Biomass direct air heating;
    - A specific tariff for deep geothermal.

27. In addition we also consulted on expanding the eligibility criteria for combustion of waste for heat to include a wider range of waste sources for fuel.

28. We will conclude on those proposals in response to the September 2012 consultations in summer 2013. In this consultation we are presenting updated indicative tariffs for those technologies consulted on in September 2012 which meet the following criteria:

    - there is new evidence available following the Sweet Group work on the cost of the technology;
    - the emerging evidence from that consultation presents a strong case for inclusion in the scheme; and,
    - the relativities to tariffs included in this review are important.

29. Given the evidence we have gathered through the September 2012 consultation we believe that there is a strong case emerging that AWHP and BDAH should be supported, although

[13] Insert link to degression announcement

support for BDAH may be difficult to introduce given the complexities of metering. Tariffs for these technologies are important to consider alongside GSHP and biomass tariffs respectively. For AAHP the emerging case is less strong, given our current evidence.

30. For medium and large biogas combustion, biomass and bioliquid CHP, and deep geothermal, there is an on-going body of research which led to the proposals for support in September 2012. This research was not updated by our review of the RHI evidence. Therefore, the consultation stage tariffs are the most indicative of DECCs view of the appropriate level of support, pending the conclusion on RHI support, due in summer 2013.

31. Table 5 sets out the status of evidence for each of the technologies consulted on in September 2012, updated tariffs where applicable, and the stage at which conclusions will be reached on proposals set out in that consultation.

Table 5: Technologies consulted on in September 2012

<table>
<tr><th>Technology</th><th>Updated tariff?</th><th>Status of evidence</th><th>When will conclusion be reached on RHI support?</th><th>When will conclusion be reached on final tariffs (if supported)?</th></tr>
<tr><td>Air to water heat pumps (AWHP)</td><td>Yes</td><td>New evidence following Sweet Group research. Industry views on tariffs, and important to consider alongside proposed GSHP tariff</td><td rowspan="2">Response to September 2012 consultation in summer 2013</td><td rowspan="2">Response to tariff review autumn 2013</td></tr>
<tr><td>Biomass direct air heating (BDAH)</td><td>Yes</td><td>Some new evidence following Sweet Group research, though little new cost data. Industry views on tariffs, and important to consider alongside biomass tariffs</td></tr>
<tr><td>Air to air heat pumps (AAHP)</td><td>No</td><td>Some updated cost data from Sweett Group. No update to tariffs given evidence from Sept 2012 consultation</td><td>Response to September 2012 consultation in summer 2013</td><td>Response to tariff review autumn 2013</td></tr>
<tr><td>Medium and large Biogas</td><td>No</td><td rowspan="3">No new evidence from Sweett Group. Other research and on-going work to support conclusion of September 2012 consultation.</td><td colspan="2" rowspan="3">Response to September 2012 consultation summer 2013[SMS(&I5]</td></tr>
<tr><td>Biomass and Bioliquid CHP</td><td>No</td></tr>
<tr><td>Deep geothermal</td><td>No</td></tr>
</table>

113. In September 2012, we consulted on extending the non-domestic scheme to a range of new technologies and identified a further three technologies where we thought it might be possible to introduce support. The Government is currently finalising its response to this consultation and expects to confirm its intentions later this summer. In the interim, as our evidence suggests that the relative value of tariff levels across the RHI is an important factor in the levels of uptake, we have used the new evidence provided by Sweet Group to remodel tariffs for air-water heat pumps and biomass-direct air. These updated indicative tariffs together with the tariff levels which have not been updated are set out below in order to provide a complete picture on the range of technologies and tariff levels under consideration.

Air to water heat pumps (AWHP)

Updated indicative tariff
114. Given the updated evidence base and the opportunity to gather industry views on tariffs through the September 2012 consultation, we now believe that a tariff of 2.5p/kWh would be sufficient to incentivise significant uptake and potentially increase competition in the market whilst not incurring too great a cost control risk. This tariff is in the middle of the stakeholder views we have collected, but lower than the range of model outputs. 115. The conclusion of whether to give RHI support for AWHPs will be presented in the response to the September 2012 consultation 'Renewable Heat Incentive: Expanding the Non Domestic Scheme', which is due to be published in summer 2013. However, the final tariff will be presented in response to this consultation in autumn 2013, once all of the views on the relativities between the tariffs in scope of this review have been taken into account. 116. The industry views collected as part of the September 2012 consultation have been taken into account in updating the tariff, so we do expect to gain significant further evidence on this at this point, but welcome any views or evidence not previously submitted.
Industry views and market intelligence
117. The 1.7p/kWh tariff consulted on in September 2012 was well received by some industry stakeholders, though there were suggestions that the tariff should be higher, up to between 1.9p and 2.9 p/kWh.
Range of updated model outputs
118. The range, 3.8 – 6.6p/kWh is much higher than the previous consulted on tariff, which at 1.7p/kWh is less than half the lower end of the range. [However, the higher figure of 6.6p/kWh should be discounted given the small sample size of data it is based on].
Cost control and overcompensation implications
119. AWHPs are a technology which could be deployed relatively quickly. There is also the potential for cheaper models of this technology on the international market to be brought into the UK market, although these have not been included in the input assumptions into the tariff calculator. If tariffs are too high this is likely to lead to overcompensation on a large scale,

with implications for overspend of the RHI budget. We have therefore taken this into account when considering the appropriateness of the model outputs.

Relativities to other tariffs

120. This tariff leads to a ratio of around 1:3.6 with GSHPs, which is within the range often quoted by industry experts as striking the right balance of support between the two technologies, that is between 1:3 and 1:4. The tariff remains lower than biomass.

Air to Air Heat Pumps (AAHP)

121. There are two distinct types of AAHPs currently in use in the UK, those which perform both heating and cooling functions, known as reversible, or those which perform heating only. There is already a strong and growing market for reversible AAHPs in the UK, with approximately 220,000 terminals (both domestic and non-domestic) being sold in 2011, worth an estimated £600million in first point sales. DECC fully supports the deployment of reversible AAHPs as energy efficient renewable heating devices and will continue to monitor the growth of the industry.

122. For further explanation of the proposals for AAHPs, please see the September 2012 consultation on expanding the RHI[14]

Biomass Direct Air Heating (BDAH)

Updated tariff

123. The range of updated model outputs implies that a minimum tariff of 3.2p/kWh would be necessary. Given this and the industry view that the previously proposed tariff, of 2.1p/kWh could feasible stimulate uptake, though at the lower end of the range required, a tariff between these two values is likely to be the most appropriate to incentivise a variety of BDAH installations in the range under 1MW without leading to overcompensation. This indicates a tariff of around 2.5p/kWh.

124. The modelled tariff for installations under 1MW proposed in September was based on data for the whole range of capacities, but this was greater than large biomass. However, since BDAH has lower associated capital costs than biomass boilers due to the fact that they do not heat water we proposed that it be paid no more than the large biomass tariff to ensure there was no overcompensation. We have also taken this approach when updating the large BDAH tariff, that is that it should receive the minimum of the large biomass tariff and the tariff for BDAH under 1MW, which leads to an updated tariff of 2.0p/kWh for installations over 1MW.

Industry views and market intelligence

[14] Insert link

125. The industry's view on the tariff proposed in 2012, of 2.1p/kWh for BDAH up to 1MW, was that this was feasible to stimulate uptake, although there were suggestions it should be higher.

126. We proposed a tariff of 1.0p/kWh for installations larger than 1MW, as the modelled output of 2.1p/kWh included a small amount of data on installations of this size. However, the industry agrees that BDAH is in theory cheaper than biomass boilers due to the fact that heat is not transferred by heating water.

Range of updated model outputs

127. The Sweett Group collected a small sample of data points for BDAH, therefore the most reliable model output is likely to be that based on AEA data which is a modelled tariff of 3.2p/kWh, significantly higher than the previously consulted on tariff of 2.1p/kWh.

Cost control and overcompensation implications

128. With a degression system in place there is no particular risk of overcompensation for BDAH.

Relativities to other tariffs

129. The recommended tariff for small BDAH is lower than that for small and medium biomass boilers which are the main counterpart technologies and are generally higher cost.

130. The large BDAH tariff is proposed to be no higher than that for large biomass.

Annex B: tariff setting, model outputs and industry views

Tariff setting methodology

125. Assumptions are made, on costs, use and performance of a given technology in each category of building, broken down by sector and building type, e.g. commercial, industrial, counterfactual fuel and location, established on the basis of evidence gathering exercises. Added to this cost are additional barrier costs associated with installing a renewable heat technology.

126. Based on those assumptions, the additional cost of installing and running a renewable heating system compared to a fossil fuel equivalent is calculated and pro-rated per unit of heat use. This cost is referred to as the 'levelised cost'.

127. An estimate of the heat demand for each building type is made separately and, considering the number of such buildings and their suitability for a particular technology, a 'technical potential' is calculated for each technology corresponding to a particular building type. That is the amount of heat that we believe could be generated from that technology if all possible installations were deployed in a given building type within one year.

128. The building types are then ordered from the lowest to highest levelised cost for a given technology. The cumulative technical potential is calculated, moving from lowest cost upwards, and the median installation type is identified, i.e. the installation which relates to 50% of the total technical potential.

129. The cost associated with the median installation is used to determine the tariff level, which includes a 12% rate of return on the additional capital investment required to install a given renewable heat technology. This is the 'hurdle rate' identified as the return which is needed to overcome the perceived risk associated with investment in an alternative technology and compensation for additional capital investment.

Datasets from AEA and the Sweett Group

130. The two datasets we now have on costs and performance have been derived using a different approach to making assumptions. For example in calculating heat demand associated with different building types:

- The older AEA data used expert opinion and stakeholder engagement to disaggregate total non-domestic heat demand to build a picture of how heat demand varies across different sectors, e.g. factories, commercial buildings etc. From this they estimated the typical heat demand in different building categories and how this could be met with different technologies, thereby inferring sizes and load factors (the percentage of the time a technology is operating at full capacity) of renewable heat installations.
- In contrast, the Sweett Group used a case study approach, i.e. a set of example buildings (school, office etc.), to build up a picture of non domestic heat demand. That is, they extrapolated from a number of real life examples to infer appropriate sizes and load factors of renewable heat technologies for different building categories. However, this was based on a relatively small number of examples.

131. The two datasets also give a different picture of capital costs associated with different size installations. Here, again, different approaches have been used:

- AEA used industry interviews and expert opinion to create a set of cost data that they considered appropriate and calibrated this to the categories of heat demand they identified.
- The Sweett Group used primary data, i.e. receipts, collected from industry, to calculate the expected cost of different size installations.

Table 7 shows a comparison of the Sweett and AEA capex assumptions (£/kW).

Technology	Commercial (AEA) - £/kW	Commercial (Sweett) - £/kW	Industrial (AEA) - £/kW	Industrial (Sweett) - £/kW
AAHPs	471-477	1,017	446	£1,017
AWHPs	588-827	725- 1,040	-	-
Biomass boilers	350-723	520-754	288-442	520-1,076
Biomass District Heating	701-1,380	631-725	701-1,380	684-737
Biomass Direct Air	292	687	£292	687
GSHPs	950-1,579	1,292-1,868	950-1,579	1,593-2,136
Solar Thermal	1,439	1,250-1,269	1,439	1,269

Table 8 shows a comparison of the Sweett and AEA load factor assumptions.

Technology	Commercial (AEA)	Commercial (Sweett)	Industrial (AEA)	Industrial (Sweett)
AAHPs	20-35%	10-22%	20-35%	8-23%
AWHPs	35%	10-26%	-	-
Biomass boilers	20-45%	13-29%	20-82%	8-50%
Biomass District Heating	20-45%	20-45%	20%	20%
Biomass Direct Air	20%	15-25%	20%	8-17%
GSHPs	35%	10-26%	35%	8-23%
Solar Thermal	6%	4-7%	6%	4%

Updated model outputs

132. To generate updated modelled outputs, we combined the data we have in different ways according to the relative strengths of the two datasets. We used cost data from the Sweett Group dataset, where it has been provided, with load factor data from both the Sweett Group and AEA, given our assessment of which of this data is most appropriate. For example the Sweett Group heavily caveated their industrial load factor data, given that it had been derived from a small set of assumptions. However, for commercial and public building sectors it is less clear which dataset offers the most realistic representation of renewable heat load factors.

133. We also generated updated model outputs based on the original AEA data. Those tariffs differ from those currently offered, or most recently consulted on, through the scheme, as other aspects of the tariff model have been updated, following an internal DECC review of the tariff setting model, based on the different assumptions made by Sweett and AEA and expert DECC engineering advice. These changes include fossil fuel and carbon price assumptions, changes to assumptions of suitability of technologies for different building categories or applications and the inclusion of the possibility of partial replacement of fossil fuel installations.

134. Table 9 shows these updated model outputs and the original or previously consulted on tariffs for those technologies in scope of the review.

Table 9: Range of model outputs for different input assumptions

Tariff (p/kWh)		Current tariff in 2014/15 prices (or September 2012 consultation tariff)	Updated input data		
			All AEA	Sweett costs and AEA heat loads	Sweett costs, with AEA heat loads for industrial
Biomass[15]	Small	Tier 1: 8.8	Tier 1: 6.2	Tier 1: 7.7	Tier 1: 10.6
	Medium	Tier 1: 5.5	Tier 1: 3.9	Tier 1: 4.0	Tier 1: 8.3
	Large	1.0	1.1	2.2	0.0
GSHPs	Small	4.9	5.2	6.2	11.7
	Large	3.6	3.2	7.2	10.8
Solar Thermal		9.5	26.5	27.8	24.2
AWHPs (consulted on)		1.7	3.8	3.8	6.6
Biomass direct air (consulted on)		2.1	3.2	6.3**	6.4**

**Cost data based on a relatively small sample size

[15] Tier 2 is always set at 2.1p/kWh

135. As described, considerable uncertainty will remain over the inputs and resulting modelled tariffs, and it is therefore important that we also consider other data available when reviewing tariffs. The industry views and market intelligence we have used comes from a variety of sources including the tariffs presented by trade associations, individual companies, or investors in response to consultations and as part of our on-going engagements with them. Table 10 shows a summary of the views on appropriate tariff levels which we have collected.

Table 10: Range of industry and market views on appropriate RHI tariffs

Technology		Current (in 2014/14 prices) or consulted on tariff	Range of industry and market views	
			Min	Max
Biomass	Small	Tier 1: 8.8	N/A	N/A
	Medium	Tier 1: 5.5	3.5	6.5
	Large	1.0	1.6	2.7
GSHPs	Small	4.9	8	10.7
	Large	3.6	3	8.0
Solar Thermal		9.5	N/A	N/A
Air to Water Heat Pumps (AWHP) (consulted on)		1.7	1	3.2
Biomass Direct Air Heating (BDAH) (consulted tariffs)	Small and medium	2.1	N/A	3
	Large	1.0	1.5	2.7