



Department  
of Energy &  
Climate Change

# Renewable Heat Incentive: Non-Domestic Scheme Early Tariff Review

# Non Domestic Scheme Early Tariff Review

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The consultation can be found on DECC's website:  
<https://econsultation.decc.gov.uk/>

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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 the cost of 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 beyond 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 any changes to the scheme, following the conclusion of this consultation, as quickly as possible to ensure that the industry and market receive any 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.

**The Rt Hon Greg Barker MP**

**Minister of State  
Department of Energy and Climate Change**

# Contents

<b>Renewable Heat Incentive: Non Domestic Scheme Early Tariff Review</b> .....	<b>1</b>
<b>Non Domestic Scheme Early Tariff Review</b> .....	<b>2</b>
<b>Ministerial Foreword</b> .....	<b>3</b>
<b>Contents</b> .....	<b>4</b>
<b>General information</b> .....	<b>6</b>
<b>Executive Summary</b> .....	<b>8</b>
Early tariff review proposals .....	8
Affordability constraints and budget management .....	9
Impacts of changes to tariffs.....	10
Update to the September 2012 consultation .....	10
<b>Background and Introduction</b> .....	<b>12</b>
About the RHI .....	12
Background to the review and scheme performance so far .....	12
Scope of the review .....	14
<b>Tariff setting and the evidence base</b> .....	<b>15</b>
Tariff setting methodology for current tariffs in the non domestic RHI.....	15
The evidence base .....	15
<b>The approach to ensuring value for money (VfM) of the RHI</b> .....	<b>16</b>
The current VfM cap .....	16
Consideration of additional impacts on VfM .....	16
<b>Proposals for reviewed tariffs</b> .....	<b>18</b>
Approach to reviewing tariffs .....	18
Biomass: small (0 – 200kW) and medium (200kW – 1MW) tariff bands .....	19
Large biomass (> 1MW) .....	21
Small (< 100kW) and large (> 100kW) ground source heat pumps (GSHPs) .....	23

Solar thermal .....	28
Affordability constraints and budget management.....	29
Who proposed tariff increases will apply to.....	30
Summary of proposed and existing non domestic tariffs .....	30
<b>Next steps.....</b>	<b>32</b>
<b>Annex A: impact on tariffs consulted on in September 2012.....</b>	<b>33</b>
How the review affects extensions and improvements to the scheme .....	33
Air to water heat pumps (AWHP).....	35
Air to Air Heat Pumps (AAHP) .....	36
Biomass Direct Air Heating (BDAH).....	36
<b>Annex B: tariff setting, model outputs and industry views .....</b>	<b>38</b>
Tariff setting methodology.....	38
Datasets from AEA and the Sweett Group .....	38
Updated model outputs.....	40

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# 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:** 31 May 2013

**Respond by:** 28 June 2013

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Consultation reference: 13D/136 Renewable Heat Incentive: Non Domestic Scheme Early Tariff Review

## **Territorial extent:**

This consultation applies to England, Scotland and Wales.

## **How to respond:**

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

Online responses are preferred and can be submitted via DECC's consultation hub, at the following link: [https://econsultation.decc.gov.uk/decc-policy/rhi-performance/consult\\_view](https://econsultation.decc.gov.uk/decc-policy/rhi-performance/consult_view)

If you are unable to submit your response online please send it in an email to: [rhi@decc.gsi.gov.uk](mailto:rhi@decc.gsi.gov.uk). Alternatively, hard copy replies should be sent to the address above.

## **Additional copies:**

You may make copies of this document without seeking permission. An electronic version can be found at [www.decc.gov.uk/rhi](http://www.decc.gov.uk/rhi).

Other versions of the document in Braille, large print or audio-cassette are available on request. This includes a Welsh version. Please contact us under the above details to request alternative versions.

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**Confidentiality and data protection:**

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (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/](http://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 an exercise to gather 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 Technology plc (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 light of our assessment of all available evidence we are proposing that:
  - the tariffs for ground source heat pumps (GSHP), and large biomass boilers be increased from their current levels, insofar as this is affordable, to drive more widespread deployment whilst ensuring value for money across renewable incentive schemes;
  - the tariffs for small and medium biomass boilers not be adjusted through this review and should remain at current levels unless automatically adjusted by the new budget management mechanism.
4. The tariffs proposed in this consultation reflect a change in approach to setting non-domestic tariffs: rather than 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 tariffs should be set at, and we are seeking views on this approach.
5. Alongside, we have reviewed the level at which current RHI tariffs are capped, set in 2011, 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 and above which subsidies should not be paid unless there is an exceptional strategic case.

6. The cost of offshore wind remains a sensible benchmark against which to judge the value for money of RHI tariffs. However, given that the tax regime provides renewable electricity generation with advantages over other forms of electricity generation, we are consulting on a range of tariffs for some of the most expensive renewable heat technologies to reflect this.
7. The primary intention of these proposals is to ensure that, insofar as is affordable, support is appropriate for each technology currently 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 <sup>1,2</sup>	Reviewed tariffs (proposed for 2014/15)
<b>Biomass Boilers</b>	<b>Small</b> (up to 200kW)	Tier 1: 8.6, Tier 2: 2.2	<b>NO CHANGE</b>
	<b>Medium</b> (200kW to 1MW)	Tier 1: 5.3, Tier 2: 2.2	
	<b>Large</b> (1MW and above)	1.0	<b>2.0</b>
<b>GSHPs</b>	<b>Small</b> (up to 100kW)	4.8	<b>7.2<sup>3</sup> – 8.2<sup>4</sup></b>
	<b>Large</b> (100kW and above)	3.5	
<b>Solar Thermal</b> (up to 200kW)		9.2	<b>10.0 – 11.3</b>

8. All changes proposed in this consultation would be subject to Parliamentary approval, State Aid rules and affordability.

### **Affordability constraints and budget management**

9. Final decisions on tariffs, following this consultation, will be made in the light of budgets agreed across Government – including any affordability constraints that result from the spending review settlement for 2015/16 – and will take into account the full portfolio of RHI

<sup>1</sup> For comparison purposes please note that these tariffs will be updated for any RPI increase. An estimate of these tariffs in nominal terms for 2014/15 can be found in the Technical Annex, available at the following link <https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

<sup>2</sup> The forecast expenditure on the medium tariff band is such that a 5% degeneration of that tariff will occur on 1 July, as a result of the operation of the degeneration policy set out in regulations. This will reduce the tariffs to 5.0p/kWh for tier 1 and 2.1p/kWh for tier 2. Quarterly expenditure statements will be published and notice of any further tariff reductions will be provided, as set out in regulations.

<sup>3</sup> Equivalent to 10.0/kWh of renewable heat

<sup>4</sup> Equivalent to 11.3p/kWh of renewable heat

support including the proposed domestic RHI and non domestic scheme extensions. Our final decisions may therefore fall outside the range of tariffs consulted upon.

10. As the RHI is a demand-led scheme, we need a way of incentivising deployment whilst ensuring the scheme remains affordable. After consulting in July 2012, we implemented a system of degression in April this year which ensures that RHI spending is within budgetary limits over the period April 2013 – March 2015. We publish monthly data on scheme uptake and make assessments on whether tariff reductions are necessary on a quarterly basis, the first of which has been published alongside this review<sup>5</sup>.
11. The degression policy sets out a series of expenditure thresholds (or triggers) and rules for automatic tariff reductions if estimated deployment exceeds these triggers. DECC will internally review and update triggers alongside the proposals in this consultation for tariff increases for GSHPs, solar thermal panels and biomass over 1MW; proposed extensions to the current scheme; and the proposed introduction of domestic scheme. This may mean that some adjustments to the current degression triggers are required to ensure that deployment continues to be affordable. We will provide an update in the Autumn.

### Impacts of changes to tariffs

12. On 21 January 2013 the Government announced that the evidence used to set some of the current non-domestic RHI tariffs was under review, and that, subject to State Aids requirements and any necessary approvals, our intention is that any new tariffs would apply to those installations with an accreditation date from 21 January 2013. 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.
12. This would mean that 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 come into force, it is DECC's intention that payments for any subsequent heat generation would be made at the higher tariff level. We are not proposing 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). We have set out our reasons for this proposal in paragraph 98 and have asked for views about this in question 20.

### Update to the September 2012 consultation

13. In September 2012 DECC consulted on expanding the non domestic RHI to include:
  - air source heat pumps (ASHP) - both air to air (AAHP) and air to water (AWHP);
  - biomass direct air heating (BDAH);

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<sup>5</sup> See <https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi>

- deep geothermal;
- medium and large biogas combustion; and
- a specific tariff for biomass and bioliquid combined heat and power (CHP).

14. 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.

15. Please note that a final decision has not yet been taken on whether the technologies on which we consulted in September should be included in the RHI. This consultation merely clarifies the tariffs that we are proposing for those technologies if a decision were taken to include them in the RHI. The interaction between this consultation and the September 2012 consultation is set out in detail at Annex A.

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

<b>Technologies for which we have recalibrated tariffs according to new evidence (conclusion on RHI support has not yet been reached)</b>		<b>Tariff proposed in September 2012</b>	<b>Indicative Update</b>
<b>ASHPs (if supported)</b>	<b>AWHP</b> (all scales)	1.7	<b>2.5</b>
<b>Biomass Direct Air Heating (if supported)</b>	<b>Small and medium</b> ( < 1MW)	2.1	<b>2.5</b>
	<b>Large</b> ( > 1MW)	1.0	<b>2.0</b>

# Background and Introduction

## About the RHI

16. 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.
17. 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 to 12% will need to be generated from renewable sources by 2020, increasing from around 2% currently. This is a significant challenge.
18. 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'<sup>6</sup>, explains how renewable heat fits in to the wider heat strategy which will enable us to decarbonise heat supply by 2050.
19. 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

20. We consulted in July 2012 on proposals for a system of budget management in the RHI in the consultation 'Renewable Heat Incentive: Providing Certainty, Improving Performance'. We also sought views at this point on early or emergency reviews of tariffs.
21. In August 2012, we contracted with 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.
22. In February this year, in our response to the proposals in the July 2012 consultation, we identified certain conditions under which we would normally expect to carry out an early

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<sup>6</sup> <https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge>

review, over and above periodic assessments. This included two conditions which appeared to apply here:

- 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.

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

24. Table 3 below sets out the forecast spend over one year for each technology based on application data for up to 30<sup>th</sup> 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 at the same time as this document<sup>7</sup>.

**Table 3: 12 month forecast spend based on data up to 30<sup>th</sup> April**

Technology	Anticipated expenditure for subsequent year (£m)	Actual forecast expenditure (£m)	Forecast expenditure as % of anticipated
	<i>Consistent with DECCs trajectory towards achieving the 2020 heat target</i>	<i>Based on actual data provided by Ofgem</i>	<i>Actual forecast as a percentage of anticipated expenditure</i>
<b>Small Biomass (&lt; 200kW)</b>	14.8	18.6	126%
<b>Medium Biomass (200kW to 1MW)</b>	13.4	22.6	169%
<b>Large Biomass (&gt; 1MW)</b>	23.1	5.2	23%
<b>Small GSHP (&lt; 100kW)</b>	28.9	0.4	1%
<b>Large GSHP (&gt; 100kW)</b>	4.9	0.5	10%
<b>Solar thermal (&lt; 200kW)</b>	4.9	0.04	1%
<b>NOT IN SCOPE Biomethane (all scales) and Biogas (&lt; 200kW)</b>	12	1.6	13%

<sup>7</sup> See: <https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi>

25. Although the scheme started later than expected, this is the most indicative metric of how current deployment compares to levels that we expect would be 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. This forecast is based on the applications that were received up until 30<sup>th</sup> April 2013.

### Scope of the review

26. The 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, which has been published alongside this consultation.<sup>8</sup>

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

Technology	In scope?	Status of evidence
<b>Small and medium biomass</b>	Yes	New evidence following Sweet Group research. Market intelligence and industry views on tariffs, appropriate support and scheme deployment data.
<b>Small and large GSHP</b>	Yes	
<b>Solar Thermal</b>	Yes	
<b>Large biomass</b>	Yes	Some new evidence, although little new cost data available. Industry views on tariffs and scheme deployment data.
<b>Biomethane and small biogas combustion</b>	No	Tariffs based on best available evidence on biomethane. No new evidence available currently.

<sup>8</sup> See: <https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

# Tariff setting and the evidence base

## Tariff setting methodology for current tariffs in the non domestic RHI

27. Most of the current tariffs in the non domestic scheme and those consulted on in September 2012 were calculated using a 'levelised cost' methodology. 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, aiming for a 12% rate of return to be delivered on top of the average additional investment required for installations at the median cost of the supply potential. For a detailed description of the tariff setting process, please refer to Annex B.

## The evidence base

28. 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 data on costs and performance of renewable heat technologies that was available at the time of developing the scheme.
29. 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.
30. 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 original data that was used to set the original tariffs, delivered by AEA Technology plc (AEA), in Annex A, along with a description of the main differences between the two datasets.
31. 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.
32. For this reason we are also drawing on other sources of qualitative and quantitative evidence in setting tariffs as part of this review. In particular: deployment data – to assess how successful current tariffs are; and evidence from industry and the market on tariffs required to stimulate deployment. Further discussion on the tariff setting principles employed in the review is set out at Annex B.

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

## The current VfM cap

33. When the non-domestic scheme was launched in November 2011, tariffs were capped at a level we considered reflected the support provided to offshore wind, which was judged to be the marginal technology that could be deployed to meet the 2020 renewables target. Therefore, in principle, paying more than this level was considered not to offer good value for money in terms of contributing to meeting the 2020 renewable targets, which is the principal objective of the RHI, as funds could otherwise have been used to deploy cheaper renewable energy.
34. The cap was estimated to be 8.5p/kWh in 2011, based on the value of Government support for offshore wind, which after increases to take into account inflation would equate to 9.5p/kWh in 2014/15 prices – when any proposals in this consultation will be implemented. At the time the scheme launched, the only technology affected by the cap was solar thermal, due to its high cost per unit of renewable heat, as the rest of the tariffs were below this level.

## Consideration of additional impacts on VfM

35. Alongside the tariff review we have considered whether the current benchmark for VfM should be revised. There are additional factors that could be taken into account when determining the cap for RHI tariffs.
36. The current cap was based on the support that offshore wind receives from the Renewables Obligation (RO); it also took into account the support received from Levy Exemption Certificates (LEC). Taking into account the latest assumptions about the value of the RO and LEC would increase the VfM cap to around 10p/kWh (in 14/15 prices).
37. Also, in setting the original cap, the impacts of the Carbon Price Floor (CPF) and the EU Emissions Trading Scheme (ETS) on the wholesale electricity price were not taken into account.
38. While neither the EU ETS nor the CPF are subsidies paid to the renewables sector, they impose costs on fossil fuel based forms of electricity generation. This provides an additional advantage to renewable electricity producers, such as producers of offshore wind. If these costs were factored into the calculation of the cap, the price of support would be around 11.3p/kWh (in 14/15 prices).
39. As well as playing a crucial role in meeting the 2020 renewables target, renewable heat technologies are key contributors to the Government's long term aim to increase energy

efficiency, and the deployment of low carbon energy with the potential for cost reduction, as outlined in the Government's heat strategy<sup>9</sup>. We are therefore consulting on a range of support for GSHP and Solar Thermal up to the level of support provided to offshore wind that would include the advantages provided by the CPF and the ETS (i.e. from 10.0p to 11.3p/Kwh).

40. For comparison purposes, it is important to be aware that non-domestic RHI tariffs are paid on *all* of the heat output from the accredited RHI installation that is used for eligible purposes. Some of the heat generated by heat pumps is not renewable. This is because heat pumps extract heat from the sun stored in the air or ground and are powered by electricity to extract heat from the air or ground. The subsidy cost per kWh of generating renewable heat output is therefore greater than that suggested by the tariff. The method of determining the renewable proportion of a heat pump's output for the purposes of determining progress towards the renewables target is set out by the European Commission<sup>10</sup>.
41. 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 updating the VfM cap applied to RHI tariffs? Do you agree that the tariff for GSHP should be increased to the level of support provided to offshore wind? 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.

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<sup>9</sup> <https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge>

<sup>10</sup> See Annex VII of the Renewable energy Directive: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF>

# Proposals for reviewed tariffs

## Approach to reviewing tariffs

42. We are continuing to aim to incentivise up to the 50<sup>th</sup> 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 (i.e. the 50<sup>th</sup> percentile) on the basis of the best available evidence, and subject to the VfM cap. We consider that this approach assists us in ensuring that the scheme does not give rise to overcompensation in the aggregate, in accordance with the State Aid requirements. To identify proposed tariffs we have broadened the range of evidence used to set tariffs whilst retaining the same overall methodology to combine model outputs with evidence from other sources.
43. We propose this holistic approach because there is limited modelling data available for some technologies and sub-sectors of the non-domestic heat sector, and because of the sensitivity of the tariff setting methodology to this data. Therefore the tariff levels proposed in this consultation have been designed to provide the incentives described in this paragraph on the basis of an assessment of both the quantitative and qualitative evidence currently available. The final decisions on the tariffs will need to be made in the light of the affordability constraints, referred to in paragraphs 9 – 11.
44. In making this assessment, we have considered the following variables:
- The level of 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 10 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 ranges of which are set out in Table 11 in Annex B;
  - The recommendations of DECC engineering specialists;
  - The nature of each technology in question and specific risks around over- or under-compensation of that technology i.e. some technologies could ramp-up deployment very quickly if over-subsidised and so pose an affordability risk.
  - The levels of tariffs relative to one another, where there are clear parallels between the technologies and their applications, e.g. biomass boilers and biomass direct air heating.
  - How each technology is used and therefore the deployment that can be achieved, or the role it has to play in meeting DECC's medium and long-term objectives.

## Consultation Question

3	Do you agree that a 12% rate of return on the additional capital investment on the median cost installations (i.e. those installations at the upper end of the 50 <sup>th</sup> percentile of the cost curve) is the right rate of return to stimulate investment in renewable heat?
4	Of the broader range of evidence used to identify tariff levels, as described above, are there any factors that should be excluded?
5	Are there other material factors we should consider in making judgements about the tariff levels needed?

## Biomass: small (0 – 200kW) and medium (200kW – 1MW) tariff bands

### Proposed approach

45. 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. The tariffs will remain subject to the depression mechanism.

46. In addition any new tariffs as a result of this review will come into force from spring 2014 and it is possible that depression 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

47. These technologies are currently deploying very well through the RHI scheme. As at 30<sup>th</sup> April, we forecast RHI expenditure on small and medium biomass to be 126% and 169% of their anticipated levels of deployment respectively, as set out in Table 3.

### Industry views and market intelligence

48. 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

49. The current tariffs for small and medium biomass (Tier 1 tariffs: 8.6 and 5.3p/kWh respectively) are in the range of updated model outputs: 6.2 – 10.6; and 3.9 – 8.3p/kWh respectively.

### Other considerations

50. 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.

51. **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 of 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 that 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, whereby 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.

52. 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**

53. 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**

54. If tariffs for other technologies are increased this may 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.

55. Evidence suggests that costs per kWh reduce as the 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**

6	Do you agree that the small biomass tariff should not change from its current levels through this tariff review?
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7	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.
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8	Do you agree that the medium biomass tariff should not change from its current level through this tariff review?
9	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.
10	Do you think that the current approach of banding and tiering of tariffs may be incentivising the installation of inefficient systems? If so, what evidence do you have, and do you have any suggestions for how this could be deterred?

### Large biomass (> 1MW)

#### Proposed approach

56. 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.

57. 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

58. As at 30<sup>th</sup> April, RHI forecast expenditure on large biomass will be 23% of anticipated deployment when the tariffs were modelled in 2011. However, there are other factors, apart from the tariff, which could be contributing to 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. We are continuing to explore options for addressing this issue during 2013 as set out in the February 2013 Government response.

#### Industry views and market intelligence

59. 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.

60. That call for evidence prompted four responses, three of which provided some evidence of either one or more of the following:
- examples of projects that had gone ahead but did not achieve the target rate of return of 12%;
  - examples of projects that were not viable against the counterfactual; or
  - cost estimates of large biomass installations higher than the assumptions on which the current tariff is based.

61. The Sweett Group work did not result in any new cost or performance data on installations of above 1MW capacity. The original proposal of a tariff of 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**

62. The range of updated modelled tariffs is inconclusive, 0 – 2.2p/kWh. Given that the Sweett Group work did not uncover any new evidence on costs of large biomass installations, an extrapolation of the trend in costs of installations lower than 1MW was used to produce some of the updated outputs, i.e. those in the columns labelled as ‘Sweett costs’ in Table 10 at Annex B.

#### **Other considerations**

63. As is the case for small and medium installations, measures to enforce biomass sustainability and air quality are due to come into effect over the next year.

#### **Cost control and overcompensation implications**

64. There is often a long lead in time for large biomass installations, usually 12 months or more. Therefore if the proposed tariff were too high, this would more likely to lead in a spike in deployment as opposed to a steady increase for smaller installations. Given that depression assessments take place every three months, we anticipate that depression would be sufficient to control spending in the near future on this type of installation. However if there were a sudden very large spike then successive depressions could be triggered.

65. We will, however, need to consider decisions on the proposals for large biomass in light of affordability constraints and any need for adjustments to the approach on depression as outlined in paragraphs 9 - 11.

#### **Relativities to other tariffs**

66. 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 tariff band. 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

- 11 Do you support our rationale for proposing 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 (< 100kW) and large (> 100kW) ground source heat pumps (GSHPs)

#### Proposed approach

67. 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<sup>11</sup>. 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.
68. 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 may need to be as high as 10.8 or 11.7p/kWh if we are to target the 50<sup>th</sup> percentile of the small and large bands respectively. In addition, the industry has also submitted evidence which indicates that tariffs of up to 8.0 or 10.7p/kWh would be needed to incentivise the small and large bands respectively. Taking into account the range of evidence we assessed that a 9.0p/kWh tariff would be appropriate to incentivise up to 50% of the heat potential of GSHPs, i.e. targeting the upper end of the range of industry evidence, which is lower than the upper end of the range of model outputs.
69. Such a tariff would be equivalent to 12.5p/kWh of renewable heat, which as is set out in paragraphs 33 – 41, is beyond the VfM cap. We are therefore consulting on supporting GSHPs in the range between the updated cap and that cap plus the impacts of wider Government policy on the wholesale electricity price, as set out at paragraph 39, i.e. between 7.2 and 8.2p/kWh on all heat output which is equivalent to 10.0 to 11.3p/kWh of renewable heat. We are seeking evidence that this increase will make a substantial impact in helping to increase additional GSHP deployment, and help drive cost reductions.

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<sup>11</sup> <https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge>

70. Single tariff: the modelled tariffs for small and medium GSHPs are relatively close to one another 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 suggested a single tariff for GSHPs is needed. 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 occur under a system of banded tariffs.

71. 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. We propose to tier the final GSHP tariff given that, even at the minimum end of the range proposed, i.e. 7.2p/kWh if paid on all heat output, it would be well above the operating costs of GSHPs. We are asking 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. We propose to extend the methodology currently used for small and medium biomass to the GSHP tariff, i.e. using the same second tier tariff and break point, but acknowledge that, given the differences between the technologies, there may be a better solution for GSHPs. Table 5, below, shows the effect of tiering on the proposed range of GSHP tariffs.

72. We intend to apply the current depression policy to this tariff to ensure value for money and control costs.

#### **Forecast deployment**

73. As set out in paragraph 22, 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 we forecast would be 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. RHI forecast expenditure at 30<sup>th</sup> March on small and large GSHPs will be 1% and 10%, respectively, of the level of anticipated expenditure, or, for large GSHPs of the expenditure limit we have set as part of the budget management mechanism, which is 5% of the overall budget.

#### **Industry views and market intelligence**

74. 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 would be required if heat generated by heat pumps are to contribute effectively towards the 2020 renewable energy target. 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 capex assumptions are not realistic.

75. 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

76. 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 suggest that tariffs for both bands, that is up to 99kW and from 100kW and above, are considerably closer together than the current tariffs.

### Other considerations

77. 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. However, the heat derived from human activity (i.e. the heat extracted from a building and returned to the soil) is not energy from renewable sources for the purposes of counting heat towards the renewable energy targets.

78. We do not wish to discourage low carbon and cost effective applications of renewable technologies even if not all of the heat generated can be counted towards the renewables target. We therefore intend to pay out on all heat produced by GSHPs (i.e. so a reduction in payments to reflect any non-renewable component would not be applied). However, we do not wish to enable extreme behaviour such as direct heat recovery passed through the ground in order to receive the RHI tariff. We are therefore working closely with the industry to develop appropriate safeguards and eligibility criteria to ensure that perverse outcomes such as this are not incentivised. Nevertheless, we intend that any increased tariff delivered through this consultation would be paid on all heat output (used for eligible purposes) of eligible GSHPs.

79. Heat Driven Heat Pumps (HDHP): the European Commission has recently confirmed that heat-driven heat pumps (e.g. gas fired, not vapour compression) do contribute to renewable energy targets where equipment has a co-efficient of performance (COP) greater than 1.15<sup>12</sup>. 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 2.9 COP set out in the regulations. The RHI only supports “Hermetically Sealed Vapour Compression Heat Pumps”. Heat Driven Heat Pumps are not currently supported by the RHI. However, 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

80. There is currently a degression mechanism in place for GSHPs. The risk of degression not being adequate to control RHI spending on GSHPs in the near future 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

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<sup>12</sup> See European Commission guidance: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:062:0027:0035:EN:PDF>

would apply. It is therefore unlikely that any persistent overcompensation could occur, despite the proposal of a higher tariff.

81. We will, however, need to consider decisions on the proposals for GSHPs in light of affordability constraints and any need for adjustments to the approach on degeneration as outlined in paragraphs 9 - 11.

#### **Relativities to other tariffs**

82. AWHP: 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. The minimum and maximum of the proposed range of GSHP tariff would lead to a ratio of 2.9:1 and 3.3:1 with ASHP respectively

83. Deep geothermal: 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 because deep geothermal plants usually have significantly higher capital costs than GSHPs.

84. 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, than that consulted on in September, 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 a revised GSHP tariff were introduced. This is because 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%; deep geothermal 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 5: Proposed tariff and VfM cap with tiering<sup>13</sup>**

<b>Proposed GSHP tariff</b> (p/kWh for all heat output)		<b>Tier 1</b> (first 15% of heat output only)	<b>Tier 2</b> (any remaining heat output)
<b>Max</b>	8.2	10.2	2.3
<b>Min</b>	7.2	8.9	2.3

<sup>13</sup> Tiering based on projected RPI increase to determine Tier 2 tariff from current small and medium biomass tariffs See Technical Annex at the following link: <https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

## Consultation Question

12	<p>Do you support our rationale for proposing a tariff of between 7.2 and 8.2p/kWh to incentivise significant deployment of GSHPs? Are there other factors we should consider?</p> <p>Please provide any evidence you may have to support your answer.</p>
13	<p>How much more deployment would you expect to see from a tariff of 8.2p/kWh as opposed to 7.2p/kWh?</p>
14	<p>How much greater would the potential for cost reduction be from a tariff of 8.2p/kWh as opposed to 7.2p/kWh?</p>
15	<p>Do you agree that a ground source heat pump tariff should be between around 3 or 4 times higher than a tariff for air to water heat pumps?</p>
16	<p>Do you agree that the tiering methodology is the correct approach for GSHPs? If not, please provide evidence on:</p> <ul style="list-style-type: none"><li>a. what the minimum reasonable usage should be; and</li><li>b. what the tier 2 tariff, i.e. operating cost should be set at.</li></ul>

## Solar thermal

### Proposed approach

85. Solar thermal currently receives the maximum tariff available given the current level of the cap. Through this review, we propose to raise the tariff for solar thermal under the non-domestic scheme to up to 11.3p/kWh.
86. Although this is likely to be below the level required to incentivise 50% of the supply chain, industry have presented evidence of potential for 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.
87. 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, and we are gathering preliminary evidence through this tariff review consultation.

### Forecast deployment

88. Forecast deployment of solar thermal is around 0.8% of the level of anticipated deployment we have prepared for, for this technology.

### Industry views and market intelligence

89. Given the current tariff is set at the previous estimate of the marginal cost of renewable energy, 9.2p/kWh (in current 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 for the median cost installation. Industry stakeholders have stated that they do not expect to see significantly greater levels of uptake of solar thermal under the current tariff.
90. 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, i.e. reverting back to fossil fuel powered heating installations after any subsidy has expired.

### Range of updated model outputs

91. The updated model outputs continue to show that solar thermal would need a tariff of between 24.2 – 27.8p/kWh, which is well beyond the current VfM cap and the cap plus additional impacts, 11.3p/kWh

### Cost control and overcompensation implications

92. Given the high costs of solar thermal and the fact that the proposed tariff remains much lower than model outputs, the risk of overcompensation remains very low.

### Relativities to other tariffs

93. 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

17	Do you support an increase to the solar thermal tariff to within the range set out in paragraph 39? If yes, please provide reasons.
18	Will increasing the tariff to within this range bring forward projects that would otherwise not have received investment? If yes, please provide evidence.
19	Is a tariff in this range tariff likely to stimulate cost reduction in solar thermal technology?
20	What do you perceive as the main opportunities and risks of the industry's proposal for a seven year tariff option?

### Affordability constraints and budget management

94. As the RHI is a demand-led scheme, we need a way of incentivising deployment whilst ensuring the scheme remains affordable within the budgets agreed across Government. After consulting in July 2012, we implemented a transparent budget management mechanism in April this year which ensures that RHI spending is sustainable over the period April 2013 – March 2015. The regulations necessary to give effect to this mechanism came into effect on 30<sup>th</sup> April<sup>14</sup>. Under this system, tariffs will be reduced by a set amount for new applicants to the scheme, but only if deployment meets pre-determined expenditure limits, “triggers”.

95. The triggers for the non-domestic RHI scheme are based on the level of deployment we were seeking from renewable heat to contribute to the 2020 renewables target when the scheme was launched. Details of how the mechanism operates have been published by DECC<sup>15</sup>, and Ofgem will shortly publish guidance for applicants. The first formal assessment of forecast expenditure against the degeneration triggers has also been announced alongside this consultation.

96. We intend that our degeneration-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, and for the domestic scheme. In addition, we will need to consider whether any changes made to existing support levels following this consultation

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<sup>14</sup> The Renewable Heat Incentive Scheme (Amendment) Regulations 2013

<sup>15</sup> See:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/128679/Gov\\_response\\_to\\_non\\_domestic\\_July\\_2012\\_consultation\\_-\\_26\\_02\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/128679/Gov_response_to_non_domestic_July_2012_consultation_-_26_02_2013.pdf)

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 the same set of regulations that implement the new tariffs.

97. However, we will need to finalise the tariffs and review the degeneration triggers taking into account any affordability constraints resulting from the 2015/16 spending settlement for the RHI along with the overall portfolio of RHI support, including the proposed domestic RHI and proposed non domestic scheme extensions. We will provide an update in the Autumn.

### Who proposed tariff increases will apply to

98. We first committed publically to carrying out the tariff review on 21 January 2013. At that point we stated our intention that any RHI participants with a date of accreditation of 21 January 2013 or afterwards would benefit from any new tariffs once they come into effect. This is to ensure that the potential impact of any new tariff could stimulate increased investment in the renewable heat market as soon as possible, given the need to increase uptake of certain technologies. Any installation which was accredited onto the scheme before 21 January 2013 would have been installed in light of the tariffs in place at the time and without any knowledge of a potential increase to tariffs in future. Given that investment decisions are usually only made if they are commercially viable, it would not be good use of taxpayers' money to increase tariffs for installations which are already adequately supported by current tariffs. This is also consistent with the approach we have taken in the budget management mechanism where tariff changes do not affect existing participants in the scheme.

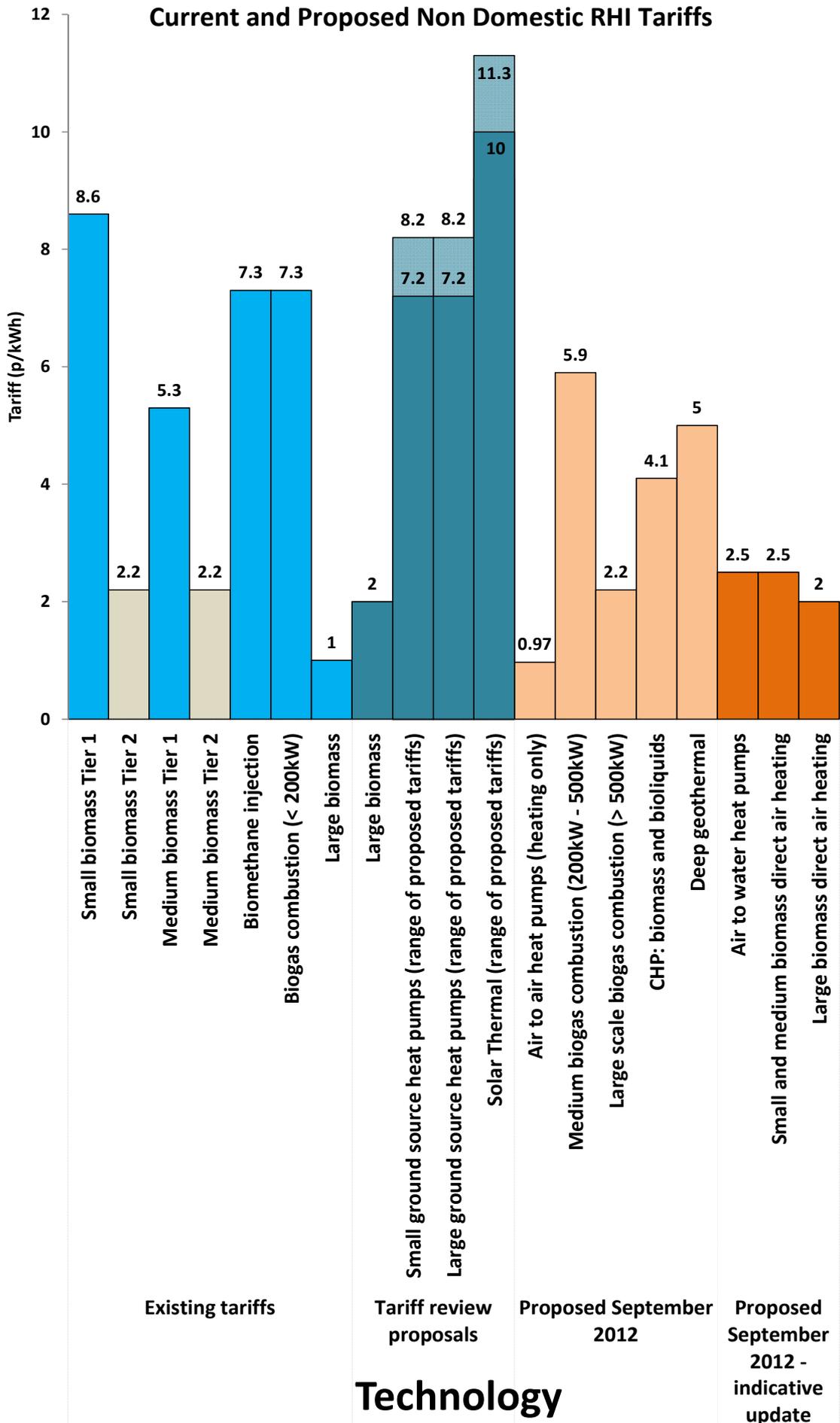
### Consultation Question

21	Do you agree with our intention that any changes to tariffs following this consultation should only affect those installations accredited from 21 January 2013? If not, please state why.
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### Summary of proposed and existing non domestic tariffs

99. The proposed tariffs and updated indicative tariffs together with the tariff levels which have not been updated are set out in the chart below in order to provide a complete picture on the range of technologies and tariff levels under consideration. Final decisions on tariffs are subject to the constraints on affordability and budget management set out at paragraphs 94 - 97 above. The chart below shows the full range of current and proposed non domestic RHI tariffs.

## Current and Proposed Non Domestic RHI Tariffs



## Technology

## Next steps

100. Decisions on extensions to the current non domestic RHI scheme and the introduction of a domestic scheme are planned for this summer, with implementation via regulations expected to come into force in spring 2014. Decisions on tariff changes for ground-source heat pumps, solar thermal panels and biomass over 1MW are planned for the autumn, alongside the conclusion of our review of budget management arrangements. Any new tariff levels are expected to come into force in spring 2014. All proposals are subject to Parliamentary approval and State Aid requirements. Table 6, below shows the sequence and timing of upcoming announcements on the RHI.

**Table 6: Upcoming announcements and conclusions on RHI scheme development**

Date	Milestone
<b>31 June</b>	Consultation closes
<b>Summer 2013</b>	Response to non domestic RHI extensions consultations (from September 2012) on RHI support for: <ul style="list-style-type: none"> <li>• AAHP</li> <li>• AWHP</li> <li>• BDAH</li> <li>• Specific tariff for biomass and bioliquid CHP</li> <li>• Medium and large biogas</li> <li>• Specific tariff for deep geothermal</li> <li>• Expansion of criteria for energy from waste</li> </ul>
<b>Autumn 2013</b>	Response to tariff review consultation: <ul style="list-style-type: none"> <li>• Announce confirmed revised tariffs for technologies in scope of the tariff review; and for AWHP, AAHP and BDAH if inclusion in the RHI is confirmed.</li> <li>• Indication of approach to any adjustment of budget management arrangements.</li> </ul>
<b>Spring 2014</b>	Planned implementation of: <ul style="list-style-type: none"> <li>• domestic RHI</li> <li>• extensions to non domestic RHI scheme and</li> <li>• any revised tariffs for existing non domestic RHI technologies</li> </ul> (Subject to Parliamentary approval and compliance with State Aid requirements.)

# Annex A: impact on tariffs consulted on in September 2012

## How the review affects extensions and improvements to the scheme

101. In July 2012, DECC consulted on a number of improvements to the scheme, including the long term budget management system, 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 regulations, with the first expenditure forecast statement and release of monitoring data published alongside this consultation. We continue to progress work on, air quality and metering simplifications which we expect to have in place by summer this year, and biomass sustainability requirements which we expect to implement in spring 2014.
102. 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 (BDAH);
  - a specific tariff for deep geothermal.
103. 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.
104. We will publish our decisions following 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 Sweett Group work on the cost of the technology;
  - while decisions have not been made, the emerging evidence from that consultation presents a strong case for inclusion in the scheme; and
  - the relativities to tariffs proposed in this review are important for the industry to consider.
105. Given the evidence we have gathered through the September 2012 consultation, while decisions have not yet been made, there appears to be a strong case emerging that AWHP and BDAH should be supported, although 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.

106. 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 DECC's view of the appropriate level of support, pending the conclusion on RHI support, due in summer 2013.

107. Table 7 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 7: Technologies consulted on in September 2012**

Technology (if supported / new tariff introduced)	Updated tariff?	Status of evidence	When will conclusion be reached on RHI support?	When will conclusion be reached on final tariffs?
Air to water heat pumps (if supported)	Yes	New evidence following Sweett research. Industry views on tariffs, and important to consider alongside proposed GSHP tariff	Response to September 2012 consultation in <b>summer 2013</b>	Response to tariff review <b>autumn 2013</b>
Biomass direct air heating (if supported)	Yes	Some new evidence following Sweett research, though little new cost data. Industry views on tariffs – important to consider alongside biomass tariffs	Response to September 2012 consultation in <b>summer 2013</b>	Response to tariff review <b>autumn 2013</b>
Air to air heat pumps (if supported)	No	Some updated cost data from Sweett Group. No update to tariffs given evidence from September 2012 consultation	Response to September 2012 consultation in <b>summer 2013</b>	Response to tariff review <b>autumn 2013</b>
Medium and large biogas (if supported)	No	No new evidence from Sweett Group. Other research and on-going work to support conclusion of September 2012 consultation.	Response to September 2012 consultation <b>summer 2013</b>	
Biomass and bioliquid CHP (if new tariff introduced)	No			
Deep geothermal (if new tariff introduced)	No			

108. 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 Sweett Group to remodel tariffs for air-water heat pumps and biomass-direct air. Updated indicative tariffs 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

109. 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.

110. 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. The industry views collected as part of the September 2012 consultation have been taken into account in updating the tariff, so we do not 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

111. 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 2.9p/kWh.

#### Range of updated model outputs

112. 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

113. 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

114. This tariff leads to a ratio of between 1:2.9 and 1:3.3 with the minimum and maximum proposed tariff range for GSHPs. The range often quoted by industry experts as striking the right balance of support between the two technologies is between 1:3 and 1:4. The tariff remains lower than biomass.

### Air to air heat pumps (AAHP)

115. 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.

116. The Sweett Group work did not provide substantial new data on the costs and performance of AAHP. For further explanation of the proposals for AAHPs, please see the September 2012 consultation on expanding the RHI<sup>16</sup>.

### Biomass direct air heating (BDAH)

#### Updated indicative tariff

117. Small and medium installations (up to 1MW): the range of updated model outputs implies that a minimum tariff of 3.2p/kWh would be necessary. The industry has expressed the view that the previously proposed tariff of 2.1p/kWh could feasibly stimulate uptake, though at the lower end of the range required. Therefore 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.

118. Large installations (1MW and above): the modelled tariff for installations under 1MW proposed in September was based on data for the whole range of capacities, but was higher than the large biomass tariff. However, since BDAH has lower associated capital costs than biomass boilers, due to the fact that they do not heat water we proposed that BDAH 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 proposed 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

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

120. 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

<sup>16</sup> <https://www.gov.uk/government/consultations/renewable-heat-incentive-expanding-the-non-domestic-scheme>

is not transferred by heating water.

#### **Range of updated model outputs**

121. 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 tariff we previously consulted on of 2.1p/kWh.

#### **Cost control and overcompensation implications**

122. With a degression system in place there is no particular risk of overcompensation for BDAH. However, since evidence suggests that BDAH is cheaper than biomass boilers, there could be a risk that there is some overcompensation for large installations if they receive the same tariff as large biomass. Since the single modelled tariff included data on large BDAH and this suggested a tariff higher than large biomass, we have therefore proposed for the tariff to be no higher than for large biomass boilers.

#### **Relativities to other tariffs**

123. 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.

124. 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 8 shows a comparison of the Sweett and AEA capex assumptions**

<b>Technology</b>	<b>Commercial (AEA) - £/kW</b>	<b>Commercial (Sweett) - £/kW</b>	<b>Industrial (AEA) - £/kW</b>	<b>Industrial (Sweett) - £/kW</b>
AAHPs	471-477	1,017	446	1,017
AWHPs	588-827	725-1,070	-	-
Biomass boilers	350-723	520-754	304-467	520-1,076
Biomass District Heating	701-1,380	631-725	701-1,380	643-737
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 9 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 through the scheme, as other aspects of the tariff model have been updated following an internal DECC review of the tariff setting model. This review included a rationalisation of technical potential, based on the different assumptions made by Sweett and AEA and expert DECC engineering advice. That is, 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. Other changes include fossil fuel and carbon price assumptions.

134. Table 10 shows these updated model outputs and the original or previously consulted on tariffs for those technologies in scope of the review.

**Table 10: Range of model outputs for different input assumptions**

Tariff (p/kWh)		Current or September 2012 consultation tariff	Updated input data		
			All AEA	Sweett costs and AEA heat loads	Sweett costs, with AEA heat loads for industrial
<b>Biomass<sup>17</sup></b>	Small	Tier 1: 8.6	Tier 1: 6.2	Tier 1: 7.7	Tier 1: 10.6
	Medium	Tier 1: 5.3	Tier 1: 3.9	Tier 1: 4.0	Tier 1: 8.3
	Large	1.0	1.1	2.2	0.0
<b>GSHPs</b>	Small	4.8	5.2	6.2	11.7
	Large	3.5	3.2	7.2	10.8
<b>Solar Thermal</b>		9.2	26.5	27.8	24.2
<b>AWHPs (consulted on)</b>		1.7	3.8	3.8	6.6
<b>Biomass direct air (consulted on)</b>		2.1	3.2	6.3**	6.4**

\*\*Cost data based on a relatively small sample size

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 as part of this review of 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 11, below, shows a summary of the views on appropriate tariff levels which we have collected.

<sup>17</sup> Tier 2 is set at 2.2p/kWh (current prices)

**Table 11: Range of industry and market views on appropriate RHI tariffs**

Technology		Current or September 2012 consultation tariff	Range of industry and market views	
			Min	Max
Biomass	Small	Tier 1: 8.6	N/A	N/A
	Medium	Tier 1: 5.3	3.5	6.5
	Large	1.0	1.6	2.7
GSHPs	Small	4.8	8	10.7
	Large	3.5	3	8.0
Solar Thermal		9.2	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

136. Further details on evidence drawn on in this review and the tariff setting methodology can be found in the accompanying Technical Annex, at the following link:  
<https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

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