



Department
of Energy &
Climate Change

The Rt Hon Gregory Barker MP
Minister of State

Department of Energy & Climate Change
3 Whitehall Place,
London
SW1A 2AW

www.decc.gov.uk

Arlene Foster MLA
Minister of Enterprise, Trade and Investment
Northern Ireland Executive
Netherleigh
Massey Avenue
Belfast
BT4 2JP

31 May 2013

Dear Arlene,

I am writing to inform you of significant developments on the non-domestic Renewable Heat Incentive (RHI) scheme. On 6 February I set out my conclusions on the RHI budget management policy and the conditions under which we would expect to carry out an early review of RHI tariffs. My officials had been conducting a review of the evidence underpinning the existing tariffs and I indicated that should they conclude that there was a case for updating tariff input assumptions then we would launch a short consultation as soon as possible.

That work has now been completed and I have today opened a consultation proposing increased tariffs for a number of technologies supported by the scheme. In addition, we have today published the first degeneration announcement as part of the scheme's budget management mechanism.

Background to the proposals

In August 2012, DECC tendered for new data on the costs and performance of renewable heat technologies, the key drivers for the scheme's tariffs. We have now completed the assessment of 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;



Department of Energy & Climate Change

- 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.

In light of this assessment, we are proposing increased tariffs for ground source heat pumps (GSHP), and large biomass boilers which are designed to achieve a rate of return for investors that would drive more widespread deployment, and we are proposing that the solar thermal tariff may also increase in line with a possible new approach to ensuring value for money in the scheme. We also propose that the tariffs for small and medium biomass boilers should not be adjusted through this review and should remain at current levels unless automatically adjusted by the new budget management mechanism. Final decisions on the proposed tariffs will need to be taken in light of any affordability constraints following the finalisation of 2015/16 expenditure levels, expected to be made public on 26 June.

In reviewing these tariffs we have taken a different approach than that taken to date in setting non-domestic tariffs: rather than relying primarily on 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 of tariff to propose.

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. 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 additional support.

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.

Interaction with the first non domestic depression announcement



Department
of Energy &
Climate Change

In addition to the tariff review we have also published figures today which show that deployment of small and medium sized biomass installations through the scheme is a real success, even beyond our initial expectations. The forecast expenditure on the medium tariff band is such that a 5% degression of that tariff will occur, as we have set out in the RHI regulations. This is an example of how the industry can achieve significant deployment with appropriately calibrated tariffs, and something we expect to see for all technologies in the scheme in the near future.

Next steps

Following the consultation, I intend to publish a response in the Autumn before bringing in any tariffs increases in Spring 2014. You will also be aware that we are continuing to work on a number of other scheme extensions and improvements including the proposed addition of new technologies in the non domestic scheme and a proposed RHI scheme for householders, and I know my officials have been in contact with yours on these workstreams.

Yours ever,

A handwritten signature in black ink, appearing to read 'Gregory Barker'. The signature is fluid and cursive, starting with a large 'G' and ending with a horizontal line.

GREGORY BARKER



Department
of Energy &
Climate Change

The Rt Hon Gregory Barker MP
Minister of State

Department of Energy & Climate Change
3 Whitehall Place,
London
SW1A 2AW

www.decc.gov.uk

Alex Attwood MLA
Stormont Castle
Stormont Estate
Belfast
BT4 3TT

31 May 2013

Dear Alex,

I am writing to inform you of significant developments on the non-domestic Renewable Heat Incentive (RHI) scheme. On 6 February I set out my conclusions on the RHI budget management policy and the conditions under which we would expect to carry out an early review of RHI tariffs. My officials had been conducting a review of the evidence underpinning the existing tariffs and I indicated that should they conclude that there was a case for updating tariff input assumptions then we would launch a short consultation as soon as possible.

That work has now been completed and I have today opened a consultation proposing increased tariffs for a number of technologies supported by the scheme. In addition, we have today published the first degeneration announcement as part of the scheme's budget management mechanism.

Background to the proposals

In August 2012, DECC tendered for new data on the costs and performance of renewable heat technologies, the key drivers for the scheme's tariffs. We have now completed the assessment of 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.



Department of Energy & Climate Change

In light of this assessment, we are proposing increased tariffs for ground source heat pumps (GSHP), and large biomass boilers which are designed to achieve a rate of return for investors that would drive more widespread deployment, and we are proposing that the solar thermal tariff may also increase in line with a possible new approach to ensuring value for money in the scheme. We also propose that the tariffs for small and medium biomass boilers should not be adjusted through this review and should remain at current levels unless automatically adjusted by the new budget management mechanism. Final decisions on the proposed tariffs will need to be taken in light of any affordability constraints following the finalisation of 2015/16 expenditure levels, expected to be made public on 26 June.

In reviewing these tariffs we have taken a different approach than that taken to date in setting non-domestic tariffs: rather than relying primarily on 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 of tariff to propose.

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. 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 additional support.

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.

Interaction with the first non domestic depression announcement

In addition to the tariff review we have also published figures today which show that deployment of small and medium sized biomass installations through the scheme is a real success, even beyond our initial expectations. The forecast expenditure on the medium tariff band is such that a 5% depression of that tariff



Department
of Energy &
Climate Change

will occur, as we have set out in the RHI regulations. This is an example of how the industry can achieve significant deployment with appropriately calibrated tariffs, and something we expect to see for all technologies in the scheme in the near future.

Next steps

Following the consultation, I intend to publish a response in the Autumn before bringing in any tariffs increases in Spring 2014. You will also be aware that we are continuing to work on a number of other scheme extensions and improvements including the proposed addition of new technologies in the non domestic scheme and a proposed RHI scheme for householders, and I know my officials have been in contact with yours on these workstreams.

Yours ever,

A handwritten signature in black ink, appearing to read 'Gregory Barker'. The signature is fluid and cursive, starting with a large 'G' and ending with a horizontal line.

GREGORY BARKER

RHI PRESS NOTICE – 31 MAY 2013 ANNOUNCEMENT**NEW TARIFFS FOR WORLD FIRST RENEWABLE HEAT SCHEME**

- New tariffs for renewable heat proposed
- Budget management measures triggered for medium biomass

Review of tariff levels for non-domestic Renewable Heat Incentive

Office blocks, factories and community centres could be among a number of buildings across Great Britain to benefit from more cash for renewable heat under proposals set out by the Department of Energy and Climate Change (DECC) today.

DECC is consulting on increasing the tariff levels for heat generated by ground source heat pumps, large biomass and solar thermal kit accredited under the Government's Renewable Heat Incentive scheme (RHI).

The RHI is a world first and is designed to revolutionise the way homes and businesses across the nation are heated, cut carbon emissions and help meet renewables targets. The scheme was launched for the non domestic sector in November 2011.

Energy and Climate Change Minister Greg Barker said:

“Over 1,300 innovative renewable heat technologies have already been installed under this scheme and are generating cash for the heat they produce.

“The Renewable Heat Incentive has been running for nearly eighteen months, so now is a timely moment to look again at the tariffs.

“We need to make sure they are set at the right level to continue bringing forward investment and growth and at the same time keep costs to the taxpayer to a minimum. That's what our proposals set out today are designed to do.”

The proposed levels follow on from a review of the evidence base used to set tariffs earlier this year and are designed to increase uptake of heat pumps, large biomass and solar thermal technologies by increasing the tariff on offer. DECC is not proposing to increase the tariffs for small and medium biomass as part of this review, based on the current high level of demand for these technologies. Biomethane and biogas combustion are outside the scope of this review.

Current and proposed tariff levels

Technology		Current tariffs ¹	Reviewed tariffs (proposed for 2014/15)
Biomass Boilers	Small (up to 200kW)	Tier 1: 8.6, Tier 2: 2.2	NO CHANGE
	Medium (200kW to 1MW)	Tier 1: 5.3, Tier 2: 2.2	
	Large (1MW and above)	1.0	2.0
GSHPs	Small (up to 100kW)	4.8	7.2² – 8.2³
	Large (100kW and above)	3.5	
Solar Thermal (up to 200kW)		9.2	10.0⁴ – 11.3

The consultation will run for four weeks and will close on 28 June 2013.

Managing the Renewable Heat Incentive Budget

As part of a wider approach to ensuring the RHI scheme stays within its budget and continues to provide value for money, DECC has today confirmed that the medium commercial biomass tariffs will be reduced by 5 per cent. The revised rates, available to new applicants from 1 July 2013 are:

Current rates	New rates (from 1 July 2013)
Tier 1: 5.3p/Kwh Tier 2: 2.2p/Kwh	Tier 1: 5.0p/Kwh Tier 2: 2.1p/Kwh

As set out in February this year, DECC has introduced a degeneration based approach similar to the regime adopted for the Feed-in Tariffs scheme, reducing tariffs available to new applicants if uptake of the technologies supported under the scheme is greater than forecast. All technologies supported under the RHI are subject to this budget management regime.

Today's announcement is the first to be made under the new budget management approach. Future announcements on potential tariff reductions under this regime will be made online by the 1st of September 2013, December 2013 and March 2014. Uptake data will be published online on a monthly basis so progress towards the pre-determined trigger points can be assessed.

¹ For comparison purposes please note that these tariffs will be uprated 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>

² Equivalent to 9.5p/kWh of renewable heat

³ Equivalent to 11.3p/kWh of renewable heat

⁴ This is the projected value of the current solar thermal tariff in 2014/14 taking into account an increase for RPI

Notes for editors:

1. Link to consultation on RHI tariffs and accompanying technical annex:
<https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>
2. Sweett Group report is available here: <https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>
3. It is DECC's intention that where tariffs increase as a result of the consultation and subject to State Aid requirements and other approvals, installations with a date of accreditation from 21 January 2013 would benefit from that increase for heat generated after the new tariffs come in to force. 21 January 2013 was the date DECC announced its review of the evidence base used to set the non-domestic RHI tariffs. It is intended that legislation implementing any new tariffs will take effect from spring 2014.
4. The biomass tiering system is designed to prevent the production of heat solely for the purpose of claiming the RHI tariff. Tier 1 is based on a minimum reasonable use of biomass heating installations, which is for 1314 hours in the year, and is calibrated to compensate for the additional capital investment in renewable heat. Tier 2 is set to compensate only for the additional running costs of an installation, and is paid out on all heat after the first 1314 hours.
5. DECC intends that tariffs will be paid on the full amount of heat generated by all heat pumps when the heat is used for the purposes set out in the Renewable Heat Incentive Scheme Regulations 2011 and is working to identify how best to bring stored heat into the scope of the RHI. This will ensure that the RHI supports ground source heat pumps used for both heating and cooling, which will improve performance, reduce electricity consumption and create carbon savings.
6. The tariff range being consulted on for the ground source heat pump tariffs is equivalent to 10.0 p/kWh to 11.3p/kWh of renewable heat in 2014/15 prices. The minimum proposed level for the solar thermal tariff, 10.0p/kWh, is equivalent to an updated estimate of the value for money cap (the equivalent cost of offshore wind) for 2014/15.
7. Any decision on tariff levels following the consultation will be taken in light of affordability constraints in relation to the RHI as a whole (including the proposed extensions to the scheme), State aid requirements and necessary approvals. Any change to tariffs may also require changes to the current budget management arrangements.
8. There is a fixed annual budget for each year of the RHI and it is essential that appropriate controls are in place to ensure the scheme remains financially sustainable and offers good value for money for the tax payer. The RHI degression mechanism involves tariffs available to new applicants being gradually reduced if uptake of the technologies supported under the RHI is greater than forecast. This will be done by monitoring uptake on a quarterly basis against a series of 'triggers'. Monthly updates on progress towards triggers will be published online and one month's notice will be given before any reductions are made to the tariffs for new applicants. The regulations came into force on 30 April 2013.
9. DECC consulted on expanding the non domestic RHI scheme to include further technologies in September 2012 and will confirm the way forward in Summer 2013.

10. More details on how the RHI works can be found here:
<https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi>

11. Over 2,100 applications have been submitted to date under the non-domestic scheme and around £27 million is expected to be made in payments for renewable heat produced in 2012-13.

12. Following on from the consultation on scheme design in September last year, the Government will confirm how a RHI for householders would work and publish the tariff levels in Summer 2013. It is expected that any householder scheme would be up and running for householders in Spring 2014.

Key Messages

Renewable heat and the RHI

1. We spend £32billion a year on heating, accounting for 1/3 of our greenhouse gas emissions. Without changing the way we produce and consume heat we will not meet our long-term climate change target or the 2020 target of ensuring 15% of energy consumed is from renewable sources.
2. To help achieve these targets in a cost-effective way, the Renewable Heat Incentive - a world first - is targeting a significant increase in the generation and use of renewable heat across England, Wales and Scotland through a diverse technology mix.
3. Launched in November 2011, the initial scheme seeks to encourage applicants from the commercial, industrial, community and public sectors to invest in ground-source heat pumps, biomass combustion, solar thermal panels and the generation of biogas. It provides quarterly payments via a range of tariffs on the amount of heat generated from accredited installations.
4. In September we consulted on proposals for a domestic scheme and extending the current scheme to include: new support for air-source heat pumps, biomass air heaters, bioliquid combined heat and power, biogas combustion over 200kWth; better support for biomass CHP, deep geothermal and energy from waste.

RHI performance to date and planned improvements

5. Since scheme launch 18 months ago, we have seen significant and growing interest in the scheme. As at 30 April 2013 we have registered 2,049 applications (and 52 preliminary applications) and accredited 1,367 installations which are now generating 236 GWh of eligible heat from across the range of technologies supported.
6. Levels of deployment for biomass installations smaller than 1MW have exceeded our forecasts, particularly for those installations between 200-999kWth. So under our recently introduced cost control policy, from 1st July newly accredited installations in this size range will see a reduced tariff of: Tier 1 - 5.0 p/kWh and Tier 2 - 2.1p/kWh (a 5% reduction).
7. Deployment of the other technologies supported under the scheme has fallen significantly short of the levels forecast at launch. We are therefore consulting on proposals to increase the current tariffs for ground-source heat pumps, solar thermal panels and biomass installations above 1MW. We have already consulted separately on a dedicated tariff for combined heat and power.
8. For installations with long-lead times, such as the injection of biomethane into the grid, combined heat and power and commercial ground-source heat pumps in new-build, we are

separately also seeking more evidence and dialogue with industry on how to strike the right balance between providing certainty and ensuring the scheme remains affordable.

Scheme Design, including budget management

9. Current tariffs are designed to incentivise 50% of the modelled heat potential and to achieve a 12% rate of return from the additional capital employed investing in renewable heat.
10. These principles continue to underpin the tariff levels proposed in the new consultation but in addition to the modelling outputs the levels are now also based upon a wider range of factors, including industry views, market intelligence and expert opinion analysed earlier this year as part of an evidence review.
11. We are also publishing updated indicative tariffs for air-water heat pumps and biomass air heating installations – two technologies we consulted on including in the scheme last September.
12. As the RHI is a demand-led scheme, we need a way of incentivising deployment whilst controlling costs to ensure the scheme remains affordable within the budgets agreed across Government.
13. After consulting last Summer, we implemented in April a transparent budget management policy called degression which reduces tariffs over the period April 2013 - March 2015 - if expenditure exceeds the levels we forecast when the scheme was launched. We publish monthly data on scheme uptake and reduce tariffs, where necessary, on a quarterly basis.
14. We will internally review our current approach to budget management in response to decisions on: the proposals for tariff increases for GSHPs, solar thermal panels and biomass over 1MW; extensions to the current scheme; introduction of domestic scheme; and DECC's budget for 2015/16.

Timings

15. Decisions on extensions to the current scheme and the introduction of a domestic scheme are planned for this Summer, with implementation via regulations expected in Spring 2014.
16. 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 cost-control review. New tariff levels are expected to come into force in Spring 2014.
17. Final decisions are subject to Parliamentary approval and State Aid rules.

Questions & Answers (Q&A)

Context

Q: Why are you consulting on a tariff review now?

A: In light of updated evidence on costs and performance of renewable heat technologies and a year's uptake data, we have identified that the conditions in which we expect to carry out an early review have been met, as we set out on the 27th February this year. In particular that: i) Evidence suggests that data we use as inputs to tariff setting methodology need updating; ii) The scheme is not incentivising deployment to the level we would anticipate, taking into account the late start of the scheme.

Q: When did you first realise your input assumptions needed updating and why did you wait for so long?

A: Any change in input assumptions and tariffs require evidence and robust analysis. The assumptions used to calculate the tariffs were initially prepared by an independent consultant's report in 2009 which gathered data on costs and performance from the renewable heat technology industries. Owing to a lack of empirical data on heat use in non domestic buildings at that time, assumptions had to be made on the heat loads for non domestic technologies. The report was followed up in 2010 and we consulted on the tariffs. While some parties raised concerns on heat load assumptions, there remained a lack of empirical data available required to inform a change in input assumptions. Uptake of some technologies following the launch of the scheme in November 2011 was below expectations and so we commissioned Sweett Group to review the costs and input assumptions used to set the tariffs.

Q: Does this mean that you did not set the tariff levels correctly in the first place?

A: The tariffs were set based on the best available data at the time. With the benefit of new emerging data a year after launch, including the benefit of scheme deployment data, we have identified new tariffs for some technologies which we believe are more likely to drive the levels of uptake needed and these are the subject of the consultation.

Q: When can we see the Sweett report?

A: We have published the Sweett report and accompanying datasets alongside the consultation [\[insert link\]](#).

Q: Why is this work taking so long and why didn't you launch the consultation earlier?

A: we have undertaken a complex review of data used in the RHI model which involves the incorporation of new capex and load factor data from the work conducted by the Sweett group and making a number of reasoned judgements on tariff levels. We need to ensure our tariff setting approach is sufficiently robust to provide certainty to the marketplace on future tariff levels.

Q: What is included in the Sweett Group report?

The research led by the Sweett Group provides updated evidence on costs and performance of renewable heating technologies. This data is an integral part of our tariff setting process which also includes evidence from industry and takes into account scheme deployment so far.

Consultation Process**Q: How long will I have to respond to the tariff review consultation?**

A: Given the importance of delivering revised tariff levels to stimulate uptake as quickly as possible, we are running a 4 week consultation period. The consultation will be open to respondents from 31 May to 28 June.

Q: When can I expect the government response to be published and any new tariffs to come into effect?

A: We plan to publish our response to the tariff review consultation in the autumn of 2013, with any changes to tariffs being introduced in spring 2014; subject to Parliamentary approval. We will also need to ensure that any changes comply with State Aid requirements. This will be in conjunction with the introduction of support for any new technologies which are also due to be introduced in spring 2014.

Q: How can I feed in to the consultation process; will there be any additional events etc?

A: You can respond to the consultation via the DECC website

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

In addition, we may hold a live web-chat and encourage interested parties to use this opportunity to pose their questions directly to DECC officials. We may also be holding a number of 'tariff review surgeries' in London to discuss the details of our work with stakeholders. Interested parties can contact officials via rhi@decc.gsi.gov.uk.

Consultation Content: Ground Source Heat Pumps**Q: The ground source heat pump industry has suffered due to low RHI tariffs; will the tariff review rectify this?**

A: Our review of the evidence, market intelligence and stakeholder views implies that a tariff of around 9p/kWh may be required to fully incentivise the deployment of GSHPs, which would be equivalent to 12.5p/kWh of renewable heat. This is higher than our updated estimate for the value for money cap, which is around 10.0p/kWh for 2014/15, and our estimate of the impacts on electricity producers of wider Government policy on the calculation of the cap which implies a tariff of around 11.3p/kWh in 2014/15. Therefore we are consulting, subject to affordability, on introducing a tariff equivalent to these limits of between 7.2 to 8.2p/kWh paid on all heat. We believe that tariffs increased to these levels will be sufficient to incentivise significant uptake of GSHPs and will be seeking views through the consultation.

Q: Will you be doing anything to assist those in the GSHP industry who have lost business as a consequence of the previous low tariffs?

A: RHI tariffs are set by reference to the best evidence available to the Government at the time. The evidence used when setting the original tariffs was gathered over several years including through stakeholder engagement and a public consultation. Since that time we have been able to gather further evidence which has ~~en~~ enabled us to propose the tariff changes set out in the consultation document. The low deployment to date is one of the factors which we have taken into account when proposing changes to tariffs, though we are also conscious that the health of industrial sectors such as the GSHP sector can be affected by many factors, including the construction market and general economic conditions. We share the GSHP industry's disappointment about the low deployment to date and will continue to consider ways to encourage further deployment.

Consultation Content: Biomass**Q: How will the tariff review affect the large biomass tariff?**

A: In the consultation document we are proposing, subject to affordability, that the large biomass tariff be increased to 2.0p/kWh to drive the uptake of installations over 1MW in the UK.

Q: How will the tariff review affect the small and medium biomass tariffs?

A: Deployment of small and medium biomass has been a real success of the scheme, even higher than expected. So we do not propose a tariff change for these installations through this consultation. However, as announced alongside the tariff review, through the depression mechanism medium biomass will be subject to a 5% reduction on 1st July for new installations given that expenditure to date is higher than forecast. Further reductions are possible in the future as explained in the February RHI policy document.

Q: Why are you consulting on increasing the tariffs for ground source heat pumps, large scale biomass and solar thermal, but keeping small biomass the same/reducing medium biomass?

A: At present, deployment of ground source heat pumps, large biomass and solar thermal installations has fallen short of expectations. We therefore need to increase these tariffs if we wish to drive uptake, help the industry drive cost reductions, achieve a diverse technology mix and to make important headway in renewable heat's contribution towards our longer-term climate change targets. In contrast, small and medium biomass installations are currently deploying beyond the levels expected with the current tariffs. It is important that we ensure value for money for the taxpayer and, with this in mind, we have no evidence that changes to tariffs through this consultation are appropriate or required.

Consultation Content: Solar Thermal

Q: Solar thermal deployment has not been successfully incentivised under the RHI; will the tariff review address this?

A: The deployment of solar thermal installations through the non-domestic RHI has been relatively low as expected. Solar thermal has the highest cost per unit heat of all the technologies currently supported through the scheme and tariffs have been capped to ensure value for money for the taxpayer. In the consultation document we are proposing, subject to affordability, that we increase the level of the cap and the solar thermal tariff which we anticipate would result in some increase in uptake.

Q: The solar thermal industry are calling for solar thermal tariffs to be paid over a period of 7 years rather than the current 20 years; do you agree that the high upfront costs and lack of on-going excess fuel costs associated with this technology warrant such an approach?

A: Offering a 7 year tariff is under consideration for the domestic scheme but we have not yet consulted or modelled such a tariff structure in the non-domestic scheme. We are seeking evidence through this consultation on the merits of such an approach.

Q. Why offer support for solar thermal when it is relatively expensive and you do not expect tariff levels to incentivise much deployment?

Solar thermal is not expected to play a material role in renewable heat's contribution toward the 2020 target due to the relatively small amount of heat generated through each installation. However as it is expected to have a role to play in the domestic new build market up to 2050, maintaining and developing supply-chain capacity, skills and innovation over the next decade will become increasingly important.

Consultation Content: Impact on Tariffs Previously Consulted on in September 2012

Q: Why are you looking at air source heat pumps and biomass direct air again when the tariff has yet to be implemented?

A: Since we proposed tariffs for these technologies in September 2012 we have completed a review of the evidence and assumptions used to set these tariffs. In addition, these technologies are strongly related to those that are being reviewed, biomass and GSHP. Therefore, we have

provided an indicative update to these tariffs according to the latest evidence and tariff setting principles for the industry to consider alongside the reviewed tariffs. Decisions on support for these technologies will be announced in the Summer with final tariffs to be confirmed in the Autumn as part of the conclusions from the tariff review.

Q: How will the outcomes of the tariff review consultation be implemented in relation to the new non-domestic tariffs?

A: We plan to implement any changes to tariffs (for existing technologies and any new technologies) in spring 2014; subject to Parliamentary scheduling and compliance with State Aid requirements.

Q: Why have you not presented updated indicative tariffs for air-air heat pumps – have you already decided not to offer support to them?

We are currently finalising the policy on whether to offer support for heating only air-air heat pumps - as yet a final decision has not been taken. However, we have not set out indicative tariffs in this consultation as our work to date suggests that support is unlikely to be required. If we do decide to offer support for air-air heat pumps we will ensure that the approach taken to setting the tariff is consistent with any final decisions taken on tariffs following this consultation.

Post-Consultation

Q: Who will be eligible for any tariff changes?

A: The Government announced on 21st January that, subject to State Aids requirements and any necessary approvals, it was our intention that installations whose date of accreditation is on or after the 21st January would be eligible for any tariff changes, from the date the new tariff comes into force. It remains our intention that any changes to tariffs should not affect installations accredited before the date of that announcement as such installations 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 also is consistent with our approach in the budget management mechanism where tariff changes do not affect existing participants in the scheme. We have asked consultees for their views on our intended approach in the consultation document.

Q: Will those on existing tariffs benefit?

A: We are not proposing to backdate any tariff changes to cover installations for which the date of accreditation is earlier than 21st January 2013. The investment decision to install renewable heat for existing installations was made in light of the existing tariffs so it is unlikely to represent good value for money to change the tariffs for these installations. We have asked consultees for their views on our intended approach in the consultation document.

Q: Will any tariff levels decrease as a result of this Review?

A: We are not proposing any reductions to tariffs through this consultation but have announced reduction as part of the budget management mechanism which controls costs where deployment goes beyond expected levels.

Q: I was about to seek accreditation for my installation. Should I wait for the new tariff to be confirmed?

A: Our intention remains that, subject to State Aids requirements and any necessary approvals, any installation whose date of accreditation is on or after the 21st January would be eligible for any tariff changes following this consultation, from the date the new tariff comes into force. The installation would initially receive payment at current rates and once any increased rate comes in to force, payments for heat generated by the installation after that date would be based on the higher tariff level.

Q. Projects with long-lead times need tariff guarantees – when are you going to make progress on enhanced preliminary accreditation as you proposed last year?

A. We consulted last Summer on proposals for reducing the uncertainty which can affect projects with long-lead times. In our February response, we identified that significant policy challenges remained and committed to work on measures to improve certainty, including through working with stakeholders through 2013 to improve our evidence base.

Value for Money & Budget Management

Q: What is the DECC Value for Money (VFM) cap?

A: To ensure that the RHI offers value for money in delivering a contribution towards the renewable energy target, any tariffs provided are capped at the marginal cost of renewable energy (i.e. the most expensive technology that could be deployed at a scale sufficient to meet the renewables target). The actual marginal cost is currently the level of support for offshore wind technology, which is supported through the Renewables Obligation (RO).

Q: Will the new tariffs end up being degressed?

A. When the RHI budget management policy was confirmed in February we noted that alongside finalising the early tariff review and the additional non domestic tariffs, being brought forward following the September 2012 consultation, we might need to review the degression triggers to adjust for changes to projected uptake. We will therefore be reviewing our current approach to cost control in light of the proposals set out in the consultation document, the proposed extensions to the current scheme, the proposed introduction of a domestic scheme and the available budget following the spending review for 15/16.

Q: How does the current degression mechanism affect the technologies whose tariffs are under review in this consultation?

The technologies for which we have proposed tariff changes are governed by the current degression mechanism so could in principle be affected by a tariff reduction in the future in the case of high deployment. However, given the current level of deployment which is one of the principle reasons for proposing changes to tariffs, we think it very unlikely that expenditure will increase so dramatically that tariffs would be reduced in the near future.

Budget control for the non-domestic RHI scheme (degression)**Q. What have you announced today?**

A. DECC has published the first quarterly budget forecast statement. This advises whether any tariffs will be reduced.

Q. Where can I find this?

A. DECC has published this on the RHI page of the [GOV.UK website](https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi) at <https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi>

Q. Why have you published this now?

A. The RHI regulations require DECC to publish the first quarterly budget statement by 1 June (and subsequently by 1 September and 1 December 2013, and by 1 March 2014). In practice, publications will need to take place, at the latest, on the nearest working day prior to the above dates.

Q. How much of the RHI budget has been spent?

A. Ofgem, who administer the non-domestic RHI scheme, have paid out over £8m in actual payments so far to accredited or registered installations. However, based upon applications made to date, we are estimating total forecast expenditure for the non-domestic scheme over the next 12 months to be £48.9 million. This equates to more than 50% of our original forecast expenditure of £97.2M for this period.

Q. Is the RHI close to busting its budget?**Q. How much do you think you will spend over this financial year?**

A. No. Current total forecast expenditure shows that we estimate to spend around half of the allocated budget i.e. £48.9 million over the next 12 months.

Q. Are you reducing any tariffs?

A. Following our assessment of data which was provided by Ofgem covering deployment and spend up to 30 April 2013, we are announcing a reduction of 5% to the current medium commercial biomass tariffs.

Q. Why are you only reducing medium commercial biomass tariffs?

A. Medium commercial biomass is the only technology which is exceeding its expenditure threshold (or “trigger”). The Medium commercial biomass forecast is £22.6m, compared to an expenditure threshold of £20.1M. The relevant thresholds and the amounts by which tariffs will be reduced in different circumstances are set out in the regulations. In this case, the medium commercial biomass tariff will be reduced by 5%.

No other technology tariff is currently in this position.

Q. What are the new tariffs for medium commercial biomass?

A. The new tariff will be as follows:

	<i>Existing tariff</i>	<i>% reduction</i>	<i>New tariff for installations accredited on or after 1 July</i>
Medium Commercial biomass	Tier 1: 5.3p/Kwh Tier 2: 2.2p/Kwh	0%	Tier 1: 5.0 p/Kwh Tier 2: 2.1 p/Kwh

Expenditure limits (or triggers), as well as the rules which determine whether and by how much tariffs will be reduced, are set out in the RHI Regulations 2011, as amended.

Q. When will the new medium biomass tariff come into effect?

A. It will come into effect on 1 July 2013 for installations whose date of accreditation or registration is on or after that date.

Q. Will the reduced tariff apply to me – I have already been accredited/registered by Ofgem.

A. No. Those who are already in receipt of RHI support will not be affected by any reduction to the tariff levels as a result of depression.

Q. Will the reduced tariff apply to me - I have submitted my application but not had a decision yet.

A. Applicants to the RHI will receive existing (i.e. non-degressed) tariffs if the date of accreditation or registration is before any new tariffs come into effect. If the date of accreditation or registration is after 1 July then any new tariff will apply.

Q. Why are you reducing a tariff when the scheme is underperforming as a whole?

A. As deployment in medium biomass is exceeding the rate we expected when the tariff was originally set, this suggests that the tariff is higher than is needed to incentivise installation and so we may be over-compensating further installations if we do not adjust our tariffs downwards. In the expenditure forecast statement we predicted a forecast for total expenditure for the non-domestic scheme over the next 12 months (i.e. until 30 April 2014) of £48.9 million. This is just over half of the total amount we calculated to be the cost of the deployment we predicted may be necessary if renewable heat is to make the intended contribution to the renewable energy targets. Although we have not reached our total, the scheme is clearly helping to deliver support to the installation of renewable technologies at a good level.

Q. The data clearly shows that some technologies are not performing well?

A. In light of updated evidence on costs and performance of renewable heat technologies and a year's uptake data, we have today published a consultation proposing changes to certain tariffs. The new approach used to identify the proposed tariffs incorporates a range of factors, including industry views, market intelligence, expert opinion and modelling outputs. Our intention is to deliver cost effective support for renewable heat ensuring support for each technology. We hope any changes to tariffs following this consultation will stimulate those technologies which have not been performing as strongly to date.

Q. The data clearly shows that biomass is dominating the scheme.

Deployment of small and medium biomass has been a real success of the scheme, even higher than expected and so we have not proposed changes to those tariffs.

We have also announced alongside the tariff review consultation that the tariff for medium commercial biomass will be reduced by 5% in accordance with the degression mechanism due to the higher than expected expenditure on that technology to date.

Q. Why are you reducing the RHI biomass tariffs when you have just announced an increase to the grant level under your RHPP scheme? This is an inconsistent approach to this technology.

DECC has recently reviewed market data used to set appropriate levels of support for all technologies eligible for the RHPP and RHI schemes, including updating its support for biomass in the respective domestic/non-domestic sectors, in response to the latest market activity. DECC is seeking to strike the best right balance of best support for the biomass industry at lowest cost to the taxpayer. The flourishing non-domestic market means we are able to save money by reducing tariffs in the existing non-domestic RHI scheme, reflecting that this market is performing well and increasing in stability. At the same time we have increased our support for the domestic sector, for which RHI support is not yet available, through increases to the grants available through the RHPP scheme and in doing so we have brought our support for domestic biomass in line with other domestic renewable heating systems.

Q. Why does the amount Ofgem estimates it has paid out differ from the amount DECC forecast they will spend?

A. In forecasting expenditure, DECC looks ahead and forecasts how much it is committed to spend over the coming 12 months, for example from 30th April 2013 to 30 April 2014, based upon applications made for preliminary accreditation, accreditation and registration, and the granting of registration and accreditation. The 12 month period rolls forward every quarter, running from the last assessment date. As we receive more applications, over time the amount of committed spend naturally increases.

Ofgem publishes separate data on actual payments they have made. This data does not identify the likely cost of future payments over the coming year. The numbers DECC publishes will inevitably always be a lot higher than the figures Ofgem publishes.

Q. Where can I find what the triggers are?

A. The expenditure limits (or triggers) which can lead to reductions to tariffs are set out in Regulations, and are available [here](#).

Q. When will you publish the first monthly forecast statement?

A. DECC will publish monthly forecasts when there is no quarterly publication. This will provide information to allow industry to see uptake under the scheme and self-assess whether any reduction of tariffs is likely to be made at the next quarterly announcement, and plan ahead accordingly. The first monthly announcement will be made by the end of June 2013.

Q. What is degression?

A. Under a system of degression, tariffs paid to new RHI recipients will be reduced if the forecasted expenditure exceeds the anticipated expenditure set out in the regulations. The anticipated expenditure is based on the deployment we have predicted may be required if renewable heat is to make an effective contribution toward the UK's 2020 renewable energy targets.

Degression is therefore intended to bring deployment back into line with estimates. It also ensures that government does not pay more than it needs to in order to incentivise the uptake of renewable technologies – and thus it ensures value for money for the taxpayer.

The circumstances which would activate a degression are set out in regulations.

77% of respondents to last year's consultation supported the adoption of a degression mechanism.



Department
of Energy &
Climate Change

**TECHNICAL ANNEX TO SUPPORT THE CONSULTATION ON THE
NON-DOMESTIC RHI EARLY TARIFF REVIEW**

31/05/13

URN:13D/134

Contents

Introduction	3
Background	3
Problem under consideration	5
Rationale for Intervention	6
Review of evidence base	6
Scheme deployment to date	6
Overview of DECC cost and heat use data	7
Modelled tariffs	11
Approach to setting the proposed tariffs	12
Value for Money of the proposed tariffs	16
Annexes	18
ANNEX 1: Approach to setting tariffs through the RHI model	18
ANNEX 2: Illustration of the impact of uncertainty in cost curves on technical potential and tariff changes	22
ANNEX 3: Comparison of Existing and Proposed Tariffs in 2014 Prices	23

Introduction

1. This technical annex is intended to explain in detail the approach taken to set the consultation tariffs. It also provides the economic rationale and reviews the evidence base that was drawn on in setting tariffs. DECC has not produced a full Impact Assessment setting out the potential effects of the tariff changes. A full Impact Assessment encompassing all changes to the RHI will be published in the autumn when a fuller picture of the combined impacts of the changes to the scheme can be provided.

Background

2. The current market for renewable heat is relatively small and these technologies are largely unable to compete on cost with conventional fossil fuel heating options such as gas, oil and electricity. In addition to cost differences, there are a number of non-financial barriers to the uptake of renewable heat. The following describes the rationale for subsidising renewable heating and the launch of the RHI:
 - The negative carbon externality associated with the conventional heating of buildings. Renewable heat technologies enable buildings to be heated using significantly less fossil fuels thereby reducing greenhouse gas emissions;
 - The UK operates under the EU's Renewable Energy Directive (RED) which sets out a legally binding target for the UK of 15% of energy coming from renewable sources by 2020. Although the infraction penalty for not meeting this target is not currently monetised, it is described as being commensurate with the costs of meeting the target;¹
 - Driving innovation and cost reductions in renewable heat technologies is also a key rationale to support the longer term sustainable heating of buildings and industrial processes;
 - Renewable technologies add a further non-monetised benefit through diversifying the UK's energy demand, reducing the exposure of the UK to the price of oil and gas through further diversification of energy supply;
3. The Renewable Energy Strategy (published in 2009²) found that, on analysis of opportunities across electricity, transport and heat, a suitable contribution from the heat sector was 12% of heat being delivered from renewable sources by 2020. Renewable heat is also a key part of DECC's Carbon Plan³ and longer-term Heat Strategy,⁴ which set out the important role of renewable heat in contributing to the long-term de-carbonisation of energy supply. The current RHI tariffs are set out in the table below.

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>

² <http://www.official-documents.gov.uk/document/cm76/7686/7686.pdf>

³ <https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2>

⁴ <https://www.gov.uk/government/publications/the-future-of-heating-a-strategic-framework-for-low-carbon-heat>

Table 1: Current RHI tariffs

Tariff	Eligible technology	Eligible size	RPI adjusted tariff (p/kWh) from 1 April 2013
Small commercial biomass	Solid biomass including solid biomass contained in municipal solid waste (incl. CHP)	Less than 200 kW	Tier 1: 8.6
			Tier 2: 2.2
Medium commercial biomass		200 kW and above; less than 1,000 kW	Tier 1: 5.3
			Tier 2: 2.2
Large commercial biomass		1,000 kW and above	1
Small commercial heat pumps		Ground source heat pumps; water source heat pumps; deep geothermal	Less than 100 kW
Large commercial heat pumps	100 kW and above		3.5
All solar collectors	Solar collectors	Less than 200 kW	9.2
Biomethane and biogas combustion	Biomethane injection and biogas combustion, except from landfill gas	Biomethane - all scales	7.3
		Biogas combustion, except from landfill gas - less than 200kW	

4. The RHI tariffs are a 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.
5. In August 2012, DECC commissioned new evidence on costs and performance assumptions of renewable heat technologies from the Sweett Group⁵ and on the 21st January 2013 announced a review of the evidence base used to set the non-domestic RHI tariffs, in light of the new data, stakeholder evidence and scheme performance so far. DECC then announced on 27 February that the conditions in which DECC expects to carry out an early tariff review had been met.

⁵ Sweett group report is published alongside the consultation documents:
<https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

Problem under consideration

6. The key reason for the tariff review is that deployment to date of key technologies has been significantly below our original forecasts and therefore below the trajectories needed to remain on track to meeting the 2020 renewables target (see Table 2 for spend forecasts). In addition, new evidence on costs and performance from research and stakeholder feedback has also become available. The range of data now available highlights the variability of heating use and associated costs in the non-domestic sector as well as the uncertainty there is in the data we use to set our tariffs.
7. When the RHI was introduced, tariffs were based on the best available data at the time – the AEA reports from 2009⁶ and 2010⁷. DECC now has four key data sources that can be used to inform our tariff setting, the original AEA data, the latest data from Sweett, actual scheme deployment data and the data collected from stakeholder engagement. The relative strengths and weaknesses of these data sources are discussed throughout this technical annex.
8. A key issue DECC faces in this review is how to combine or draw on the evidence base in order to determine where current tariffs are insufficient and to what extent they need to be altered in order to provide an incentive in line with the original policy intent. DECC is proposing to use the broader range of evidence as set out in the previous paragraph rather than having to rely so heavily on the outputs of the RHI model. The proposed new approach is described on page 12 after the next section which reviews the evidence base. The original approach is set out briefly in Box 1.

Box 1: RHI tariff setting methodology used in 2011:

1. Estimate the additional cost of installing and running a renewable heating system. This is used to calculate the cost per unit of heat produced for renewable technologies less the cost of the conventional technology alternative. Added to this cost are the additional barrier costs. Calculations are made using costs, use and performance data for each technology in each category of building (broken down by commercial, industrial, counterfactual fuel and location).
2. Estimate the heat demand of each building category, the number of such buildings and the proportion of them suitable for each renewable technology.
3. From these figures, a “supply curve” is produced for each technology which estimates the amount of renewable heat potentially fundable at each tariff level.
4. From these curves we are able to identify the tariff required to potentially incentivise the targeted percentage of the potential installations. This targeted percentage is the 50% point on the supply curve (unless the tariff is capped for value for money reasons).

A more detailed description of this tariff setting methodology can be found in **Annex 1**.

⁶ NERA/AEA (2009): The UK Supply Curve for Renewable Heat; http://www.nera.com/67_5462.htm

⁷ <http://webarchive.nationalarchives.gov.uk/20121217150421/http://decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/renewable%20energy/renewable%20energy%20policy/1394-review-of-tech-info-on-rhi-.pdf>

Rationale for Intervention

9. The RHI is the key policy mechanism that DECC has put in place to help the heat sector meet its contribution to the 2020 renewables target. Low deployment to date from the scheme increases the risk that the UK will not be able to generate 12% of its heat demand through renewables. This could have consequences for the UK's ability to use renewable heat to meet its legally binding renewables target. Current deployment for GSHPs in particular is very low and there is a significant risk that the industry will not sustain itself out to 2020. Without higher levels of deployment in the short term it is likely to be more expensive for the UK to meet longer term decarbonisation objectives in the 2020s and 2030s.
10. Without this early review of tariffs, it is unlikely that DECC would be in a position to bring any new tariffs into force until after the planned 2014 review of the scheme which, if deployment continues along current trends, would mean deployment in subsequent years would have to be even higher in order to remain on course to meeting renewable heat's intended share of the 2020 renewables target. Such high growth rates would be difficult to achieve and would most likely require even higher tariffs and/or additional policy measures to stimulate the market sufficiently.
11. There may be other, non-tariff related reasons for deployment being lower than anticipated. Policy uncertainty, economic conditions and delayed launch of the RHI could all have contributed to the low deployment seen to date. However, this review of tariffs is not seeking to review the wider structure of the scheme but instead ensuring that as full an evidence base as possible is used in setting the tariffs paid through the RHI so that there is as little delay as possible to suitable tariffs becoming available.

Review of evidence base

12. The four key data sources available to DECC are:
 - a. AEA data
 - b. Sweett data
 - c. Stakeholder evidence
 - d. Scheme data
13. Of these, only the first two are in a format that can easily be incorporated into DECC's RHI model. However, in order to ensure that the tariffs incentivise sufficient deployment whilst avoiding over-compensation and also offering value for money and being affordable all available evidence sources should be used to inform tariff levels.

Scheme deployment to date

14. Table 2 below sets out how the forecast spend over the next year for each technology compares to the anticipated⁸ spend. The table shows that current spend for the whole scheme is roughly half of what DECC had expected at launch with deployment rates for large biomass and GSHPs particularly low. The low deployment suggests the current tariffs offered through the RHI need to be changed if greater deployment is to be incentivised in the

⁸ The anticipated deployment is based on the modelling carried out for the 2011 Impact Assessment, The projected deployment for some technologies such as large GSHPs or Solar Thermal is very low, especially in the early years of the scheme.

future. When this is combined with other evidence from the Sweett Group and stakeholder evidence, the argument that some tariffs should be revised becomes stronger.

Table 2: 12 month forecast spend based on data up to 30th April 2013

Tariff	Forecast expenditure as % of anticipated
<i>Small Biomass</i>	126%
<i>Medium Biomass</i>	169%
<i>Large Biomass</i>	23%
<i>Small GSHP</i>	1%
<i>Large GSHP</i>	10%
<i>Solar thermal</i>	1%
<i>Biomethane and biogas (not in scope of review)</i>	13%
Total	8%

15. As well as data on the number of applications and installed capacity, the scheme data collected so far provides an insight into heat usage patterns. The limited outturn data from the non-domestic RHI suggests that the estimated AEA heat loads (the proportion of time heating equipment is run) are relatively high. Outturn data suggests load factors of between 6% and 29% as opposed to the 35% suggested by AEA. This range of load factors from the scheme data is also close to the range proposed by the Sweett Group (see Table 4). The load factor is a key assumption in tariff setting, assuming too high a load factor would lead to a lower tariff (all else held constant) and therefore lower deployment.

Overview of DECC cost and heat use data

16. DECC now has access to two commissioned datasets that provide an overview of renewable heat costs and heat use in the non-domestic sector. For each dataset, costs and performance have been derived using a different approach. 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 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.

17. The two datasets give different pictures of capital costs associated with different size installations, reflecting the different approaches that 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. Although sample sizes for some technologies and larger installations are very limited.

Box 2: Description of key findings from Sweett Group report

A key input to this consultation and the accompanying analysis has been the research carried out by the Sweett Group on heat costs and performance. Sweett Group was commissioned in August 2012 to look at costs of renewable heating technologies including an examination of evidence from Renewable Heat Premium Payments (RHPP). This research has recently concluded and was subject to independent peer review in January 2013. It is being published alongside this consultation.

A key finding from the Sweett Group research is that, in general, the costs of renewable heating systems are higher than the previous estimates made by AEA. However, the coverage of the Sweett data is not as wide as the AEA data and for some technologies – such as Air to Air Heat Pumps and large capacity installations – there are too few observations in the Sweett data to draw significant conclusions.

On load factors and heat outputs, there is a lack of representative measured data available in the non-domestic sector. This is because the capacity of a system and the load factor are influenced by a range of factors that are highly variable and not directly linked to a generic building type. They are more influenced by the type of heat use so will therefore vary greatly between sectors and whether heat is for process or space use. In addition, non-domestic properties may also have multiple heat sources, meaning that the size and load factor of any one of them is down to the discretion of the owner and can be altered in response to incentives. For example, a non-domestic entity may have one technology for its base load heating and another to meet peak loads.

The non-domestic heat outputs and load factors were provided by Burro Happold (as part of the consortium with Sweett Group who undertook this research). In many cases, these heat outputs (and load factors) represent a significant reduction to AEA's evidence. The impact of incorporating these assumptions would be to increase tariffs significantly in the non-domestic sector, particularly for GSHPs.

However, it should also be noted that Sweett Group and Burro Happold have advised DECC that their non-domestic load factor estimates are highly uncertain. In particular, given the time available, it was difficult for them to source a wide range of data on heat use in industrial applications so the heat use data in these cases is drawn from a narrow sample and is not sufficiently representative of the UK industrial sector as a whole.

18. A detailed picture of heat demand in the UK non-domestic sector is not currently available, which makes determining tariffs using cost and performance assumptions alone highly uncertain, given the sensitivity of tariff levels to changes in key assumptions. For example load factors vary hugely across different building types and heat uses. It is therefore difficult to make generalisations which are representative of the non-domestic sector as a whole.
19. However, where this research provided data and assumptions that are potentially closer to the 'true' cost of a renewable heating system, then using it to inform the setting of a more suitable tariff is desirable and should help mitigate the risk of any market distortions arising where tariffs are less representative of the 'true' costs.
20. The Sweett Group report, this technical annex and previously published AEA data are intended to demonstrate as fully as possible the data that DECC currently holds and how it has been used to arrive at the indicative tariffs presented in this document. Summary tables that illustrate the high level differences between capex and load factor estimates from AEA and Sweett are shown below. The ranges indicate highest and lowest figures used in DECC's tariff modelling.

Table 3: Comparison of AEA and Sweett capex estimate ranges (£/kW)

Technology (£/kWh)	Commercial		Industrial	
	AEA	Sweett	AEA	Sweett
ATW ASHPS	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
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 4: Comparison of AEA and Sweett load factor estimate ranges (% of time spent operating in a year)

Technology	Commercial		Industrial	
	AEA	Sweett	AEA	Sweett
ATW ASHPS	35%	10-26%	-	-
Biomass boilers	20-45%	13-29%	20-82%	8-50%
Biomass District Heating	20-45%	20-45%	20%	20%
GSHPs	35%	10-26%	35%	8-23%
Solar Thermal	6%	4-7%	6%	4%

Stakeholder evidence

21. The industry views and market intelligence we have used come 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.
- 22.
- 23.
24. Table 5 shows a summary of the views on appropriate tariff levels which we have collected.

Table 5: Range of industry and market views on required RHI tariffs by technology

Tariff (p/kWh)		Current tariffs (2013 Prices) or September 2012 consultation tariffs	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
Air to Water Heat Pumps (AWHP) (consulted on)		1.7	1	3.2
Solar Thermal		9.2	N/A	N/A
Biomass Direct Air Heating (BDAH) (consulted tariffs)	Small and medium	2.1	N/A	3
	Large	1	1.5	2.7

Modelled tariffs

26. As discussed above, there is considerable uncertainty over which cost, heat demand and load factor assumptions are most appropriate to use in tariff setting. Limitations in both the AEA and Sweet data have been highlighted. As part of this tariff review DECC has used the RHI model with different combinations of data to produce a range of possible tariffs. This range does not capture all uncertainty, but does capture the major variations that exist between evidence gathered by Sweett and AEA.
27. There is a very large range of possible data combinations where either costs or load factors for each technology are taken from either or both data sets. In order to provide an illustrative range of tariffs three core combinations of data have been put together:
1. **All AEA** – This provides an illustration of how changes to the model (as opposed to its input assumptions) since 2011 have impacted on the tariff setting. Box 3 provides more detail on changes to the model.
 2. **Sweett costs with AEA heat loads** – Where Sweett have been able to provide updated cost assessments based on large enough samples it is sensible to use them in tariff calculations. Sweett heat load data is less certain and was heavily caveated; this combination of data shows the impact of keeping the AEA load factor assumptions for tariff calculations.
 3. **Sweett costs and commercial load factors but AEA industrial heat loads** – A key finding of the evidence base review is that the load factor assumptions used by AEA are generally high. This combination of data illustrates the effect on tariff levels of the lower load factors in the commercial Sweett data but retains the industrial load factors from AEA as the Sweett data for this sector was particularly limited.

Table 6: Range of model outputs for different input assumptions

Tariff (p/kWh)		Current tariff (2013 Prices) or September 2012 consultation tariff (2012 Prices)	Data combinations		
			1: All AEA	2: Sweett costs and AEA heat loads	3: Sweett costs, but AEA heat loads for industrial
Biomass	Small ⁹	Tier 1: 8.6	Tier 1: 6.2	Tier 1: 7.7	Tier 1: 10.6
	Medium ⁹	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
GSHPs	Medium	4.8	5.2	6.2	11.7
	Large	3.5	3.2	7.2	10.8
AWHPs (consulted on)		1.7	3.8	3.8	6.6
Solar Thermal		9.2 ¹⁰	26.5	27.8	24.2
Biomass direct air (consulted on)		2.1	3.2	6.3**	6.4**

**Cost data based on a relatively small sample size

⁹ Tier 2 is set at 2.2p/kWh

¹⁰ Current Solar Thermal tariff is capped at 9.2p/kWh, modelled tariffs are shown uncapped for info.

28. The ranges of tariffs in Table 6 have been used to inform the levels of the proposed tariffs.

Box 3: Changes to the RHI model since the November 2011 Impact Assessment

Whilst the analysis for the original RHI Impact Assessment and the launch of the non-domestic RHI Phase I in November 2011 was based on the best available data at the time, the evidence base and assumptions feeding into the RHI model have evolved. Changes to the model and its input assumptions that will have affected tariffs include the following:

1. New evidence providing information on costs, heat loads and load factors for RHI technologies became available in spring 2013 and has been integrated into the evidence base of the RHI model.
2. Projections of fossil fuel prices, carbon prices and energy demand were updated.
3. New evidence on the suitability of technologies became available for each area of heat demand. In aggregate these show that initial estimates were too optimistic on the ability of technologies to replace non-renewable alternatives.

Approach to setting the proposed tariffs

29. The aim of the tariffs set in the scheme remains to incentivise up to the 50th percentile of the heat potential for each technology, whilst providing a rate of return of 12% to the reference installation. However, given the range of tariffs suggested by the model and the difficulties in determining which tariffs or data combination are most appropriate DECC has drawn heavily on the full range of evidence described in the previous section.

30. To make judgements about the appropriate level for tariffs, the following considerations have been taken into account:

- 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 6.
- 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 5.
- 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 and other, 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.

31. For different technologies, the evidence from the different sources available to DECC is weighted differently according to the considerations above. The exact approach taken for each of the technologies covered by this review is set out in more detail in the consultation document¹¹.

32. Table 7 shows the tariffs being proposed as part of this consultation. Aside from the proposed increase in tariff levels for all technologies apart from small and medium biomass there are a number of other changes proposed as part of this consultation. The tiered tariff approach currently applied to small and medium biomass will be extended to GSHPs. This tiered tariff will apply to all sizes of GSHP so there would no longer be two tariff bands. In addition, the range proposed for the GSHP and Solar Thermal tariffs exceed the "Value for Money" (VfM) cap that was calculated at scheme launch. These changes are discussed in more detail below.

Table 7 : Proposals for review of tariffs

Technology		Current tariffs (2013 Prices)	Proposed or updated tariffs (2014 Prices)
Biomass Boilers	Small	Tier 1: 8.6 Tier 2: 2.2	NO CHANGE ¹²
	Medium	Tier 1: 5.3 Tier 2: 2.2	
	Large	1.0	2.0
GSHPs	Small	4.8	7.2 ¹³ – 8.2 ¹⁴
	Large	3.5	
Solar Thermal		9.2	10.0 ¹⁵ – 11.3

33. The current tariffs in Table 7 are shown in 2013 prices. For a version of the above table with directly comparable tariffs in 2014 prices, please refer to Annex 3.

¹¹ <https://www.gov.uk/government/consultations/non-domestic-rhi-early-tariff-review>

¹² Tariffs are subject to existing budget management mechanism.

¹³ Equivalent to 10.0p/kWh of renewable heat

¹⁴ Equivalent to 11.3p/kWh of renewable heat

¹⁵ This is the projected value of the current solar thermal tariff in 2014/15 taking into account an increase for RPI

34. **Introduction of a tiered tariff for GSHPs** – The use of tiered tariffs is designed to remove the incentive to over-produce and vent renewable heat (see Box 4 overleaf). With the tariffs in place at the time of the RHI launch DECC concluded that, because of the tariff levels, the incentive to over-produce heat was only a serious issue for small and medium biomass.
35. In the case of large biomass or other technologies the incentive was either not present or not large enough to justify the added complexity of a tiered tariff. For GSHPs our evidence suggested the cost of the electrical input needed to produce a unit of renewable heat would be close to the current tariffs.
36. This meant that the incentive to over-produce and vent heat would be less pronounced for GSHPs; even in the cases where tariffs are slightly higher than electricity costs, generators would be unlikely to have sufficient information on the COP (Coefficient Of Performance) of their kit at each point in time to exploit this opportunity, making it difficult to tell if it would be profitable to run a heat pump more than necessary in order to generate more RHI revenue.
37. DECC is now proposing a GSHP tariff that is roughly twice the existing tariff which means that it will be well above the marginal cost of generating an extra unit of heat from a GSHP. This makes the incentive to overproduce heat for GSHP installations a lot clearer and introduces a risk to both the value for money offered by the RHI and its affordability.
38. In order to address this DECC is proposing to extend the tiered tariff methodology to GSHPs. The principles would be the same as for biomass, the second tier would need to compensate for the on-going costs of the GSHP¹⁶ and the break point between tiers would need to be set at a level that reflects a reasonable estimate of a low load factor for a GSHP.
39. However, the appropriate level for both of these factors is not clear because of the large range of load factors and the variation in on-going costs between different installation types. Therefore, for this consultation DECC is proposing to apply the same second tier tariff and break point as is used for both small and medium biomass. Further work on choosing the level of both factors will be carried out during the consultation period and using any relevant responses received from stakeholders.

Table 8: Proposed tariff and VfM cap with tiering

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

40. **Single tariff for GSHPs** – 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. This is due to different load factor assumptions making a very big impact on tariffs even when levelised capex costs are lower for large installations i.e. many large installations will have lower load factors

¹⁶ In order to minimise the risk that the owner switches back to using a conventional heat source once tier 1 tariff payments cease.

meaning they require higher tariffs. In addition, some key stakeholders have suggested a single tariff for GSHPs would be preferable. Given the lack of strong evidence for separate tariffs DECC have opted to consult on a single tariff. This will make the scheme simpler and also removes the incentive for installers to under-size kit in order to access a higher tariff (see Box 4).

Box 4: The incentive to over-produce heat in the RHI and impacts of tiered tariffs

Because of the way RHI tariffs are designed to compensate users for **both** the extra capex and opex involved in installing a renewable heating system, tariffs will often be higher than the short run marginal cost of generating an extra unit of heat (i.e. the fuel or electricity cost). This can lead to an incentive to over-produce heat in order to maximise revenue from RHI payments. This excess heat would not be useful and would not be displacing heat produced from conventional sources.

To address this, a tiered tariff was introduced for small and medium biomass installations as these are the installations where the incentive to over-produce is clearest. The tiered tariff is split into a tier 1 tariff which is available for the eligible heat generated in the first 1,314* hours of operation each year (this tier aims to mainly cover the capital cost repayment) and a tier 2 payment that covers the fuel costs of the installation (which in 2014 would be set at around 2.3p/kWh). This second tier tariff applies once the maximum of the tier 1 tariff has been reached. The tier 2 tariff is set at a level that should remove the incentive to over-produce and vent heat whilst still compensating for the net cost of the renewable fuel.

Whilst tiered tariffs are designed to avoid the incentive to over-produce heat they can also introduce a secondary incentive to oversize the kit being installed. This is because the point at which tariffs change from tier 1 to tier 2 (referred to as the break point) is determined by the capacity of kit (see note below *). So if it is relatively cheap for installers to increase the size of kit they will be able to earn larger revenues through the RHI by claiming for a larger proportion of their heat needs at the tier 1 tariff.

The deployment data for biomass boilers that we have received to date does show a bias towards the larger sizes within size bands. However, it is difficult to identify how much of this is due to oversizing to take advantage of the higher tier 1 tariffs and how much is due to other factors.

The availability of a higher tariff for smaller installations creates an incentive to install kit that falls into the smaller band, even where it may have been more efficient to use larger kit. This incentive would also lead to larger numbers of installations at the top end of banding thresholds as has been seen in the scheme deployment data. Given the uncertainty in identifying the key drivers of behaviour DECC will continue to monitor this issue and most likely revisit it as part of the wider 2014 review of the scheme.

*This is the number of hours associated with a 15% load factor which is an estimate of the lower-end of the range of possible load factors. The amount of heat an installation will receive at the tier 1 tariff is a product of its capacity and 1,314 hours. e.g. a 100kW system would be eligible for the tier 1 tariff on up 131,400kWh of heat

Value for Money of the proposed tariffs

41. When the non-domestic scheme was launched in November 2011, DECC set out that none of the tariffs should be set above the support provided to offshore wind, as this was judged to be the marginal technology that could 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.
42. 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. The rest of the tariffs were below the cap.
43. **Consideration of additional impacts on VfM** - Alongside the tariff review DECC has 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.
44. 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).
45. 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.
46. 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 cap calculation, the price of support would be up to around 11.3p/kWh (in 14/15 prices).
47. 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 strategy¹⁷. 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).
48. **GSHPs** – Given the very low level of deployment to date a substantial increase is likely to be required to incentivise up to 50% of the heat potential for GSHPs. The updated model outputs in Table 6 show that the tariff may need to be as high as 10.8 and 11.7p/kWh if the 50th percentiles of the small and large bands respectively are targeted. In addition, the industry has also submitted evidence which indicates that tariffs of up to 8.0 and 10.7p/kWh would be needed to incentivise the small and large bands respectively. Taking into account the range of evidence, DECC has assessed that a 9.0p/kWh tariff would be appropriate to

¹⁷ <https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge>

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.

49. Such a tariff would be equivalent to 12.5p/kWh of renewable heat, which, as set out above, is beyond the VfM cap. DECC is 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, 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. The current depression policy will be applied to this tariff to ensure value for money and control costs.
50. **Solar Thermal** – The range of tariffs required for Solar Thermal suggested by the model (24.2-27.8 p/kWh) are well above the support available to offshore wind and would not represent good value for money. Therefore the proposed tariff would limit support to Solar Thermal at the level adopted for GSHPs.

Annexes

ANNEX 1: Approach to setting tariffs through the RHI model

Please note: this is adapted from an annex to the non-domestic extensions IA and is intended only as an illustration of the tariff setting methodology used by the RHI model.

1. The methodology that the RHI model uses to calculate tariffs is to identify the amount of subsidy per kWh required to compensate for the difference between the lifetime costs of renewable heating technologies and the lifetimes costs of counterfactual technologies. This calculation is carried out for each technology and each building type. These calculations are described in detail and worked through using an example of an air-to-air air source heat pump below.
2. **Please Note:** there are some exceptions where this methodology is slightly different; for example for Solar Thermal, no counterfactual capex is considered. For electric heating the cost of water heating is added to the counterfactual.

Calculating a levelised cost

3. In setting tariffs DECC has calculated the levelised cost, and the tariff required to offset additional costs, for each technology in each building type.
4. The levelised cost of a renewable technology is the present value of all costs and benefits of the renewable technology divided by the lifetime energy output of that technology. This gives a cost figure expressed in £/MWh, which essentially demonstrates the cost of producing a unit of energy using that technology, by spreading out all the associated costs across all the heat produced.
5. The net levelised cost of a renewable technology is the levelised cost of the renewable technology minus the levelised cost of the counterfactual technology. In calculating RHI tariffs this net levelised cost is used as the aim is to compensate for the additional costs of installing renewable heat only, for properties that need to replace their existing heating equipment. In calculating a levelised cost DECC has assumed an average cost of capital of 12%.
6. **Example:** For an air source heat pump, using illustrative values, the levelised cost is calculated as follows:

First the heat output of the heat pump is adjusted to account for increases in efficiencies of the property (e.g. insulation) over time. This is shown below:

$$\text{Adjusted Heat Output} = \text{Annual Heat Load} * \text{Efficiency Factor} \quad (1)$$

$$\text{Adjusted Heat Output} = 919.80 * 0.93 = 853.22\text{MWh} \quad (2)$$

Following this the annuitised capital expenditure is calculated over the lifetime of technology using equation 3 and a rate of return equal to the cost of capital, 12%.

$$\text{Annuitised Capex} = \frac{\text{Present Value} * \text{Rate of Return} * (1 + \text{Rate of Return})^{\text{Lifetime}}}{(1 + \text{Rate of Return})^{\text{Lifetime}} - 1} \quad (3)$$

$$\text{Annuitised Capex} = \frac{619.65 * 0.12 * (1.12)^{20}}{(1.12)^{20} - 1} = \text{£}82.96/\text{kW} \quad (4)$$

From this the levelised capital expenditure (capex) of the heat pump can be calculated.

$$\text{Levelised Capex} = \frac{\text{Annuitised Capex} * \text{Capacity}}{\text{Heat Output}} \quad (5)$$

$$\text{Levelised Capex} = \frac{82.96 * 300}{853.22} = \text{£}29.17/\text{MWh} \quad (6)$$

The same calculations are carried out to calculate the capital expenditure of the counterfactual technology.

$$\text{Adjusted Heat Output} = 919.80 * 0.93 = 853.22\text{MWh} \quad (7)$$

$$\text{Annuitised Capex} = \frac{73.63 * 0.12 * (1.12)^{20}}{(1.12)^{20} - 1} = \text{£}9.86/\text{kWh} \quad (8)$$

$$\text{Levelised Capex} = \frac{9.86 * 525}{853.22} = \text{£}6.07/\text{MWh} \quad (9)$$

7. Using the illustrative values, the total costs of the heat pump and the counterfactual (CF) technology, per MWh, are calculated below.

$$\text{Capex \& Operating Costs} = \text{Levelised capex} + \text{Opex} + \text{Fuel cost} \quad (10)$$

$$\text{RH Capex \& Operating Costs} = 29.17 + 1.55 + 47.68 = \text{£}78.40/\text{MWh} \quad (11)$$

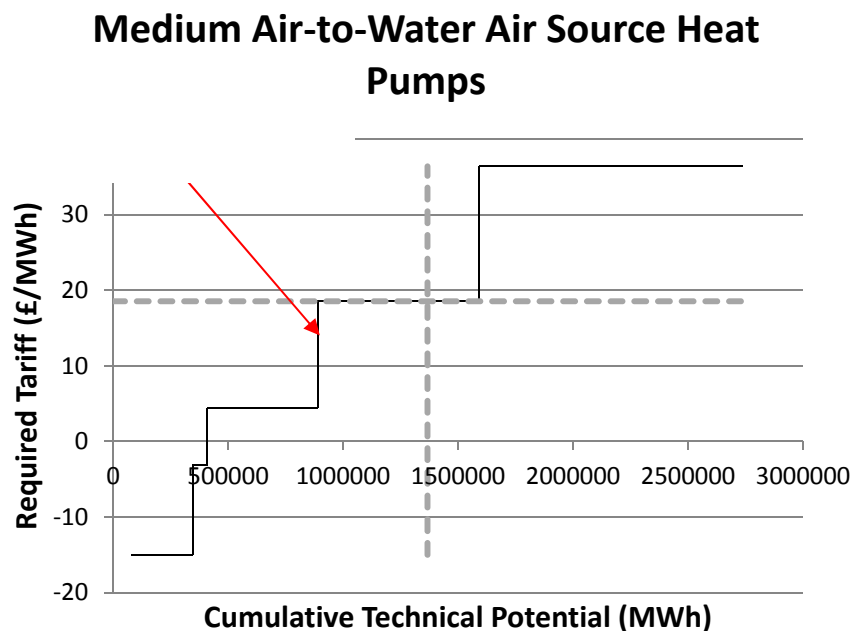
$$\text{CF Capex \& Operating Costs} = 6.07 + 0.79 + 53.51 = \text{£}60.36/\text{MWh} \quad (12)$$

Calculating the required tariff

8. The next step is to calculate the net cost which is the difference between the total costs. In calculating the net costs the non-financial barriers associated with installing the renewable heat technology and the counterfactual also need to be considered.
9. For the air source heat pump the net upfront explicit barriers (e.g. admin burdens, demand side barriers and inconvenience to the property owner/occupier) are calculated to be £0.41/MWh. The upfront implicit barriers (e.g. perceived risk barriers) are zero for air source heat pumps. These have been calculated using a rate of return of zero, as they are non-financial costs and as such, no cost of capital should apply to them.
10. The on-going explicit barriers for the renewable technology are the recurring admin and demand side barriers. For an air source heat pump in this specific building type this is estimated to be £0.08/MWh.
11. The net cost is then calculated as follows:
- $$\text{Net Cost} = \text{Levelised RH Cost} - \text{Levelised CF Cost} + \text{Levelised Barriers} \quad (13)$$
- $$\text{Net Cost} = (78.40 - 60.36) + 0.41 + 0.08 = \text{£}18.53/\text{MWh} \quad (14)$$
12. The non-domestic scheme differs from the domestic scheme, as the subsidy is paid over the lifetime of the property. In the proposed domestic scheme a shorter payment period is used to overcome some of the barriers that cause home owners to demand high future compensation in order to make early capital investments.
13. The net cost is also the required tariff for that technology.

Establishing a Cost Curve

14. Having established the net cost for each property type, the next step is to establish a cost curve for 2014. For this the technical potential of the renewable technology is used. The technical potential is the number of the dwellings of each property type which will be replacing their heating system in 2014 for each building type, multiplied by the proportion of that property type which is considered suitable for that technology and the average heat use of each property.
15. For each technology, all the required tariff data is taken, for all the different property types, and matched with the technical potential for that property type¹⁸.
16. This data is ordered by the net cost, so the lowest cost opportunities are first, and plotted with the cumulative technical potential to form a cost curve.
17. **Example:** For air-to-air air source heat pumps the net cost in 2013 and technical potentials are taken for all property types which could install a medium size air source heat pump. The data is then ordered in terms of net cost, with the lowest net cost (and therefore the most cost effective) technology first and the highest net cost last. The technical potential is then converted to cumulative figures by considering the technical potential of all the property types which have a lower cost.
18. An illustrative cost curve for all medium air source heat pumps is shown below.



19. The steps in the curve are different building types. The length of the step is how much renewable heat could be produced by that property type and the height of the step indicates its cost per MWh. The arrow on the graph indicates where the worked example is on the curve. For medium air-to-air air source heat pumps, the required tariff is also at around 0.97p/kWh.

¹⁸ This is a slight simplification to the more detailed methodology which excludes barrier costs when deriving the cost curve and adds them back in for the final tariff calculation. For this worked example we have not included these steps, but it makes only a very marginal difference.

Setting the Final Tariff

20. The tariff is then taken as the median cost opportunity. This is the net cost half way along the cost curve which refers to the cost associated with half the technical potential of that technology.
21. For the medium air source heat pump curve, the 50th percentile is at 1,368GWh which corresponds to £18.5/MWh. This is shown in the graph above by the dashed lines.
22. The maximum subsidy rate is capped which is equal to the total support available to off-shore wind in 2014/15 (£113/MWh). If the median net cost (the point halfway up the cost curve) is greater than this levelised cost then the capped subsidy is used. In this instance the tariff is lower than the capped subsidy so this is used as the tariff for all medium air-to-air air source heat pumps.
23. For our example, the air source heat pump is at the same net costs as the median point on the cost curve, which means that all of the additional costs of installing the air source heat pump in that property type will be compensated by the proposed subsidy.

ANNEX 2: Illustration of the impact of uncertainty in cost curves on technical potential and tariff changes

Different combinations of data can lead to different amounts of technical potential for some technologies and different shaped supply curves will also lead to a different scale of impacts from under-incentivising some technologies. Figure 1 shows how the three combinations of data in Table 6 produce radically different supply curves with different underlying technical potentials. Figure 2 illustrates how different supply curves can also lead to very different changes in deployment for the same change in tariff.

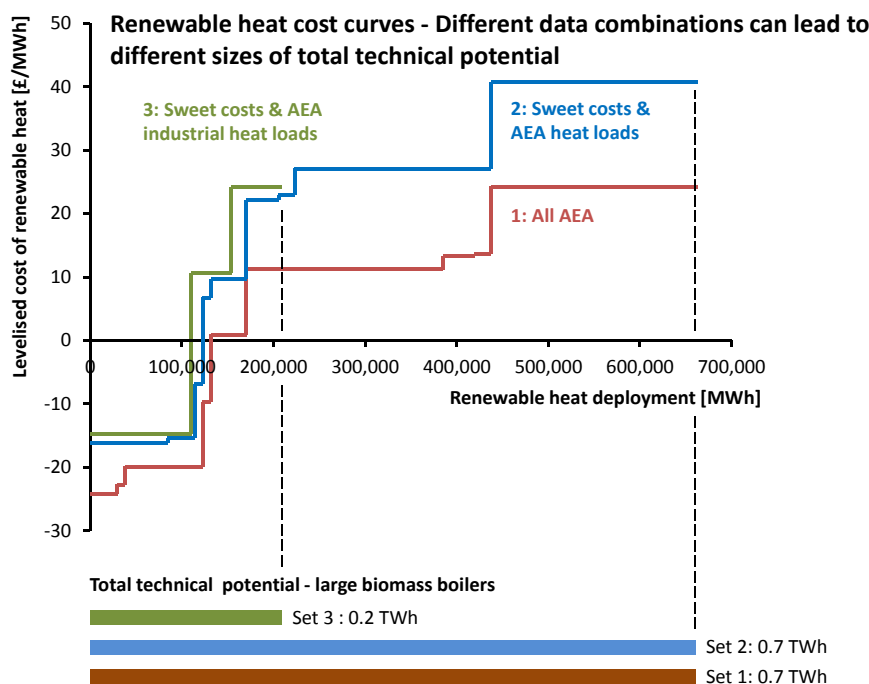


Figure 1: Illustration of the different cost curves produced by different dataset combinations

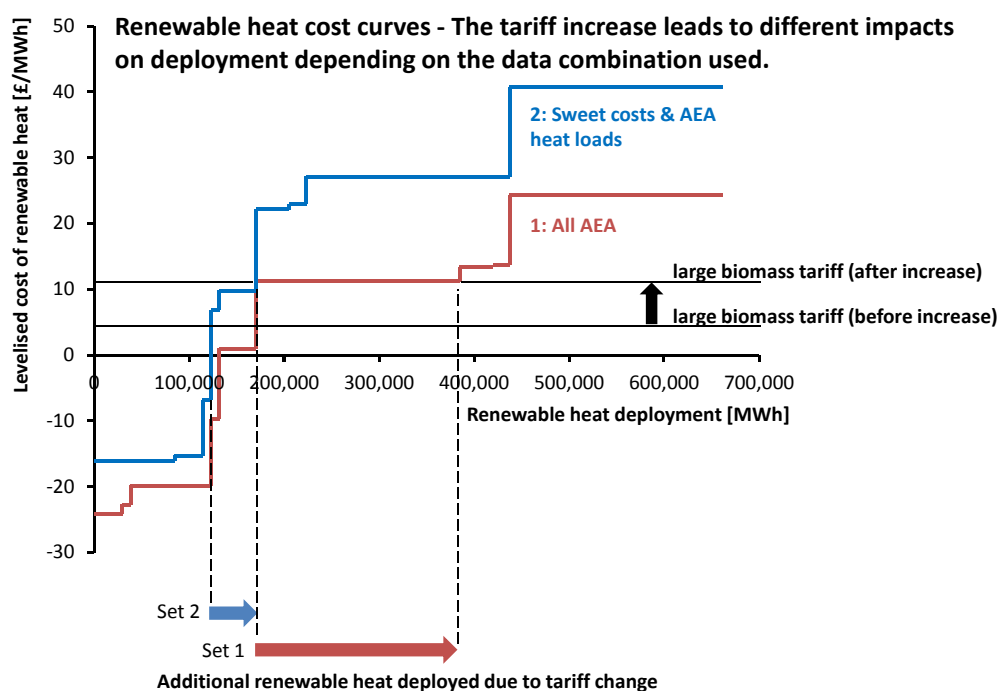


Figure 2: Impact of different cost curves on the amount of additional renewable heat incentivised by a tariff change

ANNEX 3: Comparison of Existing and Proposed Tariffs in 2014 Prices

Table 8: Comparison of Existing and Proposed Tariffs (2014 prices)

Technology		Current Tariffs (2014 Prices)	Proposed Tariffs (2014 Prices)
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	7.2* Implemented as Tier 1: 8.9 Tier 2: 2.3
	Large	3.6	8.2** Implemented as Tier 1: 10.2 Tier 2: 2.3
Solar Thermal		9.5	10.0 - 11.3

* This is equivalent to 10.0p/kWh of renewable heat only

** This is equivalent to 11.3p/kWh of renewable heat only

***Tariffs are subject to existing budget management mechanism / depression.



Renewable Heat Incentive: Non-Domestic Scheme Early Tariff Review

URN:13D/136 31/05/2013

Non Domestic Scheme Early Tariff Review

Department of Energy and Climate Change
3 Whitehall Place
London
SW1A 2AW

Telephone: 0300 068 4000
Website: www.decc.gov.uk

© Crown copyright 2013

Copyright in the typographical arrangement and design rests with the Crown.
This publication (excluding logos) may be re-used free of charge in any format or medium provided that it is re-used accurately and not used in a misleading context. The material must be acknowledged as crown copyright and the title of the publication specified.

For further information on this consultation, contact:
Renewable Heat Incentive Team
Department of Energy and Climate Change
3 Whitehall Place
London
SW1A 2AW
Telephone: 0300 068 4000
Email: rhi@decc.gsi.gov.uk

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

Published by the Department of Energy and Climate Change

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

Renewable Heat Incentive: Non Domestic Scheme Early Tariff Review	1
Non Domestic Scheme Early Tariff Review	2
Ministerial Foreword	3
Contents	4
General information	6
Executive Summary	8
Early tariff review proposals	8
Affordability constraints and budget management	9
Impacts of changes to tariffs.....	10
Update to the September 2012 consultation	10
Background and Introduction	12
About the RHI	12
Background to the review and scheme performance so far	12
Scope of the review	14
Tariff setting and the evidence base	15
Tariff setting methodology for current tariffs in the non domestic RHI.....	15
The evidence base	15
The approach to ensuring value for money (VfM) of the RHI	16
The current VfM cap	16
Consideration of additional impacts on VfM	16
Proposals for reviewed tariffs	18
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
Next steps.....	32
Annex A: impact on tariffs consulted on in September 2012.....	33
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
Annex B: tariff setting, model outputs and industry views	38
Tariff setting methodology.....	38
Datasets from AEA and the Sweett Group	38
Updated model outputs.....	40

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

Enquiries to:

Renewable Heat Incentive Team
Department of Energy & Climate Change,
1st Floor Area 1B,
3 Whitehall Place,
London, SW1A 2AW
Tel: 0300 068 4000

Email: rhi@decc.gsi.gov.uk

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

If you are unable to submit your response online please send it in an email to: 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.

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.

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/. 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:

DECC Consultation Co-ordinator
3 Whitehall Place
London SW1A 2AW
Email: consultation.coordinator@decc.gsi.gov.uk

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 ^{1,2}	Reviewed tariffs (proposed for 2014/15)
Biomass Boilers	Small (up to 200kW)	Tier 1: 8.6, Tier 2: 2.2	NO CHANGE
	Medium (200kW to 1MW)	Tier 1: 5.3, Tier 2: 2.2	
	Large (1MW and above)	1.0	2.0
GSHPs	Small (up to 100kW)	4.8	7.2 ³ – 8.2 ⁴
	Large (100kW and above)	3.5	
Solar Thermal (up to 200kW)		9.2	10.0 – 11.3

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

¹ 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>

² 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.

³ Equivalent to 10.0/kWh of renewable heat

⁴ 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 review⁵.
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);

⁵ 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

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

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'⁶, 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

⁶ <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 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 at the same time as this document⁷.

Table 3: 12 month forecast spend based on data up to 30th 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>
Small Biomass (< 200kW)	14.8	18.6	126%
Medium Biomass (200kW to 1MW)	13.4	22.6	169%
Large Biomass (> 1MW)	23.1	5.2	23%
Small GSHP (< 100kW)	28.9	0.4	1%
Large GSHP (> 100kW)	4.9	0.5	10%
Solar thermal (< 200kW)	4.9	0.04	1%
NOT IN SCOPE Biomethane (all scales) and Biogas (< 200kW)	12	1.6	13%

⁷ 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 30th 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.⁸

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	
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.

⁸ 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 strategy⁹. 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 Commission¹⁰.
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.

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

¹⁰ 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 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 (i.e. the 50th 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 th 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 30th 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?
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.

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 30th 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 heat¹¹. 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 50th 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.

¹¹ <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 30th 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 1.15¹². 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

¹² 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 degradation 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 tiering¹³

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

¹³ 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"> 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

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 30th April¹⁴. 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 DECC¹⁵, and Ofgem will shortly publish guidance for applicants. The first formal assessment of forecast expenditure against the degression triggers has also been announced alongside this consultation.

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

¹⁴ The Renewable Heat Incentive Scheme (Amendment) Regulations 2013

¹⁵ 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

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

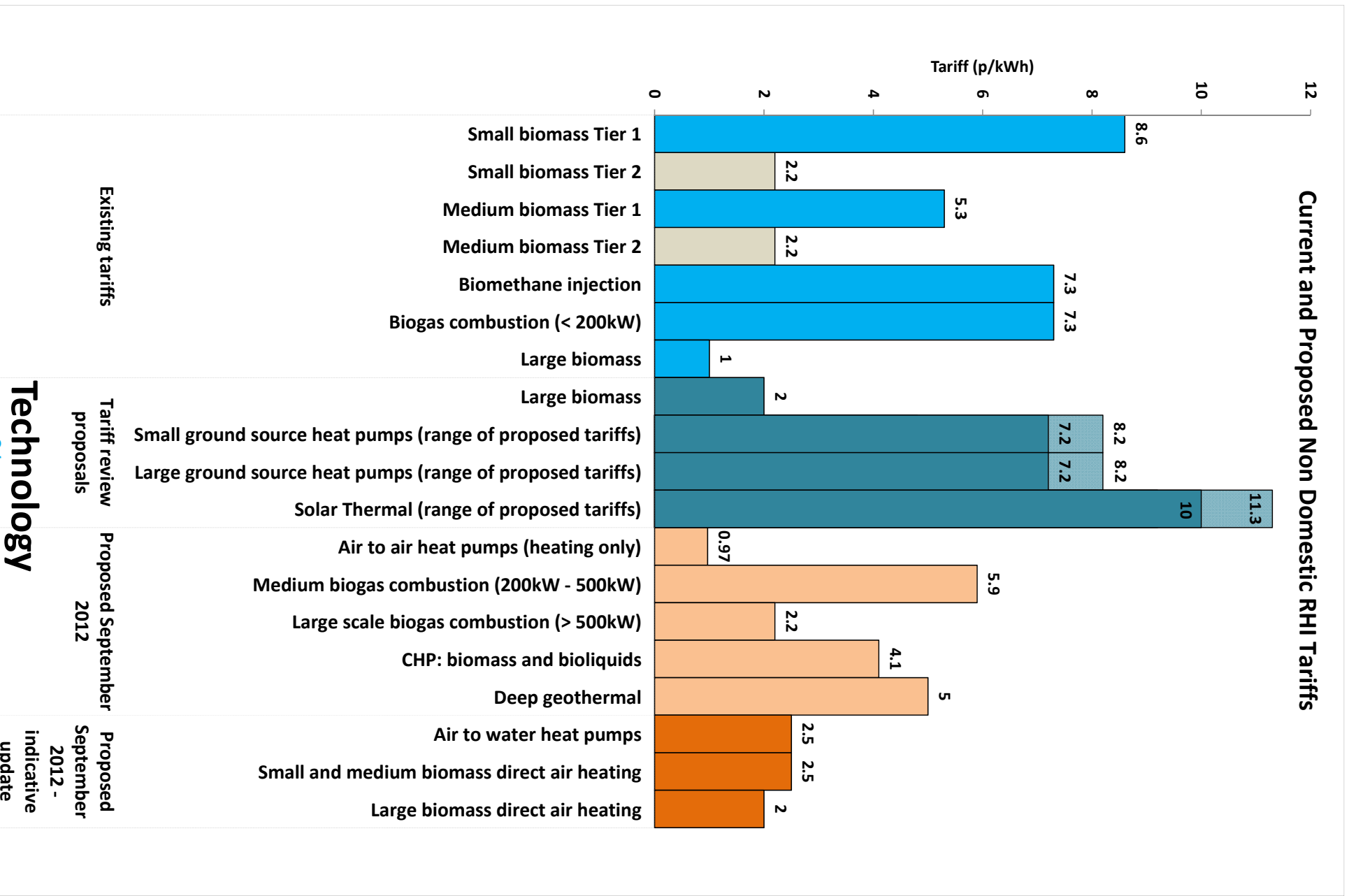
98. We first committed publically to carrying out the tariff review on 21 January 2013. At that point we stated our intention that any RHI participants with a date of accreditation of 21 January 2013 or afterwards would benefit from any new tariffs once they come into effect. This is to ensure that the 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.
----	---

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.



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
31 June	Consultation closes
Summer 2013	Response to non domestic RHI extensions consultations (from September 2012) on RHI support for: <ul style="list-style-type: none"> • AAHP • AWHP • BDAH • Specific tariff for biomass and bioliquid CHP • Medium and large biogas • Specific tariff for deep geothermal • Expansion of criteria for energy from waste
Autumn 2013	Response to tariff review consultation: <ul style="list-style-type: none"> • 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. • Indication of approach to any adjustment of budget management arrangements.
Spring 2014	Planned implementation of: <ul style="list-style-type: none"> • domestic RHI • extensions to non domestic RHI scheme and • any revised tariffs for existing non domestic RHI technologies (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 summer 2013	Response to tariff review autumn 2013
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 summer 2013	Response to tariff review autumn 2013
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 summer 2013	Response to tariff review autumn 2013
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 summer 2013	
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 RHI¹⁶.

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

¹⁶ <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

Technology	Commercial (AEA) - £/kW	Commercial (Sweett) - £/kW	Industrial (AEA) - £/kW	Industrial (Sweett) - £/kW
AAHPs	471-477	1,017	446	1,017
AWHPs	588-827	725-1,070	-	-
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
Biomass ¹⁷	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
GSHPs	Small	4.8	5.2	6.2	11.7
	Large	3.5	3.2	7.2	10.8
Solar Thermal		9.2	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

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.

¹⁷ 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>

© Crown copyright 2011

Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2HD
www.decc.gov.uk

URN: 13D/136