DEPARTMENT OF ENERGY & CLIMATE CHANGE

Renewable Heat Incentive:

Expanding the non domestic scheme

Department of Energy and Climate Change

Renewable Heat Incentive:

Expanding the non domestic scheme

Presented to Parliament by the Secretary of State for Energy and Climate Change by command of her Majesty.

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Ministerial Foreword

Over the next 20 years we must achieve a revolution in the way we heat our homes and businesses. Currently we use almost half of our energy for heating. Therefore, making a significant switch from fossil fuels to renewables will not only help us meet our renewables targets but also reduce our carbon emissions and diversify where our energy comes from. This is going to be huge challenge but we are taking the initial steps. We launched the first phase of the RHI last year for the non domestic sector and we are now proposing to expand that support to drive further deployment.

This consultation sets out the proposals for how we are going to expand the non-domestic scheme. We are already seeing deployment of the technologies supported currently under the RHI but we want to do more. In order to meet our targets we will require growth in a broad range of renewable heating technologies. For that to happen, we recognise those technologies need appropriate financial support through the RHI. Therefore, this consultation proposes new or different support for technologies including air source heat pumps, CHP and deep geothermal. We believe that, if adopted, these proposals would lead to a significant increase in renewable heat deployment with the associated growth in markets and supply chains. This greater diversity will also help us deliver on our long-term carbon reduction objectives.

Energy efficiency is at the forefront of reducing our carbon emissions and the forthcoming Green Deal will help households and businesses with the up-front costs of installing energy efficiency measures. As part of this consultation we are considering what energy efficiency requirements are appropriate for non-domestic installations. We recognise that it is not appropriate to apply the same requirements for multiple households, large commercial buildings and industrial applications. Therefore, we are seeking views on how we can best combine energy efficiency with the expansion of renewable heat to deliver the best outcomes.

We value the consultation process and for innovative policies such as the RHI it is especially important that we seek input from a wide range of people and businesses. I look forward to hearing your views on all the proposals and would like to thank you in advance for providing a response to the consultation.

The Rt Hon Greg Barker

Minister of State

Department of Energy and Climate Change

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General information

Purpose of this consultation

This consultation seeks views on the Government's plans to expand the current non-domestic Renewable Heat Incentive scheme. The expansion of this scheme includes proposals for new or different support for technologies including air source heat pumps, CHP and deep geothermal. Also at the forefront of Government thinking is energy efficiency and we are considering what requirements are appropriate for non-domestic installations.

Issued: 20 September 2012

Respond by: 7 December 2012

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Consultation reference: **URN 12D/334** – Expanding support in the non domestic RHI scheme

Territorial extent:
This consultation applies to England, Scotland and Wales.

How to respond:

The closing date for responses is: 7 December 2012

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, including a Welsh version, are available on request via the enquiries address above.

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 wish information that you provide to be treated as confidential please say so clearly in writing when you submit 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.cabinetoffice.gov.uk/sites/default/files/resources/Consultation-Principles.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
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Executive Summary

1. The Renewable Heat Incentive was launched in November 2011 with the objective of helping the UK achieve the targets set out under the Renewable Energy Directive. Initially only the non domestic scheme was launched, which supports renewable heating in the commercial, industrial, community infrastructure and district heating sectors by providing a payment for each kilowatt hour (kWh) of renewable heat generated.

2. The Government wants to support a broad range of renewable heating to encourage diversification of technologies, provide more choice for consumers and allow the renewable heat market to develop. This consultation seeks to expand the non domestic scheme by introducing more technologies and making other improvements to the support structure.

3. The Government is launching 3 consultations relating to the RHI: "Renewable Heat Incentive: proposals for a domestic scheme", detailing proposals of introducing RHI support for households; this consultation, detailing our plans for introducing support for new technologies and energy efficiency; and the accompanying consultation, "Air to Water Heat Pumps and Energy from Waste". Both the other consultations are available on the DECC website and have closing dates of 11 December and 18 October respectively.

Proposals contained in this consultation

Air to Air Heat Pumps (AAHP)

4. There is an existing strong, growing market for reversible AAHP systems and we are therefore not proposing to introduce RHI support for these systems. Heating only AAHP on the other hand is still an emerging technology with an underdeveloped market. Therefore, there is the potential to introduce RHI support for heating only AAHP. If the evidence shows introducing support for this technology is appropriate, based on our modelling we estimate a tariff of 0.97p/kWh for all installation sizes is appropriate. This is based on a single tier "one size fits all" approach but we would also consider banding the tariff by installation size.

5. Unlike the other technologies currently supported by the RHI, there is no universally accepted standard for metering the output of AAHP. Ideally there would be a consistent approach for non domestic RHI payments, but the cost of implementing a metering system may be obstructively large. We are therefore considering an alternative approach of basing payments on an estimated heat load, also known as deeming.

Biomass Direct Air Heating

6. We propose to introduce support under the RHI for biomass direct air heaters and, maintaining a consistent approach with boiler technologies, propose to support only those heaters specifically designed and installed to use biomass only.

7. No universal standard exists for metering the flow and temperature of gas. We are considering three options for determining the RHI payment on biomass direct air heaters: meter the output; measure biomass input as a proxy for output; or use deeming to estimate heat load.

8. Based on our current evidence we are proposing a tariff of 2.1p/kWh. However, this is based on a single tier approach and the existing tariff for biomass boilers over 1MW is just 1p/kWh. Since biomass direct air heating is a more cost effective technology, the tariff level should reflect this and so we propose to reduce the tariff for direct air heaters over 1MW to 1p/kWh or less.

Biogas Combustion Over 200kW

9. Heat generation through biogas is currently supported under the RHI up to a thermal capacity of 200kW, which excludes a wide variety of potential users. The complexity of biogas technologies and the planning and investment required for an installation means that without support, many potential users will not make the switch to renewable heat.

10. We are minded to introduce two separate tariff bands above 200kW. A tariff for installations of 200-500kW, and a lower tariff for installations over 500kW. This would ensure compatibility with existing biogas support while reflecting the difference between uses of medium and large sized installations.

Biomass and Bioliquid Combined Heat and Power

11. Combined heat and power (CHP) technologies produce more total energy per unit of input than heat or electricity generation only. While CHP installations can receive RHI payments on their heat output, there is currently no tariff specific to CHP. We are proposing to introduce a specific tariff for heat from biomass CHP of 4.1p/kWh based on our current evidence.

12. Bioliquid technologies have not previously been supported under the RHI. Bioliquid CHP provides high levels of energy efficiency and greenhouse gas savings, hence we are proposing to introduce support for this technology. Our modelling for biomass CHP included bioliquids data and so the same tariff of 4.1p/kWh is proposed.

13. As we are proposing to provide specific support for CHP, those installations applying for support will be required to meet the Combined Heat and Power Quality Assurance (CHPQA) requirements to be consistent with the Cogeneration Directive and demonstrate good quality CHP.

Deep Geothermal Heat

14. Deep geothermal heat is currently supported in the RHI through access to the ground source heat pump (GSHP) tariff, which is based on GSHP data. In order to ensure the RHI can provide adequate support to this technology we are proposing a new tariff of 5p/kWh based on current evidence.

Energy Efficiency

15. Energy efficiency is at the heart of the Government's approach to tackling dangerous climate change and we want to determine what energy efficiency requirements are appropriate for the non domestic RHI. We are considering introducing energy efficiency requirements by splitting applicants into three categories: users of process heat; district heating; and commercial and industrial space and water heating.

16. For users of process heat there is already a significant economic driver towards energy efficiency, with heating forming a significant proportion of the business's cost. Furthermore, they are often already subject to energy efficiency requirements under schemes such as the EU Emissions Trading System and Climate Change Agreements. We therefore propose that no additional requirements for energy efficiency are necessary in the RHI.

17. For district heating, economic factors alone may not be sufficient to compel heat users to introduce energy efficiency measures. We propose to align the approach for these users with the domestic RHI scheme, requiring applicants to install measures identified as "green ticks" under the Green Deal. It is necessary to allow some flexibility for district heating and so we propose that compliance with the measures should be required by only a majority of the premises on the network, the proportion of homes needing to comply being determined by a sliding scale based on the number of homes within the network.

18. For commercial and industrial space and water heating there is a highly heterogeneous range of users and a "one size fits all" approach is unlikely to be appropriate. While there is no universal standard for this type of heat use, there do exist various methods of demonstrating energy efficiency, such as Energy Performance Certificates, Display Energy Certificates and the Building Research Establishment Environmental Assessment Method. We therefore propose to allow applicants the choice of a range of alternative methods to demonstrate their energy efficiency.

Other Minor Regulatory Changes

19. We are also planning to make several minor regulatory changes to improve the operation of the scheme.

Calls for Evidence

20. In addition to the main consultation we are launching a series on calls for evidence on landfill gas and biopropane technologies, and verifying our tariff setting assumptions for ground source heat pumps and large biomass. The details of these calls for evidence is contained in separate documents issued as part of this consultation.

Proposals contained in the other non domestic consultation

21. Those proposals on air to water heat pumps and energy from waste are being consulted on for a shorter, four-week, period because we do not expect to collect significant data in addition to what we have already, and the practical challenges in determining final policy are limited relative to other technologies. Therefore, we have greater certainty about them. Shortening the consultation does not necessarily infer that the proposals for AHWP or EfW will be brought in on a faster timetable than the proposals contained in this 11-week consultation.

Air to Water Heat Pumps (AWHP)

22. Air to water heat pumps were excluded from the start of the RHI as insufficient data on costs meant it was not possible to set an appropriate tariff level. We have subsequently gathered further evidence and we propose introducing support for AWHP. Our modelling estimates a tariff of 1.7p/kWh based, as with AAHP, on a single tier approach. We are also considering banding support for this technology by installation capacity. These proposals are set out in a separate accompanying document, “Renewable Heat Incentive: Air to Water Heat Pumps & Energy from Waste” with the consultation running for four weeks.

Energy From Waste (EfW)

23. EfW plants provide a cost effective source of renewable heat and there are limited wider environmental concerns owing to the strict planning and environmental rules and the sustainability of the feedstock. We therefore propose expanding RHI support to include a wider range of waste feedstocks, using the same eligibility criteria as the Renewables Obligation (RO). These proposals are set out in a separate accompanying document, “Renewable Heat Incentive: Air to Water Heat Pumps & Energy from Waste” with the consultation running for four weeks.

Introduction and Background

The Renewable Heat Incentive

24. Heat is the single biggest energy use in our society, we use more energy for heating than for transport or the generation of electricity. “The Future of Heating: A Strategic Framework for Low Carbon Heat”, published in March 2012, sets out how we supply and use heat today and describes how the heat system will need to evolve over time. It identifies the substantial changes required across our economy and provides a strategic framework within which new policy proposals will be developed.

25. The Government’s vision and strategy for decarbonising heat is set out within a three stage strategy, outlined for the whole economy in the Carbon Plan published in 2011. The first stage (until 2020) is about preparation for mass deployment in the 2020s and 30s (the 2nd stage).

26. The non domestic RHI was launched in November 2011 and introduced long-term tariff support for non domestic heat generation, targeted at the big heat users – the industrial, business and public sectors. In addition to these sectors, the non domestic RHI also supports district heating, defined as heating installations which supply heat to more than one household.

27. Support was introduced in the form of tariffs payable for metered heat generated over 20 years. Some of the tariffs support more than one technology type, for example the biomass and biogas combustion tariffs also being applicable to combined heat and power (CHP) and the ground source heat pump tariff also being applicable to deep geothermal. Table 1 summarizes existing RHI support.

Tariff name	Eligible technology	Eligible sizes	Tier (if applicable)	Tariff level (p/kWh)
Small commercial biomass	Solid biomass including solid biomass contained in municipal solid waste (incl. CHP)	Less than 200 kW	Tier 1 Tier 2	8.3 2.1
Medium commercial biomass		200 kW and above; less than 1,000 kW	Tier 1 Tier 2	5.1 2.1
Large commercial biomass		1,000 kW and above		1.0
Small commercial heat pumps	Ground-source heat pumps; water source	Less than 100 kWth		4.7

Large commercial heat pumps	heat pumps; deep geothermal	100 kWth and above		3.4
All solar collectors	Solar collectors	Less than 200 kWth		8.9
Biomethane and biogas combustion	Biomethane injection and biogas combustion, except from landfill gas	Biomethane all scales, biogas combustion less than 200kW		7.1

Table 1: Existing support under the non domestic RHI

Support for new technologies

28. The main objective of the Renewable Heat Incentive is to help the UK achieve its 2020 renewable energy targets by bringing forward uptake of renewable heat. In general, renewable heat offers good value for money to the taxpayer in terms of the subsidy required per kilowatt hour (kWh) of renewable energy compared to other types of renewable energy, and forms a key part of the Government's plans for meeting the renewables targets.

29. The Renewable Energy Directive (RED) targets are deliberately set at a realistic but ambitious level, making the potential renewables contribution of a technology a key factor when prioritising which technologies to support. Costs also differ by technology and, given the scheme is funded by taxpayers, value for money is also an important consideration for each technology. Whilst it does not apply to any of the new technologies or changes proposed in this consultation, it is also important to note that Government caps support for renewable heat at the marginal cost of renewable energy. This is calculated as the cost of offshore wind (8.9p/kWh in 2012 prices paid over 20 years), because any payment for renewables above that value is more expensive that generating more renewable energy through offshore wind.

30. There may be a rationale for supporting renewables above the marginal cost in certain situations, for example we also need to consider the position post 2020 – the Strategic Framework for Low Carbon Heat sets out longer term goals and these need to form part of our thinking, as do the Carbon Plan and the 4th carbon budget. If the RHI can help incentivise technologies which contribute to these objectives then the UK will be better placed in the long term. As well as helping meet the renewables target and reducing carbon, the RHI can also contribute to our security of supply and other goals such as Defra's waste strategy.

31. In general, Government wants to support as many forms of Renewable Heat as possible providing they offer good value for money; diversification of technologies leads to more choice for consumers, better competition and greater security of supply. New renewable

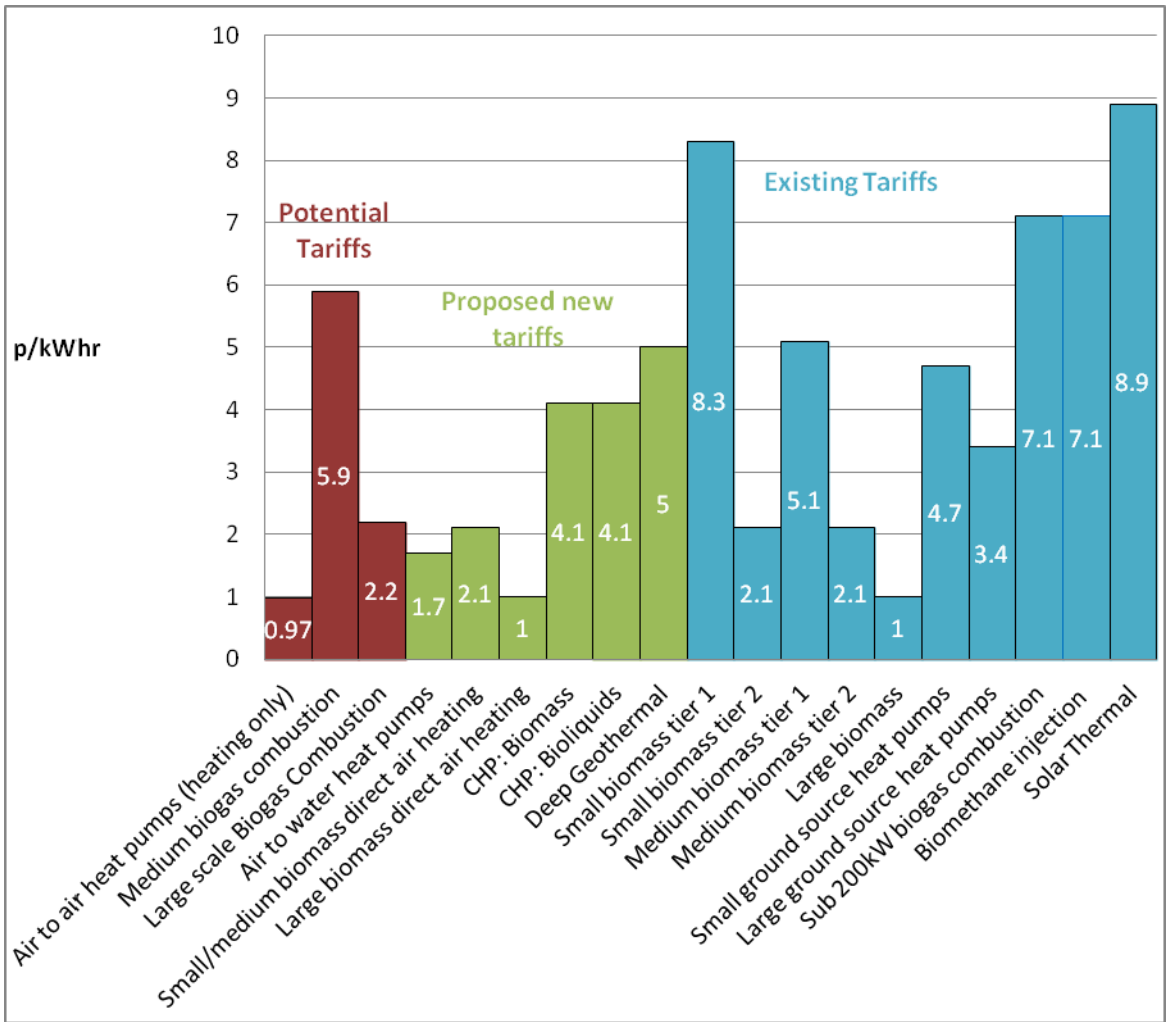
technologies and improvements on existing technologies emerge at a surprising rate and the intention is that the RHI will be regularly updated to reflect these changes.

32. In this consultation we are proposing significant changes to three currently supported technologies and considering introducing additional support for four new technologies. We are also concurrently issuing 'calls for evidence' on a further four technologies. Our modelling indicates the total additional renewable contribution of the proposed changes is 10.8TWh, although this figure excludes the contribution of the technologies on which there is the most uncertainty.

33. The technologies on which we are consulting or seeking evidence on can be divided into four main categories:

- Those for which we have previously announced our intention to introduce support through the RHI but we were unable to include in the initial tranche of the RHI in November 2011. The reasons for this varied significantly, from metering problems to fundamental consideration of the suitability for subsidy;
- Technologies which were not included in the original RHI proposals but for which there is now a case for inclusion;
- Technologies which, while currently eligible for the RHI under an existing tariff, have not had specific tariff levels set to reflect their particular costs and performance. We are proposing introducing new tariff levels for those technologies, taking into account their particular characteristics, to provide genuine incentives; and
- Technologies for which we do not yet have enough evidence to make any proposals for introducing or adjusting support. For these technologies we are issuing a call for evidence.

34. Graph 1 illustrates the different tariffs, split into existing support, firm proposals for new support and support we are considering but where the tariff proposals are less certain. Please note that all tariffs are shown at 2012 levels.



Graph 1: Existing and proposed tariffs in 2012 prices

Tariff setting methodology

35. Tariffs for both the non-domestic and domestic RHI schemes are calculated in the following way:

- Estimate the additional cost of installing and running a renewable heating system compared to fossil fuel heating. 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).

- Estimate the heat demand of each building category, the number of such buildings and the proportion of them suitable for each renewable technology.

- From these figures, a “supply curve” is produced for each technology which estimates the amount of renewable heat potential each tariff level.

- From these curves we are able to identify the tariff required to incentivise the targeted percentage of the potential installations. This targeted percentage is the 50% point on

the supply curve (**unless** the tariff reaches the level consistent with the marginal cost of meeting the renewables target, as described in paragraph 6)[1].

36. The tariffs levels, all set using this methodology, vary by technology and size because of the different costs – different technologies have different costs and larger installations tend to produce heat at a lower cost per unit. However, while certain technologies cost more per kilowatt (kWh) of heat produced, a range of technologies are supported because: (a) there is likely to be greater potential for cost reductions in the more expensive (and generally less mature) technologies and (b) all the above technologies are expected to be important sources of supply to meet future heat demand post 2020.

Budget Management

37. It is essential that the RHI is financially sustainable and that deployment of renewable heat continues to be good value for money to the taxpayer. We need fast growth in renewable heat but we must ensure the RHI provides the support for that growth to be steady. Peaks and troughs in uptake are inefficient and harm supply chains; exceeding our annual budgets would create such peaks and troughs.

38. During the summer we consulted on proposals for a long term budget management mechanism for the non domestic RHI based on flexible degression of tariffs. This means that as deployment approaches pre-determined triggers, tariffs are decreased by a set amount for new applicants to the scheme. The triggers for each technology, and for the RHI overall, would be based on the level of deployment required to keep us on a trajectory to deliver the 2020 renewables target. Degression responding to deployment levels will help ensure value for money whilst maintaining the growth required. It will also provide for continuity in the scheme by controlling budgets and removing the need for sudden or unexpected policy changes or suspensions.

39. We are considering the responses to that consultation however, assuming no significant reasons against this proposed policy have emerged in response to the consultation, we propose a similar mechanism for the additional non-domestic technologies now under consideration. Triggers for tariff reductions will be set out in advance and progress towards those triggers will be monitored and made available monthly on the DECC website. The size of possible reductions would also be set out in advance, with a small reduction if deployment is slightly above that needed, and a larger reduction if deployment is significantly higher than that needed for the 2020 renewables targets. As with those technologies already in the non domestic RHI, these technologies would also be covered by the tariff reviews scheduled for 2014 and 2017.

40. Should the decision be made to go ahead with these technologies, the trigger levels and degression amounts will be set out in the Government Response to this consultation, planned for publication in spring 2013.

[1] RHI tariffs are capped at 8.9p per kilowatt hour (2012 prices for offshore wind).

Proposals for new support

Air to Air Heat Pumps (AAHP)

Description of Technology

41. Air to air heat pumps (AAHP) produce warm air which is circulated by fans to heat a building. Heat from the outside air is absorbed into a fluid which is pumped through a heat exchanger in the heat pump. Low grade heat is then extracted by the refrigeration system and, after passing through the heat pump compressor, is concentrated into useful heat at a higher temperature which is then used for space heating. It is possible to reverse this process and instead move the heat from inside the building to outside, providing a cooling function. AAHP are less costly and more versatile than their ground source counterparts as they do not require the installation of a ground loop, however they are unlikely to be as efficient and result in as high a carbon saving.

42. The majority of existing AAHP are used for heating and cooling, but there are a small number of heating only devices available. The heating output of air to air heat pumps, both in reversible and heating only systems, is considered renewable, because a small amount of electricity is used to produce a greater amount of heat, using outside air as the source. This means the heating output of these devices, providing they are of sufficient efficiency, can contribute to national renewable targets.

43. Whilst AAHP are not currently supported within the RHI, they were included in the initial RHI consultation but uncertainty about their requirement for support and metering issues prevented their inclusion in the first phase of the RHI. Guidance from the European Commission states that the cooling output of heat pumps should not be considered “renewable” under the Renewable Energy Directive. This means it cannot be counted towards the UK’s share of the EU’s 2020 renewable energy target and hence we have chosen not to support it under the RHI.

Discussion of potential support

44. There is a large, and growing, market for AAHP devices. The vast majority of the market is for devices capable of providing both heating and cooling with approximately 220,000 AAHP terminals (both domestic and non-domestic) being sold in 2011, worth an estimated £600million in first point sales. Discussions with the industry have indicated that the growing market is reflected in the cost of the technology and prices are decreasing.

45. The RHI is intended to help overcome the financial barrier preventing the adoption of renewable heating technologies, building the UK’s supply chain for these technologies and, ultimately, helping to drive down the non subsidised cost of the technologies to the point that they can compete with fossil fuels without subsidy. If a technology has matured to such a point of competitiveness that the financial barrier no longer exists, then the RHI is unlikely to create significant additional demand and does not therefore represent good value to the taxpayer.

46. The market for reversible heat pumps is sufficiently strong that we believe it falls into this category and no RHI support is required. That is not to say that Government does not value this technology, we recognise that it can play a significant role in meeting our renewables targets, but we believe it can do so without support from the public purse.

Consultation Question	
1	Do you agree that the reversible air to air heat market is sufficiently strong that no RHI support is required?

47. Heating only air to air heat pumps on the other hand are still an emerging technology. Technically these are virtually identical to reversible models but optimised for heating, meaning the market costs are approximately the same as for reversible models . The market for heating only heat pumps is in large buildings with a heat demand but no need for cooling, such as schools, libraries and other public infrastructure. Potentially, RHI support could be introduced for these devices. Introducing support for heating only AAHP does not face the same issue as reversible heat pumps of having to discount the cooling element – all of their generation would be eligible for the RHI. However, RHI support could provide an important signal that Government values this technology and wants to encourage greater market penetration.

48. Introducing support for heating only AAHP is not without problems. Given that the costs of the heating only and reversible systems are the same, there is a risk that this support will create a false market which is entirely subsidy driven. Under normal market circumstances an organisation is unlikely to choose to install a heating only system when a system with the additional flexibility of cooling is available at the same price. Of course, the inability to provide cooling may good news from a carbon emissions perspective assuming there is no cooling requirement being met using other equipment.

49. Conversely there are benefits to supporting heating only devices. When a building with no current cooling demand needs to replace a heating system RHI support may cause them to consider installing AAHP when, otherwise, they would default to another fossil fuel system. Indeed, the heating only support may draw attention to AAHP in general with customers, who, after investigating their options, instead opt for a reversible device at no cost to the taxpayer but at least with the heat portion of its operation being renewable. Another key consideration is the cheapness and versatility of this technology, representing good value to the taxpayer in terms of the subsidy required per kWh of renewable energy. We are therefore minded to support heating only AAHP provided we are satisfied any additional evidence continues to support the benefits over the costs and risks.

Consultation Question	
2	Do you think that heating only air to air heat pumps should be supported by the RHI?

	Can you supply any further evidence to support your view?

50. Our modelling for this technology, in line with the methodology outlined in paragraph 33 above, suggests that a tariff of 0.97p/kWh would incentivise 50% of the potential uptake. Whilst the assumptions used in the modelling for this technology were based on a one tier 'one size fits all' approach, we believe there may be a case for introducing banding by size into any potential support for this technology. This would allow RHI support to take into account efficiencies of scale, effectively increasing the tariff rate for smaller installations and decreasing the rate for larger installations.

51. We currently do not have sufficient evidence to propose appropriate size bandings and associated tariff levels, but suggest a two-tier approach with a higher tariff for small systems, and a lower tariff for large systems.

Consultation Question	
3	Do you think that, were we to use a 'one size fits all' approach, a tariff of 0.97p/kWh would be appropriate for this technology?
4	Do you agree that any support for air to air heat pumps should be banded by size?
5	Can you provide any views or evidence on the installation capacity limit at which the higher rate should be applied?

Determining payment

52. All currently supported technologies in the RHI supply heat through a water or steam based delivery system. This allows a standard metering solution, using class 2 heat meters, to be used to calculate the heat generated and corresponding level of payment. Air to air heat pumps typically use fan assisted ducts as the heat delivery method, meaning that the existing RHI water or steam based metering approach will not work for this technology. This means that in order to introduce support we would have to use a different way of calculating payment, either a different form of metering or instead estimating the heat load using a methodology such as the Simplified Building Energy Model (SBEM).

53. There is no established standard for metering the heat output from air based delivery systems nor, indeed, currently any commercial reason for including such functionality. Whilst it is technically possible to carry out such metering, initially it is expected to potentially be both unreliable and expensive, increasing the cost of this technology by as much as 20% based on discussions with the industry.

54. Ideally, it would be possible to maintain a consistent approach to determining all non domestic RHI payments, i.e. metering. However, if the cost of implementing a metering solution is significant then it will exceed any benefit from the RHI.

55. There are advantages to estimating, or 'deeming', the heat load. By basing payment on a set amount, deeming removes the risk of payments being made on system inefficiencies or wasted heat and makes budget management easier.

Consultation Question	
6	Do you think we should use a deeming or metering approach to determine the RHI payment for air to air heat pumps, or is there an alternative method that you can suggest?
7	If we were to pursue a 'deeming' approach, what methodology do you suggest we use?
8	If we were to pursue a metering approach, can you suggest a methodology that would be neither unreliable nor obstructively expensive?

Seasonal performance factor requirements for heat pumps (Air and Ground source)

56. The ratio of the heating output of a heat pump over the amount of electricity it uses gives the coefficient of performance (COP) of the heat pump. The seasonal performance factor (SPF), is the average COP for a heat pump over a whole year and reflects the efficiency a heat pump achieves when installed. A higher SPF means a more efficient heat pump system which will deliver more renewable heat for every unit of electricity used, also making it cheaper to run and delivering greater carbon savings.

57. The Renewable Energy Directive (Annex VII) sets out the equation for calculating how much of the energy generated by heat pumps should be considered renewable and a minimum SPF is part of that equation. The SPF is dependent on pan-EU average electricity generation efficiency. Heat pumps which do not meet the minimum SPF are not counted as renewable under the Directive. The latest available data, when entered into this equation, gives a minimum SPF of 2.5. The RHI has a current requirement for heat pumps to meet a minimum COP of 2.9.

58. We would expect heat pumps which are designed, installed and used appropriately to meet an SPF requirement of 2.5 but we would like to see better and improving performance over time. However, the European Commission has committed to produce guidance by 1 January 2013 on how to calculate SPF for different heat pump technologies and applications, taking into account differences in climate conditions. Therefore, we intend to review that final

guidance to inform our decision as to whether and how our efficiency requirements for heat pumps should be revised.

59. For example, one option, were we to make a minimum SPF a condition of the RHI, would be to require proof of that minimum SPF level via the newly revised MIS3005 version 3.1a or later, including for those heat pump systems that are over the 45kW Microgeneration Certification Scheme (MCS) limit. The European Commission guidance is due to be published prior to the finalisation of this policy so we will be able to clarify the position in the Government response.

Consultation Question	
9	Do you agree that any changes to the heat pump efficiency requirements should be based on the European Commission guidance?
10	Were a minimum SPF required, how do you suggest that it should be demonstrated as part of the RHI application process?

Biomass Direct Air Heating

Biomass

60. Biomass is material of recent biological origin derived from plant or animal matter. The RHI supports technologies that use solid biomass to generate heat, the primary source being the burning of wood. We expect biomass technologies to make a significant contribution to the UK's energy mix and in turn help the UK to reach its renewable energy targets. We recognise concerns on the sourcing of organic material and we are determined that the biomass used for energy generation in the UK is sustainable. As such, we have recently consulted on the introduction of mandatory standards to ensure that biomass is sustainably sourced[2]. These sustainability standards would also apply to any new support introduced for other biomass based technologies.

Description of Technology

61. Biomass direct air heaters produce heat through the combustion of solid biomass material, primarily waste wood, to heat the air directly. There are a wide variety of uses for direct air heaters including space heating, agricultural processes such as grain drying and in the wood processing industry. Products include waste wood air heaters used in factories as space heaters with a thermal capacity of around 300kW; hand and automatically fed heaters installed mainly in businesses working with wood or that have easy access to waste wood, these range from 50kW to 2MW thermal capacity.

[2] Renewable Heat Incentive: Proving certainty and improving performance.
http://www.decc.gov.uk/en/content/cms/consultations/rhi_cert_perf/rhi_cert_perf.aspx

62. Direct air heating systems, unlike biomass boiler technologies, do not use boilers or have any need for an additional wet heating system. Therefore, they are often simpler and cheaper than equivalent biomass boiler installations and represent a significant saving where a building does not have an existing wet system. Direct air heating is a particularly good fit where a wet system cannot be used to produce the heat required and the likely alternative would be fossil fuel generated heat, an example being drum dryers for woodchip processing.

Proposed support

63. Currently the RHI only supports biomass installations where the heat is delivered via liquid or steam. These installations use a boiler to transfer the heat from biomass combustion to produce usable heat through a central heating and hot water system. RHI support is currently limited to these types of installations primarily due to the availability of metering equipment and the existence of established metering standards.

64. However, we recognise the potential of biomass direct heating systems to provide a valuable source of renewable heat for a variety of users and industries. We also believe it is important to try to avoid perverse outcomes such as a boiler and wet system being installed to receive the RHI where a direct air system would be a more appropriate and cost effective solution. Furthermore, in situations where a boiler cannot be used, support for biomass direct air technologies would encourage the installation of this renewable heat source over the use of fossil fuels.

65. Therefore, we propose to introduce a tariff under the RHI for biomass direct air heating systems in addition to the existing support for biomass boilers. Since these systems tend to be cheaper and simpler than boiler systems, the tariff can be lower than that for biomass boilers, making this a cost effective technology.

66. Current RHI support for biomass boilers is restricted to equipment specifically designed and installed to use biomass as its only primary fuel source. Large scale co-firing operations exist where biomass is used alongside traditional fossil fuels. While we recognise the carbon savings and renewable contribution from using biomass fuel in these applications, we note that additional capital expenditure is rarely required and that biomass is already an economically viable option without an additional incentive.

67. Therefore, we propose to apply the existing approach for biomass boilers to direct air heaters and restrict RHI support to those systems specifically designed and installed to use biomass only.

Consultation Question	
11	Do you agree that biomass direct air heating should be supported under the RHI and that it should be restricted to systems specifically designed and installed to use biomass only?

Tariff levels

68. Biomass direct air heaters are generally simpler and cheaper than boiler technologies and so the tariff level required to incentivise their installation should generally be lower. Using the usual RHI tariff setting methodology, our current evidence suggests a single tariff of 2.1p/kWh.

69. We believe that this tariff level is appropriate for small and medium sized heaters up to 1MW thermal capacity. However, due to economies of scale and the more industrial uses of larger installations, we believe it is unlikely that this same tariff level is appropriate for installations above 1MW.

70. Furthermore, the tariff level should reflect the fact that direct air heating is cheaper than biomass boiler technologies. These were modelled for installations over 1MW capacity and produced a tariff of just 1p/kWh. Therefore, we propose that the tariff for direct air installations should be 1p/kWh or less.

Consultation Question	
12	Do you agree that a tariff of 2.1p/kWh is appropriate for installations below 1MW capacity? Please provide evidence to support your answer.
13	Do you agree that there should be a different tariff level for installations over 1MW, and that a tariff of not more than 1p/kWh is appropriate?

Metering

71. Biomass direct air heaters have not previously been supported under the RHI, primarily due to problems with establishing heat use. These are similar to the issues we face on metering the output of air to air heat pumps.

72. RHI payments are made against heat used for an eligible purpose: heating a space, heating water or for carrying out a process. Under the current RHI regulations, a class 2 heat meter must be installed to measure the heat used. The standards for these meters are provided under the EU's Measuring Instruments Directive. The Directive specifies standards for meters measuring the flow and temperature of water, which are directly applicable to biomass boiler systems; but there are no equivalent standards for the flow and temperature of gas, which would be required for metering direct air systems.

73. We need to establish a methodology for measuring the heat use of biomass direct air systems. There are three options under consideration:

- **Meter the flow and temperature of gas:** While there are no standards under the Measuring Instruments Directive against which to accredit equipment for this type of metering, it is possible to meter the flow and temperature of gas and guidelines exist from the Chartered Institute of Building Services Engineers. Heat use metered in this

way can provide a reasonable level of accuracy but can be more complex for the measurement of flue gases. Metering is a more practical option for biomass direct air heaters than for air to air heat pumps (AAHP) as, typically, the heat is used for a process and supplied down only 1 air duct, unlike AAHP which can potentially use many more.

- **Measure biomass input:** It may be possible to measure the biomass input into the **system** in order to calculate heat output. If the requirements under the EU Emissions Trading System and the Climate Change Agreements are applied, the biomass input might provide a reasonable proxy for renewable heat output. This would be a fairly simple solution to administer, however the additional requirements could prove to be too onerous for smaller users. A further problem with this approach is that it will not incentivise the use of more efficient boilers.

- **Deeming:** We are also considering a 'deeming' approach' similar to that we are considering for AAHP. This would involve having to calculate the payment by estimating the heat load of the building. However introducing standards for accurate assessment may be complicated by the wide variety of non domestic uses for direct air heating.

Consultation Question	
14	How do you think we should determine the RHI payment for direct air biomass installations?

Biogas combustion over 200kW

Description of Technology

74. Biogas is a mixture of gases produced from renewable materials such as food waste, commercial waste, farm waste and sewage that can be combusted to generate heat or power. It can be produced via Anaerobic Digestion (AD) or Advanced Conversion Technologies (ACT).

75. Anaerobic Digestion is a 4-stage process where biodegradable materials such as food waste and animal slurry are broken down by micro-organisms in the absence of oxygen. This produces a biogas consisting of approximately 60% methane and 40% carbon dioxide that can be used to generate heat or electricity.

76. The two main types of ACT are gasification and pyrolysis. Gasification is the heating of organic material at high temperatures with reduced oxygen to produce a synthetic gas or "syngas" of hydrogen, carbon monoxide, carbon dioxide and various other hydrocarbons. Pyrolysis is the thermal decomposition of organic matter at high temperatures in the absence of oxygen to produce a solid carbon rich char and oil alongside biogas.

77. As well as providing a renewable source of heat, biogas technologies offer a valuable means of dealing with organic waste. Typical feedstocks are “wet wastes” such as food and farm waste that is produced automatically under ordinary business processes. The disposal of this waste to landfill would usually have to be paid for and also has associated greenhouse gas emissions. Utilising the waste to produce biogas reduces greenhouse gas emissions as well as providing an effective waste management strategy. Anaerobic Digestion also produces a digestate that can be used as a fertiliser, providing a renewable alternative to fossil fuel derived fertilisers.

Support over 200kW

78. The RHI supports biogas combustion via AD, Gasification and Pyrolysis. However, largely due to a previous lack of data on larger plants, this support was restricted to installations with a thermal capacity of less than 200kW. Installations ranging from AD facilities on farms just over 200kW to large industrial plants such as whisky distilleries and food manufacturers with a multi MW capacity have previously been excluded therefore.

79. We believe that biogas technologies over 200kW can make a valuable contribution in terms of waste management, reducing greenhouse gas emissions and providing renewable heat, particularly where fuel is sourced from waste produced on farms and in industry. However, due to the perceived complexity and significant investment and planning required for a biogas installation, we are not seeing high levels of deployment for larger installations.

80. Support does currently exist under the Feed-in-Tariffs and the Renewables Obligation for electricity generation over 200kW from biogas combustion. Combined heat and power biogas installations are a growing market and we believe that the RHI should be designed to be compatible with existing incentives, but the current limit of 200kW in the RHI creates an additional barrier for heat generation compared to electricity generation. Ensuring support for electricity under existing incentive schemes also encourage the more effective use of the heat produced by CHP installations rather than distortion towards electricity generation that we may see with a large tariff differential. We therefore propose introducing support under the RHI for biogas combustion over 200kW.

Consultation Question	
15	Do you think we should introduce support under the RHI for biogas combustion installation plants over 200kWth?

Tariff levels

81. Our evidence demonstrates that there is a significant saving to users of biogas as they offset the costs of gate fees, paying for the feedstock to be taken away. This saving totals more than the cost of setting up the biogas plant, suggesting that no support is required to make this technology feasible. Current deployment implies that this assumption is inaccurate and that an RHI tariff is required to encourage uptake. A biogas installation is a significant and

relatively high risk investment which requires careful consideration and planning making it uncompetitive with fossil fuel technology. We expect to resolve this, by developing more sophisticated assumptions and building in a facility for multi-tiered modelling to produce appropriate tariffs within the current tariff methodology.

82. To provide a reference, we have used an alternative methodology to provide indicative tariff figures, using existing support under FITs and RO as a starting point and reducing the tariff to reflect the differences between heat and electricity generation. The result of these calculations are shown below:

Installation size	**Tariff (p/kWh)**
Medium (200-500kW)	5.9
Large (>500kW)	2.2

83. We are considering banding the potential support for biogas combustion with a tariff for installations of 200-500kW thermal capacity, and a separate tariff, likely to be significantly lower, for installations of 500kW and above. These bandings have been chosen to be compatible with the existing Feed-in-Tariffs support for electricity generation using AD and are also designed to reflect the differences in cost between medium sized and large installations. However, we do recognise that there fundamental differences between heat and electricity generation so would consider different banding levels, for example a middle level of 200kW-1MW, if the evidence we receive demonstrates that is appropriate.

Consultation Question	
16	What are your views on tariff bandings of 200-500kW for a medium tariff and >500kW for a lower tariff? Please provide evidence to support you answer, particularly if you have proposed alternative bandings.

84. Ultimately, the intention is to introduce support for biogas combustion over 200kW using the established modelling methodology for RHI, assuming the evidence is consistent with that approach. Whilst we cannot be certain of the final tariff setting results, we expect them to be broadly similar to and certainly not more than those listed above, which we include to allow more focussed consultation responses.

Consultation Question	
17	Do you think a tariff of approximately 5.9p/kWh for medium installations and a tariff of 2.2p/kWh for large installations is appropriate?

18	Can you provide any evidence for the tariff levels required for medium and large installations?
19	Can you suggest any alternative methods of calculating support for this technology?

Combined Heat and Power Quality Assurance and capacity limit

85. Under the EU's Cogeneration Directive, systems receiving specific support for CHP are required to receive Combined Heat and Power Quality Assurance (CPHPQA) accreditation. There is however no such requirement for receiving the RHI for heat produced by biogas CHP installations. This is because the tariff is based on the heat generation only and there is no specific tariff for the heat generated by CHP systems.

86. Where possible, we hope to support CHP over electricity generation only and we are aware that the CHPQA requirements may be onerous for smaller users. Introducing these additional requirements may prevent some users from installing CHP systems over simple electricity generation.

87. However, CHPQA standards ensure that CHP systems are of good quality and we want to ensure that efficient energy production is incentivised. We would therefore consider introducing a CHPQA requirement for biogas CHP installations to ensure that we do not incentivise inefficient systems.

88. Introducing a requirement for CHPQA accreditation would include a condition on how the capacity of CHP installations is interpreted, as the CHPQA requires that the capacity is determined taking into account the system as a whole. This has particular relevance for small to medium biogas operations, in which CHP installations are common, at or near the 200kW capacity limit.

89. In these systems biogas combustion is used to feed a generator which as well as electricity produces heat by the use of a thermal water jacket. The heat is fed into a heat exchanger which produces usable heat. The current interpretation of capacity limit for these systems, which is consistent with CHPQA requirements, is based on the thermal jacket rather than the heat exchanger. This means that many small to medium sized CHP installations with an output of useful heat from the heat exchanger of below 200kW are above the capacity limit because of their thermal jacket and so are excluded from current RHI support.

90. We believe that current definition of thermal capacity and its interpretation for biogas CHP, which is consistent with CHPQA, is correct. While we do not wish to exclude small to medium sized installations from support, we propose that the medium level tariff will be sufficient to incentivise these projects and so the interpretation of capacity need not be adjusted regardless of whether or not we introduce CHPQA requirements.

Consultation Question	
20	Do you think that we should introduce a requirement for biogas CHP systems to be CHPQA accredited in order to receive RHI payments?
21	Do you agree that we should continue to base the capacity limit for biogas CHP installations on the thermal jacket, regardless of whether or not we introduce CHPQA requirements?

Changes in support

Biomass and Bioliquid Combined Heat and Power

A new specific tariff for CHP

91. Combined heat and power is currently supported under the RHI for biomass, biogas and geothermal sources of heat. There is no specific CHP tariff, rather an installation is able to claim the tariff applicable to the technology it uses, subject to the banding and size limitations of that technology.

92. Due to the nature of CHP, there is more interaction between the RHI and the RO than for other technologies. The intention is that an eligible renewable CHP plant will be able to claim both the RO and RHI on its power and heat output respectively. Biomass, biogas and geothermal CHP is currently eligible for the RHI providing the installation is not or has not been a CHP generating station under the RO, thereby receiving the ½ ROC CHP uplift.

93. The RO is a more attractive mechanism for supporting CHP currently. However the extra CHP support under the RO, in the form of the ½ ROC uplift, will end in 2015. This means CHP plants are already beginning to look to the RHI as an alternative to RO support and it is important that we act now due to the long lead-in time for this technology to ensure the RHI provides the right support to this technology.

94. The current RHI arrangements are not seen as sufficient for long-term CHP support for certain technologies: evidence suggests that the large biomass tariff of 1p/kWh is too low to incentivise biomass CHP; the capacity limit of 200kW for biogas combustion rules out large scale biogas CHP; and there is currently no support for bioliquids. Whilst the proposals for expanding support for biogas should mean the RHI provides adequate support for this technology, ensuring adequate support for biomass requires a different solution.

95. Given the relative complexity and size of CHP plants, the market requires clarity about levels of support, and that clarity is required now in order that long-term investments are made. Under the current RHI arrangements, large scale biomass CHP receives the corresponding biomass tariff. This is set at 1p/kWh due to the European Commission's decision, as part of the State Aid process, that the large biomass was set inconsistently with other tariffs and was too high as a result. There are significant extra costs associated with building a CHP plant

rather than generating electricity only and our evidence does not suggest that the 1p tariff will be sufficient to incentivise biomass CHP.

96. Our modelling results indicate that a tariff of 4.1p/kWh will be sufficient to incentivise this technology.

Consultation Question	
22	Do you agree that a separate tariff should be introduced to support biomass combined heat and power?
23	Do you think the proposed tariff of 4.1p/kWh is appropriate for this technology?

97. Introducing a CHP specific tariff also means that all RHI CHP installations will need to undergo the CHP Quality Assurance process, something which is not currently the case under the RHI. This is a requirement of the Cogeneration Directive when specific support is provided for CHP. CHPQA is also a requirement for CHP plants under the RO. This will not apply to any CHP plants already accredited within the RHI, and they will continue to receive the biomass tariff.

Support for bioliquid CHP

98. The inclusion of bioliquid CHP under the RHI has not previously been proposed. However, it is recognised that CHP use of bioliquid produces the most total energy per unit of input fuel and should be encouraged. This leads to high levels of efficiency, and greenhouse gas savings that are higher than for equivalent use in electricity only, heat only or transport sectors.

99. CHP plants can take a wide range of bioliquids, including those that are not suitable in the transport sector. Over 80% of bioliquids used in the RO in 2009/2010 were bioliquids not used in the transport sector.

100. CHP can also use advanced bioliquids made from waste and solid biomass sources which do not have high sustainability risks, and have very high GHG savings. We are aware of a number of producers who are seeking to use CHP as a stepping stone to generate advanced biofuels such as aviation fuel, which are strategically important to decarbonise the transport sector between 2020 and 2050.

101. The CHP tariff calculated for biomass also included bioliquid data so the above tariff (4.1p/kWh) will be applied to bioliquids.

Consultation Question	
24	Do you agree that we should support bioliquid CHP through the RHI and the tariff level

	of 4.1p/kWh is appropriate?

102. The Renewable Energy Directive outlines mandatory sustainability criteria for bioliquids and these are already applied under the Renewables Obligation[3]. The RHI will adopt the same mandatory sustainability criteria. The production of bioliquids can cause significant GHG emissions from Indirect Land Use Change(ILUC), where existing food crops are displaced by the production of crops used for fuel. We will consider the Commission's future proposal on bioliquids when we review RHI support in 2014/15.

103. Some bioliquids suitable for CHP could otherwise be used in transport and are one of the few sources of renewable fuel available to meet the renewables targets in that sector. To be consistent with the bioenergy strategy, published earlier this year, we must be mindful not to divert significant volumes of bioliquids from the transport sector. Therefore, we are proposing to introduce mechanisms which would limit the use of bioliquids under the RHI. One option would be to only allow those CHP generating stations which receive Renewable Obligation Certificates to claim the RHI. This would ensure that they would be captured under the RO cap for bioliquids and would also mean that all installations would already have to fulfil the bioliquids sustainability criteria. Alternatively, a lower tariff level could be set which would limit deployment to those levels incentivised under the RO.

Consultation Question	
25	Do you agree with the proposal to limit the amount of bioliquid qualifying for the RHI? Please provide reasons to support your answer.
26	Is an enforced link to the Renewables Obligation or a lower tariff the best mechanism for providing this limit? What alternatives do you suggest?

Deep Geothermal

Current support

104. Deep geothermal heat is currently supported within the RHI under the Ground Source Heat Pump (GSHP) tariff which is set at a rate of 3.4p/kWh for installations above 100kW. This was a result of having insufficient data to set a specific geothermal level of support. We recognise this tariff is insufficient to encourage new geothermal development.

[3] The RO sustainability criteria are outlined on the Ofgem website: http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/Documents1/Sustainability%20Criteria%20for%20Bioliquids%2019%2012%202011.pdf

105. Deep Geothermal heat is harnessed from depths of below 500 metres under ground. In the UK there heat is stored in deep aquifers at both medium (90°C to 160°C) and low temperatures (below 90°C); to generate direct heat temperatures in excess of 60°C are required. This heat is extracted by drilling boreholes to reach the heat source. Once the heat source is reached geothermal brine is pumped out of the borehole and pumped through a heat exchanger, eventually delivering the appropriate level of heat to the point of demand.

106. Deep geothermal heat has the potential to provide renewable, low carbon heat with no air quality issues and has a lifetime of several decades with low running costs. It also requires a relatively small surface footprint; approximately 1.5 acres during drilling and less than 0.5 acres during operation.

107. This technology offers a large amount of heat from a single borehole, offering a capacity of 5MW plus and making it ideal for supplying heat networks. A recent study carried out by SKM consultants[4] suggested there is the potential for 67,000MW, however there are uncertainties attached to this figure.

Proposed new tariff

108. When setting up a deep geothermal site there is a large financial outlay on planning and survey work as well as the risks associated with the technology which includes potential unexpected geology and loss of capital due to initial boreholes being unproductive. There is also a long lead in time, which could be up to 3 years from the initial outlay until renewable heat can be produced and the RHI claimed.

109. Deep geothermal technology is unique in the fact that the investment required is predominantly based on upfront costs whereas the operating costs are low and a lifetime usually in excess of 20 years. We have limited data on the cost and performance associated with deep geothermal technology, though our evidence suggests that the typical capital costs are around £14.6m for 2 wells with a capacity of 6-7MW.

Consultation Question	
27	Do you agree that there should be a separate tariff to properly incentivise deep geothermal heat?

110. It has been established that the ground source heat pump tariff of 3.4p/kWh is inappropriate for deep geothermal technology as the data available highlights the difference in cost and risk associated with this technology. We estimate that that current tariff would not bring forward any new geothermal heat generating stations by 2020.

[4] The SKM report on Geothermal Energy Potential can be obtained through the following link http://www.skmconsulting.com/Knowledge-and-Insights/News/2012/SKM-report-on-Geothermal-Energy-Potential-in-Great-Britain--Northern-Ireland.aspx

111. There is currently limited data available on deep geothermal heat due to the absence of UK geothermal heat plants. However, DECC have committed to supporting a number of deep geothermal projects across the country including the refurbishment of the Southampton borehole, and two heat projects one of which is based in Newcastle, this will provide us with further data for future modelling.

112. As mentioned above, we do not have a large range of cost and performance data to estimate a supply curve. Therefore, we have based our tariff estimate on an average of the data in a report provided by consultants AEA and data supplied to DECC by Geothermal Engineering Ltd. From this information we are proposing a separate geothermal tariff of 5.0p/kWh. Given the limited amount of data we would welcome further evidence to help corroborate our current assumptions and set the most appropriate tariff for this technology.

Consultation Question	
28	Do you think that a specific deep geothermal heat tariff of 5.0p/kWh is appropriate? Please provide supporting evidence and/or data to help set an appropriate tariff for deep geothermal heat.

113. Government is committed to supporting the development of geothermal heat and the proposed tariff will demonstrate the value that we place on this technology.

114. Currently under RHI requirements, to be considered as geothermal, the heat has to be generated by naturally occurring energy located and extracted from at least 500 metres beneath the surface of solid earth.

Consultation Question	
29	Is 500 metres the correct depth to define geothermal? If not what do you believe should be the correct depth and why?

Other changes

Energy Efficiency

Energy Efficiency and the existing RHI scheme

115. The Government places great value on energy efficiency and it is at the heart of the Government's approach to tackling dangerous climate change and ensuring safe, secure and affordable energy supplies. The potential social, economic and environmental benefits of increasing the UK's energy efficiency are significant and Government plans to unlock this potential through existing policies, such as the RHI.

116. There are currently no building fabric or process energy efficiency requirements for the non domestic RHI. The non domestic scheme was launched without explicit energy efficiency measures for the following reasons:

- diversity of usage and occupancy in the non-domestic sector means that no specific standards for energy efficiency exist and appropriate efficiency measures will be more variable than in the residential sector;
- a significant proportion of the non domestic schemes generate heat for processes where that forms a large part of the business costs and they already face economic drivers to reduce those costs;
- the non domestic Green Deal would soon be launching with a focus on providing low cost finance to help deliver energy efficiency improvements; and
- it was important that the RHI launched in order to begin to deliver renewable heat, with the intention that energy efficiency criteria could be developed and added at a later date.

117. Despite the lack of explicit energy efficiency criteria, some heat losses in the non domestic RHI are nevertheless dealt with via the distinction in the regulations between simple and complex systems in terms of metering and tariff calculations. For complex systems, the RHI pays for heat used rather than heat generated, thereby excluding heat losses from the payments. The recent RHI consultation, 'Providing Certainty, Improving Performance' proposes changes to the RHI metering requirements which reward energy efficiency through greater flexibility for heating systems which use appropriate insulation on external piping.

118. The non domestic RHI has been running for 10 months and we are now in a position to discuss our initial thoughts for energy efficiency requirements in the non domestic scheme. Introducing requirements would help to ingrain the principle of energy efficiency into the RHI. It would also reduce RHI payments being made on lost heat. Furthermore, end users benefit from having confidence that their heating system meets acceptable energy efficiency standards and are reducing the amount of heat they need to generate.

119. It is important however that any standards introduced do not present too great a barrier to accessing the RHI and making the switch to renewable heat. Any requirements should therefore ensure good standards of energy efficiency are upheld, while not proving so onerous to be a disincentive to the uptake of renewable heating systems.

120. For the purposes of energy efficiency we believe it makes sense to split potential non domestic RHI applicants into three main categories:

- Users of process heat
- District heating (heat for multiple domestic dwellings)

- Commercial, industrial and public space and water heating

Users of process heat

121. RHI payments are only made for metered heat generated by an eligible installation and used for an eligible purpose. Carrying out a process is an eligible use of heat.

122. The RHI supports any process using heat other than the generation of electricity. This includes heat users such as the chemical, food processing and agricultural industries. For most process heat users, the generation of heat is a key part of their operations and forms a significant proportion of their energy use and will, for a large proportion of customers, be one of the largest costs of their business. This means that there is already a strong driver for businesses to drive down the cost of their process heating by becoming more energy efficient.

123. Many users of intensive process heating are likely to be amongst the highest consumers of energy in the UK and therefore participants in schemes such as Climate Change Agreements (CCA), which entitles energy intensive industry to a reduction in their Climate Change Levy provided they meet targets on improving energy efficiency and reducing carbon emissions; or the EU Emissions Trading System (ETS) where installations are required to surrender allowances based on their actual emissions. Schemes such as these already provide a strong financial incentive for intensive energy users to ensure high standards of energy efficiency. Our current thinking is that RHI does not need to include any specific energy efficiency requirements relating to process heat. The key role heat plays in industrial processes already provides a strong driver to use energy efficient methods. Where businesses are already participants in CCAs or the ETS, any additional requirements in the RHI are likely to create unnecessary bureaucratic complexity and act as a disincentive for the switch to renewable heat.

Consultation Question	
30	Do you agree that the RHI should not include energy efficiency requirements for process heating?
31	If you disagree, what process heat uses should be required to meet energy efficiency standards, and what do you suggest they should be?

Domestic Premises in the non-domestic scheme

124. District heating, whether in the form of a central boiler for an apartment building, or as a network of pipes delivering heat from a central installation to a number of local households or businesses, can be a cost-effective alternative to installing individual heating systems in individual properties. Where heat is supplied from one installation to multiple domestic dwellings, or to a single domestic dwelling which partly pays business rates, they form part of the non domestic scheme and will be ineligible for the domestic when it is launched.

125. Due to the investment and planning required to install energy efficiency measures in households and small businesses compared with their relatively modest heat usage, in comparison to users of process heat, there is less of an existing financial driver for high standards of energy efficiency in district heating.

126. A key difference between the domestic RHI and the district heating networks eligible for the non domestic RHI is the recipient of the tariff payments. The RHI payments are made under both schemes to the owner of the installation. In the domestic scheme, it will usually be the resident of the household who claims the RHI payment. Under a district heating scheme, the owners of the installation will not necessarily be those who reside in the buildings the installation is heating. For this reason, it is helpful to consider the two separately: smaller scale heating networks where it is likely the recipients of the heat have a stake in the heating installation; and larger networks where a third party owns the heating installation and supplies heat to many domestic premises.

Small Scale heat networks

127. Small scale heat networks will typically be situations where households together have invested in a renewable installation to supply heat to their home rather than applying for the domestic scheme and also a primarily domestic property which gains eligibility for the non domestic scheme by partially paying business rates. In these circumstances we are considering requiring the households involved to meet the same energy efficiency criteria as in the domestic RHI.

128. The initial proposals for the domestic RHI set out energy efficiency requirements by linking eligibility to Green Deal ‘green ticks’. These are measures that a Green Deal assessor has designated as eligible for the Green Deal on the basis of their cost and relative energy efficiency benefits. The domestic consultation proposes that in order to receive the RHI, consumers will be required to have installed all green tick measures relating to thermal efficiency on a Green Deal Assessment that has been completed for their properties.. The box below shows a list of measures that are likely to be counted as a thermal efficiency measure.

Potential 'thermal efficiency' measures

- Loft Insulation
- Cavity Wall
- Solid Wall
- Draught Proofing
- Duct Insulation
- External Wall Insulation
- High Performance External Doors
- Hot Water Cylinder Insulation
- Internal Wall Insulation
- Pipe Work Insulation
- Roof Insulation
- Sealing Improvements
- Secondary Glazing
- Under Floor Insulation

129. To ensure simplicity and clarity to applicants we are considering defining a 'small scale network' as one which consists of five or fewer households. This would include single households which qualify for the non domestic scheme for whatever reason, such as partly paying business rates.

Consultation Question	
32	Do you think that we should be consistent with the domestic RHI and introduce a requirement based on 'green ticks' for small scale district heating networks?
33	How do you think we should define as a 'small scale heat network'?

Large heat networks

130. For larger scale schemes, where the number of individual homes benefiting from district heating can be in the hundreds, and where the owner of the installation is likely to be a third party, it may be unrealistic to expect that all of the households meet the Green Deal criteria. In many situations where district heating is appropriate, the owner of the installation may have little or no influence over the occupants of the households. In the right situations , large scale district heating is a more efficient way of delivering heat than a single boiler heating a single home and we need to avoid creating barriers to plans for district heating, particularly the situation where one household could prevent renewable heat being made available to many others. Indeed, there is an argument that specific energy efficiency criteria for large scale district heating may not be necessary.

Consultation Question	
34	Do you think that energy efficiency measures should be introduced as eligibility criteria of RHI for large scale district heating networks?

131. If energy efficiency requirements were to be introduced, one way to accommodate the difficulty in achieving compliance would be to introduce a sliding scale determining the proportion of households that have to meet energy efficiency standards, based on the size of the district heating network. Our current thoughts for this sliding scale are illustrated in table (#). It should be emphasised that these are initial thoughts only, and we expect the figures to change after this consultation is concluded, if the requirement were to be implemented.

Number of homes in district heating network	Proportion required to meet Green Deal 'green tick' energy efficiency recommendations
1-10	100%
11-50	90%
51-100	80%
100+	70%

Table #: Sliding scale for district heating energy efficiency

132. This approach is designed to encourage the take up of energy efficiency in district heating schemes whist also providing sufficient flexibility that it will remain possible for these schemes to access the RHI.

Consultation Question	
35	Do you think that a sliding scale approach is suitable for district heating networks?
36	What do you suggest the correct proportion of green deal tick compliance should be for each district heating size banding?

133. The domestic RHI proposes that the green tick measures will need to have been installed and proof of installation provided to Ofgem (in the form of the revised EPC) before the renewable heating system is able to receive a subsidy. This approach has been set in order to ensure that the renewable heating system is sized to take into account the energy efficiency measures that have been installed. Our initial proposal is to take the same approach in the nom domestic RHI.

Consultation Question	
37	Do you agree that we should require energy efficiency measures to be installed before the renewable heating system is able to receive RHI payments? If not, what do you propose?

Commercial and industrial space and water heating

134. Outside of process heat users and district heating, the other main eligible heat use supported by the non domestic RHI is space and water heating in commercial buildings and community infrastructure. The broad spectrum of potential RHI customers who fall into this category and the resulting heterogeneous building use means that a 'one size fits all' approach is unlikely to be appropriate. Indeed, there is no universally accepted method of assessing energy efficiency for these heat users.

135. Rather than choosing or devising a specific method of demonstrating a building meets certain standards of energy efficiency and hence is eligible for the RHI, we are considering allowing a range of alternative methods. For example, some organisations will already have used BREEAM (Building Research Establishment Environmental Assessment Model), others EPCs (Energy Performance Certificates) and others DECs (Display Energy Certificates). In future other methodologies, such as the non domestic Green Deal assessment, may provide other ways of proving a building is energy efficient.

136. For each accepted methodology, we need to establish what the corresponding minimum standard should be to gain eligibility for the RHI. Rather than setting an absolute standard, such as a 'C' EPC rating, our current thinking is that the standard should be relative to the potential energy efficiency of the building – this will ensure all buildings are able to meet the necessary standard and claim the RHI.

137. There is a risk that requiring energy efficiency standards of this nature will make the RHI inaccessible for a broad range of potential applicants – a situation that we wish to avoid. Introducing as much flexibility as possible in methodology will help to reduce the likelihood of this occurring, but there will be still be businesses or organisations who are simply unable or unwilling to undergo an assessment and make energy efficiency improvements.

Consultation Question	
38	Do you agree that we should allow a range of energy efficiency assessment methodologies to prove a minimum standard of energy efficiency has been met?
39	Can you provide any views or evidence as to whether these requirements would act as too significant a barrier to the uptake of renewable heat?

40	Other than BREEAM, Green Deal, EPCs and DECs, can you suggest other methodologies which could be used?
41	What minimum standards should we accept for each methodology?

Calls for Evidence and other technologies

138. In addition to this consultation we will be launching a series of 'calls for evidence' relating to different technologies. Please note that these calls for evidence and being issued as separate documents and are being run to different timescales with different deadlines for response.

Call for Evidence- Landfill gas

139. Landfill gas is a declining resource and has not previously been considered as an RHI supported technology. We are launching a call for evidence asking for more information on this technology.

Call for Evidence- Ground source heat pumps

140. The existing tariff for ground source heat pumps has not brought forward the number of installations of this technology we expected. Discussions with the industry have indicated that this may be due to inaccuracies in our assumptions about the costs, efficiencies and load factors of installations. We are issuing a call for evidence to verify our current assumptions.

Call for Evidence- Biopropane

141. A relatively recent proposal from the industry involves importation of biopropane for use in the UK. Initial research suggests this would present good value for money in terms of renewable targets – associated tariff likely to be low – but importing this gas would not promote green growth and UK heat self sufficiency to the same degree as other renewable technologies. This is unlike any other technology supported under the RHI and we do not have sufficient data to make any decisions. In order to obtain more information we plan to launch a call for evidence on this technology.

Call for Evidence- Large biomass tariff (>1MW)

142. A European Commission state aid decision resulted in the RHI large biomass tariff being reduced from 2.7p/kWh to 1p/kWh. Subsequent projections of fossil fuel costs suggests that this should be sufficient to incentivise significant large scale biomass. However, market evidence suggests that very few projects are going ahead under the current tariff with a much greater proportion than 50% being cancelled following the change to the tariff. Therefore, we intend to use this call for evidence to verify our assumptions.

Other technologies

143. We have recently been made aware of two new renewable heating technologies. We are gathering data and information on these technologies and whilst we have not yet had time to fully consider their inclusion in the RHI, we do wish to make clear our view that these technologies can play a key role in the switch to renewable heat. A brief outline of the technologies:

- **Solar Thermodynamic Panels:** These systems operate similarly to air source heat pumps, but utilise a solar collector to maximise heat absorption. The solar collector, filled with a refrigerant liquid enabling heat to be collected through the night and in cold temperatures, absorbs heat from the ambient air. This heat is then passed through a compressor and concentrated into a useful heat before being passed into a heat exchanger, where the heat is transferred to a water cylinder. These systems appear to be capable of a high seasonal performance factor and so could provide a valuable contribution to meeting our renewable energy targets. Further investigation is required to understand the market and costs of this technology.

- **Active solar air heating:** These systems by installing a dark, perforated metal wall on the building requiring the heat, to act as a large solar collector. The dark wall converts solar radiation into heat. Fans within the building, which would be associated with the ventilation system, are mounted at the top of the wall draw in outside air through the wall's perforations. As the air is sucked through the holes it is heated by the thermal energy collected in the wall. A key benefit of these technologies is their relative simplicity and the fact that they can be installed to work using a pre existing ventilation system. The relative energy and money savings will vary widely depending on the size and structure of the building and its exposure to sunlight and so further research is needed.

Other minor regulatory changes

144. **Ineligible forms of biomass.** We will revisit the definition of 'solid biomass' to provide greater clarity regarding biomass eligibility.

145. **Power to amend conditions of accreditation.** We intend to allow amendments to conditions of accreditation once participation has commenced. This will provide a consistent approach to that which is taken with the preliminary accreditation that enables Ofgem to make amendments throughout the tariff lifetime.

Next Steps

146. Following the consultation, our proposals will be finalised and a Government response issued, after which we will undergo the necessary regulatory processes, both domestic and European, with the aim of introducing new support by summer 2013.

147. Parts of the proposals outlined in this consultation will require European State Aid Clearance. Whilst we do not expect any delays as a result of these European requirements, they are nonetheless possible.

148. The Renewable Heat Incentive is being reviewed in 2014 with the aim of introducing the outcome of the review in 2015.

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