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# Perspective on the proposed Renewable Heat Incentive (RHI)

**As of April 1<sup>st</sup> 2011, businesses, consumers and communities in Great Britain<sup>1</sup> will be able to claim a payment; the Renewable Heat Incentive (RHI) on most types of renewable heating installations installed after July 2009. A consultation document published on February 1<sup>st</sup> 2010 sets out the Government's proposals for the RHI, which aims to accelerate the uptake of Renewable Heat by providing owners who chose to install it a return of ~12% (6% return for solar thermal technology). Prior achievement of certain levels of energy efficiency will be a pre-requisite to RHI eligibility. The Carbon Trust can help to look at the business case for your site/business.**

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## Summary points

- The Government has published a consultation document on the Renewable Heat Incentive (RHI). The RHI will be introduced across Great Britain<sup>1</sup> in April 2011 as part of its effort to increase the amount of heat generated from renewable sources; the Government is working to a stretching scenario of 12% by 2020, comprising 1 million domestic installations (one in every 30 homes) and 80 thousand (larger) non-domestic installations.
- The RHI has been designed to be sufficient to compensate the owner for the additional capex and opex incurred compared to a conventional "reference installation". It has been designed to provide a return of ~12% (a payback of 6 to 8 years<sup>2</sup>), with the exception of solar thermal where the incentive will provide a return of ~6% (a payback of 12 years) since it is deemed to be a relatively mature technology with relatively low installation challenges.
  - The scheme should support a range of technologies, including air, water and ground-source heat pumps (and other geothermal energy), solar thermal, biomass boilers, renewable combined heat and power, use of biogas and bioliquids and the injection of biomethane into the natural gas grid.
  - The payment will be calculated multiplying a tariff (in pence/kWh, banded by technology and size) by the heat use, which may be deemed or estimated.
- The financial returns with the RHI will make renewable heat more attractive, but other barriers still need to be overcome.
- The Government expects that a number of financing options may become available to support both upfront costs and ongoing operational costs although no firm descriptions of these are given in the consultation.
- A range of conditions will have to be met to ensure eligibility for the scheme, including meeting energy efficiency and (for biomass) sustainability standards. These must be maintained over the RHI period to ensure payments are made.
- The RHI will reinforce the case for renewable heat in the context of a range of existing and planned policies ranging from CERT to the CRC.
- The Government plans to make a further announcement at Budget 2010 regarding how the scheme will be funded.

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<sup>1</sup> The RHI will be established across England, Scotland and Wales. Northern Ireland will not be included in the RHI as the province is not covered by the legislation in the Energy Act 2008.

<sup>2</sup> For equipment lifetimes of 10 to 20 years respectively.

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## **The Government has published a consultation document on the Renewable Heat Incentive (RHI). The RHI will be introduced across Great Britain in April 2011 as part of its effort to increase the amount of heat generated from renewable sources**

Heat generation produces 47% of UK carbon dioxide emissions. The EU's Renewable Energy Directive requires that the UK generates 15% of its primary energy from renewable sources by 2020. The Government is working to a stretching scenario of 12%<sup>3</sup> of heat energy from renewable sources by 2020 – over a twelvefold increase over the next decade. Three quarters of renewable heat is expected to be generated in the non-domestic sector (commercial and public sector buildings and in industry), a quarter in domestic buildings. This equates to 1 million domestic installations (one in every 30 homes) and 80 thousand (much larger) non-domestic installations.

The Government has estimated the net annual resource cost of renewable heat to the UK to be £1.2 billion by 2020, saving 18MtCO<sub>2</sub> at a unit cost of £90/tCO<sub>2</sub><sup>4</sup>. This is more cost effective than small scale renewable electricity (incentivised by feed-in tariffs<sup>5</sup>), costing more than £200/tCO<sub>2</sub>. By comparison energy efficiency measures will on average save more than £30/tCO<sub>2</sub> by 2020.

The Government plans to introduce the RHI to incentivise individuals and organisations to install renewable heat solutions by both compensating for any additional costs (compared with the conventional fuel alternative) and providing a 12% financial return on the additional capital cost of the renewable installation. The Government proposal for the RHI is set out in the *Renewable Heat Incentive consultation on the proposed Renewable Heat financial support scheme* document for which the closing date for responses is 26 April 2010.

**The RHI has been designed to be sufficient to compensate the owner for the additional capex and opex incurred compared to a conventional "reference installation". It has been designed to provide a return of ~12% (a payback of 6 to 8 years), with the exception of solar thermal where the incentive will provide a return of ~6% (a payback of 12 years) since it is a relatively mature technology with relatively low installation challenges**

In most cases renewable energy sources are not currently competitive on cost. The RHI aims to stimulate demand and the supply chain for renewable heat by rewarding those owners who install eligible technologies through a regular payment over a number of years.

The tariff will be set to bridge the financial gap between installing a conventional heat solution and a renewable heat solution, and to yield a return of typically 12% (with the exception of solar thermal, which will earn a return of typically 6%) to the investor who purchases, installs, and operates the renewable solution. 12% returns imply installations will payback in 6-8 years (for equipment lifetimes of 10-20 years respectively), the 6% return for solar thermal equates to a payback of under 12 years.

### **Eligibility**

The scheme should support a range of technologies, including air, water and ground-source heat pumps (and other geothermal energy), solar thermal, biomass boilers, renewable combined heat and power, use of biogas and bioliquids and the injection of biomethane into the natural gas grid.

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<sup>3</sup> Our "Perspective on the UK Renewable Energy Strategy (RES)" argues that renewable electricity uptake has the potential to exceed the Government's 31% target and offset the expected shortfall in renewable heat.

<sup>4</sup> Carbon Trust experience suggests this could be optimistically low.

<sup>5</sup> See our "Perspective on Feed-in Tariffs".

## **Tariff**

Because different renewable technologies have different capital and fuel costs, and costs also vary by size of installation, a specific tariff has been proposed for each of the eligible technologies in three size bands.

The tariff has been calculated based on a cost comparison with a typical “reference installation” for different technologies and sizes, based upon a comparable, conventional fuel alternative. The total cost difference between the renewable technology and the reference installation over the lifetime of the asset has been estimated, and the tariff set such that it both repays this difference in capital and operating costs and yields a 12% return on the additional capital invested in the renewable solution. Because the calculation is based on a reference installation, installations with lower or higher costs than the average installation would likely see higher or lower rates of return.

Tables with the specific proposed tariff per technology and size band are appended at the end of this note.

## **Heat use**

The approach to determining how much heat use is supported by the incentive aims to ensure that the scheme avoids funding heat that serves no useful purpose. To this end, heat use will be either “deemed” or measured (or a combination of both), depending on the size and use of the renewable installation.

- Deeming - for small and medium scale installations (except medium-scale solid biomass installations), a “reasonable” annual heat load (which assumes that “minimum” energy efficiency measures are in place) will be estimated for the building in question before installation through an assessment process based on SAP, SBEM, EPC<sup>6</sup> or equivalent methods. The tariff will only be available to the sites for this amount of heat annually, additional heat outputs from the technology may be used and needed by the site (but will not be eligible for the RHI). This is designed to ensure that the RHI will not only incentivise energy efficiency foremost but also to prevent perverse incentives – such as leaving a biomass boiler on when heat is not needed, so as simply to generate income from the RHI. One exception to this is medium-scale solid biomass installations, where a deemed approach would be followed, but in cases where metering is in place and the use exceeds the deemed amount, an additional, considerably lower tariff per kWh would be paid for the metered excess.
- Metering – for large installations and process heat installations it is proposed that metering be used to establish the amount of heat for which the RHI is to be paid. Deeming would be more difficult to do accurately in these situations, and metering is likely to be more reliable. Tariff levels at larger scales are also lower to prevent the occurrence of perverse incentives discussed above and also to reflect the fact that larger systems are usually more cost effective than smaller systems.
- Biomethane injection in to the gas grid and district heating will be metered at all scales.

## **Payment frequency**

Payments will be made annually for installations below 45 kW and quarterly for those above this level; and always subject to conditions such as continuing to operate and maintain the equipment.

## **Duration of the scheme and scope for changes**

The lifetime over which each technology receives RHI payments is captured in the tariff tables appended at the end of this note, ranging from 10 to 23 years depending on the technology.

Projects which take part in the scheme will have the conditions agreed at the start of the project. The RHI will remain open to new projects until at least 2020, although the specific conditions offered to future projects may be revised. It is worth noting that regression of the incentive over time is not planned, in contrast with the Feed-in Tariffs currently available for small-scale power generation.

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<sup>6</sup> Standard Assessment Procedure (for domestic sector); Standard Building Environmental Modelling, Energy Performance Certificate (for commercial buildings).

## The financial returns with the RHI will make renewable heat more attractive, but other barriers still need to be overcome

Returns of 12% from the RHI equate to installations paying back in 6-8 years (for equipment lifetimes of 10-20 years respectively), the 6% return for solar thermal equates to a payback of under 12 years. These average payback periods are theoretically sufficient and should drive a significant increase in uptake. Furthermore, returns will vary significantly depending on the location, building and energy needs of the household or organisation. Returns for buildings that are not connected to the gas network (normally in rural locations) and that have high heat requirements could be higher than 12% - implying paybacks of 5 years or less.

Even though financial returns will theoretically be high enough with the RHI in place to drive uptake of renewable heat solutions, there will still be significant barriers to take-up. There are still technology, supply chain and security of supply issues, as well as the "hassle factor" which will be significant in domestic and SME sectors. Programmes such as the Carbon Trust Biomass Heat Accelerator are helping to address these issues. There are also structural and business case issues specific to different groups: homeowners, business owner-occupiers, landlords and tenants:

**Homeowners:** For businesses looking to serve this sector, returns of 12% and above for homeowners seem attractive against alternative investment opportunities of similar risk. However, renewable heat installations will require significant upfront capital e.g. around £15,000 for a biomass boiler compared to less than £2,000 for a conventional system. Furthermore this investment will be tied up for the lifetime of the installation, 10-20 years. There will need to be a mechanism to transfer value if the owner moves house within the lifetime of the renewable generation installation. Mechanisms could include incorporating the value of the renewable into the house price, or a 3rd party such as an Energy Service Company (ESCO) owning the installation and sharing the benefits with whoever occupies the building.

**Business owner-occupiers:** Whilst returns of 12%/paybacks of 6-8 years might be theoretically high enough, businesses usually apply rules of thumb, with building upgrades requiring shorter payback periods (3 years or less) than the 12 years provided by the RHI. Businesses also face non-financial barriers – similar to those that have hindered implementation of (cost effective) energy efficiency measures. These include the fact that energy costs are often small relative to other costs – only 2-3% of total costs for service companies.

**Landlords:** The RHI could lead to positive uptake by landlords, but only those that pay the heating bill or enter arrangements to share the benefits with tenants, such as green leases. Landlords that do not pay the heating bill will not benefit from the reduced fuel costs, which make up a significant proportion of the benefit (30-50% for biomass).

**Tenants:** Tenants will usually not be able to install heat generation equipment in the buildings they occupy.

The RHI should stimulate the business case to the extent that the market develops solutions to address some of these barriers. These include a number of financing options such as ESCOs, discussed below.

## The Government expects that a number of financing options may become available to support both upfront costs and ongoing operational costs although no firm descriptions of these are given in the consultation

The Government expects that the RHI will stimulate the market to provide a number of different financing options. These could cover the upfront costs (e.g. cost of installing the equipment) and ongoing operational costs (e.g. fuel costs) for the lifetime of the technology.

Possible models include:

- Energy service companies (ESCOs) – a separate company set up around a specific installation where heat is sold to a client on a delivered unit basis; the renewable heat equipment, its

installation, operation, maintenance and any fuel needed for it are financed by the ESCo. RHI payments are expected to make it easier for such projects to attract private financing.

- Public sector financing – local authorities are potentially able to take advantage of economies of scale and a lower cost of capital.
- Government policies such as Pay As You Save – Home Energy Pay As You Save pilots were launched in December 2009, giving households the opportunity to invest in energy efficiency and microgeneration technologies in their homes with no upfront cost and making repayments over a long enough period so that repayments are lower than their predicted energy bill savings (meaning financial and carbon savings are made from day one).
- Fossil fuel suppliers – providing renewable heating as an option alongside their current package of services.
- Developers – arrangements to be agreed between the builder and buyer of new homes or non-domestic buildings where the builder would finance the installation of renewable heat equipment as part of the overall building cost, and in turn would receive RHI payments from the buyer.
- Banks and other lenders – lenders to finance upfront capital costs for an assigned proportion of the RHI.

**A range of conditions will have to be met to ensure eligibility for the scheme, including meeting energy efficiency and (for biomass) sustainability standards. These must be maintained over the RHI period in order to ensure payments are made**

The scheme aims to encourage renewable energy systems to be installed in buildings alongside (or in addition to) adopting a basic level of energy efficiency measures. In small and medium-scale installations, it is proposed that both installers and equipment be certified under the Microgeneration Certification Scheme to provide consumer confidence and help ensure the quality of workmanship and equipment being used.

Biomass systems will have to meet minimum sustainability standards for the fuel they use and also the equipment will need to meet certain standards over the levels of emissions of certain particulates and gases from combustion.

In the domestic sector, the RHI should be part of a “whole-house approach”. A basic minimum level of energy efficiency required for existing homes would be:

- at least 125mm of loft insulation; and
- cavity wall filled where appropriate.

Ofgem will be responsible for the overall administration of the RHI. It will make incentive payments to RHI recipients and deal with the auditing and enforcement of the scheme.

To continue to qualify for RHI payments over the lifetime of the scheme, the recipient will need to comply with the rules of the RHI. The owner of the equipment may be asked to sign a declaration that they agree to meet their obligations under the scheme (e.g. keeping the equipment working and well-maintained). Ofgem may then require further declarations (e.g. annually) from the owner confirming that they continue to meet their obligations and still qualify for incentive payments.

## **The RHI will reinforce the case for renewable heat in the context of a range of existing and planned policies ranging from CERT to the CRC**

There are a range of policies which may incentivise renewable heat:

- Carbon Reduction Commitment (CRC): all heat production under this scheme, regardless of origin, is zero rated under the scheme, although carbon allowances must be surrendered for fuel supplies to (non EU ETS) combustion plants. As Biomass is zero rated under this scheme, no allowances will have to be surrendered. However, there is no detail yet as to whether or not RHI-claiming output will need to be reported against CRC footprint.
- Carbon Emissions reduction Certificate (CERT): renewable heat (RH) is currently an "eligible measure" under this programme, a consultation is out as to whether it should remain so but no decision as yet. A certain amount of renewable heat equipment is currently being installed with financial support from CERT-obligated parties (energy suppliers), RHI might increase this if RH remains an "eligible measure" under CERT.
- Community Energy Saving Programme (CESP): where RH is eligible for the RHI RH can be used to meet CESP targets by obligated parties (energy suppliers), this will still count as an "eligible measure" for meeting the target.
- Voluntary Reporting Guidance (VRG): RH that is "owned or controlled" by an organisation can use this to account as zero in their annual carbon footprint reporting
- Future building standards:
  - Zero Carbon Homes: on-site RH will count towards the "Zero Carbon" standard required for this by 2016. RHI will therefore probably make achieving this slightly less costly for developers.
  - Zero carbon new non-domestic buildings: as above but policy is not formally in place.

## **The Government plans to make a further announcement at Budget 2010 regarding how the scheme will be funded**

The Government plans to make a further announcement at Budget 2010. Work to assess options for funding the RHI scheme will not impact on the intention to launch the scheme in April.

The Government is considering what would be the most effective way to fund the RHI, including reviewing the levy provisions in the Energy Act 2008. The Government plans to make a further announcement at Budget 2010. However, the Government does not expect these considerations to impact on the intention to launch the scheme in April 2011.

## Case study

Below is a simplified, worked example for one type of renewable heat technology which is designed to illustrate how this financial measure could incentivise the use of renewable energy:

A leisure centre (which has a swimming pool) has a total installed heating plant capacity of **1MW** (heating oil-fired), which supplies **2,400MWh** of metered heat every year. The capital cost of a 500kW biomass boiler installation at the leisure centre is likely to be **between £225,000 and £275,000** (i.e. £450 and £550 per kW). The cost could vary from this range (up or down) depending on the extent of work that needs to be undertaken in the conversion, as well as the boiler specifications. It is also important to note that additional Opex fees are likely to be incurred, beyond those required for the existing oil boiler.

By installing a **500kW biomass boiler** with metered heat output (fuelled by chipped wood – a typical renewable heat technology) to replace the oil plant and act as the lead boiler in a heating system which will also use a thermal store (a large hot water tank), they are able to supply approximately **65%** of their annual heat demand (**1,576MWh**) from a Renewable Heat Incentive (RHI) - eligible source. The balance of the heating, where the woodchip boiler is not able to meet the peak of site heat demands, will be provided by using the existing fossil fuelled system as an auxiliary.

Under these circumstances, the amount that the leisure centre can claim under the RHI would be:

$$1,576,000\text{kWh} \times 2.5\text{p}^7 = \text{£}39,420 \text{ per year for 15 years}$$

Assuming the heat output from the biomass system remained the same for the full 15 years which the RHI will be available for, the total value claimed under the RHI would be **£591,300**.

In addition to the payments from the RHI, it is likely that the leisure centre will be saving on their annual heating costs compared to if they were to continue to generate all of their heat from their oil boiler (biomass fuel is usually lower cost than heating oil on a unit-of-energy basis). The value of this saving would be dependent on their specific site circumstances (i.e. what they currently pay for heating oil and how much they will be paying for woodchip – the biomass fuel).

By generating 1,576MWh of heat from woodchip instead of oil, the leisure centre can also save around **380 tonnes of CO<sub>2</sub> per year**.

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<sup>7</sup> This is the upper end of the range of tariffs proposed under the RHI consultation for biomass systems above 500kW, the lower end of the proposed scale is 1.6p/kWh – so annual receipts could vary from this example.

## Appendix: proposed tariff tables

### Small installations (1)

Technology	Scale	Proposed tariff (pence/kWh) (2)	Deemed or metered (3)	Tariff lifetime (years)
Solid biomass	Up to 45 kW	9	Deemed	15
Bioliquids (7)	Up to 45 kW	6.5	Deemed	15
Biogas on-site combustion (5)	Up to 45 kW	5.5	Deemed	10
Ground source heat pumps (8) (9)	Up to 45 kW	7	Deemed	23
Air source heat pumps (9)	Up to 45 kW	7.5	Deemed	18
Solar thermal	Up to 20 kW	18	Deemed	20

### Medium installations

Technology	Scale	Proposed tariff (pence/kWh) (2)	Deemed or metered (3)	Tariff lifetime (years)
Solid biomass	45-500 kW	6.5	Deemed	15
		2 (fuel tariff)	Optional: for metered kWh above deemed number of kWh	15
Biogas on-site combustion (5)	45-200 kW	5.5	Deemed	10
Ground source heat pumps (8)(9)	45-350 kW	5.5	Deemed	20
Air source heat pumps (6)(9)	45-350 kW	2	Deemed	20
Solar thermal (6)	20-100 kW	17	Deemed	20

### *Large installations*

<b>Technology</b>	<b>Scale</b>	<b>Proposed tariff (pence/kWh) (2)</b>	<b>Deemed or metered</b>	<b>Tariff lifetime (years)</b>
Solid biomass (4)	500 kW and above	1.6 – 2.5	Metered	15
Ground source heat pumps (8)(9)	350 kW and above	1.5	Metered	20

### *Biomethane injection*

<b>Technology</b>	<b>Scale</b>	<b>Proposed tariff (pence/kWh) (2)</b>	<b>Deemed or metered</b>	<b>Tariff lifetime (years)</b>
Biomethane injection	All scales	4	Metered	15