BIOMASS HEATING AND THE RENEWABLE HEAT INCENTIVE

TIME FOR THE SLEEPING GIANT TO COME AWAKE?

AN ANALYSIS BY

BOYLE CONSULTING

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DISCLAIMER

This is a summary of the Government's proposals for the Renewable Heat Incentive, published on 10 March 2011. It is no substitute for reading the documents themselves, which are available from the DECC website.

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At the recent Ecobuild Show, a major success with record numbers of exhibitors and visitors, Solar PV, solar thermal and Heat Pump exhibitors outnumbered biomass heating companies by more than 20:1. Despite its huge potential in the UK, biomass heating often feels like a sleeping giant compared to the other renwables. It also gets much less coverage in the media when renewable energy is discussed. All that however may be about to change.

Despite a 3-month delay, DECC have pulled the rabbit out of their hat and announced the Renewable Heat Incentive (RHI). Described by Chris Huhne, Coalition Cabinet member and boss of the Department of Energy and Climate Change (DECC), as "the worlds first Renewable Heat Incentive" it contains a great deal that will put flesh on the Government's much-vaunted 'Green Economy'. Huhne has stated that: "The RHI will reduce emissions by 44 million tonnes of carbon to 2020, equivalent to the annual carbon emitted by 20 typical new gas power stations". To the surprise of industry watchers, they are also proposing that the scheme starts in July 2011, much earlier than predicted.

The headline figures and statements are:

- £860 million in funding committed in the lifetime of this Coalition – i.e. a 4-year period till 2014/15
- As air source heat pumps are effectively excluded for the first year and the tariff for solar thermal is half the level previously proposed, up to 50% of this money is likely to be used by the biomass heating sector
- Tariffs for biomass boilers have changed from the Feb 2010 Consultation (where two non-domestic tariffs were proposed), to three non-domestic tariff levels – up to 199kWth, 200-999kWth and above 1000kWth
- The tariff levels up to 999kWth boiler capacity are based on a Tier 1 payment for up to 1,314 peak load hours of operation (i.e. a 15% annual heat load) and then a lower Tier 2 payment at 1.9p/kWh for operational hours above this
- The Tier 1 tariffs up to a 199kW boiler size are 7.6p/kWh; those for 200-999kW boilers are 4.7p/kWh, and above that boiler capacity a 2.6p/kWh tariff is offered for all hours operated.
- For base load or high usage boilers below 1000kW capacity, the two-tier proposal will bring average tariff levels down. For example, a 500kW boiler operating for 3000 peak load hours equivalent, say as base-load in a hospital, would have an average tariff of 3.1p/kWh rather than the headline figure of 4.7p/kWh
- The tariffs are available for up to 20 years – longer than the original 15 years
- Meter readings on a quarterly basis will be required to get the RHI payments for non-domestic boilers

- For boiler capacities of 1000kW and above, a quarterly wood fuel sustainability report will be required, in line with requirements for the Renewables Obligation (RO)

- Long-term domestic tariffs for biomass boilers are not yet known but will be introduced in July 2012 and linked to the 'Green Deal' for homes which includes energy efficiency measures. An interim **Premium RHI payment** will be made for July 2011-July 2012. Payment levels are not finalised but a figure of £950 for each boiler has been suggested by DECC.

- Boilers commissioned on or after 1st July 2009 until the scheme comes into force (expected July 2011) are eligible for RHI payments. Any public grants issued would need to be paid back however. Boilers will need to MCS registered (below 45kW) or equivalent (above 45kW) from July 2011. Installers will also need to be MCS registered or equivalent

- A number of unresolved issues have been left for 12 months to avoid delaying the RHI launch. These include a potential uplift tariff for district heating projects, the long-term domestic tariff, and the introduction of new air quality standards for boilers which DEFRA wanted introduced from 2011

- Degression – i.e. reductions in the tariff levels - will be considered from 2012, with a formal Review of the whole RHI scheme due in 2014-15.

TABLE 1 - ALL THE RHI TARIFFS

Levels of support					
Tariff name	**Eligible technology**	**Eligible sizes**	**Tariff rate (pence/ kWh)**	**Tariff duration (Years)**	**Support calculation**
Small biomass	Solid biomass; Municipal Solid Waste (incl. CHP)	Less than 200 kWth	Tier 1: **7.6** Tier 2: **1.9**	20	Metering. Tier 1 applies annually up to the Tier Break, Tier 2 above the Tier Break. The Tier Break is: installed capacity x 1,314 peak load hours, i.e.: **kWth x 1,314**
Medium biomass		200 kWth and above; less than 1,000 kWth	Tier 1:**4.7** Tier 2:**1.9**		
Large biomass		1,000 kWth and above	**2.6**		Metering
Small ground source	Ground-source heat pumps; Water-source heat pumps; deep geothermal	Less than 100 kWth	**4.3**	20	Metering
Large ground source		100 kWth and above	**3**		
Solar thermal	Solar thermal	Less than 200 kWth	**8.5**	20	Metering
Biomethane	Biomethane injection and biogas combustion, except from landfill gas	Biomethane all scales, biogas combustion less than 200 kWth	**6.5**	20	Metering

TABLE 2 - DETAILS OF THE TARIFFS FOR BIOMASS BOILERS

Biomass Boiler Size (non-domestic all require heat meters)	**Tier 1 Tariff (p/kWh)**	**Tier 2 Tariff (p/kWh) above 1,314 peak load hours**	**Average Tariff (p/kWh) for 3,000 peak load hour operation**
Domestic below 45kW non-metered	One-off RHI Premium Payment for 2011-2012, long-term Tariff clarified for 2012-2013	Not relevant	Not relevant
<45kW	7.6	1.9	4.44
45kW-199kW	7.6	1.9	4.44
200kW-999kW	4.7	1.9	3.13
1000kW and above	2.6	2.6	2.6

In view of the above tariff complexity, we have carried out some initial analysis for a range of boiler sizes to get some sense of the payback on investment and likely attractiveness of boiler systems for clients. The boiler types and sizes assessed were:

- 25kW pellet boiler (domestic)
- 45kW non-domestic log boiler
- 190kW pellet boiler (Containerised)
- 500kW wood chip boiler (underfed hearth, below ground fuel silo, accumulator tanks)
- 1200kW wood chip boiler (step-grate boiler, walking floor fuel store, accumulator tanks)

The costs assumed are for a fully installed and commissioned boiler system (i.e. not just the costs of the biomass boiler system), plus conservative current fuel costs, and LESS the costs of an equivalent oil or gas boiler system. A subjective assessment of the likely attractiveness for each investment at current tariff levels was then made, ranging from *** (highly attractive), ** (attractive) to * (marginal).

TABLE 3 - INCOME STREAMS FROM THE RHI

First the good news. What sort of income stream could be expected under the RHI? Table 3 below indicates the potential annual income for a range of boilers under varying heat loads. It adjusts the tariff to the average level where operating hours are more than the 1,314 hours allowed under Tier 1 tariffs.

Installed kWth	Operating hrs	kWh	Average Tariff p/kWh	Annual RHI Income £
25	1,314	32,850[3]	7.6 (assumed)	2,000[3]
45	1,314	59,130	7.6	4,494
45	2,200	99,000	5.4	5,306
200	1,314	262,800	7.6	19,973
200	2,500	500,000	4.95	24,750
200	3,000	600,000	4.44	26,640
500	1,314	657,000	4.7	30,879
500	2,000	1,000,000	3.74	37,400
500	3,000	1,500,000	3.13	46,950
1,200	2,000	2,400,000	2.6	62,400
1,200	3,000	3,600,000	2.6	93,600

NOTE 3 – assumed kWh figures for the domestic sector are likely to be reduced when the long-term RHI tariff is introduced in 2012 with an assumed building efficiency improvement. The income is hence reduced by 20%.

TABLE 4 - ECONOMICS OF THE TARIFFS BY BOILER SIZE (PREPARED FOR ENAGRI BY BOYLE CONSULTING)

Boiler Size and type	**RHI Tariff – p/kWh**	**Estimated Capital Cost**	**10-Year Effective heat Costs to pay for the project in p/kWh (See NOTES *1 and *2)**	**Attractive for Investment? *** - highly attractive, ** - attractive, * - marginal**
25kW domestic pellet boiler with 7-day capacity fuel hopper, less the costs of an oil boiler	Assumed 7.6p/kWh* for first 1,314 peak *(tariff not yet agreed and may be higher than this level)	£10-£16K (including full install costs such as mechanical and electrical)	For a 1,314 hour peak load operation(reduced 20% by assumed efficiency building improvements) – 2.4p to 6p/kWh	** at lower capital costs, ** to * at higher capital costs
45kW log boiler with large capacity accumulator tank, less the costs of an oil boiler	7.6p for the first 1,314 hours then 1.9p	£18-£22K (including mechanical and electrical)	1.2-2.2p/kWh at 1,314 hours operation 1.9-2.5p/kWh at 2,200 hours operation	*** at all levels even up to capital costs of £22,000
199kW pellet boiler (containerised system with integral pellet store, fully installed and commissioned, less the costs of an oil boiler)	7.6p for first 1,314 hours then 1.9p	£80-£100K (including mechanical and electrical)	For 1,314 hours – 4.3p/kWh; for a 2,500 hour peak load operation - 3.7p/kWh; for 3,000 hours – 3.4p/kWh;	** to *** when compared to heating oil and bottled gas; ** to * when compared to natural gas
500kW chip boiler (underfed hearth, 10,000l accumulator tank, below ground silo, fully installed and commissioned, less the costs of a gas boiler)	4.7p for first 1,314 hours then 1.9p	£180-£300K (fully installed including civil works)	For 1,314 hours operation – 5.2p/kWh; for a 2,000 hour peak load operation – 4p/kWh; for 3,000 hours peak load operation - 3.3p/kWh; operation	For lower heat load applications below 1,500 hours peak load this is a * to ** investment opportunity; for 2,000-3,000 hours peak load operation it is a ** Investment opportunity

1200kW chip boiler (step grate boiler, walking floor fuel store, 25,000l accumulator tank, fully installed and commissioned, less the costs of a gas boiler)	2.6p	£400-£500K (fully installed including civil works)	For a 3,000 hour peak load equivalent operation the heat price is 2.4p/kWh; for a 2,000 hour load the heat price is 3.5p/kWh;	For a heat load above 2,500 hours the investment opportunity is **; above 3,000 hours the investment opportunity is ***

NOTES

*1 For the 25kW and 45kW boilers - this is an assessment of the heat tariff that would need to be charged over a ten year period to cover the capital costs of the boiler, an assumed interest rate of 12%, and fuel costs, LESS the costs of an oil or gas boiler and LESS RHI tariff at various operating hours

*2 For the 199kW, 500kW and 1200kW boilers - this is an assessment of the heat tariff that would need to be charged by an ESCO in a commercial contract over a ten year period to cover the capital costs of the boiler, an assumed interest rate of 12%, servicing, spares, admin. and insurance costs, plus fuel costs, LESS the costs of a gas or oil boiler and LESS the RHI tariff at various operating hour levels.

DOMESTIC SECTOR ANALYSIS BY BOYLE CONSULTING

There will be major disappointment in the lack of clarity over long-term tariffs for the domestic sector. At least biomass boilers are included in the RHI however. For the air-source heat pump sector, the lack of inclusion of their technology must be deeply disappointing, notwithstanding the appropriate concerns over the variable and at times very modest carbon savings from the technology (See ‘Getting Warmer: A field Trial; of Heat Pumps’, Energy Savings Trust, 2010).

A ‘Premium RHI Payment’ of £15 million has been allocated by DECC from July 2011 through to October 2012. At this point domestic tariffs - probably integrated with the Green Deal - will come into force. For illustrative purposes only, we have allocated in the Table below the £15million by technology. Rather than allocate it equally 25% to each technology, we have taken a view, based on the indicative Payments suggested by DECC - £950 for a biomass boiler, £300 for a solar water heating system, £850 for an air-source heat pump and £1,250 for a ground source heat pump – that some technologies will do better than others. We believe £300 will do little to help sell a solar water heating system and we have hence downrated their share of the pot. This still leads to supported sales of 10,000 over the period. Solar water heating sales-people have always been very ‘creative’ with their pitches, this having little to do with payback periods, so our view is that sales will tick along, without having the lift-off their sector had hoped for. Air source heat pumps, by not having any long-term tariff whatsoever at this stage, will be faced with a major level of uncertainty over future tariffs which will affect sales significantly. If a client has no certainty that any tariff will be available, that may make signing an agreement harder.

We think domestic pellet boiler suppliers and installers will have to work hard to maintain current sales and keep the prospects of longer-tariffs alive. Larger domestic properties in off gas-grid locations will still be a good focus. We also suspect that many will re-orientate their focus to non-domestic sectors such as housing association’s, community facilities, and sub-200kW public sector sites such as Depots, primary schools and local offices.

Total Premium Payment Fund - £15,000,000	Share Of Premium Funds *2	Funding Pot	Suggested Payment per install *1	No. Installs	Estimated Cost	Full Value of Installs
Technology						
Air Source HP	10%	£1,500,000	£850	3,067	£9,000	£27,607,000
Ground Source HP	35%	£5,250,000	£1,250	4,200	£12,500	£52,500,000
Solar Heating	20%	£3,000,000	£300	10,000	£4,000	£40,000,000
Biomass Boiler	35%	£5,250,000	£950	5,526	£12,000	£66,316,000
TOTAL				**19,726**		**£186,423,000**

Notes: *1 – Suggested Payment via DECC

*2 – Our estimates (see text)

CONCLUSIONS

1. For the biomass heating sector, the new RHI package is a mixed bag; though generally positive and with enough of an uplift to stimulate the sector. As the analysis has shown, it will be important for clients to carry out detailed heat load assessments and boiler sizing, then link this to the tariff scales to see what is the optimum level for investments.

2. There will be big disappointment over the unfinished business for domestic sector boilers. An interim **RHI Premium Payment** of c.£950 will be available from July 2011, but without clarity on what the long-term tariff will be. This makes selling domestic pellet and log boilers a bit more difficult than it should be as it leaves a fair degree of uncertainty over Year 2 onwards Cashback levels. The client essentially has to take a risk that tariff levels will be no less than the 7.6p level for 45-199kW boilers. Not a huge risk in truth, but a risk nonetheless. Early clarification of DECC's tariff intentions will be important in helping the domestic market.

3. The two tier approach for the middle three tariffs in boilers sizes up to 999kWth, where the tariff plummets to 1.9p/kWh for any heat generated above 1,314 hours (a 15% annual load), is also potentially a perverse move. Based on data provided to the Renewable Energy Association (REA) by its members, many operational biomass boilers have an annual heat load of 22-27% (personal communication Steve Critchley, REA). This is especially so for sub-1000kW boilers used as base-load boilers, for district heating or for end-uses such as hospitals and process heating. According to DECC, the two-tariff approach is intended to discourage clients from just running boilers and dumping the heat to get the RHI tariff. No real empirical data was provided to suggest this was likely however, as fuel costs would be incurred by the boiler operator without any fossil fuel displacement and carbon saving benefits. The current tariff plan may actually discourage users from running the boilers to their full potential, and switching over to fossil fuel boilers as soon as the 1,314 hours of peak load operation are reached. If the Tier 1 cut-off had been set at 20-25% heat load a lot of uncertainty would have been removed.

4. For larger boilers of 1,000kW capacity and above, it is generally good news. A straight forward 2.6p/kWh regardless of the hours of operation will allow many projects to go forward, as long as they have a decent heat load above 2,500 hours at peak load equivalent.

5. One of the realities of the current market is that aspirations for carbon saving and renewable technology are very high, particularly in the public sector. The capital available to achieve these targets is however

increasingly limited. Under the RHI there is hence a real opportunity for smaller-scale **Energy Service Contracts (ESCO)** or simpler Heat Contracts to be offered by specialist companies, or boiler and fuel suppliers, who wish to secure routes to market. Some or all of the capital costs of the boiler system can be exchanged for part of the tariff income. We expect a lot of interest and activity with this option, as the RHI in effect offers secure cash flows to a project.

6. Based on DECC's own projections and estimates from within the biomass heating sector, an estimated 6,000 to 10,000 biomass boilers could be supported by the RHI measure in the 18-months period July 2011-December 2012. This could split between 3,000 to 5,000 domestic boilers and the remainder commercial systems including community and public sector. Uncertainties include the lead time in companies 'closing deals', delays in massively expanding boiler and fuel supply chains, and having sufficient trained engineers to install and commission boilers. The latter is important as some companies have been laying off staff or not recruiting in advance of the expected growth in business through the RHI. All of these factors will heavily impact on the growth rates and numbers.

7. 'Transition' boilers commissioned between July 2009 and July 2011 will now be an attractive option for wood fuel suppliers. It is well-known that a number of boilers in urban areas, installed for planning purposes, are either not running or running at low loads. Now it will be extremely cost-effective to run them at last. These are some of the low-hanging fruit of the RHI.

8. Good news too for UK wood chip and wood pellet suppliers. For the pellet industry we estimate between 8,000 to 25,000 tonnes of extra demand could be generated by the RHI in a full year (ie by the end of 2012), while for chip suppliers, an additional 40-100,000 tonnes of fuel in a full year might be generated. These might seem quite low estimates, and we have been deliberately conservative, but the £15million allocated for domestic installations under the RHI Premium Payment may be grossly under-subscribed. There is too much risk on what the long-term tariff will be. Would you spend £12-£15,000 when the only guarantee is a single £950 payment? In addition, while there will be a surge of 'deal closing' now in the commercial sector for projects holding on for the RHI announcement, it will take time for new projects to get up and running, and then using fuel. So the big surge on fuel demand won't we believe start coming before winter 2012-2013 and especially 2013-14. It also takes at least 6 months for many boilers to really get into their stride and go through the usual teething problems stage. That again diminishes fuel demand for the first season.

So while we believe our estimates can be surpassed easily enough, these practical factors mitigate against big initial increases in fuel demand. There will be good business to be had but not as amazing as some think.

10. Chris Huhne of DECC suggested at the RHIs launch that: "by 2020 we expect 13,000 (renewable heat) installations in industry and 110,000 installations in the commercial and public sector, supplying 25% of the heat demand in these sectors". With the £15m earmarked for the RHI Premium payment for households they also suggested this could fund some 15,000 to 20,000 domestic installations across all technologies.

These are all highly speculative figures of course, with many variables and likely teething problems in the first 12 months. However, after a growing hiatus in order books over the past 9 months, the biomass heating industry has at last got a spring in its step and a real opportunity to grow the business rapidly. The sleeping biomass heating giant may finally be coming awake.

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