

From: [Iain Morrow](#)
To: [Hutchinson, Peter](#)
Subject: DETI RHI Phase 2 executive summary - draft
Date: 23 April 2013 15:01:55
Attachments: [DETI RHI Phase 2 executive summary - draft 230413.docx](#)

Peter

Ahead of sending you the draft final report, I wanted to share the current exec summary with you.

Two main issues:

First, no option gets to 10% (although some get over 8%). The main reason is that we are now assuming that industrial sites need subsidy to switch to renewable heat. You can see how hard the target is by comparing what the RHI needs to deliver by 2020 with the expected budget in that year. If you divide one by the other you get about 4.2p. So to hit the 10% target the average subsidy needs to be below 4.2p. But many of the tariffs are well above that – particularly the seven year ones.

This brings me to the next point, which is that the seven year tariffs appear to perform badly compared to both capital grants and 20 year tariffs. However, I think this is misleading for two reasons. First, when we look at what is happening with the 20 year tariffs, they are subsidising so much renewable heat that they are constantly running up against supply chain barriers. In other words, renewable heat is being installed as fast as possible across technologies. Second, the 20 year tariff results assume that households can borrow or use their savings to cover the installation costs. This is probably unrealistic (as DECC recognised) except for the wealthiest few % of households. We are looking at whether this conclusion changes when we impose a limit on how much households can spend to install renewable heat. My expectation is that it will and so the seven year tariffs will look better.

Happy to talk this afternoon or tomorrow if that would be useful. In parallel, Ricardo-AEA are finalising their conclusions on district heating and these should be completed very shortly.

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EXECUTIVE SUMMARY

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- extension of the NI RHI to additional technologies for the non-domestic sector;
- a consideration of the appropriate form of support, if any, for large biomass installations in the industrial sector;
- a consideration of the appropriate form of support, if any, for deep geothermal; and
- a consideration of an appropriate uplift factor for district heating.

Since these are relatively separate issues, we discuss each one separately. However, in the report they have been considered as a whole, not least because all policy options need to be viable within the allocated budget for the NI RHI.

Extension to domestic sector

In our 2011 report for DETI, the tariffs presented were focused on the commercial and small industrial sectors. While domestic installations were not ruled out, we did not explicitly produce tariffs for them. A separate scheme, the Renewable Heat Premium Payments (RHPP) scheme, was introduced by DETI for domestic installations.

Since that report, DECC has announced that it is considering extending the GB RHI to domestic installations, although this has now been put on hold until 2014. Our analysis has assumed that DECC's proposed rates are unchanged as a result of consultation. We have also assumed that DECC's proposed move to seven year tariffs for domestic installations (as opposed to 20 years) is reflected in the final form of the GB scheme.

Our proposed tariffs for the domestic sector are shown in Table [EX.1] below, alongside the proposed DECC tariffs.

Table EX.1: Domestic RHI rates pence per kWh (2012 prices), using lead option (7 year tariffs)

Technology		NI RHI rates (7 year tariffs)	GB RHI rates (7 years)
Solar Thermal	Calculated	50.12	17.3
	Cap ²	17.30	
Biomass boiler		7.86	5.2 – 8.7

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Technology	NI RHI rates (7 year tariffs)	GB RHI rates (7 years)
Bioliquids	3.78	-
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As can be seen, our proposed tariffs are within the range proposed by DECC, where one exists. In our previous report, our tariffs were often somewhat lower than DECC's. In large part, this reflected our use of an oil counterfactual when calculating the tariffs, whereas DECC used a gas counterfactual. However, we understand that DECC now uses an oil counterfactual³ since the domestic RHI is focused on off-gas-grid properties.

In our analysis we considered a range of options including tariff lives of five, seven and 20 years, as well as pure capital grants. We also considered options where there was an upfront grant payment plus an ongoing payment stream. However, our analysis using our economic model suggested that the 20 year tariffs come closest to achieving the 10% target. We also, however, note that the use of multi-year tariffs with no upfront payment requires households to cover the upfront costs of renewable heat themselves before recovering that cost several years later. As our table showing savings and investments per household (Table 4.1) suggests, the vast majority of households in NI would be unable to fund this from savings. Homeowners may also be reluctant to rely on benefits many years in the future, as they may have moved house. Finally, seven year tariffs have a lower lifetime cost per unit of renewable heat.

For this reason, and because DECC is proposing seven year tariffs, we recommend that DETI also adopts seven year tariffs.

It should also be noted, in the discussion of domestic uptake, that we have changed our view on the appropriate *discount rate* for households. Our previous analysis used a rate of 16%, based on a survey of the literature. However, we now use a rate of 7.5%, in line with the GB RHI.

We also recommend the use of deeming in the domestic sector in Northern Ireland (see Annex [A] for a discussion of why we do not consider metering is appropriate).

Additional non-domestic technologies

DETI asked us to develop tariffs for the following non-domestic technologies: direct air biomass heating, air-to-water air source heat pumps, air-to-air air source heat pumps, bioliquid microgeneration and solar thermal above 200kW.

In our view, the potential for solar thermal above 200kW is very limited. There is no evidence from the GB market that such installations are being considered, and they would in any case likely require connection to a district heating network. We therefore do not propose a tariff for these technologies. We consider that it would be appropriate to revisit the question of tariffs for this size of installation once there have been further examples in the 50-200kW range.

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66156/RHI_domestic_scheme_-_impact_assessment.pdf

Turning to the other technologies listed, our proposed tariffs for them are shown in Table [EX.2] below.

Table [EX.2]: Proposed non-domestic RHI tariff options

Technology	Tariff band (kW _{th})	Lifetime (years)	NI calculated rates (p / kWh _{th} 2012 prices)	Indicative DECC rates (p / kWh _{th} 2012 prices)
Biomass direct air	0 – 99	20	2.4	2.1
	100 – 999		1.3	
	1,000+		0.0	
ATW ASHPs	0 – 99	20	2.5	1.7
	100+		0.0	
ATA ASHPs	0 – 99	20	3.3	0.97
	100+		0.0	
Bioliqid boilers	0 – 99	15	5.0	0.0
	100+		2.1	
Solar Thermal	200+	n/a	0.0	8.9
CHP	Conversion	[20]	1.8	[xx]
	New installation	[20]	2.2	[xx]

Note that for these technologies, we propose 20 year tariffs⁴. This has the twin advantages of consistency with the existing NI RHI and GB RHI, and of providing maximum renewable heat within DETI's budget constraints (albeit at a higher lifetime NPV).

Direct air heating

In the table above we propose tariffs for direct air technologies (biomass direct air and Air to Air Heat Pumps). These were not included in Phase I because of the difficulty of heat metering of hot air. Previous research conducted by Ricardo-AEA in GB concluded that there is no recognised approach for metering hot air. While there are a number of possible approaches, including deeming or using the biomass fuel input, we consider that it would make most sense that DETI follow the same approach as GB in dealing with direct air heat measurement.

Biogas

We were also asked to consider tariffs for biogas. However, the Northern Ireland incentives under the RO mean that it is highly unlikely that any development will consider biogas heat only. Evidence from the AD projects in planning indicates that AD CHP is more popular than AD electricity only plants in Northern Ireland. Given the interest in AD CHP a dedicated tariff for

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biogas heat recovery is unlikely to deliver much additional renewable heat and therefore is not recommended.

Large biomass

In our 2011 report, we concluded that biomass would be economic at large industrial sites without subsidy. However, based on further discussions with industry, we have reconsidered this view. In particular, we understand that the constraint on woodchip supply is significant and that it is highly likely that any large industrial site installing biomass would therefore want to rely on wood pellets instead. These are significantly more expensive than woodchips. We also note that large industrial sites are likely to either be on or have the option of gas. We have therefore used a gas counterfactual. These factors combined lead us to propose a tariff of 0.6p/kWh for large industrial biomass.

We note that there is a relatively small number of potential sites for large industrial biomass in NI. An RHI may therefore not be the most appropriate subsidy mechanism. We therefore recommend that DETI considers the option of a Challenge Fund, although we note the lead time and requirements for specialist advice that this would have.

In considering biomass in the large industrial sector, we concluded that the largest sites would be more likely to install CHP than stand-alone biomass. We have therefore proposed CHP tariffs, as described below.

Combined Heat and Power (CHP)

We propose two CHP tariffs – 2.2p and 1.8p. The first is for sites where the CHP plant would be a new installation, and the second is for sites where an existing boiler is being converted to CHP.

The former is based on an oil counterfactual; the use of a gas counterfactual suggests a higher 4.3p tariff, but this would mean that there was significantly less funding available for other technologies.

Given the relatively small number of installations that these tariffs are based on, we also recommend that DETI gives serious consideration to an alternative form of subsidy such as a Challenge Fund (as for deep geothermal).

Deep geothermal

Our January 2012 report for DETI provided an indicative tariff for deep geothermal, but as noted the tariff is highly dependent on the assumptions about what is being displaced.

Subsequently, we have updated our assumptions and had further discussions with the geothermal industry, as well as reviewing a potential project in the UK. This has led to an indicative updated figure of [4.0p/kWh].

However, we note that since there are only a very few firms likely to be interested, an RHI may not be the most appropriate form of subsidy. As for large biomass, we recommend that DETI considers the option of a Challenge Fund, although we note the lead time and requirements for specialist advice that this would have.

Comment [IDM1]: Peter, did this ever get published? Do you want us to mention it?

We also noted that the contribution by 2020 may be limited. Given the timescales required to develop geothermal sites, it is likely that there will be no developments by 2020 in NI. In the best case scenario, one might expect two installations delivering around 50GWh annually. In our analysis we have not included any contribution from geothermal by 2020.

District heating

DETI asked us to look at what an appropriate uplift for district heating might be. District heating systems involve the connection of a central boiler or heat source to multiple homes or businesses through a system of pipes. These can range from a handful of homes (e.g. in the same apartment block) up to larger developments (such as the 400 house development in Lisburn) and beyond.

Compared to individual renewable heat installations in individual properties, district heating systems suffer because of the cost of building the network of pipes. However, while the lower per kW cost and greater load factor of the central boiler can counteract this to some extent, our analysis suggests that for the range of likely applications in NI, district heating would always be a more expensive option. This additional cost is difficult to justify given that the 10% renewable target is likely to be challenging even before additional payments for district heating. We therefore do not recommend an uplift for district heating [although we have calculated that the required uplift would be x pence].

Overall conclusions

Finally, the lead options for each issue were combined and the net renewable heat delivered was calculated, along with the financial costs and benefits.

We start with industrial biomass and CHP. At our recommended tariff of 0.6p (industrial biomass) and 1.8p (CHP conversion), this has the potential to deliver around 291 GWh per year of industrial biomass and CHP by 2020. The present value cost to 2020 is £19.2 million.

We now consider the renewable heat that could be delivered in the domestic and commercial sectors, taking into account the subsidy that is assumed to go to the industrial sector. The total expected renewable heat delivered is shown in Table [EX.3] below.

Table EX.3: Renewable heat⁵ in 2020, by funding level and policy, in GWh

<i>Non-domestic policy</i>	Domestic policy					
	No support	Lifetime RHI	7 year RHI	Grant	Grant + lifetime RHI	Grant + 7 year RHI
No new tariffs	1,031	1,377	1,301	1,242	1,263	1,256
New narrow tariff bands	1,050	1,390	1,259	1,214	1,250	1,236
New wide tariff bands	1,111	1,450	1,228	1,244	1,293	1,276
Extra DECC tariffs	1,111	1,464	1,244	1,258	1,293	1,280

⁵ ARR

As this indicates, no option delivered 10% renewable heat (1,670 GWh/ year) by 2020. This is not unexpected. A simple comparison of the expected NI RHI budget in 2020 of £42 million with the level of renewable heat needed (around 1,000GWh from the RHI once viable and baseline installations are taken into account) suggests that the average subsidy per kWh needs to be no more than about 4.2p/kWh. Many of the technologies require significantly higher tariffs, particularly in the domestic sector with seven-year tariffs.

Supply chain barriers are also likely to be a factor, particularly in early years, as are households' ability to raise capital.

The net financial cost/ benefit for each option is shown in [table y] below. The top row shows the "do nothing" option, which is a continuation of the current NI RHI.

Table EX.4: Net benefit/ (cost) of each option, in present value terms, by funding level and policy [to follow]

This indicates that all options have a negative NPV.

[recommendation]

From: [Hutchinson, Peter](#)
To: [Iain Morrow](#)
Cc: [McCutcheon, Joanne](#)
Subject: RE: DETI RHI Phase 2 executive summary - draft
Date: 23 April 2013 17:31:36
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Thanks for early sight of this Iain.

In regards the two issues you highlight, firstly we accept that the change in assumptions has meant the less renewable heat could be delivered because we are now assuming larger installations need incentives rather than being cost-effective already. I think all we can say is that the feedback from stakeholders and industry has led to new assumptions over 1MW, if these are to be believed the previous modelling of 10%+ will not be realised and therefore a tariff is required. These new assumptions lead to a position where RHI support will deliver between 7-9% of renewable heat, to secure the additional 3-1% DETI will need to consider additional policy levers or require additional funding (from DECC/HMT).

In terms of the 7 year tariff, I agree that this is peculiar as my natural inclination would be that domestic customers would be reluctant to install technologies with 20 year tariffs unless they were certain they would not be moving house within this timeframe – the 7 year tariff therefore presents greater flexibility for potential applicants and opens to the scheme up to more potential installers. In the same way I would assume that the provision of a grant plus 7 RHI tariff would be the most favourable option for the consumer and ensures that renewable heat isn't only for the 'already-afford' market. Think some narrative around this point, explaining what the model may not have considered, will be important. In addition, 7 yr tariffs would have considerably lower admin costs than 20 yr as the final admin would finish in 2027 rather than 2040 – the cost of 13 years additional administration would be significant.

From a quick glance at Exec Summary I see that budget constraints could be a major issue as noted in your discussion on CHP, Large Biomass, Deep Geo and District Heating. I think an unknown factor is take-up, experience in NI and GB is that take-up is much much lower than forecast with only a handful of accreditations to date in NI all under 100kw. It is therefore hard to envision, at this stage, the budget being overspent. Therefore I think more emphasis should be using tariffs (for CHP, large biomass, Deep Geo etc) rather than Challenge Funds, these should be a secondary option. If tariffs are provided that could ultimately lead to breach on the budget this should of course be highlighted but caveated against a position of low up-take. It should also be recommended that DETI implement cost control mechanisms and keep tariffs under review.

I'll look at this in more detail and can speak later in week once report is available.

Thanks,

Peter

From: Iain Morrow [mailto:Iain.Morrow@cepa.co.uk]
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Overall conclusions

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We start with industrial biomass and CHP. At our recommended tariff of 0.6p (industrial biomass) and 1.8p (CHP conversion), this has the potential to deliver around 291 GWh per year of industrial biomass and CHP by 2020. The present value cost to 2020 is £19.2 million.

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Table EX.3: Renewable heat⁵ in 2020, by funding level and policy, in GWh

<i>Non-domestic policy</i>	Domestic policy					
	No support	Lifetime RHI	7 year RHI	Grant	Grant + lifetime RHI	Grant + 7 year RHI
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The net financial cost/ benefit for each option is shown in [table y] below. The top row shows the "do nothing" option, which is a continuation of the current NI RHI.

Table EX.4: Net benefit/ (cost) of each option, in present value terms, by funding level and policy [to follow]

This indicates that all options have a negative NPV.

[recommendation]

From: [Iain Morrow](#)
To: [Hutchinson, Peter](#)
Cc: [McCutcheon, Joanne](#)
Subject: RE: DETI RHI Phase 2 executive summary - draft
Date: 23 April 2013 17:39:38

Thanks Peter.

On the 7 year point, I will include some narrative. My expectation is the same as yours – that the combination of a grant plus 7 year RHI tariff would work best in practice.

Regards

Iain

From: Hutchinson, Peter [mailto:Peter.Hutchinson@detini.gov.uk]
Sent: 23 April 2013 17:32
To: Iain Morrow
Cc: McCutcheon, Joanne
Subject: RE: DETI RHI Phase 2 executive summary - draft

Thanks for early sight of this Iain.

In regards the two issues you highlight, firstly we accept that the change in assumptions has meant the less renewable heat could be delivered because we are now assuming larger installations need incentives rather than being cost-effective already. I think all we can say is that the feedback from stakeholders and industry has led to new assumptions over 1MW, if these are to be believed the previous modelling of 10%+ will not be realised and therefore a tariff is required. These new assumptions lead to a position where RHI support will deliver between 7-9% of renewable heat, to secure the additional 3-1% DETI will need to consider additional policy levers or require additional funding (from DECC/HMT).

In terms of the 7 year tariff, I agree that this is peculiar as my natural inclination would be that domestic customers would be reluctant to install technologies with 20 year tariffs unless they were certain they would not be moving house within this timeframe – the 7 year tariff therefore presents greater flexibility for potential applicants and opens to the scheme up to more potential installers. In the same way I would assume that the provision of a grant plus 7 RHI tariff would be the most favourable option for the consumer and ensures that renewable heat isn't only for the 'already-afford' market. Think some narrative around this point, explaining what the model may not have considered, will be important. In addition, 7 yr tariffs would have considerably lower admin costs than 20 yr as the final admin would finish in 2027 rather than 2040 – the cost of 13 years additional administration would be significant.

From a quick glance at Exec Summary I see that budget constraints could be a major issue as noted in your discussion on CHP, Large Biomass, Deep Geo and District Heating. I think an unknown factor is take-up, experience in NI and GB is that take-up is much much lower than forecast with only a handful of accreditations to date in NI all under 100kw. It is therefore hard to envision, at this stage, the budget being overspent. Therefore I think more emphasis should be using tariffs (for CHP, large biomass, Deep Geo etc) rather than Challenge Funds, these should be a secondary option. If tariffs are provided that could ultimately lead to breach on the budget

this should of course be highlighted but caveated against a position of low up-take. It should also be recommended that DETI implement cost control mechanisms and keep tariffs under review.

I'll look at this in more detail and can speak later in week once report is available.

Thanks,

Peter

From: Iain Morrow [<mailto:Iain.Morrow@cepa.co.uk>]
Sent: 23 April 2013 15:02
To: Hutchinson, Peter
Subject: DETI RHI Phase 2 executive summary - draft

Peter

Ahead of sending you the draft final report, I wanted to share the current exec summary with you.

Two main issues:

First, no option gets to 10% (although some get over 8%). The main reason is that we are now assuming that industrial sites need subsidy to switch to renewable heat. You can see how hard the target is by comparing what the RHI needs to deliver by 2020 with the expected budget in that year. If you divide one by the other you get about 4.2p. So to hit the 10% target the average subsidy needs to be below 4.2p. But many of the tariffs are well above that – particularly the seven year ones.

This brings me to the next point, which is that the seven year tariffs appear to perform badly compared to both capital grants and 20 year tariffs. However, I think this is misleading for two reasons. First, when we look at what is happening with the 20 year tariffs, they are subsidising so much renewable heat that they are constantly running up against supply chain barriers. In other words, renewable heat is being installed as fast as possible across technologies. Second, the 20 year tariff results assume that households can borrow or use their savings to cover the installation costs. This is probably unrealistic (as DECC recognised) except for the wealthiest few % of households. We are looking at whether this conclusion changes when we impose a limit on how much households can spend to install renewable heat. My expectation is that it will and so the seven year tariffs will look better.

Happy to talk this afternoon or tomorrow if that would be useful. In parallel, Ricardo-AEA are finalising their conclusions on district heating and these should be completed very shortly.

Regards

Iain