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Friends of the Earth

Briefing

Renewable Heat Incentive

Heat accounts for 47% of all UK CO2 emissions and 60% of domestic energy bills. The Renewable Heat Incentive (RHI) would be the primary mechanism for delivering 12% of UK heat from renewable sources by 2020. It requires a step change in UK renewable heat policies.

Half the problem will not just go away.

Alan Simpson (for Friends of the Earth)

Introduction

UK Climate Change Commitments

The government has now submitted its national Renewable Energy Action Plan to the European Commission. This is the framework for delivering 15% of UK energy supply from renewable sources by 2020. The Plan is based on the following:

- Over **30% of electricity** will be produced from renewable sources (up from 5.5% today)
- **12% of heat** will come from renewables (up from 1% today), and
- **10% of transport energy** will come from renewables (currently 2.5% of road energy comes from renewable sources).

The government is also committed to an 80% reduction in UK carbon emissions by 2050.

Background

Heat accounts for 47% of all UK CO_2 emissions and 60% of domestic energy bills. In theory, the government is committed to introducing an RHI by April 2010, although the lack of any clear messages coming out of the new administration on this are causing increasing anxieties.

The RHI would be the principal mechanism for delivering 12% of UK heat from renewable sources by 2020. Currently, only 1% of UK heat comes from renewable sources. The 12% target translates into 73 TWh of heat energy (and 60 mt [megatonnes] CO_2 savings) by 2020. It requires a step change in UK renewable heat policies.

Any shortfall on the UK's 2020 'heat' target would have to be made up by higher targets (and costs) in the transport and electricity sectors.

The government is still committed to introducing feed-in-tariffs (called Renewable Heat Incentive) for renewable heat. Different departments are now arguing about whether the April 2011 deadline can still be met and what the cost might be. There has been a history of internal resistance to a heat tariff for many years. Some of the current uncertainties may come from confusion about the scheme's proposed structure. Some undoubtedly comes from an external lobby that objects to the UK having any renewable heat targets. Some comes from Treasury misconceptions about the scheme costs. None of these are substantive objections, and none should be allowed to delay or dilute the government scheme.

It would be a severe setback for the UK if the RHI start date, of April 2011, were missed.

The government has made a number of other policy commitments that are highly dependent on the introduction of the full RHI scheme in April 2011:

Decentralisation policies will have to carry local duties to deliver a share of national carbon reduction and renewable energy targets. Localities will need to access new income streams to finance this transformation. The RHI (and Feed-in Tariffs - FiTs) may be some of the few (new) financial resources that localities have access to.

UK Ministers are pressing for **higher EU 2020 carbon reduction targets**. If the RHI does not get off to a racing start, the UK may not meet its existing 2020 targets, let alone higher ones.

The RHI opens up funding streams for local authorities and local communities to help deliver other government targets; ie **UK fuel poverty targets**, the EU's **Energy Performance of Buildings Directive** (EPBD), the **Home Energy Management Strategy** (HEMS), and plans for the transformation to a low carbon economy.

The government places much reliance on the **Green Investment Bank**. It is not clear that the Bank will prioritise local or regional schemes. Yet public sector cuts have come at precisely the time that localities are also expected to drive the local transformation agenda. The RHI (and FiTs) may offer a financial 'get out of jail' card that avoids collision between Coalition partners and their supporters across the country.

The Challenge

Two benchmark studies should inform any detailed discussion of the RHI:

The **Energy Saving Trust (EST**) published a feasibility study (March 2010) on the UK's ability to deliver the 80% reduction target. The focus was on housing, but included scenarios about grid de-carbonisation. It assessed the maximum technical level of carbon reductions where a) only energy efficiency measures are used, with no de-carbonisation of the Grid , b) where Grid 'carbon intensity' is also cut in half, and c) where a low-carbon grid is created (less than 30gCO2/kWh) to support the full range of other measures. The figures speak for themselves:

Potential for meeting the UK's 2050 carbon targets

Measures	**Carbon savings**	**% reduction on 1990 levels**
Energy Efficiency and micro generation only (Max. technical potential)	**86 Mt CO2**	**58%**
Max. technical potential + 50% grid decarbonisation	**114 Mt CO2**	**76%**
Max. technical potential + Low Carbon grid	**141 Mt CO2**	**95%**

The essential message is this; **there is no either/or choice about strategies for meeting UK carbon reduction targets**. It would be disastrous to allow the debate to be hijacked by an argument playing energy saving off against energy market transformation.

Energy efficiency measures are the essential 'low hanging fruit' of carbon reduction initiatives. However, even if there were no cost constraints on deployment of today's full range of energy efficiency measures, these alone cannot deliver more than 58% of the required UK carbon reductions. **Grid de-carbonisation has to go hand in hand with energy saving.** It is fatuous and self-defeating to play one off against the other.

Ofgem undertook a Discovery Probe on future energy market scenarios for the UK. They set out four scenarios (see appendix), based on different assumptions about the UK's economic recovery rate and the pace of transition to a low-carbon, renewable energy economy. For the purpose of any discussion about the RHI, the key points to address are that a) only the 'Green' scenarios meet UK carbon reduction targets, and b) **the Green scenarios cost impact on domestic energy bills by 2020 are not higher than other scenarios.**

The Proposed RHI

The key to a successful RHI is to keep it simple. Deliver positive tariff rates for solutions/technologies that are relatively straightforward and can be brought into play quickly. Focus on sectors that can deliver UK jobs and skills. Use existing heat and energy networks rather than looking for grand plans for entirely new infrastructures. Allow for different approaches in off-grid communities, where localised networks may be the most viable options.

Some confusion in the current RHI debate arises because of an analytical failure to distinguish between different, overlapping, interest groups involved in renewable heat. These fall into 3 categories –

- **Technologies** supplying more individualized on-site renewable heat solutions
- **Energy resource producers**, supplying renewable materials (ie biogas and biofuels) to support existing heat systems, and
- **Network interests**, seeking finance for new heat networks (principally district heating systems).

(There is also a problem of omission, in that **renewable cooling** is completely absent from the cost/benefit analysis in all of the Impact Assessment scenarios that government economists have put forward. This works to the disadvantage of technologies that deliver both heating and cooling.)

The government's key proposals

For years, government departments struggled to come up with a workable 'renewable heat' incentive scheme. This was largely due to the obsession with modelling it on the ill-designed Renewables Obligation scheme for electricity.

The fundamental proposition in the RHI scheme is sound; **the government's 'lead option' aims to provide a 12% rate of return on investment in both the domestic and non-domestic sectors.** A lower rate of **6%** is applied to **solar thermal** because it is regarded as an established technology.

The 'lead option' also assumes the following –

- Tariff support will last for the expected lifetime of the technology.
- No degression rate is applied to tariff payments.
- Compensation will be provided to overcome non-financial barriers* to the application of each technology, and
- Tariff rates are set to deliver high growth/uptake.

(* These include the disruption element of fuel storage and deliveries (for bio-mass or bio-fuel boilers), and for digging up gardens in ground source heat pump installations.)

Projected costs in the Impact Assessment (IA)

This is the most contentious, and opaque, part of the Assessment presented to government. It is difficult to see how some of the figures have been arrived at, and others appear plain wrong. There are awkward echoes of the DECC paper, produced a couple of years ago, to justify a low ambition level for the introduction of Feed-in Tariffs (FiTs).

The DECC Impact Assessment, of January 2010, estimated that the **RHI** would incur **annual subsidy costs of £2.4 billion in 2020**. This would result in **an increase of 14% in household gas bills (£104) by 2020**, and a 20% increase in industrial bills.

In **July 2010** DECC revised these figures, claiming that **the RHI would add £94 to the average domestic gas bill by 2020**. This does not turn out to be the actual impact on bills because the June calculations include cost savings that come from other government measures. **The overall impact of government climate change policies on energy bills is now deemed to be £13 (1%), by 2020.**

The following extract (Table 1) from the July update reflects the latest DECC thinking:

Table 1: Estimated impact of energy and climate change policies on average domestic gas and electricity prices and an average domestic energy bill (including VAT)

	2010	2015	2020
Price impacts (real 2009 £/MWh and % change)			
Increase in **gas prices** due to policies	1 (4%)	4 (10%)	8 (18%)
Increase in **electricity price** due to policies	15 (14%)	29 (26%)	40 (33%)
Energy bill (gas + electricity) impacts (real 2009 £ and % change)			
Estimated average **energy bill** without policies	£1,060	£1,149	£1,226
Estimated average **energy bill** with policies	£1,103	£1,150	£1,239
Impact of policies on **energy bill**	£42 (4%)	£1 (0%)	£13 (1%)

Source: DECC 2010. Numbers may not add up due to rounding

Elements of this table need to be explained as much as challenged.

The final impact (a 1% increase in energy bills by 2020) brings home the role of energy saving/demand reduction measures in reducing costs in the overall strategy. This Briefing sets out (below) how this can be used to critical advantage in protecting the fuel poor.

Government strategy is clearly based on a package of measures with different individual cost impacts. So, although disaggregated figures show that, the EU-ETS and the Renewables Obligation account for 70% of the impact costs in electricity pricing, these are not set to be discarded on grounds of price alone. Despite this, concerns remain about the following RHI presumptions-

The RHI figures still do not appear to stack up. If you multiply the 'bill impact' (£94) by the number of homes on the gas grid, this accounts for almost the entire RHI scheme costs. Domestic customers account for only about 33% of total gas consumption, (and so would expect to incur 33% of the total costs). It is hard to explain how DECC has come up with different figures (even when using non-discounted, rather than discounted costs).

No account is taken of '**avoided' costs,** i.e. of fossil fuels 'not' consumed because they have been displaced by the use of renewable fuels, or of the costs that would be incurred if a shortfall in renewable heat had to be met from higher targets in renewable electricity or transport.

'**Central fossil fuel prices'** assume that oil and gas prices will be $80/barrel in 2020. You wish. In an annex to the report, oil price projections of $150/barrel are also considered. These turn cost calculations upside down. **If oil returns to $150 a barrel, UK climate change policies would then deliver savings on annual domestic energy bills of £87 per year**. Higher oil prices dramatically change the cost implications of the proposed RHI scheme… even before we reach questions about domestic energy security.

DECC's analysis of cost implications offers **no connection to the pattern of changes in UK gas and electricity prices**. The government's Fuel Poverty Advisory Group's appraisal paper (June 2010), however, offered the following opening observation –

"**These past 6 years have been a devastating period for the fuel poor, largely due to gas and electricity bills increasing by 125%."**

In 2004, combined gas and electricity bills were around £500. Today, Ofgem estimates that average annual gas and electricity bills are £620 and £500, respectively. **Since 2004, domestic fuel bills have risen by £620. Government environmental measures account for less than £70 of this figure.**

The government's 'lead option' proposal still:

- places no economic value on the increase in **UK domestic energy security**,
- ignores all aspects of **employment and economic growth**, and
- excludes consideration of **technology and efficiency improvements** that could lower scheme costs considerably (by building in degression rates to the scheme).

The effect of omitting the above is to present the government with an assessment stripped of its most coherent and compelling arguments. The same approach almost prevented the introduction of FiTs in the last administration.

The RHI can be delivered, in transformational terms, at much lower cost to households (and the economy) than the current Impact Assessment projects. The compelling case is to do so in bold and imaginative terms.

It would run counter to UK strategic interests if introduction of the RHI were pushed back and missed the April 2011 start date.

Re-working the costs

Improvements to the scheme's structure can be made easily, and without delaying the start date.

Degression rates. The IA assumes there will be zero savings made in either technology costs or in economies of scale over the lifetime of the tariffs. The Assessment did run one analytical variation that applied a degression rate of 3% to most of the technologies; concluding that this limited increases in domestic heating bills to £70 by 2020 and delivered a 30% reduction in subsidy costs by 2020.Applying this to the latest DECC figures, **heating bills would be £66 higher in 2020 (in cash terms) than they are today.** The obvious presumption is that **the government's RHI scheme should include a degression rate of 3% p.a.** The degression itself could be deferred until after the first 3 years of the scheme, when the first overall review has taken place.

Resource costs. DECC economists must re-work their figures on 'resource costs'. Traditionally, these are lower for renewable heat than for renewable electricity. This makes it difficult to understand why the impact on household bills is suddenly assumed to be greater under the RHI. A similar explanation is needed for the figures used for the cost of carbon abated. Ofgem puts the cost of carbon abatement as being higher under the Renewables Obligation than under the RHI (£101/tCO2 as against £57-£75). It is bizarre that DECC figures reverse the assumption about cost impacts.

The gas grid/bio-methane. The only tariff rate that looks seriously deficient is the one relating to bio-methane supply to the gas grid. The current proposal (4p/KWh) will not bring forward the level of investment the government is looking for. DECC wants 7TWh of renewable heat to come from renewable gas by 2020. In practical terms, this means constructing 200, 5MW bio-methane plants, feeding gas directly into the grid… no mean feat. To deliver this target, there are compelling grounds for arguing that –

> **a) the RHI needs a higher tariff for bio-methane gas grid injection, than the rate given to it under FiTs for electricity generation,**
>
> **b) the government (and Ofgem) has to deliver priority access to the gas grid for bio-methane injection, and**
>
> **c) without compromising on safety, the UK needs to clarify how gas quality standards are to be harmonised with gas the UK imports**.

The grounds for making these additional provisions for bio-methane grid injection include a recognition that:

- DECC expects bio-methane gas injection to contribute 10 times more to the RES target than the amount of electricity generated from bio-gas under FiTs. The current RHI tariff for bio-methane gas injection will not deliver this.

- It is far more efficient to promote biogas upgrading for injection into the gas grid than to use it for electricity generation. There is a 90% efficiency rate in converting biogas into bio-methane. Then it can be used in boilers that are 80-90% efficient. Bio-gas used for electricity only has a 30-40% conversion efficiency rate (even before transmission losses, etc, are accounted for), and

- A higher rate for bio-methane injection into the grid would help reduce the perverse incentive to over-produce electricity from waste on farms, simply as a money earner.

A number of **perverse disincentives** need to be addressed by Ministers. Previously, local authorities were prevented from selling renewable energy back to the grid. The Secretary of State has now removed this restriction, and should be congratulated for doing so. **It is important to allow organizations producing their own renewable energy to count this as part of their Carbon Reduction Commitment.** The inability to do so acts as a

disincentive to private sector partners, who currently feel punished under the CRC, rather than being encouraged to use FiTs and the RHI to drive down their carbon footprint.

Local heat networks. Although there is a considerable lobby pressing for the RHI to support the development of district heating networks, the economics of this are far from clear. The strongest case is for local networks supplying heat to:

- Rural, off-grid, communities
- High density housing developments, suitable for bio-mass boiler systems, or
- New commercial, industrial or residential developments adjacent to existing district heating networks.

The sheer scale of infrastructure costs associated with the construction of district heating systems cannot reasonably be accommodated within the RHI framework. Any exceptions should be expected to show carbon savings commensurate with their economic cost. This would have to include the carbon cost of supplying the raw materials that power the heat network itself (along with their impact on air quality).

Heat pumps. Two criticisms have been levelled at tariff rates proposed for both ground- and air-source heat pumps.

The first criticism is that heat pumps can increase fuel poverty rather than reduce it. If the property has a low energy efficiency rating, the heat pump will keep trying to raise the ambient temperature while heat pours out of the walls, windows, roof, etc. The pump uses more electricity than it saves. The household then spends a higher proportion of their income on fuel bills, and the numbers in fuel poverty increase. This is a damning criticism but one that is easily addressed. **The installation of heat pumps must be seen to help households out of fuel poverty rather than into it. The government must establish a link between defined, minimum home energy efficiency standards and the eligibility for heat pumps under the RHI.**

The government would not have to specify which measures were used to raise the SAP rating of the property. It is simply the linkage that is important. In doing so, this would strengthen the role of EPCs (Energy Performance Certificates), in delivering government objectives, and reinforce the policy focus on whole house/whole area strategies of the energy transformation.

The second criticism is no less serious. A report is due out on customer complaints about the performance of heat pump systems. Some companies appear to have made serious errors in claims about the effectiveness of their heat pump system. This does not apply to the whole spectrum of firms, or of heat pump systems. The problem appears to lie in the methodology used to calculate performance standards. The criticism will, however, create hostile publicity and needs to be addressed by the sector itself.

Solar Thermal. This appears to be the least contentious part of the RHI proposal. It is seen as a low-risk, low-complexity technology that requires only a modest incentive to deliver an increase in uptake. The central question is how you measure the heat gain in order to determine the tariff payment. The government proposes to ‘deem’ such payments. This would presumably work via a ‘rating’ system for the equipment itself. This may have considerable merit in its simplicity. The final judgment, however, may rest on the mechanisms used to make this finance accessible to the poor.

Delivery. The key test for the RHI is not going to be found in the individual technologies. The test will be in whether it delivers the behavioural changes needed to meet broader UK

carbon and energy targets. **Coordinated local area strategies will be needed, to overcome consumer fear and vulnerability**. There are bound to be rogue sellers in the market. The best protection for vulnerable households is the presence of a local strategic body with a focus on delivering whatever works; whether this is in carbon savings, reducing fuel poverty, creating jobs or increasing local energy security. This can be resolved as part of the government's regulation of industry standards, and in the powers and duties that go along with decentralization plans. These are important technical and administrative issues, but should have no bearing on RHI tariff rates. Nor should they delay the RHI timetable.

Protecting the fuel poor

This has been a legitimate concern for both politicians and those working on fuel poverty issues. Price mechanisms alone cannot protect the poor if we return to a world of spiralling energy prices. DECC's July analysis offers more striking conclusions about the role of an overall strategy, rather than separate initiatives. The strategic dilemma is summed up in the following quotes:-

> "…households in the bottom income decile are estimated to see their expenditure on electricity and gas increase by around 1% of income in 2020 as a result of energy and climate change policies. (para 39)
>
> Households that receive insulation *or* renewable measures in the bottom income decile see the largest decrease in bills accounting for just under 1% of their income. However, without measures their bills rise by about 2% of their income. (para 41)"

Various housing agencies have come to the same conclusion, though via a different route. Agencies who have looked at public spending cuts and fuel poverty targets know they cannot get the numbers to add up without the RHI and FITs in place. There is no income stream for the housing agency when energy efficiency measures are undertaken, nothing 'bankable'. The RHI and FITs are bankable assets, against which thermal upgrading of homes can be paid for. It is the only secure route for inclusion of the fuel poor.

It is for Ministers to bring this home to Treasury officials, and for the public to bring this home to Ministers. This is the task that now has to be addressed.

Biodiversity

One specific advantage of an RHI scheme, constrained by 'sustainability factors, is the benefits this could restore to Britain's woodlands. If DECC sets the appropriate limits, it could encourage short-crop coppicing and local sourcing of bio-mas fuels. This, in turn, would create real incentives for the sustainable management of currently neglected woodlands. Although not forming a central part of either the costs or the cash benefits of the RHI, such an element in the scheme would allow biodiversity benefits to be part of the un-costed environmental gains derived from it. If properly integrated into FoE's proposals for '**local carbon budgets**', it would also offer considerable gains in the reduced carbon footprint of renewable energy sourcing.

Conclusion

There is no party political battle that stands in the way of an imaginative and transformational Renewable Heat Incentive. Opposition comes principally from those with a vested interest in the status quo, and those with an inability to see the cost of what lies ahead in a 'business as usual' scenario.

Fearfulness within the Treasury should be countered by reference to the responses from the likes of Deutsche Bank, et al, who argue that a positive FiTs/RHI framework makes their own 'risk assessment' appraisals so much easier. This increases (rather than reduces) the likelihood of low cost finance being made available in the UK, at the 'softer' rates already enjoyed elsewhere in Europe.

The key, however, is to keep the opening framework simple and attractive. Britain has to leap into its renewable heat agenda if it has any chance of meeting its binding 2020 targets. Addressing the issues above would allow the country to do so.

A footnote on Banding

For each technology, the impact assessment works on tariff rates that are divided according to the scale of production. Small installations have an upper threshold of 45kW (20kW for solar thermal). Medium installations go up to 500kW (solid bio-mass), 350kW (ground-source/air source heat pumps), 200kW (biogas, on site consumption) and 100kW (solar thermal).

The mistake in the setting of thresholds for FiT payments was to have under-valued the role of community scale generation.

The RHI thresholds should be run past the most ambitious local partners to **ensure that tariff bands and payment rates are sufficient to promote community scale generation of renewable heat.**

Appendix

Ofgem Project Discovery scenarios

Scenario overview

Green Transition	Green Stimulus
In this scenario.... • There is a rapid economic recovery and significant new investment globally • A global agreement on tackling climate change is reached • Energy efficiency measures are effective • New nuclear and CCS demonstration projects come on-line before 2020 • Gas prices are moderate, carbon prices are high, and coal prices are relatively low as demand is suppressed by the high carbon prices • GB gas demand falls but electricity demand grows on the back of wider deployment of heat pumps and electric vehicles	**In this scenario....** • There is a slow recovery from recession and restricted availability of finance • A global agreement on tackling climate change is reached and governments implement 'green stimulus' measures • Energy demand falls globally in the near term • Fuel prices are relatively low • The combination of relatively high carbon prices and direct government support to nuclear, CCS and large scale renewables promote rapid decarbonisation of the generation sector
Key features • Gas imports increase until 2016 and then stabilise • Diverse generation mix • Risk from generation intermittency towards the end of the period due to high levels of wind generation • 2020 renewables targets met: 30% electricity, 12% heat • Carbon dioxide emissions from the electricity and gas sectors: down 33% from 2005 levels • Domestic consumer bills: increase by 23% by 2020 • Total investment costs 2009-2020: £200bn	**Key features** • Gas imports increase until 2012 and then stabilise • Lower gas prices favour gas-fired generation over coal • Risk from generation intermittency towards the end of the period due to high levels of wind • 2020 renewables targets met: 30% electricity, 12% heat • Carbon dioxide emissions from the electricity and gas sectors: down 43% from 2005 levels • Domestic consumer bills: increase by 14% by 2020 • Total investment costs 2009-2020: £190bn
Dash for Energy	**Slow Growth**
In this scenario.... • Global economies bounce back strongly • Security of supply concerns prevail over environmental concerns: there is no global agreement on tackling climate change • Gas supply is tight and fuel prices are high • Investment is forthcoming but not always timely • Significant expansion of CCGT generation capacity • Planning and supply chain constraints prevent new nuclear plant becoming operational before 2020 • Planning delays push back storage investment	**In this scenario....** • Impact of recession and credit crisis continues • Low levels of investment • Low commodity and carbon prices, reducing incentives for renewables, nuclear and CCS • Generation build is dominated by CCGTs • Energy efficiency measures have limited impact but demand is low initially due to slow economic growth
Key features • Sharp increase in gas import dependence • Gas increases its share of the generation mix • Shortage of gas storage coincides with peak energy prices in 2015 • 2020 renewables targets are not met: 15% electricity, 4% heat • Carbon dioxide emissions from the electricity and gas sector: down 12% from 2005 levels – insufficient to meet carbon budgets • Domestic consumer bills: rise with high and volatile commodity prices, increasing over 60% by 2016 before falling back • Total investment costs between 2009-2020: £110bn	**Key features** • Increasing dependence on gas imports and gas-fired electricity generation • Tight supply margins due to lack of investment when economic growth returns • 2020 renewables targets are not met: 15% electricity, 4% heat • Carbon dioxide emissions from the electricity and gas sector: down 18% from 2005 levels – insufficient to meet carbon budgets • Domestic consumer bills: relatively low in early years but increase by 22% by 2020 as market tightens • Total investment costs between 2009-2020: £95bn.