

Re: quick question on numbers

Mark Cockburn

Wed 16/11/2016 20:01

To: Willy Rickett - External Personal information redacted by the RHI Inquiry; Kirby Owen <kirby.owen@cepa.co.uk>;

Cc: Paul Grimal <paul.grimal@cepa.co.uk>; Paget Fulcher <paget.fulcher@cepa.co.uk>;

PwC also accuse us of ignoring the need to review biomass prices which we clearly do not and we should seek to have that corrected as it is materially misleading (even though we are not mentioned by name). Just because PwC says something does not make it correct. They were also responsible for the factual error on banding and relevant tariffs.

As discussed, though, we are fine in terms of the 2011 report. Our approach is consistent with DECC's. I have also found that we did discuss tiering with them. However, we are clearly exposed in the 2012 addendum. I checked with Iain and our role was to respond to specific points raised in the consultation. A reconsideration of tiering was not explicitly asked for but no doubt we will be criticised for not having spotted the need for it. And we clearly have to fess up to that. However, I did find that in the to and fro between Iain and DETI on different versions of the report, we were explicitly asked about tiering in the context of heat pumps and we do indeed provide a tier 1 and a tier 2 tariff. So we did miss it for biomass, but had we been explicitly asked we would most likely have revisited it. In any event, once you decide what Tier 2 tariff you want to offer, it's a back of the flag packed calculation to work out the Tier 1.

I also went through the Ofgem meeting minutes. Apparently the lack of tiering was brought up with them on several occasions. They had some form of consultation on scheme controls in 2013 but then didn't introduce any.

I am quite amazed by the blatant nature of what people ended up doing - not initially (borne out by Ofgem's evidence) - it would be interesting to know what might have been prevented if the scheme had been closed earlier. From the point of view of future actions, I personally find it difficult to believe that burning biomass 100% of the time is remotely what a renewable heat incentive was meant to do - at that point it becomes a subsidy for mushroom growers. The aim was to make a reasonable 12% return on capex from switching, not the massive returns they're now trying to make. Interestingly in their consultation response the Ulster Farmers' Union says that tariffs shouldn't continue for 20 years as this would be too generous. It would be interesting to know if any oil boilers were being run 24/7 all year round - this perhaps would demonstrate that what is being observed is not even gaming but sheer exploitation.

Although not in our remit I do wonder what could be done in terms of the "grandfathered tariffs". I can't believe that these confer contractual rights and presumably could be changed in law by an act of the Northern Ireland Assembly? In the absence of the UK taxpayer coming to the rescue they ultimately are likely to have to do this. Essentially the greed of the installers has created significant political risk for them. Even if, say, total tariff revenue was capped at a level that would earn them a return greater than was intended. Alternatively, if they don't like the new tariff I'm sure they could be compensated for less than the quoted £1m estimated lifetime cost.

From: William Rickett Personal information redacted by the RHI Inquiry

Sent: 16 November 2016 19:05:49

To: Kirby Owen

Cc: Paul Grimal; Paget Fulcher; Mark Cockburn

Subject: Re: quick question on numbers

Provided by CEPA on 10th May 2017

I am afraid you are right - and PwC make much of this.

W

William Rickett CB | Personal information redacted by the RHI Inquiry

On Tue, Nov 15, 2016 at 7:48 PM, Kirby Owen <kirby.owen@cepa.co.uk> wrote:

just had to discard my half-written previous answer.

Tiering -- if properly done -- certainly could have prevented the ability of people to just buy a wood chip boiler, heat an empty building almost full time and earn a 10% rate of return on investment (from Paul's figurs) -- assuming no value (none!) for the heat. don't forget, if you buy a home boiler and use it, you have a negav e rate of return investment unless you count a "value" for the heat. Whatever value you assign to that, you could assign to the wood chip boiler and even earn a more than 10% rate of return (with the windows wide open to winter!)

I agree with your statement in your email below, but I have to suck in my breath to do so: "tiering is not a budgetary control measure" (no, but it's a measure that would have -- if done correctly or even almost correctly -- killed the incenv e for fraud and it is also a most basic and sensible tariff structure (compared to an energy only tariff) now that I understand it).

Add that to "and of course, monitoring and control was necessary as we always -- even in the first report -- said".

But the combination of lack of tiering together with an over-the-variable-cost subsidy level (the problem goes away if the subsidy is less than variable cost because then increased level of usage doesn't contribute to covering -- or more than covering in this case -- your initial capital costs) was a bad mistake.

Our initial reaction that an energy only tariff structure which had a level greater than variable cost was bad -- that reaction is absolutely correct, IMHO.

Sorry to all recipients -- this email is a combination of some backing and forthing between some of us and some of it has not been copied to all -- my fault enr ely. But I'm happy to go over the logic with any / all as needed.

But the lesson is -- a single-part "tariff" (subsidy) is a mismatch to a multi-part cost structure. Not a problem in the first report, but once the single part tariff value got above variable cost, then load factors above the "target level" could result in super profits. All down to tariff structure; that part could have been addressed by (properly designed) tiering.

So the folks who heated empty barns were evil villains indeed, but they needed a poor tariff design to abet them.

Kirby Owen

Director

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Kirby.Owen@cepa.co.uk

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From: William Ricke | Personal information redacted by the RHI Inquiry

Sent: 15 November 2016 19:37:16

To: Paul Grimal

Provided by CEPA on 10th May 2017

Cc: Kirby Owen; Paget Fulcher; Mark Cockburn
Subject: Re: quick question on numbers

On reflection, I am not sure we want to be too dismissive of tiering. It clearly reduces the problem. I think we should stick to "not primarily designed to be a budgetary control measure".
W

Willy Rickett
Sent from my iPhone

On 15 Nov 2016, at 17:47, William Rickett Personal information redacted by the RHI Inquiry wrote:

Very useful analysis on tiering and degression which could be reflected in a couple of sentences in the draft opening remarks I have just circulated by adding: "We have in fact done some analysis which suggests that tiering would not have avoided the overspend we have seen. While it does suggest that degression might have solved the problem, I still believe the only sure remedy would have been scheme level controls on applications."

all the best
Willy

William Rickett CB | Personal information redacted by the RHI Inquiry

On Tue, Nov 15, 2016 at 5:37 PM, Paul Grimal <paul.grimal@cepa.co.uk> wrote:

Kirby,

Are "opex" fixed O&M?

Yes, it is a fixed annual cost by kW.

A surprisingly big difference in capital cost!

Driven by large boiler size (from 20 to 50kW) and increased load factor (from 6% to 17%).

What would be the 20 year IRR as a function of load factor?

To see/modify the assumptions I have used, please use the attached model.

I am not entirely clear with what you meant by "an adder to revenue" but happy to delve into more detail when/if I am more time this week.

<image003.png>

You may find an additional ad hoc piece of analysis interesting; we modelled what would have been the effect of implementing tiering in 2011 using a variety of scenarios on the tiering level (document attached).

Thanks,
Paul

From: Kirby Owen

Sent: 15 November 2016 16:35

To: Paget Fulcher <paget.fulcher@cepa.co.uk>

Cc: Paul Grimal <paul.grimal@cepa.co.uk>; Willy Rickett - External Personal information redacted by the RHI Inquiry

Mark Cockburn <mark.cockburn@cepa.co.uk>

Subject: Re: quick question on numbers

Over to Paul then. At last resort, over to me (Paul, if you can help me out, great, but I know that you are time constrained. If you can do this but need help, I can be in on Thurs.)

Kirby Owen
Director

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From: Paget Fulcher
Sent: 15 November 2016 16:32:56
To: Kirby Owen
Cc: Paul Grimal; Willy Rickett - External; Mark Cockburn
Subject: RE: quick question on numbers

Hi Kirby,

This isn't something I have done but I have a suspicion that Paul might be able to help you with some of the modelling he has already been doing.

Thanks,

Paget

From: Kirby Owen
Sent: 15 November 2016 16:20
To: Paget Fulcher <paget.fulcher@cepa.co.uk>
Cc: Paul Grimal <paul.grimal@cepa.co.uk>; Willy Rickett - External
Mark Cockburn <mark.cockburn@cepa.co.uk>
Subject: Re: quick question on numbers

Personal information redacted by the RHI
Inquiry

ahhh, there's that lovely 4.39. Thanks. Are "opex" fixed O&M? From the units quoted it looks as if they are.

A surprisingly big difference in capital cost! Must be due (I guess) to the need for fuel crushing and ash disposal mechanicals in the wood chip version.

And now that you have provided these to me so quickly, probably you have already done this calculation, though if not, if it's easy please do:

For the biomass (I assume this is a wood chip / pellet device) unit, what would be the 20 year IRR as a function of load factor (i.e., at load factors of 10%, 20%, 30% etc on up to 90%) if you assumed the initial capex and annual O&M / fuel cost as costs and the 5.9 p / kwh number as revenue? Assume initially zero value for the actual heat output. (If you haven't done this calculation already for load factors up to 90%, well, shame on you). If the IRR doesn't flip positive after about 60% load factor or so, do it again assuming the "value" of heat output (an adder to revenue) equal to say 20% of the variable cost of fuel oil and see if that flips it.

You can see where I'm going on this part of the analysis -- duplicating the thought process of those fellows who were heating empty barns etc.

But also, these numbers provide some extra thought for the tiering question.

Kirby Owen

Director

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From: Paget Fulcher
Sent: 15 November 2016 16:10:57
To: Kirby Owen

Cc: Paul Grimal; Willy Rickett - External; Mark Cockburn
Subject: RE: quick question on numbers

Hi Kirby,

The numbers you are a. er are in the annex to the extension report (a ached). The small commercial biomass numbers are on pages 34-35. This contains the 4.39p/kWh fuel cost and the 5.9p/kWh tariff.

I have added screen clips of the sections below for easy reference.

Thanks,

Paget

<image005.png>

<image009.png>

From: Kirby Owen

Sent: 15 November 2016 15:59

To: Paget Fulcher <paget.fulcher@cepa.co.uk>

Cc: Paul Grimal <paul.grimal@cepa.co.uk>; Willy Rickett - External

Personal information redacted by the RHI
Inquiry

Mark Cockburn <mark.cockburn@cepa.co.uk>

Subject: quick question on numbers

Paget --

I'd like to benchmark myself on the 2012 report numbers.

For a "standard" (or reference) size boiler -- I guess you were using 50 kW -- is it correct that both the capital cost and fuel cost / unit for the renewable option were (without subsidy) higher than the alternative (which I assume to be fuel oil)?

Can you show me the numbers? Say all-in capital cost (per kW), and per-kwh fuel cost for each (again without subsidy)? Please make it simple (at this stage of my curiosity) rather than complex.

thx

Kirby Owen

Director

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Kirby.Owen@cepa.co.uk

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Re: sanity check

Kirby Owen

Wed 16/11/2016 10:26

To: Ian Alexander <ian.alexander@cepa.co.uk>;

thanks for the support. I did (I think) eventually get Willy to understand and buy into this. Helped by the fact that once we both understood yesterday afternoon that the "final" recommendation was an energy only tariff that was greater than the true variable cost (as known at the time of the recommendation) of the wood chip option, certainly something did not smell right. and Paul's graph (if I didn't send it to you, let me know -- it is very instructive about how a poor tariff design combined with generous tariff levels leads to "interesting" incentives and results; I asked him to calculate the IRR of a wood chip boiler with the recommended subsidy level at various load factors) proved it.

Mark's under a lot of stress, much self-imposed. But also -- between you and me -- he's not really great at explaining things either simply, clearly, or with focus on high level. Probably partly because he's unsure / non-confident (when I was much more junior, I always over-explained as well) but probably also because presentation is not really his thing. You remember how the great teachers you had in school/ university made "complex things seem clear and simple" and how bad teachers made "clear and simple things seem complex"? Food for thought.

And -- maybe related to that -- I'm surprised that he's good on tariff design (which is slightly different from subsidy design which is maybe what you mean). He is good on explaining the difference between "challenge fund" (i.e., bidding for subsidy) and a direct payment scheme like the RHI, so maybe that's what you have in mind. But for a payment scheme, then actual tariff design enters (the "tariff" is the structure of the subsidy payment in this instance) and that seems not at all as strong.

anyway, just hold onto these ideas for now. I'll share the key points of the "analysis" with you later over a glass of wine if you're interested.

Turns out that the first report (2011) wasn't all that bad at all, but whomever did the re-do (2012 and it wasn't Paget; not sure who did it) missed completely (or skated over) the fact that in the 2012 recommendations the subsidy value per kwh was greater than the fuel cost per kwh. In the 2011 report, there was a clear statement that "tiering" (i.e., creating what amounts to a two-part tariff for the subsidy scheme) wasn't necessary because the subsidy/kwh level was indeed less than the fuel cost. But that situation reversed in the 2012 report and -- foolishly -- whomever wrote it ignored (or didn't understand) the stated logic in the 2011 report. The result was once the subsidy scheme was introduced as in the 2012 report, indeed after a couple of years people were heating empty barns because you could make a financial profit on the whole thing, even if you just vented all the heat.

It's a true problem -- a truly bad recommendation on subsidy design. Even with a generous (or overly-generous) subsidy level / amount, better (er, proper) design would have stopped the problem that emerged.

Ouch. Happily the 2011 report says a lot of words about "monitoring is necessary" though I don't think it really meant "watching out to correct the mistakes we made is necessary". And the tariff design error (given that the amount / kwh was greater than VC) was indeed an error. But we won't call it that. Anyway, the focus on monitoring will -- or should if he can use it as his touchstone (as WR and I recommended) or "rock" to chain himself to -- help.

Kirby Owen

Director

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From: Ian Alexander
Sent: 16 November 2016 10:09:46
To: Kirby Owen
Subject: RE: sanity check

Hi Kirby

Sorry -- only just got time to look at this.

You are right -- as you say, two part tariffs are designed to handle issues like fixed costs and variable costs and rather than make an assumption about the level of usage (and so open up the system to abuse/mis-forecast impacts) we would have been better off paying the lump sum subsidy and then paying the variable charge for actual heat generated. Many ways one could do this, but having a single tariff is clearly not a good one (however, many countries do this and given the ability of the client to understand what was going on we would probably have found it harder to sell this rather than the simple single part tariff we went for.

Little surprised with our position as Mark knows a lot about subsidy design.

Do we know if the ToR encouraged a single part tariff? (Not saying that would be right, but it would at least excuse us a little...)

Also, not sure that the client is really pursuing this point...yes, it would have solved the problem but have they said it was our single part tariff which was the root cause of the issue? (Not sure we should beat Mark up unless the client is already pursuing this.)

Provided by CE

Ian

From: Kirby Owen
Sent: 15 November 2016 18:18
To: Ian Alexander <ian.alexander@cepa.co.uk>
Subject: FW: sanity check

just between you and me -- this is because I'm not sure if the relevant parties understand the implications of a "single part tariff" (effectively what was recommended by CEPA in its final report) and a two part (energy / capacity) tariff.

lots of subtleties here, but I suspect I'm right. Have a read up from my 15:59 email to Paget. Hard to follow maybe if you don't know the details (and I'm only about 2 hours reading / listening on the details) but suddenly a lot of our "problem" seems less arcane and more obvious.

Happy to -- indeed, wanting to -- go over this with you, assuming you are au fait with "two part" tariffs. (I suspect you are; tariff structure following cost causality etc). But I don't think == and keep this between us -- that Mark or the others have picked up on this; so-called "tiering" is to them a cost saving measure rather than a tariff design measure.

Anyway, I'm hoping for some reality checking before I make a fool of myself in front of Mark . . .

Kirby Owen
Director
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From: Kirby Owen
Sent: 15 November 2016 18:12
To: Willy Rickett - External
Subject: Re: quick question on numbers

happy to go over it with you -- tariff "structure" is a specialty subject.

But you can think of it as this (and we can talk whenever; I would like you onside on this, because the CEPA people involved are not really energy tariff specialists).

Of course we have observed that the 5.9 p of the 2012 report was above the 4.39 p of energy costs. Why? Because they lumped in some subsidy for capital costs into the 5.9. All well and good (hah!). But in lumping in a fixed cost into a per-kwh cost, they had to make an assumption about how many kwh would be produced. If you produce the magic number, fine; then you receive just enough subsidy (over and above your fuel costs) to help meet your capacity costs.

But what if you produce more kwh than planned? Er, you receive more than the "planned" fixed cost subsidy, obviously because each kwh you produce adds (because it is price greater than fuel cost) to fixed cost contribution.

and Paul's graph shows that at about 55% capacity factor (don't forget, expected usage was 17%), the whole thing turns into a money making machine. Even with zero value assigned to the expected heat output.

Again, happy to chat.

Kirby Owen
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From: William Rickett Personal information redacted by the RHI Inquiry
Sent: 15 November 2016 18:00:56
To: Kirby Owen
Subject: Re: quick question on numbers

Ouch indeed. I am not sure I am completely on top of this!!
W

William Rickett CB
Provided by CB

Personal information redacted by the RHI Inquiry

On Tue, Nov 15, 2016 at 5:58 PM, Kirby Owen <kirby.owen@cepa.co.uk> wrote:

Oops, sorry; the email I just sent you goes completely against what you say on tiering.

tiering would have -- assuming I'm right (er, 80% I am) -- have avoided the incorrect use of the subsidy.

Sure, we're not on the hook for fraud. But == assuming I'm right -- our tariff design (single part instead of two part or tiered) encouraged it.

Ouch.

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From: William Rickett Personal information redacted by the RHI Inquiry

Sent: 15 November 2016 17:47:55

To: Paul Grimal

Cc: Kirby Owen; Paget Fulcher; Mark Cockburn

Subject: Re: quick question on numbers

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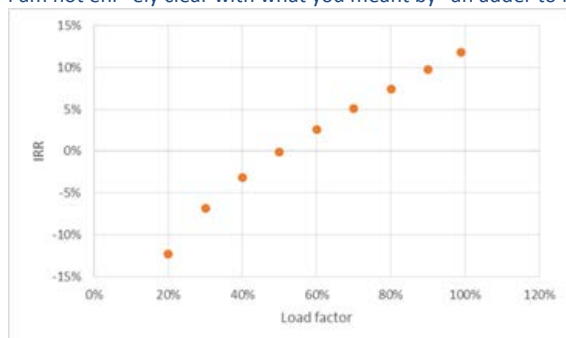
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Thanks,

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Paget

Biomass – small commercial

The picture for small commercial biomass is slightly different to that for domestic, in that the fuel is marginally cheaper than oil, as shown in the table of costs below.

Table 4.25: Biomass (small commercial) – technology parameters

	Capex (£/kW)	Opex (£/kW/year)	Efficiency (%)	Load Factor (%)	Size (kW)	Lifetime (years)	Fuel cost (p/kWh)	Upfront barrier costs (£)	Ongoing barrier costs (£/year)
Biomass	608	4.60	85%	17%	50	20	4.39	3,951	828 ⁵²
Oil	97	3.45	93%	17%	50	15	4.86	0	0

The slightly lower fuel cost is though outweighed by the significantly higher capital cost in particular, translating into a tariff almost identical to that for domestic biomass. This is shown in more detail in the two tables below.

Table 4.26: Biomass (small commercial) – technology resource costs in £ per year

	Annuitised Capital cost at 12%	Annual operating costs	Annual fuel costs	Annuitised Upfront barrier costs	Ongoing barrier costs
Biomass	4,073	230	3,868	718	828

⁵² Source: GB RHI impact assessment

	Annuitised Capital cost at 12%	Annual operating costs	Annual fuel costs	Annuitised Upfront barrier costs	Ongoing barrier costs
Oil	710	173	3,902	-	0
Difference	3,362	58	-34	718	828
Sum of difference			4,932		

Table 4.27: Biomass (small commercial) – tariff breakdown, in pence per kWh

Subsidy for	Amount
Annualised capital and barrier costs	5.9
Operating costs	0.2
Fuel costs	-0.1
TOTAL	5.9
Convert to quarterly basis	5.6
Adjust for inflation	5.9

From: Kirby Owen

Sent: 15 November 2016 15:59

To: Paget Fulcher <paget.fulcher@cepa.co.uk>Cc: Paul Grimal <paul.grimal@cepa.co.uk>; Willy Rickett - External Personal information redacted by the RHI Inquiry Mark Cockburn <mark.cockburn@cepa.co.uk>

Subject: quick question on numbers

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