

From: [Murphy, Shane](#)
To: [Neeson, Patrick \(DoF\)](#)
Cc: [Scott, Michelle](#); [McMurray, Stephen](#); [Smith, Alan](#)
Subject: RHI - Annex C
Date: 16 January 2017 09:54:16
Attachments: [image001.png](#)
[Book1.xlsx](#)

Patrick,

See enclosed a copy of the spreadsheet for Annex C. Think this was raised by you when talking to Alan.

Happy to talk thru if you want.

Shane

Shane Murphy

Analytical Services

Department for the Economy

Adelaide House

39-49 Adelaide Street

Belfast, BT2 8FD

Tel: 028 9041 6951 (ext: 26951)

Mob: Personal information redacted by the RHI Inquiry

TextRelay: 18001 028 9041 6951

Web: www.economy-ni.gov.uk



Please consider the environment - do you really need to print this e-mail?

CEPA 2012: Capex & Opex Environment (Dec 2010 Prices)						
<u>50kW Biomass Boiler</u>						
	<i>Capex</i>	<i>Opex</i>	<i>Size</i>	<i>Life</i>	<i>Up Front</i>	<i>Ongoing</i>
	£/kw	£/kW/pa	kW	yrs	Barrier	Barrier
Biomass	608.00	4.60	50	20	3951	828
Oil	97.00	3.45	50	15	0	0
<u>200 kW Biomass Boiler</u>						
Biomass	486.00	4.60	200	20	5364	878
Oil	68.00	1.47	360	15	0	0
<u>Estimated for 99kW Biomass Boiler Using Average of 50kW and 200kW</u>						
Biomass	547.00	4.60	99	20	4658	853
Oil	82.50	2.46	99	15		
<i>Rate of Return (Annualised)</i>			12.00%			
<i>Frequency (No. Payments p.a.)</i>			4			
<u>Annuited</u>						
- Biomass Capex		£6,945	(Quarterly as per CEPA)			
- Oil Capex		£1,149	(Quarterly as per CEPA)			
<i>Additional Annualised Cost</i>		£5,796	A			
<i>Annuited Initial Barrier Costs</i>		£597	B			
<i>Ongoing Barrier</i>		£853	C			
<i>Annual Opex Difference</i>		£212	D			
<i>Annual / Annualised Cost</i>		£7,458	A + B + C + D			
<i>Heat Output @ Tier</i>		130086	(99kW x 1314)			
<i>Cost per kW</i>		5.73p				
<i>CEPA Fuel Differential</i>		-0.10p	See CEPA 2012 Report			
<i>Overall Cost (Dec 2010 Prices)</i>		5.63p	CEPA's Cost Inputs in Dec 2010 Prices			
<i>Cost Indexed to Nov 2016</i>		16.2%	CEPA only updated to Dec 2011			
<i>Cost Indexed to Nov 2016</i>		6.55p	As per latest available RPI figure			
<i>Implied RoR @ Tier for 99kW</i>		11.86%	Implied RoR with a 6.5p Traiff			

Table A.28

Biomass
Oil

Biomass – s:

The picture f
of costs below

Table A.25: Bio

Biomass
Oil

The slightly l
for domestic

Table A.26: Bio

Biomass

Mid 2015: Capex & Opex Environment (Sources incl DETI Business Case)	
<u>Aim of Tariff Design</u>	
- Up to the Tier (1314hr)	6.40p With excess over 1.5p to reward capital
- From Tier to Cap	1.50p For the then fuel / opex cost differential
<u>Capital Cost</u>	

- 99kW Biomass Boiler	£50,000	As per DETI Business Case
- Implied Cost per kW	£505	Case notes Capital Costs had fallen
- 99kW Oil Boiler	£3,000	
- Implied Cost per kW	£30	
<i>Rate of Return (Annualised)</i>	12.00%	
<i>Frequency (No. Payments p.a.)</i>	4	
<u>Annuitised</u>		
- Biomass Boiler	£6,412	
- Oil Boiler	£422	
<i>Annualised Capital Cost</i>	£5,990	
<i>Heat Output @ Tier</i>	130086	(99kW x 1314)
<i>Cost per kWh for Capital</i>	4.60p	
<i>Cost total (Sept 2015 Prices)</i>	6.10p	4.6p plus the 1.5p for Fuel / Opex
<i>Cost Indexed to Nov 2016</i>	6.24p	As per latest available RPI figure
<i>Implied RoR @ Tier for 99kW</i>	12.90%	Implied RoR with a 6.5p Traiff

RPI

2008 MAY	215.1	
2008 JUN	216.8	
2008 JUL	216.5	
2008 AUG	217.2	
2008 SEP	218.4	
2008 OCT	217.7	
2008 NOV	216.0	
2008 DEC	212.9	
2009 JAN	210.1	
2009 FEB	211.4	
2009 MAR	211.3	
2009 APR	211.5	
2009 MAY	212.8	
2009 JUN	213.4	
2009 JUL	213.4	
2009 AUG	214.4	
2009 SEP	215.3	
2009 OCT	216.0	
2009 NOV	216.6	
2009 DEC	218.0	
2010 JAN	217.9	
2010 FEB	219.2	
2010 MAR	220.7	
2010 APR	222.8	
2010 MAY	223.6	
2010 JUN	224.1	
2010 JUL	223.6	
2010 AUG	224.5	
2010 SEP	225.3	
2010 OCT	225.8	
2010 NOV	226.8	
2010 DEC	228.4	
2011 JAN	229.0	
2011 FEB	231.3	
2011 MAR	232.5	
2011 APR	234.4	
2011 MAY	235.2	
2011 JUN	235.2	
2011 JUL	234.7	
2011 AUG	236.1	
2011 SEP	237.9	
2011 OCT	238.0	
2011 NOV	238.5	
2011 DEC	239.4	1.048161
2012 JAN	238.0	
2012 FEB	239.9	
2012 MAR	240.8	
2012 APR	242.5	
2012 MAY	242.4	
2012 JUN	241.8	

2012 JUL	242.1
2012 AUG	243.0
2012 SEP	244.2
2012 OCT	245.6
2012 NOV	245.6
2012 DEC	246.8
2013 JAN	245.8
2013 FEB	247.6
2013 MAR	248.7
2013 APR	249.5
2013 MAY	250.0
2013 JUN	249.7
2013 JUL	249.7
2013 AUG	251.0
2013 SEP	251.9
2013 OCT	251.9
2013 NOV	252.1
2013 DEC	253.4
2014 JAN	252.6
2014 FEB	254.2
2014 MAR	254.8
2014 APR	255.7
2014 MAY	255.9
2014 JUN	256.3
2014 JUL	256.0
2014 AUG	257.0
2014 SEP	257.6
2014 OCT	257.7
2014 NOV	257.1
2014 DEC	257.5
2015 JAN	255.4
2015 FEB	256.7
2015 MAR	257.1
2015 APR	258.0
2015 MAY	258.5
2015 JUN	258.9
2015 JUL	258.6
2015 AUG	259.8
2015 SEP	259.6
2015 OCT	259.5
2015 NOV	259.8
2015 DEC	260.6
2016 JAN	258.8
2016 FEB	260.0
2016 MAR	261.1
2016 APR	261.4
2016 MAY	262.1
2016 JUN	263.1
2016 JUL	263.4
2016 AUG	264.4

2016 SEP	264.9			
2016 OCT	264.8			
2016 NOV	265.5	1.02194	1.162434	1.022727

Table 10: Biomass (larger commercial) – technology parameters

	Capex (£/kW)	Opex (£/kW/year)	Efficiency (%)	Load Factor (%)	Size (kW)	Lifetime (years)	Fuel cost (£/kWh)
Small commercial	486 ⁵³	4.60	81%	36%	200	20	4.39
Large commercial	68	1.47	89%	20%	360	15	4.86

Small commercial

For small commercial biomass is slightly different to that for domestic, in that the fuel is marginally cheaper than for domestic biomass.

Table 11: Biomass (small commercial) – technology parameters

	Capex (£/kW)	Opex (£/kW/year)	Efficiency (%)	Load Factor (%)	Size (kW)	Lifetime (years)	Fuel cost (£/kWh)	Upfront barrier (£)
Small commercial	608	4.60	85%	17%	50	20	4.39	3,000
Large commercial	97	3.45	93%	17%	50	15	4.86	

For large commercial biomass, the lower fuel cost is though outweighed by the significantly higher capital cost in particular, translating into a tariff that is higher than for domestic biomass. This is shown in more detail in the two tables below.

Table 12: Biomass (small commercial) – technology resource costs in £ per year

	Annuitised Capital cost at 12%	Annual operating costs	Annual fuel costs	Annuitised Upfront barrier costs
Small commercial	4,073	230	3,868	718

Level cost (cWh)	Upfront barrier costs (£)	Ongoing barrier costs (£/ year)
4.4	5,364	878 ⁵⁴
4.86	0	0

oil, as shown in the table

Upfront barrier costs	Ongoing barrier costs (£/ year)
9,951	828 ⁵²
0	0

is almost identical to that

Level	Ongoing barrier costs
	828