

Steve Luker Associates Ltd



SUSTAINABLE DEVELOPMENT BIOMASS RENEWABLE ENERGY

Opportunities for Renewable Heat: Planning and procuring biomass heat systems

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A little policy context:

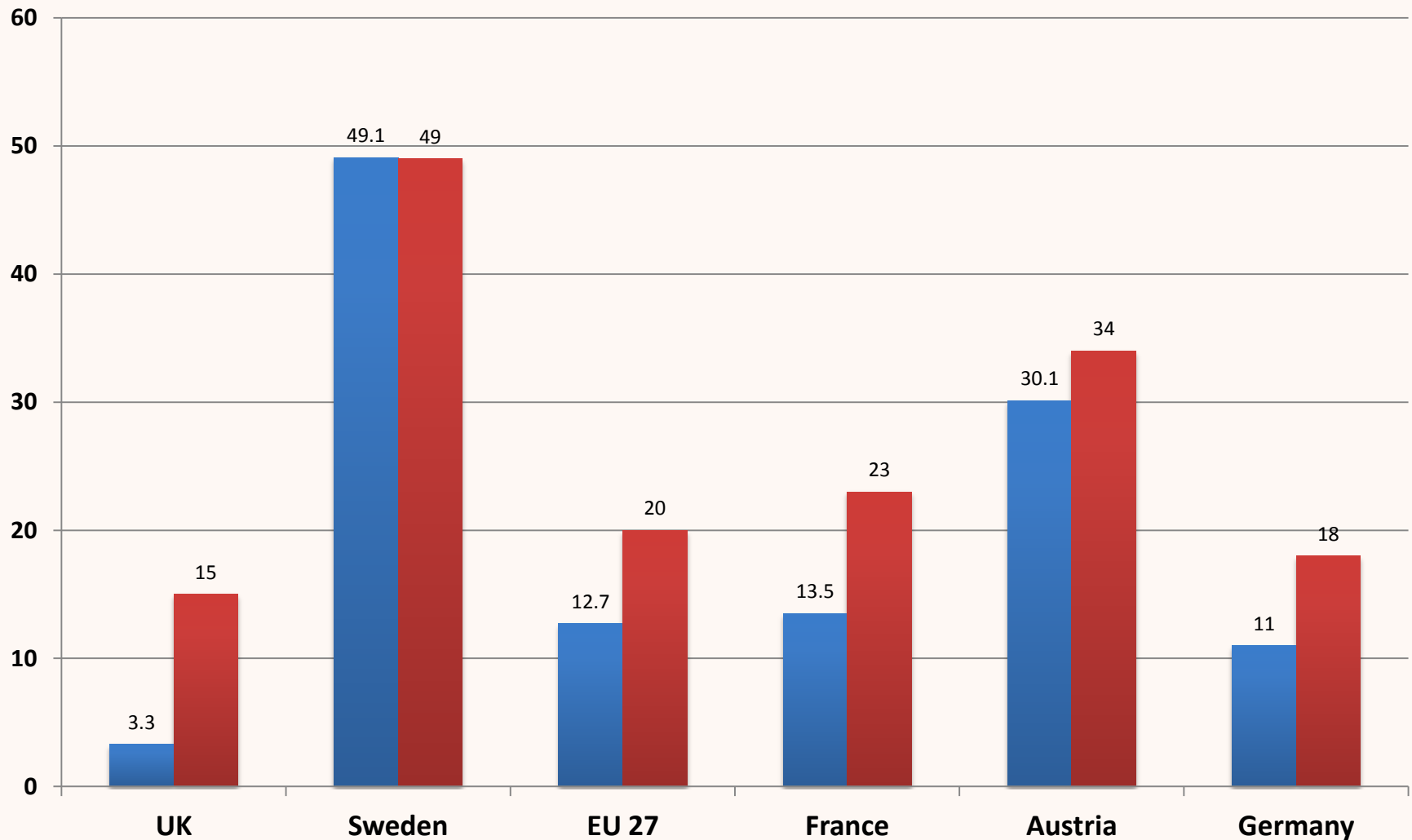
the EU's largest renewable energy source with high growth forecasts



Renewables: UK/EU targets to 2020 & share at 2010

(5% of UK energy is now renewable)

■ 2010 % share ■ 2020 % Target



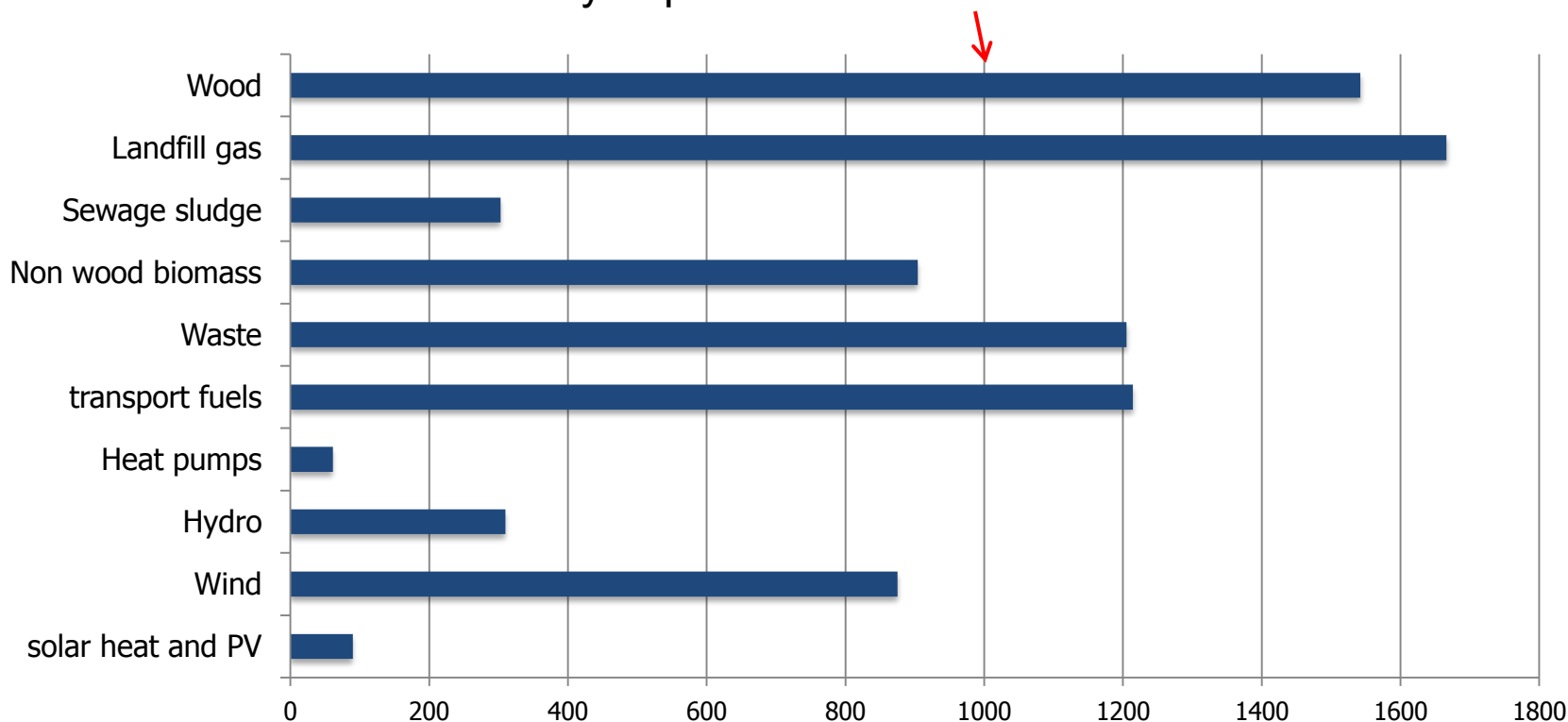
Renewable Energy: a few facts

About 60% of EU's renewable energy is from wood

Most of that is in the form of renewable heat

About 20% of UK's renewable energy is from wood

Bar Chart - UK RES 2010: Wood of which c60% is heat and c40% is power
.....biomass heat is already important and well-established in the market

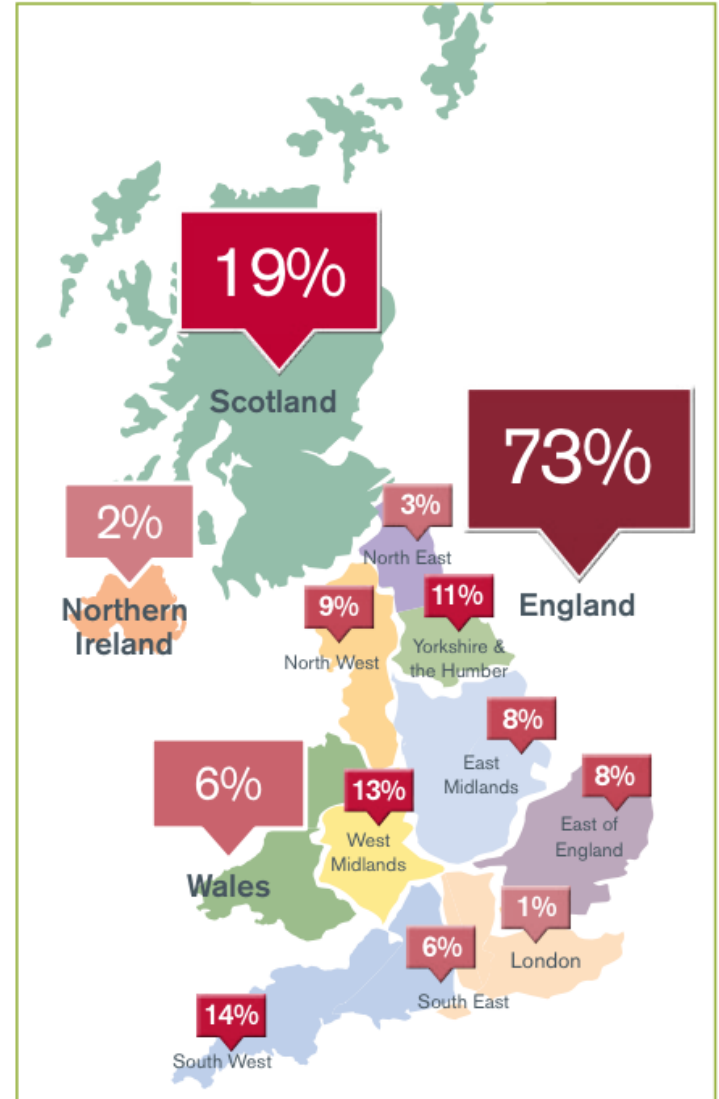


The Renewable Heat Incentive (RHI): progress so far

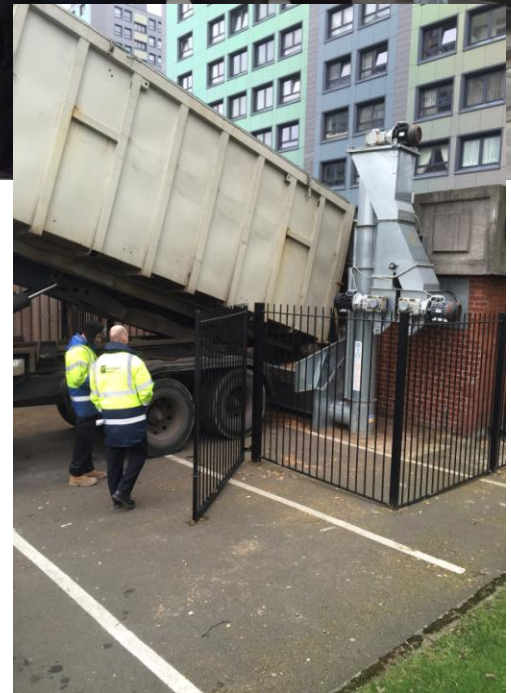
Key Stats:

- 1. Heat = c50% of all UK energy use (electricity and transport are the rest)
- 1. Heat = 47% of all UK CO2 emissions
- 1. RHI is designed to deliver 12% RES heat by 2020
- 1. RHI is 98.7% biomass
- 1. As of 2014 – 1GW of installed capacity was achieved via RHI – with perhaps a further 3GW outside RHI
- 1. £3.2 billion of capital investment
- 1. £0.3 billion of fuel pa (3 million tonnes)

Figure 1: Regional break down of accredited installed capacity











MULTICAL® 602



E 1
0035926



Kamstrup

69124186

Type: 602C08230A8219
S/N: 69124186/2013
Prog: 44158158
Con: 210002424003
Class: E2, M1

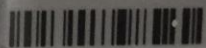
Non-cond/Closed
Imp/l: 5 qp: 40.0 m³/h

Meter in Return pipe
Heat Meter

0 : 2°C... 180°C Pt 500-EN 60751
Δ: 3K... 170K IP54 (5-55°C)

DK-0200
MI004-020

CE M13 0200



Performance standards and efficiency:

lower than it should be and below expectations:
but good procurement can address this





- A DECC assessment of the 'performance standards' in the biomass heating sector in the UK:
 - Covered observed % operational efficiencies and expected efficiencies (measured via fuel in/heat out)
 - Undertaken in March to May 2014
 - 106 schemes with fuel and meter readings obtained
 - Possibly the largest such sample collected
 - Verified via 3,143 RHI schemes

Expected Performance Standards

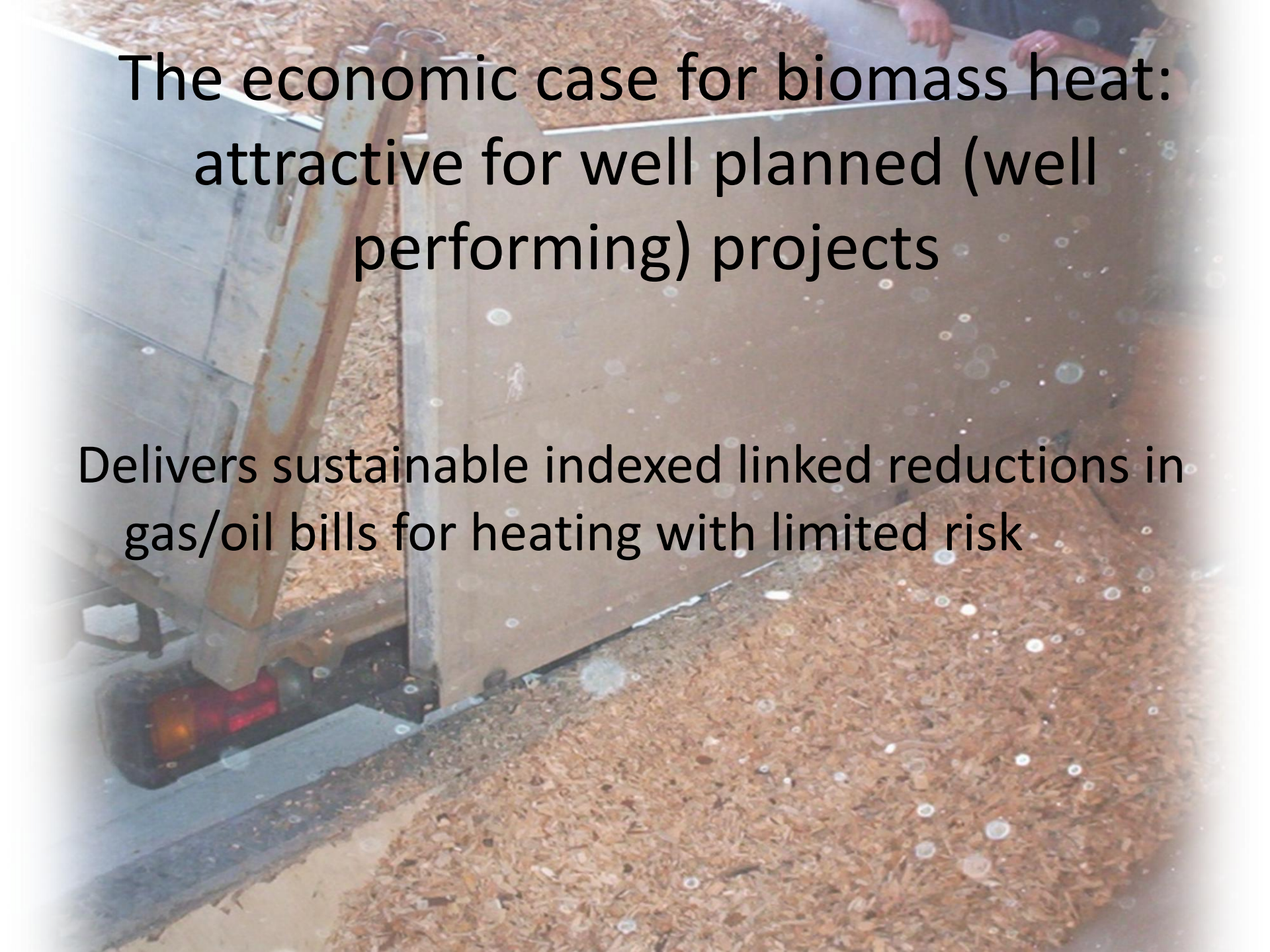


Situation	Max efficiency (annual)	Worst efficiency (annual)	Central efficiency (annual)
Base load boilers	86%	77%	81.5%
Peak load boilers	77%	67%	72%

The average (central) **expected performance standard is 76.75%⁽¹⁾** (compared to 66.5% we found in practice): 85% expectations make it worse...

Which affects the economics of the schemes, the reputation of the sector and increases emissions/decreases carbon savings.

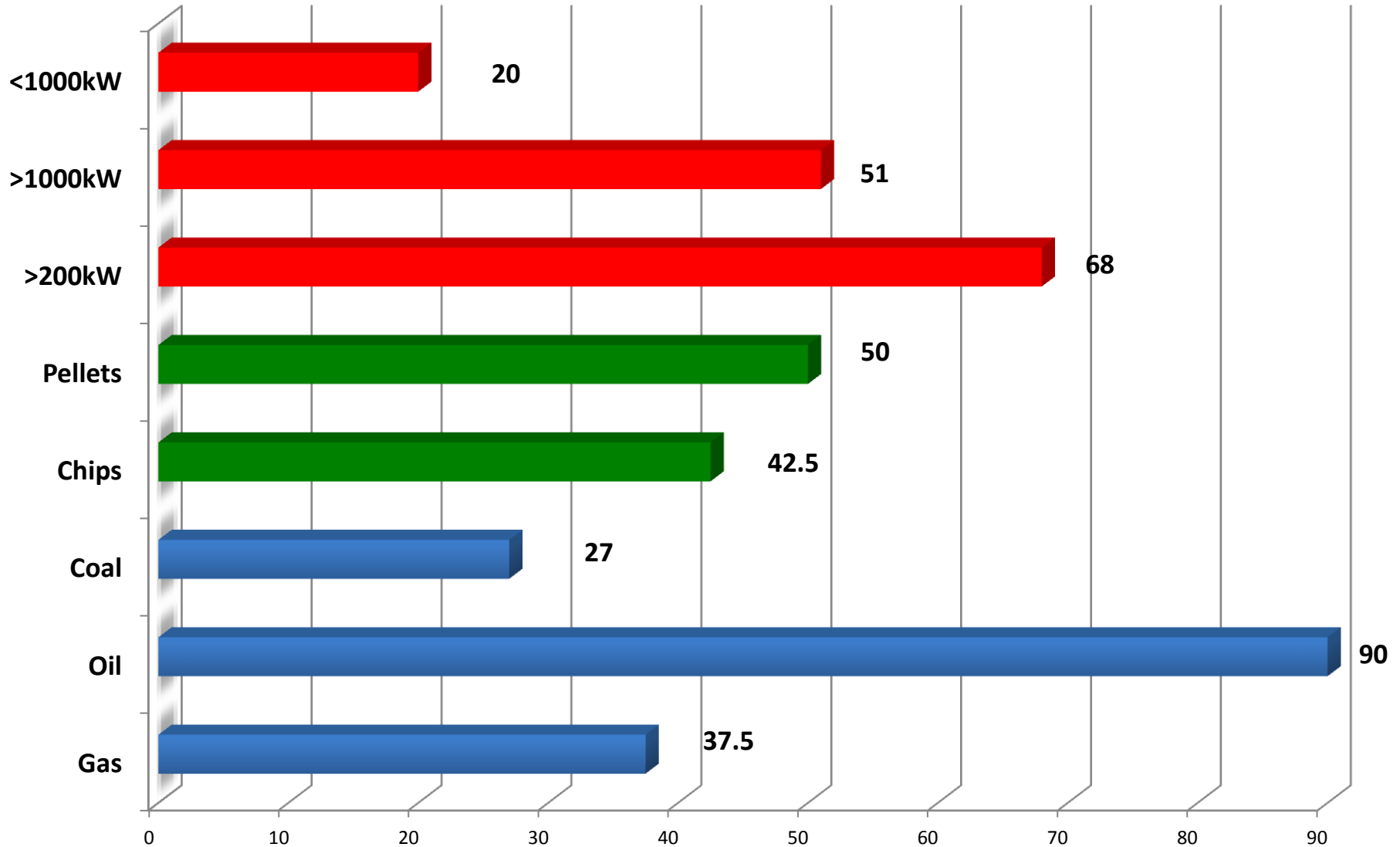
(1) It is important to note that these estimates are not very different from how a gas, oil or coal fired heating system would perform in a similar situation.



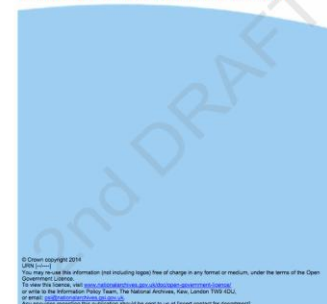
The economic case for biomass heat:
attractive for well planned (well
performing) projects

Delivers sustainable indexed linked reductions in
gas/oil bills for heating with limited risk

Fuel costs and the RHI rates (2015 £/MWh)



Installed costs of biomass heat systems – DECC study



Size/cost	25kW scheme	199kW scheme	500kW scheme
Low Cost	£6,530 (£254/kW)	£106,000 (£643/kW)	£256,937 (£514/kW)
Average Cost	£12,665 (£507/kW)	£166,700 (£854/kW)	£436,500 (£873/kW)
High Cost	£22,436 (£897/kW)	£254,000 (£1065/kW)	£779,953 (£1560/kW)

Real world paybacks (ex inflation)

Site	Capital costs	Do nothing energy cost	Biomass Costs	Back up Fossil Fuel Costs	RHI income	Net new energy cost	Simple Payback
1	459,898	34,793	71,881	0	72,349	468	13.4
2	155,452	19,894	22,024	1,590	28,211	-4,597	6.3
3	158,188	27,990	29,509	4,190	31,561	2,138	6.1
4	160,500	18,870	21,200	1,320	27,755	-5,235	6.6
5	168,866	6,554	11,260	0	21,032	-9,274	10.6
6	211,273	25,915	18,735	1,554	24,239	-3,949	7
7	345,813	57,060	62,549	2,853	69,877	-4,474	5.6
8	156,471	15,720	18,124	942	26,055	-6,988	6.8
9	156,023	14,259	16,599	855	25,212	-7,757	7
10	185,094	26,970	27,163	4,044	31,053	155	6.9
11	133,728	10,419	6,699	518	9,112	-1,894	10.8
12	171,423	19,257	11,146	964	17,806	-5,697	6.8
Totals	2,462,729	277,701	316,889	18,830	384,262	-48,543	7.5

Carbon: further benefit

Site	Tonnes of Carbon Savings	Annual CRC savings @£12/t
1	97.03	£1,164
2	61.52	£738
3	93.09	£1,117
4	71.08	£853
5	95.72	£1,149
6	112.11	£1,345
7	121.61	£1,459
8	287.73	£3,453
9	296.63	£3,559
10	31.48	£377.76
11	91.26	£1,095
12	78.37	£940.44
Totals	1437 tonnes a yr	£17,250 CRC saved a yr

Good procurement practice

- It's a design, build and operate sector.....



Design, build and operate

(not the only model of course)

- Let the specialists design and build it based upon a performance specification
- Integrates fuel supply with scheme design
- Allows biomass supplier to balance opex and capex via wholelife assessment
- Transfers performance and efficiency risks to those best placed to manage them
- Consider group procurement to deliver economies of scale in build and operation (especially)

And finally: good procurement process and documents

- Employers Requirements
 - MQH: Heat loads and profiles (occupancy patterns, BMS)
 - Location and appearance standards required
 - Role of existing fossil fuel plant (HPR) – retain, remove, replace?
 - Planning consents, building warrant, emissions
 - Tender submission requirements (what are firm designs?)
 - Award process, evaluation criteria (payback not cost)
 - RHI compliance (Metering point, Ofgem registration, IMR)
- A Heat Supply Agreement
- Consider a building contract
- Realistic timescales (6 months procurement, 3 months lead time)