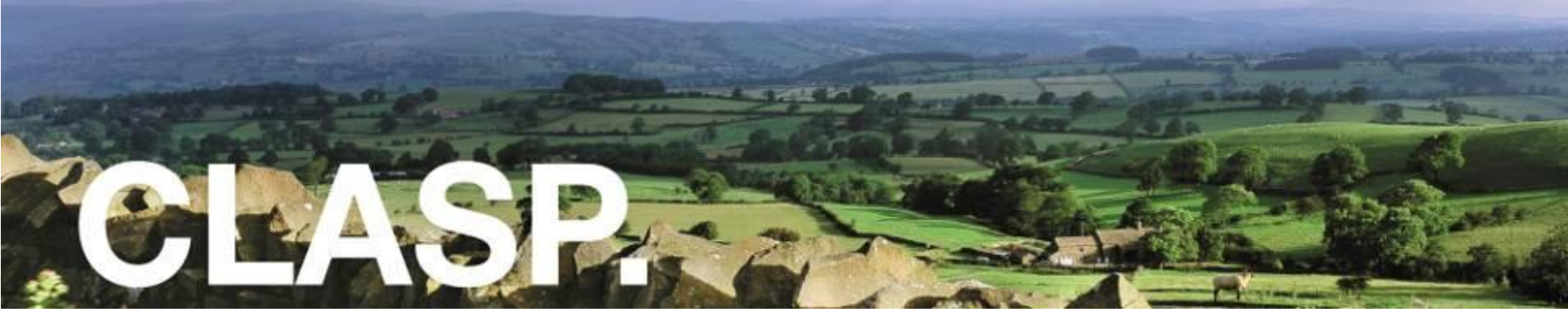


Assessing Energy Statements Part 2

Gill Fenna

Delivered by:

nwIEP north west improvement and efficiency partnership | CLASP. Envirolink Quantum AECOM

Happy Daze Again

- Happy Daze have sacked their original energy consultant and provided you with more data on their baseline energy consumption and proposed renewable technologies. Unfortunately, this is still not exactly what you asked for.

Question 1

- What is the Building Emissions Rate for the development?
- Does it comply with Part L before the installation of any Low and Zero Carbon Technologies?

Buildings Emissions Rate

- BER = Total Part L Emissions / Floor Area

  = 56,600 / 2,000

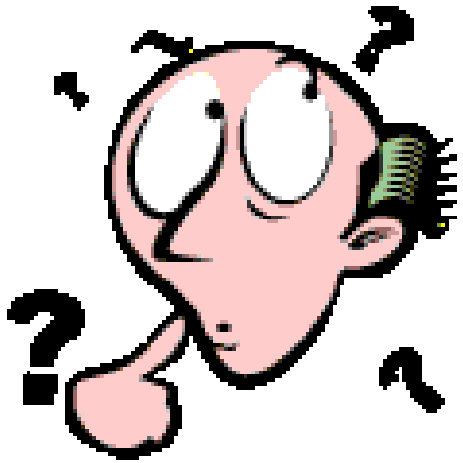
  = 28.3 kg CO2/m2

- Does it Pass?
  - YES

Question 2

- Happy Daze have provided you with a range of data on the technologies such as ratings, size, costs, efficiencies and outputs.
- Calculate the CO2 savings for each technology
- Show this as a % of the total emissions to see whether it meets your criteria
- Calculate two factors that may affect their decision
  - Capital Cost Factor: Capital Cost / kg CO2 saved
  - Output Factor: kWh output / kW rating (electricity

Scary Sums?



11 kW Wind Turbine

Rating	11	kW
Capital Cost	£50,000	
Annual Output	25,000	kWh
	= 25,000 x 0.591 ↙	
Annual CO2 Savings	14,775	kg CO2
		Use CO2 emissions factor Grid Elec.
= 14,775 / 56,600 ↘		
% of Building Emissions	26 %	Use total Annual Emissions (56,600)
	= 25,000 / 11 ↙	
Output Factor	2,273	kWh output per kW Capacity (rating)
Capital Cost Factor	£ 3.38	£ per kg CO2 saved

↖ = 50,000 / 14,775

Over to You

- PV system
- Solar Hot Water System
- Air Source Heat Pump (similar to GSHP calcs earlier)
- Biomass boiler

- If you finish – think about Question 3
  - What would be the main issues with each technology?

Solar PV

Rating	5	kWp
Area	40	m2
Capital Cost	£20,000	
Annual Output	4,000	kWh
Annual CO2 Savings	2,364	kg CO2 = 4,000 x 0.591
% of Building Emissions	4%	= 2,364/ 56,600
Output Factor	800	kWh output per kW Capacity (rating) = 4,000 / 5
Cost Factor	£8.46	£ per kg CO2 saved = £20,000 / 2,364

30 m2 Solar Hot Water

Rating	30	kWth	
Area	30	m2	
Capital Cost	£30,000		
Annual Output	15,000	kWh	
Gas Boiler efficiency	95%		
			= Heat provided / Boiler Efficiency
Annual Gas savings	15,789	kWh	= 15,000 / 0.95
Annual CO2 Savings	3,253	kg CO2	= 15,789 x .206
% Building Emissions	6%		= 3,253 / 56,600
			Solar should not provide more than 50% of hot water demand i.e. 25% of heating demand if hot water is 50% of total heating.
% of Heating demand	10%		= 15,000 / 152,000
			£ per kg CO2 saved
Capital Cost Factor	£9.22		= £30,000 / 3,253

Air Source Heat Pump

Heat Output	152,000	kWh	
Coefficient of Performance	2.4		
Electricity Consumption	63333	kWh	= Heat Output/ COP
Gas Saved	160,000	kWh	
CO2 Emissions of Electricity used	37,430	kg CO2	= 63,333 x .591
CO2 Emissions of Gas Saved	32,960	kg CO2	= 160,000 x .206
Annual CO2 Savings	-4470	kg CO2	= 32,960 – 37,430
% of Building Emissions	-8%		

Biomass Boiler

Boiler Rating	50	kW	
Heat output	100,000	kWh	
% of heat demand supplied	66%		
Biomass Boiler efficiency	90%		
Gas Boiler efficiency	95%		
Capital Cost over gas boiler	£15,000		
Annual biomass energy	111,111	kWh	= Heat / Biomass Efficiency
Annual gas energy replaced	105,263	kWh	= Heat / Gas Efficiency
Annual CO2 emissions biomass	4,111	kg CO2	= 111,111 x .037 (Wood pellet CO2 factor)
Annual CO2 emissions of gas saved	21,684	kg CO2	= 105, 263 x .206 (Gas CO2 factor)
Annual CO2 Savings	17,573	kg CO2	= 21,684 – 4,111
% of Building Emissions	31%		= 17,573 / 56,600
Cost Factor	£0.85	£ per kg CO2 saved	= 15,000 / 17,573

What would be the issues with each technology?

Question 3

	Capital Cost	Annual Saving
Wind Turbine	£50,000	£9,055
PV	£20,000	£1,892
Solar Hot Water	£30,000	£1,807
Biomass Boiler	£15,000	£2,045

- As the developer, which technology might you prefer?
- As the building owner/occupant, which technology might you prefer?
- Which technology or combination of technologies might you propose?

Questions?

So…

- Do you understand how policy wording affects your workload?
- Do you know what information you need to ask for?
- Do you know how to check whether what you get is what you asked for?
- Do you feel more comfortable working out the energy and CO2 emissions from different technologies?