

# Community Sustainable Energy Programme

## BENCHMARKS

Information gathered from section D of the application form will be used to estimate the cost (based on total installation cost) of saving a unit quantity of carbon dioxide over the expected lifetime of the installation. These figures are compared to the following “benchmarks” and if they are higher, it may cause BRE to either:

- reject an application
- reduce the grant amount
- request further information and clarification

The benchmarks are expressed as £/tonneCO<sub>2</sub>. Please note the benchmark figures may change from time to time and the applicant will need to check these before applying.

	Solar PV	Solar thermal	Heat pumps	Wood pellet stoves	Wood fuelled boilers
	<b>Assumed life (years)</b>				
<b>Displaced fuel/energy</b>	25	20	20	20	20
<b>Electricity</b>	£670	£310	£180	to be confirmed	£250
<b>Natural Gas</b>	N/A	£610	£1050	tbc	£230
<b>Oil</b>		£380	£460	tbc	£120
<b>Coal</b>		£470	£86	tbc	£83
<b>LPG</b>		£470	£263	tbc	£185

	<b>Wind turbines ( by size in kW)</b>				
	<b>Assumed life - 20 years</b>				
<b>Displaced energy</b>	less than 1.5	1.6 – 5.0	6.0	15.0	20 and larger
<b>Electricity</b>	£1,049	£490	£420	£345	£300

### Carbon dioxide emissions factors to be used in the £/tonneCO<sub>2</sub> calculations:

Electricity=	0.43 kgCO <sub>2</sub> /kWh	Coal=	0.3 kgCO <sub>2</sub> /kWh
Natural Gas=	0.19 kgCO <sub>2</sub> /kWh	Oil=	0.25 kgCO <sub>2</sub> /kWh
		LPG=	0.21 kgCO <sub>2</sub> /kWh

### Calculation formula for all technologies apart from Heat Pumps:

£/tonneCO<sub>2</sub> = (Total cost (based on eligible costs) x 1000) / (Energy yield x emission factor x assumed life)  
Example for Solar thermal system costing £15,300 with an estimated annual yield of 13,410 kWh, replacing gas:

$$(\text{£}15,300 \times 1000) / (13,410 \text{ kWh} \times 0.19 \times 20) = \text{£}300 \text{ /tonneCO}_2$$

### Heat Pump £/tonne CO<sub>2</sub>:

£/tonneCO<sub>2</sub> = (Total cost (based on eligible costs) x 1000) / ((Energy yield x emission factor - **Electrical input** x emission factor) x lifetime)

Example for Ground Source Heat Pump supplying underfloor heating (effective CoP of 3.2), costing £20,000 supplying all of an estimated annual heating load of yield of 21,000kWh replacing oil:

$$(\text{£}20000 \times 1000) / ((21000 \text{ kWh} \times 0.25 - \text{6562.5 kWh} \times 0.43) \times 20) = \text{£}412 \text{ / tonneCO}_2$$

Where electrical input = Energy Yield / CoP (efficiency adjustment as defined by SAP 2005 in Tables 4a and 4c ([http://projects.bre.co.uk/sap2005/pdf/SAP2005\\_9-82.pdf](http://projects.bre.co.uk/sap2005/pdf/SAP2005_9-82.pdf)))

CoP	Underfloor heating	Radiators
Ground source heat pump	3.2	2.25
Air source heat pump	2.5	1.75

### Why does the benchmark calculation use the electricity emission factor or 0.43 kgCO<sub>2</sub>/kWh instead of the 0.568 kgCO<sub>2</sub>/kWh as per the building regulation part L2A

*The 0.43kgCO<sub>2</sub>/kWh is applied in line with calculating general long term figures for likely CO<sub>2</sub> savings. This figure is based on the predicted fuel mix of electricity generation to 2010, 2020 and beyond. Further analysis of the likely fuel mix showed that 0.43 now seems to be too low, hence a higher figure of 0.568 is used in Part L of the Building Regulations. However even though it looks like the 0.43kgCO<sub>2</sub>/kWh might have to be revised it is still used for potential savings in the long term, whereas the lower figure is used for more immediate savings.*