Developing A Low Carbon Economy

Appendices

WSSP
WEST SOMERSET STRATEGIC PARTNERSHIP

West Somerset Community Climate Change Strategy
2008-2012

Draft consultation January 2008

WEST SOMERSET COUNCIL

EXMOOR NATIONAL PARK

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Towards a Sustainable West Somerset

Appendices

Appendix 1: The Basket of Greenhouse Gases

Source: Extracted from Annex 5 of 'Guidelines to Defras ghg conversion factors for company reporting': 2007. The conversion factor reflects the relative potency to CO_2. It does not reflect the lifetime of the gase in the atmosphere.

Table 4

Factors for Process Emissions				
Emission	Amount Emitted per Year in tonnes	x	Conversion Factor	Total kg CO_2 equivalent
CO_2		x	1,000	
Methane		x	21,000	
Nitrous Oxide		x	310,000	
HFC - 125		x	2,800,000	
HFC - 134		x	1,000,000	
HFC - 134a		x	1,300,000	
HFC - 143		x	300,000	
HFC - 143a		x	3,800,000	
HFC - 152a		x	140,000	
HFC - 227ea		x	2,900,000	
HFC - 23		x	11,700,000	
HFC - 236fa		x	6,300,000	
HFC - 245ca		x	560,000	
HFC - 32		x	650,000	
HFC - 41		x	150,000	
HFC - 43 - l0mee		x	1,300,000	
Perfluorobutane		x	7,000,000	
Perfluoromethane		x	6,500,000	
Perfluoropropane		x	7,000,000	
Perfluoropentane		x	7,500,000	
Perfluorocyclobutane		x	8,700,000	
Perfluoroethane		x	9,200,000	
Perfluorohexane		x	7,400,000	
SF_6		x	23,900,000	
Total				0

Sources

The conversion factors in the table above incorporate global warming potential (GWP) values published by the IPCC in its Second Assessment Report (Climate Change 1995. The Science of Climate Change. Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change. (Eds. J.T Houghton et al). Published for the Intergovernmental Panel on Climate Change by Cambridge University Press 1996). Revised GWP values have since been published by the IPCC in the Third Assessment Report (2001) but current UNFCCC Guidelines on Reporting and Review, adopted before the publication of the Third Assessment Report, require emission estimates to be based on the GWPs in the IPCC Second Assessment Report.

Notes

Not all refrigerants in use are classified as greenhouse gases for the purposes of the Climate Change Programme (e.g. CFCs, HCFCs). GWP values for refrigerant HFC blends should be calculated on the basis of the percentage blend composition (e.g. the GWP for R404a that comprises is 44% HFC125, 52% HFC143a and 4% HFC134a is 2800x0.44 + 3800x0.52 + 1300x0.04 = 3260).

Appendix 2: The role of ozone and water in warming our climate

Ozone (O_3) forms when sunlight hits pollutants. For example low level ozone forms when sunlight reacts with the pollutants from exhausts. This sometimes sits around for days, particularly in urban areas that are surrounded by hills like Los Angeles and when there is a high pressure system. During times of high pressure with little wind the pollutants do not escape the 'inversion layer' which can be seen as brown smog from a distance. Plants, animals and humans breathe in the polluted air. As a greenhouse gas, ozone survives in the troposphere for only a few days and although there appears to be little change since the 1980's, models hint that there has been a global increase in concentration levels of about 30% since the start of the Industrial Revolution[1].

Water vapour, mostly in clouds is also a significant greenhouse gas, not because of its relative potency but more because of the amount of vapour around. Over the past 160,000 years, estimated levels of water vapour in the troposphere have remained fairly constant[2]. However as global temperatures rise seas, lakes and rivers release more water vapour as part of the hydrological cycle. This in turn increase the amount of water vapour to the troposphere which in turn absorbs more heat and so on. This is one of a number of positive feedback mechanisms that could accelerate global warming.

[1] Rough guide to climate change: 2006.
[2] Living in the Environment; seventh edition; G Tyler Miller, Jr.

Appendix: 3 Dispelling the myths of climate change

Source: http://www.metoffice.gov.uk/corporate/pressoffice/myths/index.html

Prof. John Mitchell OBE FRS, Chief Scientist at the Met Office explores some of the common myths about climate change.

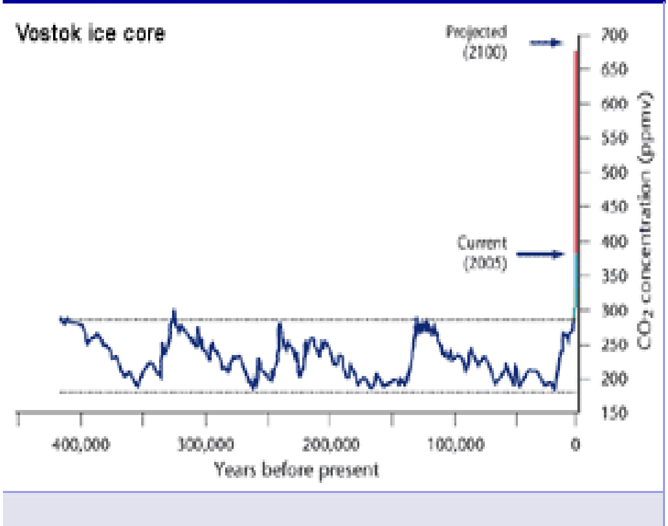
The Met Office recognises that climate change is a complex subject. There are genuine areas of uncertainty and scientific controversy. There are also a number of misunderstandings and myths which are recycled, often by non-climate scientists, and portrayed as scientific fact.

Recent coverage has questioned the influence of humans on the climate. While the arguments used might have been regarded as genuine areas of sceptical enquiry 20 years ago, further observed warming and advances in climate science render these out of touch.

Myth 1 - Ice core records show that changes in temperature drive changes in carbon dioxide, and it is not carbon dioxide that is driving the current warming

Only the first part of this statement is true. Over the several hundred thousand years covered by the ice core record, the temperature changes were primarily driven by changes in the Earth's orbit around the sun. Over this period, changes in temperature did drive changes in carbon dioxide (CO2). Concentrations of CO2 are now much higher and increasing much faster than at any time in at least the last 600,000 years. This should be a warning that what is happening now is very different to what happened in the past.

Levels of atmospheric CO2 are higher than at any time in the last 430,000 years

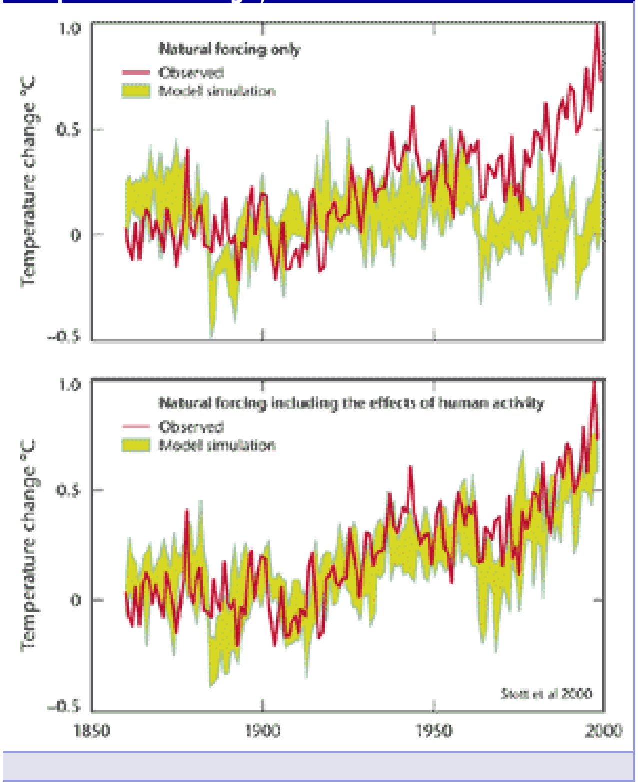


In fact, over the last 100 years CO2 concentrations have increased by 30% due mainly to human-induced emissions from fossil fuels. Because CO2 is a greenhouse gas, the increased concentrations have contributed to the recent warming and probably most of the warming over the last 50 years.

The bottom line is that temperature and CO2 *concentrations* ***are*** *linked. In recent ice ages, natural changes in the climate (due to orbit changes for example) led to cooling of the climate system. This caused a fall in* CO2 *concentrations which weakened the greenhouse effect and amplified the cooling. Now the link between* *temperature and CO_2 is working in the opposite direction. Human-induced increases in CO_2 is enhancing the greenhouse effect and amplifying the recent warming.*

Myth 2 - Solar activity is the main driver of climate change

Temperature change, 1850-2000



There are many factors which may contribute to climate change. For example, over the last million years most of the long-term changes in climate were probably due to small but well understood changes in the Earth's orbit around the Sun. Over much of the last 1,000 years most of the variability can probably be explained by cooling due to major volcanic eruptions and changes in solar heating.

However, the situation in the 20th century is more complicated. There is some evidence that increases in solar heating may have led to some warming early in the 20th century, but direct satellite measurements show no appreciable change in solar heating over the last three decades. Three major volcanic eruptions in 1963, 1982 and 1991 have led to short periods of cooling. Throughout the century CO_2 increased steadily and has been shown to be responsible for most of the warming in the second half of the century.

The final piece of the jigsaw is that as well as producing CO_2, burning fossil fuels also produces small particles called aerosols which cool the climate by reflecting sunlight back into space. These have increased steadily in concentration over the 20th century, which has probably offset some of the warming we have seen. Only when all of these factors are included do we get a satisfactory explanation of the magnitude and patterns of climate change over the last century.

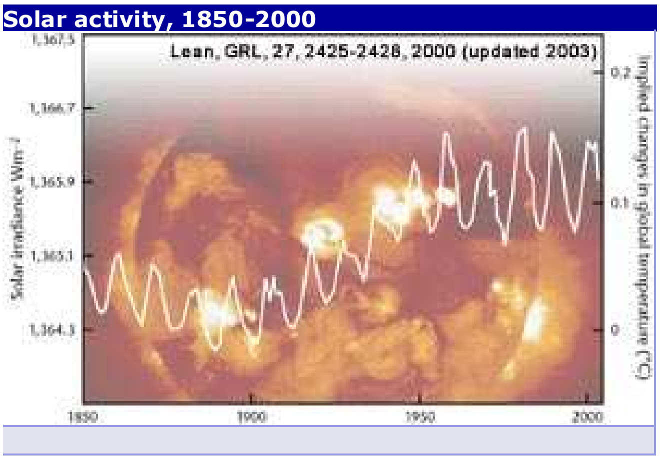
The bottom line is that changes in solar activity ***do*** *affect global temperatures. However, what research also shows is that increased greenhouse gas concentrations have a much greater effect than changes in the Sun's energy over the last 50 years.*

Myth 3 - There is less warming in the upper atmosphere than at the surface which disproves human-induced warming

We expect greater warming in the upper atmosphere than at the surface in the tropics, but the reverse is true at high latitudes. This expectation holds whether the cause of warming is due to greenhouse gases or changes in the Sun's output. Until recently, measurements of the temperature changes in the tropics in recent decades did not appear to show greater warming aloft than at the surface. It has now been shown that allowing for uncertainties in the observations, the theoretical and modelling results **can** be reconciled with the observations.

The bottom line is that the range of available information is now consistent with increased warming through the troposphere (the lowest region of the atmosphere).

Myth 4 - The intensity of cosmic rays changes climate



A recent experiment has apparently shown that gamma radiation can form ions (electrically charged particles) in the atmosphere. Under certain circumstances, these can subsequently form ultra-fine particles (or aerosols), which could conceivably act as cloud condensation nuclei (CCN) and therefore form clouds. However, the mechanism by which cosmic rays might affect climate is as yet purely speculative and unquantified. While it has long been known that radiation could form ions and, in theory, ultimately lead to cloud formation, the importance of this process compared to all the other major sources of particles and CCN has not been proven. Indeed, there is no evidence that the flux of cosmic rays has decreased over the last 30 years.

The bottom line is, even if cosmic rays have a detectable effect on climate (and this remains unproven), measured solar activity over the last few decades has not significantly changed and cannot explain the continued warming trend. In contrast, increases in CO2 are well measured and its warming effect is well quantified. It offers the most plausible explanation of most of the recent warming and future increases.

Myth 5 - Climate models are too complex and uncertain to provide useful projections of climate change

There have been major advances in the development and use of models over the last 20 years. The models are based mainly on the laws of physics. There are also empirical techniques which use, for example, studies of detailed processes involved in cloud formation. The most advanced computer models also include detailed coupling of the circulations of atmosphere and oceans, along with detailed descriptions of the feedbacks between all components of the climate system including the cryosphere and biosphere. Climate models have been used to reproduce the main features of the current climate, the temperature changes over the last hundred years and the main features of the Holocene (6,000 years ago) and Last Glacial Maximum (21,000) years ago.

The bottom line is that current models enable us to attribute the causes of past climate change and predict the main features of the future climate with a high degree of confidence. We now need to provide more regional detail and more complete analysis of extreme events.

Appendix 4: members of the West Somerset Strategic Partnership

Visit www.westsomersetstrategicpartnership.co.uk
Or call 01643 703704 for more information

West Somerset Council	www.westsomersetonline.gov.uk
Somerset County Council	www.somerset.gov.uk
Exmoor National Park Authority	www.exmoor-nationalpark.gov.uk
Somerset Primary Care Trust	www.somersetpct.nhs.uk
Avon and Somerset Constabulary	www.avonandsomerset.police.uk
West Somerset Initiative	www.wsclp.org.uk
Butlins	www.butlinsonline.co.uk
West Somerset Business Network	www.westsomersetbusinessnetwork.org.uk
Chambers of Trade	
West Somerset Voluntary Sector Forum	
Forum 21	www.west-somerset-forum21.org.uk
Watchet, Williton and Quantocks Area Panel	
Exmoor Panel	
Dunster Panel	
Minehead Town Council	www.minehead.co.uk
For the Housing Forum: Magna West Somerset Housing Association	www.magna.org.uk

Appendix 5: Overview of budget 2007: Environmental Protection

Please refer to www.westsomersetonline.gov.uk/climatechange for a separate document

Appendix 6: Available support to insulate your home

Source: Energy Savings Trust. www.est.org.uk

Local Schemes

Somerset Warm and Well

The scheme offers grants and discounts towards loft and cavity wall insulation. Additional secondary energy efficiency measures may also be available. The level of assistance available depends on the circumstances of the householder.

Applicants must either be homeowners, privately rent their home, tenants of a housing association or council tenants. Tenants of council or housing association properties will only be eligible for discounted insulation measures and can not be considered for a full grant.

For an application form contact the **Energy Efficiency Advice Centre on 0800 512 012.** A free, no obligation survey will be arranged with the schemes approved contractor.

Sedgemoor and West Somerset Home Improvement Programmes

Offering home improvement advice to the over 60's and those with a disability. Do not need to be on benefits. Council and housing association tenants are not eligible. The service can offer assistance or advice even if the person does not qualify for a grant. Those wishing to apply should contact: **01278 444815**

Regional/National Schemes

Warm Front Grant

Nationally available grants of up to £2700 to provide loft and cavity wall insulation, heating system improvements, draughtproofing and hot water tank insulation.In addition you can get free energy efficiency advice and two low-energy light bulbs. Available to those on income related benefits who are over 60 or have a child under 16, or those on disability benefit/premiums.

For more details call the Energy Efficiency Advice Centre on: 0800512 012.

Magic Boiler Scheme

Energy efficient A-rated condensing boilers and accessories at discounted prices from Magic Boiler Scheme. Additional £30 cashback may be available subject to funding.

Contact the **Energy Efficiency Advice Centre** free on 0800512 012 for an information sheet including a list of available appliances and price list or contact the Magic Boiler Scheme direct for more details, call **Nottinghamshire & Derbyshire EEAC on 01298 766880 or e-mail LizParker@highpeak.gov.uk**

Grants From Your Fuel Supplier

Many fuel suppliers currently offer discounts and special deals for energy efficiency improvements, including low energy light bulbs, insulation measures, high efficiency boilers and energy saving appliances.

For more details contact your fuel supplier (there should be an energy efficiency advice number on your fuel bill). Alternatively for a list of currently available fuel supplier insulation schemes you can call the Energy Efficiency Advice Centre on: 0800 512 012

SIMPLYSWITCH

Independent fuel supplier switching service accredited by Energywatch. Can provide information on Gas and electricity tariffs, including 'green' tariff. SimplySwitch can change supplier for you over the phone. **Freephone 0800011 1065**

Appendix 7: Comparison of domestic energy efficiency measures: Cost and CO_2

Assumptions behind calculations:

Page 40: cavity and loft insulation. Based on EST figures a gas centrally heated home will save around 1.6tCO_2/year which is equivalent to 8367kWh. To save 20,000tCO_2 /1.6 = 12581 homes would need insulation. At 3.5p/kWh this equates to £3.7million [12581 homes X 8367 kWh X 3.5p/kWh] According to the EST this is the best case scenario.

Others provided upon request.

Please note that all figures used here have been derived from Energy Savings Trust assumptions and extrapolated to assess the impact for homes not on mains gas. No Net Present Value (NPV) has been applied and any future use of the data for assessing the most effective investment should include both NPV and marginal abatement analysis.

The cost and effectiveness of energy efficiency options have been considered using two different methods:

- Payback: the time it takes to recover the initial investment and is calculated as;

$$\text{Payback} = \frac{\text{Capital Cost}}{\text{Annual Saving}}$$

- The cost to reduce a tonne of CO_2

The payback method is useful when comparing the cost effectiveness of the investment against the energy costs. What it does not take into account is the effectiveness of the measure to reduce CO_2 and the associated cost.

According to the payback method the most effective measure for space heating is loft and cavity wall insulation, which in an electrically heated house gives a payback of just over 6 months. The most cost effective measure is the deployment of efficient lighting with a payback of less than 6 months.

Appendix 7: Comparison of domestic energy efficiency measures: Cost and CO_2

Gas heated detached house or bungalow	Saving (£/yr) worst case	Typical installed cost (£)	Payback (yrs) worst case
Cavity wall insulation	210	300	1.4
Solid wall insulation (external)	460	2300	5.0
Solid wall insulation (internal)	430	1900	4.4
Loft insulation (new installation)	210	250	1.2
Loft insulation (top up)	60	260	4.3
Floor insulation	60	1000	16.7
Replacement condensing boiler	130	1000	7.7
Hot water tank insulation	20	40	2.0
Full heating control package	70	200	2.9
Draught-stripping	20	75	3.8
Lighting (4Xlamps)	15	15	1.0

Electricity heated detached house or bungalow	Saving (£/yr) worst case	Typical installed cost (£)	Payback (yrs)
Cavity wall insulation	496	300	0.6
Solid wall insulation (external)	1087	2300	2.1
Solid wall insulation (internal)	1016	1900	1.9
Loft insulation (new installation)	496	250	0.5
Loft insulation (top up)	142	260	1.8
Floor insulation	142	1000	7.1
Replacement condensing boiler	307	1000	3.3
Hot water tank insulation	47	40	0.8
Full heating control package	165	200	1.2
Draught-stripping	47	75	1.6
Lighting (4Xlamps)	35	15	0.4

Oil heated detached house or bungalow	Saving (£/yr) worst case	Typical installed cost (£)	Payback (yrs)
Cavity wall insulation	289	300	1.0
Solid wall insulation (external)	632	2300	3.6
Solid wall insulation (internal)	591	1900	3.2
Loft insulation (new installation)	289	250	0.9
Loft insulation (top up)	82	260	3.2
Floor insulation	82	1000	12.1
Replacement condensing boiler	179	1000	5.6
Hot water tank insulation	27	40	1.5
Full heating control package	96	200	2.1
Draught-stripping	27	75	2.7
Lighting (4Xlamps)	21	15	0.7

Calculating the cost to reduce a tonne of CO_2 may be a better indicator and more useful because this takes into account both the effectiveness of the measure to reduce CO_2 and the cost implications. The cost to reduce a tonne of CO_2 has been calculated for each of the measures and listed in the table below.

Taking this method and assessing the cost to reduce 1tCO_2 we find that the most cost effective measure is loft insulation costing around £3 to reduce one tonne of CO_2 in an electrically heated home. This rises to £6/tCO_2 for gas central heated homes. Cavity wall insulation is the 2nd most cost effective measure ranging from £3.30 to £8/tonne of CO_2 depending on the fuel type to heat the home. Using this method, lighting is one of the least effective measures costing £19.50 to reduce 1 tCO_2. The most expensive measure the replacement of a gas condensing boiler costing £102/tCO_2 reduced.

detached house or bungalow	£/tCO2[3] reduced lower range gas	£/tCO2 reduced lower range electricity	£/tCO2 reduced lower range oil
Cavity wall insulation	8	3.3	6.5
Solid wall insulation (external)	26	11.7	22.8
Solid wall insulation (internal)	23	10.3	20.2
Loft insulation (new installation)	6	2.8	5.4
Loft insulation (top up)	23	10.1	19.8
Floor insulation	88	38.9	76.1
Replacement condensing boiler	102	n/a	n/a
Hot water tank insulation	26	11.7	22.8
Full heating control package	38	16.7	32.6
Draught-stripping	50	21.9	42.8
Lighting (4Xlamps)	44	19.5	38.0

The most cost effective energy efficiency measure is loft and cavity wall insulation. This will pay for itself in just over 6 months in a home that relies on electricity for space heating.

Graphic comparisons of energy efficiency measures in the home.

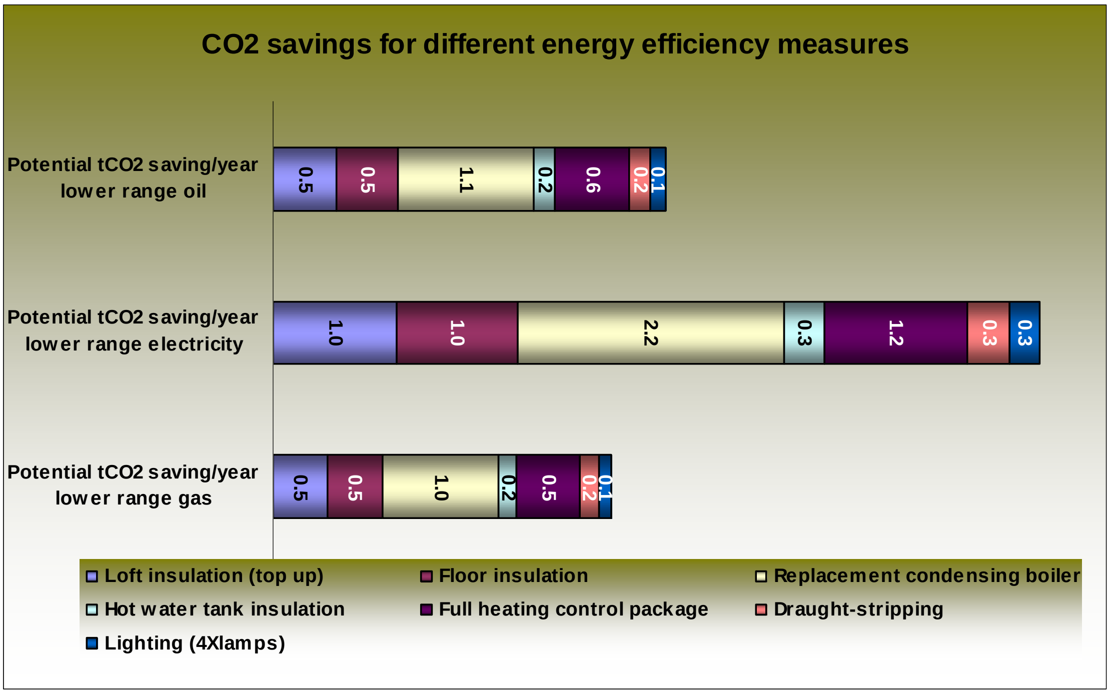
The following diagrams are the result of some simple analysis comparing the different energy efficiency measures in gas, oil and electrically heated homes. They reflect the CO_2 effectiveness of each of the measures and the cost effectiveness based on the length of time it will take to payback the investment. The key point to come out of the

[3] The cost has been calculated over the expected lifetime of the measure. For example the cost to reduce a tCO2 for cavity wall insulation has been spread across 25 years. Whereas the expected lifetime used for the light bulb is 3 years and the gas boiler for 10 years.

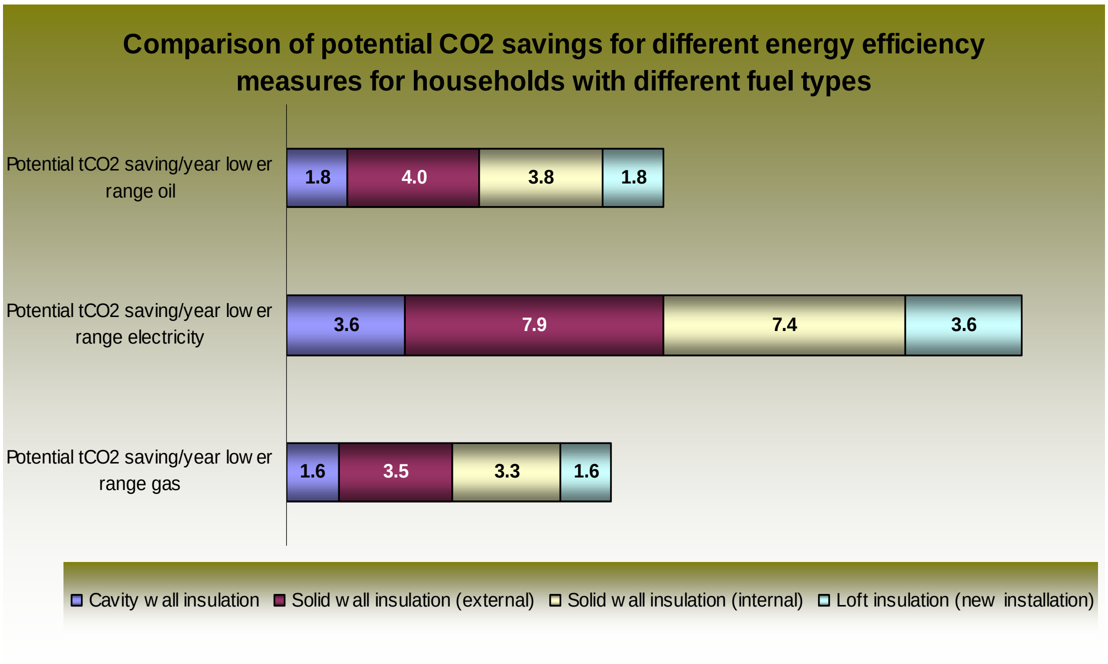
assessment is that loft and wall insulations are undoubtedly the most effective way to reduce CO_2 and energy costs.

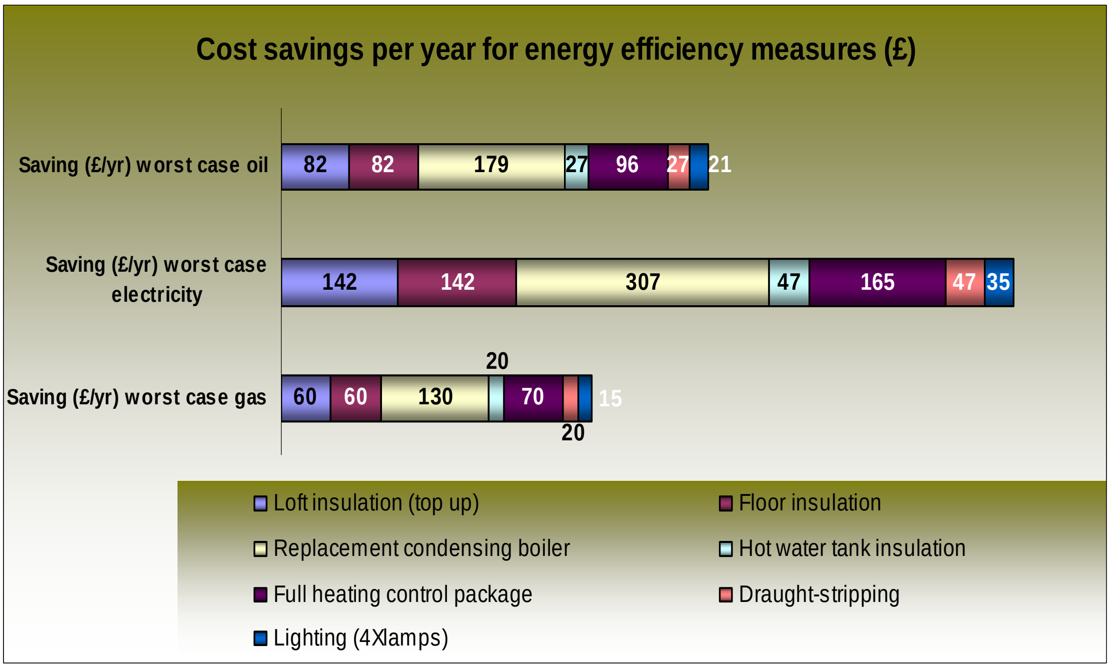
Notes

- The costs and saving figures will vary according to the size of the dwelling, its location, the measures (if appropriate), fuel heating system and the materials used.
- Energy savings are estimated from a range of standard house types. Actual savings depend on individual circumstances. Some of the energy reduction benefits may be taken in improved comfort known as 'comfort taking'. For example if less money is spent on space heating, then the householder may use the extra money to spend on less energy efficient goods like a plasma screen television.



Appendix 7: Comparison of domestic energy efficiency measures: Cost and CO_2





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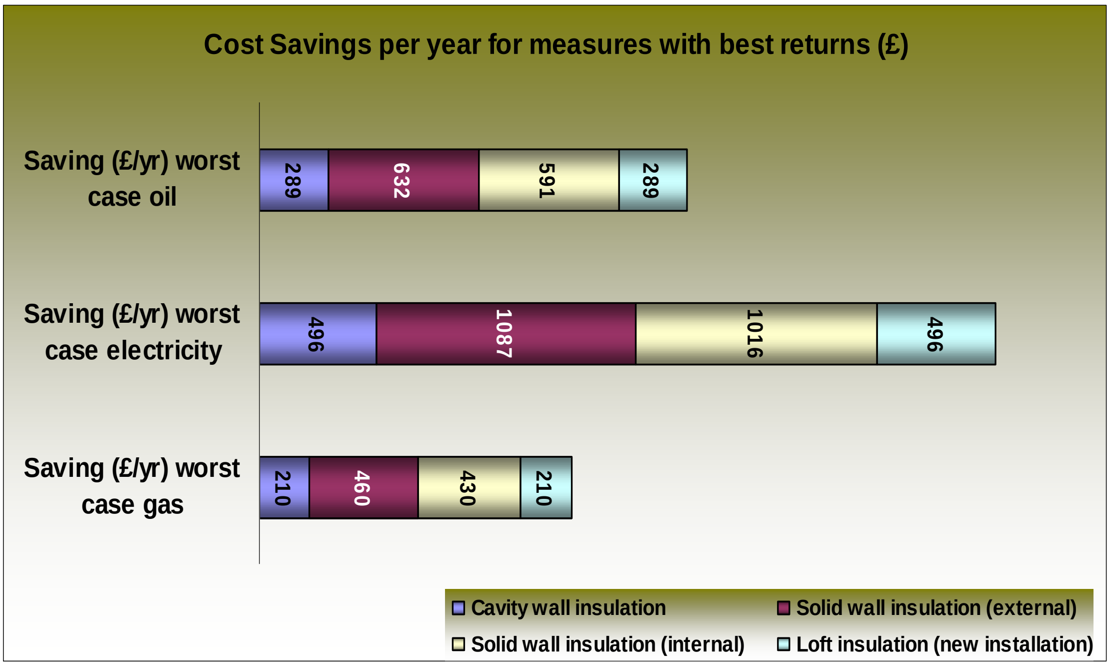

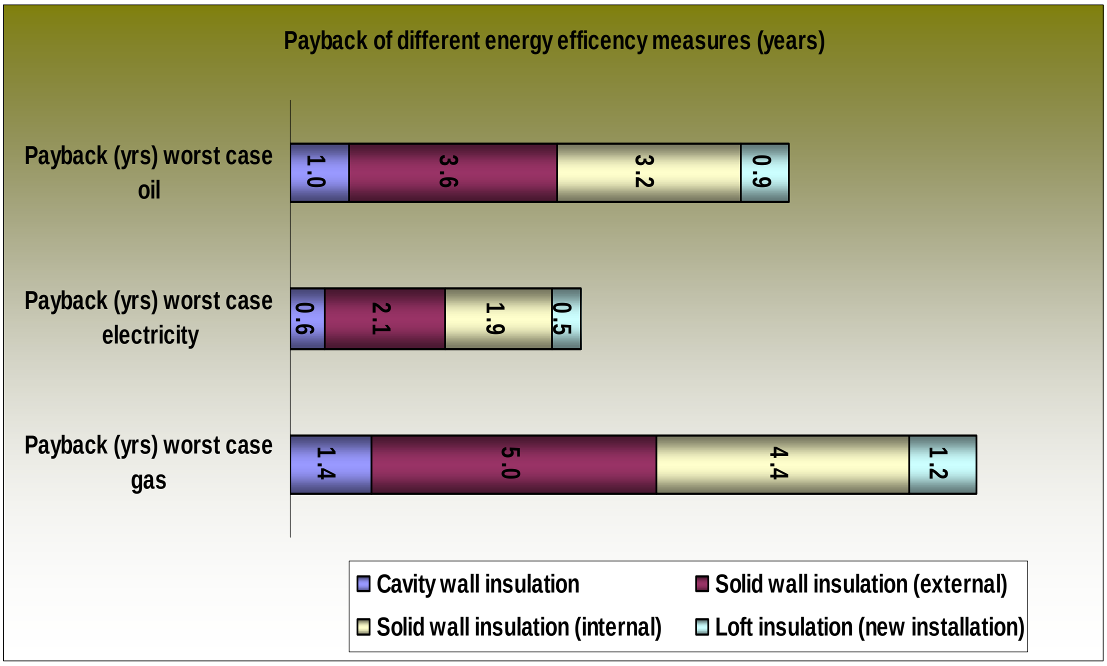

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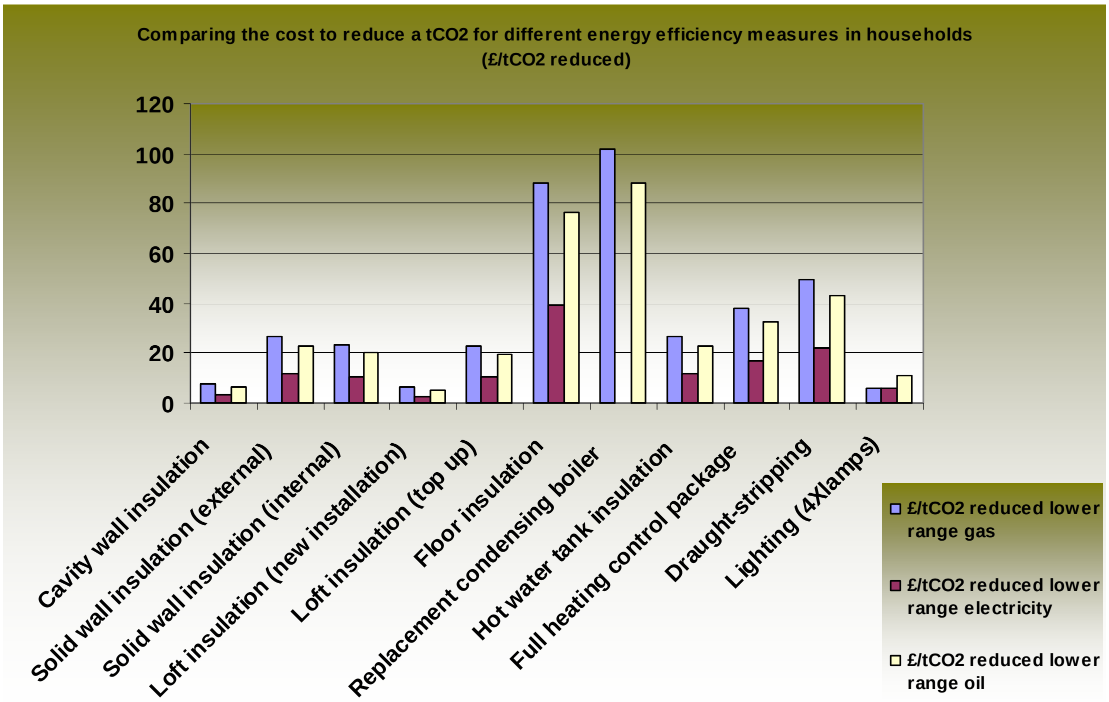


Appendix 8: Comparing the CO_2 saving potential and cost effectiveness of different micro-generation technologies

Derived from Energy Savings Trust figures:

Technology	Size KW	Average Cost	Lower cost	Upper cost	Typical CO2 saving/yr lower range	Typical CO2 saving/yr upper range
Biomass Stove	9	£3,000	£2,000	£3,000	£1	1
Biomass (pellet) Boiler	15	£9,000	£5,500	£12,000	6	10
Ground Source Heat Pump	7	£10,000	£7,300	£11,800	2	8
Air Source Heat Pump	5	£8,500	£6,000	£9,000	0.5	0.5
Solar Water Heating	3.5	£4,100	£3,200	£4,500	0.33	0.6
Solar PV	2.5	£15,500	£10,000	£18,000	0.3	0.5
Wind turbine	1	£1,400	£1,500	£3,000	0.25	0.6
	2.5	£10,375	£10,000	£13,000	1	1.5
	6	£21,000	£18,200	£25,000	2	4

Assumptions

All assume domestic installations in gas heated 3 bed semi detached houses except GSHP and biomass boiler

Biomass Boiler and GSHP assume installation in a 4 bed detached house and savings are derived from a weighted average of savings from non-gas households.

All system cost assumptions are final install costs using Low Carbon Building Programme data from 4th May 2007 export

GSHP saving depends on fuel type replaced

Wood chip price is for purchases of around 4 - 5 tonnes

SWH savings are based on 2007 BRE SWH figures

Source for Wood Chips and Wood Pellets prices:
http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,59188&_dad=portal&_schema=PORTAL

Wind financial savings assumes 4,150kWh per year domestic electricity consumption, with 40% of generated electricity consumed on site, 60% sold back to grid (plus any excess above 4,150 kWh/yr exported)

PV financial savings assume 50% of generated electricity consumed on site, 50% sold back to grid.

Appendix 9: Installation of a wood fuelled boiler: A Case Study

Please refer to www.westsomersetonline.gov.uk/climatechange for a separate document

Appendix 10: More figures on energy use in West Somerset

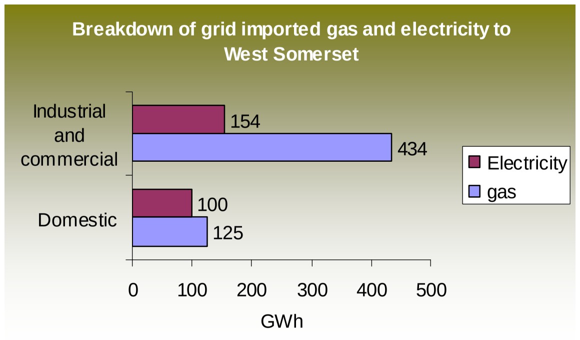
Source: derived from DTI regional energy statistics (DUKES)

Gas sales and numbers of customers by region and area, 2004

	Domestic consumers (1)		Commercial and industrial consumers		All consumers		Sales per consumer	
NUTS4 Area (2) **and Government Office Region**	Sales 2004 - GWh	Number of consumers (thousands)	Sales 2004 - GWh	Number of consumers (thousands)	Sales 2004- GWh	Number of consumers (thousands)	Domestic- kWh	Commercial and industrial - kWh
West Somerset	125	7.27	434	0.13	559	7.40	17,188	3,310,875

Regional and local electricity consumption statistics, 2004 (experimental)

	Domestic consumers		Commercial and industrial consumers		All consumers		Sales per consumer	
NUTS4 Area and Government Office Region	Sales 2004 - GWh	Number of MPANs (thousands)	Sales 2004 - GWh	Number of MPANs (thousands)	Sales 2004 - GWh	Number of MPANs (thousands)	Average domestic consumption kWh	Average industrial and commercial consumption kWh
West Somerset	100	17.0	154	2.6	253	19.5	5,875	59,481



Appendix 10: More figures on energy use in West Somerset

Total final energy consumption at regional and local authority level: 2004 in Gwh

		Coal[6]			Manufactured fuels[7]			Petroleum products[6]			
	NUTS4 Region	Industry & Commercial	Domestic	**Total**	Industry & Commercial	Domestic	**Total**	Industry & Commercial	Domestic	Road transport	Rail
419	West Somerset	1.5	10.9	**12.4**	0.0	0.0	**0.0**	103.6	103.9	365.0	0.0
422	**SOUTH WEST**	**1,523.9**	**701.7**	**2,225.6**	**11.3**	**56.2**	**67.5**	**10,680.3**	**6,768.9**	**45,915.0**	**1,436.7**
451	**Great Britain**	**25,847.4**	**10,876.4**	**36,723.9**	**6,188.8**	**2,869.6**	**9,058.4**	**197,705.5**	**29,982.7**	**508,278.1**	**10,044.5**
452											
453	**Northern Ireland and Un- Allocated**	..	..	..	..	..	..	..	..	..	..
454											
455	**UK**	**27,660.9**	**12,027.3**	**39,688.2**	**6,190.2**	**3,153.2**	**9,343.5**	**203,564.2**	**38,683.7**	**525,892.5**	**10,047.3**
456											
457	**Energy Consumption as in DUKES[5]**	**26,868.0[1]**	**12,110.2**	**38,978.2**	**7,780.5[2]**	**3,097.2**	**10,877.7**	**190,501.2[1]**	**36,075.6**	**491,028.5**	**2,154.7**

458
459 (1) As shown in table 1.1 of DUKES 2005. Includes Autogenerators, Heat Generation, Energy Industry use, Industry, Public administration, Commercial, Agriculture, Miscellaneous
460 (2) As shown in table 2.4 of DUKES 2005. Includes Patent fuel manufacture, Unclassified, Iron and steel
461 (3) As shown in table 4.3 of DUKES 2005
462 (4) As shown in table 5.5 of DUKES 2005
463 (5) Figures from table 1.1 of DUKES 2005 unless otherwise stated
464 (6) Includes coal/petroleum (as appropriate) consumed in all sectors mentioned in footnote (1)
465 (7) Includes only manufactured solid fuels and not derived gases
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467
468
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Continued:

		Natural gas			Electricity			Renewables & Waste	
1	**Total final energy consumptior**								
3	NUTS4 Region	Industry & Commercial	Domestic	**Total**	Industry & Commercial	Domestic	**Total**	**Total**	**Total**
414	Tewkesbury	429.1	485.7	**914.8**	348.2	174.5	**522.8**	**7.3**	**3,534.8**
415	Torbay	315.0	873.8	**1,188.8**	276.7	279.5	**556.2**	**10.9**	**2,587.1**
419	West Somerset	433.7	124.9	**558.6**	153.7	99.7	**253.4**	**2.8**	**1,399.6**
422	**SOUTH WEST**	**16,950.4**	**28,606.4**	**45,556.8**	**15,189.0**	**11,517.8**	**26,706.9**	**1,108.1**	**140,465.7**
451	**Great Britain**	**271,181.5**	**411,988.2**	**683,169.6**	**187,801.3**	**119,745.0**	**307,546.4**	**14,884.3**	**1,797,393.4**
452									
453	**Northern Ireland and Un- Allocated**	..	..	**303,100.0**	**8,915.5**	**3,244.4**	**12,159.9**	..	**315,259.9**
454									
455	**UK**	..	..	**986,269.6**	**196,716.8**	**122,989.4**	**319,706.2**	**15,163.8**	**2,148,359.0**
456									
457	**Energy Consumption as in DUKES(5)**	..	..	**1,035,560.0(3)**	..	..	**323,711.0(4)**	**8,545.8**	**2,137,432.7**
458									
459	(1) As shown in table 1.1 of DUKES 2005.								
460	(2) As shown in table 2.4 of DUKES 2005.								
461	(3) As shown in table 4.3 of DUKES 2005								
462	(4) As shown in table 5.5 of DUKES 2005								
463	(5) Figures from table 1.1 of DUKES 2005								
464	(6) Includes coal/petroleum (as appropriat								
465	(7) Includes only manufactured solid fuels								
466									
467									

Appendix 11: Woking Borough Council ESCo Case Study

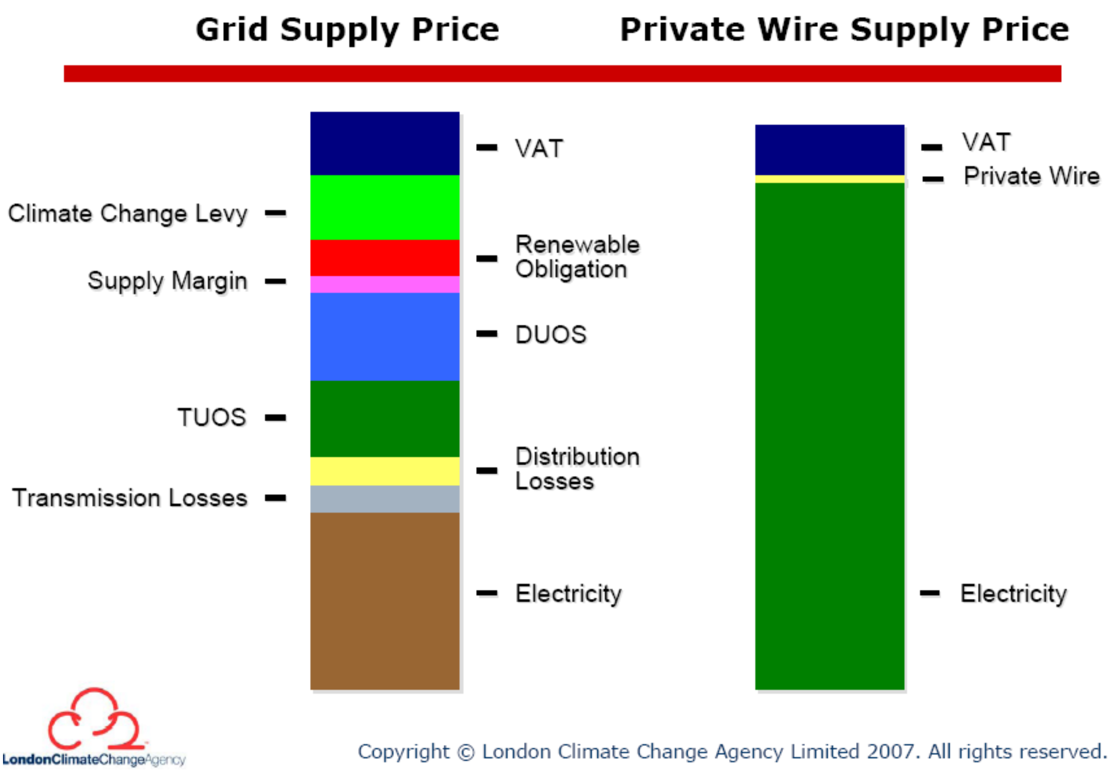
Please refer to www.westsomersetonline.gov.uk/climatechange for a separate document

Appendix 12: Private wire approach

The Case of Woking Borough Council included as Appendix 11 implemented a private wire approach. Other local authorities are also considering this approach as a way of maximising local opportunities for decentralised generation for community benefit.

Private wire enables green electricity to be sold directly to the customer and avoids transmissions and distribution charges and electrical losses through the national grid. In the case of Woking this enabled residents and business users to benefit from lower energy prices and bespoke contracts. Furthermore, profits were reinvested into the energy efficiency fund to deploy more projects.

The following depicts the losses through grid imported energy through the financial and physical loses to the community inherent within the system. By comparison the private wire supply eradicates many of the losses through the grid because it is more locally generated which reduces physical losses. The ownership of the distribution sits within the Energy Service Company (ESCo) which means that other parties do not have to be compensated for transmission and distribution reducing the cost of a unit of energy.



Transmission Network Use of System (Tuos) and Distribution Use of System (Duos) are both costs associated with centralized generation systems – this cost is passed through to the consumer along with connection charges, climate change levy, supply margins and renewable obligations. Moving to a decentralized system will eliminate these costs as well as reducing the physical transmission losses.