

Stroud Town Council

Carbon Footprint Study

Cllr Dave Cockcroft, November 2007

Introduction

This is the baseline assessment report for the carbon footprint of Stroud Town Council. It was conducted in house by Cllr Dave Cockcroft with data collection by Rachel Managhan and Sue Edwards and support of all staff. Suggestions for improvements to this report in the future, or observations on any omissions, are most welcome.

A carbon footprint is a calculation of the weight of carbon dioxide emitted by energy used and in the production of other resources consumed. There are a wide range of carbon foot printing tools available and they produce varying results dependent on the conversion factors used for gas, electricity and liquid fuels. This report uses Defra's Environmental Reporting Guidelines for which are used for the purposes of Environmental reporting, the UK Emissions Trading Scheme and Climate Change Levy agreements.

Executive Summary

Stroud Town Council has a modest carbon footprint based on primary energy use of 20 tonnes CO₂ per annum. Adjusted for purchasing renewably generated electricity this is reduced to 12 tonnes CO₂ per annum.

In addition staff commuting contributes approximately 4 tonnes of CO₂. There is also a small contribution from consumables and waste. Although no footprint is calculated for these the total is estimated as less than 10% of the primary energy use footprint.

Baseline Carbon Footprint for STC for year to June 2007	
Primary energy use footprint	20 Tonnes CO ₂
Adjusted for green fuel use	12 Tonnes CO ₂
Secondary activities footprint	
Staff commuting	4 Tonnes CO ₂ approx
Christmas lights	1.5 Tonnes CO ₂
Paper	1.5 Tonnes CO ₂ estimated
Other consumables and waste	not calculated, estimated < 10% primary

By comparison the national average carbon footprint in 2006 was 9.4 tonnes CO₂ per person.

Although STC carbon footprint is modest the council should aim to reduce total energy use year on year and not just reduce the adjusted carbon footprint by purchasing green power and bio-fuel.

The council should continue to monitor energy use and produce an annual carbon footprint report. Targets should be set to achieve 20% savings on the primary energy footprint over these baseline figures by 2010 and 5% per annum thereafter.

Consideration should be given to purchasing carbon offsets for our remaining footprint to make the council's activities carbon neutral. This would cost about £100 per annum on current figures.

To make a more significant contribution to reducing total carbon emissions the council should facilitate energy saving in homes, businesses, schools, public buildings and travel in the wider community. There are around 6,000 households and 13,000 people living in the parish and by helping them save energy and reduce their carbon footprint we will have much greater overall impact.

STC carbon footprint should be assessed annually and compared to this baseline. Procedures will be put in place to do this and a standard worksheet prepared for council staff to complete. The cost of producing such an annual report is small and should form part of our normal accounting practice.

Primary Energy Use

This is the energy used by the council to heat and power buildings and office equipment and the fuel used by vehicles and grounds works equipment.

Council Owned Buildings

Thanet House, London Road – 18th Century building which includes reception area, offices , meeting room and service rooms.

Plus two independent one bedroom flats above. The flats are managed and run by Sanctuary Housing. Originally refurbished in 1992/3 and being of the same solid wall construction as the main building they are unlikely to current standards for insulation. However Sanctuary Housing Group has recently been awarded the Energy Efficiency Accreditation Scheme (EEAS) quality standard from the Carbon Trust and so are well versed in energy saving. They have strong environmental standards and a commitment to low energy use in buildings since this is beneficial to low income tenants. It may be worthwhile writing to Sanctuary to ask whether the efficiency of the flats has recently been assessed and if not whether it could be done. There are several

years left to run on the lease arrangement so STC has no direct control of the flats for the time being.

Council Managed Buildings

The Chapel, Bisley Road – 19th Century building providing a store room, a workshop, staff rest room and service rooms for the grounds maintenance team.

Council Vehicles

During the reporting period of this assessment the council leased two diesel vehicles for grounds maintenance, a pickup truck and a transit van. In addition there are ride on mowers and other powered equipment.

Thanet House – Town Council Offices

Heating

Thanet House has gas central heating and hot water on demand from an energy efficient condensing combi boiler. There is little hot water use so the majority of the energy used is for heating. We have figures for 2 years and there is significant difference with year to June 06 using 38% more energy than the year to June 07. Heating requirement varies with external temperature, as well as with setting of heating system controls (timers and thermostats). Regional degree days¹ show that the year to June 07 was a very mild year with 28% less degree days than the average and 35% less than the previous year.

Period	kWh
July - September 05	62
September - November 05	6585
December - March 06	10156
April - June 06	472
Total – year to June 06	17275
July - September 06	0
September - November 06	2432
December - March 07	7561
April - June 07	2515
Total – year to June 07	12508

So the majority of the difference in the two annual totals can be accounted for by the difference in degree days. In future years we will need to do more precise degree day adjustment in order to assess any changes in consumption. The Energy Neighbourhoods² project will provide a toolkit for making these calculations.

In calculating this baseline for CO₂ emissions for this we'll take an average of the two years and multiply by the conversion factor of 0.19 kg CO₂ per kWh for natural gas.

Thanet House gas related CO₂: 2800 kg per annum

Electricity

It's not clear where Thanet House uses most electricity but there is a significant use for lighting, with computers and other office equipment making substantial contributions. In addition there is also ventilation system, air conditioning unit, a fridge and water cooler. It will be useful to install an electricity monitor³ to improve knowledge of where the power is used. The figures below cover the year to May 07 and similar figures for earlier periods indicate this usage is typical.

Period	kWh
May - August 06	2932
August - November 06	3400
November - February 07	2971
February - May 07	3162
Total	12465

There is more CO₂ produced for each unit of electricity consumed, compared to gas, due to inefficiencies⁴ in power generation and distribution. Each kWh of electricity is produces 0.43 kg of CO₂.

Thanet House electricity related CO₂ emissions: 5360 kg per annum

STC used Good Energy a green energy supplier that provides 100% renewably generated electricity. Many carbon footprint calculators will count this as producing zero CO₂, although this is an under estimate. The problem with this is it can hide the actual consumption and discourage efforts to reduce use. Hence the use of 2 headline figures in this report, STC's full carbon footprint and the adjusted figure for green fuels.

The Chapel – Bisley Road Cemetery

The Chapel is the grounds maintenance team headquarters. It is used as a depot and office. There is no gas so the building footprint is based on electricity consumption. Some of the bills for the Chapel are estimated so the period is extended to include metered readings either side of the estimates and averaged, with an adjustment, to allow for the inclusion of two winter periods in the 18 month period.

November - February 06	3321
February - May 06	1479 Estimate
May - August 06	1479 Estimate
August - November 06	1479 Estimate
November - February 07	3126

February - May 07	1624	
Total 18 months	12508	
Pro-rata 12 months	8339	Too high
Adjusted annual total	7754	

Electric space heaters are used as well as an immersion heater for the hot water tank. There are also some powerful 500W halogen lights used to light inside and out although these are not used for extensive periods.

Cemetery Chapel electricity related CO₂ emissions: 3330 kg per annum

Vehicle and Equipment Fuel

The ground works team use diesel in vehicles and petrol for other equipment like mowers. Since these figures were obtained there has been a change in vehicles and some equipment so savings are expected in the next year. The diesel truck will also be run partly on bio-diesel, this will be included in the adjusted total in future years.

Month	Vehicle	Litres	Total
Jul-06	Y569JFO	122.3	
	VN03VXD	156.3	278.6
Aug-06	Y569JFO	65.63	
	VN03VXD	203.67	269.3
Sep-06	Y569JFO	139.8	
	VN03VXD	156.3	296.2
Oct-06	Y569JFO	128.4	
	VN03VXD	160.5	289
Nov-06	Y569JFO	130	
	VN03VXD	150.7	280.7
Dec-06	Y569JFO	113.4	
	VN03VXD	54	167.4
Jan-07	Y569JFO	130.5	
	VN03VXD	92.7	223.1
Feb-07	Y569JFO	121.4	
	VN03VXD	127.1	248.5
Mar-07	Y569JFO	62.9	
	VN03VXD	98	160.9
Apr-07	Y569JFO	126.5	
	VN03VXD	147.6	274.1
May-07	Y569JFO	20.2	
	VN03VXD	96	
	VE56	121.9	238.1
Total year to May 07			2725.9

To convert litres of diesel to CO₂ emissions multiply by 2.68 to give:

Diesel vehicle fuel CO₂ emissions: 7300 kg per annum

Other fuel use is a less clear from the figures to hand but use of unleaded petrol for the year to May 07 is much lower so the accuracy of the figures is not crucially important.

	Unleaded	2 stroke
Aug-06	4.9	2
Oct-06	55.4	2
Nov-06	39.4	
Jan-07	38.0	1
Feb-07	74.6	
Mar-07	59.0	
Apr-07	64.7	
Apr-07	46.7	
May-07	76.5	
Total	459.2	

Conversion factor for petrol is 2.3 kg CO₂ per litre – so:

Petrol fuel CO₂ emissions: 1050 kg per annum

Primary CO₂ Emissions Totals

The total from primary fuel use – that is gas, electricity, diesel and petrol.

Electricity:	8690 kg
Natural gas:	2800 kg
Liquid fuels:	8350 kg
Total:	19840 kg or 20 tonnes

Adjusted for Good Energy electricity at 10% emissions and bio-diesel (none in year assessed) at 25%:

Adjusted total: 12000 kg or 12 tonnes

To offset this with a government accredited carbon offset scheme⁵ will cost around £100 – something the Council may wish to consider.

Secondary Energy Use

This is a provisional assessment of the energy use in areas like staff commuting and embedded in the consumables we use. This is more difficult to calculate but is estimated to be much less than the primary energy use.

Commuting

Annual round trip commuting distance by car totalled for all current staff is approximately 15000 miles or 24000 km. An average conversion factor for a of mix of cars is 180g per km – so the total commute footprint is:

Commuting CO₂ footprint: approximately 4300 kg per annum

It's difficult to attribute this figure as part of the Council's carbon footprint since the staff would have jobs somewhere, if they didn't work for STC, and this could result in more or less commuting distance. However it is a significant figure and the largest of all the secondary emissions sources so some attention should be given to ways to reduce it.

Christmas Lights

The Christmas lights are metered and billed separately and last year totalled 3524 kWh. This is based on 14 cross street displays of 745W each and 400 other 15W bulbs. These were on from 3.30 until 10pm for 32 days. Conversion factor for electricity is 0.43 kg CO₂ per kWh. This is not purchased from a green tariff.

Christmas lights CO₂ footprint: 1500 kg

Consumables – Office and Chapel

There are estimates for some consumables based on purchasing records.

- 170 reams of A4 copier paper per year
- 2,500 envelopes per year
- 100 pens per year
- hundreds of plastic bags for bins, dog mess and litter
- other miscellaneous grounds maintenance consumables

The largest of these is the paper use for which an estimate is possible. There are no government figures for CO₂ footprint of a ream of paper but an assessment by GreenPDF comes up with an average figure of 8kg per ream.

Paper use CO₂ footprint: approximately 1500 kg

No figures are available for the carbon footprint of the rest of these items but it is judged to be small compared with our primary energy use footprint.

Waste

The office produces a minimal amount of waste. In general 2 waste bags per week consisting of kitchen waste including plastic lunch containers. 10 bags of waste paper every sixth months are collected and go for recycling.

Grounds maintenance green waste - about 2m³ a month is able to be processed on site with our chipper. Other green waste is currently skipped up to Babdown where it is processed into either mulch or compost, currently 5m³ a month.

Dog mess is skipped in special yellow clinical waste bags and goes straight to landfill, currently 5m³ a month.

Litter bin waste in heavy duty black bin liners (to protect staff and prevent waste spreading) is skipped to Babdown and sorted for recyclables.

General waste is skipped to Babdown and sorted for recyclables. Litter and general currently 5m³ a month. We don't know how much is recycled.

No estimate is available for the carbon footprint of this waste but again it is judged to be minimal compared to primary energy use.

Areas for improvement

Vehicle fuel

Significant steps have already been taken by the new ground maintenance manager in replacing two vehicles with one multi purpose truck and a road going multi purpose tractor unit. This should reduce total fuel consumption over the year. It is also planned to use some bio-diesel sourced carefully from European rapeseed oil and hence has a lower carbon footprint than mineral fuel and some other bio-fuels especially those produced from tropical palm oil. Fuel purchases need to continue to be monitored and distinction made between bio-diesel and mineral diesel purchases.

Staff commuting is also has a significant carbon footprint. Measures should be considered that would reduce this. There is very limited travel required by the council staff in the course of their duties other than routine grounds maintenance movement of people, equipment and waste.

Electricity

A major electricity use in Thanet House is the lighting in the main office which, although low energy, has a total of 128 strip lights of 18W each. This is over 2kW total and much of it is on throughout the day as the central office area is too dark to work in. Savings could be made by turning off lights in sections of the room when not in use although this is inconvenient. It may be worthwhile investigating different

lighting units and different control systems. Estimates of energy saving could be prepared before purchasing decisions are made.

Use of the air conditioning unit in the main meeting room should be kept to a minimum. Other high power equipment such as projectors should be turned off when not in use.

An energy monitor should be installed for a few months to create awareness of power use and work out what's consuming most power and when. SWEA have monitor units available and it should be possible to loan one.

In the Cemetery Chapel it is space heating and lighting that are the main uses. This should be looked at to see if timer controls could be added to heaters or if heating could be reduced to a smaller insulated office area.

Gas

Thanet House heating related emissions could be reduced by making best use of boiler and heating controls and improved insulation. However the total CO₂ produced by the heating system is half that from electricity use and there is unlikely to be significant gains in this area.

It is however worth checking the timer settings on the combi boiler are appropriate to working and meeting hours. The next time the system is serviced the engineer should be asked to show staff how to optimise performance for energy efficiency.

It is recommended that improving insulation is considered as an option when related building repair works are being done, since the incremental cost is often minimal. For example the end wall of the building is budgeted for re-rendering in the next couple of years. Estimates should be obtained for external insulation to be added at the same time since this is a solid wall and as such has poor thermal properties.

The front window is single glazed and will have considerable heat loss. It would be possible to make some calculations of potential energy saving of replacement with modern double glazed windows to see if such a change is worthwhile.

Activities not considered

No consideration has been made of water use, planting and land use or consequences of grants and funding other organisations. No estimate has been made of councillor travel footprint whilst engaged on Council business.

These could be considered in the future and whilst difficult to estimate accurately it might be that some activities, for example appropriate maintenance of Bisley Road Cemetery are carbon sinks that help reduce our overall footprint.

Conclusions

The executive summary presents these in full. In summary STC has a modest carbon footprint but should still seek to minimise it by sensible and cost effective means, reducing year on year by at least 5%.

To make greater impact in total carbon savings the council should seek to facilitate significant energy saving measures and, where appropriate, renewable power generation within all sectors of the wider community.

Footnotes

¹ – Degree days are quantitative indices that reflect demand for energy to heat or cool houses and businesses. They are calculated over a period of time (typically a year) by adding up the differences between each day's mean daily temperature and the "balance point" temperature of 18°C.

² – Energy Neighbourhoods is a community energy saving project with some European funding that STC will hopefully be participating in over the next couple of years. It compares energy savings in towns across Europe and figures are adjusted to allow for external temperature differences by using degree day calculations.

³ – An energy monitor shows building electricity use at any instant and some also accumulated use for the past day, week and month. For example see www.currentcost.com

⁴ – Carbon offsetting is grant funding projects to reduce carbon emissions elsewhere, however it's important to first make cost effective savings in one's own emissions and only offset the remainder. There is currently no government accreditation for offset providers although Defra has held a consultation and will be launching a scheme at the end of this year or early 2008.

⁵ – electricity generation has a larger footprint per kWh, even if the power station is fuelled by gas, since there is a great deal of waste heat. In combined heat and power plants (CHP) the waste heat is used to heat nearby buildings. However most thermal power stations in the UK are situated away from centres of population and simply dump the waste heat.

CO₂ conversion factors used in this report are based on The Carbon Trust Conversion Factors – see: http://www.carbontrust.co.uk/resource/conversion_factors