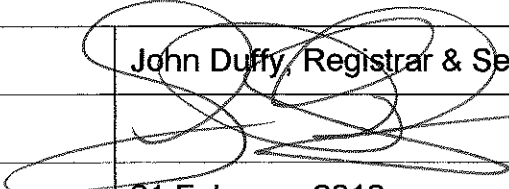


# Carbon Management Plan

Owner:	John Duffy, Registrar & Secretary
Approved:	
Date:	21 February 2012
Version:	02 (replaces Version 1, February 2011)
Next review due:	February 2013

## **1.0 Introduction**

The University of Sussex is set in an attractive campus bordered by the recently designated South Downs National Park, between Brighton and Lewes. The University has over 10,500 students<sup>1</sup> and over 2,200 members of staff<sup>2</sup>. The campus comprises of 94 hectares of land and approximately 209,000 square metres of buildings<sup>3</sup>, 18% of which is listed<sup>4</sup>.

As a responsible institution, Sussex intends to grow and develop in a sustainable manner. This is confirmed in the University's Corporate Plan, *Making the Future*. Goal 8 of that plan states that Sussex intends "to create a sustainable university, with a well-functioning and reliable infrastructure, that is financially, socially and environmentally sound".

This Carbon Management Plan forms an integral part of the University's Environmental Management System. Sussex was awarded *EcoCampus* Gold accreditation in November 2011, and is actively working towards Platinum accreditation for completion in 2012.

## **2.0 Responsibilities for carbon management**

The Energy & Environment Manager is responsible for overall environmental performance and for carbon management in particular. This is a senior management position, reporting to the Director of Estates and Facilities Management. Ultimately, the Registrar and Secretary is responsible for corporate governance and compliance, including the Carbon Reduction Commitment.

The approval process for policies, strategies, objectives and targets for carbon management is through the Capital Programmes Committee (formerly the Physical Resources Committee). This is an authorised committee of the University's Governing Body and is empowered to exercise executive decision making regarding strategic matters.

## **3.0 The Carbon Management Policy**

The University's carbon management policy is embedded within its Environmental Policy. This was revised and approved in May 2009 by the former Physical Resources Committee, and is publicly available from the Energy and Environment web page at <http://www.sussex.ac.uk/efm/1-2-20.html>. It states that the University is committed to "reducing its overall carbon emissions across the campus relative to its building floor area". It will achieve this by "maximising energy efficiency, the use of renewable resources and low carbon technology".

<sup>1</sup> 10,562 Full Time Equivalent (FTE) teaching and research students in 2007/08, as per the 2007/08 Estates Management Statistics (EMS) return

<sup>2</sup> 2,238.04 FTE academic and support services staff as per the 2007/08 EMS return

<sup>3</sup> 208,755 m<sup>2</sup> of Gross Internal Area (GIA) as per 2007/08 EMS return

<sup>4</sup> 18.4% of GIA is listed under the Planning (Listed Buildings & Conservation Areas) Act 1990 (2007/08 EMS return)

Notwithstanding that the policy statement refers to *relative* reductions in carbon emissions, the University is striving to, and has achieved, *absolute* reductions in carbon against the baseline carbon footprint year of 2005/06, in accordance with the Higher Education Funding Council for England's (HEFCE) "*Carbon Reduction Target & Strategy for higher education in England*" (January 2010/01). The challenge at Sussex is to maintain absolute reductions year-on-year, given the intended expansion of the University's real estate.

#### **4.0 Real Estate Strategy**

The University currently occupies a gross space (residential and non-residential) of 208,764m<sup>2</sup>. The Estates Strategy identifies that, between 2009 and 2015, total new space developed<sup>5</sup> equates to circa 52,300m<sup>2</sup>, which will be offset by the demolition of 17,000m<sup>2</sup> of buildings either outdated, or in poor condition. The overall space gain is therefore 35,200m<sup>2</sup> (or 17%), taking the gross internal building area to 244,000m<sup>2</sup>.

Clearly there is a conflicting challenge between expanding the estate and reducing absolute carbon emissions. However, as the Corporate Plan indicates, the underlying rationale underpinning the Estates Strategy is to replace poor condition buildings with new developments constructed to a far higher standard of environmental design. The University uses the Building Research Establishment's Environmental Assessment Method (BREEAM) to achieve a design standard which will deliver against the Plan statement.

To date, Sussex has achieved BREEAM "Excellent" for its recently new buildings:

- Fulton Building
- Northfield student residences
- New Academic Building (design stage – completion expected July 2012).

Incorporating improved environmental design standards into its new developments will contribute to the reduction in absolute carbon emissions, in spite of the 17% growth in the physical estate. However, in order to maintain absolute reductions in carbon emissions, significant investment will be required into renewable and low carbon technologies.

#### **5.0 The Carbon baseline**

SQW Consulting produced a report to HEFCE entitled "*Carbon baselines for individual Higher Education Institutions in England*" in January 2010.

This identified the carbon baseline for the University of Sussex for the academic year 2005/2006 as **22,174 tonnes of carbon (CO<sub>2</sub>)**. This data was derived from the EMS statistics for that period, applied to the 2009 carbon conversion factors published by the Department for Environment, Food and Rural Affairs (Defra).

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<sup>5</sup> This assumes that all currently conceived (both approved and potential) projects identified in the Estates Strategy are developed, subject to capital funding provision.

Carbon conversion factors were revised by Defra in 2010, and the electricity and gas consumption data for that period has also been reviewed by the University. The emissions data for Scope 1 and Scope 2 emissions is presented in Appendix A. The World Resources Institute defines three categories of carbon emissions, and these are used internationally to assess carbon performance.

## **5.1 Scope 1 Direct Emissions**

Scope 1 Direct emissions are defined as those resulting from activities within the organisation's control, including on-site fuel combustion, manufacturing and process emissions, refrigerant losses and company vehicles.

The significant Scope 1 emissions for the University are associated with natural gas used in the boilers for heating and hot water generation across the majority of campus.

Emissions associated with fuel use other than gas used in boilers on site has been reviewed as part of the University's Carbon Reduction Commitment Energy Efficiency Scheme (CRCEES) obligations. This accounts for less than 0.01% of total scope 1 emissions, and has therefore been excluded as insignificant in accordance with CRCEES reporting guidelines.

Scope 1 emissions for the last 2 years are illustrated in Table 1:

**Table 1 – Scope 1 Direct emissions; energy use**

<b>GAS</b>	<b>2009-10</b>	<b>2010-11</b>	<b>% variance</b>
Total Site consumption - kWh	44,373,622	43,704,169	-1.5%
Total gas consumption kWh per m <sup>2</sup> GIA	257.77	220.26	-15%

## **5.2 Scope 2 Indirect Emissions**

Scope 2 Indirect emissions are defined as those resulting from electricity, heat or steam purchased and used by the organisation.

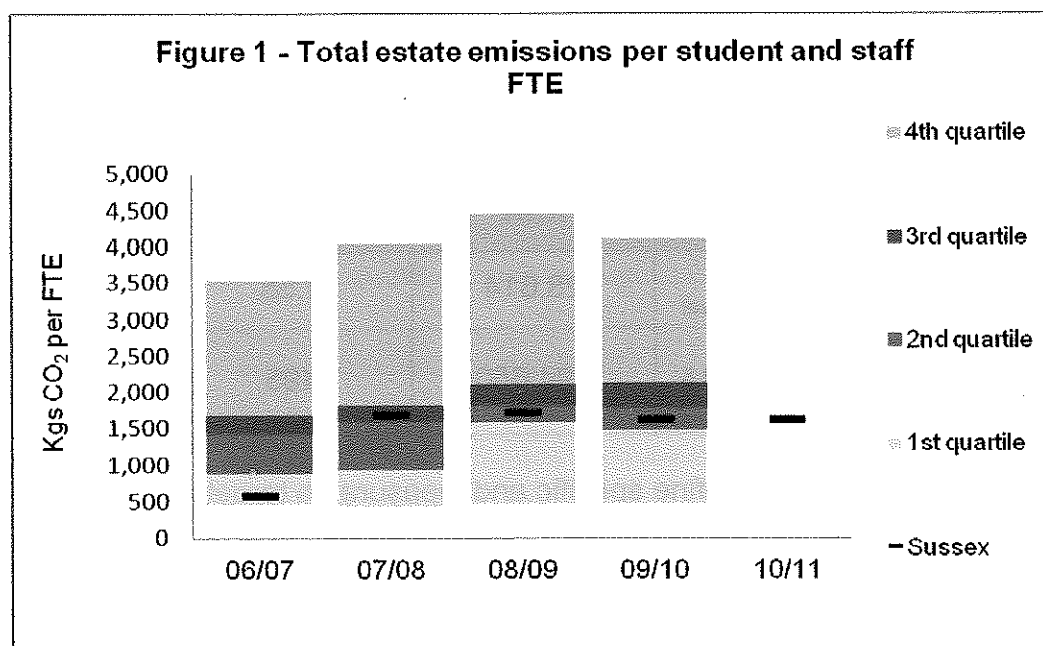
Scope 2 emissions for the last 2 years are illustrated in Table 2:

**Table 2 – Scope 2 Indirect emissions; energy use**

<b>ELECTRICITY</b>	<b>2009-10</b>	<b>2010-11</b>	<b>% variance</b>
Total Site consumption - kWh	24,770,958	24,950,985	+0.73%
Total electricity consumption kWh per m <sup>2</sup> GIA	143.89	125.75	-13%

The net increase in electricity use is considered to be directly attributable to the growth in the estate in the last year.

In relation to carbon emissions, the total estate emissions per student and staff FTE reported in the 2010/11 Estates Management Statistics is 1,620 kilos of CO<sub>2</sub>, or 9% less than the sector median of 1,770 kilos, illustrated in Figure 1.



Sussex performance over the last 3 years is steadily improving, being positioned in the 2<sup>nd</sup> quartile and above the median of the 1994 and Russell Groups.

### **5.3 Scope 3 Indirect emissions: other**

Scope 3 Indirect emissions (other) are defined as any other indirect emissions from sources not directly controlled by the organisation.

Currently, the submission of Scope 3 data under the Carbon Reduction Commitment (Energy Efficiency) Scheme is non-mandatory, and there is no requirement under the HEFCE guidance on Carbon Management Plans to address Scope 3 emissions.

Notwithstanding that, the University takes a best practice approach to carbon management, and has collated Scope 3 data in order to set realistic targets for voluntary reduction.

Please note that Scope 3 emissions are excluded from the 2005/06 carbon footprint baseline.

### 5.3.1 Employee business travel

Scope 3 emissions arising from air and rail travel undertaken on University business in the 2011 calendar year are illustrated in Table 3. The 2011 calendar year was used as the data for this period is known to be the most reliable.

Carbon conversion factors were used from Defra's *Annexe 6: Passenger transport* (August 2011). Note that the conversion factors differ depending on the type of rail and air travel (e.g. domestic rail vs. Eurostar rail, domestic flights vs. international long-haul flights).

**Table 3 – Scope 3 Indirect emissions; rail & air business travel**

<b>TRAVEL 2011 calendar year</b>	<b>Kms</b>	<b>tCO<sub>2</sub></b>	<b>% of baseline CO<sub>2</sub> footprint</b>
<b>Rail travel</b> Includes domestic & international rail travel	28,614	1.55	0.007
<b>Air travel</b> Includes national, international short-haul & international long haul	494,650	495	2.23

These baselines are used to define specific and measurable targets for carbon reduction within the Carbon Reduction Action Plan (Appendix A).

### 5.3.2 Employee commuting

A detailed travel survey was carried out in April 2009 to identify staff and student use of various modes of transport to campus and distances of travel based on postcodes. The results are summarised in Table 4.

**Table 4 – Scope 3 Indirect emissions; employee commuting**

	<b>Staff Postcodes</b>		<b>Student Postcodes</b>	
	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
The City of Brighton and Hove	1,713	54%	9,263	83%
East Sussex County	685	22%	758	7%
West Sussex County	361	11%	583	5%
Greater London	167	5%	248	2%
Surrey County	36	1%	78	1%
Kent County	26	1%	53	0%
<b>Total</b>	<b>2,988</b>	<b>94%</b>	<b>10,983</b>	<b>98%</b>

A recent survey (7 February 2012) of 1388 campus users (staff, students and visitors) identified that:

- Bus travel was the most frequently used mode overall with 36% share;
- Amongst staff, rail had the highest modal share (35%);
- 23% of staff travelled by car together with 11% of students.
- Overall, 8% of respondents cycled and 20% walked.

A detailed staff and student travel survey is planned for 2013 in order to plot distances and modes of travel to the campus in order to calculate an accurate benchmark against which specific and measurable targets can be assigned to reduce emissions associated with daily commuting to the campus by staff and students.

### **5.3.3 Supply chain emissions**

Defra's *Annex 13; Indirect emissions from the supply chain* has been used to calculate the emissions of the procurement supply chain against the relevant spend categories to derive a kg CO<sub>2</sub>/ £ figure. This data is included as Appendix B.

Emissions arising from the procurement supply chain amounted to 6,583 tonnes CO<sub>2</sub> in 2010/11, providing the baseline against which specific measurable reduction targets are identified within the Carbon Reduction Action Plan.

## **6.0 Carbon Reduction Targets**

Sussex intends to achieve a reduction in carbon emissions of 44% by 2020 against the 2005/06 baseline. Ultimately, by 2050, emissions should be reduced by 80% against the baseline, as defined by the Climate Change Act.

Milestones are important to maintain a continual effort to reduce emissions, and the University has consequently set a milestone target of 29% reductions in absolute emissions by 2015/16. This target can be found in the University's Environmental Objectives and Targets, and is publicly available from the website.

The University needs to reduce absolute carbon emissions by 9,757 tCO<sub>2</sub> by 2020 against the published 2005/06 baseline of 22,174 tCO<sub>2</sub>, thereby reducing its total annual emissions to 12,417 tCO<sub>2</sub>, illustrated in Table 5.

Objectives and targets are translated into a Carbon Reduction Action Plan, based on a 5 year planning cycle. The current implementation plan covers the period 2011 – 2016, and includes SMART targets which will deliver the required reduction of Scope 1, Scope 2 and Scope 3 emissions. This is included as Appendix A.

The Registrar & Secretary, Director of Estates & FM, and the Energy & Environment Manager, are accountable for delivery of carbon reduction measures at the University of Sussex.

Progress is reported on a termly basis to the Capital Programme Committee.

**Table 5 – Carbon reduction performance & targets**

<b>Year</b>	<b>Actual emissions tCO<sub>2</sub></b>	<b>Target emissions tCO<sub>2</sub></b>	<b>% Reduction on Baseline</b>	<b>Reduction achieved tCO<sub>2</sub></b>	<b>Reduction required tCO<sub>2</sub></b>
2005/06	22,174				
2006/07	22,526		-1.59	-352	
2007/08	22,010		0.74	164	
2008/09	21,667		2.29	507	
2009/10	20,979		5.39	1,195	
2010/11	19,024		14.21	3,150	
2011/12		18,404	17.00		3,770
2012/13		17,739	20.00		4,435
2013/14		17,074	23.00		5,100
2014/15		16,187	26.00		5,987
2015/16		15,744	29.00		6,430
2020/21		12,417	44.00		9,757

## **7.0 Carbon Reduction performance, 2005/06 – 2010/11**

Significant reduction in carbon emissions have been achieved over this period:

- The Combined Heat and Power plant is saving 1,224 tCO<sub>2</sub> per annum, or 5.5% of the baseline reporting year (2005/06) emissions;
- Salix Revolving Green Fund projects have saved 1,169 tCO<sub>2</sub> per annum, or 5.3% of the baseline reporting year (2005/06) emissions.

**In 2010/11, the University has achieved a reduction in emissions of over 3,150 tCO<sub>2</sub>, or 14%, against the baseline reporting year.** This reduction is in accordance with the targets, illustrated in Table 5.

A major project is due to commence shortly where a significant amount of internal and external lighting is to be replaced with LED technology, savings potentially 75% of the total electrical load (estimated to be 20%) of total campus electricity use. This will potentially save an additional 11% of carbon emissions against the baseline in the next 12 months.

## **8.0 Carbon Reduction Action Plan; 2013 - 2020**

Beyond 2015, it is likely that significant capital investment will be required in renewable energy and low carbon technologies, subject to acceptable Return on Investment. These *may* include:

- Installation of a biomass boiler to reduce reliance on natural gas. The South East has a significant available wood fuel resource and the potential to reduce carbon emissions will be significant, subject to issues surrounding the delivery, storage and handling of wood fuel;
- Investment in off-campus wind turbine at an established wind farm at Romney Marsh, or the proposed Rampion offshore wind farm. This would overcome significant planning barriers compared to an on-campus wind turbine;
- Investment in an on-campus photo-voltaic array of significant size, either directly or via an Energy Supply Company model;
- Passive energy design of East Slope residential redevelopment, incorporating ground source heat pumps and other environmental design innovations;
- Further optimisation of space use to improve occupancy ratios, allowing closure of additional poor performing buildings not currently identified for replacement under the Estates Strategy.

In order to determine the contribution the above initiatives can make to the 44% reduction in carbon emissions, a full renewable technology assessment needs to be undertaken whereby all options are fully costed in terms of capital and payback. This exercise will commence in 2012/13 in order to fully inform a detailed carbon reduction implementation plan for the period 2013 – 2020.

The Carbon Reduction Action Plan (Appendix A) identifies projects currently underway or expected to commence very shortly.

## **9.0 Conclusions**

The University is committed to achieving its targets for carbon reduction. Not only is this morally appropriate, but it also demonstrates sound business practice and governance, not least in terms of reducing its reliance on finite fossil fuels and its £4M p.a. energy expenditure.

This Carbon Management Plan defines how that reduction will be achieved, and should be considered a dynamic document which evolves and improves over time, adapting to the changing needs of the University.

The University has already demonstrated that it can achieve absolute reductions in carbon emissions, and will continue to be early adopters of new initiatives which further support its intention to grow sustainably.

# APPENDIX A - CARBON REDUCTION PROJECT PLAN 2011 - 2016

## SCOPE 1 & 2 EMISSIONS

Year	Project Description	Carbon reduction potential tCO <sub>2</sub> against baseline	Carbon reduction potential % against baseline	Cost (£)	Payback (Years)	Funding Source
2011/12	Replace old Life Sciences Controlled Environment Cabinets with new energy efficient technology	207	0.94	29,000	0.7	Salix
2011/12	Conduct further detailed building energy surveys inc. thermographic imaging and half-hourly sub-metering to develop building energy profiles and act on recommendations	100	0.45	16,500	2	Salix
2012/13	Replace lighting with LED technology – this project will replace a significant proportion of old lighting with highly efficient LED lights	2,494	11.25	500,000	1.09	HEFCE RGF2
2012/13	Replace all Biology glasshouse lighting from 400W sodium grow light to 100W LED grow light in 9 glasshouses	186	0.84	40,500	1.09	Salix
2012/13	Install PIR controls (& daylight sensors if appropriate) to all internal light fittings	102	0.46	30,000	3	Salix
2012/13	Install all external light fittings with time switch or daylight sensor	74	0.33	20,000	2	Salix
2012/13	Install Variable Speed Drive motors to Mains Water pumping station	50	0.23	28,000	10	LTM budget
2012/13	Replace Sodium streetlights with LED - phase 2	50	0.23	17,500	5	Salix
2012/13	Replace Boiler House and Science Research HV substation transformers with low loss transformers with integral voltage optimisation	17.4	0.08	10,793	3.8	Salix
2012/14	Deliver ongoing behavioural change & awareness programme to encourage staff and students to be more energy efficient	10	0.045	10,000	6.5	LTM budget
2014/15	Install Biomass boiler to Energy Centre subject to	1224	5.52	750,000	5	Capital

	detailed feasibility study						funding
2014/15	East Slope & Park Village redevelopment/connection to DHN	332	1.50	300,000	0		Capital funding
2014/15	Install full Automatic Metering and Targeting (AM&T) across campus and connect via modern bus links enabling improved energy management and control	200	0.90	250,000	10		LTM budget
2013/15	Replace remaining Crittall single glazing with low emissivity double glazing	547	2.5	2,000,000	10		LTM budget
<b>Totals</b>		<b>5,593.4</b>	<b>25.275</b>	<b>4,002,293</b>			

### SCOPE 3 EMISSIONS

2012	Reduce air travel emissions for business use by 10% by end of calendar year 2012 from baseline data of 495 tonnes in calendar year 2011	49.5	0.7	N/A	N/A		N/A
2012	Reduce business travel by car by 10% by end of calendar year 2012 by demonstrating 10% increase in rail travel for business use from 28,614 kilometres in calendar year 2011 to 31,475 kilometres	N/A	N/A	N/A	N/A		N/A
2012/13	Undertake detailed travel survey to determine total distance of commuter travel to campus by staff and students on a daily basis in order to determine baseline carbon footprint from which reduction targets can be defined	N/A	N/A	N/A	N/A		N/A
2012/14	Reduce carbon footprint associated with procurement by 15% by end of academic year 2013/14 from 6,583 tonnes CO <sub>2e</sub> to 5,596 tonnes CO <sub>2e</sub>	987	13.94	N/A	N/A		N/A
2013/14	Determine overseas travel by international students to domicile countries to determine baseline carbon footprint for air travel not associated with University business in order to determine baseline carbon footprint from which reduction targets can be defined	N/A	N/A	N/A	N/A		N/A
<b>Totals</b>		<b>1,036.50</b>	<b>14.64</b>				

# APPENDIX B: SCOPE 3 INDIRECT EMISSIONS (OTHER)

## Supply chain emission factors for spending on products: kgCO<sub>2</sub>e per £

SIC code 2003	Product category	(CO <sub>2</sub> )	(CH <sub>4</sub> )	(N <sub>2</sub> O)	HCFCs	PFCs	SF <sub>6</sub>	(F)	Total kg CO <sub>2</sub> e per £	Total kg CO <sub>2</sub> e
15	Food and drink products	0.55	0.38	0.29	0.01	0.0010	0.0009	342,000	1.23	419,382
21	Pulp and paper, paper products	0.69	0.05	0.02	0.01	0.0008	0.0008	231,678	0.77	178,107
22	Printing matter and related services	0.35	0.03	0.01	0.01	0.0007	0.0006	35,159	0.40	14,036
24.13	Inorganic chemicals	1.06	0.09	0.03	0.02	0.004	0.002	224,000	1.22	273,097
24.14	Organic chemicals	1.11	0.10	0.09	0.06	0.012	0.002	246,000	1.38	338,350
24.4	Pharmaceuticals	0.49	0.05	0.03	0.02	0.002	0.0009	231,679	0.59	136,113
24.6	Other chemical products	0.80	0.07	0.05	0.03	0.005	0.002	79,142	0.96	76,114
26.1	Glass and glass products	1.18	0.06	0.02	0.01	0.002	0.002	123,577	1.28	157,779
30	Office machinery and computers	0.63	0.05	0.02	0.04	0.009	0.005	762,000	0.76	575,558
32	Radio, television and communications	0.37	0.03	0.01	0.04	0.006	0.003	47,890	0.46	21,854
33	Medical and precision instruments	0.44	0.03	0.01	0.04	0.013	0.005	323,000	0.54	174,956
34	Motor vehicles	0.80	0.05	0.02	0.02	0.008	0.007	32,000	0.90	28,925
36, 37	Furniture, other manufactured goods, recycling services	0.52	0.04	0.02	0.01	0.0012	0.0010	220,000	0.58	128,551
41	Mains water	0.64	0.04	0.01	0.01	0.0011	0.0013	455,417	0.71	321,514
45	Construction	0.49	0.04	0.02	0.01	0.0014	0.0013	5,276,000	0.56	2,933,758
64	Post and telecommunications	0.56	0.05	0.02	0.09	0.012	0.004	177,000	0.72	128,041
70	Real estate activities	0.10	0.01	0.01	0.00	0.0003	0.0003	2,122,379	0.12	261,512
71	Renting of machinery etc	0.40	0.07	0.02	0.01	0.0015	0.0012	198,000	0.50	99,017
74	Legal, consultancy, other business activities	0.17	0.02	0.01	0.01	0.0008	0.0005	573,000	0.21	119,084
90	Sewage and refuse services	0.47	1.42	0.10	0.01	0.001	0.012	97,813	2.01	196,851
	<b>TOTAL</b>									<b>6,582,601</b>

CONVERSION FACTOR & CATEGORY SOURCE: DEFRA GHG COMPANY REPORTING AUGUST 2011;  
ANNEXE 13: Indirect emissions from the supply chain

Tonnes CO <sub>2</sub> e	6,583
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