Northwest
REGIONAL DEVELOPMENT AGENCY

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Title: **Greenhouse Gas Footprint report (Carbon Footprint)**
Organise This Ltd.

Written by: **S. Wrigley** ……..

Approved by: **C. Lambert** ……..

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Change Record

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1	Initial issue	Sept 08	

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1. Executive Summary

1.1. Footprint Boundary

This carbon footprint covers the direct and indirect emissions for Organise This Ltd. with the exception of: customer travel to events, customer travel to the Organise This Ltd. office and the small amount of waste produced in what is ostensibly a paperless office. There were two main issues surrounding collection of data which will have reduced the accuracy of the carbon footprint. Firstly Organise This Ltd. share office accommodation with other businesses and it was impossible to get the landlord to provide accurate electricity, water and sewage usage information. Secondly a lot of the companies business travel is paid for by clients which meant the cost of air travel and hotel stays had to be estimated.

1.2. Calculated carbon Footprint

The total carbon Footprint is 32.3 tonnes $CO_{2e.}$ Of this 72% is attributed to business travel, 8% to office electricity and 8% to staff commuting. In terms of the commonly used scope 1, 2 & 3 emissions the split is as follows:

Scope 1 Direct Emissions	0 tonnes CO_{2e}
Scope 2 Indirect Electricity	2,563 tonnes CO_{2e}
Scope 3 Indirect Emissions	29,691 tonnes CO_{2e}
Total	32,254 tonnes CO_{2e}

Unusually there are no scope 1 direct emissions as Organise This Ltd. are not responsible for any direct burning of fossil fuels and they do not own or operate any company vehicles. Almost all of their emissions are indirect and can be attributed to business travel.

The scope 1 and 2 emissions have been calculated using the 2007 Defra published data and have a high degree of accuracy. Scope 3 emissions have mostly been calculated using

Office of National Statistics Economic Input Output conversion factors. This data is less reliable and has a much lower degree of accuracy. It does however allow an analysis of the 'Organise This Ltd.' footprint to identify areas for Greenhouse Gas Reduction. For a more accurate analysis of scope 3 emissions a much more detailed study would be required.

1.3. Recommendations

- Collect and record better data on business travel either in terms of cost of flights, distance travelled by air and class of travel ie economy , business etc.
- Record better details of hotel stays including cost of room and food consumed
- Consider calculating the carbon footprint of business travel using the latest 2008 Defra data.(Defra, 2007) This would require detailed information on the distances travelled by the various modes of transport used.
- Publish the results of the carbon footprint to all stakeholders in the Organise This Ltd. business
- Discuss with the landlord and the other occupiers of the office a plan to monitor and reduce electricity and water usage. This will not only reduce Greenhouse Gas emissions but could lead to savings in terms of rent. (a gain-share approach could be discussed with the Landlord on any savings made)

2. Company Profile

Company Name	Organise This Ltd
Company Address	The Stables Paradise Wharfe Ducie St Manchester M1 2JN
Managing Director	Fiona Pelham
Environment Manager	Fiona Pelham
Reporting Period	August 2007 to July 2008
Number of Employees	2 Full time 1 part time (1day per week)
Company Overview *(include details of all offices, warehouses and factories)*	***Organise This Ltd. is a sustainable event management company providing the following services to clients:*** • creative event ideas benefiting clients, local communities & the global environment, • event management with staff trained in sustainability, • a sustainability report for each event organised, • a targeted sustainable marketing & procurement strategy for events and • implementation of BS8901 the standard for sustainable events ***Organise This Ltd. operate from a 'paperless' office in central Manchester. They do not posses a printer or scanner which helps promote the paperless concept.*** ***All UK travel is done using public transport wherever possible as is staff commuting to work.***

3. Introduction

This report has been written in accordance with the reporting requirements of ISO 14064-1:2006 paragraph 7.3. To date verification against this standard has not been applied for. A cross reference matrix is provided in Annex III to demonstrate compliance. In the context of this report the term 'carbon footprint' is used to describe the result of quantifying the greenhouse gas emissions and removals of an organisation in terms of tonnes Carbon Dioxide Equivalent (CO_{2e}). A detailed explanation of this term can be found in Annex II.

3.1. Climate Change

It is now widely accepted by the majority of governments and scientists that human activity is the cause of recent climate change and that the release of Greenhouse Gases (GHGs) into the upper atmosphere is resulting in Global Warming. The Intergovernmental Panel on Climate Change (IPCC) is forecasting a possible global temperature rise of up to 4 ^{o}C if no action is taken (IPCC, 2007). This would have a major impact on the worlds' climate, ecology and economy. The Stern report (Stern, 2006) looked at the Economics of climate change and argued that "the overall costs and risks of climate change will be equivalent to losing 5% of the global GDP each year, now and forever". It concluded that the costs of reducing and stabilising emissions to acceptable levels could be achieved by spending about 1% of the Global GDP per year.

3.2. International and National targets

Recognising that action is required the International Kyoto Protocol has targeted a 5.2% global reduction in GHG emissions by 2012. Closer to home the UK government targets are currently being enshrined in law with the passing of the Draft Climate Change Bill through Parliament. When it becomes law later this year it will mean that the UK will have to reduce GHG emissions by 30% before 2020 and 60% before 2050.

3.3. Why perform a carbon footprint?

If we are to be serious about meeting these targets, everyone must rise to the challenge. In the UK, according to government figures, 99% of all VAT registered companies are classified as small to medium sized enterprises (SMEs) and between them they account for 47% of the country's annual turnover. Clearly SMEs have a major role to play in governments drive to reduce UK GHG emissions. The first step to reducing emissions is to create a baseline carbon footprint which will identify direct and indirect GHG emissions attributable to the company or its product range. Once this has been done a systematic review of the business can be performed in order to identify ways of reducing GHG emissions.

By quantifying GHG emissions and seeking to reduce them, an SME can also realise cost savings with respect to energy, raw materials and transport. The carbon footprint can also be used as a marketing tool especially as more consumers and investors are seeking out companies with green credentials.

Furthermore when the draft Climate Change Bill becomes law we may see increasing legislation placed on companies to quantify and reduce GHG emissions. Those companies taking a lead in this area may find themselves gaining a competitive advantage.

4. Methodology Overview

4.1. Carbon Footprint Calculator

The carbon footprint calculator used for this study has been developed by the Lancaster University Product Development unit (LPDU). It is a hybrid, excel based calculator using conversion factors derived from Life Cycle Analysis and Economic Input Output Analysis. A detailed description of the methodology can be found in Annex I.

The calculator design aim is to cover all direct and indirect emissions from 'cradle to grave'. A three stage approach is taken as shown in Table 1, which allows an SME to progressively build up a complete carbon footprint in a stepwise fashion. All three phases are compatible with the requirements of ISO 14064

Table 1 calculator phased approach

Stage 1	Goods in to Goods out (factory emissions & company owned or controlled vehicle emissions)
Stage 2	Supplier related / contracted out emissions back to raw material extraction. Plus non company owned transport emissions
Stage 3	Customer use and final disposal stages of products

The calculator results are given in tonnes CO_{2e} and cover all six Kyoto GHGs.

4.2. Boundary Condition Selection

4.2.1. Greenhouse Gases

The six GHGs defined by the Kyoto Protocol are all included in the carbon footprint namely Carbon Dioxide, Methane, Nitrous Oxide, Haloalkanes, Perflourocarbons and Sulpher Hexaflouride.

Apart from CO_2, Organise This Ltd. are not directly responsible for the production of any other of GHG though their operations.

Organise This Ltd. does not have any sinks for GHGs and does not use biomass as a combustion fuel.

4.2.2. Organisational

The organisation boundaries for the direct and indirect GHG emissions were defined as those resulting from all areas of the business under operational control of the Organise This Ltd. Board.

Organise This Ltd. has just one operational site, their main office in central Manchester.

4.2.3. Operational

The Organise This Ltd. business is split into two main areas,

- organising sustainable corporate events and
- providing training and promotion of a sustainable agenda when organising events

Both areas of the business have been included in the carbon footprint and stage 1 & 2 GHG emissions as defined by Table 1 have been considered. It was decided not to include emissions associated with customers travelling to either the Manchester Office or any other site being used for training or event hosting.

Waste: as the Organise This Ltd. office is essentially paperless the small amount of commercial non recyclable waste has been ignored. Staff recycle waste whenever possible.

4.2.4. Baseline Year & Reporting Period

As this is the first carbon footprint for Organise This Ltd. it will become the baseline for future assessments. The carbon footprint has been calculated based on data from the 1st August 2007 to 31st July 2008. All financial data used for Economic Input output analysis is Basic Cost data i.e. excluding VAT and any transport costs billed separately.

4.2.5. Uncertainty

All scope 1 & 2 emissions (direct emissions from all sources owned or under the companies control and indirect emissions from imported electricity) are calculated using

published peer reviewed Life Cycle Analysis (LCA) conversion factors to calculate GHG emissions. There is thus a high level of certainty that these emissions are accurate.

Most scope 3 emissions are derived from economic input output (EIO) analysis conversion factors taken from the Office of National Statistics (ONS) database, (ONS, 1995). This data is over ten years old and is based on an economic model which will not accurately reflect the UK economy today. Thus the emissions associated with scope 3 data are much less certain. Although less certain than the scope 1 & 2 emissions they do provide a good indication as to which areas of the business are contributing most to the overall GHG emissions of the SMEs. It is considered unlikely that the conclusions of this report would be materially effected if more recent or accurate data was available.

It should also be noted that the EIO conversion factors are based on the UK economy and will be less accurate for products and services bought from economies different from that of the UK. For example the calculated embodied carbon of products imported from China will be less accurate than if the product was bought in the UK or Germany.

4.2.6. Estimated Electricity, water and sewage usage

Organise This Ltd. operate out of shared office accommodation. They pay a monthly rent for which they receive all their required heating, lighting and water related services. When approached to provide consumption data for the office the landlord was not particularly forthcoming. Eventually annual water and sewage data was provided however just two months worth of electricity consumption were provided for the period 15th February 2008 to 15th April 2008. The assumptions used to estimate the annual electricity consumption are shown below. Once annual figures had been established for the office this was multiplied by a factor of 2.2 / 20.2 as there are 20.2 staff sharing the office and Organise This Ltd. have 2.2 staff (2 full time and 1 part time)

Electricity calculation :

Month (2008)	Primary Units (kWh)	Secondary Units (kWh)
Feb	362	4676
April	386	4452
Total	748	9128

Thus the monthly average is: (748 + 9128) / 2 = 4,938 kWh per month

As the figures relate to the winter months the following assumption was made.

6 months at 5,000 kWh = 30,000 kWh

6 months at 2,500 kWh = 2,500 kWh

This gives an annual usage of 45,000 kWh for the whole office. Applying the 2.2 / 20.2 factor thus gives:

(2.2 / 20.2) x 45,000 = 4,901 kWh as the annual share for Organise This Ltd. of the office electricity. This was the figure used for the carbon footprint calculation.

Water calculation:

Annual office usage: $14m^3$

Organise This Ltd. share 2.2 / 20.2 x 14 = $1.52m^3$

Sewage Calculation :

Annual sewage charge £10.60

Organise This Ltd. share 2.2 / 20.2 x 10.6 = £1.15

5. Results

5.1. Calculated Footprint

The total Carbon footprint for Organise This Ltd. is 32 tonnes CO_{2e} for the given boundaries described in 4.2.3. This is composed of 3 tonnes CO_{2e} from Stage 1 (internal company emissions) and 29 tonnes CO_{2e} from Stage 2 (Supply Chain / contracted out services emissions). Stage three (customer emissions) are not included in this footprint.

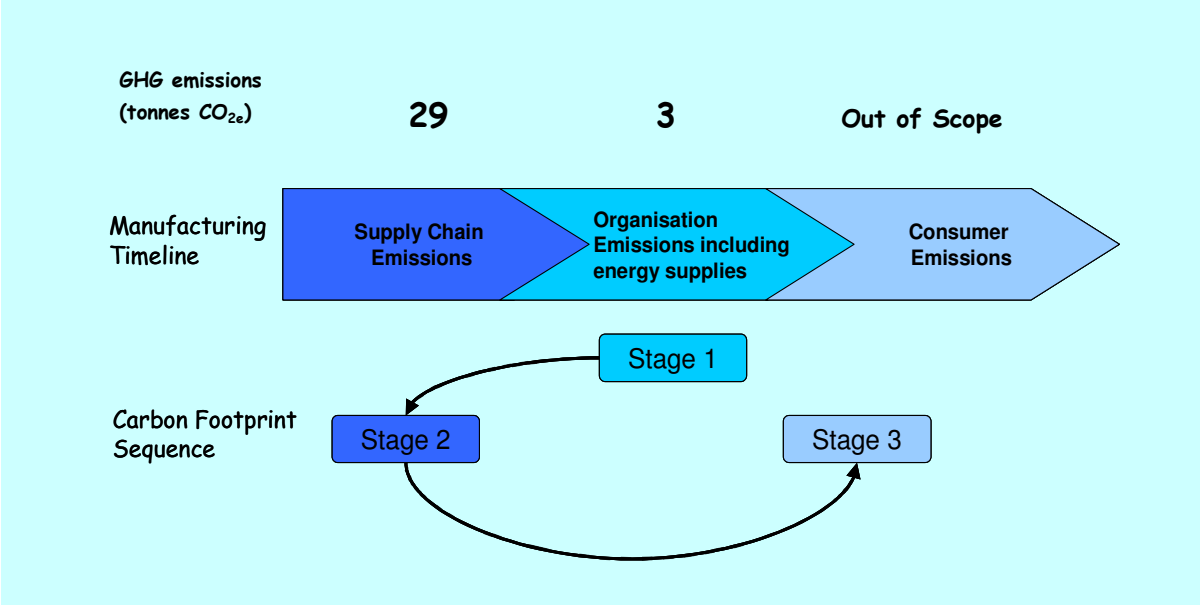

Figure 1 Calculated Emissions

In terms of the Greenhouse Gas Protocol and ISO 14064 the split is as follows:

Scope 1

	CO_{2e} (kg)
Fossil Fuel Combustion	0
Company Vehicle Fuel Combustion	0
Refrigerent / Air Con losses	0
Natural Gas	0
Total	0

Scope 2

Electricity	2,563

Scope 3

Company Vehicle embodied carbon	0
Capital Eqpt depreciation	413
Electricity, Fuel & Water Upstream Emissions	211
Supply Chain	2,166
Contracted Out Freight	0
Contracted Out Office services	885
Business travel	23,506
Waste Disposal	1
Employee Commuting	2,510
Customer Travel	0
Total	29,691

Grand Total	**32.3**	**(tonnes CO_{2e})**

In terms of a percentage split this is shown in Figure 2

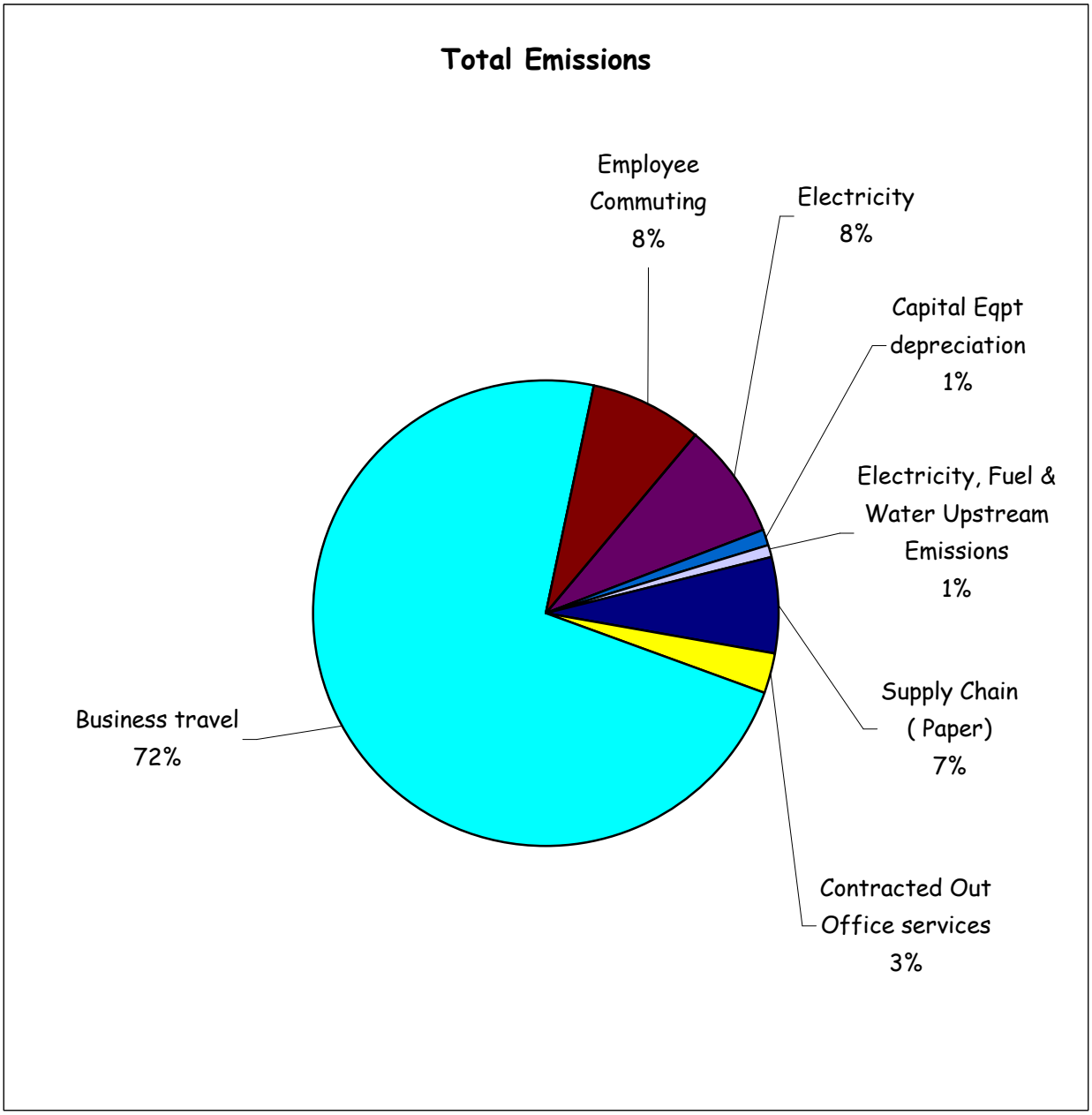

Figure 2 Total Carbon Footprint percentage split

Business travel emissions have been broken down further and are shown in Figure 3 Business Travel Emissions.

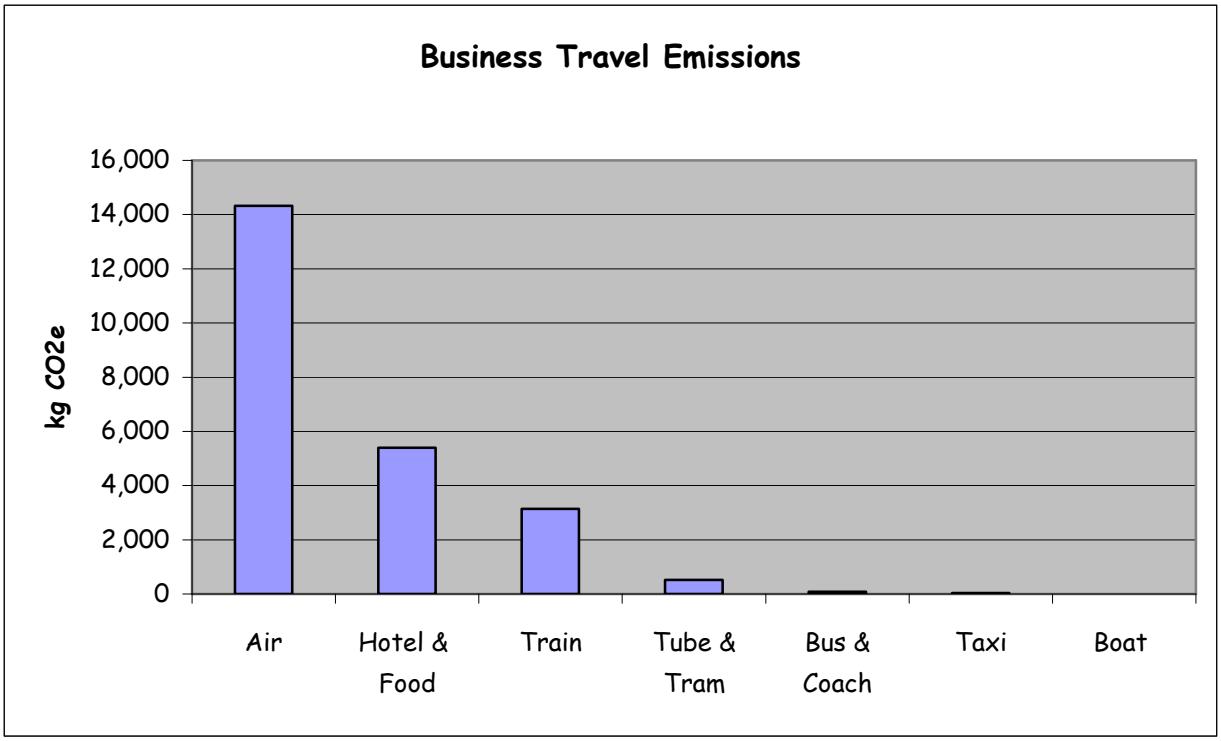

Figure 3 Business Travel Emissions

5.2. Analysis of results

Considering the total carbon footprint of Organise This Ltd., 72% (23.5 tonnes CO_{2e}) relates to business travel. Of this 14.3 tonnes is attributed specifically to air travel and 5.4 tonnes to associated hotel and food costs when away on business. The next significant contributors to the footprint are electricity consumption at 8% and employee commuting also at 8%.

With respect to electricity, the office usage had to be estimated from just two months of consumption figures provided by the landlord. The estimation methodology can be found in section 4.2.6 . It should be noted that the derived annual figure of 4,900 kWh for the

whole office seems to be quite a high figure for such an office when compared to typical energy consumption figures for similar offices provided by 'Action Energy' in their energy consumption guide (ActionEnergy, 2003). In this guide a figure of 200 kWh per m^2 is suggested for an office similar to the one Organise This Ltd. occupy.

A detailed breakdown of all the emissions can be found in Annex IV.

6. Conclusions

The business travel part of the business (72% of the total footprint) is the obvious starting point for Organise This Ltd. to focus on if they wish to significantly reduce their carbon footprint. Unfortunately this part of the business may be difficult to address but better data collection in the future will enable the company to take a pragmatic view on the necessity of travel weighed against the impact on the environment through GHG gas emissions. It should be borne in mind that the business travel emissions have been calculated using economic input output analysis based on the ONS 1995 data sets. However even with more recent data it is expected that business travel emissions will be the most significant element of the Organise This Ltd. carbon footprint.

The other main area of focus should be on a joint review of electricity and water usage in the office along with the other residents and the landlord. The tenants should have access to better consumption data and be encouraged perhaps through a gain-share scheme to reduce usage.

7. Recommendations

- Collect and record better data on business travel either in terms of cost of flights, distance travelled by air and class of travel ie economy, business etc.
- Record better details of hotel stays including cost of room and food consumed
- Consider calculating the carbon footprint of business travel using the latest 2008 Defra data.(Defra, 2007) This would require detailed information on the distances travelled by the various modes of transport used.
- Publish the results of the carbon footprint to all stakeholders in the Organise This Ltd. business
- Discuss with the landlord and the other occupiers of the office a plan to monitor and reduce electricity and water usage. This will not only reduce GHG emissions but could lead to savings in terms of rent. (a gain-share approach could be discussed with the Landlord on any savings made)

Annex I Carbon footprint Methodology

Outlined below are the origin and derivation of all the conversion factors used in the hybrid carbon calculator.

The following conversion factors for fossil fuel consumption, electricity, passenger transport have all been sourced from the official government data (Defra, 2007)

Fossil Fuel Combustion

Fuel	Factor	units
Coal	2457	kg CO_2 / tonne
Diesel	2.6304	kg CO_2 / litre
Petrol	2.3154	kg CO_2 / litre
Fuel oil	3223	kg CO_2 / tonne
Paraffin	2.518	kg CO_2 / litre
LPG	1.498	kg CO_2 / litre
Natural Gas	0.206	kg CO_2 / kWh

Electricity

Defra suggest using a rolling 5 year average for the electricity conversion factor. The figure is constantly changing as the UK mix of fuels used for power generation alters. It is expected the emissions from electricity generation will reduce as more renewable sources are brought online and carbon capture technologies are introduced.

Electricity 0.523 kg CO_2 / kWh

Passenger Transport

Defra publish figures for small, medium and large vehicles based on new car emission data and figures from the transport research laboratory. For the SME calculator it has been decided to use the average figure quoted by Defra. This has been done in order to simplify the calculator. If required an SME can perform a more detailed study of vehicle fuel emissions by using actual fuel consumption figures along with the fossil fuel conversion factors shown above.

The hybrid average figure is not published by Defra so the mathematical average of the two quoted figures for small and large petrol Hybrids was calculated.

The LPG vehicle figure used has been scaled up from the Defra petrol figure per mile. The logic behind this was that the Society of Motor Manufactures and Traders (SMMT) new vehicle average emissions for a gas / petrol car is 172.8g / km as opposed to 172.2 g for the average petrol car (SMMT, 2006). This 0.35% difference was then applied to the Defra Petrol figure to generate a LPG conversion factor.(SMMT, 2006)

Vehicle	Factor	units
Average Petrol Car	0.3372	kg CO_2 / mile
Average Diesel Car	0.3197	kg CO_2 / mile
Average Hybrid Car	0.2818	kg CO_2 / mile
LPG Car	0.3383	kg CO_2 / mile
Average Motorcycle	0.1718	kg CO_2 / mile

Refrigerant / Air Conditioning Loses

These are known as fugitive loses and occur from leakages in pipe work. It is assumed that if a refrigerator or air conditioning unit requires replenishing with the appropriate gas that an equivalent amount of gas has been released to atmosphere. The conversion factors used by Defra are taken from the second IPCC Report because of a UNFCCC agreement. For the purposes of this carbon calculator the 100 year Global Warming Potentials (GWP) used for the conversion factors have been taken from the latest Intergovernmental Panel on Climate Change (IPCC) report (IPCC, 2007).

Gas	GWP	Units
R134a	1,430	kg CO_2 / kg
R125	3,500	kg CO_2 / kg
CO2	1	kg CO_2 / kg

Upstream Electricity Emissions

These indirect emissions upstream of the electricity provider cover things such as; oil exploration, drilling, flaring, transportation. The emissions data for the calculation was taken from (Odeh and Cockerill, 2008) and the UK energy mix from (BERR, 2007).

Industry	Factor	Units
Coal mining & transport	0.0925	kg CO_2 / kWh
Nuclear	0.0085	kg CO_2 / kWh
Gas extraction & transport	0.0083	kg CO_2 / kWh

UK electricity production split :

Industry	% split
Nuclear	18.0
Gas	36.0
Coal	37.5
Other	8.5

In order to simplify the calculation the other energy sources have been apportioned to the three main ones as below:

Industry	% split
Nuclear	20
Gas	39
Coal	41

Thus the upstream indirect emissions for UK electricity based on 2006 data are:

(0.2*0.0085) + (0.39*0.0083) + (0.41*0.0925) = 0.04286 kg / kWh

Upstream Fossil Fuel Emissions

These indirect emissions associated with exploration, drilling, flaring and transport have been taken from (Odeh and Cockerill, 2008). These figures are only provided in terms of kg CO_2 / kWh, which is acceptable for Natural Gas as gas bills normally convert the gas volume consumed into a kWh equivalent. However for Coal and Paraffin it is necessary to convert the kg CO_2 / kWh as an SME will only be aware of the physical amount of coal or Paraffin used for heating .By using the Defra conversion factors, (Defra, 2007) it is possible to convert the kg CO_2 / kWh figure into kg CO_2 / tonne or litre for coal and refined oil products eg paraffin. An example calculation is shown for Coal.

1 tonne coal produces 2457 kg CO_2 or 1 kWh of coal energy produces 0.346 kg CO_2

Thus 1 tonne of coal generates 2457 / 0.346 = 7,101 kWh energy

If coal upstream emissions are 0.0925 kg CO_2 / kWh then this equates to:

7,101 x 0.0925 = 657 kg CO_2 / tonne of coal

Fossil Fuel	Factor	Units		Factor	units
Natural Gas / LPG	0.0083	kg CO_2 / kWh		0.006	kg CO_2 / litre
Coal	0.0925	kg CO_2 / kWh		657	kg CO_2 / tonne
Refined Oil Products	0.0049	kg CO_2 / kWh*		0.048 #	kg CO_2 / litre

* it is assumed that for Diesel, Petrol, Paraffin and Fuel Oil the indirect upstream emissions are the same.

the conversion to kg CO_2 / litre was performed using data for Paraffin.

Water

A value for the embodied carbon in Swiss water was found in (Jungbluth, 2006). In the absence of any better UK data this has been used in the calculator

Water 0.000436 kg / litre or 0.436 kg / m^3

Passenger Vehicle Embodied Carbon

A figure for the embodied carbon in a S series Mercedes was taken from (Finkbeiner, Hoffmann *et al.*, 2006). This paper describes how a detailed LCA study was performed bottom up. The quoted value for embedded carbon equates to 12% of the total life cycle emissions of 98.4 tonnes CO_{2e}. The S series Mercedes is a large luxury car with a high specification and will represent a higher than average value for embodied Carbon. However as the use phase of a vehicle accounts for 85% of the life cycle emissions (Finkbeiner, Hoffmann *et al.*, 2006) this is deemed to be acceptable.

Embodied carbon in a car 11.8 tonnes CO_{2e} (Finkbeiner, Hoffmann *et al.*, 2006)

Assuming a car has a life of 13.5 years (Waste-Watch, 2008) the yearly allocation of carbon emissions associated with an owned car will be:

Embodied Carbon in car 874 kg CO_2 / year owned

For the purposes of this calculator this value has been used for all cars and vans.

This value has been confirmed by deriving a very similar factor from the work performed by Deluchi cited in DeCicco (1999) who quotes a figure of 55.9 g / mile CO_2 for a 992kg car. This would equate to 56g / mile per metric tonne. So for an S series Mercedes weighing 1,805 kg over a life time of 120,000 miles this would equate to;

0.056 * 1.805* 120 = 12, 130 kg or 12.1 tonnes

which is very close to the figure derived from (Finkbeiner, Hoffmann *et al.*, 2006)

The figure used in the carbon calculator is 874 kg CO_2 / year owned

HGV embodied Carbon

Data from the Volvo Web site was used to determine the embodied carbon of an HGV tractor unit. A Volvo FM tractor with a 9 litre engine was chosen for the calculation. It is assumed that an SME would not own the trailer

The Volvo calculator can be found at

http://www.volvo.com/trucks/global/en-gb/aboutus/environmental_care/Environmental_Product_Declaration/

Embodied Carbon in a HGV 14,634 CO_2 (Volvo, 2008)

Assuming a ten year life the carbon emissions associated with an HGV tractor unit would be:

Embodied Carbon in a HGV tractor 1,463 kg CO_2 / year

Customer travel

There is a specific tab to allow for the quantification of emissions associated with customer travel to the organisation. This may be important when considering the location of a retail outlet. The organisation will need to collect information on how customers travelled to their facility and an average distance. Such data should be collected through customer surveys. The following conversion factors were taken from (Defra, 2007)

Vehicle	Defra Description	Factor	units
Car	Average Car (unknown fuel)	0.3340	kg CO_2 / mile
Taxi	Average Diesel Car	0.3197	kg CO_2 / mile
Motorcycle	Average petrol (unknown size)	0.1718	kg CO_2 / mile
Bus	Bus	0.0891	kg CO_2 / mile
Train	National Rail Figure	0.0602	kg CO_2 / mile

No embodied carbon figures for the vehicles / infrastructure have been used as the aim of this part of the footprint is to provide an indicative value for emissions which could be used as part of an informed debate on the location of future sites or discussions with local authorities over public transport policy.

Economic Input Output Factors

A large number of conversion factors quoted in kg CO_2 / £ spent (basic price) have been derived from the ONS environmental accounts. The methodology used is detailed in (Vaze, 1997).

Each conversion factor can be found on the Office of National Statistics (ONS) excel data sheet (ONS, 1995). They are reproduced in a summary table below. It should be noted that the economic and environmental data in these accounts are 13 years old. The ONS are being approached to determine if and when these accounts will be updated. Emission factors for the products and road transport associated with the products are listed separately and must be added together

The OECD definition for basic price shown below accessed on 9/5/08
http://stats.oecd.org/glossary/detail.asp?ID=189

The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale; it excludes any transport charges invoiced separately by the producer.

The derived conversion factors used in the calculator are shown in Table 2.

Table 2 Economic Input Output Conversion Factors

Industry Group	EA Code	GHG for commodity (t CO_{2e} / £M spend)	Total kg CO2e / £ spend
Agricult	1	2633	2.633
Forestry	2	376	0.376
Fishing	3	1243	1.243
MineCoal	4	9514	9.514
ExtOilGas	5	1625	1.625
MineMetal	6	11597	11.597
MineOth	7	1667	1.667
FoodProd	8	1157	1.157
Tobacco	9	1040	1.040
Textiles	10	899	0.899
Apparel	11	645	0.645
Leather	12	602	0.602
WoodProd	13	704	0.704
Paper	14	2707	2.707
Printing	15	582	0.582
Coke	16	34655	34.655
Petroleum	17	3346	3.346
Nuclear	18	997	0.997
Dyes&Gas	19	1952	1.952
InorgChem	20	2197	2.197
OrgChem	21	7861	7.861
Fert&Nitr	22	1925	1.925
Plastics	23	1893	1.893
AgroChem	24	1515	1.515
PaintEtc	25	1181	1.181
PharmChem	26	875	0.875
SoapEtc	27	1001	1.001
ChemProd	28	1328	1.328
M-m fibre	29	2884	2.884
RubbProd	30	1095	1.095
PlastProd	31	1083	1.083
GlassProd	32	1663	1.663
CeramicGd	33	994	0.994
BricksEtc	34	3467	3.467
CementEtc	35	17071	17.071
ConcEtc	36	1692	1.692
IronSteel	37	4651	4.651
N-f metal	38	1537	1.537
Aluminium	39	1844	1.844
CastMetal	40	1461	1.461
MetalProd	41	936	0.936
Machinery	42	829	0.829
OffMach	43	413	0.413
ElecMach	44	688	0.688
TV&comm	45	569	0.569
Precision	46	508	0.508
MotorVeh	47	718	0.718
OthTranEq	48	532	0.532
FurnToys	49	772	0.772
MiscManuf	50	880	0.880
Elec-gas	51	10452	10.452
Elec-coal	52	14636	14.636
Elec-nuc	53	3582	3.582
Elec-oil	54	10511	10.511
Elec-oth	55	3779	3.779
GasDist	56	1789	1.789
WaterDist	57	958	0.958
Construct	58	602	0.602
Garages	59	602	0.602
Wholesale	60	535	0.535
Retail	61	385	0.385
Hotel&Res	62	474	0.474
Railways	63	1569	1.569
Buses	64	1998	1.998
Trams	65	2620	2.620
Taxis	66	639	0.639
HGV etc	67	1430	1.430
Pipelines	68	331	0.331
WaterTran	69	3178	3.178
AirTran	70	2924	2.924
TranSup	71	298	0.298
Post&tcom	72	293	0.293
FinInterm	73	247	0.247
Insurance	74	410	0.410
FinIntAux	75	416	0.416
RealEst	76	84	0.084
RentMach	77	540	0.540
Computer	78	460	0.460
R&D	79	388	0.388
OthBusin	80	260	0.260
PubAd-ND	81	301	0.301
PubAd-Def	82	536	0.536
Educate	83	345	0.345
HealthVet	84	463	0.463
Sewage	85	734	0.734
SolWaste	86	14167	14.167
OthSanit	87	610	0.610
MembOrgs	88	284	0.284
Recreat	89	476	0.476
OthServ	90	534	0.534
Household	91	0	0.000

Annex II Climate Change Background

It is now widely accepted by the majority of governments and scientists that human activity is the cause of recent climate change and that the release of Greenhouse Gases (GHGs) into the upper atmosphere is resulting in Global Warming. It was through the work of Charles Keeling that the scientific community first became aware of the rising levels of CO_2 in the earths atmosphere. Keeling's measurements, started in 1958 at the Mauna Loa observatory, have become a powerful graphical illustration of mans effects on atmospheric CO_2 levels. The "Keeling Curve" as it has become known is shown in Figure 4 and shows a steady increase in atmospheric CO_2, since the records began, up to the 2007 level of 384 ppm.

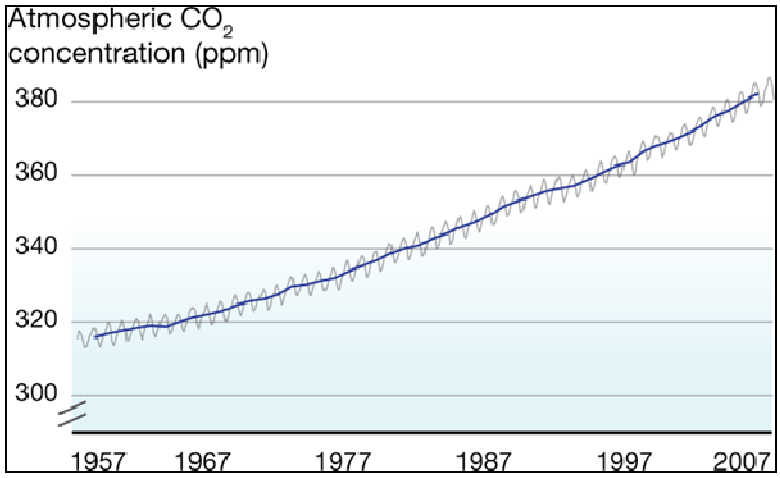

Figure 4 Keeling Curve

There are many GHGs that contribute to global warming but for the purpose of this report only the six GHGs as defined in the Kyoto protocol are considered. These are shown in Table 3 along with their relative importance in terms of Global Warming as measured by the radiative forcing (RF) in watts per metre squared. The RF figures quoted show the net the heating effects of the GHGs on the earths surface due to human activity since 1750 (the industrial revolution) It should be noted that the (RF) quoted only relates to the anthropogenic (man made) part of GHGs in the atmosphere. As can be seen 93% of the

man made heating effect is derived from the two main GHGs, Methane and Carbon Dioxide.

Table 3 Greenhouse Gas radiative forcing components & GWPs

Greenhouse Gas		Radiative Forcing (Wm^{-2})	% of total		GWP *
Carbon Dioxide	(CO_2)	1.66	72%		1
Methane	(CH_4)	0.48	21%		25
Nitrous Oxide	($N0_2$)	0.16	7%		298
Haloalkanes	(HFCs)	0.01	0.4%		124 to 14,800
Perflourocarbons	(PFCs)	0.0042	0.2%		7,390 to 17,200
Sulpher Hexaflouride	(SF_6)	0.003	0.1%		22,800

* source: (IPCC, 2007)

A useful metric for comparing the potential climate impact of emissions from the various GHGs is the Global Warming Potential (GWP). The GWPs compare the integrated radiative forcing of GHGs over a specified period, usually 100 years) for a given unit mass pulse of emissions. Carbon Dioxide is given a GWP of 1 and all other GHGs are compared to it. Methane is 25 times more potent than Carbon Dioxide with some of the HFCs, PFCs and SF_6 being several thousand times more potent. GWPs are used to convert the kg emissions for each GHG into the CO_{2e} figures. Thus 1kg CH_4 emissions equates to 25 kg CO_{2e}.

Figure 5 focusing shows a timeline from 1000 AD to 2100 AD with historical measurements, of the worst GHG with respect to Global warming (CO_2), taken from ice cores and direct atmospheric measurements as well as predictions based on various scenarios ranging from ‘do nothing’ to ‘pulling out all the stops’

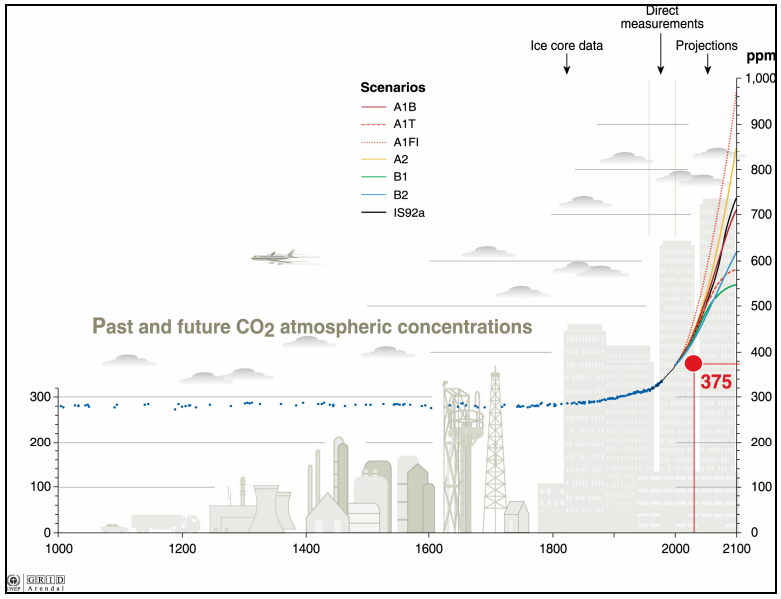

Figure 5 Past and future CO2 concentrations. (2005). In UNEP/GRID-Arendal Maps and Graphics Library. Retrieved 17:22, June 21, 2008 from http://maps.grida.no/go/graphic/past_and_future_co2_concentrations.

Figure 6 shows the measured and predicted surface air temperatures for the same time period and for the same predictions. The best scenario sees atmospheric CO_2 levels peaking at 550 ppm in 2100 which would equate to a 2 degree C rise in temperature over the1990 baseline. This is the often quoted maximum figure that was first cited in the Kyoto protocol. It is possible though that a do nothing culture will mean CO_2 levels of 1000ppm and a 5.5 ^{0}C rise in temperature which would have catastrophic global effects.

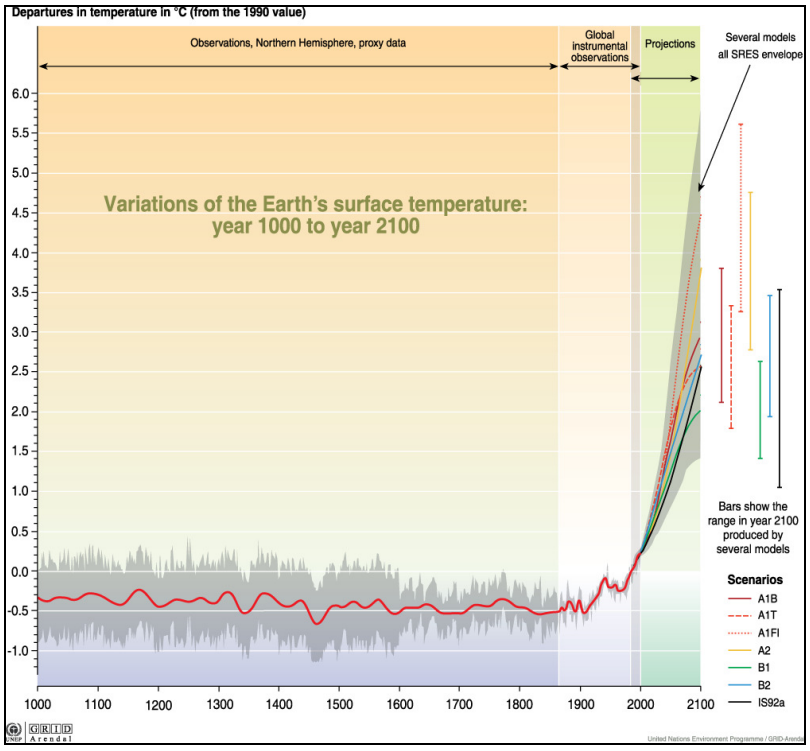

Figure 6 Temperature trends and projections. (2005). In UNEP/GRID-Arendal Maps and Graphics Library. Retrieved 17:28, June 21, 2008 from http://maps.grida.no/go/graphic/temperature-trends-and-projections.

In order to slow down and halt the ever increasing rise in atmospheric GHG concentrations, and the subsequent heating effect, it is imperative that the world governments take positive action immediately. Against a backdrop of a rising global population and an ever increasing thirst for fossil fuels by the developing nations this is going to be a difficult task. For further information on the scientific basis of climate change the IPCC publication "Climate Change 2007 the physical science basis" is the definitive text and an online version can be found on the IPCCs web site http://www.ipcc.ch, along with lots of other useful resource material.

Annex III ISO 14064 cross reference Matrix

ISO 14064 requirement		Report Para.		ISO 14064 requirement	Report Para.
7.3.1 Compulsory requirements				**7.3.2 Optional requirements**	
a	Organisation description	2	a	Organisation GHG policy & strategy	N/A
b	Responsible person	2	b	Combustion of Biomass CO_2 emissions reported seperatley	N/A
c	Reporting Period	4.2.4	c	Description of actions to reduce GHG emissions	N/A
d	Organisational Boundaries	4.2.2	d	Description of plans to reduce GHG emissions	N/A
e	Separate reporting of Direct emissions for all 6 GHGs in tonnes CO_{2e}	4.2.1	e	Description of any	N/A
f	How CO_2 emissions from biomass combustion are treated	4.2.3	f	GHG emissions or removals disaggregated by th efacility	N/A
g	GHG removals in tonnes CO_2	4.2.1	g	any other indirect GHG emissions in terms of CO_{2e}	N/A
h	Reason for exclusion of any GHG sources or sinks	4.2.1	h	uncertainty assessment description & results plus any plans to manage / reduce these	N/A
i	Energy indirect emissions from generation of imported electricity , steam & heat in tonnes CO_2	5.1	i	description of additional indicators such as GHG emission intensity	N/A
j	Declaration of historical base year	4.2.4	j	benchmarking activity	N/A
k	Explanation of any change / recalculation to base year or historica data	N/A	k	GHG information management / monitoring procedures	N/A
l	Description of quantification methodology	Annex I			
m	Explanation of any changes to quantifiaction methodology	N/A			
n	Description of GHG emission & removal factors used	Annex I			
o	Impact of uncertainty on the accuracy of GHG emissions and removals data	4.2.5			
p	Statement that the report has been prepared iaw ISO 14064 requirements	3			
q	statement regards if verification has been achieved and the level of assurance achieved	3			

Annex IV Complete Results

Fossil Fuel Combustion	kg (CO_{2e})
Coal	0
Diesel	0
Petrol	0
Fuel Oil	0
Paraffin	0
LPG	0
Company Vehicle Fuel combustion	
Petrol	0
Diesel	0
LPG	0
or	
Petrol Car	0
Diesel Car	0
Hybrid Car	0
LPG Car	0
Motorbike	0
Utilities	
Electriciry Onsite usage	2,563
Electricity Upstream Emissions	210
Gas Onsite usage	0
Gas Upstream Emissions	0
Water	1
Refrigerent Losses	
R134a	0
R125	0
CO_2	0
Other	0
Capital Equipment Depreciation	
Machinary	0
Office Eqpt / Computers	413
Electrical Machinary	0
Radio, TV & comms eqpt	0
Medical / Precision eqpt	0
Motor Vehicles	0
Office funiture	0
Company Vehicle Embodied carbon	
Cars	0
Small Vans	0
Large vans	0
HGV's	0
Motorcycles	0

Fossil Fuel Upstream Emissions	kg (CO_{2e})
Coal	0
Diesel	0
Petrol	0
Fuel Oil	0
Paraffin	0
LPG	0
Supply Chain	
Food & Beverages (onsite)	0
Textiles	0
Personal Protective Eqpt	0
Timber	0
Paper and Card	2,166
Lubricants & Grease	0
Dyes & Pigments	0
Inorganic Chemicals	0
Organic Chemicals	0
Fertilisor / N_2 compounds	0
Plastics & Synthetic Rubber	0
Pesticides	0
Paint / Varnish	0
Soap / Detergent	0
Chemical Products	0
Man made fibre	0
Natural Rubber	0
Plastic Products	0
Glass & Glass product	0
Ceramic goods	0
Bricks	0
Cement	0
Stone	0
Iron & Steel	0
Othe nonferrous metal	0
Aluminium	0
Cast metal	0
Fabricated metal	0
Machinary	0
Office Machinary	0
Electrical Machinary	0
TV & Comms Eqpt	0
Precision Parts	0
Motor Vehicle	0
Furnature & Toys	0
Misc. Manufacture	0

Contracted Out Freight	kg (CO_{2e})
Rail	0
Road	0
Sea	0
Air	0
Contracted out Office services	
Canteen	0
Postage & Phone	146
Insurance / Pensions	738
Machine rental	0
Laundry	0
Cleaning	0
Accomodation & Business Travel	
Hotel & Food	5,400
Train	3,137
Bus & Coach	80
Tube & Tram	524
Taxi	38
Boat	0
Air	14,326
Private Car	0
Waste Disposal	
Sewage	1
Solid waste / recycling	0
Staff Commuting	
Train	2,510
Bus	0
Tube & Tram	0
Taxi	0
Petrol Car Fuel	0
Diesel Car Fuel	0
Hybrid Car Fuel	0
LPG Car Fuel	0
Motorcycle	0
Embodied carbon in Car	0
Embodied carbon in Motorcycles	0
Customer Travel	
Car	0
Motorbike	0
Train	0
Bus	0
Taxi	0

Grand Total **32,254 (CO_{2e})**

Data Collection Sheet 1

Power / Fuels Water

Electricity	4950	kWh
Natural Gas		kWh
Water	14	m^3
Coal		tonnes
Diesel		litres
Petrol		litres
Fuel oil		tonnes
Paraffin		tonnes
LPG		litres

Company Vehicles

Number of Cars		
Number of small vans		
Number of Large Vans		
Number of HGV's		
Number of Motorcycles		
Petrol Car mileage		miles
Diesel Car mileage		miles
Hybrid Car Mileage		miles
LPG Car Mileage		miles
Motorcycle Mileaage		miles

Refrigerents

R134a		kg
R125		kg
CO_2		kg
Other		kg

Staff Travel

Number of cars		
Number of Motorcycles		
Petrol Car mileage		miles
Diesel Car mileage		miles
Hybrid Car Mileage		miles
LPG Car Mileage		miles
Motorcycle Mileage		miles
Train Fares	1600	pounds
Bus Fares		pounds
Tube / Tram Fares		pounds
Taxi Fares		pounds

Consumer Travel

Number of Car Visits		
Number of Motorbike Visits		
Number of Train Visits		
Number of Bus Visits		
Number of Taxi Visits		
Car Distance return		miles
Motorbike Distance Return		miles
Train Distance Return		miles
Bus Distance Return		miles
Taxi Dustance Return		miles

Depreciation Costs

Machinary		pounds
Office eqpt	1000	pounds
Office Furnature		pounds

Business Travel

Hotel & Food	11400	pounds
Train fares	2000	pounds
Bus Fares	40	pounds
Tube & Tram Fares	200	pounds
Taxi Fares	60	pounds
Boat Fares		pounds
Air Fares	4900	pounds

Office Costs

Postage & Phone Bills	500	pounds
Insurance / Pension	1800	pounds
Machinary Rental		pounds

Contracted Out Services

Canteen		pounds
Rail Freight		pounds
Road Freight		pounds
Sea Freight		pounds
Air Freight		pounds
Cleaning		pounds

Waste

Cost of sewage disposal	1	pounds
Cost of Solid waste / Recycling		pounds

Data Collection Sheet 2

Bought In Goods

Food & Beverages (onsite)		pounds	Glass & Glass product		pounds
Textiles		pounds	Ceramic goods		pounds
Personal Protective Eqpt		pounds	Bricks		pounds
Timber		pounds	Cement		pounds
Paper and Card	800	pounds	Stone		pounds
Lubricants & Grease		pounds	Iron & Steel		pounds
Dyes & Pigments		pounds	Othe nonferrous metal		pounds
Inorganic Chemicals		pounds	Aluminium		pounds
Organic Chemicals		pounds	Cast metal		pounds
Fertilisor / N_2 compounds		pounds	Fabricated metal		pounds
Plastics & Synthetic Rubber		pounds	Machinary		pounds
Pesticides		pounds	Office Machinary & computers		pounds
Paint / Varnish		pounds	Electrical Machinary		pounds
Soap / Detergent		pounds	TV & Comms Eqpt		pounds
Chemical Products		pounds	Precision Parts		pounds
Man made fibre		pounds	Motor Vehicles		pounds
Natural Rubber		pounds	Furniture & Toys		pounds
Plastic Products		pounds	Misc. Manufacture		pounds
			Laundry service		pounds

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