



The Carbon Trust

Accelerating the move
to a low carbon economy

Carbon Footprinting Workshop

Introduction

The Carbon Trust's mission is to accelerate the move to a low carbon economy



WE CUT CARBON EMISSIONS NOW

- By providing the private and public sectors with expert advice, finance and accreditation
- By stimulating demand for low carbon products and services

WE CUT FUTURE CARBON EMISSIONS

- By developing new, commercial low carbon technologies through project funding and management, investment and collaboration
- By identifying market barriers and practical ways to overcome them

Specialist advice:

support to help organisations cut carbon

Micro-SME	SME	Mid-Cap	Large
Telephone advice	Site survey and implementation advice		Carbon Management
Low carbon collaboration			
Publications and web tools			
Events and workshops			

Since our launch we have supported tens of thousands of customers, helping them to save

23MtCO₂ and **£1.4 billion**

Setting standards:

Recognising Carbon Reduction in Organisations

- » Standard approach to carbon footprint measurement
- » Rewards real carbon emission reductions
- » Enables clear communication to customers and stakeholders
- » Currently awarded to over 250 organisations



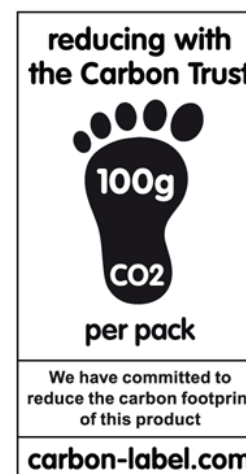
first direct



Setting standards:

Recognising carbon reduction in products with The Carbon Footprinting Company

- › Standard, comparable approach to carbon footprinting of products and services
- › Rewards commitment to real carbon emissions reductions
- › Carbon Reduction Label awarded to more than 2,500 products and services
- › Product footprinting and labelling projects in USA, Europe and Asia



Finance:

Interest-free Energy Efficiency Loans

Loans to help SMEs upgrade or replace equipment with energy efficient alternatives

Since the scheme started in 2003 we have:

- Offered over £100 million in loans
- Saved businesses approximately £80 million

Non-SME loans periodically available in Wales

£100m

interest-free loans
available to SMEs in
2009/10 and 2010/11



www.carbontrust.co.uk

0800 085 2005

A Practical Guide to Carbon Footprinting

James Moore, SKM Enviros



Quick Quiz



Q1 : When was the Green House effect first discovered?

a. 1820s

b. 1890s

c. 1930s



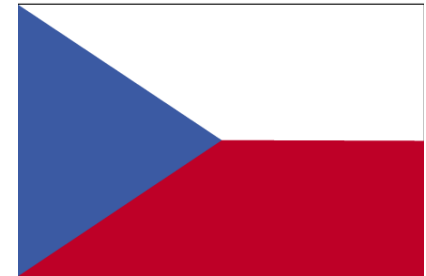
Q2: If we could harness 100% of the sun's power hitting the earth, how long would it take to provide the world's annual primary energy demand

- a. About 1 hour
- b. About 1 day
- c. About 1 week



Q3: Which country has the lowest CO₂ emissions/ capita

a. Czech Republic



b. Australia



c. UK



Answers

- 1820's (Joseph Fourier), 1890's CO₂ effect, 1930's global warming)
- An hour (143,000,000 GWh)
- UK (then CZ, then Aus)

Tie-breaker:

If you were to drive from Manchester to Prague in a BMW 520d how much CO₂ would you emit?

Agenda

- **Session 1** **What is a carbon footprint**
- **Session 2** **How to calculate your carbon footprint**
- ***Exercise 1*** ***Calculating your carbon footprint***
- **Session 3** **Reporting your carbon footprint**
- **Session 4** **How to reduce your carbon footprint**
- ***Exercise 2*** ***Reducing your carbon footprint***

Session 1

What is a carbon footprint?



Session 1

➤ **What is a Carbon Footprint?**

- Sources of carbon emissions
- Why calculate your footprint
- Types of carbon footprint
- Reporting standards
- What companies are doing
- After calculating your footprint....

What is carbon footprint?



the total greenhouse gas emissions caused directly and indirectly by an individual, organisation, event or product

Session 1

- **What is a Carbon Footprint?**
 - **Sources of carbon emissions**
 - Why calculate your footprint
 - Types of carbon footprint
 - Reporting standards
 - What companies are doing
 - After calculating your footprint...

Sources of GHGs

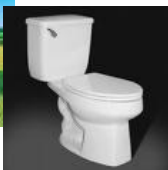
Carbon Dioxide

Fuels for Energy
and Transport,
Manufacturing
Processes



Methane

Waste (Landfills,
natural activity)



Nitrous Oxide

Chemical manufacture
and agriculture

HFCs

Refrigerants,
chemical
manufacture,
foams & aerosols

PFCs

Aluminium
manufacture,
electronics
manufacture

Sulphur hexafluoride

Magnesium smelting,
high voltage switchgear,
electronics
manufacturing

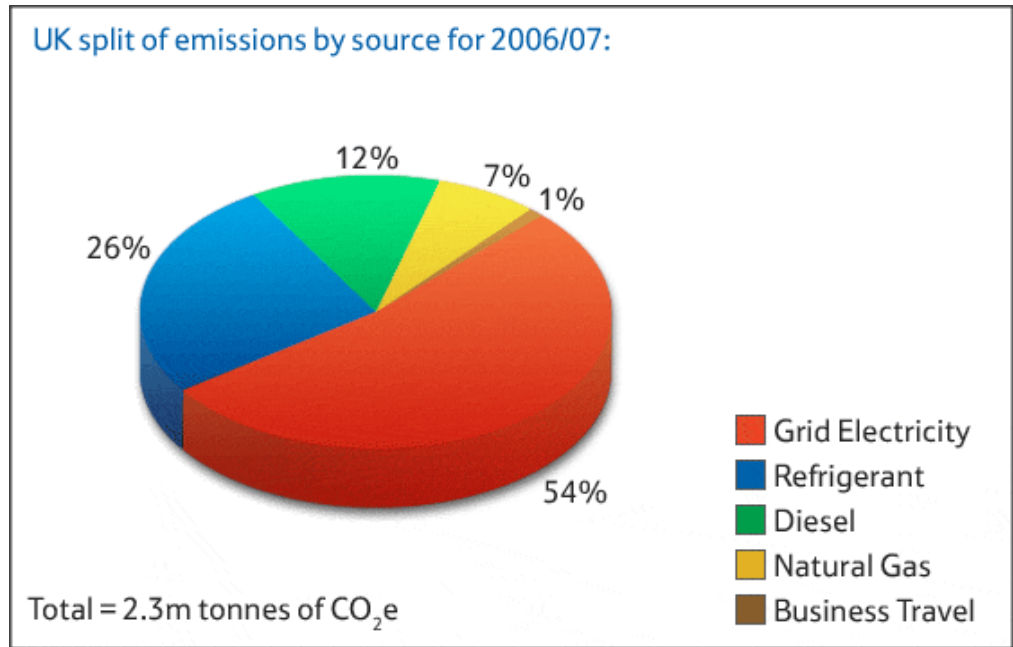
Relative impact – 100 year GWP

GHG	Global Warming Potential
CO ₂	1
CH ₄	21
N ₂ O	310
HFCs	140 – 11,700
PFCs	6,500 – 9,200
SF ₆	23,900

Factors
used to
convert
into CO₂e

Why calculate your footprint?

- Manage
 - Quantify sources
- Reduce
 - Minimise or prevent
 - Cost reduction
- Report
 - To customers, for legislation, part of CSR, to 'offset'

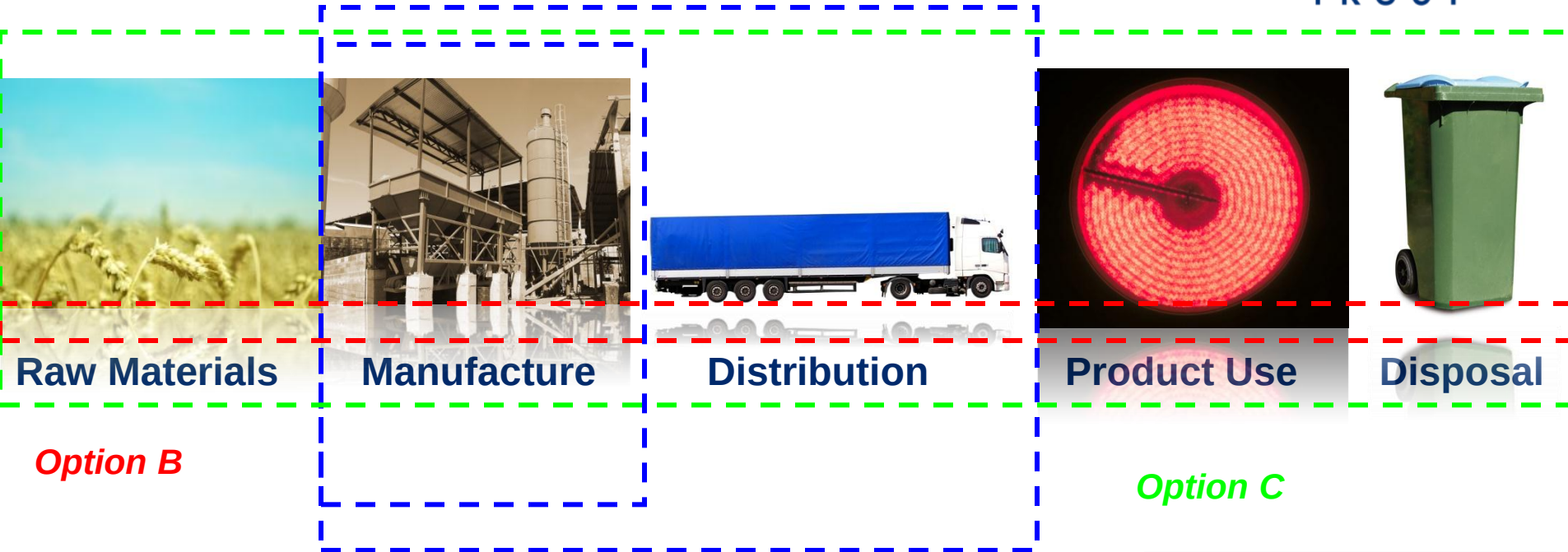


Tesco Example

Session 1

- **What is a Carbon Footprint?**
 - Sources of carbon emissions
 - Why calculate your footprint
 - **Types of carbon footprint**
 - Reporting standards
 - What companies are doing
 - After calculating your footprint...

Different types of footprints



Boundary of A depends on ownership and control boundaries

Boundaries

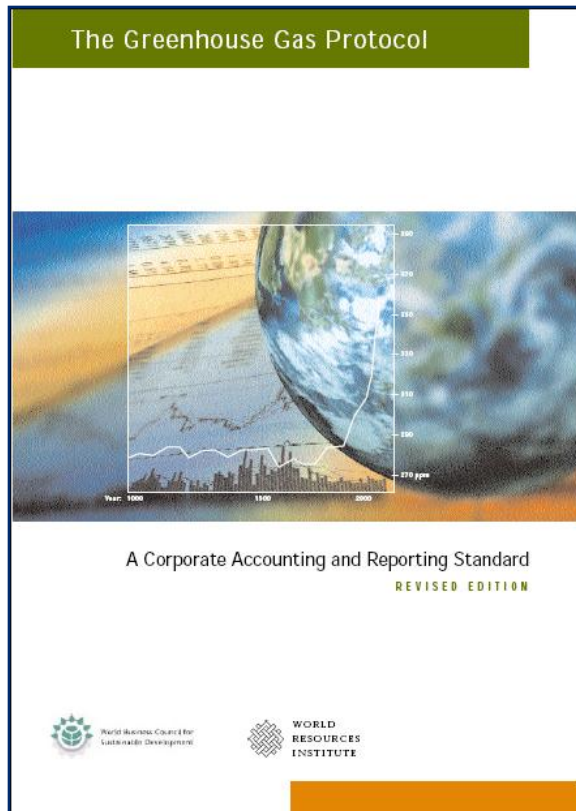
- A. Organisation**
- B. Single Product/Activity /Service (Life Cycle Approach)**
- C. All activities and products through the Supply Chain**

Session 1

- **What is a Carbon Footprint?**
 - Sources of carbon emissions
 - Why calculate your footprint
 - Types of carbon footprint
 - **Reporting standards**
 - What companies are doing
 - After calculating your footprint...

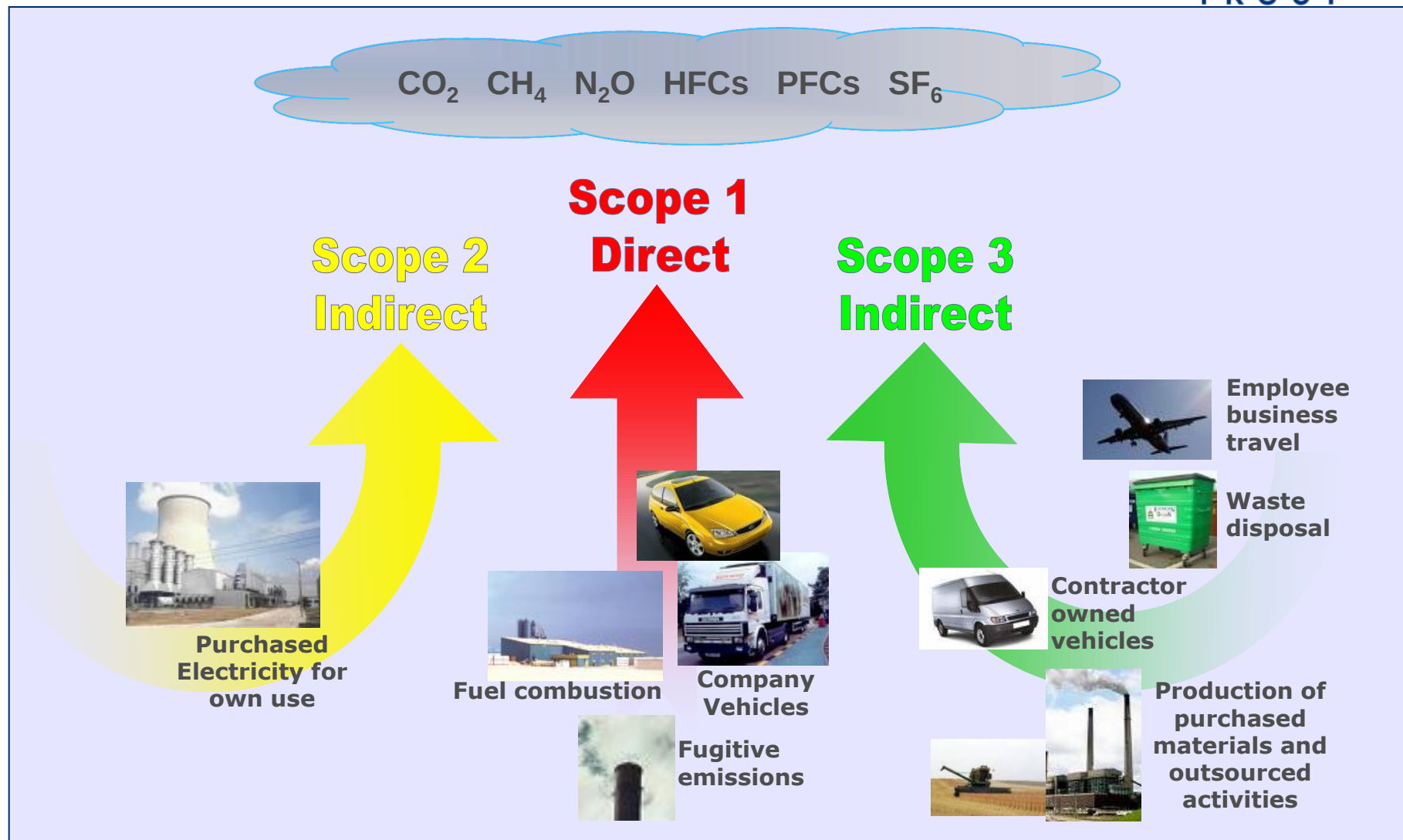
Reporting Standards

GHG Protocol



- World Resources Institute and the World Business Council for Sustainable Development
- Globally accepted standard for measuring and reporting corporate emissions inventory
- Guidance for setting boundaries, categorises emissions sources
- Used by many organisations

Emission Scopes



Reporting Standards

ISO 14064



- Part 1: specification and guidance for calculating an organisation's GHG emissions
- Objectives of ISO 14064:
 - Consistency and transparency
 - systematic development & maintenance of GHG inventories
- **ISO14065:** Accreditation requirements for GHG assertions/claims

Reporting Standards



Carbon Footprinting – The Next Step to reducing your Emissions



Management guide

Carbon footprinting

The next step to reducing your emissions



- Introductory guidance for organisations thinking about carbon footprints
- Overview of how to calculate organisational and product carbon footprints
- More detailed guidance on Carbon Trust website

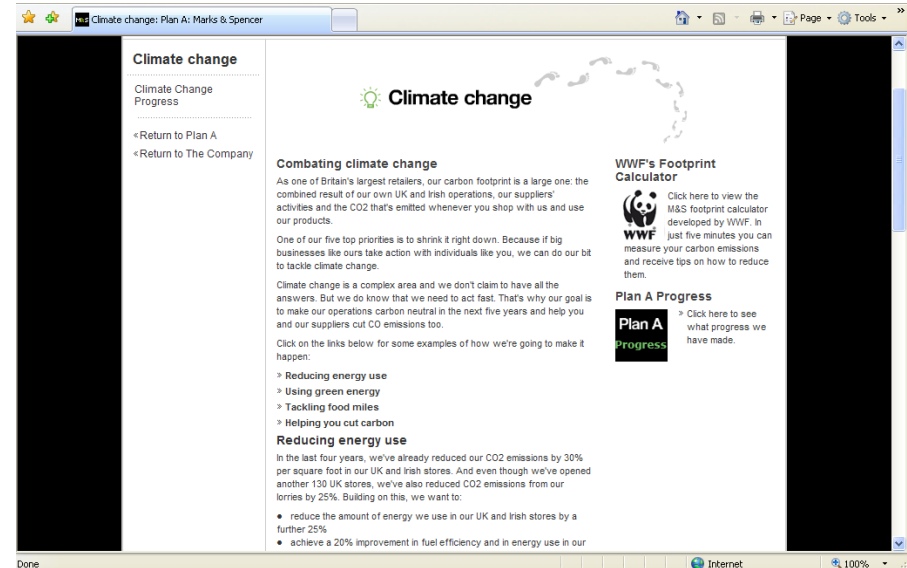
Session 1

- **What is a Carbon Footprint?**
 - Why calculate your footprint
 - Sources of carbon emissions
 - Types of carbon footprint
 - Reporting standards
 - **What companies are doing**
 - After calculating your footprint...

Company responses: M&S



- Launched Plan A Jan 07
 - Climate Change and other Sustainability issues
- Carbon Footprint:
 - 2006/7: 517,000 tCO₂e
 - 2007/8: 469,000 tCO₂e
 - Store, office and warehouse energy
 - Distribution/deliveries
 - F-gas leaks
 - Business travel



Measures:

- Increase store energy efficiency
- Increase fuel efficiency
- Switch to cleaner refrigerants
- Aim to be carbon neutral

Company responses: Unilever

Estimate that the carbon footprint of immediate operations is 4 million tonnes of CO₂ equivalent per year.

Supply chain = x10

Add consumers = x30-60



About us ▼ Our brands ▼ Sustainability ▼ Innovation ▼

▼ Sustainability

▼ Environmental sustainability

► Sustainable agricultural sourcing

Climate change

► Water

► Packaging

► Eco-efficiency in manufacturing

Climate change

Climate change is one of the most serious issues facing the world. Consequences for our business include threats to our agricultural supply chain and to the availability of water in some markets. We have joined business coalitions endorsing the need for immediate action.

Our approach

In 2007, the Unilever Executive agreed a greenhouse gas strategy, covering both our direct and indirect impacts, and setting out that we will seek to:

- build on existing reductions to cut CO₂ from energy in our manufacturing operations by 25% by 2012
- improve the footprint of our existing product portfolio using our new vitality metric
- assess innovations using our greenhouse gas profiling tool
- work with our customers and suppliers to address our wider impacts.

Our carbon footprint

We estimate total emissions of greenhouse gases from our immediate operations to be around 4 million tonnes of CO₂ equivalent a year. Include Supply Chain, and that may amount to 10 times as much. Include consumer use and disposal of our products, and that may amount to between 30 and 60 times as much.

Our direct impacts

Greenhouse gas emissions in manufacturing

Since 1995 we have achieved a 39% reduction in CO₂ from energy per tonne of production, while in 2008, we reduced our CO₂ emissions by 1.6% per tonne of production compared to 2007 – keeping us on track to meet our 2012 target.

We are now investing in more efficient power and steam generation technology, and less energy-intensive manufacturing processes, targeting sites which emit the most CO₂.

In Europe we now have three efficient combined heat and power plants in Caivano

Session 1

- **What is a Carbon Footprint?**
 - Why calculate your footprint
 - Sources of carbon emissions
 - Types of carbon footprint
 - Reporting standards
 - What companies are doing
 - **After calculating your footprint...**

Develop and implement a carbon management strategy



Measure

Avoid

→ Is the activity necessary?

Reduce

→ Can you be more efficient?

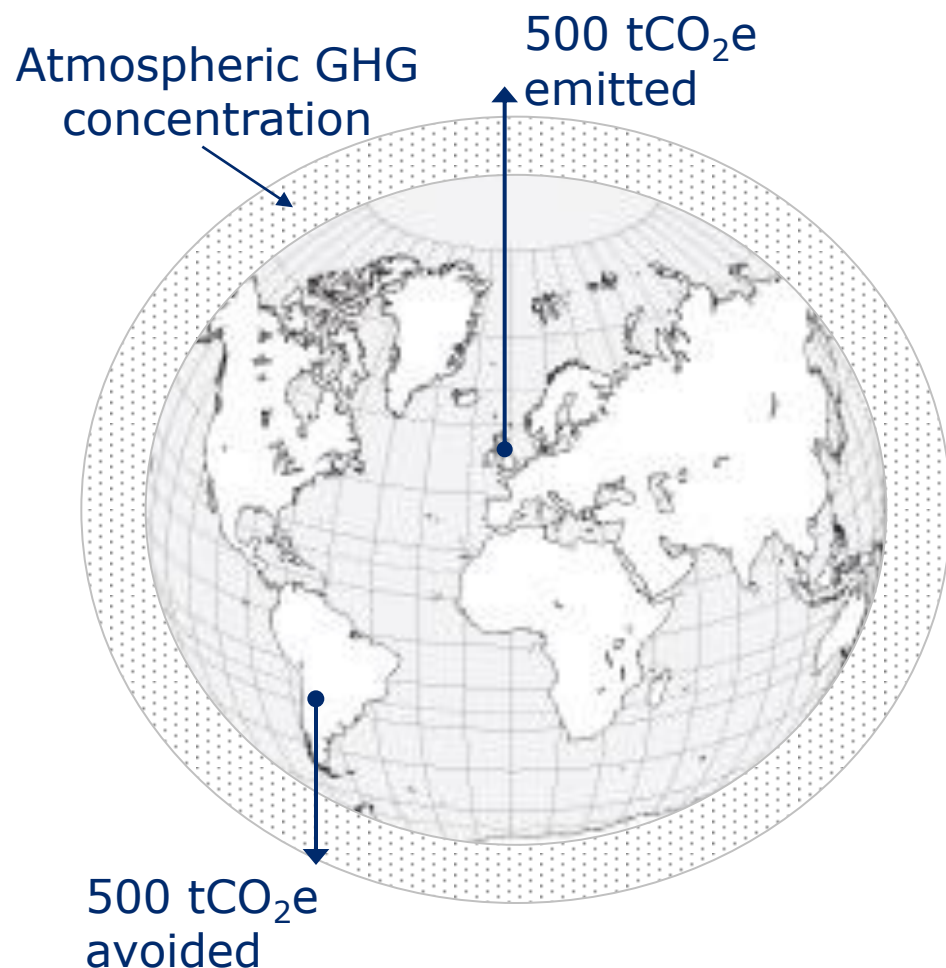
Replace

→ Could you consider renewables?

Offset

→ Consider offsetting (and green tariffs)

Carbon Offsetting and Neutrality



- Emissions reduction credits purchased by 3rd parties to compensate for their carbon emissions
- Typically projects in developing world – bringing technology transfer and development benefits

Offsetting – Further information



Carbon Trust

Offsetting – Further information



PAS 2060 2010
Specification for the demonstration
of carbon neutrality



BSI - PAS 2060



Session 1 - recap

- **What is a Carbon Footprint?**
 - Why calculate your footprint
 - Sources of carbon emissions
 - Types of carbon footprint
 - Reporting standards
 - What companies are doing
 - After calculating your footprint...

Session 2

How to calculate your carbon footprint



Session 2

- How to calculate your carbon footprint
 - **Principles of footprinting**
 - Procedure
 - Defining boundaries
 - Data collection
 - Calculating emissions
 - Scope 1
 - Scope 2
 - Scope 3

Principles of footprinting



- Relevance
- Completeness
- Transparency
- Consistency
- Accuracy

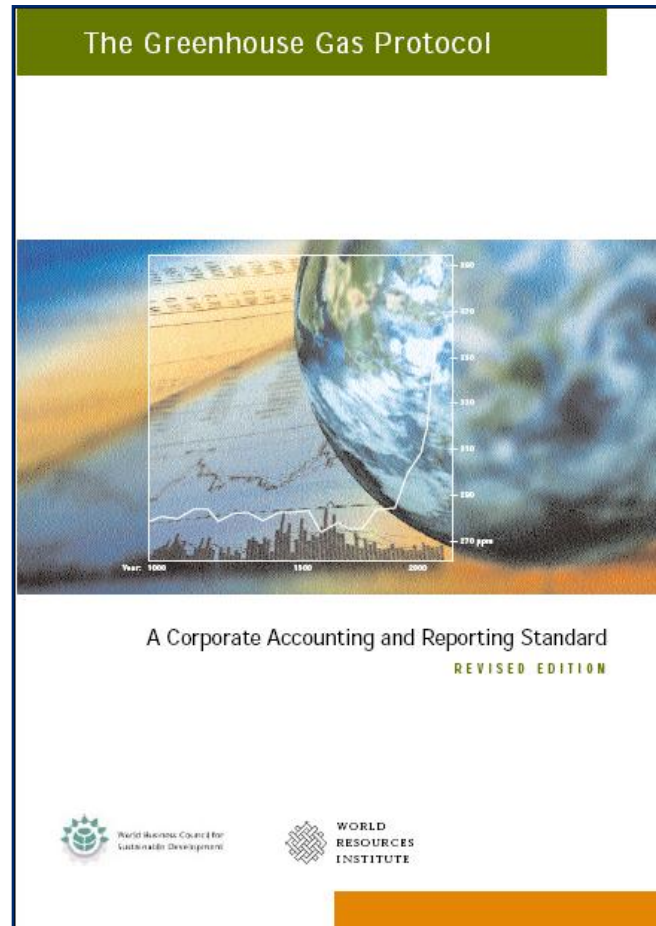
Session 2

- How to calculate your carbon footprint
 - Principles of footprinting
 - **Procedure**
 - **Defining boundaries**
 - **Data collection**
 - Calculating emissions
 - Scope 1
 - Scope 2
 - Scope 3

Procedure

1. Define Methodology
2. Set boundaries
 - Level of control
 - Emission sources
3. Collect data and calculate footprint
 - Define measurement methods and time period
 - Select carbon emission factors
4. Verify
5. Disclose

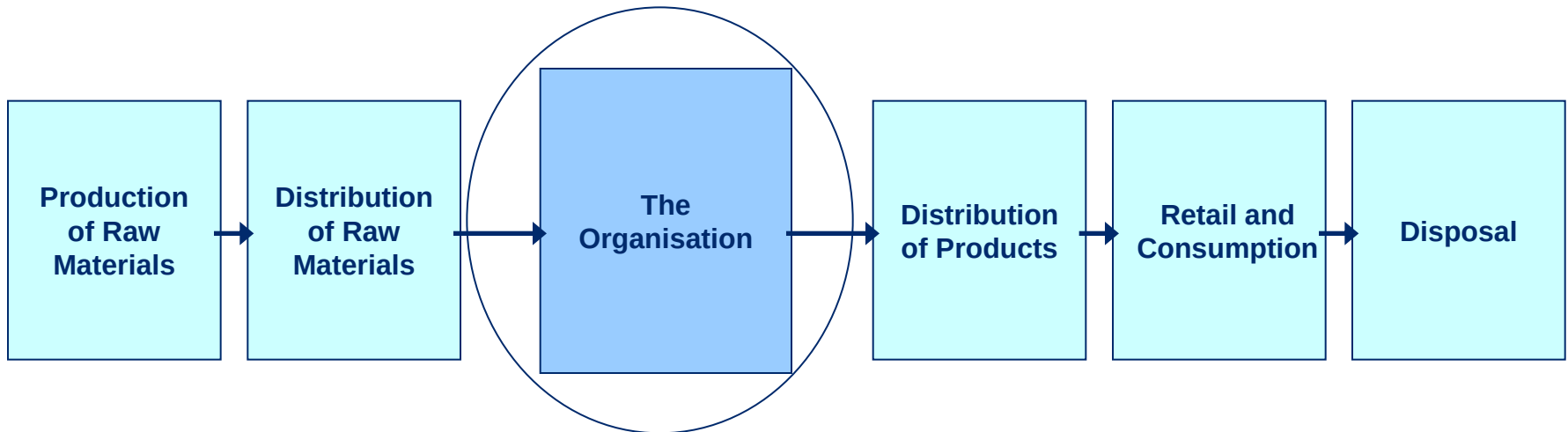
1. Define Methodology



GHGP, 2008

2. Set boundaries

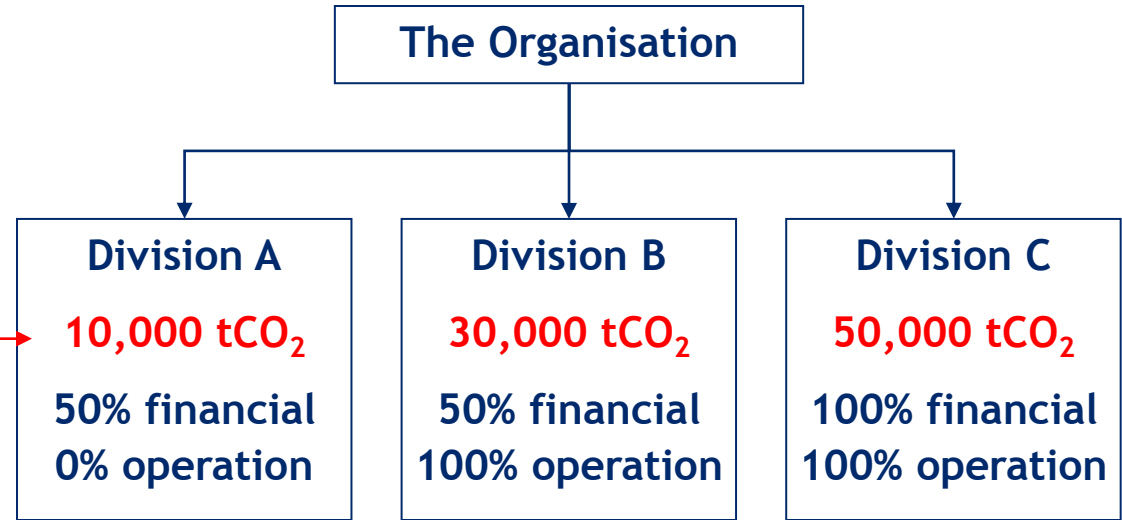
- Financial or operational control
- Owned and Leased assets
- Emission sources



Deciding upon financial or operational control boundaries



Total carbon footprint with no boundaries applied



	Financial
Division A	5,000
Division B	15,000
Division C	50,000
Organisation	70,000

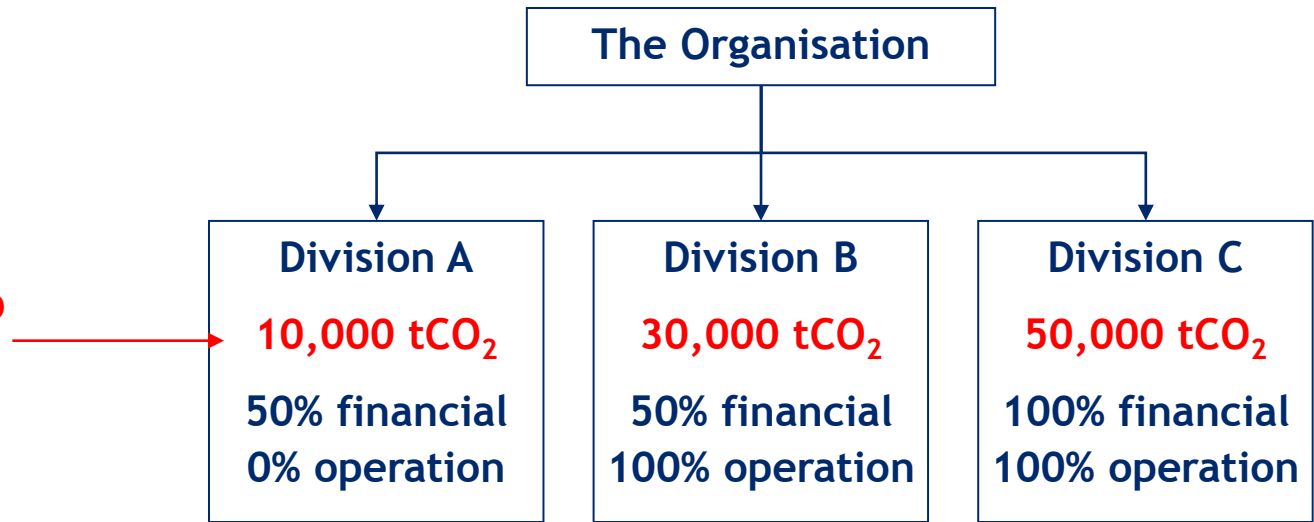
Applying a financial control boundary:

% x total carbon footprint

Deciding upon financial or operational control boundaries



Total carbon footprint with no boundaries applied



Applying an operational control boundary:
% x total carbon footprint

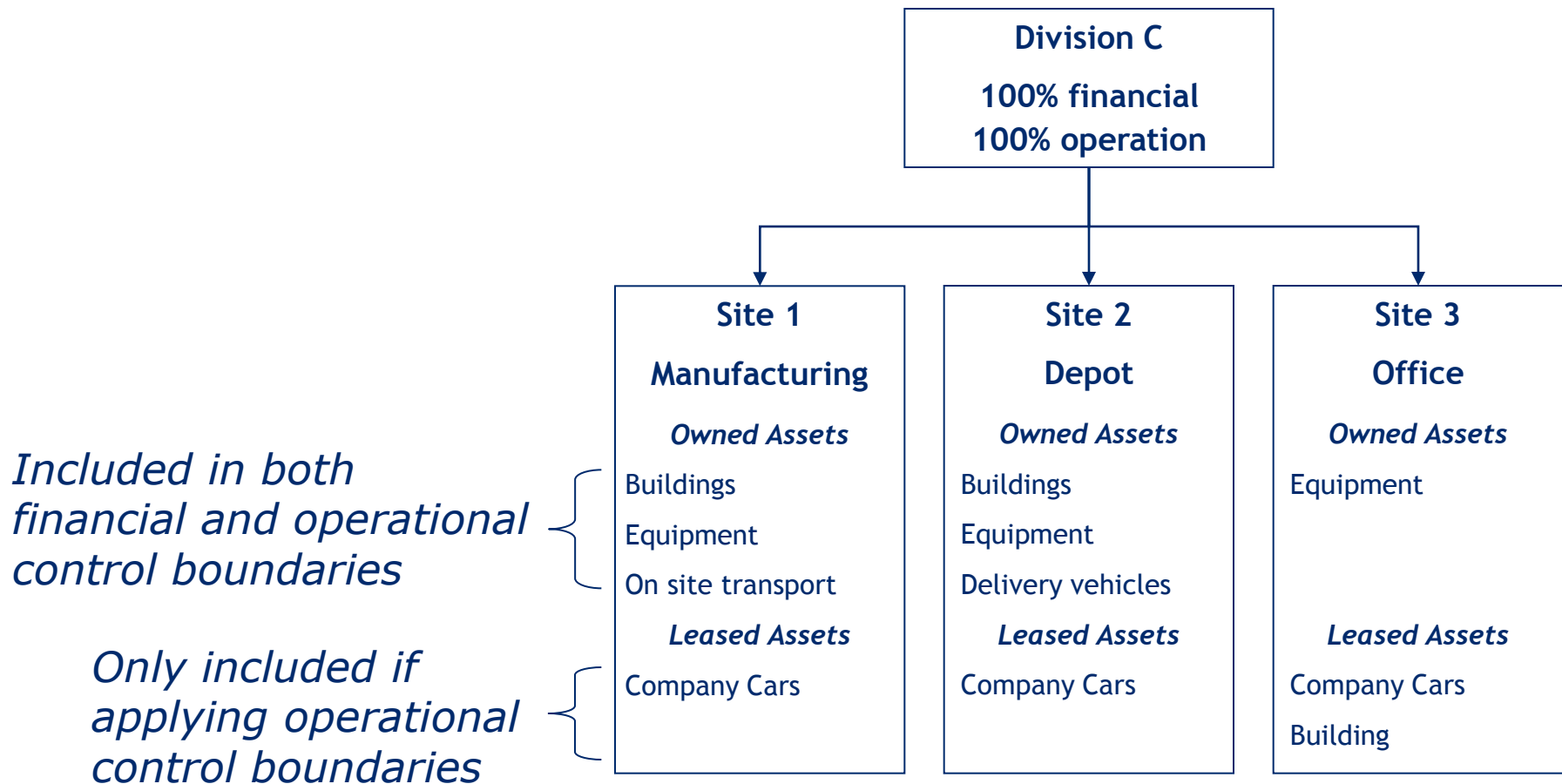
	Operational
Division A	0
Division B	30,000
Division C	50,000
Organisation	80,000

Guidance on setting boundaries

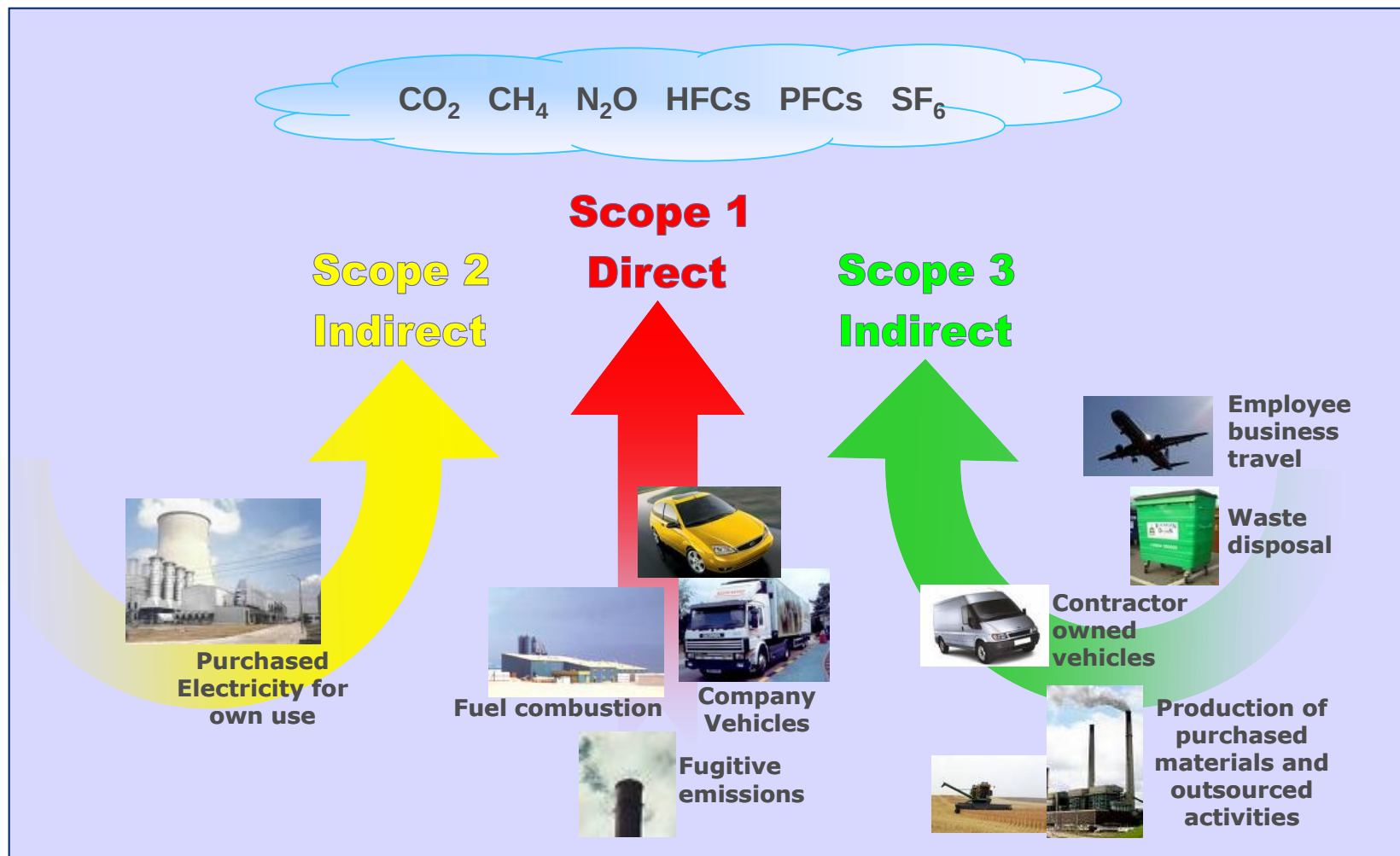


- Reflect reality
- Fit with other reporting requirements
 - Legislative, financial accounting
- Practicalities of data collection
 - Completeness and accuracy
- Ability to influence

How to account for owned and leased assets



Identifying emission sources



3. Collect data and calculate footprint

- Define time period
 - Baseline
 - Calendar / Financial / Academic Year
 - On-going reporting

- Identify sources of data
 - E.g. invoices, meters, expenses



3. Collect data and calculate footprint



- Calculating carbon emissions
 1. Actual consumption multiplied by carbon emission factor
 2. Averages/benchmarks used to calculate consumption and use carbon emission factors
- Consider materiality
 - Large sources – accurate consumption
 - Very small sources – accuracy less important

3. Collect data and calculate footprint



➤ Carbon Emission Factors

- Use Defra GHG conversion factors for company reporting
- But be consistent if:
 - already applying legislative factors
 - using Supplier provided information

Procedure

1. Define Methodology
 2. Set boundaries
 - Level of control
 - Emission sources
 3. Collect data and calculate footprint
 - Define measurement methods and time period
 - Select carbon emission factors
 4. Verify
 5. Disclose
- Discussed in session 3*

Difficulties

- Availability of data
- Lack of evidence or audit trail
- Different time periods
- Differing boundaries prevent comparisons
- Choosing appropriate conversion factors

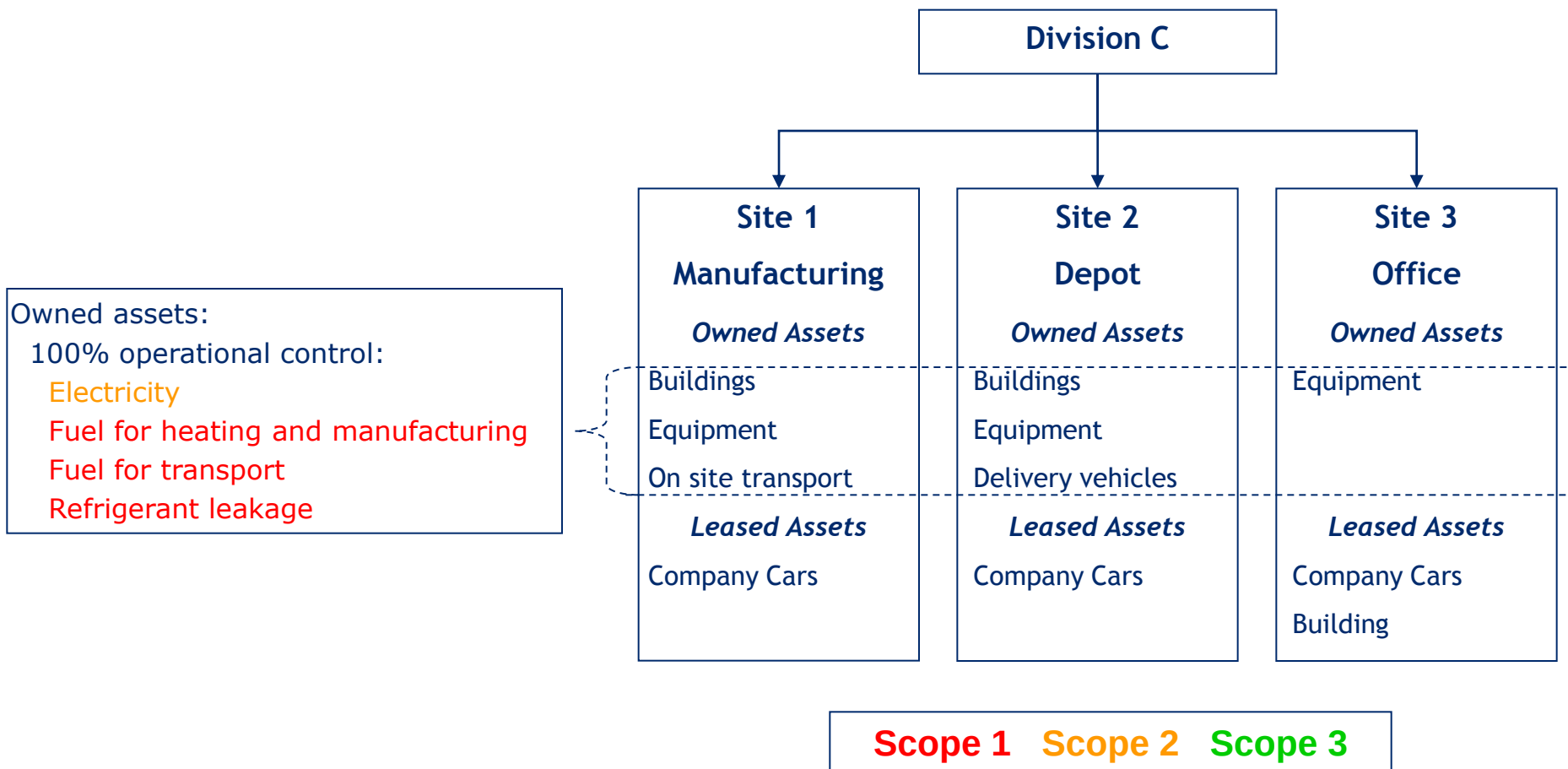


Session 2

- How to calculate your carbon footprint
 - Principles of footprinting
 - Procedure
 - Defining boundaries
 - Data collection
 - **Calculating emissions**
 - **Scope 1**
 - **Scope 2**
 - **Scope 3**

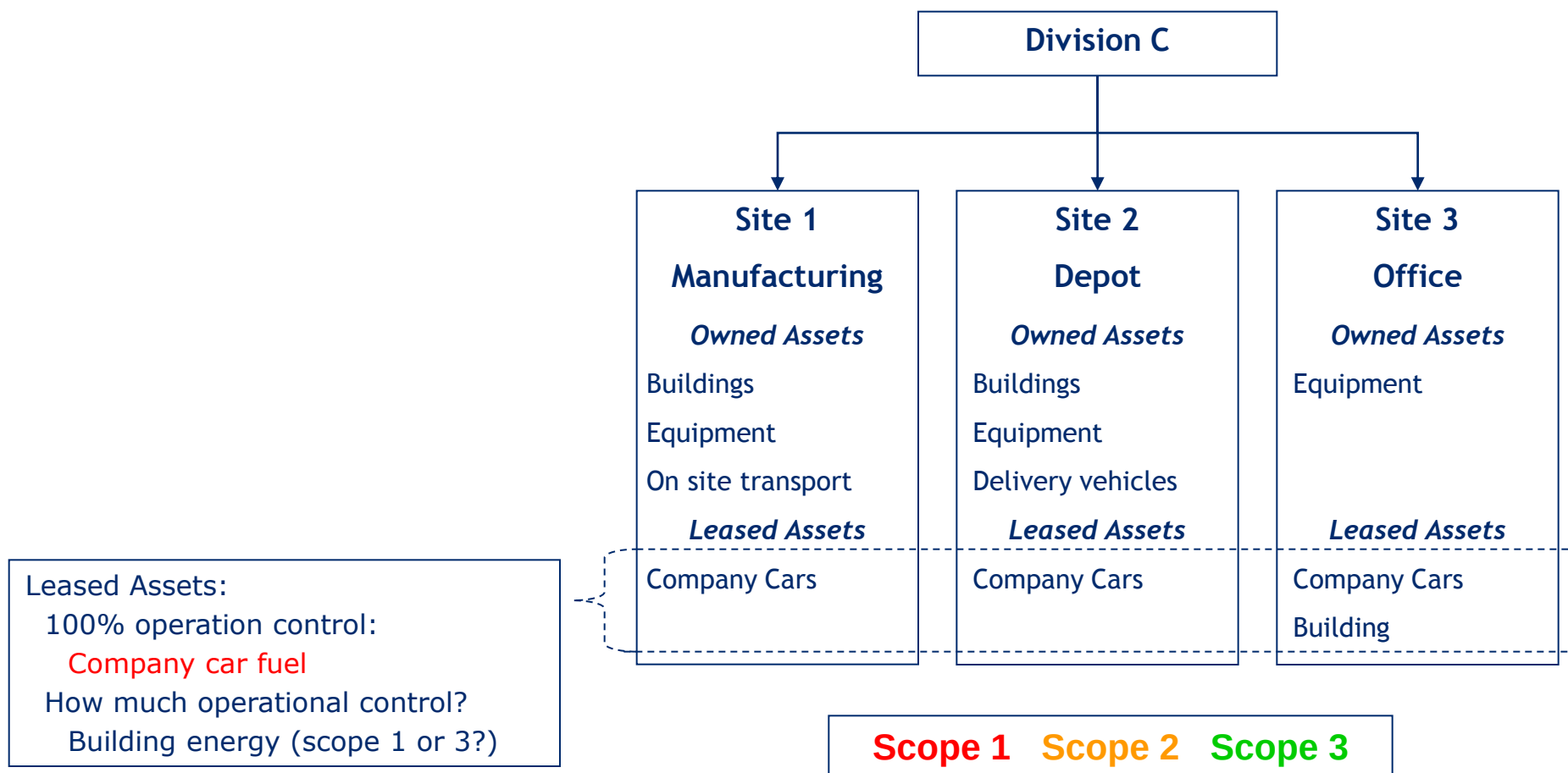
Example: Division C

Applying an operational control boundary



Example: Division C

Applying an operational control boundary



Example: Division C



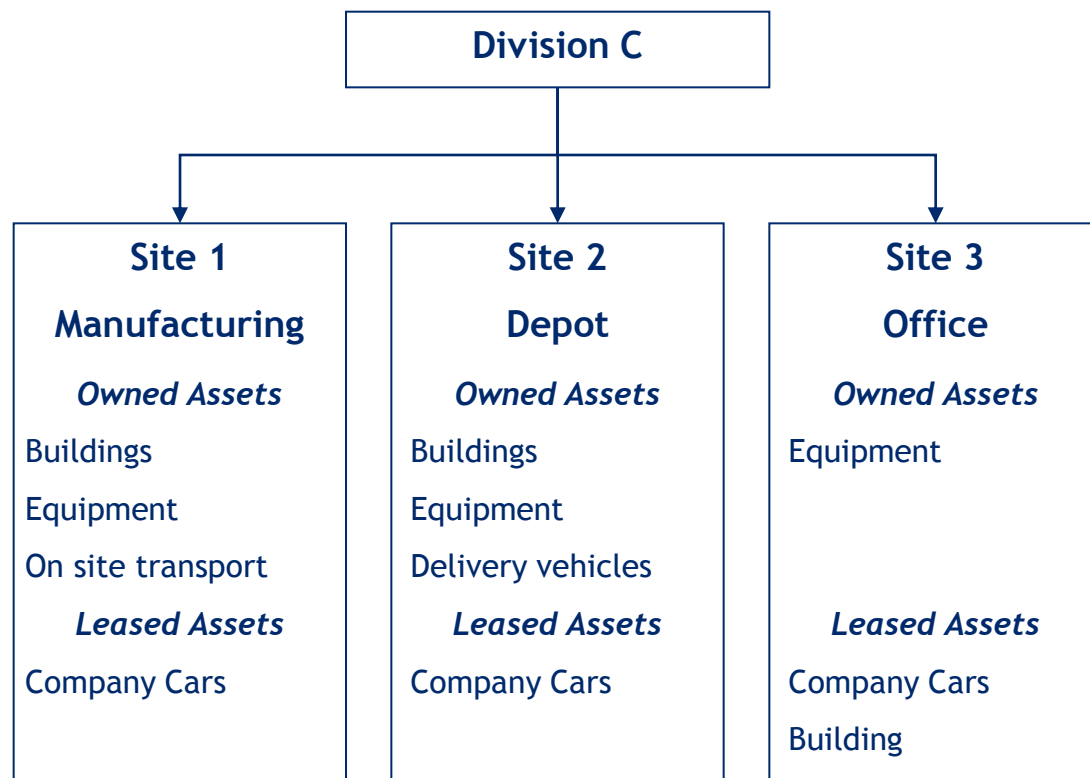
Applying an operational control boundary

Other activities:

100% operational control:

Waste to landfill

Employee non car business travel

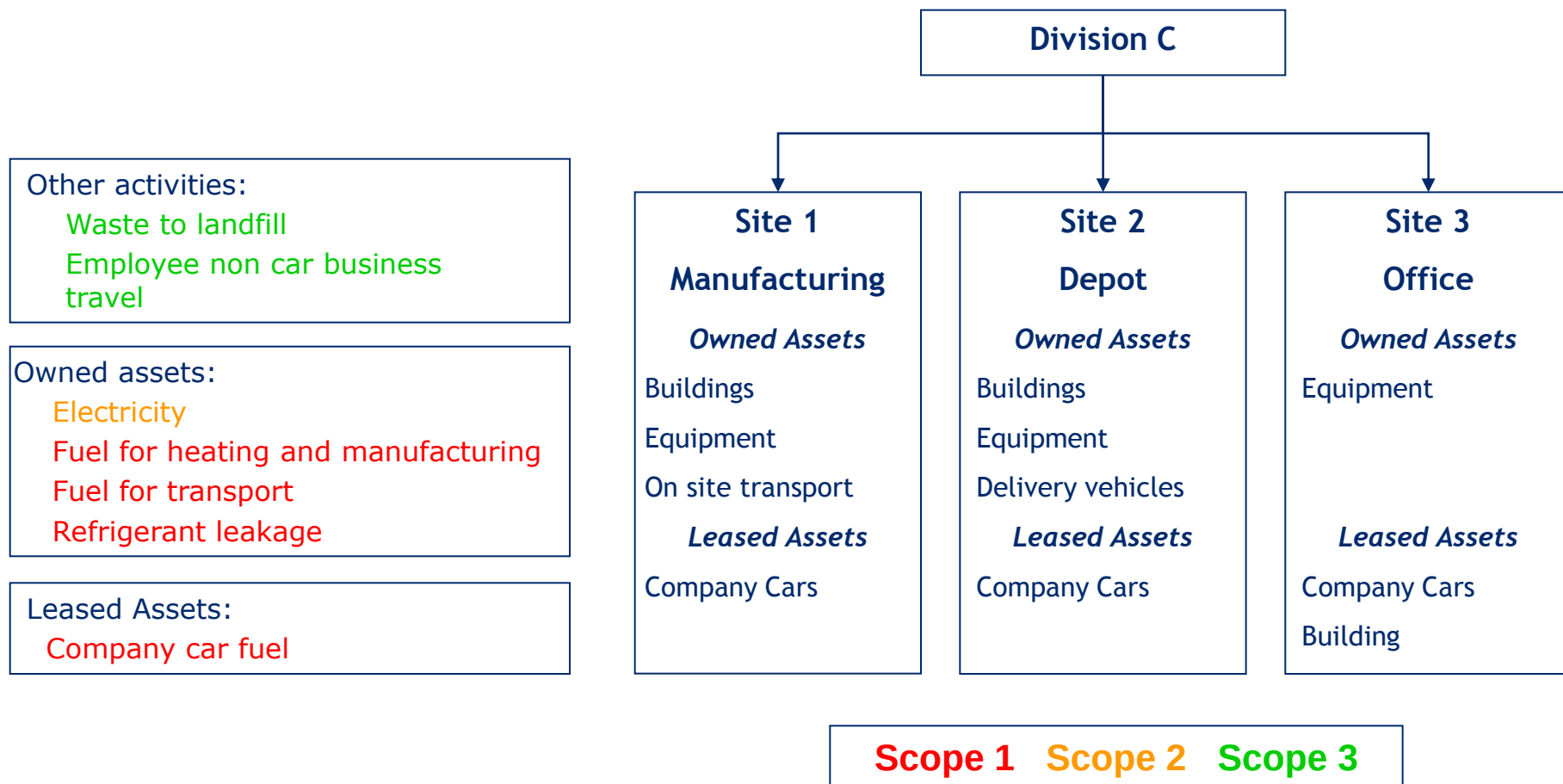


Scope 1 **Scope 2** **Scope 3**

Division C emissions overview



Applying an operational control boundary



Calculating Scope 1 emissions

➤ Fuel for energy and transport

➤ Use actual consumption of fuel in kWh, MJ, litres and convert into CO₂

- Use CT guide for converting fuel consumption
- Use Defra 2010 conversion factors for carbon emissions

Conversion factors



Calculating Scope 1 emissions for Division C



➤ Fuel for energy

Gas used: 1,000,000 m³
Defra carbon emission factors: 0.185 kgCO₂/kWh (gross)
To convert m³ (gross) to kWh: x 11
CO₂ from Gas = 1,000,000 x 11 x 0.185 = **2,035,000 kgCO₂e**

Calculating Scope 1 emissions for Division C



➤ Fuel for energy

Gas used:

1,000,000 m³

Defra carbon emission factors:

0.185 kgCO₂/kWh (gross)

To convert m³ (gross) to kWh:

x 11

CO₂ from Gas = 1,000,000 x 11 x 0.185 = 2,035,000 kgCO₂e

↑
m³

↑
 $\frac{\text{kWh}}{\text{m}^3}$

↑
 $\frac{\text{kgCO}_2}{\text{kWh}}$

Calculating Scope 1 emissions for Division C



➤ Fuel for energy

Gas used: 1,000,000 m³
Defra carbon emission factors: 0.185 kgCO₂e/kWh
To convert m³ to kWh: x 11
CO₂ from Gas = 1,000,000 x 11 x 0.185 = **2,035,000 kgCO₂e**

Gas Oil used: 5,000 litres
Defra carbon emission factors: 3.021 kgCO₂e/litre
CO₂ from Gas Oil = 5,000 x 3.021 = **15,105 kgCO₂e**

Calculating Scope 1 emissions for Division C



➤ Fuel for transport

Diesel used: 300,000 litres
Defra carbon emission factors: 2.67 kgCO₂/litre
CO₂ from Diesel = 300,000 x 2.67 = **801,000 kgCO₂**

Business car travel:

Miles travelled: 140,000 miles
Car engine emission factor: 198gCO₂/km
Convert miles into km: x 1.609344
CO₂ from vehicle = 140,000 x 0.198 x 1.609344
= **44,611kgCO₂**

Calculating Scope 1 emissions for Division C

➤ HFCs - Refrigerant leakage

➤ Use actual consumption of refrigerant and use Defra conversion factors for carbon emissions (incorporates GWP)

➤ *Example*

HFC 134a leakage: 50kg

Defra factor: 1,300kgCO₂e/kg

CO₂e from refrigerants

= 50 x 1,300 = 65,000 kgCO₂e

Annex 6 - Conversion Factors for Greenhouse Gas Process Emissions
(including emissions from refrigerants and air conditioning systems)

Last updated: 1/10/15

Table

Emission	Amount Emitted per Year (t tonnes)	Conversion Factor	Total kg CO ₂ equivalent
CO ₂	x	1.000	
Methane	x	25.000	
Nitrous Oxide	x	298.000	
HFC - 125	x	3,600.000	
HFC - 134a	x	1,300.000	
HFC - 143a	x	1,300.000	
HFC - 145	x	300.000	
HFC - 145a	x	3,000.000	
HFC - 152a	x	145.000	
HFC - 227ea	x	3,900.000	
HFC - 23	x	11,700.000	
HFC - 236fa	x	8,500.000	
HFC - 245fa	x	960.000	
HFC - 32	x	650.000	
HFC - 41	x	150.000	
HFC - 43 - Gaseous	x	1,500.000	
Perfluorobenzene	x	7,800.000	
Perfluoromethane	x	8,500.000	
Perfluoroethane	x	7,800.000	
Perfluoropropane	x	8,700.000	
Perfluorobutane	x	8,700.000	
Perfluoropentane	x	9,300.000	
Perfluorohexane	x	9,400.000	
SO ₂	x	25,900.000	
Total			

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 (IPCC: 27 August 2001). Published for the Intergovernmental Panel on Climate Change by Cambridge University Press 1995. Revised GWP values have since been published by the IPCC in the Third Assessment Report (2001) but current UKIPCC 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:

All air refrigerants in use are classified as greenhouse gases for the purposes of the Climate Change Programme (e.g. CO₂, HFCs). GWP values for refrigerant (HFC) blends should be calculated on the basis of the percentage blend composition (e.g. the GWP for a blend that comprises 40% HFC125, 50% HFC143a and 10% HFC134a is 20000 x 0.4 + 29800 x 0.5 + 13000 x 0.1 = 13000).

Calculating other Scope 1 emissions



- Other fuels
 - Use Defra conversion factors

- Releases from Processes
 - Measurement needs to be specific to circumstances and use Defra / DECC conversion factors

Calculating Scope 2 emissions



➤ Electricity – Defra factors

Electricity emission factors from 1990 to 2008 per kWh (electricity CONSUMED):	Total Direct GHG
UK Grid Electricity Year	kg CO ₂ e per kWh
1990	0.77651
1991	0.76641
1992	0.74624
1993	0.71591
1994	0.69568
1995	0.65726
1996	0.62051
1997	0.58493
1998	0.56584
1999	0.54220
2000	0.53072
2001	0.52515
2002	0.52483
2003	0.52737
2004	0.53666
2005	0.53744
2006	0.54073
2007	0.54509
2008	0.54522
Other electricity factor	
Renewables ²	0
Total	

- Green electricity
 - Use standard grid electricity factor (report 'green' and 'brown' separately)
- Onsite renewable for electricity generation is a scope 1 emission

Use the rolling average value to calculate footprint and evaluate short term savings

Renewables factor does not apply to green tariff electricity

Calculating Scope 2 emissions for Division C



➤ Electricity

Electricity used: 10,000,000 kWh
Defra carbon emission factors: 0.5452 kgCO₂e/kWh
CO₂e from Electricity = 10,000,000 x 0.5452
= **5,452,000 kgCO₂e**

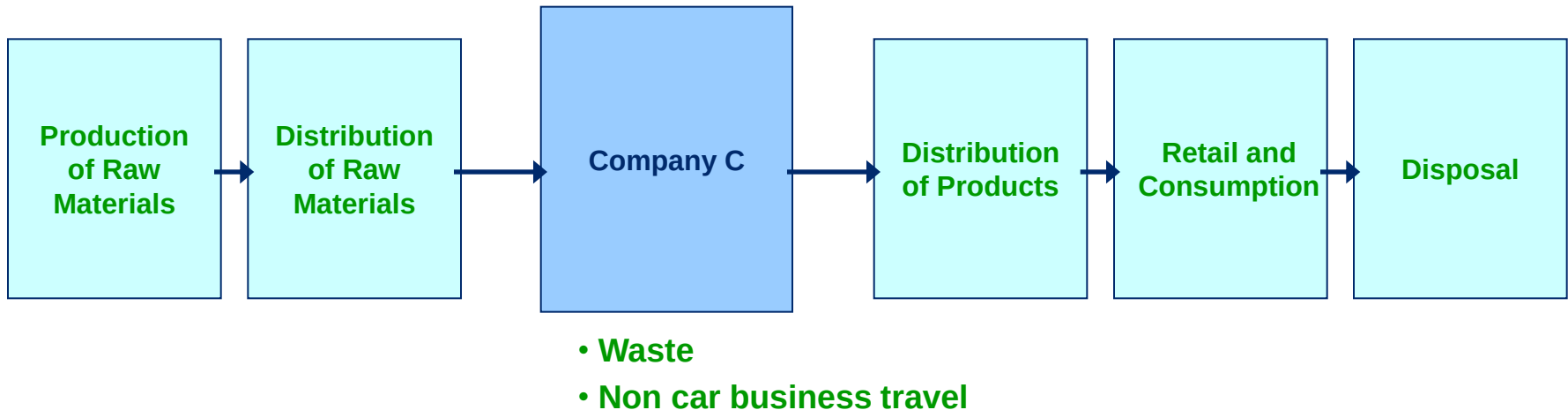
Calculating other Scope 2 emissions



- Imported electricity and steam
 - from neighbouring facility or a landlord
 - need primary fuel data to derive carbon conversion factor

- Electricity used in other countries
 - Need to obtain country specific conversion factors

Calculating Scope 3 emissions



Level of influence or control of 3rd party's emissions can help decide what to include

Also consider the reason why you're producing the footprint

Example: Division C



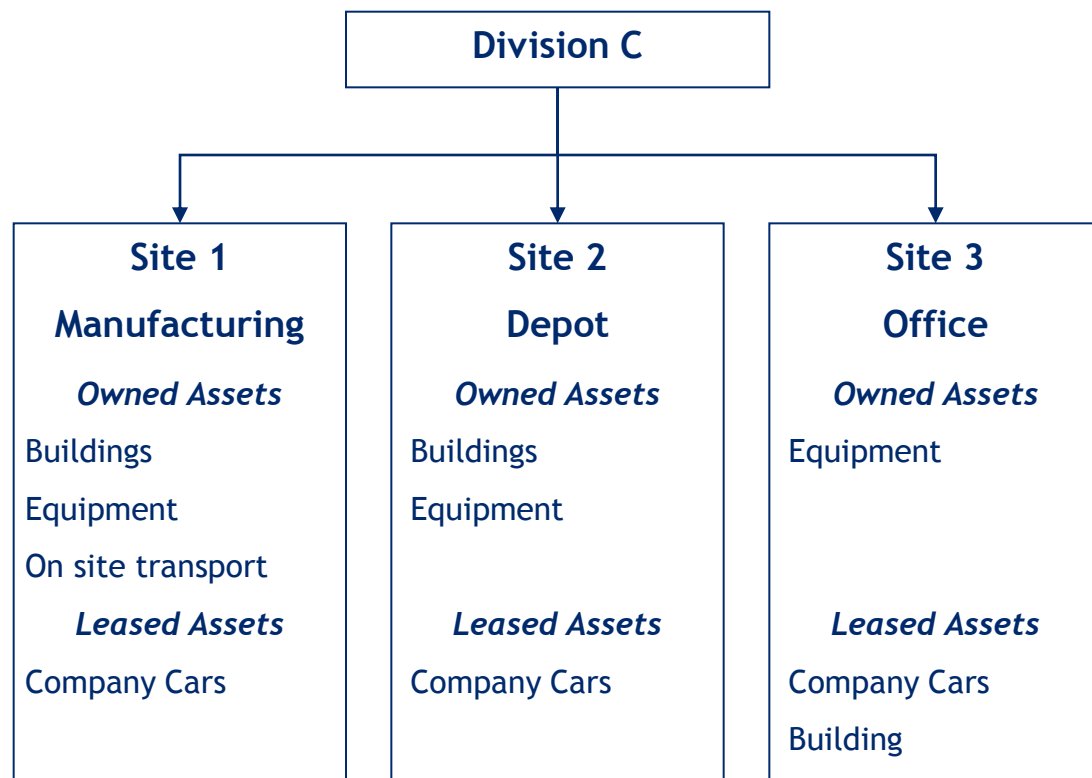
Applying an operational control boundary

Other activities:

100% operational control:

Waste to landfill

Employee non car business travel



Scope 1 **Scope 2** **Scope 3**

Calculating Scope 3 emissions for Division C



➤ Non car business travel

Number of return trips between London and Paris: 30

Distance between London and Paris: 346 km

Defra carbon emission factor short haul: 0.093 kgCO₂/km

Uplift factor: 109%

$$\text{CO}_2\text{e from air travel} = 30 \times (2) \times 346 \times 0.093 \times 1.09$$
$$= \mathbf{2,104 \text{ kgCO}_2}$$

Return journey!

➤ Waste

General mixed waste sent to landfill: 1,000 kg

Approximate carbon emission factor: 0.5 kgCO_{2e}/kg

$$\text{CO}_2\text{e from landfill methane} = 1,000 \times 0.5$$
$$= \mathbf{500 \text{ kgCO}_{2e}}$$

Calculating other Scope 3 emissions



- Employee Commuting and public transport
 - Carry out survey
 - Use Defra / DECC conversion factors

- Supply chain
 - Need to obtain information from 3rd parties or research secondary factors which will be representative
 - Defra / DECC provide rough estimates per £ spent

Calculating emissions for Division C



Scope	Emissions kgCO ₂ e		
1	<i>Energy</i>	Gas	2,035,000
		Gas Oil	15,105
	<i>Transport</i>	Diesel	801,000
		Cars	44,611
	<i>Refrigerants</i>		65,000
2	<i>Electricity</i>		5,452,000
3	<i>Air travel</i>		2,104
	<i>Waste</i>		500
Total	8,415,320 kgCO₂e		

or 8,415 tonnes CO₂e

Calculation Tools – Carbon Trust



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Sector

Size

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Technology

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Carbon footprinting

A 'carbon footprint' measures the total greenhouse gas emissions caused directly and indirectly by a person, organisation, event or product.

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The footprint considers all six of the Kyoto Protocol greenhouse gases: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF₆).

A carbon footprint is measured in tonnes of carbon dioxide equivalent (tCO₂e). The carbon dioxide equivalent (CO₂e) allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO₂. CO₂e is calculated by multiplying the emissions of each of the six greenhouse gases by its 100 year global warming potential (GWP).

Two types of carbon footprinting

The main types of carbon footprint are:

- [Organisational](#)

More info

Publications



[Conversion factors - Energy and carbon conversions - 2009 update](#)



[Carbon footprinting](#)



Your estimated carbon footprint

8,323.10 tCO₂e/yr

This footprint was calculated using emissions factors published by Defra in April 2008



Quantified emissions breakdown over one year



direct emissions

	CO ₂ e (tonnes)	kWh
Fossil fuel use on-site	2,048.37	11,053,055.56
Owned road vehicles	837.31	3,357,263.33
Process emissions	65.00	n/a

indirect emissions 'electricity and imports'

	CO ₂ e (tonnes)	kWh
Electricity	5,370.00	10,000,000.00

other indirect emissions

	CO ₂ e (tonnes)	kWh
Employee travel - air	2.42	9,896.01

Carbon Trust Calculation Tool

Output report

Calculation Tools

- Carbon Trust Carbon Calculator
- GHG Protocol Calculation Tools (sector specific)
- Directgov Act on CO₂ (personal)
- Others...

Session 2 - recap

- How to calculate your carbon footprint
 - Principles of footprinting
 - Procedure
 - Defining boundaries
 - Data collection
 - Calculating emissions
 - Scope 1
 - Scope 2
 - Scope 3

Exercise 1

Calculating a carbon footprint



Exercise 1 – question 1

Electricity

Gas

3rd party fuel

Company car petrol

Waste

Air travel

Gas Oil

Exercise 1 – question 1

Which scope?

Scope 1 Scope 2 Scope 3

Electricity

Gas

3rd party fuel

Company car petrol

Waste

Air travel

Gas Oil

Answer for question 1

Scope	Watford	Manchester
1	Gas Company car petrol	Gas Gas Oil
2	Electricity	Electricity
3	3 rd party fuel Waste?	Waste Air travel

Exercise 1 – question 2

Scope	Watford	Manchester
1	Gas (100,000 kWh) Company car petrol (£150,000)	Gas (8,500,000 kWh) Gas Oil (8 x 5,000 litres)
2	Electricity (8,000,000 kWh)	Electricity (10,000,000 kWh)
3	3 rd party fuel (70,000 litres)	Waste (?) Air travel (6 return flights)

Workings to question 2

Scope 1

Gas

$$(100,000 + 8,500,000) \text{ kWh} \times 0.185 \text{ kgCO}_2/\text{kWh} = 1,591,000 \text{ kgCO}_2$$

Petrol

$$£150,000 \div £1.50 \text{ per litre} \times 2.322 \text{ kgCO}_2/\text{litre} = 232,200 \text{ kgCO}_2$$

Gas Oil

$$8 \text{ deliveries} \times 5,000 \text{ litres per delivery} \times 3.021 \text{ kgCO}_2/\text{litre} = 120,840 \text{ kgCO}_2$$

Scope 1 Total: 1,944,040 kgCO₂e

Workings to question 2

Scope 2

Electricity

$$(8,000,000 + 10,000,000) \text{ kWh} \times 0.5452 \text{ kgCO}_2\text{e/kWh} = 9,813,600 \text{ kgCO}_2\text{e}$$

Scope 2 Total: 9,813,600 kgCO₂e

Scope 3

3rd party fuel (Diesel)

$$70,000 \text{ litres} \times 2.6720 \text{ kgCO}_2\text{/litre} = 187,040 \text{ kgCO}_2\text{e}$$

Air travel

$$6 \text{ flights} \times 2 \times 1,560 \text{ km} \times 0.093 \text{ kgCO}_2\text{/km} \times 1.09 = 1,898 \text{ kgCO}_2\text{e}$$

Scope 3 Total: 188,938 kgCO₂e

Answer for question 2



Scope 1	1,944	tonnes CO ₂ e
Scope 2	9,814	tonnes CO ₂ e
Scope 3	189	tonnes CO ₂ e
TOTAL	11,947	tonnes CO ₂ e

Session 3

Reporting your Carbon Footprint



Session 3



- Reporting your Carbon Footprint
 - Presenting the footprint
 - Information to accompany the footprint
 - Verification and Assurance

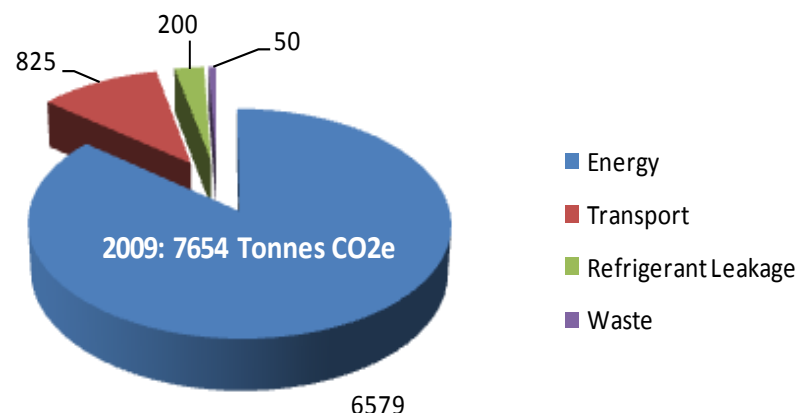
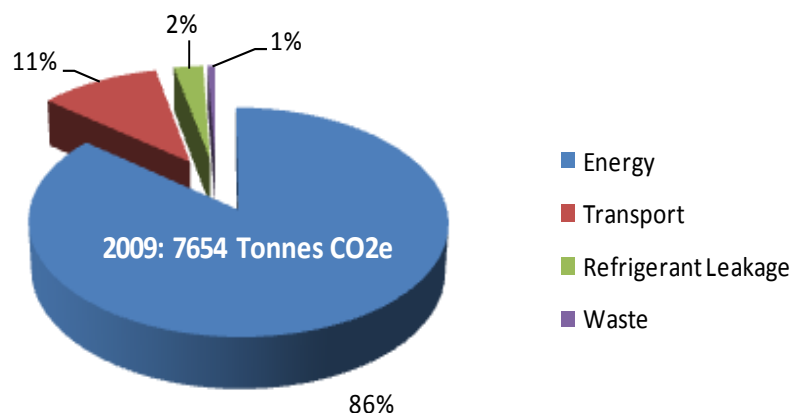
Options for presenting the carbon footprint



- ? Absolute value 15,000 tonnes CO₂e
- ? Relative value 100kgCO₂e/tonne produced
- ? Time period Jan to Dec 2006
- ? Emissions breakdown Scope 1, 2, 3

Presenting the footprint

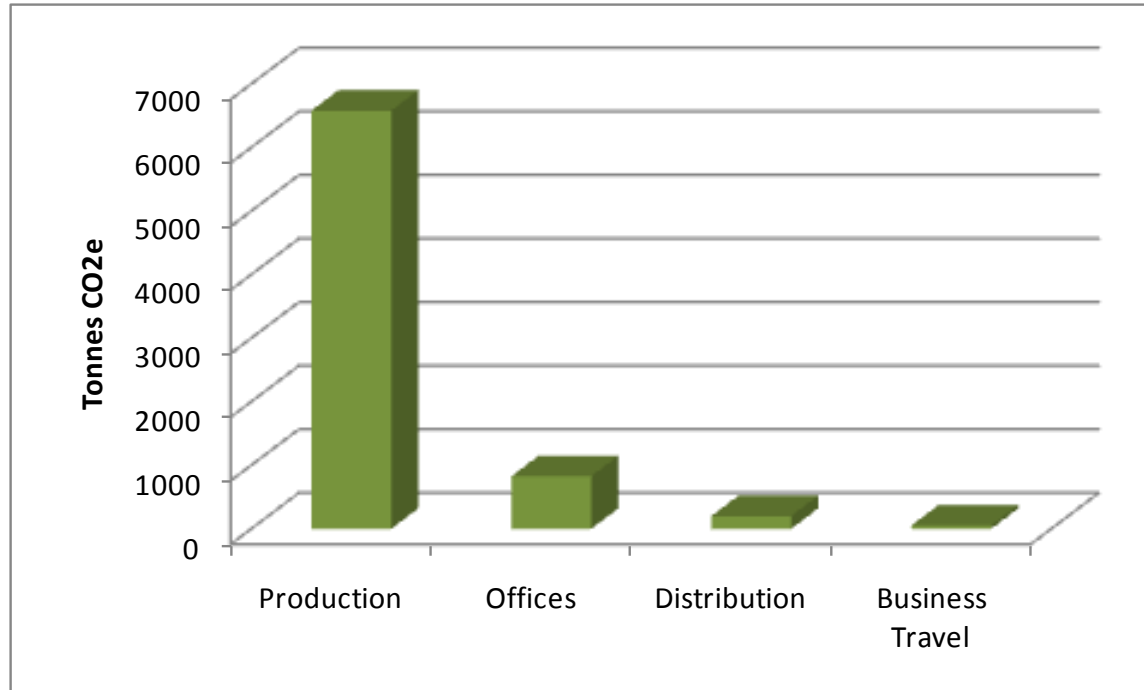
➤ Emissions breakdown – by source?



Example

Presenting the footprint

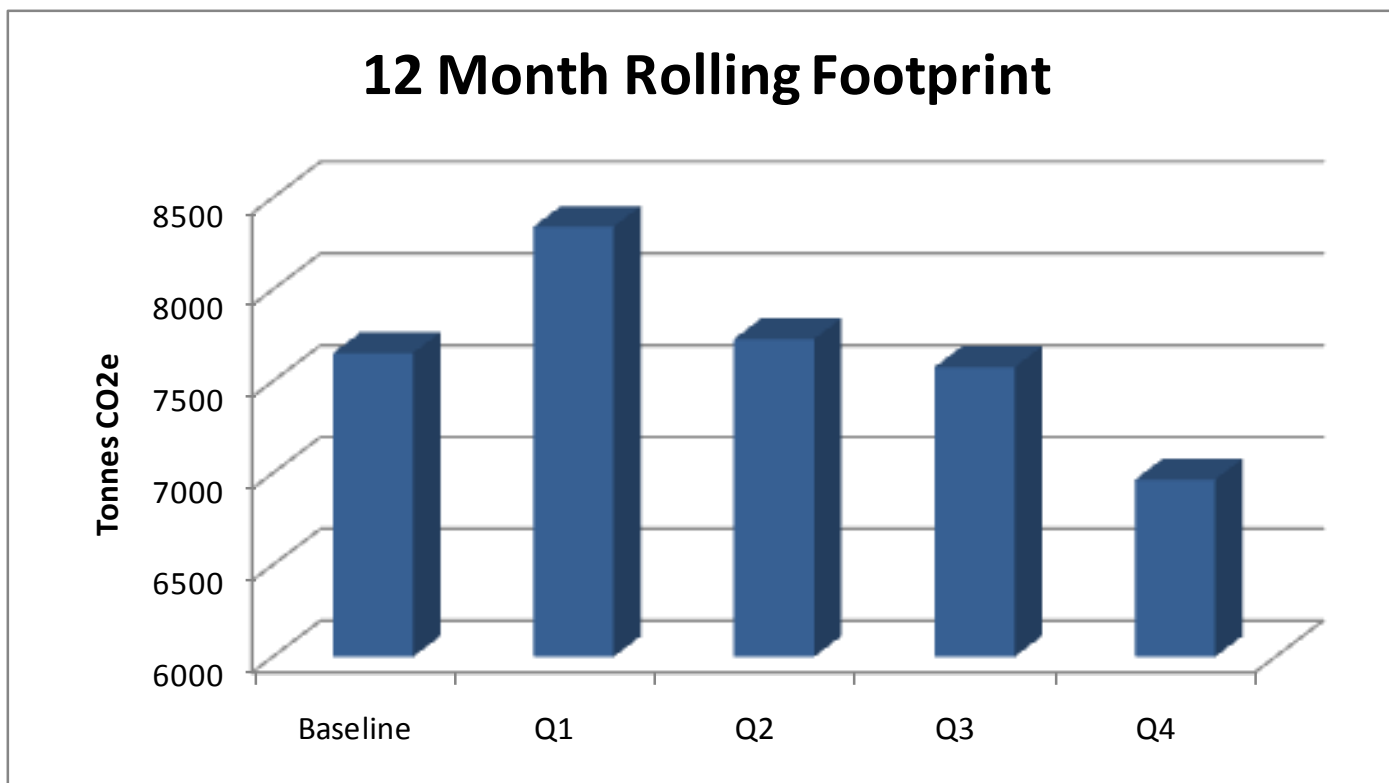
➤ Emissions breakdown – by department?



Example

Presenting the footprint

➤ Monitoring progress



Example of public disclosure of footprint



CARBON DISCLOSURE PROJECTSign In

[Home](#)[What We Do](#)[Programs](#)[How To Disclose](#)[Results](#)



"The Carbon Disclosure Project's detailed reporting is helping persuade companies throughout the world to measure, manage, disclose and ultimately reduce their greenhouse gas emissions."

- Ban Ki-moon, UN Secretary-General

The Carbon Disclosure Project is an independent not-for-profit organization holding the largest database of primary corporate climate change information in the world.

Thousands of organizations from across the world's major economies measure and disclose their greenhouse gas emissions, water use and climate change strategies through CDP. We put this information at the heart of financial and policy decision-making.

- > [Find out more about CDP](#)
- > [Read about our network of partners and alliances](#)

CDP worldwide operations

Find CDP's global offices and international partner organizations.

Support for responding companies

Program and sector specific guidance for companies responding to CDP 2011.

Carbon Action is asking companies to implement cost-effective greenhouse gas emissions reductions.



Read all about Carbon Action, a new investor led initiative from CDP

Source: <http://www.cdproject.net/>

Reporting to the Carbon Disclosure Project



1. Climate Change Risks, Opportunities and Strategy
2. Greenhouse Gas Emissions Accounting
3. Greenhouse Gas Emissions Management
4. Climate Change Governance

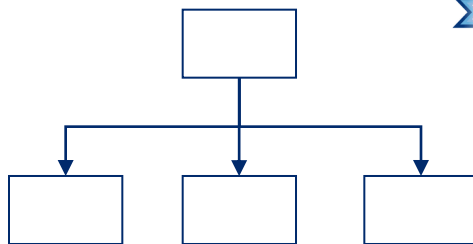
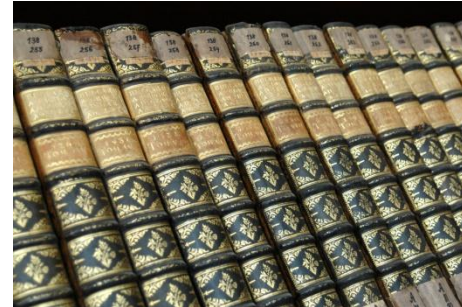
Session 3



- Reporting your Carbon Footprint
 - Presenting the footprint
 - **Information to accompany the footprint**
 - Verification and Assurance

Information to accompany the footprint

- Methodology
 - brief overview!



➤ Boundaries

- Organisation / Company / Activities included and not included

➤ Strategy

- Now what are you going to do!



Session 3

- Reporting your Carbon Footprint
 - Presenting the footprint
 - Information to accompany the footprint
 - **Verification and Assurance**

Verification and Assurance

- External verification
 - to an accredited ISO standard?
 - 3rd party review?
- Verify your procedure
 - What you did
 - How you did it
 - How you checked that it was correct!



Verification data requirements



1. Company information

- e.g. organisation and structure



2. Audit trail

- e.g. invoices, expense receipts



3. Procedures

- Data collection, checking

4. Justification

- Inclusion/exclusion sources
- Carbon conversion factors



Session 3 recap

- Reporting your Carbon Footprint
 - Presenting the footprint
 - Information to accompany the footprint
 - Verification and Assurance

Session 4

How to reduce your carbon footprint



Session 4

- Reducing your Carbon Footprint
 - What are businesses doing?
 - Drivers to manage and reduce emissions
 - Identifying Opportunities
 - Develop a Strategy and Implementation Plan
 - Manage and Review

What are businesses doing?



- Monitoring and reducing energy consumption / becoming more energy efficient
- On-site renewables generation
- Combined heat and power
- Using biofuels / electric vehicles
- Developing green travel plans / encouraging public transport
- Increased recycling
- Rain water collection

Session 4

- Reducing your Carbon Footprint
 - What are businesses doing?
 - **Drivers to manage and reduce emissions**
 - Identifying Opportunities
 - Develop a Strategy and Implementation Plan
 - Manage and Review

Drivers to manage and reduce emissions



- Costs
- Corporate Image / Brand Value
- Investor / Consumer Pressure
- Employee Engagement
- Compliance with Legislation

Climate Change Legislation



- EU Emissions Trading Scheme (EU ETS)
- UK Climate Change Agreements (CCAs)
- UK Carbon Reduction Commitment (CRC) Energy Efficiency Scheme
- EU F-gas and Ozone Depleting Substances directives
- EU Building Regulations

Session 4

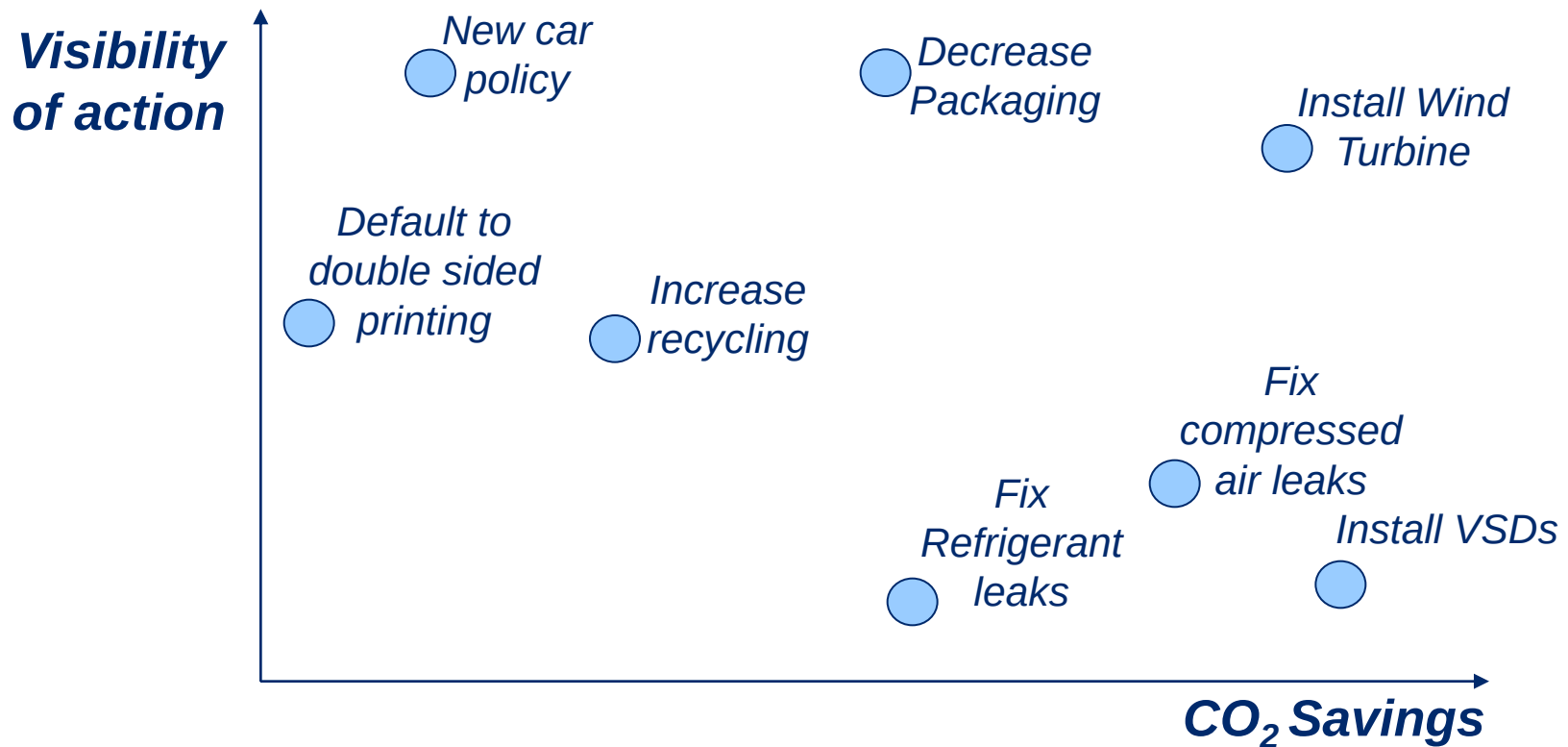
- Reducing your Carbon Footprint
 - What are businesses doing?
 - Drivers to manage and reduce emissions
 - **Identifying Opportunities**
 - Develop a Strategy and Implementation Plan
 - Manage and Review

Identifying Opportunities

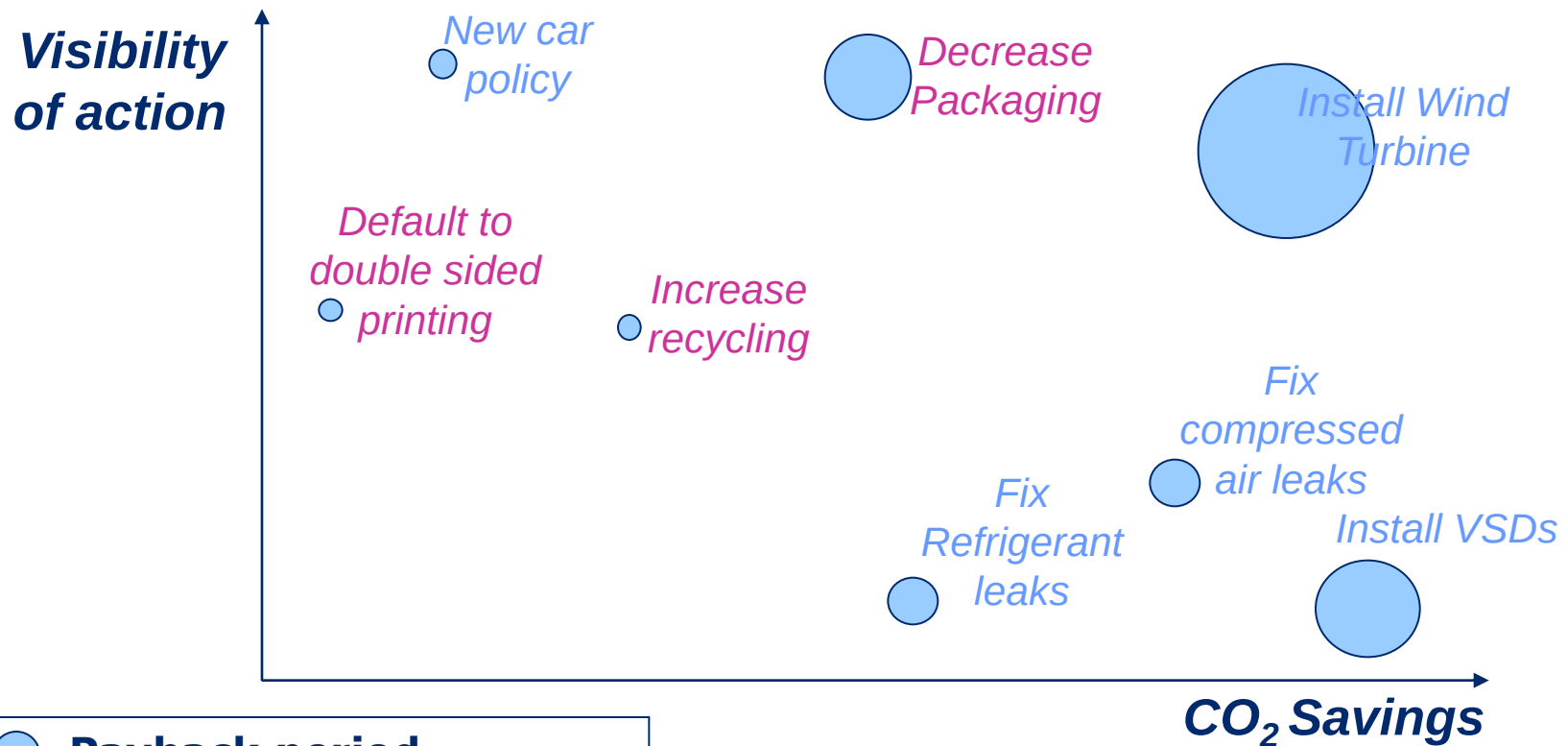
- Evaluate each source
- Generate ideas
- Quantify potential
- Identify feasibility
- Need help?
 - Carbon Trust
 - WRAP, Envirowise, Energy Saving Trust, RDAs



Identifying Opportunities - don't just concentrate on the big ones!



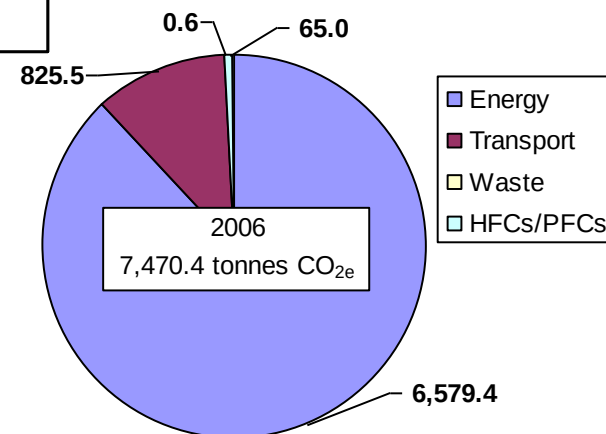
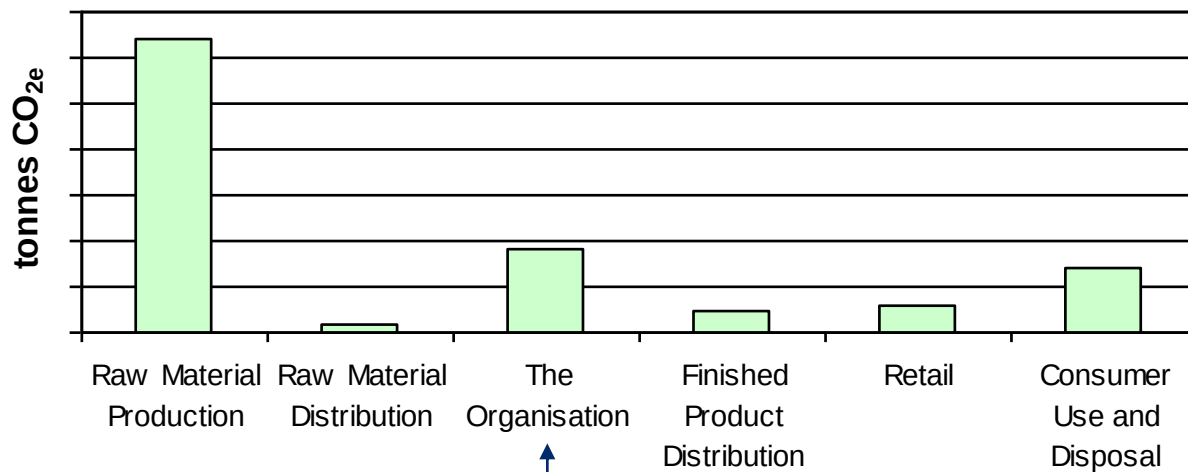
Identifying Opportunities - don't just concentrate on the big ones!



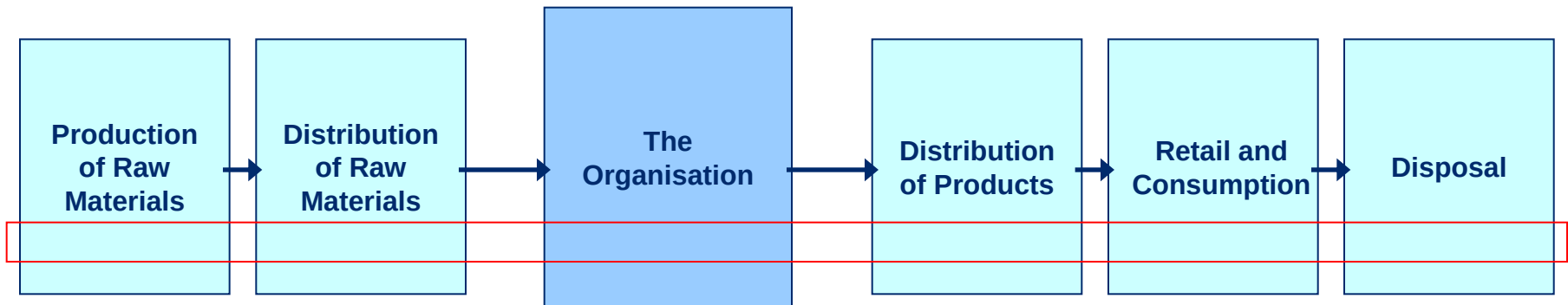
● Payback period
Organisation / Supply Chain

Identifying Opportunities

**Illustrative Supply Chain Carbon Footprint:
Food Manufacturer**



Tackling footprints



Product and life cycle footprints

Product footprints

working with
the Carbon Trust



- **Independent measurement**
- **"Reduce or lose" commitment**

<http://www.carbon-label.co.uk>



250 ml

294 gCO₂e



34.5g bag

80 gCO₂e



49g bar

169 gCO₂e



500 ml bottle

240 gCO₂e



Raw Materials - 44%

Crisp Manufacture - 30%

Packaging - 15%

Distribution - 9%

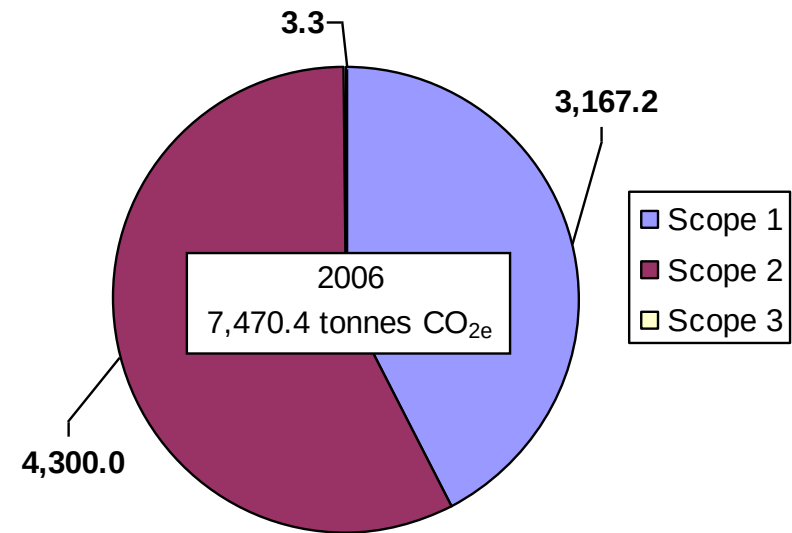
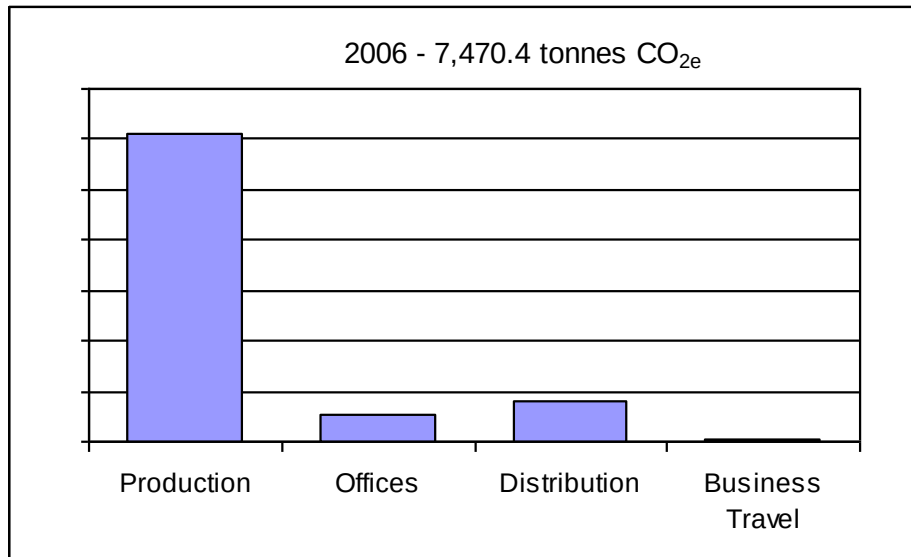
Disposal - 2%

Reduction Opportunity:

***Decrease water
content of potatoes***

**Saves on frying energy
use and transportation
fuel as less heavy**

Remember: only you can reduce your footprint!



Session 4

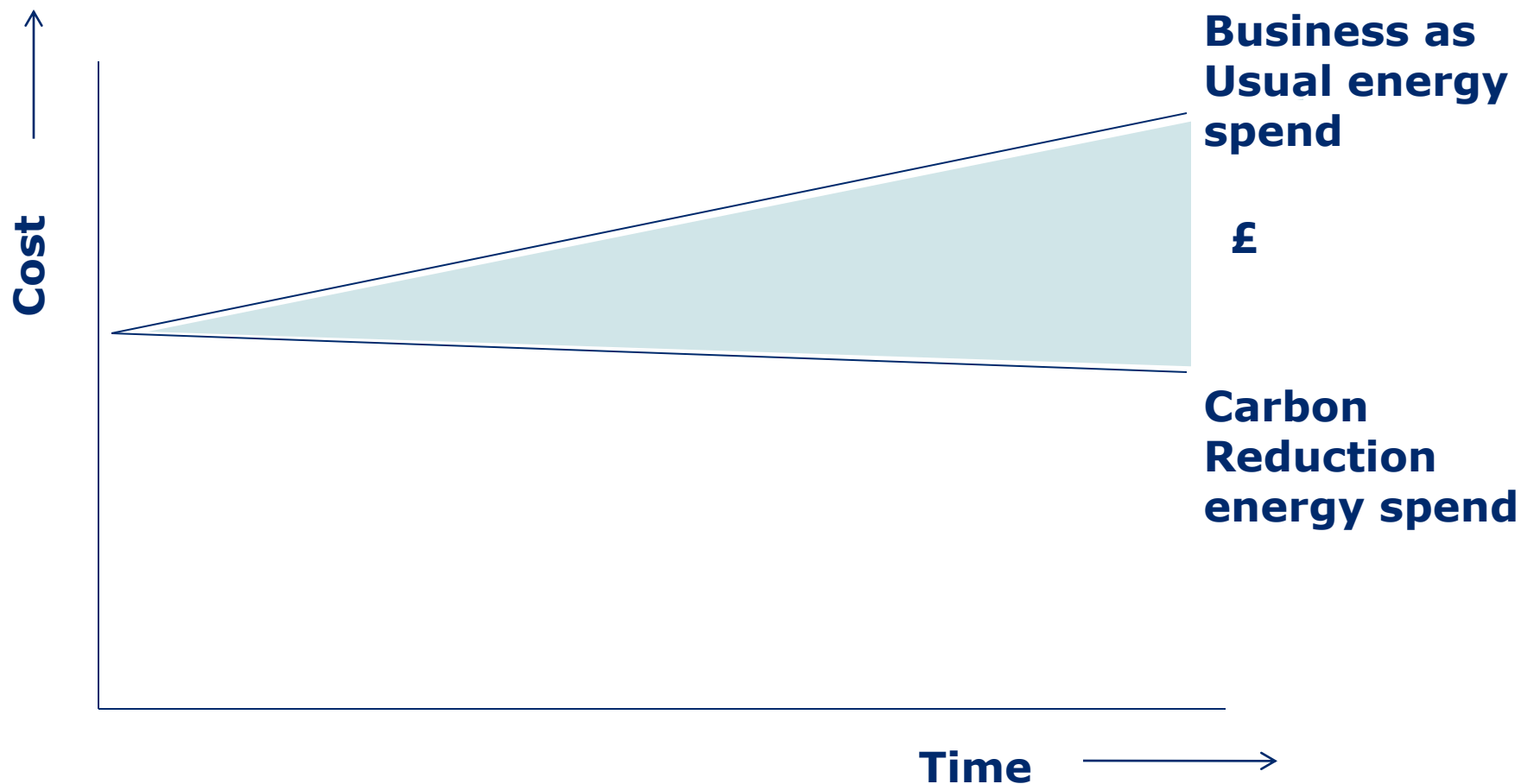
- Reducing your Carbon Footprint
 - What are businesses doing?
 - Drivers to manage and reduce emissions
 - Identifying Opportunities
 - **Develop a Strategy and Implementation Plan**
 - Manage and Review

Developing an Implementation Plan



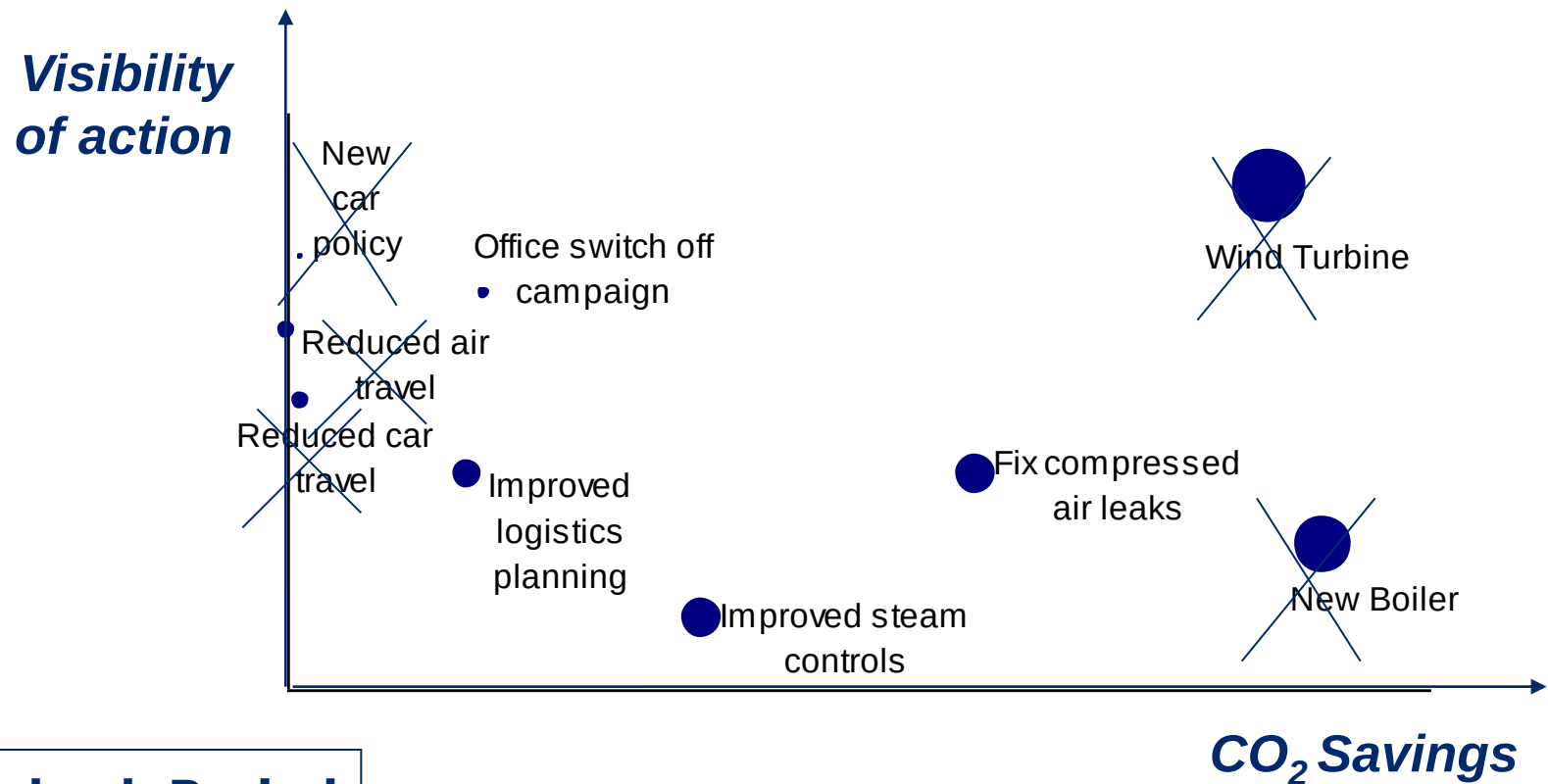
- Prioritise on simple payback?
- Net Present Value (NPV) evaluation / value at stake?
- Timescales?
- Step changes in attitude?
- High visibility actions?
- Integrate into EMS or CSR objectives / personal objectives?

Value at Stake



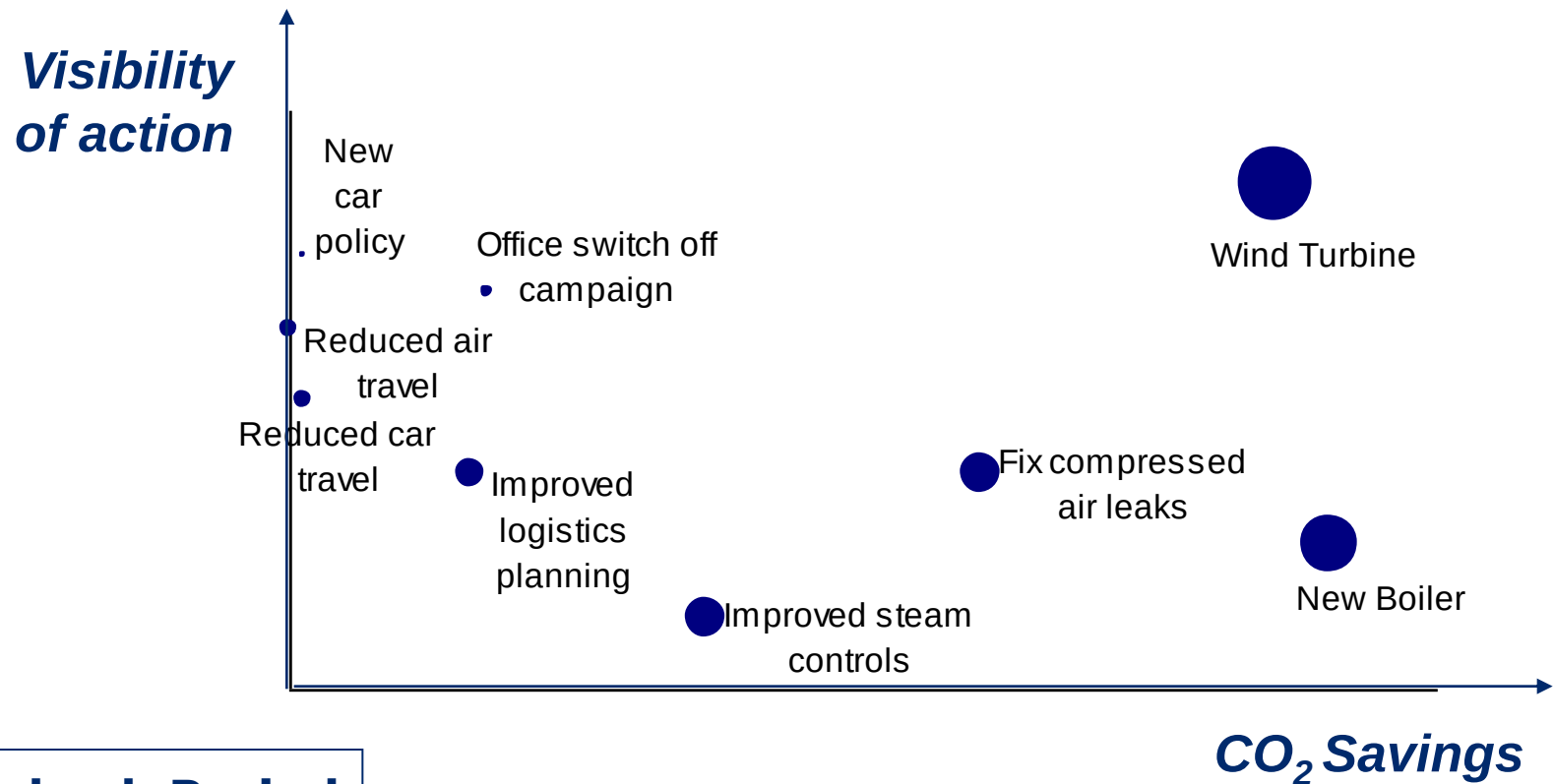
Implementation Plan

Cautious approach: <2 year payback only strategy and don't change current policy



Implementation Plan

Ambitious approach: <5 year payback, integrate sustainability into activities, changes attitudes



Implementation Plan

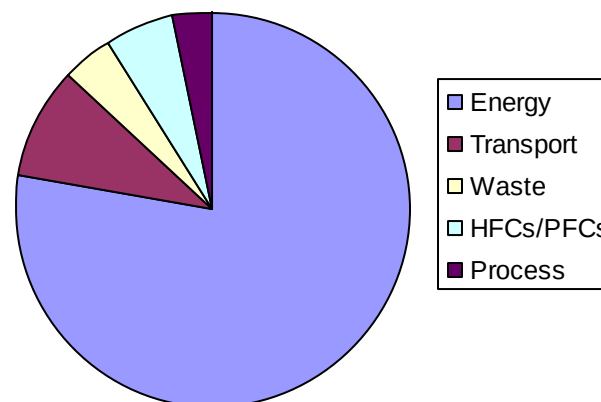
No cost and <5 year payback

Opportunity Description	Est. Saving (%)	Saving (Tonnes CO _{2e})	Saving (£)	Cost (£)
Scope 1				
- Replace boiler	X	X	X	X
- Steam controls	X	X	X	X
- Improved logistics	X	X	X	X
- Reduce business travel	X	X	X	X
- Clean car policy	X	X	X	X
Scope 2				
- Office switch off	X	X	X	X
- Compressed air leaks	X	X	X	X
- Wind Turbine	X	X	X	X
Scope 3				
- Reduce business travel	X	X	X	X
Total	40% total footprint	2,988	X k	X k

becomes the target

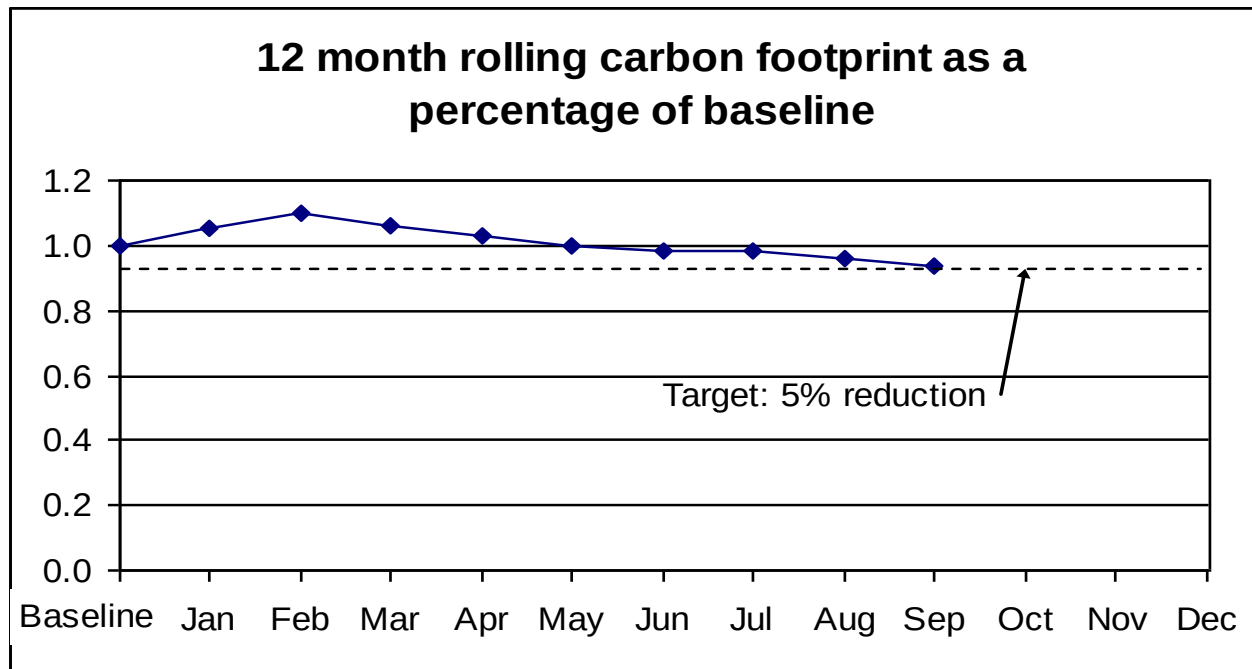
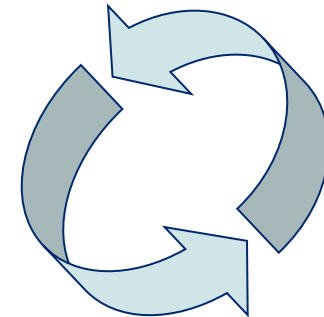
Manage and Review

- Senior management endorsement
- Team to plan, implement and regularly review progress against target
- Refine accuracy of carbon footprint
 - Collect data on missing sources
 - Develop a more ambitious approach to footprinting!



Manage and Review

- Feedback loop
 - Communicate progress



Session 4 recap

- Reducing your Carbon Footprint
 - What are businesses doing?
 - Drivers to manage and reduce emissions
 - Identifying Opportunities
 - Develop a Strategy and Implementation Plan
 - Manage and Review

Exercise 2

Reducing Your Carbon Footprint



Exercise 2 - APL

APL's businesses are in a very competitive market and their competitors are making public statements about their commitment to reducing their climate change impacts.

APL would like to engage the entire company (including employees), customers and suppliers to launch an ambitious carbon reduction campaign.

In groups of 6 to 8, suggest some generic ideas which APL can consider to reduce their carbon footprint in the following areas of their business:



**Head office:
building and
equipment**



Employees



Factories



Distribution



**Supply
Chain**

Workshop recap

- **Session 1** **What is a carbon footprint**
- **Session 2** **How to calculate your carbon footprint**
- 📄 ***Exercise 1*** ***Calculating your carbon footprint***
- **Session 3** **Reporting your carbon footprint**
- **Session 4** **How to reduce your carbon footprint**
- 📄 ***Exercise 2*** ***Reducing your carbon footprint***

The Carbon Trust

Guide to Practical Carbon Footprinting