Sustainable Procurement: Measuring the impact on Climate Change

Dave Faulkner and Keith Dickerson, Chairman SG5 WP3 ICT & Climate Change

Vision Statement

- ‘Sustainable procurement’ means providing the functionality needed (including LCA-embodiment, use and replacement) without a negative environmental impact for the next generation to clean up

Objectives of Sustainable Procurement

- With climate change the game needs to change
  - What are the new 'rules'?
  - How do we implement them?
  - What is the role of standards?
  - Who can help/champion this initiative?

Today's Situation

- Climate Change Act 2008
  - A world first
  - Focuses on reducing emissions in UK
  - but…
- Up to 50% of the UK's emissions have been off-shored to producer countries
  - Depending on the specific product…

How Did We Get Here?

- Producer countries often have lower costs
  - Especially for commodity or high volume products
  - (e.g. Contracts increasingly go to China etc)
- Life-cycle and sustainability have not been high on the agenda in SoRs
  - Perhaps because there is a perceived risk that this might increase costs…

Available Options

- 'Business as usual' - no change to existing procurement processes
  - Simple to implement - no change in business model…
  - …but UK fails to take a 'global' lead on sustainability and climate change
  - …and fails to meet requirements of UK Climate Change Act
- Change the way we procure
  - Make sustainability a key objective
    - Ensure it's embedded in each aspect of a product's lifecycle
    - Demand year-on-year improvements
    - Understand the impact on cost (positive or negative) and seek to minimise any negative cost impact
  - Comply with the requirements of UK Climate Change Act
    - Considering also producer countries

The Role of Standards

- Provides purchasers with a readily available tool for sustainable procurement
  - No need to start from scratch
- Commoditises sustainability requirements
  - Drives out cost
  - Reduces Risk

Which are the key standards?

- BS ISO
  - 14040 Environmental management - Life cycle assessment - Principles and framework
  - 14044 Environmental management - Life cycle assessment - Requirements and guidelines
  - 14064.1 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
  - 14064.2 Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
- World Resources Institute and BSI feed into ISO (e.g….
- BSI PAS2050
  - Offers consistent method for assessing the life cycle GHG emissions of goods and services
  - Facilitates the evaluation of alternative product configurations, sourcing and manufacturing methods, raw material choices and supplier selection on the basis of the life cycle GHG emissions associated with goods and services

Sector specific examples

- ITU-T Methodology (under development)
  - Internationally agreed common methodology for measuring the impacts of ICTs on climate change
    - Reduction of ICT's own emissions over their entire lifecycle
    - Mitigation that follows through the adoption of ICTs in other sectors
- ITU-T L.1000 Recommendation L.adapter - Universal power adapter/charging solution for mobile terminals and other ICT devices
  - Avoids providing a new charger with every phone
  - Maximises energy efficiency of chargers

Relevant Metrics and Units

Metric System

- Power unit: 1 W = 1 kg m^2 s^{-3}
- Energy unit: 1 J = 1 W.s
- 1 kWh = 3,600,000 J
- Mass unit: 1 kg or 1 t = 1,000 kg
- Volume unit: 1 m^3 = 1,000 L

Global warming Potential (GWP)

- Carbon Dioxide (CO_2) = 1 CO_2e
- Methane (CH_4) = 25 CO_2e
- Nitrous Oxide (N_2O) = 298 CO_2e
- Sulfur Hexafluoride (SF_6) = 22,800 CO_2e
- HFC-23 (CHF_3) = 14,800 CO_2e

Direct Emissions – CO_2 intensity

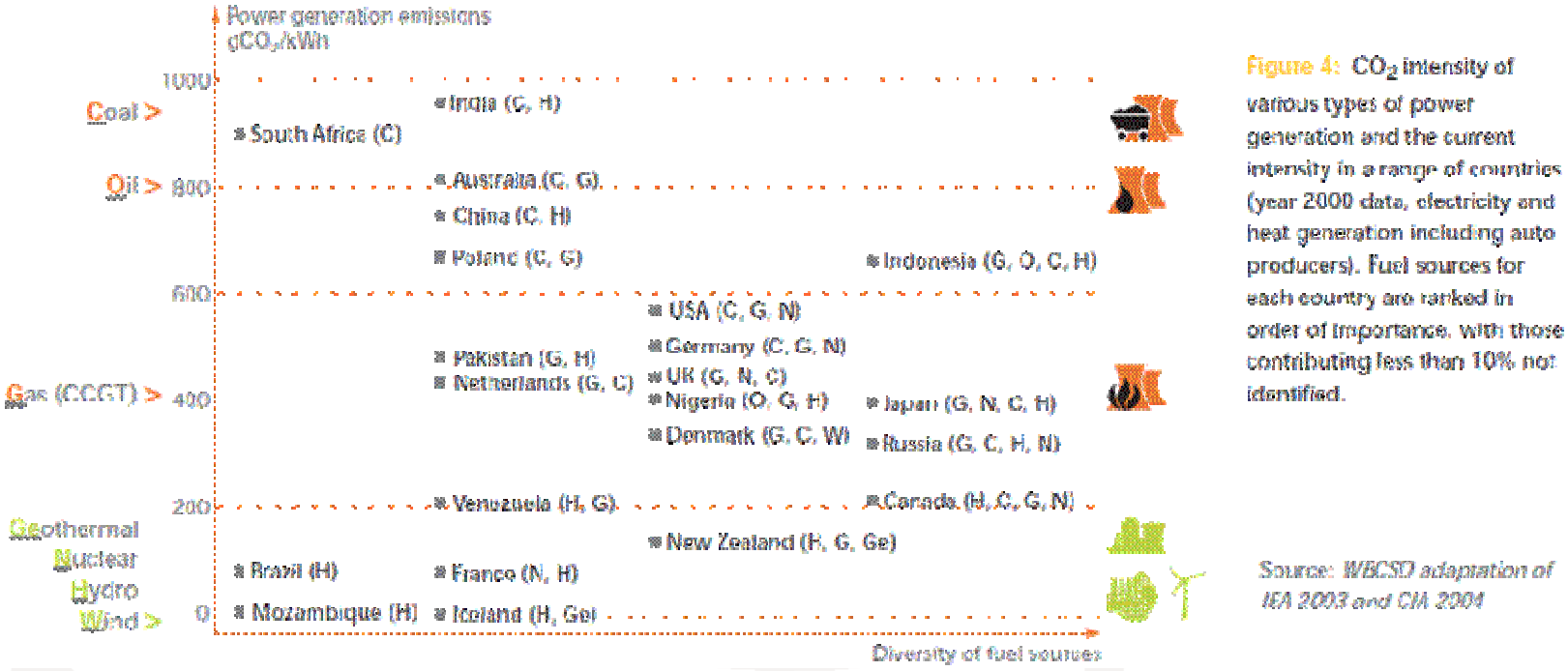


Figure 4: CO_2 intensity of various types of power generation and the current intensity in a range of countries (year 2000 data, electricity and heat generation including auto producers). Fuel sources for each country are ranked in order of importance, with those contributing less than 10% not identified.

Source: *WBCSD adaptation of IEA 2003 and CM 2004*

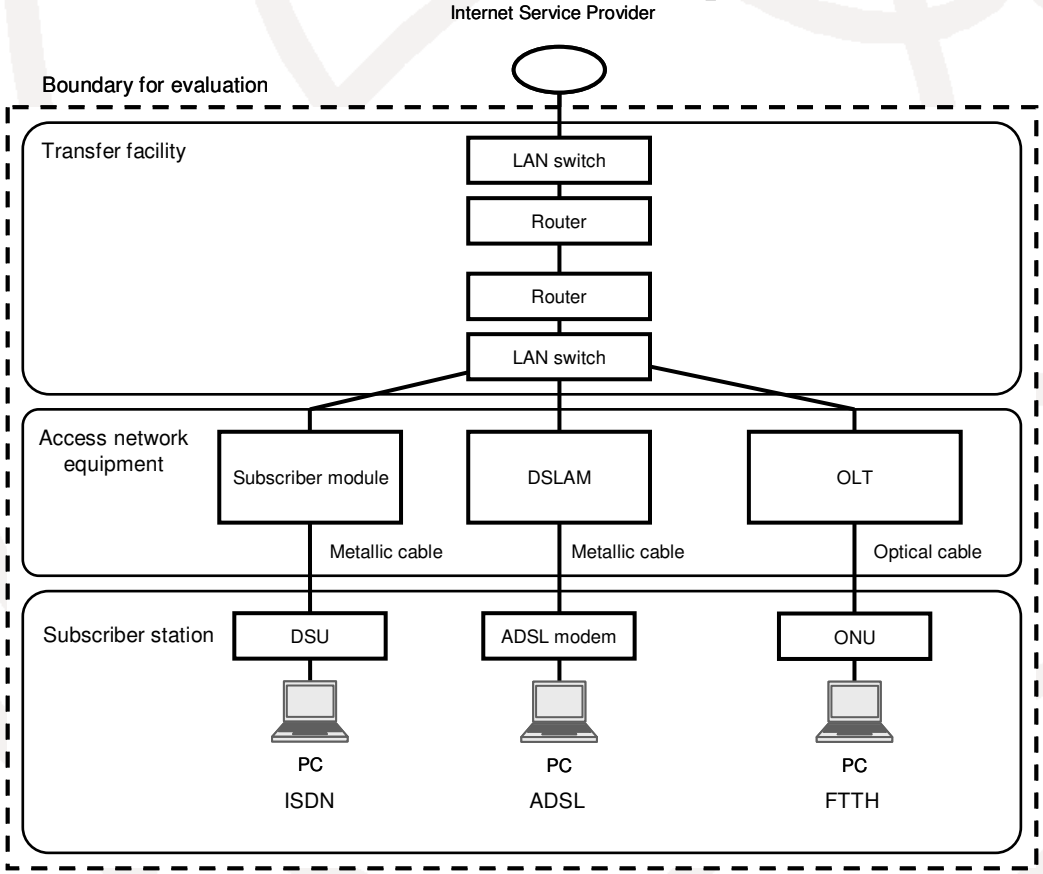
(1) Calculate energy consumption reduction through the use of ICTs → (2) Convert into CO2 emissions reduction

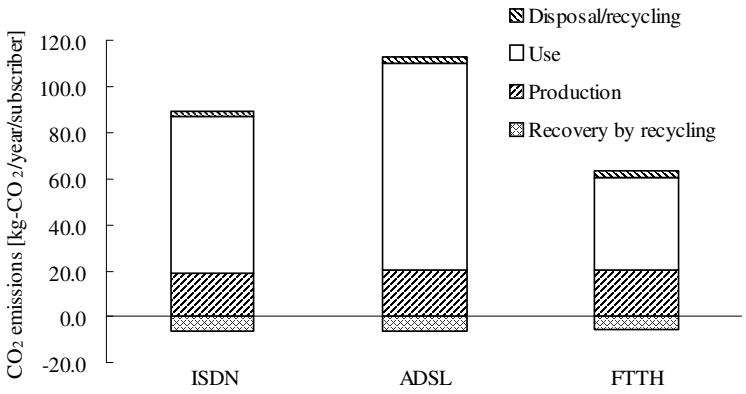
Use CO2 emission intensity reflecting the situation in each country.

Impact of own GHG emissions

- LCA require to set
  - Functional Unit
  - System boundary
  - Allocation procedure

Case study: LCA of Wired Network

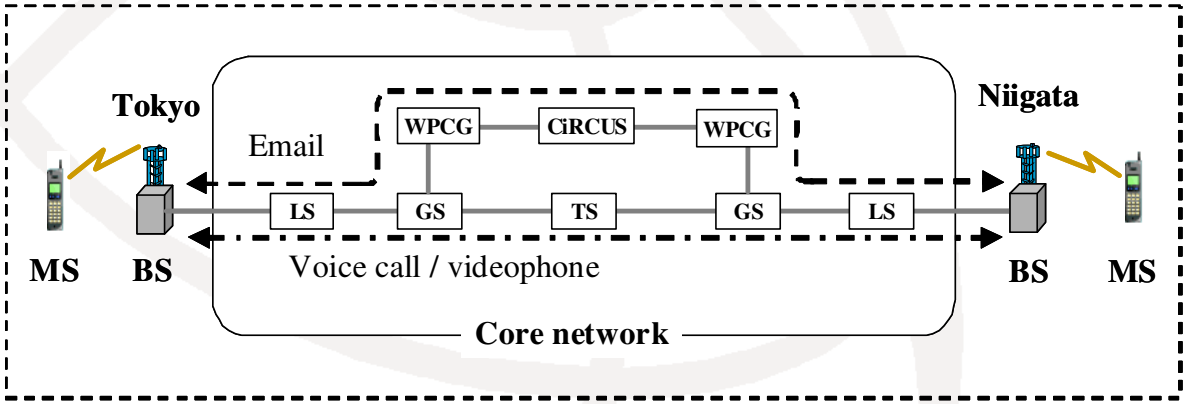


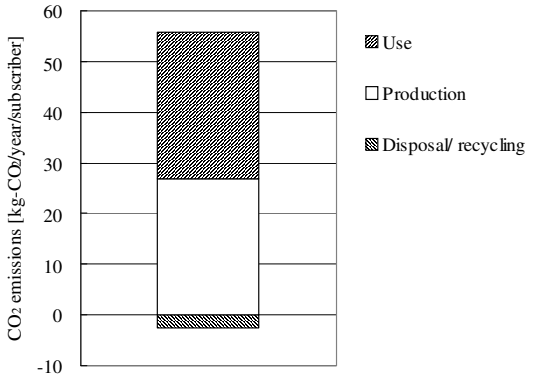


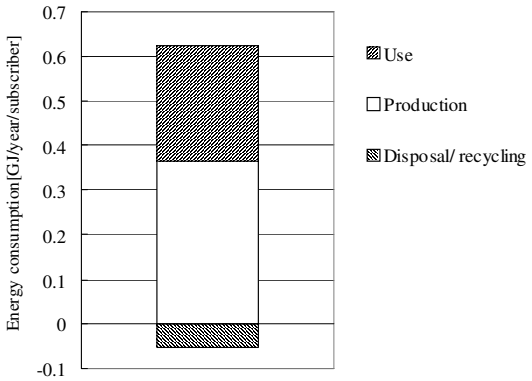
Impact of own GHG emissions

- LCA require to set
  - Functional Unit
  - System boundary
  - Allocation procedure

Case study: LCA of Wireless Network



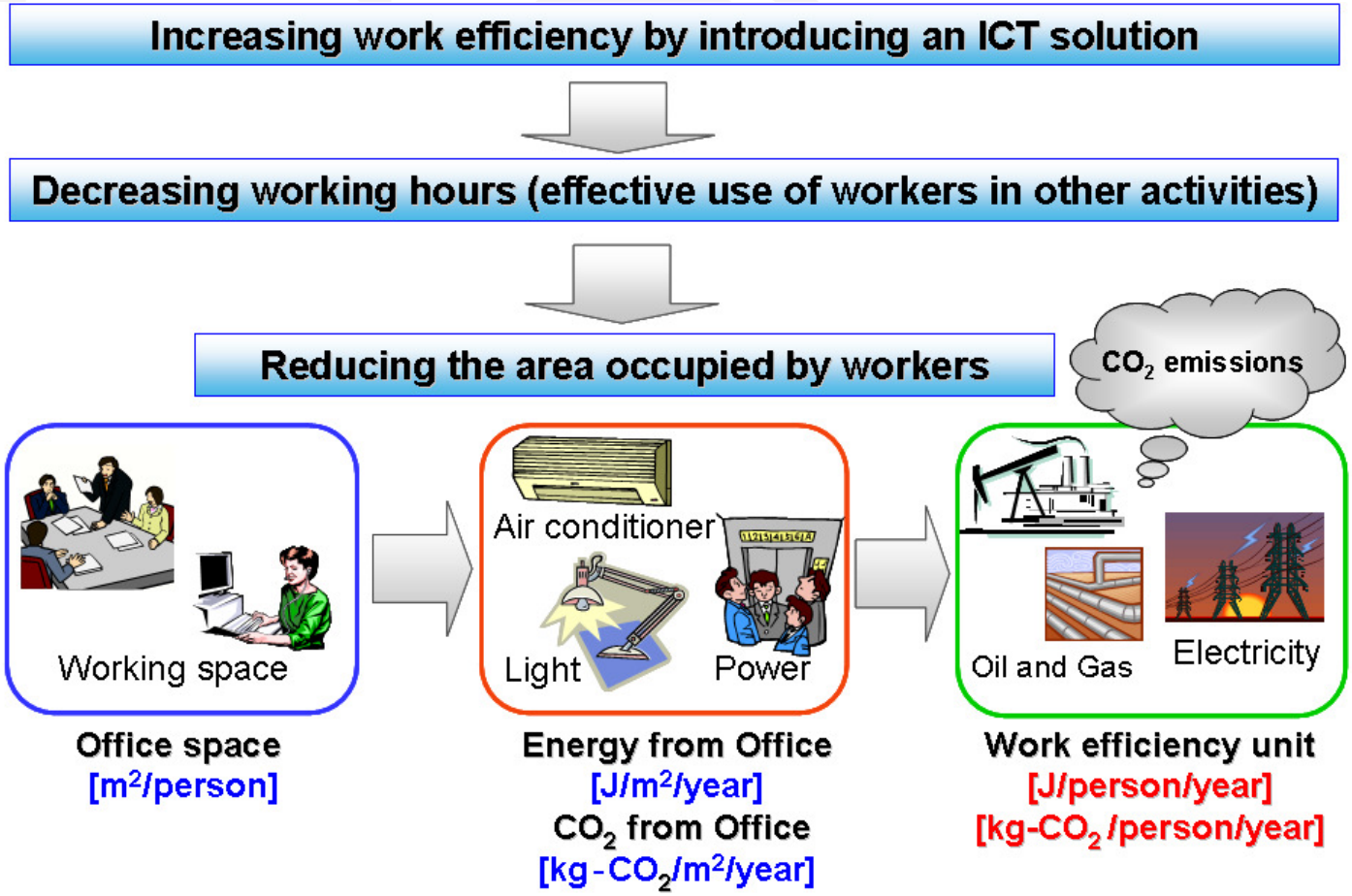




Mitigation
- Impact on other sectors

- Dematerialisation to reduce energy in production of goods (paper, CDs, DVDs, etc.)
- Efficient use of power (e.g. standby modes, load shifting)
- Travel avoidance to reduce energy in movement of people (cars, buses, rail, aircraft, etc.) via teleconferencing, etc
- Process optimisation to improve energy efficiency in moving goods (e.g. mail, trucks, rail cargo, cargo ships)
- Improved efficiency in use of office space (electricity, office area, etc.) reduces the need for heating lighting, etc (e.g. hot desking)
- Reduced storage of goods, e.g. in the 'just in time' supply chain to save warehouse lighting and heating
- Improved work efficiency (workload etc.) e.g. streamlining processes and online training
- Waste avoidance and efficient recycling

Evaluation method for "work efficiency"



Impact on other sectors - Teleworking

Typical CO_2 emissions per unit area of office space

Japan

1. CO_2 emissions per unit area of office space

	Energy Consumption [Mcal/m^2/year] A	Basic Unit of CO_2 Emissions [kg-CO_2/Mcal] B	CO_2 Emissions [kg-CO_2/m^2/year] A x B
Electricity	136	0.441	59.9
Urban gas	44	0.237	10.4
Heavy oil A	9	0.309	2.8
Kerosene	2	0.299	0.6
District heat and cooling	17	0.324	5.5
Total	**208**		**79.2**(1)

2. Space occupied by an office worker for clerical work
13.6 m^2/person(2)

3. Basic unit of office space
(1) x (2) = 1,078 kg-CO_2/person/year

*** If the annual working hours are 2040 hours (170 h x 12 m),**

CO_2 emissions are estimated to be 0.528 kg-CO_2/person/ hour when an office worker works for one hour in Japan.

USA

1. CO_2 emissions per unit area of office space

	Energy Consumption [Mcal/m^2/year] A	Basic Unit of CO_2 Emissions [kg-CO_2 / Mcal] B	CO_2 Emissions [kg-CO_2/m^2 /year] A x B
Electricity	134	0.66	88.8
Natural Gas	79	0.21	16.6
Fuel oil	9	0.29	2.5
District heat	24	0.31	7.5
Total	**246**		**115.4**(1)

2. Space occupied by an office worker for clerical work: 21.4 m^2/person (2)

3. Basic unit of office space
(1) x (2) = 2,470 kg-CO_2/person/year

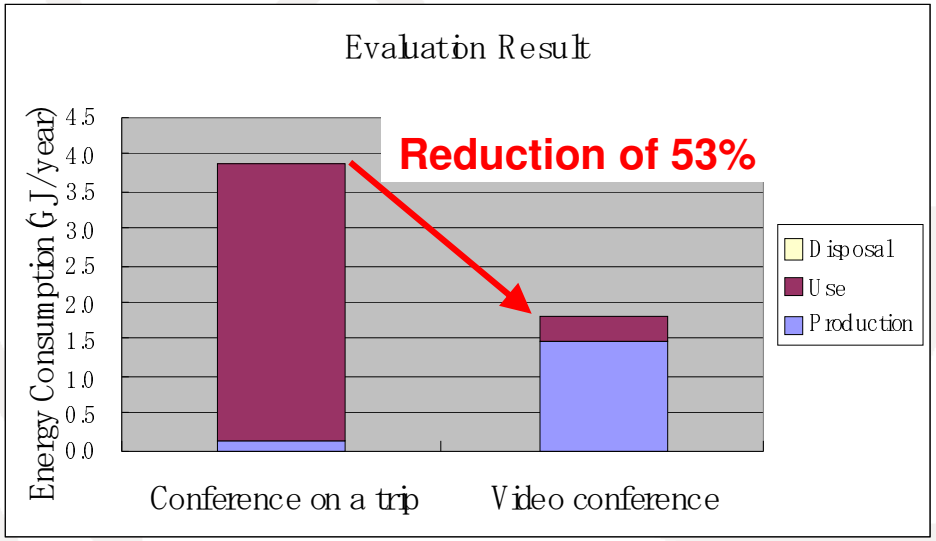
*** If the annual working hours are 2040 hours (170 h x 12 m),**

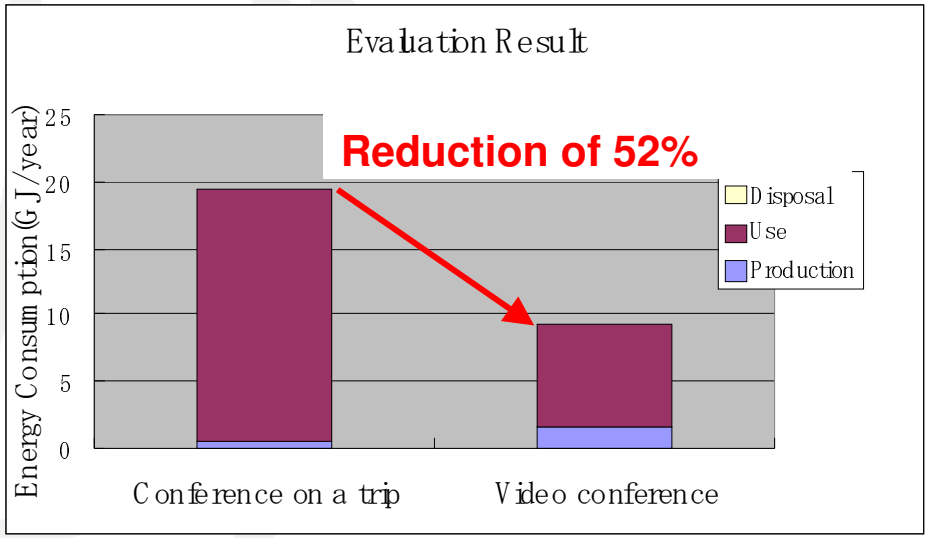
CO_2 emissions are estimated to be 1.21 kg-CO_2/person/ hour when an office worker works for one hour in USA.

Impact on other sectors - Videoconferencing

Video conference held between Tokyo and Yokohama, once a week (48 times / year), one hour each time, participated in by two people from each office

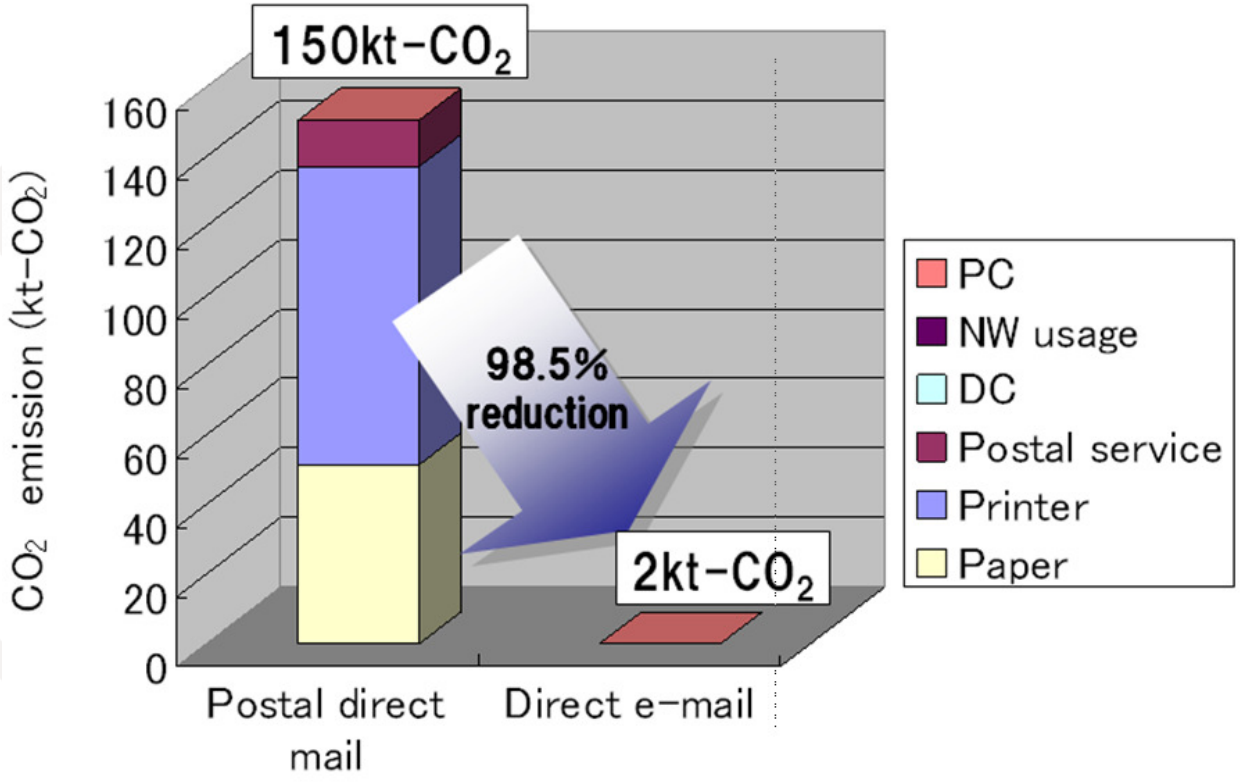
Video conference held between Tokyo and Yokohama, every working day (240 times / year), eight hours each time, participated in by two people from each office





Impact on other sectors - Post vs Email

Case-study:
Comparison of GHG emissions of postal mail and e-mail services



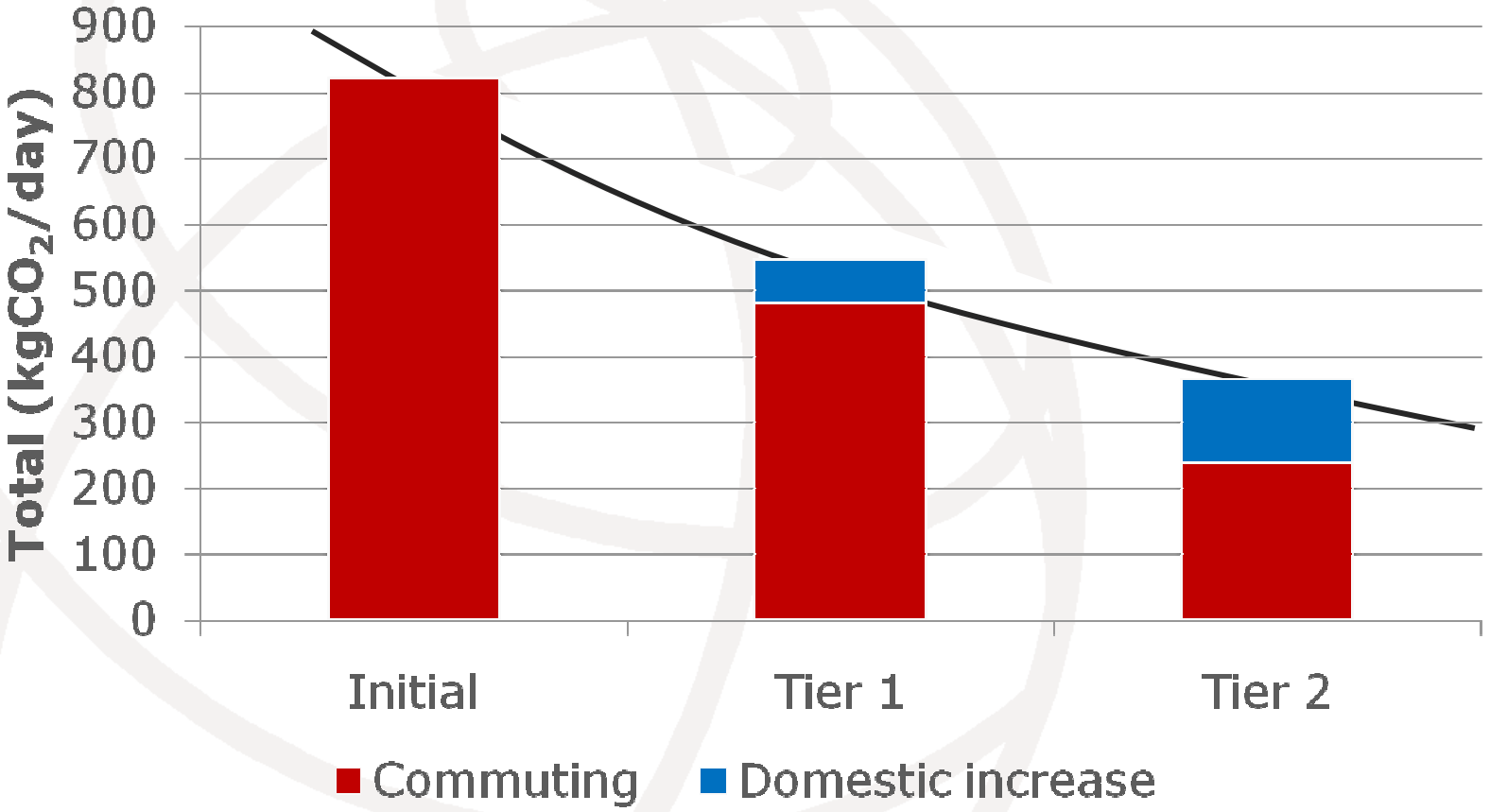
Pitfalls: Conventional wisdom

- "*Substituting kilobits for kilograms cuts down carbon emissions…*"
- Obviously, this is an area in which ICT has a critical role to play
- *Reducing travel (of goods and people) is always beneficial*
- This is generally true *but*…
- Some projections about the resulting carbon savings are greatly exaggerated
  - Average commuting distance is often overestimated (and sometimes attributed to car travel only)
  - The increase in domestic energy use incurred by teleworking is usually not factored in

Domestic carbon footprint

- Teleworking increases domestic energy consumption
- Flexible workers estimate that their home is occupied an average 21hrs/week more when they telework
- This is an (optimistic) >12.5% increase
- Yearly energy usage of an average UK household (source: OFGEM):
  - 3300 kWh (Electricity) → 400 kWh extra
  - 20500 kWh (Gas) → 2500 kWh extra

Net result



Conversion factors for the UK: DEFRA (2008)

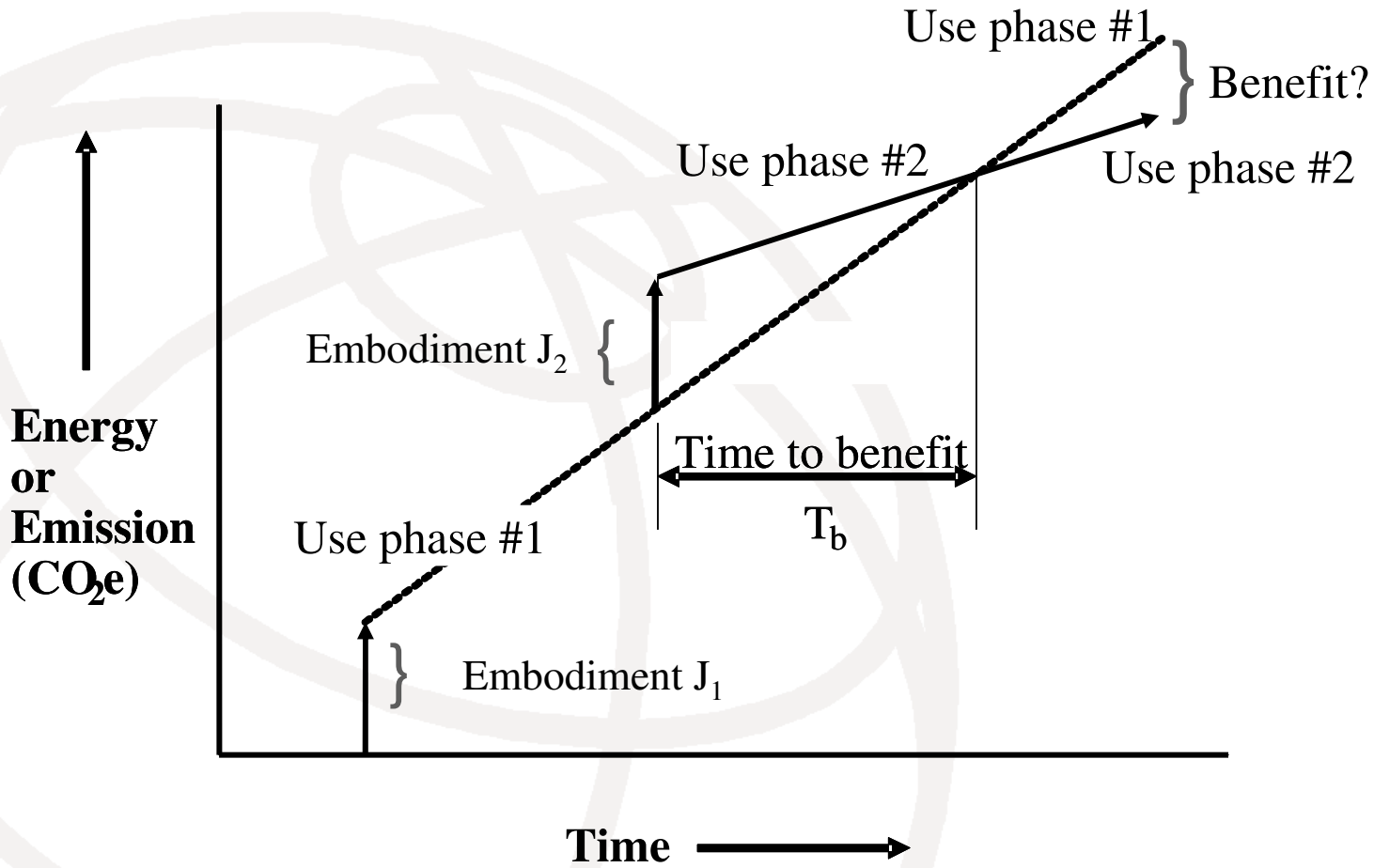
Preliminary conclusions

- Teleworking is *definitely* and *provably* beneficial
- Most businesses will *substantially* reduce their carbon footprint by encouraging it
- However, looking at the big picture, it becomes obvious that:
  - Linear extrapolation leads to overoptimistic projections
  - Accompaniment measures will make a big difference (e.g. "educating" home-workers)
  - Secondary optimisation is needed to maximise impact

Secondary optimisation

- The increase in domestic CO_2 emissions can be more than offset by scaling down office space
  - One of the least controversial "green" propositions
  - Potentially huge savings on utility bills and/or rental costs
- But there are obstacles
  - "Discretisation": until you can power down a room, floor, building or site you've gained nothing!
  - Semi-flexible workers means this is often impractical

When to replace a product?



- Is there ever a positive energy benefit?
  - (e.g. poor quality solar panel/wind generator-the lines may not cross)
- What is the time to benefit?

Recommendations

- Include energy and GHG saving initiatives as your part in sustainable procurement/supply
  - Seek year on year improvements from your suppliers
  - Understand economic impact of initiatives
  - Change the economic model (if you need to or are able)
- Address both offshore and onshore impacts
  - Not just UK centric