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Gordon Carey

BCO -Past President
careyjones -Chairman
BURA -Vice Chairman

Energy Efficient Office Buildings – Examples, Research and the Future



Caroline McDade
Driver Jonas

Marcus Boret
Akeler





HOARE LEA RESEARCH & DEVELOPMENT

- BCO Guide to Environmental Management
- Planning and Sustainability Briefing Paper
- A Good Practice Guide to Green Travel Plans
- Green Travel Plans for Offices
- BCO Guide to Green Incentives
- Green Roofs Research Advice note
- Sustainability starts on the Boardroom
- Sustainable Offices are better buildings


STERN
review
ON THE ECONOMICS
OF CLIMATE CHANGE


This coast
is subject to erosion.
Caution should be taken when
walking on or near the beach.

Climate Change

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The STERN REPORT - Impact on growth and development by 2100:

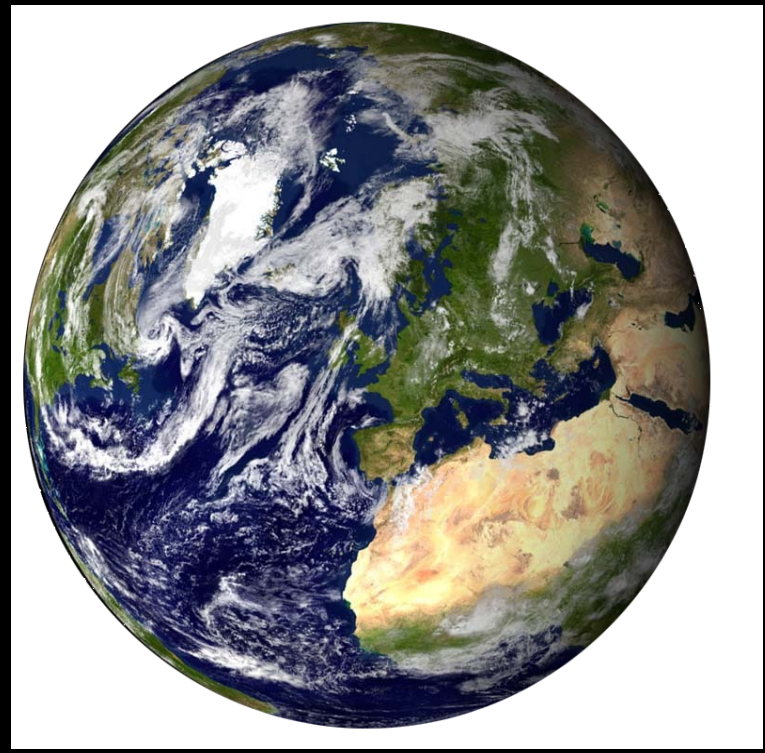
- An extra **250,000 children a year will die** in the poorest countries
- Up to **220 million more people** could fall below the **$2 a day poverty line**.
- **Crop failure** will leave hundreds of millions at risk of starvation
- The **extinction** of between **15 and 40 % of all species**.
- **Rising sea levels** will threaten countries like Bangladesh but also London, New York, Tokyo and Shanghai.
- 200 million people will be displaced by rising sea levels, floods and drought..
- The world's richest countries will suffer with more hurricanes and floods.
- Climate change could **cost between 5 and 20 per cent of global GDP.**

It's a FACT that:

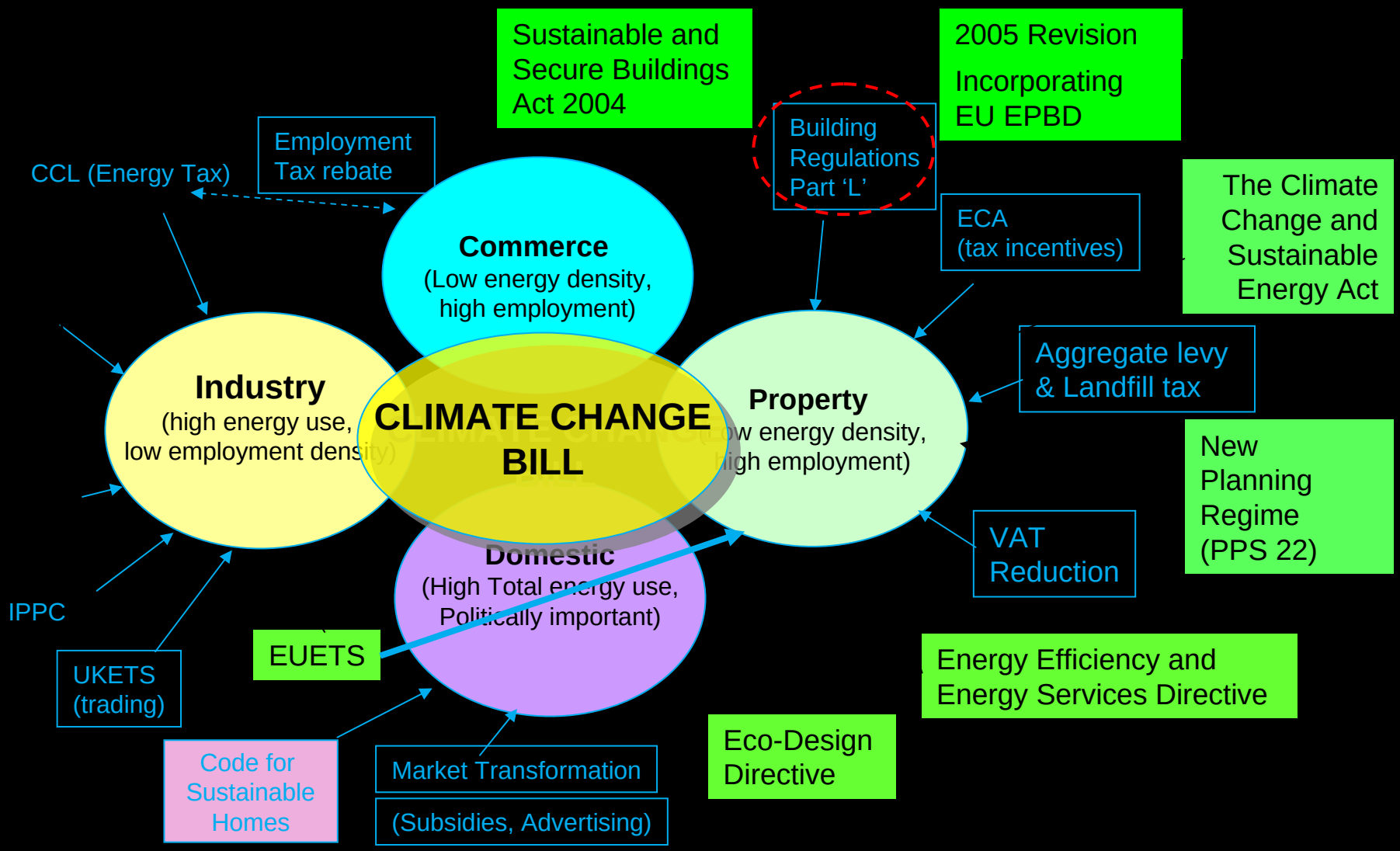
If we consumed resources globally at the same rate as **North America** we would require **5 planets to support us**.

If we consumed resources globally at the same rate as **Somalia** we would require **1/5 of a planet to support us**.

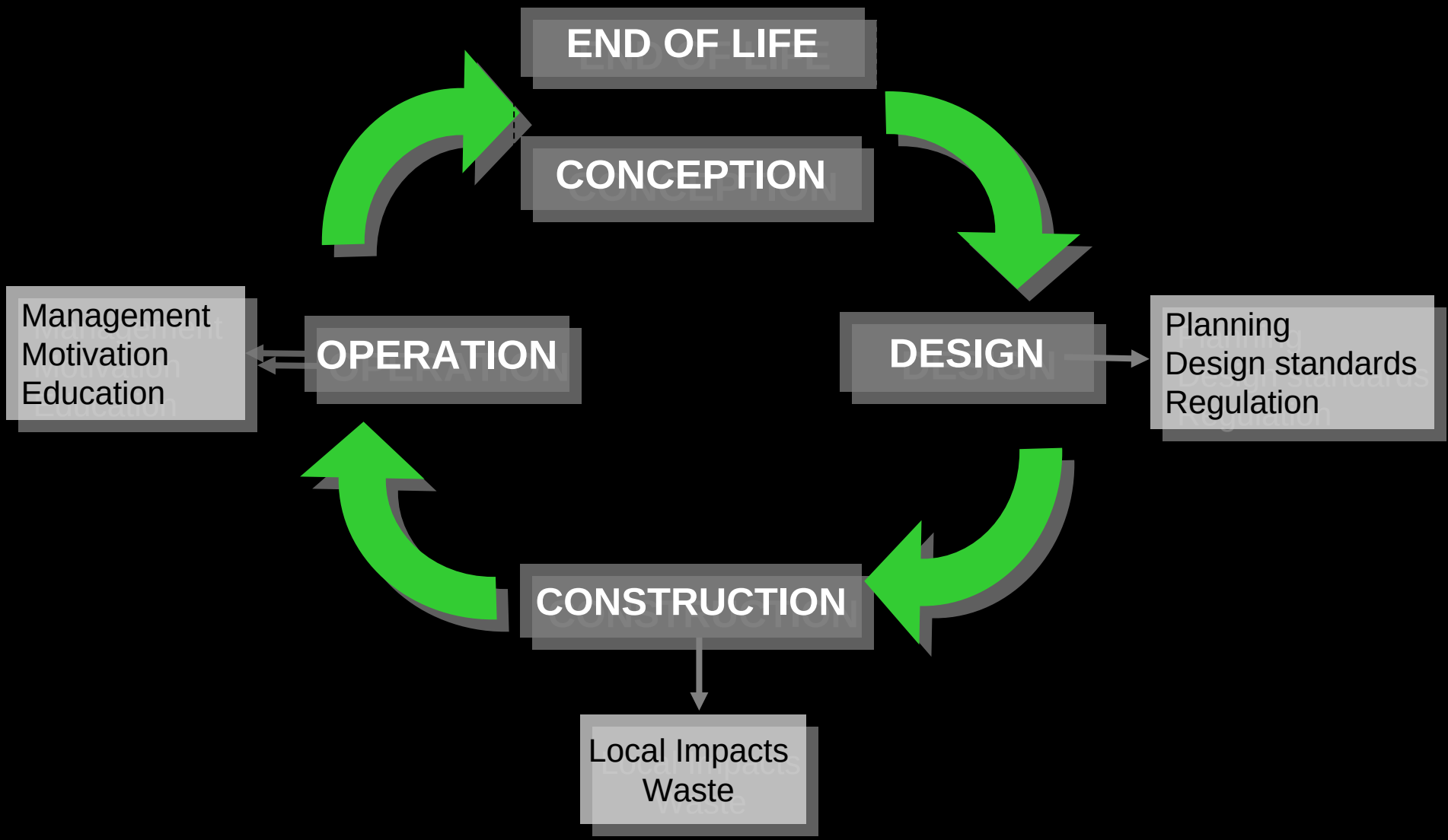
As an average globally we require **3 planets to support our lifestyle currently**.

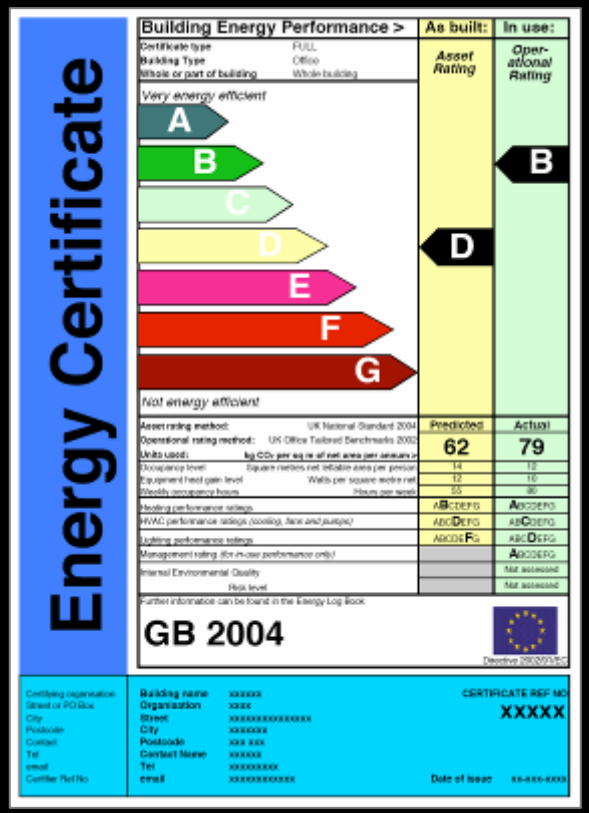


- **Construct new buildings and infrastructure** that can cope with climate change.
- **Regulations**
  - to encourage better use of **land**
  - **higher quality buildings**
- **Carbon pricing - core of any policy**
  - appropriate price on **carbon**, through **taxes**, trading or regulation
  - encourage **low-carbon goods** and services
  - **carbon trading schemes** to give industry and business financial incentives to reduce emissions
  - **investment** in new technology to reduce greenhouse gas emissions
  - **increase in incentives** for "low emission technologies".


Sustainable and Secure Buildings Act 2004
2005 Revision Incorporating EU EPBD
Building Regulations Part 'L'
Employment Tax rebate
CCL (Energy Tax)
ECA (tax incentives)
The Climate Change and Sustainable Energy Act
Commerce
(Low energy density, high employment)
Industry
(high energy use, low employment density)
CLIMATE CHANGE BILL
Property
(Low energy density, high employment)
Aggregate levy & Landfill tax
New Planning Regime (PPS 22)
VAT Reduction
Domestic
(High Total energy use, Politically important)
IPPC
UKETS (trading)
EUETS
Energy Efficiency and Energy Services Directive
Code for Sustainable Homes
Market Transformation
(Subsidies, Advertising)
Eco-Design Directive


ENVIRONMENTAL JUSTICE
LOBBY GROUP PRESSURE
GOVERNMENT LEGISLATION & REGULATION
EMPLOYEE MOTIVATION & RETENTION
SHAREHOLDER PRESSURE
SOCIETY
OCCUPATION, PROPERTY & CONSTRUCTION


END OF LIFE
CONCEPTION
DESIGN
Planning
Design standards
Regulation
CONSTRUCTION
Local Impacts
Waste
OPERATION
Management
Motivation
Education



- **BREEAM**
  - In the UK over **95.000 buildings** have received certification.
  - BREEAM In Use (release 2009)

- **LEED** (Leadership in Energy and Environmental Design)
  - In 2007 **5,528** buildings registered or received LEED certification, **a 330% increase** from the 1,672 in 2006.*

- **BOMA**
  - BEEP (BOMA Energy Efficiency Programme)
  - ROI (Return On Investment)

- **Energy Certification**

* Source CoreNet Global May/June 2008

LEED buildings

- Research carried out by NBI and CoStar of a series of buildings
- 25 to 35% energy savings
- **4% Increase in occupancy rate**
- **$11 Rental premium per square foot**
- **$170 Increase in value per sq/ft**

“Demand in the Marketplace for Sustainability Creates Higher Occupancy Rates, Stronger Rents and Sales Prices in Green Buildings”

Quote CoStar Study, BOMA US - March 2008

This is how two building standards programs cut the energy use and enhance the finances of newly built green commercial buildings.

	Energy Savings	Rent premium, per sr.ft.	Increase in occupancy rates	Sales Premium, per sq.ft.
LEED certified	**25-30%***	**$11.24**	**3.8%**	**$171**
Energy star certified	<40%	$2.38	3.6%	$61

* 25-30% for al LEED buildings, including certified, silver, gold and platinum grades. For gold and platinum savings approach 50%.

The above table is sourced from the the USGBC website

Case Study – Wellington Place

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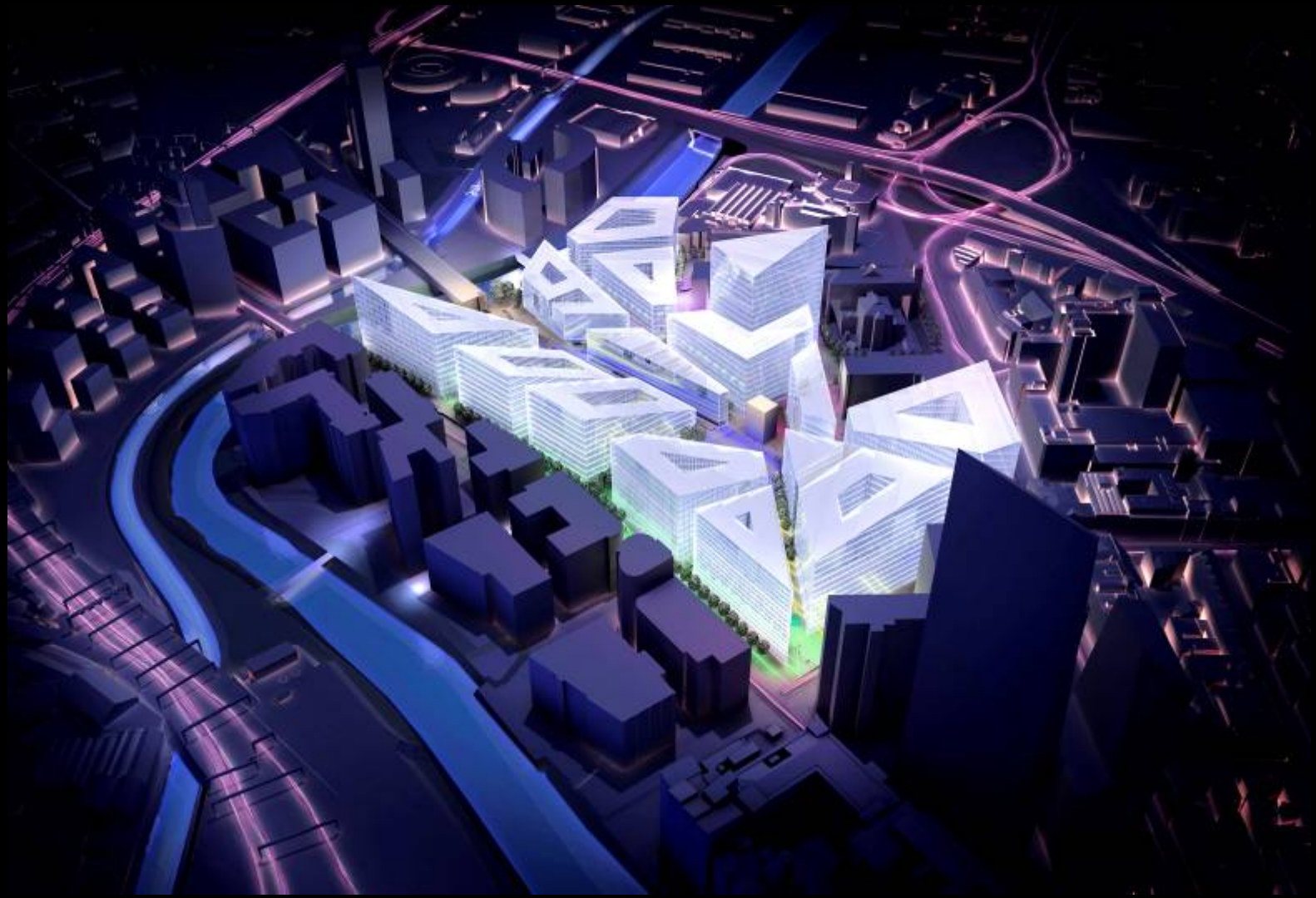

Case Study – Wellington Place

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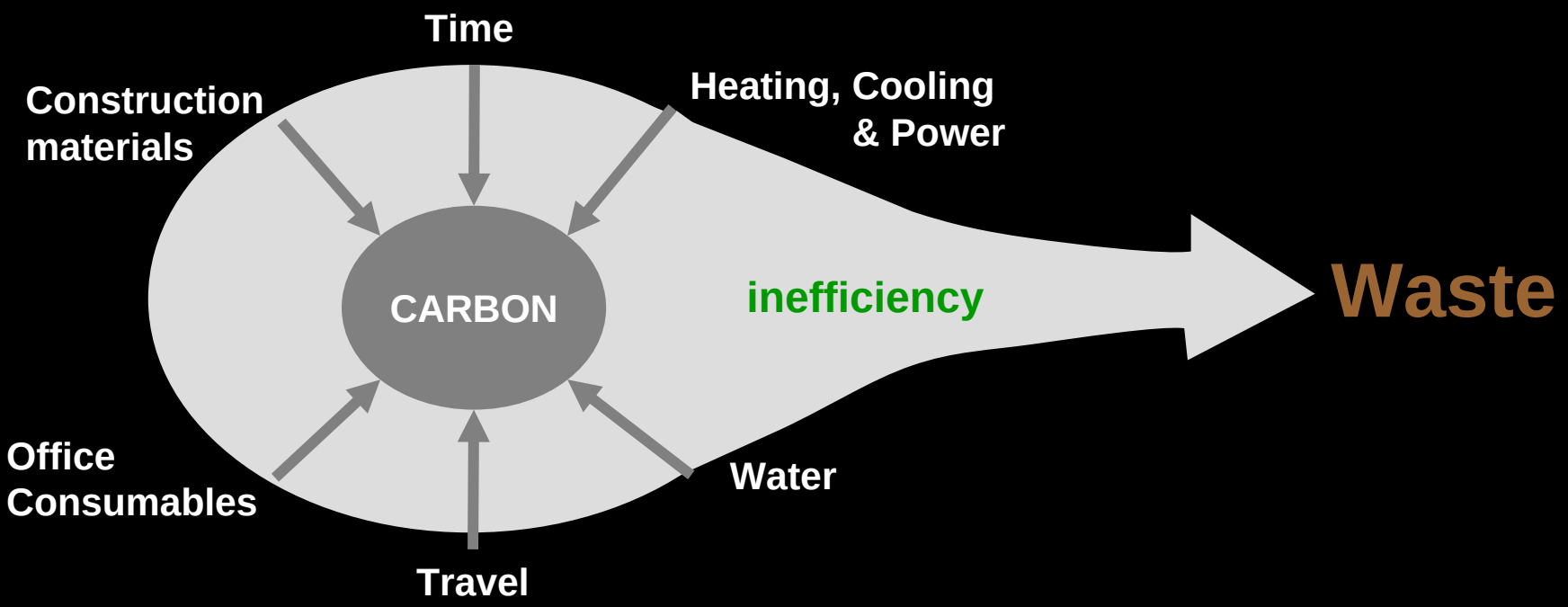
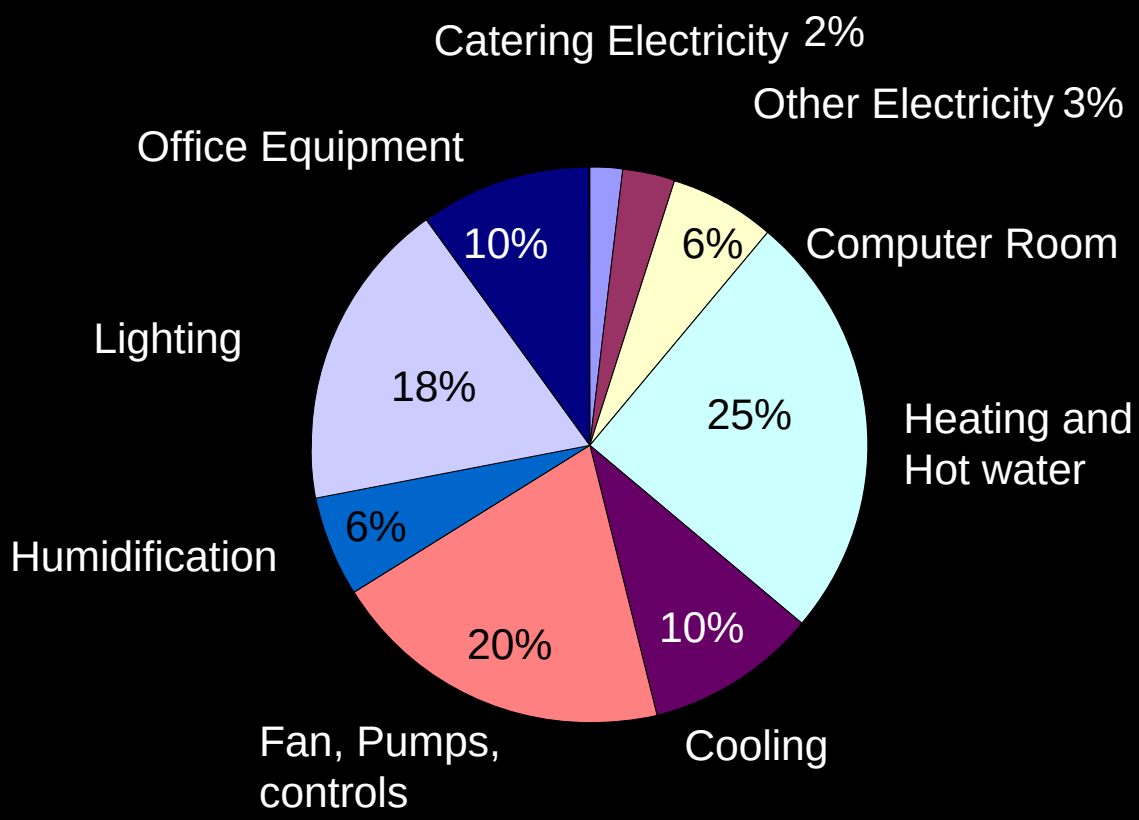
- 250,000 sq.m. (2.7million sq.ft.)
- New city centre business quarter
- Mixed-use development.
- 14 acres
- Sustainable community
- Offices
- Residential
- Restaurants & cafes
- Cultural facilities
- New public squares



“Just use less stuff”

BUSINESS ENERGY USE AND CARBON



Case Study – Alliance and Leicester plc

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Building Features

- Displacement ventilation – through raised floor plenum
- Chilled ceiling
- Perimeter hot water radiator heating
- 50% window to wall ratio to reduce solar gain
- Saving in fan energy from typical four pipe fan coil system
- Less maintenance
- Low energy solution

Case Study – Alliance and Leicester plc

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Other Features

- Designed on a 1.5 m plan grid
- Partition head fixing detail incorporated in the ‘chilled ceiling’ system on a 1.5 m tartan grid

NB this has proved highly successful and sustainable in dealing with high churn rate and flexibility

- Client very pleased with the overall flexibility and environment of the building

Case Study – Central Square

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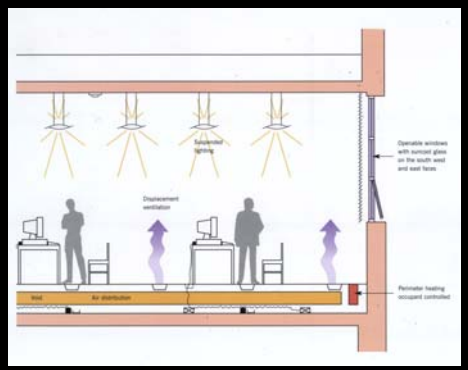
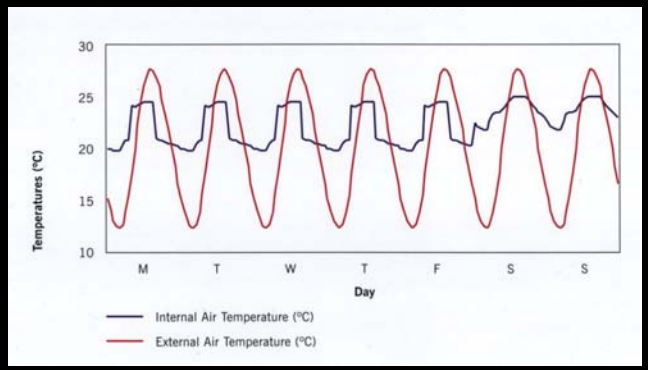
- The Developer was keen to explore the benefits of a sustainable design
- Sustainability was central to the design process from the start
- Performance targets were used to aid the design process
- Robust yet simple servicing strategy
- Maximum use made of the existing thermal mass and high open floor plates





Case Study – Central Square

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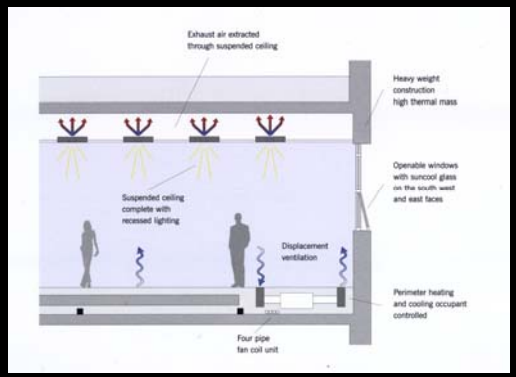
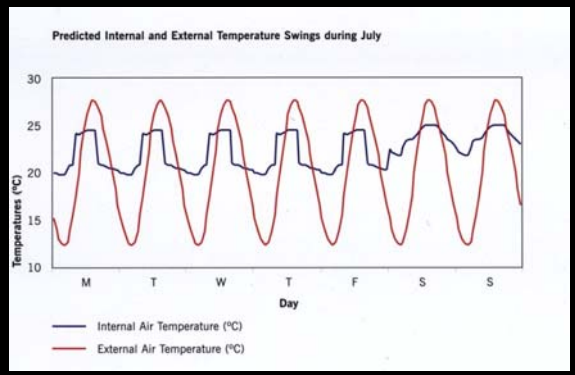
Central Square Phase II Advances on Phase I

- Simple lighting controls added to improve tenants energy consumption
- Additional cooling (w/m2) provided through installation of fan coil units
- Controls philosophy simplified following experience on phase 1
- Increased number of dedicated tenants risers provided



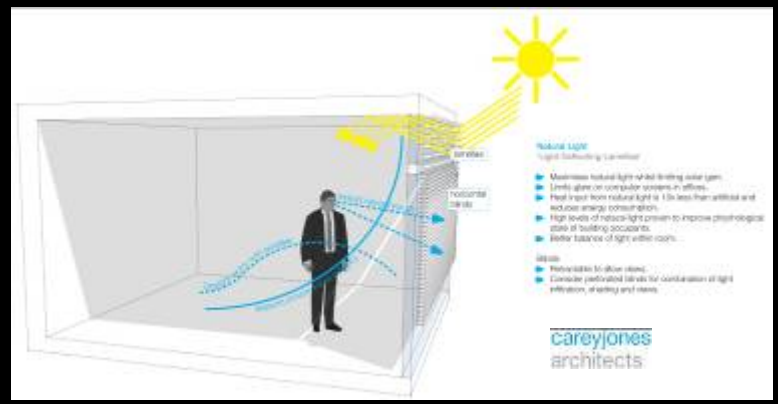


Simple ideas to Create a sustainable office Part 1

- Specify products with true ‘Green’ credentials – Create a Green Library!
- Reduce waste through design
- Video conference more – travel less!
- Review the existing buildings performance/energy/water use – collect data
- Review the way the building is occupied – densities, maximisation etc
- Improve lighting controls/sensors

Simple ideas to Create a sustainable office Part 2

- Review building management systems
- Overhaul mechanical equipment
- Eco loos and sensor taps
- Review glazing – solar control and heat loss
- Sun shading – internal or external
- Waste disposal/ compactors
- Waste management strategy/ building alterations
- Encourage cycling - showers and lockers
- **Appoint a good professional team!**



Simple ideas to Operate a sustainable office Part 1

- Turn off lights when not needed
- Review light source/bulbs
- Turn off computers and other equipment when not being used and particularly over night (i.e. not on standby)
- Buy energy/electric from sustainable providers
- Review temp settings e.g. can higher temps in summer be acceptable if people change their dress code?

Simple ideas to Operate a sustainable office Part 2

- Ensure mechanical and electrical equipment is properly serviced
- Separate waste at source/bins
- Double sided printing
- Washable crockery rather than disposable, e.g. plastic cups
- Recycling strategy – paper/furniture/equipment
- Review suppliers/deliveries/couriers compliance
- Implement green travel plan – encourage walking, cycling and public transport
- Educate and engage staff

Case Study – Green Office Scheme

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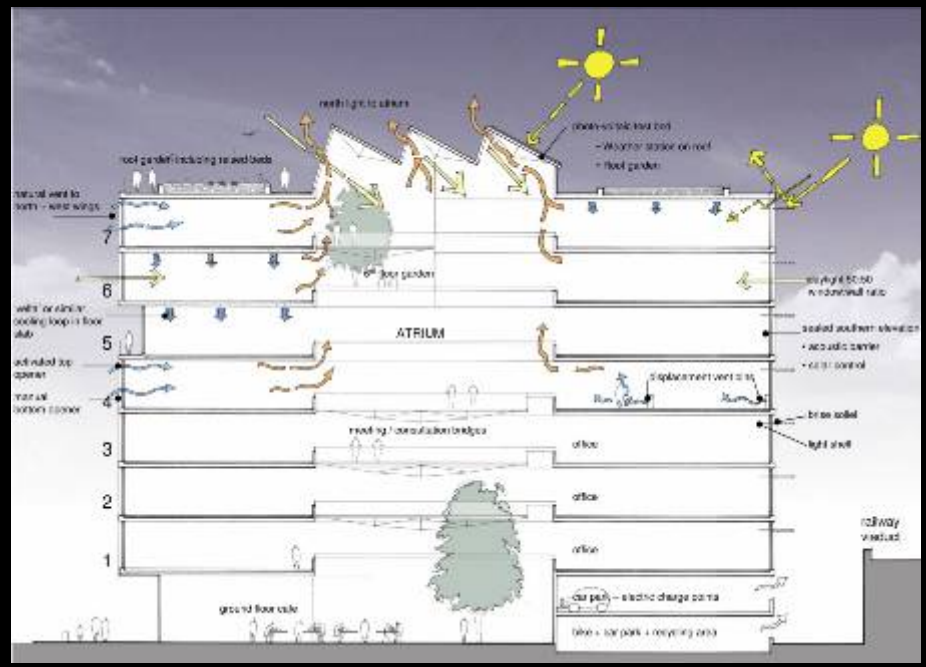
Building Features

- Low carbon Grade A office scheme
- Holistic approach sets new standards for future office design
- Designed as an examplar/showcase for sustainable design and management
- South wing acts as an acoustic shield to the railway – solar gain reduced through high performance glazing and solar shading
- North and west wing naturally ventilated through manual and automated opening windows to maximise efficiency
- Flat slab concrete floor incorporates “Velta” or similar cooling loops providing “chilled floor” solution
- Velta system connected to Aquifer providing natural cooling.
- High floor to soffit circa 3550mm enhances air flow and thus comfort
- Atria produces “stack effect” ensuring air flow at all times

Building Features

- Southern wing air supply via displacement vent bins with cooling through adiabatic system (low energy)
- Additional tenant cooling provided by chilled beams (cooling from the aquifer source)
- Bio diesel or bio mass boiler utilised for heating
- Potential to use solar hot water system (mounted on atria north light roof)
- 50:50 window to solid wall ratio – good natural daylight balanced with reducing heat loss/gain
- High quality suspended light fittings providing up/down light. Sophisticated lighting controls to minimise electric consumption
- Dimmer system to encourage lower overall lux levels and utilise task lighting – more energy efficient.
- Internal light shelves to southern façade to enhance
- Weather station on roof to monitor buildings performance and provide long term data
- Recycling facilities provided
- Photo Voltaic test station on roof (new products)
- Roof garden provides both food produce for café and also amenity space for the tenants
- Building materials carefully selection from renewable resources in order to reduce carbon footprint



HANDOVER

Testing and Commissioning to

- Achieve health and comfort
- Maintain building systems
- ***Minimise carbon emissions***

Occupier Education

- Key environmental features
- What maintenance and how often
- Occupier to take “ownership”
- Occupier / Landlord agreement
- “Green” Leases

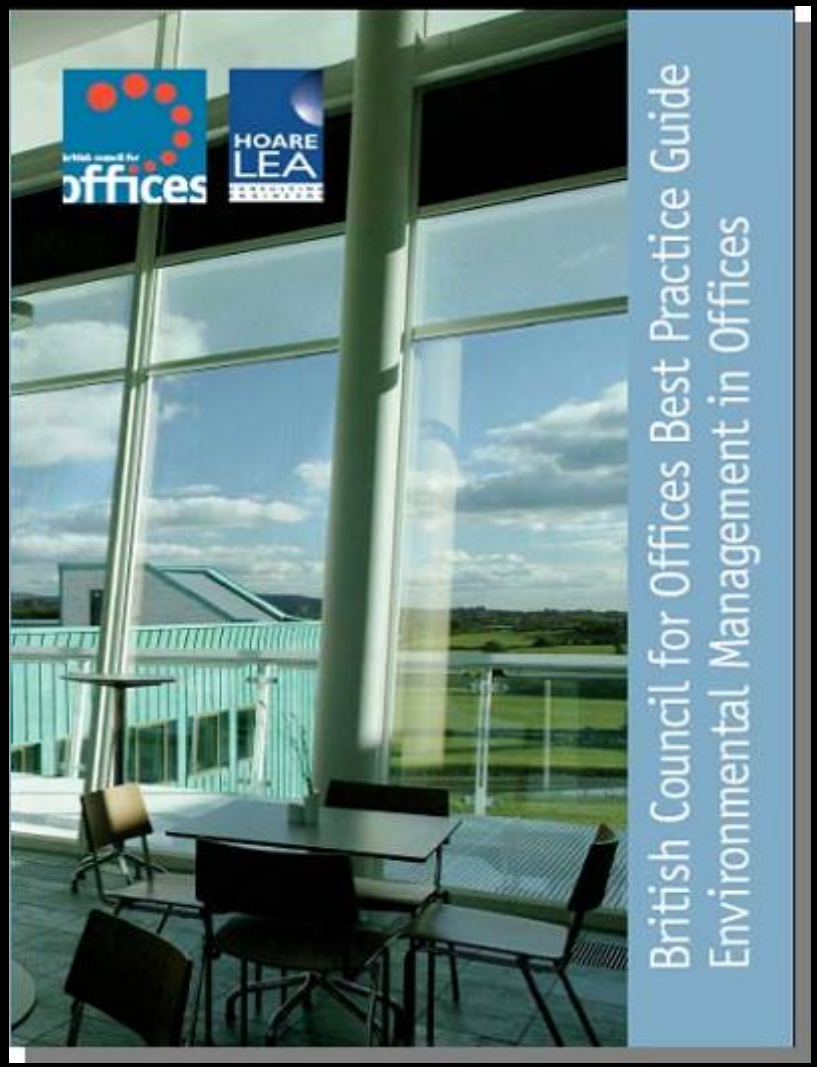
Post Occupancy Monitoring and Fine Tuning

- **Reduce 30% of Energy Usage** by implementing some of the following actions:
  - Equipment Functioning as designed
  - Consider your Cleaning Options (team/day cleaning, switching off)
  - Initiate an Energy Awareness Programme
  - Install Monitor Power management Software
  - Change Incandescent to CFL and HID
  - Harvest Daylight
  - Evaluate After-Hours usage
  - Adjust ventilation
- Feedback / evaluation / good practice
- **Involve the original designers**

We need to challenge the defaults that our lifestyle is set to.

BCO Best Practice Guides reflect the BEST of INDUSTRY standards

- Investor
- Building Owner
- Developer
- Building user
- Agents
- Contractors
- Operators
- Design Team



Next Steps – BCO Research:

- **Refurbishment / re-cycling of the UK's older office stock**
- BCO highlight issue, provide best solutions
- Research criteria to consider:
  - Site Issues
  - Building Form including grids and core elements
  - Engineering
  - Finishes and Fit out
- Major focus on:
  - Energy, carbon footprints
  - Life-cycle costs
  - Business performance and workplace productivity
  - Balance between productivity and business performance issues versus the costs of high sustainable building quality and kit.
  - The investment issues

A Developers View…

- Moved from a position of skepticism to one of acceptance and basic necessity

- New developments with environmental issues are a primary consideration

- Industry's ability to develop new highly energy efficient buildings tempered only by the degree they can be delivered in a practical and cost effective way

- In the medium and long term environmental issues will directly affect value – **IGNORE THEM AT YOUR PERIL**

Quote Mike Hussey, Land Securities
May 2008

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