IPD Environment Code

Measuring the Environmental Performance of Buildings

In association with:

BARCLAYS

BUREAU VERITAS

CBRE
CB RICHARD ELLIS

About IPD Occupiers

IPD Occupiers provides high quality performance analysis, benchmarking and research services to public and private sector users of corporate property. This work is founded on our industry standard measurement frameworks, collectively entitled the IPD Occupiers *Global Estate Measurement Standards* (GEMS). GEMS currently comprises three documents:

- *IPD Cost Code.* Our well-established, comprehensively defined framework for collecting property cost information.
- *IPD Environment Code.* Our new good practice framework for collecting property-related environmental information.
- *IPD Space Code.* Our forthcoming* framework for collecting floorspace information. The IPD Space Code provides a much needed reconciliation tool to compare the key national floorspace standards.

For more information, please visit: www. ipdoccupiers.com

IPD Occupiers is part of IPD, the world leader in real estate performance analysis. Our products and services aim to help those in the real estate industry, from investors to occupiers, get the most out of their property.

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About Barclays

Barclays is a major global financial services provider with over 300 years of history and expertise in banking. Barclays operates in over 50 countries, employs over 127,000 people and moves, lends, invests and protects money for over 27 million customers and clients worldwide.

Barclays aims to be a leader on the issue of climate change. Barclays Climate Action Programme focuses first and foremost on reducing emissions from its own operations and buying renewable energy. Barclays UK operations are carbon neutral, and it is aiming globally to be carbon neutral by 2009. It is also developing products and services that help its customers manage their climate impacts, for example, Barclaycard Breathe, a credit card that donates 50% of profits to carbon emission reduction projects worldwide.

About Bureau Veritas

Bureau Veritas is a global, independent company. With over 26,000 employees in 700 offices and laboratories across 140 countries, Bureau Veritas delivers services to a customer base of 280,000. Its product range includes helping clients conform to standards and regulations and achieving best practice in Quality, Health & Safety, Environment and Social Accountability. Its mission is to help clients manage risks and optimise performance while adding economic value. Activities include:

- Day to day compliance
- Environmental and technical due diligence
- Performance improvement in energy efficiency, carbon footprint, waste and water management, and broader sustainability targets
- Development and certification of management systems
- Corporate positioning through strategy development, corporate reporting and assurance

About CB Richard Ellis

CB Richard Ellis Group, Inc. (NYSE: CBG), an S&P 500 company headquartered in Los Angeles, is the world's largest commercial real estate services firm (in terms of 2006 revenue). With over 24,000 employees, the Company serves real estate owners, investors and occupiers through more than 300 offices worldwide (excluding affiliate and partner offices). CB Richard Ellis offers strategic advice and execution for property sales and leasing; corporate services; property, facilities and project management; mortgage banking; appraisal and valuation; development services; investment management; and research and consulting. The Company has a dedicated Energy & Sustainability Group focused on aligning client real estate & business strategies with their environmental objectives. In 2007, CB Richard Ellis was named one of the 50 'best in class' companies by BusinessWeek, and one of the 100 fastest growing companies by Fortune. Please visit our website at www.cbre.co.uk.

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Foreword

The environment and climate change are fast becoming some of the most important political issues in the UK. Governments internationally are setting ambitious targets for carbon reduction; businesses are increasingly putting in place programmes to reduce their impact on the environment and consumers are becoming more demanding about the environmental credentials of the products and services they buy.

Property has a critical part to play in this story. Analysis carried out for the CBI Task Force on Climate Change showed that buildings represent one of the largest areas of potential to cut UK carbon emissions: and a significant proportion of this opportunity rests in corporate property.

But recognising the problem is not enough - the UK's ambitious carbon reduction target of 60% by 2050 will simply not be met if we rely on current efforts and initiatives. The good news is that we can get on track to meet such a target if urgent action is taken now.

Businesses can help to play their part by reducing the impact their property has on the environment. Very significant reductions in carbon emissions can be harnessed simply through measures to increase the energy efficiency of buildings and at the same time cut energy bills.

IPD's Environment Code is a useful tool which will help Property Executives operating in the public and private sector to 'do their bit'. In helping to monitor and compare the environmental performance of buildings in terms of energy and water consumption and waste produced, the Code will facilitate more informed decisions about which buildings to occupy and how to manage the operations that take place within them. After all if we don't know how our buildings are performing, we will struggle to find ways to improve them.

Richard Lambert
Director General
CBI

Preface

I am delighted to introduce the Environment Code, IPD Occupiers' new global standard for measuring the environmental impacts of corporate property. The document represents a significant step change in IPD's work, and complements our established industry standard Cost Code to provide a more balanced view of corporate property performance.

A good practice framework for measuring, analysing and reporting on environmental performance, this Code is the essential starting point for property executives charged with addressing the environmental impacts associated with an estate. Indeed, with a robust set of baseline environmental data in place property professionals will be able to:

- Gain clarity on environmental impacts
- Support effective decision-making to reduce environmental impacts
- Accurately and confidently communicate improvements
- Support regulatory compliance and information requests
- Enable benchmarking against other organisations

Environmental issues are unlikely to go away and I am positive that this Code can make a significant contribution to the global effort to address climate change.

The Environment Code is IPD's first major attempt to set a standard for measuring corporate property's environmental impacts. It will no doubt require periodic updating, not least to take account of changes to the scope of global environmental regulations, and we would very much welcome comments and feedback that could help us to improve the Code in the future.

Finally, I would like to thank all the sponsors of the Environment Code. We are extremely grateful for their help and support, without which the Code would not have been possible.

Christopher Hedley
Managing Director
IPD Occupiers

Industry endorsements

The collection and analysis of information on environmental performance has rapidly moved from being viewed as low priority to highly relevant in the effective management of real estate portfolios. The ability to carryout effective measurement of environmental performance has been, and for very many still is, greatly inhibited by the lack of definitions and a structure for measurement and comparison across different buildings and between portfolios.

The major barriers to measurement of data collection, standards and definitions were identified by CoreNet Global in 2004 in its Sustainability and Corporate Social Responsibility Report published as part of its major CoRE 2010 research project. The creation of the IPD Environmental Code is a very significant contribution to addressing these important needs and will contribute significantly to enabling the effective collection of data and the proactive management of corporate property.

Ron Adam
CoreNet Global

The RICS is committed to achieving a low carbon built environment through the effective carbon management of real estate and the wider environment, both in the UK and overseas. We welcome the new IPD Environment Code as an invaluable tool to assist our members and other property professionals with achieving global targets for carbon reduction.

Louis Armstrong
RICS

The BIFM welcomes the launch of the IPD Environment Code. It is a comprehensive and well thought-out approach to a complex subject. The Institute is particularly pleased to see transport, pollution and health covered alongside the more usual property-related factors. Facilities managers are on the frontline of environmental performance and stand ready to work with other property professionals to effect real change in the way buildings are designed, occupied and managed.

Ian Fielder
British Institute of Facilities Management

I welcome IPD's initiative in launching the Environment Code. Data collection and benchmarking are vital to achieving improvement – a message that BRE has spent many years promoting. Our existing building stock has a critical role in reducing environmental impacts but, in recent years, emphasis has been placed on the construction of buildings rather than the operation of them. This focus needs to change if we are to meet targets for reducing impacts including climate change. It is important that initiatives in this sector are coordinated and we would be keen to work with IPD to develop our new BREEAM in Use method for property management.

Martin Wyatt
BRE Group

Acknowledgements

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Special thanks must be given to Ken Smith, Mike Lachowicz, Ben Shuster and Simon Evans at Bureau Veritas for access to their significant environmental expertise, which has supported the development of the Environment Code.

IPD would also like to thank the following individuals and organisations for their help, support and contributions to the development of the Code.

- Charlotte Eddington and Sandra Gomez, CBRE
- Bill Bordass, William Bordass Associates
- Dilpreet Sagoo, Barclays
- Sezgin Kaya, IBM
- Emma Wild, CBI
- Tom Saunders and Alan Yates, BRE
- Paul Mills, Steve Parker and Adam Gwatkin, Legal and General
- Tim Horsey, Journalist

Any errors or omissions remain, of course, the responsibility of IPD.

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Chapter 1

The Global Environmental Challenge

The Stern Review on the effects of climate change[1]

"The benefits of strong, early action on climate change outweigh the costs... if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast, the costs of action - reducing greenhouse gas emissions to avoid the worst impacts of climate change - can be limited to around 1% of global GDP each year."

Climate Change and Global Politics

With an increasing body of scientific evidence showing the global effects of climate change, waste generation and resource depletion[2], environmental issues have been catapulted to the very top of the global political agenda.

Governments and societies around the world are becoming increasingly united on the need to tackle these challenges and to reduce the negative environmental effects associated with our increasingly resource hungry lifestyles[3]. As a result there is an ever increasing range of regulatory and taxation measures, as well as voluntary initiatives, designed to help reduce environmental damage.

The Environment: a key Boardroom Issue

Unsurprisingly, this worldwide focus has pushed environmental issues up the corporate agenda and into the Boardroom. And as society's expectations increase, so organisations are likely to find themselves under increasing pressure to be more accountable for their environmental and social conduct.

Corporate Social Responsibility and Sustainability

Of course, these issues are not new. Leading organisations have long understood that the generation of profits brings with it broader social and environmental responsibilities. Such organisations have embedded the values of Corporate Social Responsibility (CSR) and sustainability into their corporate culture and day-to-day working practices, recognising that the approach makes good business sense and will reap rewards over the longer term:

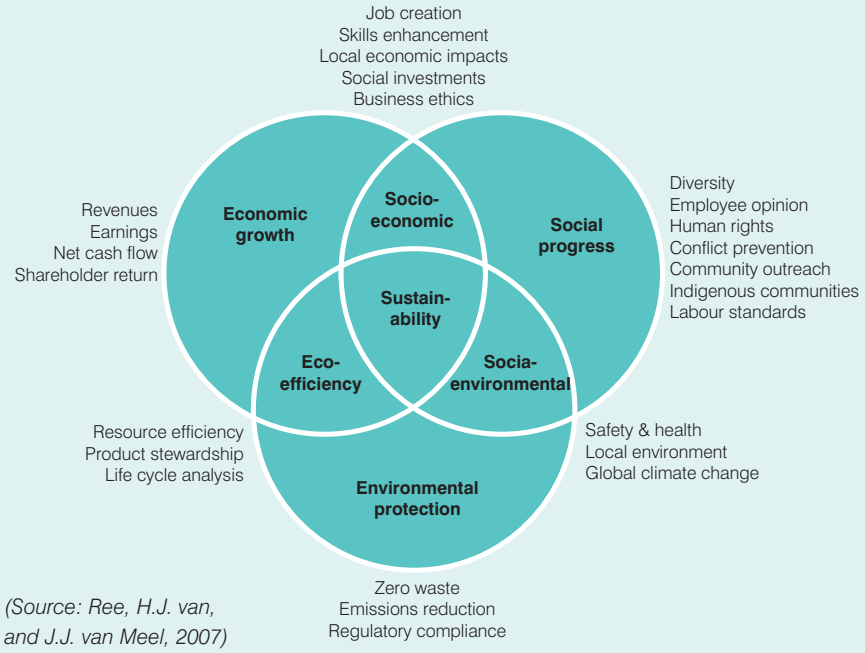
- **Corporate Reputation**. As more and more people consider the importance of environmental issues, strong CSR values can have a positive impact on corporate reputation and brand, and help improve competitive advantage. By the same token, a failure to address these issues can have a negative impact on corporate success.
- **Respect of Communities**. Addressing environmental issues can help organisations to forge closer relationships with the communities in which they operate. An investment in the future of the business, this means ensuring it is welcomed and respected by its surrounding community.

1 *The Stern Review: The Economics of Climate Change, Executive Summary*

2 *For example, see the UN website: www.unep.org/themes/climatechange or the Inter-governmental Panel on Climate Change: www.ipcc.ch*

3 *The WWF has calculated that our carbon footprint is significantly out of sync with the capacity of the planet, to the tune of a three-fold difference. Put simply, we are living as if we had three planet's worth of resources to live with, rather than just one. The WWF calculate that we need to cut our ecological footprint by about two thirds: www.wwf.org.uk*

Figure 1.1: The Sustainability Challenge



(Source: Ree, H.J. van, and J.J. van Meel, 2007)

- **Valued and Motivated Employees**. Employees are often the link to the customer and a key source of ideas and innovation, and with labour typically the highest cost for an organisation, the attraction, retention and motivation of skilled staff are key business issues. Strong environmental credentials can play an important role supporting these objectives.
- **Meeting Shareholder Requirements**. A core element of business strategy, investors are increasingly looking at how their funds are used and 'ethical investments' are becoming increasingly widespread

It is no longer enough for well-managed organisations to perform in financial terms alone and the majority of leading businesses either already produce regular CSR and sustainability reports, or intend to do so. Failure to do so is not only likely to damage public relations, but also represents a significant risk to long-term corporate success.

Looking ahead, as governments around the world increase their focus on environmental concerns (see Appendix 1 for an overview of the key global environmental regulations), the CSR issues of today are likely to become the formal compliance issues of tomorrow.

It is therefore vital that organisations treat environmental issues seriously and take early action to reduce the environmental impacts associated with their operations.

Chapter 1

Sustainable Reporting and Investment Initiatives

A selection from an expanding list:

- ***The Global Reporting Initiative*** (GRI) has pioneered the development of the world's most widely used sustainability reporting framework. The framework sets out the principles and indicators that organisations can use to measure and report their economic, environmental, and social performance. The G3 Guidelines published in 2006 are followed by most leading international businesses when preparing their reports (see Appendix 3 for an analysis of how the Code maps to GRI sustainability indicators).
- ***UK FTSE4Good Index***. A series of Socially Responsible Investment (SRI) benchmarks and tradable indexes designed to measure the performance of companies that meet globally recognised corporate responsibility standards and to facilitate investment in those companies.
- ***US Dow Jones Sustainability Indexes***. Similar to the above, the indexes track the financial performance of the leading sustainability driven companies worldwide. In 2007 a total $5 billion of asset values was based on the indexes.
- ***ACCA Awards*** (Association of Chartered Certified Accountants) and ***ESRA Awards*** (European Sustainability Reporting Association) aim to promote excellence in environmental, social and sustainability reporting.

The Next Challenge: Measure it, Prove it!

In recent years public trust in business and government has fallen and the onus now is very much for organisations to prove that they are addressing their environmental impacts[4]. Indeed, leading UK business charity Business in the Community suggests that the next key challenge that organisations face is to *"consolidate the way they manage environmental issues and to give a greater focus to measuring and improving their impact on issues such as climate change and the use of natural resources"*[5].

What Does This Mean for Corporate Property?

A lot! Corporate real estate executives are likely to find themselves at the frontline of the environmental agenda, with a real opportunity to lead the way. Corporate property is responsible for some 20% of global CO_2 emissions[6] (mainly through energy use), a major source of waste generation, and a huge consumer of water resources.

As such, corporate boards will be asking their property and facilities executives to supply ever more detailed and higher quality environmental performance information to support their CSR statements - to prove their environmental performance. Shareholders, customers and employees (as well as the CEO) will all want to know the hard facts, and if these can be independently verified so much the better.

This represents a major challenge, and opportunity, for property executives. Clearly there is scope to make a valuable contribution, but environmental issues remain relatively new to the majority and organisations are still finding their way. From the corporate real estate point of view a widely accepted, good practice 'way of doing things' would be highly desirable, especially if it can help support the information disclosure requirements that stakeholders are increasingly coming to expect. The IPD Environment Code provides this support.

4 *Business in the Community, Looking Back, Moving Forward: building the business case for environmental improvement (2006)*

5 *Ibid*

6 *United Nations Environment Programme, Buildings and Climate Change (2007)*

Chapter 2

The Purpose of the Environment Code

Given the information and reporting challenges associated with the environmental agenda, IPD has developed the Environment Code to help corporate property professionals deliver high quality performance information to their organisations and stakeholders.

What is the IPD Environment Code?

The Code is a good practice template for the collection, measurement and analysis of environmental information. Through use of common terminologies, it can be applied to buildings anywhere in the world.

Why is it needed?

Most fundamentally, to measure the environmental performance of corporate buildings. More specifically, it fulfils the following key functions:

- **Good Practice**. Without an accepted global approach for measuring and reporting on environmental performance, many organisations are either simply not doing it, or the quality and consistency of the information collected may be questionable. This problem is especially acute for organisations that have a large number of buildings around the world and need to develop a 'global view' of performance. The Code provides a good practice, global measurement standard.
- **Clarity and Co-ordination**. Environmental matters are likely to be relatively new for the majority of property professionals, and with an explosion of environmental initiatives around the world, it can be difficult to know where to begin. By providing a central hub for the co-ordinated collection of baseline environmental information, the Code is the essential starting point in this process. Armed with Code-compliant information, organisations will be able to gain real clarity on how their estate is performing as well as respond positively to requests for detailed performance information, for instance for regulatory compliance purposes.
- **Practicality and Manageability.** While established environmental standards such as LEED in the US, BREEAM in the UK, CASBEE in Japan and HQE in France provide organisations with a highly rigorous and valuable approach to assessing a buildings environmental performance, the cost, time and resources needed to undertake such an assessment can be prohibitive. As such, use of these methods in their current form is likely to be restricted to the larger 'flagship' buildings within an estate. The Environment Code - developed with these best practice standards in mind - provides a simple means of collecting data and benchmarking performance across a broader range of buildings and as such provides organisations with a more practicable and cost effective tool for internally generating an environmental health check for an entire estate. This is an essential input to effective environmental policy and management.

How does the Code help?

By setting out a clear and unambiguous approach to the collection of environmental data, the Code enables property executives to generate consistent and comparable performance information about their buildings anywhere in the world. By doing so, it supports two key management imperatives:

- **Decision Making**. With a trustworthy and reliable information base, managers are able to make better, faster, more confident decisions about how to reduce environmental impacts in relation to their estate.
- **Communication**. As well as enabling the corporate property industry to 'speak the same language', the Code provides a ready-made structure for communicating performance to key stakeholders, such as senior management, staff, shareholders, customers and communities.

Benefits

Through use of the Code - and by generating high-quality environmental information - corporate property professionals will be better equipped to support their organisation's environmental objectives, for example through:

- **Enhanced Environmental Performance**. With good quality information managers will be better equipped to take effective action to improve environmental performance across the estate.
- **Supporting Corporate Reputation**. Not only by helping the organisation to meet an increasing range of environmental obligations (statutory or otherwise), but also through compliance with a recognised 'industry standard' for environmental performance measurement.
- **Improved Risk Management**. With a clear picture of the environmental risks and potential liabilities associated with an estate, managers will be better equipped to take effective mitigating action to reduce exposure to risk factors.
- **Better Procurement**. With a clear level of environmental performance in mind, managers will be able to set better, more sophisticated environmental specifications for the procurement associated with new buildings or refurbishment/improvement of existing buildings.
- **Benchmarking**. As well as comparing the environmental performance of buildings within an estate, the Code enables users to compare their relative performance against other Code-compliant organisations.

The Concept

In preparing the Code we have combined IPD's experience of performance measurement with the environmental expertise of Bureau Veritas and CB Richard Ellis. Our approach has been to focus on:

- **Good Practice**. Using existing national and international approaches to building management and sustainable construction - for example ISO 14001, BREEAM in the UK and LEED in the USA - as the basis for the Code.
- **Government Regulation**. A key driver of the environmental agenda, the Code provides a robust template for the collection of the baseline environmental data that organisations will increasingly need in order to demonstrate compliance with the growing range of environmental regulation.
- **Practicality**. Creating a broad picture of environmental performance without making data collection too complex or too expensive (see overleaf).
- **Functionality**. Allowing for detailed analysis and 'drilling down'. For example, users are able to examine headline figures of estate performance right down to the individual component elements of building performance. Users are also able to develop a number of key performance indicators such as 'CO_2 per square metre' or 'tonnes of waste per person' to support more detailed analysis and performance improvements (see Chapter 5 - Applying the Code).
- **Global Applicability**. Creating a universal structure that can be implemented internationally, anywhere in the world.

Chapter 2

The Challenge of Data Assembly

Ensuring that the information collected is sufficiently robust, while not being prohibitively expensive to collect and maintain, is a key challenge. Experience suggests that it may well take three years to develop a robust set of baseline data, not least because many organisations do not currently record environmental data. With this in mind, the Code has been split into two parts:

- **Core Measures**. Covering energy, water and waste, collecting this information is an essential part of any environmental performance measurement framework and should be the primary focus for property executives starting to implement the Code. For manageability, users could begin by assembling the data most important to them, for instance energy and waste. Once this data is in place, water data could be collected.
- **Qualitative Measures**. With robust core quantitative data in place users should consider developing a more complete picture of environmental performance by collecting the Code's qualitative data items. Collectively these could form an Environmental 'Health-Check' (see Chapter 3 and Appendix 6).

Landlord and Tenant Information

For leased premises, as well as collecting environmental data for your leased floor area, it is important to collect data for the 'common parts' of the building - the shared parts of multi-tenanted buildings for which the building owner is responsible. Access to data on this part of the building is essential for a fair comparison with wholly owned buildings within an estate.

Is the Environment Code relevant to all buildings?

The Environment Code is a tool for the collection of information relating to the occupancy and use of corporate buildings; as such it is applicable to a wide range of property types and uses, for example:

- Offices
- Call Centres
- Data Centres
- Retail Stores and Shopping Centres
- Laboratories
- Warehouse and Storage Facilities
- Hotels
- Public Buildings
- Supermarkets
- Airports
- Hospitals
- Leisure Facilities
- Educational Buildings
- Industrial Buildings*

* For industrial buildings where plant and machinery is likely to be the principal driver of environmental performance it will be important to distinguish between ‘process’ uses and ‘building’ uses, e.g. for energy consumption.

Specific Applications of the Code

The Code reflects the perceived priorities for property occupiers wishing to measure the environmental impact of their buildings. The use of the data will depend on the size and type of organisation collecting it, but broad applications are many and include:

- Compliance with national and state regulations
- Creating an environmental strategy
- Inputting to real estate strategy
- Communicating a commitment to environmental improvement
- Creating performance targets
- Environmental improvement plans
- Performance assessment and measurement
- Life cycle assessments
- Acquisition and disposal of buildings
- Supplier management
- Information systems and data population
- Team and personal objectives

Future Development of the Code

Given the rapid growth of the environmental agenda, the Code will be periodically updated to take account of aspects of environmental performance measurement (as well as good practice and global regulations) that emerge and are not covered in this first edition of the Code. We anticipate the first revision taking place in 2010.

Chapter 3

Environmental Measures and Definitions

This chapter sets out the data items and definitions that comprise the Environment Code. To support practical application it has been split into two parts:

- **Part 1: Core Measures**. This section, focussing on energy, water and waste, represents the most significant environmental challenge to building managers at present. As such, it should form the initial focus for data collection and reporting.
- **Part 2: Qualitative Measures**. A range of additional qualitative measures are set out in Part 2 of the Code. The majority of these measures come together to form an Environmental 'Health-Check'. Once the Core Measures set out in Part 1 are in place, users should consider collecting this supporting information about their buildings.

A Note on Units of Measurement

For the sake of simplicity and to attain consistency across an international estate, the Environment Code sets out all quantitative data in metric units, since the majority of the users of the Code will be familiar with the Système International (SI) units of measurement. This will aid international comparisons and benchmarking. However, especially in the United States, users might prefer to collect numbers in alternative formats.

Part 1: Core Measures

EA. Energy Measures

There is increasing international scientific consensus that rising levels of man-made greenhouse gases are leading to global warming. Possible consequences include rising temperatures, changing sea levels, and impacts on global weather. These changes could have serious impacts on the world's organisms and on the lives of millions of people, especially those living in areas vulnerable to extreme natural conditions such as flooding and drought.

Through the energy needed for heating, lighting and servicing of buildings, corporate and residential property is responsible for approximately 40% of global greenhouse gas emissions (such as carbon dioxide) and is one of the most significant contributors to climate change.

A key purpose of collecting energy consumption figures is to enable property executives to determine the level of carbon emissions related to their buildings.

Performance Drivers

As the problems associated with climate change and CO_2 emissions have become increasingly important within the scope of global politics, many key targets and limits have been set through collaborative agreements. Some of the main ones include:

- The Kyoto protocol of 1997 which asked 'developed world' nations to reduce their CO_2 output to 5.2% less than 1990 levels by 2012.
- The European Union agreed to an 8% reduction from 1990 levels (by 2012) - currently only four EU countries are on track to achieve this.
- The UK Government has proposed to reduce its CO_2 emissions by 60% by 2050 (compared to 1990 levels).

Core Energy Measures

The structuring of the energy data below requires some explanation. Fundamentally, the Code distinguishes between ‘imported energy’ (energy that is supplied to a building or site from an external source) and renewable energy generated on-site. Moreover, data items are grouped by broad energy type (e.g. fossil fuels, renewable fuels, electricity). These broad energy types have different thermodynamic values and should be recorded and analysed separately.

Collecting energy data in this way will help to facilitate increasingly sophisticated energy performance analysis.

We recognise that occupiers may export energy to nearby sites. Appropriate adjustments to energy figures may be needed in these circumstances.

Imported Energy

EA1 Electricity	*The total annual imported electricity (kWh) used to provide electrical services to a building.* + **Includes:** the sum of EA1a, EA1b and EA1c
EA1a Mains Electricity	*The annual electricity (kWh), as metered, to a building supplied by the mains supply.* + **Includes:** all mains electricity supplied to the building − **Excludes:** electricity provided by on-site renewable generation, communal electricity, owned off-site facility electricity
EA1b Communal Electricity	*The annual electricity (kWh), as metered, to a building supplied by communal power sources.* + **Includes:** all electricity supplied by communal schemes, for example a community Combined Heat and Power scheme or community wind turbine − **Excludes:** all mains supplied electricity (EA1a), owned off-site facility generated electricity (EA1c)
EA1c Owned Off-Site Facility	*The annual electricity (kWh), as metered, to a building supplied by the organisation's, or building owner's, own off-site electricity supply.* + **Includes:** all electricity supplied to the building as a result of direct investment in an off-site supply by the building owner or occupier. For example, off site wind turbines. − **Excludes:** all mains supplied electricity (EA1a), communal electricity (EA1b)

EA2 Fossil Fuels	*The annual energy equivalent (kWh) to a building supplied by fossil fuels (as detailed in EA2a to EA2e below)* Where possible, provide data on the specific fuel type set out below. See Appendix 4 for advice on converting fuel use from mass or volume to kilowatt hours. + **Includes:** the sum total of EA2a to EA2e below − **Excludes:** other imported energy sources listed under categories EA1, EA3 and EA4
EA2a Natural Gas	*The annual natural gas (kWh equivalent), as metered, used to provide space and water heating and associated functions to a building.* − **Excludes:** liquefied petroleum gas (EA2c), biogases (EA3a)
EA2b Oil	*The annual oil use (kWh equivalent), as metered, used to provide space and water heating and associated functions to a building.*
EA2c LPG	*The annual energy equivalent (kWh) of Liquefied Petroleum Gas (LPG) use.* − **Excludes:** natural gas
EA2d Solid Fossil Fuels	*The annual energy equivalent (kWh) of solid fossil fuel use.* + **Includes:** coal, anthracite, smokeless fuels
EA2e Other Fossil-derived and Non-Renewable Fuels	*The annual energy equivalent (kWh) of other fossil-derived and non-renewable fuel use.* + **Includes:** other fuel uses not covered in EA2a to EA2d above, e.g. coal gas, bitumen.

Chapter 3

EA3 Renewable Fuels	*The annual energy equivalent (kWh) of imported renewable fuels.* + **Includes:** the sum total of EA3a, EA3b and EA3c below − **Excludes:** other imported fuels listed under categories EA1, EA2 and EA4 Note: See EA8 for advice on reporting carbon emissions for fuels under EA3.
EA3a Gases	*The annual energy equivalent (kWh) of renewable gases.* + **Includes:** biogas, 'landfill gas' methane Note: Biogas is a mixture of gases, principally methane and carbon dioxide, produced from the anaerobic breakdown of organic material, e.g. from landfill or in sewage digesters. Methane is a potent greenhouse gas, 21 times more so than carbon dioxide over 100 years; and even more potent in the short term
EA3b Liquids	*The annual energy equivalent (kWh) of renewable liquid fuels.* + **Includes:** biodiesel, ethanol
EA3c Solids	*The annual energy equivalent (kWh) of biomass used.* + **Includes:** solid 'biofuels' derived from biomass (i.e. organic material made from plants and animals). Wood is commonly used − **Excludes:** renewable energy resources in gaseous or liquid form such as biogas, landfill gas, biodiesel Note: Burning of biomass does still release greenhouse gases including CO_2 (see EA8 for details on biomass-related CO_2 accounting).

EA4 Communal Non-Electrical Energy	*The annual non-electrical energy equivalent (kWh) supplied to a building by communal sources. If possible, provide specific data on the type of communal energy imported, as set out in EA4a and EA4b below.* + **Includes:** the sum total of EA4a and EA4b − **Excludes:** other imported fuels listed under categories EA1, EA2 and EA3 Note: Communal Energy can be generated using a range of primary fuel sources and so to determine the CO_2 equivalent emissions users will need to refer to their local supplier for details.
EA4a Communal Heating	*The annual energy equivalent (kWh) to a building supplied by communal heating sources.* + **Includes:** hot water or steam from district schemes, for example a community Combined Heat and Power scheme Note: District Heating means a system supplying heat that is generated centrally in one or several locations to a non-restricted number of customers. It is distributed by means of a network using hot water or steam as a medium. District heating can allow the utilisation of low-grade energy that otherwise would be wasted, such as municipal refuse and waste heat from different sources.
EA4b Communal Cooling	*The annual energy equivalent (kWh) to a building supplied by communal cooling sources.* + **Includes:** chilled water from district schemes Note: District Cooling means a system producing cooling services by means of a distribution network, supplying centrally produced chilled water to customers in a number of different buildings.

On-site Renewable Energy (not requiring imports)

EA5 On-site Renewable Electricity Generation	*The annual electrical energy (kWh) generated on-site through renewable sources.* + **Includes:** for example, photovoltaic systems, wind turbines, hydro turbines
EA6 On-Site Renewable Combustion Fuels	*The annual energy equivalent (kWh) generated on-site through renewable combustion fuels.* + **Includes:** for example, on-site harvested biomass
EA7 On-Site Renewable Heating and Cooling	*The annual thermal energy equivalent (kWh) generated on-site through renewable sources.* + **Includes:** the sum total of EA7a and EA7b below
EA7a Renewable Heating	*The annual heating energy equivalent (kWh) generated on-site through renewable sources.* + **Includes:** for example, solar energy, direct geothermal heating
EA7b Renewable Cooling	*The annual cooling energy equivalent (kWh) generated on-site through renewable sources.* + **Includes:** for example, groundwater cooling

Carbon Emissions

EA8 CO_2 Equivalent	*The annual CO_2 equivalent emissions based on the sum of relevant items under the headings EA1, EA2, EA3* and EA4 above.* See Appendix 5 for information on calculating CO_2 equivalent emissions. Note: *EA3 emissions are not included as 'Scope 1' Direct Emissions in the Greenhouse Gas Protocol (see www.ghgprotocol.org) the most widely used international accounting tool for quantifying greenhouse gas emissions. Instead, the Protocol advises that all 'Biologically Sequestered Carbon' (under EA3) should be recorded and reported separately.

Chapter 3

Measures for Compensating and Offsetting Carbon Emissions

It is important to record the proportion of electricity (EA1) that has been derived from renewable sources, not least to accurately determine carbon emissions. This is a key function of EA9 below. When calculating carbon emissions from imported electricity EA9 should be subtracted from EA1; the relevant Fuel Emission Factors (see Appendix 5) should then be applied to the figures remaining. Data item EA10 can be used to report other carbon mitigation initiatives.

EA9 Supplied 'Zero Carbon' Electricity	*The annual imported electricity (kWh) that is sourced through a verified renewable 'zero carbon' supply and used in the building. (See overleaf for details of green energy tariffs.)* + **Includes:** supplied electricity that has been verified* as having a zero carbon loading. These can include on-shore and off-shore wind, hydro-electric, tidal, solar, photo-voltaics, geothermal (* For example, in EU countries, energy tariffs backed by a 'Guarantee of Origin' certificate.) − **Excludes:** all fossil fuel energy generation, all on-site renewable energy generation, communal electricity heating and cooling, green energy 'fund' tariffs and 'carbon offset' tariffs (as EA10 below) Note: Sub-categories may be required e.g. EA9a Mains Electricity, EA9b Communal Electricity and EA9c Owned Off-Site Facility.

EA10 Other 'Renewable Energy' Tariff Use	*The annual imported electricity (kWh) that is sourced using 'renewable energy tariffs' other than EA9 above. (See overleaf for further details of such tariffs).* + **Includes:** 'renewable Energy Fund' tariffs (energy tariffs where the supplier invests a premium into renewable energy or related projects) and 'Carbon Offset' tariffs (energy tariffs where suppliers offer to offset the CO_2 emitted by the gas and electricity supplied) − **Excludes:** verified* zero carbon supplied energy (* For example, in EU countries, energy tariffs backed by a 'Guarantee of Origin' certificate)

Sub-metered Energy Uses*

EA11 Total Sub-Metered Energy Use	*The total annual sub-metered energy used (kWh) for building uses or areas.* + **Includes:** the sum total of EA11a, EA11b and EA11c below
EA11a Electrical	*The annual sub-metered electricity used (kWh) for building uses or areas.* + **Includes:** sub-metered electricity supplied to a localised area or piece of equipment. For example, an item of process equipment, or an IT Server Room
EA11b Thermal	*The annual sub-metered heat use (kWh) for building uses or areas.* + **Includes:** sub-metered hot or chilled water supplied to a localised area or piece of equipment. For example, hot water to a catering kitchen
EA11c Fuel	*The annual sub-metered fuel use (kWh) for building uses or areas.* + **Includes:** sub-metered combustion fuel supplied to a localised area or piece of equipment. For example, natural gas supplied to a catering kitchen

Useful Energy Information

Renewable Energy Generation

Many countries are now introducing a legal requirement for a percentage of all building energy to be supplied by renewable sources. As a result, an increasing number of organisations are considering on-site generation of renewable energy.

In addition, several countries have introduced an obligation for electricity producers to generate a percentage of their energy from renewable sources. For example, in the UK, most electricity companies generate 10% or more from renewable sources - these contracts are marketed as 'green tariffs'.

'Green' Energy Tariffs

The term green energy refers to electricity produced from sources which do not involve any burning and so do not release CO_2, such as wind, wave, tidal and solar power. At present around 18% of our global electricity comes from renewable sources[7], 90% from hydropower which releases large amounts of CO_2 in construction. In practice, there are three broad types of 'green energy' tariffs:

- A 'green supply' tariff where the supplier guarantees that the electricity it sells is equivalent to the electricity it buys from renewable sources (the preferable option).
- A 'green energy fund' tariff where the supplier invests a premium that customers pay into renewable energy or related projects.
- A 'carbon offset' tariff where suppliers offer to offset the CO_2 emitted by the gas and electricity supplied.

The environmental benefits of 'green tariffs' are a subject of intense debate. The demand for energy generated from renewable resources is higher than the current supply, but there is growing concern that some green energy tariffs are not having the anticipated environmental benefits. Other concerns surround the energy sources that are being used to fulfill suppliers' green tariffs. A range of low-carbon energy sources which are exempt from the Climate Change Levy in EU countries have been tied into many suppliers' green tariff schemes. But while energy sources such as Biomass are somewhat cleaner than traditional fossil fuel-based power, they still produce carbon emissions. Energy from waste is also often deemed renewable.

Increasingly energy suppliers are distinguishing between 'green' and 'low carbon' tariffs, but there are no definitive standards setting out what can and cannot be included as a 'green' tariff. Perhaps the greatest concern with green energy tariffs is the fear that organisations regard green tariffs as a 'silver bullet' for their environmental problems, instead of focusing on energy efficiency and on-site energy generation.

Security of Energy Supply

Energy supply is not guaranteed and many developed countries rely on importing energy from other states to meet their overall energy needs. This high level of energy demand can leave countries exposed to the possibility of their supply being interrupted by circumstances outside of their control. By 2020, around half of total oil demand will be met by countries with a high potential risk of internal instability. This could lead to major problems for countries that use far more energy than they produce.

* *While not currently widely used, sub-metering can be a valuable way to better understand energy use in buildings. We therefore anticipate that future editions of the Code will examine energy use breakdown and sub-metering in greater detail.*

7 *BP Statistical Review of World Energy 2007*

Chapter 3

EB. Water Measures

While rising sea levels and the increasing frequency of major flood events may be the most publicised threats from unchecked climate change, global warming also poses a significant threat to our supplies of clean drinking water. Fresh water is likely to be in ever shorter supply as climate change gathers pace and increasing temperatures dramatically affect the world's great rivers.

Developing nations and island nations are likely to be most seriously affected, but even wealthy and developed nations face serious risks from climate change in relation to water.

Performance Drivers

Most countries have regulations regarding water quality and usage and developed countries are increasingly having temporary limits placed on water use due to the overuse of this precious natural resource.

For example, Europe has seen increasing restrictions on non-essential water uses such as swimming pools, car washing and garden water features. In the USA, areas such as California and Arizona are now facing long term problems of water supply meeting the needs of a growing population. Australia has faced extended drought conditions in many areas of the south east for several years and stringent measures have been introduced to combat this problem.

Core Water Data

EB1 Mains Water Consumption	*The annual volume (m^3) of mains supplied water used in a building.* + **Includes:** mains supplied water for general use, for example, catering, washrooms, cleaning − **Excludes:** bottled drinking water, on-site extracted water, on-site harvested rain and snow water, recycled 'greywater', water used for production processes (for example heavy industry)
EB2 Water Extracted On-site	*The annual volume (m^3) of water extracted directly on site and used in a building.* + **Includes:** water extracted on-site through boreholes or water courses (for example rivers and streams) − **Excludes:** all mains-supplied water, harvested rain and snow water
EB3 Use of Harvested Rain and Snow Water	*The annual volume (m^3) of collected rain and snow water and used in a building.* + **Includes:** all rain and snow water that is collected (after falling on the building) and used on site (for example watering grounds or flushing toilets)
EB4 Use of Recycled Water	*The annual volume (m^3) of recycled 'greywater' used in a building.* + **Includes:** waste water produced from baths, sinks, showers, clothes washers, dishwashers and lavatories. This can be recycled and reused if an appropriate system is installed

EC. Waste Measures

Good waste management is a key component of an environmentally effective building. Effective recycling systems, such as wet and dry waste bins, and battery and printer cartridge recycling points, can reduce waste collection frequencies and costs. This can, in turn, have the further benefit of reducing the number of 'waste miles' that are incurred transporting waste for disposal. Meanwhile, the effective separation of any hazardous waste will also reduce disposal costs and avoid the chance of any fines or legal action. These systems can be mapped out in a building waste management plan.

The procurement management of a building can also increase efficiency by not overstocking, ensure that the building purchases the most environmentally friendly office consumables and gets involved in 'take-back' and 're-use' schemes with items such as print cartridges, printers, and office furniture.

Performance Drivers

Given the negative effects of waste on the environment, in particular the pollution of surface water, groundwater, soil and air, most countries have targets in place for landfill reductions and for recycling. Sweden, for example, has set a number of waste reduction targets, such as a 50% reduction of all waste taken to the local Waste Transfer Station. Members of the EU are party to the Waste Packaging Regulations which set a variety of targets for reduction of different types of packaging waste, while the WEEE Regulations require a rapid rise in recycling of electrical and electronic waste within a short space of time.

Core Waste Data

EC1 Total Non-Recycled Waste	*The annual mass (tonnes) of waste arisings from a building sent to landfill and incineration. If possible, please provide specific data on methods of waste disposal as set out in EC1a, EC1b and EC1c below.* + **Includes:** any waste produced on site which is not reused or recycled. Mass weight (tonnes) is the preferred measure but, where mass is not available, it is acceptable to use approximations by volume (see Appendix 4 for advice on converting waste volume data to mass equivalent) − **Excludes:** all recycled waste and composted waste, construction waste, waste returned to producers (e.g. under EU WEEE Regulations or other national or international regulations) Note: Risk of 'double counting': EC1 = EC1a + EC1b + EC1c.
EC1a General Waste Sent to Landfill	*The annual mass (tonnes) of waste arisings from a building sent to landfill (landfill is defined as a waste disposal site for the deposit of the waste onto or into land).* + **Includes:** internal waste disposal sites (i.e. a landfill where a producer of waste is carrying out its own waste disposal at the place of production) − **Excludes:** facilities where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere; storage of waste prior to recovery or treatment (for a period less that three years as a general rule), or storage of waste prior to disposal (for a period less than one year)

Chapter 3

Core Waste Data *(continued)*

EC1b Incinerated General Waste with Energy Recovery	*The annual mass (tonnes) of waste arisings from a building sent for incineration (with energy recovery).* Energy Recovery from waste describes the process in which energy (in the form of heat) is recovered from the incineration of waste, and used to generate electricity which is then fed back into the national electricity 'grid' or network, or to provide both electricity and heat (combined heat and power) to nearby communities or other uses. This is an option for the disposal of high calorific-value wastes such as tyres and plastics.
EC1c Incinerated General Waste with No Energy Recovery	*The annual mass (tonnes) of waste arisings from a building sent for incineration (with no energy recovery).* This is often the most suitable option for hazardous chemicals and clinical waste. For example, the EU Landfill Directive bans certain wastes from being sent to landfill (liquid waste, explosive, corrosive or flammable waste).
EC2 Recycled Waste	*The annual mass (tonnes) of waste arisings from a building that are recycled.* + **Includes:** many wastes can be recycled, for example paper, cardboard, glass, metal, plastics, batteries, waste electronic equipment, laser printer cartridges, fluorescent tubes, wood (for example, pallets) − **Excludes:** general waste for incineration or landfill, composted waste, waste returned to producers (e.g. under EU WEEE Regulations or other national or international regulations)
EC3 Composted Waste	*The annual mass (tonnes) of waste arisings from a building that are composted.* + **Includes:** biodegradable waste

Note: Increasingly occupiers will wish to examine the different types of waste produced in order to manage waste more intensively. At present, our judgment is that it is beyond the means of most organisations to produce a detailed waste audit but we believe such audits will become increasingly necessary in future. For the time being, users may wish to distinguish certain types of waste. Paper could be a particular focus for many. For example, users might wish to record and track the total weight of paper bought and the total paper sent for recycling and for confidential waste treatment. This goes to emphasise the importance of simplicity, which underpins much of the Environment Code.

Part 2: Qualitative Measures

This part of the Environment Code sets out a series of qualitative measures - in questionnaire form - designed to complement the core data items set out in Part 1. As well as including measures relating to energy, water and waste matters, this section examines the following key property-related issues:

- Transport and Travel
- Equipment and Applicances
- Health and Well-Being
- Adaptation to Climate Change

The questions come together to form a broad Environmental survey. And while not an exhaustive list of survey questions - and not necessarily relevant to all organisations - it is a useful starting point for organisations examining their buildings' environmental credentials. The questionnaire can be carried out at regular intervals to provide an environmental 'health-check' of buildings, perhaps highlighting important risks and liabilities that might not otherwise have been uncovered. (See Appendix 6 for further information about the Environmental issues addressed in these questions.)

Environmental 'Health-Check'

General			
	Question	Answer	Score
1	Is there a named individual with specific responsibility for overall environmental management for this property?	Yes ❑ No ❑	5 0
2	Is there a formal Environmental Management System such as ISO14001 in place that covers activities in this property?	Yes ❑ No ❑	5 0
		Sub-total	/10

Chapter 3

Energy			
	Question	Answer	Score
3	Has a target for boiler combustion efficiencies been set for servicing operators to meet?	Yes ❑ No ❑	3 0
4	Do time settings for heating/cooling controls match occupancy hours?	Yes ❑ No ❑	3 0
5	To what extent does the building have electricity metering? Pick one of the following: • None • Building Level • Sub-building level e.g. floor level	 ❑ ❑ ❑	 0 1 3
6	To what extent does the building have gas metering? Pick one of the following: • None • Building Level • Sub-building level e.g. floor level	 ❑ ❑ ❑	 0 1 3
7	Are light switches and controls labeled to aid manual control?	Yes ❑ No ❑	2 0
8	Are light fittings and diffusers cleaned at least annually?	Yes ❑ No ❑	2 0
9	Are light switches wired in parallel to windows to enable lights close to the window to be switched off, while those in the centre may remain on?	Yes ❑ No ❑	2 0
10	Is lighting controlled by time-setting controls, for example to match occupancy hours?	Yes ❑ No ❑	2 0
11	Are lights fitted with motion sensors to detect occupancy e.g. in toilet areas?	Yes ❑ No ❑	2 0
12	Is photoelectric switching and dimming in place?	Yes ❑ No ❑	2 0
13	Are local temperature controls available within the building?	Yes ❑ No ❑	2 0
		Sub-total	/26

Water

	Question	Answer		Score	
14	Does the building have the following water efficient fittings?	Yes	No	Yes	No
	• Toilets (dual flush, low cistern capacity, waterless urinals etc)	❑	❑	3	0
	• Taps (aerating or other low flow features)	❑	❑	3	0
	• Showers (for example, low flow shower head)	❑	❑	2	0
15	Does the building have an operable leak detection system?	Yes ❑		3	
		No ❑		0	
16	To what extent does the building have water metering? Pick one of the following:				
	• None	❑		0	
	• Building Level	❑		1	
	• Sub-building level e.g. floor level	❑		3	
17	Are regular checks (and repairs) made for dripping taps by building staff e.g. security, cleaners?	Yes ❑		3	
		No ❑		0	
		Sub-total		/17	

Waste

	Question	Answer	Score
18	Do you have a waste management plan for the building?	No ❑	0
	If yes, which of the following are included:	Yes	
	• Recycling	❑	2
	• Wet and dry waste bins	❑	2
	• Take back schemes e.g. for print cartridges, batteries, fluorescent light tubes	❑	2
	• Environmentally sourced consumables e.g. paper	❑	2
	• Re-use of consumables and equipment e.g. paper, IT equipment	❑	2
19	Which of the following is true?		
	• There are enough well placed bins for segregating white paper	❑	2
	• There are also bins for segregating at least one of these waste types: plastic, glass, metals	❑	2
	• Information on the amounts of each type of waste taken off-site is regularly communicated to occupants	❑	2
20	Is there a drive to reduce the number of waste bins per person?	Yes ❑	2
		No ❑	0
21	Is there a policy in place to use recycled or sustainably sourced products?	Yes ❑	2
		No ❑	0
		Sub-total	/20

Chapter 3

Transport and Travel

	Question	Answer	Score
22	Is there a 'Green Travel Plan' in place at this property to encourage more sustainable forms of transport to work?	Yes ❑ No ❑	3 0
23	Is the building located within 1 km of a commuter rail or subway station?	Yes ❑ No ❑	2 0
	If not, are building occupants provided with a shuttle link e.g. a bus service that supplies transportation between the building and local public transport?	Yes ❑ No ❑	1 0
24	Does the building have its own cycle parking facilities?	Yes ❑ No ❑	1 0
25	Are shower and changing facilities available for staff?	Yes ❑ No ❑	1 0
26	Are 'food miles' taken into account in procurement of catering/vending facilities?	Yes ❑ No ❑	1 0
		Sub-total	/8

Equipment and Appliances

	Question	Answer	Score
27	How frequently are checks made for refrigerant leaks within the building?		
	• 6 monthly or less	❑	2
	• Annually	❑	1
	• 1+ years	❑	0
	• Don't know	❑	0
28	Does the building make use of alternative 'greener' refrigerants to HCFCs (e.g. ammonia, propane, carbon dioxide, HFC32)?	Yes ❑ No ❑	2 0
29	Is there a plan in place to phase out the existing HCFC gases?	Yes ❑ No ❑	1 0
30	Has a refrigerant gas leak detection system been installed within this property?	Yes ❑ No ❑	1 0
31	Do you monitor and record NOx emissions in relation to the building?	Yes ❑ No ❑	1 0
32	Is consideration made of light pollution and possible impact upon local residencies, neighbouring buildings etc?	Yes ❑ No ❑	1 0
		Sub-total	/8

Health and Well-Being

	Question	Answer	Score
33	Are there openable windows on all floors of the building?	Yes ❑	2
		No ❑	0
33	How frequently are maintenance checks made to the air intake system?		
	• Annually	❑	2
	• 1-3 Years	❑	1
	• 3+ Years	❑	0
34	Is there on-site water storage in place at this building?	No ❑	1
	If yes: • Is the volume stored less than one working day's average consumption?	❑	0.5
	• Is the water regularly tested (min. per annum)	❑	0.5
35	How frequently are staff feedback exercises carried out relating to general workplace environment satisfaction?		
	• Every 1 to 2 years	❑	2
	• Every 2 to 3 years	❑	1
	• 3+ years / Never	❑	0
36	How frequently are noise levels monitored in the building?		
	• Every 1 to 2 years	❑	1
	• Every 2 to 3 years	❑	0.5
	• 3+ years / Never	❑	0
37	Is there a policy in place to encourage the use of interior plants and/or exterior landscaping?	Yes ❑	1
		No ❑	0
		Sub-total	/9

Adaptation to Climate Change

	Question	Answer	Score
38	Has a flood risk assessment been carried out on the building?	Yes ❑	1
		No ❑	0
39	Is the building covered by a current business continuity plan for responding to extreme weather events e.g. sustained periods of high temperatures?	Yes ❑	1
		No ❑	0
		Sub-total	/2

Summary and Health-Check Rating

Summary Scores

Scores	Maximum Score	Your Building Score
General	10	
Energy	26	
Water	17	
Waste	20	
Transport	8	
Pollution	8	
Staff Well-Being	9	
Adaptation	2	
Total	**100**	

Environmental 'Health-Check' Rating

Score	Rating
0-20	Very Poor Health
21-40	Poor Health
41-60	Average Health
61 to 80	Good Health
81+	Excellent Health

Chapter 4

Additional Information Requirements

What other information should you collect?

Having used the Environment Code methodology to collect environmental data, it is important to collect additional descriptive data about the estate in order to make fair and balanced comparisons between buildings. For example, it is important to know that you are comparing the performance of, say, a retail building with an office building, or a new building with an older building. The information is also crucial for the development of key performance indicators, discussed in Chapter 5.

The descriptive data that IPD Occupiers collects for benchmarking clients' buildings is set out below. In general, greater detail will allow more meaningful comparisons and so the more accompanying information that can be provided the better the analysis and benchmarks that can be provided.

Descriptive Information

Building details	Description
Location	
• Address details • Site	A = located in the Central Business District (CBD) B = located in the town centre but outside the CBD C = located on a business park / estate D = located outside an urban area, but not on a business park / estate

Descriptive Information (continued)

Building details	Description
Size	
• Gross, Net and Rentable Floor Area (m^2)	Users should also record the national measurement convention used. Various national approaches to floor space measurement exist such as RICS in the UK, BOMA in America and NEN in the Netherlands, each using its own measurement methodology. Below are some of the measurement conventions that should be recorded, depending on which national standard the organisation is using: RICS (UK) • Gross Internal Area • Net Internal Area BOMA (USA) • Gross Building Area • Floor Rentable Area NEN (Netherlands) • Gross Floor Area • Net Floor Area Note: The forthcoming IPD Space Code will provide a much-needed tool to reconcile these national space standards and enable more accurate comparison of floor space across national boundaries.
• Number of Floors	Number of distinct floors within the building. This should include basement and mezzanine floors with a net internal area at least 50% of typical upper floors.
• Number of Rooms	Gives an indication of intensity and type of use. For example, an open plan office versus a cellular office.
Type	For example, retail, office, data centre, call centre, hospital, supermarket and so on.
Use	
• The number of hours the building is in operation each working week	Average for the predominant part of the building. (Gives an indication of the intensity of uses of the building.)
• Headcount (see Figure 5.2 on page 33 for other business-relevant denominators)	Most appropriate for offices, typical numbers of permanently-employed, temporary, and contract staff should be counted in terms of full-time equivalents (FTEs). (Gives an indication of the intensity of uses of the building).
• Number of workstations (especially for offices)	The number of designated "desk" or other work places and positions within the building. (Gives an indication of the intensity of uses of the building).

Chapter 4

Descriptive Information (continued)

Building details	Description
Condition	
• A to D	A = as new condition B = sound, operationally safe exhibiting only minor deterioration C = operational, but in need of major repair or replacement soon D = inoperable or serious risk of failure/breakdown.
• Year of construction	Major refurbishments do not alter the date of construction unless the building has been completely reconstructed behind a facade.
• Year of last major refurbishment	If the refurbishment affected a significant proportion of the building (more than 50% in most cases).
• Is the building listed?	Whether the building is subject to extra land use planning regulations on account of its historic or architectural interest.

Specification	
Air-conditioned?	For example, is the majority of the building cooled by: Comfort Cooling, Air Conditioning (installed within last 5 years), Air Conditioned (older) or Natural Ventilation.
Number of lifts	The total number of lifts (including goods lifts) serving the building.
Is a staff restaurant or canteen located in the building?	A dedicated Area where staff can buy a hot meal and eat it at a table in the same area. A refreshment trolley or small kitchen on a floor with a microwave and fridge is not included in the definition of a canteen.
Double glazing?	Yes / No.
Number of car parking spaces	The total number of car/vehicle parking spaces designated specifically to the premises and available on the site only. This total should exclude any spaces utilised regularly in public car parking facilities.

Chapter 5

Applying the Code

Assessing Environmental Performance

The key purpose of using the Code is to measure and analyse the environmental performance of buildings. Once the Code data (along with additional descriptive data) has been assembled it will be possible to convert it into key performance indicators (KPIs) such as ratios, scales and rankings that help to:

- Demonstrate the true level of environmental resources used
- Track progress over time
- Create performance-linked targets
- Judge the environmental performance of the organisation
- Make decisions about environmental priorities and actions
- Support direct communication with the rest of the organisation.

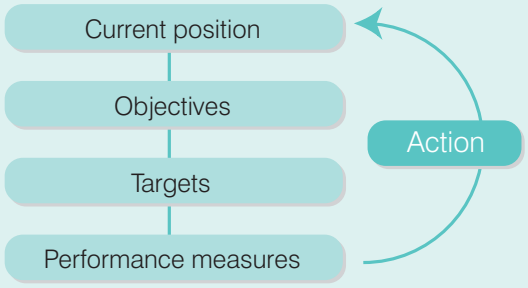
See pages 34-39 for suggested Key Environmental Performance Indicators.

Getting Started

The starting point for any performance analysis will be an organisation's corporate objectives. From these objectives and the corporate mission statement, appropriate performance targets can be set. Progress against these targets determines what we understand as 'occupier performance'. Figure 5.1 indicates the process that IPD Occupiers uses to help clients build up this performance culture.

Given the infancy of environmental performance measurement, corporate objectives in this area are still being developed and refined. However, the bulk of this chapter details a range of measurement approaches that should be helpful across differing circumstances as well as organisation types: from offices to retail and from hospitals to universities.

Figure 5.1: Achieving 'Occupier Performance'



Some Key Principles of Environmental Performance Measurement

- Ideally, performance should be assessed for the whole estate, with performance analysis produced down to building level (although users may wish to focus on the most important buildings in the estate, i.e. those accounting for the bulk of their environmental impact).
- Analysis should allow for individual countries to be clearly identified, not least to satisfy the increasing levels of compliance and other governance issues usually operated at national level.
- For manageability, organisations should avoid using too many performance indicators. Indicators that are useful for some organisations may not be useful for others.
- Choose performance indicators that can be compared with national standards and/or government-devised benchmarks.
- Performance indicators should be capable of being tracked over time.

The Use of Denominators

What are Denominators?

Denominators are the bottom number of a fraction. For example, in energy use (kWh per m^2) it is the 'm^2' figure that is known as the denominator, while in 'kWh per person', people are the denominator, and so on. Denominators can play a key role in performance analysis, allowing organisations to drill down to the factors most critical to their overall performance (see Figure 5.2).

A range of different denominators can be used to analyse environmental performance. However, their use - for example in setting targets and benchmarks - will depend on the type of property being analysed and the use to which the indicator is being put, such as an estate wide analysis or building level analysis.

Users of different types of property should consider using denominators that are based on their core activities. The figure below shows some examples:

Figure 5.2: Examples of Denominators

Type of Property	Typical Denominator
Airports	Passengers
Hospital	Patients
Leisure	Customers, or customer hours
Offices	Building users (normally full-time equivalent staff) or building user hours
Retail	Customers or store turnover
University or school	Students
Warehouse	Throughput

A Word of Warning

Some caution does need to be exercised in using denominators. For example, examining 'kWh energy per square metre' may be misleading if a higher environmental impact is produced as a result. Take an organisation with 10 offices of 1000m^2 each with 600 kWh of energy consumption per m^2. The total energy consumption would therefore be:

- 10 offices x 1000m^2 x 600 kWh per m^2 = 6 million kWh total energy consumption

However, were the organisation to optimise space use and reduce the number of buildings from ten to nine, this could have the effect of increasing consumption for the remaining buildings (to, say, 625 kWh per m^2) through more intensive use. In this case, the total kWh consumed would be:

- 9 x 1000m^2 x 625 kWh per m^2 = 5.625 million kWh

  (A total energy reduction across the estate of 6.25%, despite the fact that kWh per m^2 for individual buildings has risen by 4.2%).

Despite this point, the production of a performance figure 'per m^2' can be essential to understand differences between one building and another. Thus, it can be very helpful for benchmarking either internally within an organisation or externally with others. Analysis 'per m^2' is also the basis for many standards introduced by national governments.

Chapter 5

Key Environmental Performance Indicators

While by no means exhaustive, this section sets out four broad types of environmental performance indicator, operating on a hierarchical basis:

- Strategic Indicators
- Tactical Indicators
- Operational Indicators
- Qualitative Indicators

Care should be taken when choosing indicators to ensure that the most important factors are being measured. Although the following section includes a range of indicators for consideration, users should ensure that the number of indicators is limited since too many can cause confusion and are difficult to communicate. In IPD's opinion, the most important of the indicators summarise 'totals'; the total environmental impact, the total use and total renewable/recycled.

Individual users will wish to decide their own priorities in line with the 'Getting Started' section at the beginning of this chapter.

Strategic Indicators

These will be the most important indicators for the typical organisation, and are likely to be used for board level reporting purposes or for external communications (see Table 5.1 for full details). The indicators have been split into two categories: Environmental Budget Indicators and Annual Change Indicators.

- **Environmental Budget Indicators**

  Property occupiers are advised to monitor their environmental impacts in the same way as their financial budgets. We therefore refer to environmental 'budget' indicators, which represent the total carbon, energy, waste and water produced by the organisation through its buildings. Evaluation of the organisation's performance should be made against the corporate environmental budget, or target, for the year. For example, a self imposed energy budget for the estate of, say, 3 million kWh in the year.

  Table 5.1 focuses on the total use of an environmentally-important indicator, the total impact of that use, and the total savings from that use. Thus, in the case of water consumption, we recommend tracking:

  a) Total Water Used

  b) Total Sourced Water (i.e. water from mains and on-site extracted sources and so potentially less environmentally-sustainable than recycled water use)

  c) Total Recycled Water (i.e. water use from rain/snow and recycled 'grey water')

- **Annual Change Indicators**

  The change in the total impact for energy, water and waste should also be recorded, since the main focus of environmental efforts will be to reduce impacts, for example by 5% or 10% each year.

  Again, a warning needs to be given about the use of percentage indicators for recycling or renewables since it is possible for total environmental damage to increase for an organisation while these indicators are apparently moving in the right direction. For example, total non-recycled waste could be increasing at the same time as the '% of waste recycled' is also increasing.

Table 5.1: Strategic Indicators

Environmental Measure		Total Budget	Annual Change	Measures Covered
Energy	Total Energy	SI 1. Total Use of all Energy (kWh)	% annual change in total energy use	EA1, EA2, EA3, EA4, EA5, EA6, EA7
	Non-Renewable Energy	SI 2. Total Use of Non-Renewable Energy (kWh)	% annual change in non-renewable energy used	Total Energy – Renewable Energy
	Renewable Energy	SI 3. Total Use of Renewable Energy (kWh)	% annual change in renewable energy used	EA3, EA5, EA6, EA7, EA9
	CO_2 Equivalent	SI 4. Total Emissions (tonnes)	% annual change in CO_2 emissions	EA1 (minus EA9), EA2, EA4
Water	Total Water	SI 5. Total Use of all Water (m^3)	% annual change in total water use	EB1, EB2, EB3, EB4
	All 'Sourced' Water	SI 6. Total Use (m^3) of Mains and Extracted Water	% annual change in 'sourced' water use	EB1, EB2
	Harvested & Recycled Water	SI 7. Total Use (m^3) of Recycled or Harvested Water	% annual change in harvested and recycled water use	EB3, EB4
Waste	Total Waste	SI 8. Total mass (tonnes) of all waste	% annual change in total waste produced	EC1, EC2, EC3
	Non-Recycled Waste	SI 9. Total mass (tonnes) of non-recycled waste	% annual change in non-recycled waste produced	EC1
	Recycled and Composted Waste	SI 10. Total mass (tonnes) of recycled or composted waste	% annual change in recycled and composted waste	EC2, EC3

Chapter 5

Tactical Indicators

Property managers using the Code will be keen to influence the strategic indicators set out above. To help do this strategic indicators can be put into the context of specific building operations (see Table 5.2 below). The result is a set of more management focused 'tactical' indicators whose purpose is to:

- Control the Strategic Indicators
- Drive operational performance improvements
- Permit comparison against internal and external benchmarks
- Permit comparison against national or international standards

Table 5.2: Tactical Indicators

	Environmental Measure	Main unit	m²	People	Unit output	Other
Energy	Total Energy Use	kWh per	✔	✔	✔	Core Operating Hour [11]
	Non-Renewable Energy Use	kWh per	✔	✔	✔	Core Operating Hour
	Renewable Energy Use	kWh per	✔	✔	✔	Core Operating Hour
	CO_2 Equivalent Emissions	tonnes CO_2 per	✔	✔	✔	Core Operating Hour
Water	Total Water Use	m^3 per	✔	✔	✔	
	Sourced Water Use	m^3 per	✔	✔	✔	
	Recycled Water Use	m^3 per	✔	✔	✔	
Waste	Total Waste	tonnes per	✔	✔	✔	
	Non Recycled Waste	tonnes per	✔	✔	✔	
	Recycled waste	tonnes per	✔	✔	✔	

Operational Indicators

As well as the Tactical Indicators above, users have the opportunity to create a range of more detailed indicators from any of the core measures listed in chapter 3. More commonly, these Operational Indicators will track changes over time or be examined as totals if these have been set as targets. Thus, an office occupier using gas to fuel a central boiler might want to focus on:

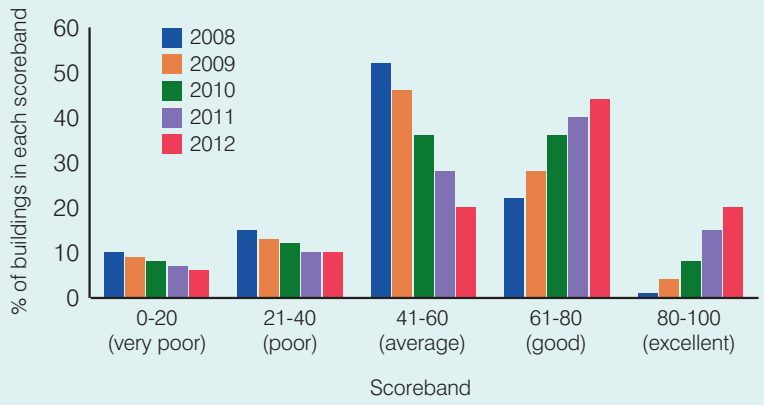
- Total annual gas use
- Annual change in total gas use

Moreover, if occupiers wish to give further attention to these indicators, the totals could be expressed as ratios, for example:

- Total gas use per person
- Annual change in total gas use per person
- Total gas use per m^2
- Annual change in total gas use per m^2
- Total gas use per core operating hour
- Annual change in total gas use per operating hour

11 Core Operating Hour can be a useful indicator to take account of the intensity of building use. For example, a call centre operating 24 hours a day, 7 days a week is very likely to consume more 'energy per m^2' than an office building operating 9 hours a day, 5 days a week. However, this indicator does not take into account the number of hours that these buildings are operational. By using 'energy use per core operating hour' it is possible to more fairly compare the relative performance of these two buildings.

Figure 5.3: Operational Indicators



This list is long enough to act as a warning to building managers to avoid too many indicators, even though any one of these could be justified in specific circumstances.

Qualitative Indicators

As well as the quantitative measures outlined above, users of the Environment Code are able to analyse their estate against the qualitative measures in the Environmental 'Health-Check'[12]. Users are advised to score themselves every year and to rate their estate, countries and buildings for the scores achieved for given proportions of their buildings, floor space or rental value. For example, the following graphs could be produced to illustrate performance and progress in this area.

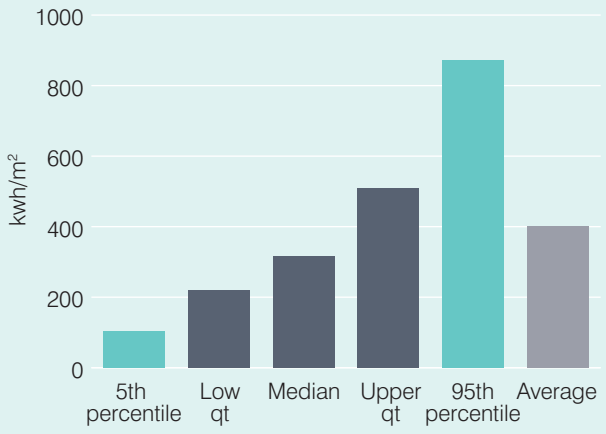
In addition, the analysis could be more question-specific with users measuring, for instance, the percentage of buildings or floor space that:

- Have cycle parking facilities & showers
- Are within 1 km of a public transport station
- Have a travel plan
- Use HCFCs
- Have openable windows on all floors
- Have all light switches labelled
- Door code security exists
- A flood risk assessment has taken place

Benchmarking Performance

With a robust dataset for an organisation's buildings in place, benchmarking can be used to compare its performance against an appropriate peer group of similar occupiers. Great care should be taken in using benchmark information in the arena of environmental performance. As illustrated by Figure 5.4 below, there is likely to be significant room for improvement even amongst the 'best' corporate and public sector organisations. That said, it is still extremely helpful to know whether other key players in the market place are making progress at a slower or faster pace than your own organisation.

Figure 5.4: Energy Consumption in UK Offices



Source: IPD Corporate Occupier Trends, 2007

12 The Environmental 'Health Check' is set out in Chapter 3 with further supporting information in Appendix 6.

Chapter 5

Towards Environmental Totality: Bringing Together Building Owners and Tenants

It is important to measure the total environmental impact of buildings and the Environment Code is directly relevant to building owners, managers and tenants who wish to collaborate to ensure that their buildings perform in totality - not just the areas for which they are responsible. The Code can help support this end by enabling a coordinated approach to the allocation of responsibilities and control. These will vary from country to country but the following broad principles emerge, in our opinion:

Table 5.3: Division of Environmental Responsibilities

Type of Responsibility	Building Owner	Building Tenant
Direct responsibility	• Commonly supplied services to tenants through air-conditioning, management of WCs, reception, security, site management etc. • Specification and design in order to control the environmental impact in use • Environmental impact of building construction	• Own direct consumption and environmental impact • Choice of building in terms of its environmental performance
Indirect responsibility	• Supporting tenants to minimise environmental impacts	• Supporting the building owner to minimise environmental impacts

All of the data items set out in the Code are capable of being analysed by owners. At the minimum, they need to be able to produce environmental data for the areas of activity they control. The analytical denominator (see Table 5.2 on page 36) used by building owners should typically be the floor space (m^2) of the building. This is likely to mean rentable area, as this information is known to tenants, but gross floor space may also sometimes be appropriate as many of an owner's cost impacts will be linked to the entire area of the building rather than just the lettable part.

The use of denominators other than floorspace is problematic as building owners are likely to have limited access to other occupier-specific data. They are also likely to be outside the scope of owner control. As such, the following system of performance classification might be used (see Table 5.4).

Table 5.4: Suggested Owner Key Performance Indicators

Environmental Indicators		Units	Totals	Annual Change
Total Impacts	Total energy use	kWh	✔	✔
	Total non-renewable energy use	kWh	✔	✔
	Total CO_2 equivalent	tonnes CO_2	✔	✔
	Total water consumption	m^3	✔	✔
	Total sourced water	m^3	✔	✔
	Total waste	tonnes	✔	✔
	Total non-recycled waste	tonnes	✔	✔
Sustainability	% energy consumed from renewable sources	% (kWh)	✔	✔
	% waste recycled/composted	% (tonnes)	✔	✔
	% water from 'renewable' sources (i.e. from rainwater, snow or greywater)	% (m^3)	✔	✔
Floor space	Total energy use per m^2	kWh per m^2	✔	✔
	Total non-renewable energy use per m^2	kWh per m^2	✔	✔
	Total CO_2 equivalent per m^2	kg CO_2 per m^2	✔	✔
	Total water consumption per m^2	m^3 per m^2	✔	✔
	Total 'sourced' water per m^2	m^3 per m^2	✔	✔
	Total waste per m^2	kg per m^2	✔	✔
	Total unrecycled waste per m^2	kg per m^2	✔	✔

National Regulations: A Recipe for Confusion?

For many organisations a key driver for environmental action will be government regulations and/or voluntary national standards. The ability to compare organisational performance against national targets is often a useful spur for progress in the environmental arena. For this reason, all building users and owners will need to record the precise grading of their buildings according to the legislation in each country in which they operate.

A key problem, however, is that national governments are likely to produce their own approaches to environmental regulation. For example, while the EU Energy Performance of Buildings Directive applies to all EU member states, each country is able to interpret the Directive differently. The result is a plethora of potentially inconsistent national approaches to regulating the energy performance of buildings.

Given this reality, the strong recommendation of the Environment Code is to collect the ***baseline data*** needed to respond to regulatory requirements, no matter how they are framed. As such, the Code will act as a valuable tool helping organisations respond to the information challenges associated with the growing range of global environmental regulation.

Chapter 6

A Worked Example

The hypothetical example below illustrates the type of output that can be delivered using the Environment Code's core measures. It is based on a typical University Campus site in the United Kingdom with 8,494 full time equivalent students and 123,130m² of total floor space. Carbon emissions have been calculated using current UK Fuel Emission Factors (see Appendix 5).

Given the complexity of environmental matters, IPD would recommend that users seek professional advice on how best to use such information to help improve environmental performance of buildings.

Energy Results

Measures	Total Annual Use (kWh)	EA8 Total Annual CO_2 (tonnes)*	kWh per m²	kg CO2 per m²	kg CO_2 per student
Total Energy Use	**37,683,915**		**306.0**		
Total Renewable Energy Use	**1,611,352**		**13.1**		
Total Carbon Emissions*		**13,923**		**113.1**	**1,639**
IMPORTED ENERGY					
EA1 Electricity	15,159,564	6,154	123.1	50.0	725
EA1a Mains	*15,159,564*	*6,154*	*123.1*	*50.0*	*725*
EA1b Communal	*0*	*0*	*0.0*	*0.0*	*0*
EA1c Owned Off-Site Facility	*0*	*0*	*0.0*	*0.0*	*0*
EA2 Fossil Fuels	5,060,260	1,088	41.1	8.8	128
EA2a Natural gas	*4,285,755*	*883*	*34.8*	*7.2*	*104*
EA2b Oil	*772,411*	*205*	*6.3*	*1.7*	*24*
EA2c LPG	*0*	*0*	*0.0*	*0.0*	*0*
EA2d Solid fossil fuels	*2,094*	*1*	*0.0*	*0.0*	*0*
EA2e Other fossil-derived fuels	*0*	*0*	*0.0*	*0.0*	*0*
EA3 Renewable Fuels	0	0	0.0	0.0	0
EA4 Communal Non-Electrical Energy	16,699,627	6,680	135.6	54.3	786
EA4a Communal Heating	*16,699,627*	*6,680*	*135.6*	*54.3*	*786*
EA4b Communal Cooling		*0*	*0.0*	*0.0*	*0*
ON-SITE RENEWABLE ENERGY (NOT REQUIRING IMPORTS)					
EA5 On-Site Renewable Electricity Generation	764,464	0	6.2	0.0	0
EA6 On-Site Renewable Combustion Fuels	0	0	0.0	0.0	0
EA7 On-Site Renewable Heating and Cooling	0	0	0.0	0.0	0
EA8 Total Annual Carbon Emissions (tonnes)		13,923		113.1	1,639
COMPENSATING AND OFFSETTING CARBON EMISSIONS (FOR ELECTRICITY, EA1 ABOVE)					
EA9 Mains Supplied Zero Carbon Electricity	846,888	0	6.9	0.0	0
EA10 Other Renewable Energy Tariff Use	0	0	0.0	0.0	0

* *The total annual carbon emissions figure for electricity in this example is calculated as follows: EA1 – EA9 x fuel emission factor. See Appendix 5 for further instructions on calculating carbon emissions.*

Water Results

Measures	Total Annual Use (volume m^3)	Annual Change (%)	Total Use (m^3) per student	Total Use (m^3) per m^2
Total Water Consumption	**112,773**	**Up 2%**	**13.30**	**0.92**
Total 'Sourced' Water	**100,765**	**Up 1%**	**11.86**	**0.82**
Total Harvested & Recycled	**12,008**	**Up 13%**	**1.41**	**0.10**
EB1. Mains Water Consumption	100,765	Up 1%	11.86	0.82
EB2. Water Extracted On-site	-	-	-	-
EB3. Use of Harvested Rain and Snow Water	5,476	Up 21%	0.64	0.04
EB4. Use of Recycled Water	6,532	Up 7%	0.77	0.05

Waste Results

Measures	Total Mass (tonnes)	Annual Change (%)	Total Mass (kg) per student	Total Mass (kg) per m^2
Total Waste	**1049.25**	**Up 3%**	**123.52**	**8.52**
Recycled and Composted Waste	**208.00**	**Up 4%**	**24.49**	**1.69**
EC1. Non-Recycled Waste	**841.25**	**Up 2%**	**99.04**	**6.83**
EC1a. General Waste Sent to Landfill	*816.25*	*Up 2%*	*96.09*	*6.63*
EC1b. Incinerated General Waste with Energy Recovery	-	-	-	-
EC1c. Incinerated General Waste with No Energy Recovery	*25*	*Up 14%*	*2.94*	*0.20*
EC2. Recycled Waste	208	Up 4%	24.49	1.69
EC3. Composted Waste	-	-	-	-

Appendix 1

Environmental Regulation: An overview

Environmental regulation is being constantly updated and any attempt to summarise it will be immediately obsolete. However, the following is a very small selection to illustrate the type of international and national treaties, agreements, directives and codes relevant to this complex area.

Global Treaties and Agreements

- ***The Kyoto Protocol (1997)***, an international treaty addressing Greenhouse Gas emissions and global warming, has been signed by 175 countries so far. Notable exceptions include the USA and Australia.
- ***The Montreal Protocol (1989)***, an international treaty addressing the impacts of ozone depleting substances such as CFC gases. 166 countries are now parties to the Protocol.

European Union Directives

- ***EU Emission Trading Scheme (2005)***, a mandatory EU scheme for all EU countries, it aims to encourage large emitters of CO_2 and other greenhouse gases to reduce emissions on a 'cap and trade' basis.
- ***WEEE directive (2003)*** The Waste Electrical and Electronic Equipment Directive aims to minimise the impact of electrical and electronic goods on the environment by increasing re-use and recycling and reducing the amount of WEEE going to landfill. It obliges distributors to allow consumers to return their equipment free of charge.
- ***EU Energy Performance of Buildings Directive (2003)***, a mandatory scheme for all EU countries that aims to promote improved energy performance in buildings.

Europe

- **The United Kingdom** has set an aspirational target to reduce CO_2 emissions by 60% by 2050 (compared to 1990 levels). **France** aims to reduce greenhouse gas emissions by 75% by 2050 and to provide 21% of its electricity from renewable sources by 2010.
- According to **German** building regulations, when more than 20% of a building component is upgraded, this must be in line with new construction requirements. For example, owners of existing buildings must replace windows in line with the regulations on new construction if more than 20% of the window area is to be changed.

Asia

- In **Japan** the Building Standard Law (BSL) was amended in July 2002 and came into force from July 2003. The amended BSL includes so-called 'sick house' regulations, which regulate chemical products emitted from building materials. These regulations limit and prohibit the use of certain chemical emitting products such as most formaldehyde-emitting building materials.

Americas

- In the **United States**, new federal buildings will be required to consume 30% less energy than that allowed under the standard for commercial buildings or the International Energy Conservation Code for residential buildings, and additional measures, such as solar energy and better measurement of energy expenditures, are encouraged.

Australia

- **Australia** has a range of specific environmental regulations. There are also national requirements for environmental reporting by corporations which require company directors to disclose environmental performance. Public companies and large proprietary companies are required to produce a 'Directors' Report' that must show performance in relation to environmental regulation.

Appendix 2

Reducing Environmental Impacts

Armed with knowledge of an estate's environmental performance, managers can then take effective action to make improvements. The table below summarises some potential drivers of environmental performance across the Code.

Category		Performance Drivers
EA	Energy	One of the biggest drivers of energy consumption (and CO_2 emissions) for an organisation is the amount of space that is held. And although much of the activity surrounding reductions in carbon will, quite rightly, be based on the drivers set out below, one the most significant contributions that many organisations can make to reduce CO_2 emissions is to substantially reduce the amount of space that they use, most likely by managing it more effectively.
	Lighting	Energy efficient lighting should radically reduce energy consumption, and reduce costs significantly. For example: • Reductions of up to 25% energy consumption may be achieved through installation of new high frequency ballasts and fluorescent lighting with triphosphor coating • Size of fluorescent bulb impacts on energy consumption - 26mm diameter tubes use 10% less energy than 38mm and are less expensive to purchase • Regular cleaning of rooflights and shades ensures maximum natural light is coming through and reduces need for artificial lighting • Avoid standard light bulbs which give off more heat than light, and use more than 75% more energy than standard fluorescent bulbs • Introduce task lighting where possible. This is where the working area is lit to a higher level with the background areas at a lower level of light, ultimately saving on light use as well as reducing glare • Install more switches and zoning to allow individual control over lights, as opposed to banks of lights. • Label switches to aid control. • Automatic lighting control considered - photoelectrical control and passive infrared sensors to insure lights only switch on when occupants are present or when daylight fails to provide necessary luminance • Exterior lighting need only operate during hours of darkness and even then not necessarily for the entire period. Timer controls could be installed to keep to a minimum • Lighting left on when property not in use is a key driver in wasting energy. Checks need to be made and staff educated

Appendix 2

Category	Performance Drivers
Equipment	Office equipment accounts for up to 20% of a typical energy bill, half of which comes from PCs and monitors. Within an air-conditioned office the energy used to remove the heat generated by office equipment may amount to 50% as much as is required to run the equipment in the first place. • Equipment should switch to low power energy saving modes or autosleep after a set space of time. Equipment often is installed with this function but it needs to be activated. • Electrical equipment is now often rated for its energy efficiency and correct management. Central databases and servers can reduce the energy use of an office or building. • A 75% reduction in energy can be achieved by switching computers off at night and weekends, and by switching off laser printers. 7 day timer switches can be used to do this automatically. • 90% reductions can be achieved if monitors are switched off when not in use and standby options are activated • Photocopiers are responsible for significant heat gains and so locating these outside of air conditioned areas will minimise the workload on the a/c system. • Limit photocopying to batches to allow longer periods where the equipment can remain in sleep modes • Set cold water coolers and vending machines on timers to switch off over evenings and weekends
Heating and Cooling	Most commercial buildings will require heating at some point during the year and in many countries, for the whole year round. It is one of the principal components of energy consumption within offices, so an efficient heating system can provide large reductions in energy use and financial benefit - heating costs rise by 8% for every 1 degree Celsius of overheating. Heating areas which do not require to be heated to the same temperature and poor control systems lead to wasted energy. Reduction of heat loss also saves on energy. Heat usage • Regular servicing of boilers - heating costs can increase by 30% or more if a boiler is poorly maintained. • Ensure heating and air-conditioning units are not operating in the same place or at the same time to avoid two systems working against each other. Similarly, do not open windows and run a/c units simultaneously. • Just as overheating is wasteful, insure overcooling is avoided by adjusting the cooling set point no lower than 3°C below the ambient temperature. • Air conditioning systems can be used all year round to maintain the internal climate of a building. Using efficient cooling units such as 'evaporative cooling' can significantly reduce the overall energy consumption of a building. Evaporative cooling has only 15% of the carbon impact of conventional refrigeration-based air conditioning and the coolers do not use potentially harmful refrigerants • Equipment is increasingly able to withstand warmer temperatures so the need to continually chill communication rooms to set levels of, for example, 18°C could be reviewed. • Installation of decentralised water heaters where small quantities of hot water are required away from main boiler. This would allow main boiler to be switched off during the summer months and save up to 90% of energy used through minimising losses and inefficient generation. • Insulate hot water tanks and pipework to avoid high standing losses

Category		Performance Drivers
		• Direct-fired hot water tanks are more efficient than boiler systems as the water is heated directly, with potential savings as great as 50% • Heat loss from a modern boiler may represent only 1.5% of its output at full load, but will increase to 6% it is operating at only 25% load, so it is important to insure proper insulation • Monitoring of boiler combustion efficiencies and setting efficiency targets for service contractors will insure combustion is as energy efficient as possible. • Heat the building in zones, areas of greater activity require less heating, as do corridors and store rooms Controls • Ensure correct setting of thermostats at 20°C during working hours. At night set-back temperature of 10°C is usually sufficient. • To enable local control, install thermostatic radiator valves and ensure that users are instructed on correct use • Make sure thermostats are out of direct sunlight, draughts and away from heat sources so that they function accurately • Use 7-day timers to control heating so that time setting matches occupancy and requirements, and during regularly unoccupied periods the heating may be switched off • Extractor fans - these extract warm air and waste energy. Fit time switches or occupancy detectors. • Do not set local air conditioning units to their lowest temperature as this wastes energy and does not cool the area more quickly Minimising heat loss • Lower thermostat rather than opening windows to reduce heat loss • Educational material to increase staff awareness • Time controls at hot water points and immersion heaters • Fit draught strips and seal windows and doors that are not used Heat pump systems and the use of CHP (Combined Heat and Power) systems can increase efficiency and reduce energy usage.
EB	Water	• Increasing staff and/or user awareness of water issues and encouraging more careful use.
EB1	Mains Water Consumption	• The presence of water saving devices - sensor taps, push taps, aerating taps and low flow shower heads can reduce the amount of water consumed • Restrict the flow capacity through taps, limiting the flow of water and reducing consumption • Fitting of urinal flush controls limits the flushing from the traditional continually flushing cisterns • Installation of waterless urinals cuts water significantly • Use of low flush WCs
EB3, EB4	Harvested and Recycled Water	• Greywater/rainwater harvesting systems save mains water by collecting used water and rainwater for use in non-drinking functions such as flushing toilets. They do however often require expensive filtration systems and maintenance. • Use of water butts to collect rainwater for watering landscaped areas saves on mains water use

Appendix 2

Category		Performance Drivers
EC	Waste	• Increasing staff and/or user awareness of waste issues.
EC1	Non-Recycled Waste	• Reduction of number of waste bins per person • Consider effective use of stationery. Use scrap paper, re-use envelopes, use both sides of paper • Try to avoid purchasing excessively packaged goods
EC2	Recycled Waste	• Presence of bins for segregation of paper, card, plastics, bottles etc. • Appointment of a waste champion to engage staff and motivate office action • Information relating to what happens to waste fed back to occupants to keep users informed of progress • Ensure local suppliers are able to offer waste recycling facilities • Avoid disposable mugs, plates and cutlery and replace with washable crockery • Central collection of composting food by local authority / supplier • Check with suppliers to see if products can be delivered in larger, fewer cartons
EC5	Sustainable Materials	• Try to maximise the use of recycled materials, both in the building structure and during its day to day use. Creating markets for recycled materials is as important as recycling waste materials.
ED	Transport and Travel	
ED2	Access to Public Transport	• Provide information on local public transport links to staff using notice boards, emails etc. • Arrange interest-free season ticket loans for staff • Develop a Green Travel Plan that provides a more coordinated approach to transport; including public transport, cycling, car sharing, walking etc.

ED3	Cycling Facilities	• Secure bike sheds / stands
		• A variety of measures can be introduced by organisations to encourage staff or customers to use cycles. Some of these include:
		  • Interest-free loans for cycle purchase
		  • Free cycles
		  • Pool cycles
		  • Cycle hire scheme
		  • Bicycle User's Group
		  • Free/discount cycle route maps
		  • Cycle purchase discounts including safety equipment
		  • Cycle training - perhaps via a partnership with a local sports centre to offer cycle proficiency courses to staff
		  • Cycle clinics - held once a month for customers/staff arriving by bike to the building, perhaps operated in partnership with a local cycle shop.

ED4	Shower and Changing Facilities	• Lockers, showers, changing facilities all make staff more inclined to cycle to work
ED5	Food Miles	• Local sourcing of food produce. • Avoiding air freighted produce where local alternatives exist.

Category		Performance Drivers
EE	Equipment and Appliances	
EE1	Refrigerants	• There are a number of alternatives to CFC refrigerants which do not have a high ozone depleting potential, although they are not in as widespread use. These chemicals need to be stored correctly and disposed of in a responsible manner: • Ammonia • Propane • Carbon Dioxide • HFC32
EE2	Refrigerant Leak Detection	• It is worthwhile fitting leak detection to systems with a large refrigerant charge; this highlights leakage of refrigerant so that maintenance may be carried out.
EE4	Light Pollution	• Draw blinds during the evenings • Fit external lights with automatic shut-off systems (except essential security lighting) • Follow guidance from the Institute of Lighting Engineers when specifying external lighting
EF	Health and Well-Being	
EF1	Daylight Access	• Office layout and the arrangement of desks is important • Provide blinds (external, where possible) to avoid glare, but try to avoid a situation where blinds are closed and lights are on during summer, as this increases heating loads and wastes energy on lighting. Low emissivity ('Low E') glass reduces solar gains.
EF2	Ventilation and Air Intake	Energy efficiency and comfort will be improved by the following measures, where possible: • Provide heat recovery via run around coils, thermals wheels etc. on full fresh air AHUs. • Provide effective control of dampers for minimum fresh air and free cooling on recirculation systems. • Close fresh air and exhaust dampers when the building is unoccupied. • Ensure that only the minimum fresh air required is treated by the system • Utilise 'free cooling' if possible Always ensure that the building is adequately ventilated.
EF3	Temperature Controls	• Try to zone heating/cooling controls in small areas, as this provides occupants with more flexibility in how they control their local environment. • Set timers on local temperature controls and lock key settings to ensure that the settings are not overridden by occupants (allow them to switch system on or off at their convenience but not to change timers, temperature settings etc.)
EF5	Legionella Contamination	• Ensure Legionella risk assessments are conducted regularly, and clean/chlorinate equipment as necessary.

Appendix 2

Category		Performance Drivers
EF6	Staff Feedback	• Always seek to involve building occupants in any environmental initiatives. Engaging staff and asking their opinion will generally result in higher take up and participation amongst building occupants, and will ultimately result in more effective environmental initiatives.
EF7	Noise Reduction	• Options to reduce noise in open plan offices include using acoustically absorbent furniture and barriers. Office layout is also important; noise can be reduced by accurate placement of barriers and by increasing the distance between workstations.
EF8	Planting	• Specify planting which requires little/no water, if possible.
EG	Adaptation to Climate Change	
EG1	Flood Risk	• Make sure flood risk assessments are carried out if the building is in an at risk area.
EG2	Extreme Weather	• Ensure adequate business continuity plans are in place.

Appendix 3

The Global Reporting Initiative (GRI) and the Environment Code

How does the Code support GRI Sustainability Reporting?

IPD is keen that the Environment Code should support organisations' corporate reporting and disclosure requirements and the table below shows how the Code aligns to the Global Reporting Initiative's Sustainability Reporting Framework.

The Sustainability Reporting Framework sets out the principles and indicators that organisations can use to measure and report their environmental performance. The so-called 'G3' Guidelines published are followed by many leading international businesses when preparing their reports.

As the table shows, the Code enables property and facilities departments to make a significant contribution to organisation-wide GRI environmental reporting, principally in relation to energy, water and waste matters.

For more information about the GRI Sustainability Reporting Framework see www.globalreporting.org

GRI Performance Indicators		The IPD Environment Code	
Materials			
EN1 EN2	Materials used by weight or volume. (Core) Percentage of materials used that are recycled input materials. (Core)		
Energy			
EN3	Direct energy consumption by primary energy source. (Core)	✔	Energy Measures: EA2, EA6, EA7 Note: EA3 (renewable fuels) is excluded and should be reported separately
EN4	Indirect energy consumption by primary source. (Core)	✔	Energy Measures: EA1, EA4, EA5
EN5	Energy saved due to conservation and efficiency improvements.	✔	By using the Code organisations will be able to clearly show annual energy savings at building and estate level.
EN6	Initiatives to provide energy-efficient or renewable energy based products and services, and reductions in energy requirements as a result of these initiatives.		
EN7	Initiatives to reduce indirect energy consumption and reductions achieved.		
Water			
EN8	Total water withdrawal by source. (Core)	✔	Water measures: EB1, EB2, EB3
EN9	Water sources significantly affected by withdrawal of water.		
EN10	Percentage and total volume of water recycled and reused.	✔	Water Measure: EB4

Appendix 3

GRI Performance Indicators		The IPD Environment Code	
Biodiversity			
EN11	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas. (Core)		
EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas. (Core)		
EN13	Habitats protected or restored.		
EN14	Strategies, current actions, and future plans for managing impacts on biodiversity.		
EN15	Number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk.		
Emissions, Effluents, and Waste			
EN16	Total direct and indirect greenhouse gas emissions by weight. (Core)	✔	Energy Measure: EA8
EN17	Other relevant indirect greenhouse gas emissions by weight. (Core)		
EN18	Initiatives to reduce greenhouse gas emissions and reductions achieved.	✔	The Code is a key tool for setting and monitoring carbon reduction targets in relation to an estate.
EN19	Emissions of ozone-depleting substances by weight. (Core)		
EN20	NO_x, SO_x, and other significant air emissions by type and weight. (Core)		
EN21	Total water discharge by quality and destination. (Core)		
EN22	Total weight of waste by type and disposal method. (Core)	✔	Waste Measures: EC1a, EC1b, EC1c, EC2, EC3
EN23	Total number and volume of significant spills. (Core)		
EN24	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally.		
EN25	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organisation's discharges of water and runoff.		

GRI Performance Indicators		The IPD Environment Code
Products and Services		
EN26	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation. (Core)	
EN27	Percentage of products sold and their packaging materials that are reclaimed by category. (Core)	
Compliance		
EN28	Monetary value of significant fines and total number of non-monetary sanctions for noncompliance with environmental laws and regulations. (Core)	
Transport		
EN29	Significant environmental impacts of transporting products and other goods and materials used for the organisation's operations, and transporting members of the workforce.	
Overall		
EN30	Total environmental protection expenditures and investments by type.	

Appendix 4

Unit Conversion Tables[13]

Energy

Kilowatt-Hours (kWh) and Joules (J)
The watt-hour (Wh) is a unit of energy, commonly used on electricity meters in the form of the kilowatt-hour (kWh), which is 1,000 watt-hours. It is not used in the International System of Units (SI), as the hour is not an SI unit. Rather, the SI unit of energy is the joule (J), equal to one watt-second. The joule is also a commonly used unit for measuring electric energy.

1 kilowatt-hour (kWh)	3,600,000 joules (J)	3.6 mega-joules (MJ)
1 joule (J)	2.77777777778E-7 kilowatt hours (kWh)	
1 Giga joule (Gj	277.8 kilowatt hours (kWh)	
1 BTU (British Thermal Unit)	0.00029 kilowatt hours (kWh)	
1 therm	29.3 kilowatt hours (kWh)	
1 hundred cubic feet of natural gas (CCF)	1.03 therm	

Converting Primary Fuel Units to kWh Equivalent

To our knowledge an accepted global standard for converting key fuel units (for example, a cubic metre of natural gas) to kWh equivalents is not available. The table to the right provides some UK-based conversions.[14]

For an independent and authoritative source of conversion information IPD would recommend that users refer to their national government department with responsibility for energy matters.

Primary Fuel Unit	kWh equivalent
1 tonne of oil equivalent	11,630 kWh
1 litre fuel oil	11.69 kWh
1 cubic foot natural gas	0.313 kWh
1 cubic metre natural gas	11.06 kWh

Waste

Converting Volume Data to Mass Equivalent
Some organisations will collect waste information by volume, rather than mass. To convert volume (m^3) data to mass (tonnes) equivalent, we suggest the following guide and high level 'factors':

Conversions
- Volume (m^3) x Factor (see below) = Mass (tonnes)
- Volume (litres) / 1000 x Factor = Mass (tonnes)
- Volume (cubic feet) x 0.028 x Factor = Mass (tonnes)

Factors*
- Mixed commercial waste = 0.2
- Mixed household waste = 0.3
- Paper/card = 0.6

* it is recognised that more detailed conversion factors exist for a wide range of waste products. This simple approach is intended to provide a standardised, high level mass approximation.

13 The World Resources Institute (www.wri.org)
14 The Carbon Trust (www.carbontrust.co.uk and Digest of UK Energy Statistics 2003

Mass

1 pound (lb)	453.6 grams (g)	0.4536 kilograms (kg)	0.0004536 metric tonnes
1 kilogram (kg)	2.205 pounds (lb)		
1 short ton (US ton)	2,000 pounds (lb)	907.2 kilograms (kg)	
1 metric tonne	2,205 pounds (lb)	1,000 kilograms (kg)	1.1023 short tons (tons)

Volume

1 cubic foot (ft^3)	7.4805 gallons (gal)	0.1781 barrel (bbl)	
1 cubic foot (ft^3)	28.32 litres (L)	0.02832 cubic metres (m^3)	
1 gallon (US liquid - gal)	3.785 liters (L)	0.003785 cubic metres (m^3)	0.0238 barrel (bbl)
1 litre (L)	0.001 cubic meters (m^3)	0.2642 gallons (gal)	
1 cubic metre (m^3)	6.2897 barrels (bbl)	264.2 gallons (gal)	1,000 litres (L)

Area

1 square foot = 0.093 square metres

1 square metre = 10.764 square feet

1 square yard = 0.836 square metres

1 square metre = 1.196 square yards

Other

Kilo	1,000
Mega	1,000,000
Giga	1,000,000,000
Tera	1,000,000,000,000

Appendix 5

Calculating CO_2 Equivalent Emissions

CO_2 Emissions (Tonnes) = Energy Consumption per Fuel Type (kWh) x Fuel Emission Factor x 0.001

While the basic formula for calculating carbon emissions from buildings is relatively straightforward (see above), it is complicated by the need to apply a 'Fuel Emission Factor' to each fuel type used. This factor varies from fuel to fuel as different fuels emit different amounts of CO_2.

Moreover, in the case of mains electricity, the Fuel Emissions Factor will vary from country to country, and over time, as the methods of electricity generation determine the Fuel Emission Factor that should be used. For example, France utilises a high proportion of nuclear fuel (which emits little or no carbon) and currently has a relatively low Fuel Emission Factor for its mains electricity. The US, by contrast, uses a different fuel mix and currently has a higher Fuel Emissions Factor for its mains electricity.

Given this complexity, IPD would recommend that users seek professional advice on which Fuel Emissions Factors they should use when calculating carbon emissions from their buildings.

In addition, key sources of carbon emissions information include the following:

- **The Greenhouse Gas Protocol Initiative.** An international resource for calculating carbon emissions, see www.ghgprotocol.org. Launched in 1998, the Initiative's mission is to develop internationally accepted greenhouse gas accounting and reporting standards for business and to promote their broad adoption. Users will need to register to access the emissions calculation tools.
- **Official Government Statistics.** For each country around the world the government department responsible for environment may have publicly available resources for calculating carbon emissions from buildings. Also, an official Fuel Emission Factor for the country's mains electricity supply.

Example: Fuel emissions factors from the UK Department for Environment, Food and Rural Affairs (DEFRA*)

Electricity	= 0.43
Gas	= 0.206
Oil	= 0.265
Coal	= 0.346

- **Local Suppliers.** Where energy or fuel is sourced locally - for example via a communal heating or cooling scheme or through supply of biomass fuels - users should refer to their local supplier for information on the energy values (in kWh) of the sourced energy (or fuel) and the Fuel Emission Factor for the energy (or fuel).

  In the worked example on page 40, the Fuel Emission Factor used for district heating is 0.4.

** www.defra.gov.uk/environment/business/envrp/pdf/conversion-factors.pdf*

Appendix 6

Environmental 'Health-Check'

Below is a summary of the 'Health-Check' questions set out in Chapter 3 along with detailed supporting information on the environmental issues addressed in these questions.

Energy Measures (continued)

Questions	Description
EA12 Boiler Efficiency	
Has a target for boiler combustion efficiencies been set for servicing operators to meet?	The efficiency of a boiler is often in proportion to its maintenance and age. While new boilers have to meet high minimum performance standards, older boilers can be up to 30% less efficient, if not serviced regularly, emitting more greenhouse and other harmful gases.
EA13 Metering	
To what extent does the building have electricity metering? *To what extent does the building have gas metering?*	Regular meter readings will provide some information about the overall energy consumption, but they reveal little about where energy problems might lie. Installing sub-metering throughout a building to monitor specific uses can help identify which end-use or service (for example, lighting, fans, pumps, etc.) is performing well, or badly - and so where and when energy is being wasted - allowing more targeted action. An essential part of good energy measurement and management, building regulations throughout the EU now increasingly require sub-metering in all new non-domestic buildings. So-called 'smart metering' is also being introduced which has the potential to enable further levels of sophistication in energy monitoring and management.

Water Measures (continued)

Questions	Description
EB5 Water Efficient Fittings	
Does the building have the following water efficient fittings? • *Taps (for example aerating or other low flow features)* • *Toilets (for example dual flush, low cistern capacity)* • *Showers (for example low flow shower heads)*	Toilets, showers, taps etc can have a large impact on the total water usage in a building and many countries have regulations to reduce the water consumption using water effecient fittings. There are significant savings to be made by using efficient fittings such as low flush toilets and push or passive infra red taps which can provide long term water usage reductions for a relatively small 'one off' financial outgoing. Ensuring that procurement policy includes efficiency criteria is a key element in improving a building's environmental performance.
EB6 Leak Detection Systems	
Does the building have an operable leak detection system? *Are regular checks made for dripping taps by building staff (for example FM, security or cleaning staff)?*	Water leaks from distribution systems can go undetected for long periods of time, after which thousands of litres could have already been lost down the drain. Leaking pipes cause environmental and economic losses, and can also pose a risk to public health as potential entry points for contamination. New technology can detect leaks in buildings and allow for the problems to be fixed quickly and efficiently.

Appendix 6

Water Measures (continued)

Questions	Description
EB7 Water Metering *To what extent does the building have water metering?*	Water metering is increasingly becoming compulsory in commercial buildings but this is still not the case in many developed nations. Metering can allow for improved water management and targets. The more sophisticated the metering, the better managers will be able to monitor and improve performance of the building.

Waste Measures (continued)

EC4 Waste Management Planning

Do you have a waste management plan in place for the building? If yes, which of the following are included:

- *Re-use. For example paper, IT equipment*
- *Recycling*
- *Take back schemes. For example for print cartridges, batteries, fluorescent light tubes*
- *Environmentally sourced consumables. For example paper, refillable pens, recycled 'post-it' notes, lever-arch files*
- *Wet and dry waste bins*

Which of the following is true?

- *There are enough well placed bins for segregating white paper*
- *There are bins for segregating at least one of these waste types: plastic, glass, metals*
- *Information on the amounts of each type of waste taken off-site is regularly communicated to occupants*

Is there a drive to reduce the number of waste bins per person?

EC5 Use of Sustainable & Recycled Materials

Is there a policy in place to use recycled or sustainably sourced materials?	Organisations should consider selecting recycled materials, or materials with high recycled content where possible. Claims of recycled content sometimes include materials that are recycled within a manufacturing process, before it leaves the facility. Post-consumer recycled content is considered to be greener because the product has already had a useable life and has been re-incorporated into a new material. Wood or paper fibre products, and rubber products are often available with high proportions of post-consumer recycled materials. Common examples of products that can have a high percentage of recycled content include: cellulose insulation, carpet, paint, ceiling tile, concrete, rubber tiles and mats, steel, aluminium, gypsum board, roofing and siding. Look for independently verified labels such as the Forestry Stewardship Council, the German Blau Engel, EU Eco Label or the Nordic Swan to establish a product's credentials.

ED. Transport and Travel

Transport accounts for 14% of global greenhouse gas emissions, with the majority of these coming from road transport (76%) and aviation (12%)[9]. And with the increasing centralisation of business districts, commuting to the place of work can often have a significant indirect environmental impact - especially via the use of private transport - and increase CO_2 and other greenhouse gases and pollutants such as NO_x (Nitrogen Oxides).

To address these concerns larger buildings and business parks are increasingly adopting 'green travel plans' to encourage employees to use more sustainable forms of transport such as public transport, cycling and walking which can be promoted through, for example, improved access to information, cycle storage facilities, showers and changing rooms.

Performance Drivers

Many national governments have introduced measures to regulate transport (particularly road traffic) in order to reduce its impact on the environment, for example through the use of land-use planning regulations, taxes like fuel duties and congestion charging, restriction of car parking space for employees, and transport emissions trading schemes (especially for aviation).

Transport and Travel Measures

Questions	Description
ED1 Green Travel Planning	

Is there a 'Green Travel Plan' in place at this property to encourage more sustainable forms of transport to work?	A Green Travel Plan can be created for individual developments and could include the following:
	• A site plan and description of the location.
	• Details of access to nearby existing and proposed public transport facilities.
	• Details of existing and proposed cycle and pedestrian facilities in the immediate area, and those linking public transport interchanges and residential estates.
	• Targets for reduction of car use and increased use of sustainable transport modes.
	• Specific actions (for each mode of travel) that will be implemented to achieve its purpose and targets. For each action, a timeframe and the person responsible for implementation should be identified.
	• Details of all financial incentives to encourage use of sustainable modes and sanctions/remedial measures to discourage car use should be specified.
	• The Plan should be monitored on a regular basis and include:
	  • Numbers using public transport/cycling/walking against a baseline data set from the beginning of the Travel Plan's implementation.
	  • Mechanisms to address/manage potential non-compliance or ineffectiveness of travel plan initiatives.

9 *See World Resources Initiative: www.wri.org*

Appendix 6

Transport and Travel Measures (continued)

Questions	Description
ED2 Access to Public Transport	
Is the building located within 1km of a commuter rail or subway station? If not, are building occupants provided with a shuttle link, for example a bus service that supplies transportation between the building and local public transport?	Developments should have good access and circulation that allow for pedestrian movement and the use of public transport. Good access should also be provided for those with mobility or sensory impairments. Access to and from public transport should be as attractive as possible, the connection should be accessible and routes to and from the development to the transport should be well-lit and open. Large developments could implement an integrated public transport system.
ED3 Cycling Facilities	
Does the building have its own cycle parking facilities?	There are a range of measures that could improve cycling and walking conditions to work, or for business. These can have the benefit of reducing the space required for parking, reducing mileage claims and having a healthier workforce (for example, less sick leave). The provision of cycle parking is a minimum requirement. Cycle bays should also be secure, sheltered and preferably in a location which can easily be viewed and is close to building entrances. Routes to the cycle bays should be clearly signed and should involve a minimum of conflict with vehicular traffic (preferably segregated).
ED4 Shower and Changing Facilities	
Are shower and changing facilities available for staff in the building?	These should be provided to complement cycle parking facilities. It is suggested that one shower facility per 50 occupants should be provided, to ensure sufficient facilities are provided for cyclists. These will need to be attractive enough for employees to use, and changing rooms should also include the provision of a sufficient number of lockers to allow for storage of alternative clothing.
ED5 Food Miles	
Are 'food miles' taken into account in procurement of catering and vending facilities?	'Food miles' is a term which refers to the distance food travels from the time of its production until it reaches the consumer or end-user. It is one dimension used in assessing the environmental impact of food. This is an increasingly important issue - especially for businesses examining the efficiency and sustainability of their supply chain - as in 2005 the UK Government found that "the direct environmental, social and economic costs of food transport are over £9 billion each year, and are dominated by congestion." [10]

10 DEFRA, The Validity of Food Miles as an Indicator of Sustainable Development (2005)

EE. Equipment and Appliances

Buildings, and more specifically the range of equipment and appliances used within a building, can have a significant impact on the local environment; and if not constructed and managed properly can represent significant corporate risk.

Performance Drivers

It is now a common legal requirement in many EU states for boilers to be emissions tested annually. Similarly, testing for ozone depleting substances (ODS) in air conditioning systems and Legionella testing for water based systems is often a legal requirement as well as best practice. Inappropriate disposal of waste and water can also lead to potential pollution issues.

Visual and light pollution, noise and interference with television signals are other less obvious forms of pollution which may need to be considered. Air conditioning units, back-up generator testing and early/late hour operations are all potential sources of such pollution.

Equipment and Appliances Measures

Questions	Description
EE1 Use of Refrigerants with Global Warming Potential	
How frequently are checks made for refrigerant leaks within the building? *Does the building make use of alternative 'greener' refrigerants to HCFCs?* *Is there a plan in place to phase out the existing HCFC gases?*	Air conditioning has to use refrigerants and although there are many types, including air and water, it is necessary to use chemicals for reasons of efficiency and ultimately in order to conserve energy. Many current air conditioning units use the HCFC compounds with both high ozone depleting potential and global warming potential; where these substances are used it is important to frequently check for leaks and dispose of the equipment properly at the end of its lifespan.
EE2 Refrigerant Gas Leak Detection	
Has a refrigerant gas leak detection system been installed within the building?	Leak detection has become a high priority for many companies given the increasing price of refrigerant gas and the emergency call-out costs that are incurred to find, detect and repair leaks of the gases. In addition wasted man-hours will also be incurred by the property and facilities team. These problems can be reduced through the installation of refrigerant gas leak detectors which can alert in the early stages of a refrigerant leak.
EE3 NO_x Emissions from Heating Systems	
Do you monitor and record NO_x emissions in relation to the building?	Nitrogen Oxides are produced from most heating systems; these can be reduced through using more efficient boilers and renewable energy for space heating.
EE4 Light Pollution from Buildings	
Is consideration made of light pollution and the possible impact upon local residencies, neighbouring buildings and so on?	Exterior lighting can cause a nuisance to neighbouring buildings or residences. This can be reduced through timer switches and motion sensors on exterior security lights (also helping to optimise energy usage). Organisations can also use low glare lighting and angle any exterior lighting away from neighbouring properties and infrastructure.

Appendix 6

EF. Health and Well-Being

Socially responsible organisations keen to promote the health and well-being of their employees and customers will view a 'healthy' building as an important component of their CSR approach. Good quality light (especially daylight), fresh air, comfortable noise levels and good levels of security will all assist in delivering an effective building and a productive workforce.

Health and Well-Being Measures

Questions	Description
EF1 Daylight Access	Access to daylight is an important factor to health and well-being of building users. It can increase human productivity and reduce fatigue and stress. Ensuring that the maximum amount of daylight penetrates each room can be achieved through the use of translucent barriers and floor to ceiling windows. Buildings can also use artificial light that mimics natural daylight by replacing fluorescent tube lighting with full-spectrum tubes. Full spectrum lighting emits a balanced spectrum of light to help replicate sunlight indoors.
EF2 Ventilation and Air Intake	
Are there openable windows on all floors of the building? How frequently are maintenance checks made to the air intake systems?	Access to fresh air has been proven to be a healthier environment than controlling the indoor climate through heating and cooling systems. The presence of openable windows in buildings is therefore important to the health of the occupants. The ventilation system should bring fresh air to all occupied spaces and remove contaminants that occur in normal use. Any air system must be balanced and assure good mixing. It is also important to ensure that there is outside air entering the system and that louvres are open and unblocked. Building managers should also ensure the air is fresh and not potentially contaminated by nearby industrial discharge, for example a loading dock where trucks idle or some other source of pollution.
EF3 Temperature Controls	
Are local temperature controls available within the building? Are they available on all floors? Do time settings for heating and cooling match occupancy hours?	As different rooms within a building will experience different temperatures - for example, the side of the building which receives more sunlight can potentially be warmer than the side that receives less - it can be important to localise temperature controls. This can be done by individual office thermostats which can be manually adjusted but can also be limited and checked from a central system in order to reduce energy usage. Local controls will assume greater significance as climate change causes increases in temperature extremes.

Health and Well-Being Measures (continued)

Questions	Description
EF4 Lighting Controls and Zoning	
Are light switches and controls labelled to aid manual control? *Are light fittings and diffusers cleaned at least annually?*	There are various types of control available to help maintain correct lighting levels and provide optimum light output while minimising energy consumption. See below for examples:
Are light switches wired in parallel to windows to enable lights close to the window to be switched off, while those in the centre may remain on?	*Switches wired in parallel.* Consider wiring light switches to control lights in zones parallel to windows. Then lights above windows can be switched off, while those in the centre of a room are switched on.
Is lighting controlled by time-setting controls, for example to match occupancy hours?	*Time control.* Timers can be particularly useful in the control of slow response lighting usually found mounted at heights above 5m. This type of lighting takes time to warm up (and cool down) so should not be switched on and off too often while the building is occupied. Time controls can ensure it is not left on when the building is empty.
Are lights fitted with motion sensors to detect occupancy?	*Occupancy control.* These controls are often used in external security lighting. They turn off lights after a set time where no movement is detected and can be particularly useful in conjunction with a manual switch or time control. Also useful in toilet, cloakroom and storage areas, where they can be linked to ventilation fans to ensure lights and fans are switched together.
Is photoelectric switching and dimming in place?	*Photoelectric switching and dimming.* Responding to light levels, they can switch lights on when it is sufficiently dark. A relatively new use is to control the dimming of fast response lighting (for example tungsten or high frequency fluorescent lighting) to ensure a specified level of illumination. This is most often used to control lights next to windows.

EF5 Minimised Legionella Contamination	
Is there on-site water storage at the building? *If yes,* • *Is the volume of cold water stored less than one working day's average consumption?* • *Is the water regularly tested (at least once per annum)?*	Legionnaires' Disease or Legionellosis is the term used for infections caused by Legionella pneumophila and other related bacteria. Legionella bacteria are only dangerous in respirable form and generally only to susceptible individuals where inhalation of the bacteria in aerosols or water droplets may cause severe pneumonia and, in extreme cases, death. To minimise the risk of Legionella it is important to ensure that cold water storage is minimised, and this normally should be no greater than one working day's average water consumption. Ensure that suitable measures, including regular testing, are in place to protect cold water storage tanks and prevent excessive temperature increases in the cold water supply. Storage calorifiers and recirculating hot water systems must store hot water at a minimum temperature of 60°C and deliver hot water of at least 50°C to the outlet

Appendix 6

Health and Well-Being Measures (continued)

Questions	Description
EF6 Mechanism for Staff Feedback	
How frequently are staff feedback exercises carried out relating to general workplace environment satisfaction?	It is important to ensure that staff are satisfied with their working conditions. A good way to facilitate this is to allow them to inform the building manager of their levels of satisfaction. This will permit inefficiencies to be observed and rectified, and help create a better working environment for the organisation's most valuable resource - its people. There are various ways of obtaining staff feedback such as committee meetings, suggestion boxes, annual meetings, feedback questionnaires, annual surveys and incentive schemes.
EF7 Noise Reduction in Open Plan Offices	
How frequently are noise levels monitored?	For office occupiers the trend is increasingly towards open-plan layouts and hot desks where everyone shares and adds to each other's noise. With electronic technology continuing to become more prevalent - such as air conditioning and heating systems, mobile phones, photocopiers, printers, PCs, voice recognition software and others still in their growth phase - typical work-place noise levels can reach as much as 75 decibels. The limit recommended by the World Health Organisation stands at 55 decibels, with any level above this seen as contributing to higher stress levels among employees.
EF8 Interior and Exterior Planting	
Is there a policy in place to encourage the use of interior plants and/or exterior landscaping?	A co-ordinated programme of interior plant displays and exterior landscaping can create a pleasant environment for clients and employees, as well as improving the quality of the air through daytime release of oxygen and satisfying people's psychological need for living office plants.

EG. Adaptation to Climate Change

With the increased possibility of extreme weather conditions as a result of climate change, buildings will need to be prepared for an array of potential risks from flooding and extreme temperatures.

Adaptation Measures

Questions	Description
EG1 Flood Risk	
Has a flood risk assessment been carried out on the building?	Flood mitigation will become increasingly important to building planning, with flood risk assessments taking into account the maximum predicted flood depth, plus a recommended additional 20% for climate change. In addition, building managers need to consider the potential impact of a month's rainfall arriving in three hours and overloading drainage systems that are not designed to cope with these volumes.
EG2 Extreme Weather	
Is there a building continuity plan in place for responding to extreme weather events, for example sustained periods of high temperatures?	Prolonged periods of high temperatures are likely to push building cooling systems beyond their capacity. Building managers and occupiers should consider the ability of staff to carry out their duties in temperatures in the upper thirties degrees centigrade that are sustained for longer periods. Power outages are also more likely during heat waves. In such scenarios building managers will need to review business contingency and continuity plans.

Bibliography

BCO (2005), *Best Practice in the Specification of Offices*

BIFM (2006), *Making it Happen: Creating Value through FM in the Built Environment*

Burberry, P. (1988) *Environment and Services* (Mitchell)

BRE (2006), *BREEAM Pre-assessment Estimator (Management and Operations)*

British Property Federation (2007), *Landlord's Energy Statement - Guidance and Specification*, prepared by Mark Standeven and Bill Bordass of the Usable Building Trust

Business in the Community (2005), *Environment Index 2005 Report: Benchmarking Corporate Environmental Engagement*

Business in the Community (2006), *Looking Back, Moving Forward: building the business case for environmental improvement*

CABE (2007), *Sustainable Design, Climate Change and the Built Environment*

Carbon Trust (2006), *Carbon Footprints in the Supply Chain*

Carbon Trust (2004), *Good Practice Guide 367: Better Business Guide to Energy Saving*

CBI (2000), *Global Social Responsibility: Is the business of business just business?*

CLG (2006), *Code for Sustainable Homes*

Defra (2000), *Guidelines for Company Reporting on Waste*

Defra (2006), *Water Efficiency in New Buildings - consultation document*

Defra (2007), *Guidelines to GHG Conversion Factors for Company Reporting*

Gensler (2006), *Faulty Towers: Is the British Office Sustainable?*

Global Reporting Initiative (2006), *Environmental Indicator Protocols*

The Government's Energy Efficiency Best Practice programme (2000), GPG286: *Energy Performance in the government's civil estate*

King Sturge (2007), *European Property Sustainability Matters*

LEED (2005), *Green Building Rating System for Existing Buildings*

Marmot, A., and J. Eley (2000), *Office Space Planning* (McGraw-Hill)

Ree, H.J. van, and J.J. van Meel (2007), Sustainable briefing for Sustainable Buildings, at: CIB World Building Congress, Cape Town, 14-18 May 2007

United Nations Environment Programme (2007), *Buildings and Climate Change: Status, Challenges and Opportunities*

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