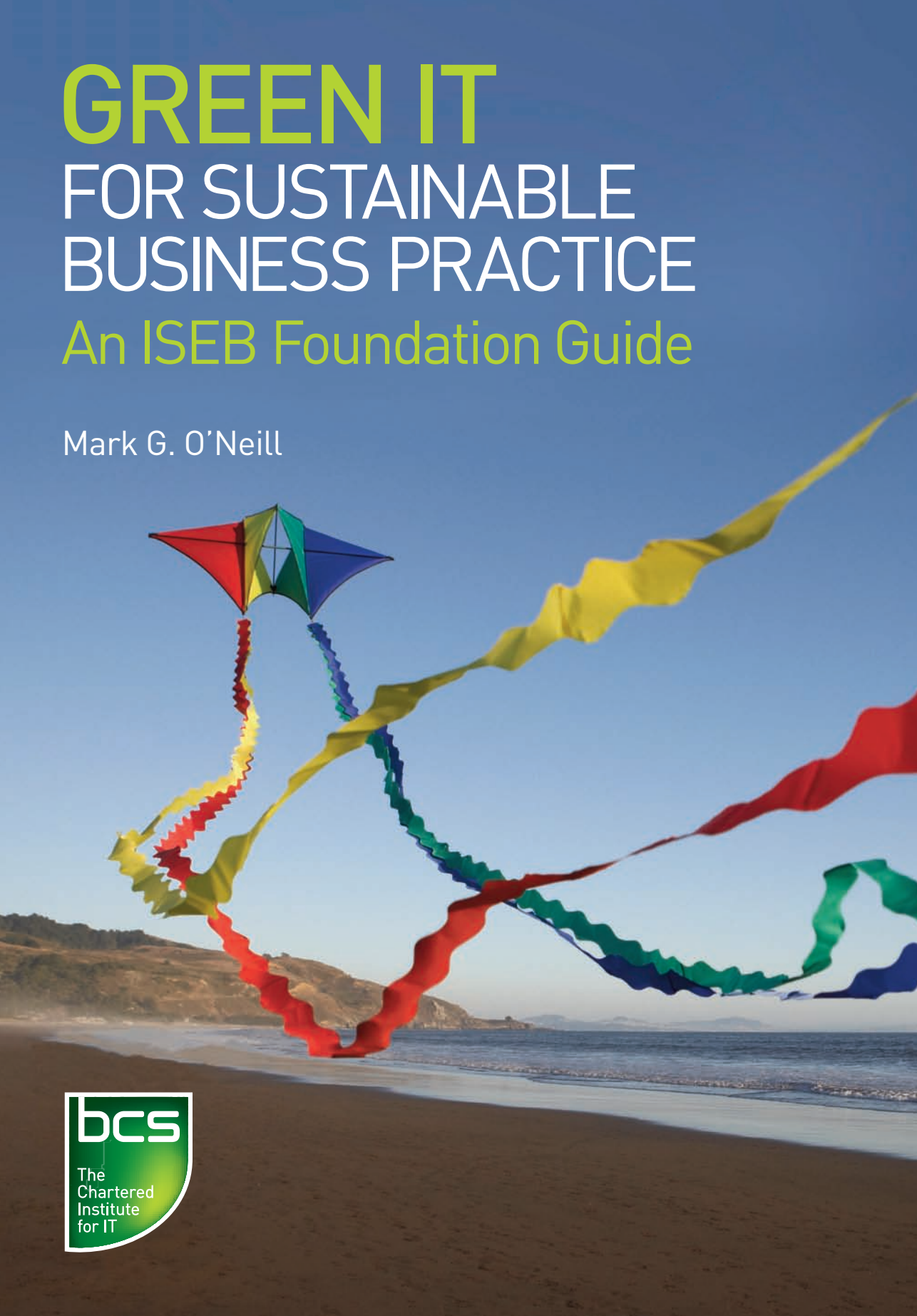
GREEN IT
FOR SUSTAINABLE BUSINESS PRACTICE
An ISEB Foundation Guide

Mark G. O'Neill



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AUTHOR

Mark G. O'Neill is a highly experienced IT Professional with 20 years experience in the IT industry. He has held a number of senior roles and has experience of large-scale IT Service Management and Infrastructure implementation programmes.

Mark's experience in customer relations and the managed services arena enabled him to successfully manage delivery of IT service provision for the Sales and Marketing division of one of Europe's largest organisations. More recently Mark has been appointed the Head of Service Management and Green Learning Consultancy for QA Ltd, and in the recent past has undertaken a number of key consultancy assignments and has extensive training experience with leading organisations in the public and private sector, both in the UK and overseas.

In conjunction with the BCS, Mark has also been responsible for designing the first formally accredited training course for Green IT – the Foundation Certificate in Green IT, and is the holder of the world's first individual accreditation in Green IT.

FOREWORD

Increasing worldwide concern for the environment has brought into sharp focus the emissions and energy inefficiencies of IT systems. As the evidence for man-made climate change mounts, and we are all faced with having to do more with fewer resources, there is an increasing demand for authoritative sources of practical information to help people use their IT more efficiently. Across a range of activities the mantras of 'switch off' and 'sweat the asset' are effective first steps; however, there are greater gains to be had where these can be harnessed as part of a wider programme of efficiency savings and strategic planning which can deliver more significant and sustained savings across the whole of an organisation's IT estate, e.g. through joint IT and Estates adoption of the EU Code of Conduct for energy efficient data centres. And IT itself is also part of the solution, enabling emission and energy savings in other areas of an organisation's operations, e.g. by providing services that support remote working and electronic meetings, savings can be made on travel, paper and accommodation.

In this book, Mark O'Neill provides strategies and practical approaches to resolving the environmental problems that IT poses, thereby enabling savings for the benefit of all concerned. He sets out a path to embedding Green IT in sustainable business practices that will help organisations avoid the charge of 'Green Wash' and achieve real energy, emission and bottom line financial savings of interest to us all as we face up to our current economic and climate change challenges.

Bob Crooks *MBE, CITP*
Defra Lead for Green IT
Chair of the BCS Green IT Specialist Group

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I would also like thank my family and friends for their patience and understanding whilst I was writing this book, and, in particular, my wife Sam and children Shannon and Aidan. Finally I would like to thank all the other contributors who I have not named personally, but without whom this book would never have seen the light of day.

1 INTRODUCTION TO GREEN IT

From both an individual and an organisational perspective the global environmental issues we all face are here to stay for the foreseeable future. Arguably the most commonly known and widely reported environmental concern nowadays is global climate change. The Earth's climate is influenced mainly by the amount of heat being produced by the sun but other factors, including the production of GreenHouse Gases (GHGs) in the Earth's atmosphere, and the properties of the Earth's surface, determine how much of this heat is retained or reflected back to space. The general consensus amongst scientists and climate specialists is that the amounts of man-made GHG produced, such as carbon dioxide (CO_2), have increased significantly since the beginning of the Industrial Revolution, which started in the UK in the mid 1800s. This is mainly due to the burning of fossil fuels, land use change, intensive farming and modern agricultural working practices. Although the scientific evidence linking climate change to severe weather events such as floods, rising sea levels and droughts has recently been challenged,[1] organisations still need to consider the social implications of their working practices as many of the severe weather events tend to affect the poorest of people and nations, many of whom are unable to defend themselves against such events.

For many of us in the Information Communication and Technology (ICT) Industry, the environmental spotlight is shining directly at us, as the consumption of energy derived from traditional fossil fuels becomes an international concern. It is widely cited in Information Technology (IT) circles that the ICT industry is responsible for approximately 2 per cent of worldwide carbon emissions, which is roughly the equivalent to the carbon emissions attributed to the aviation industry. Whilst this figure is open to interpretation and observers would question whether the current situation requires any great attention, what is indisputable is that IT is in a unique position to influence the other 98 per cent.

The demand for technology services from both an individual and an organisational perspective is increasing rapidly. This demand is being generated from an increased reliance on ICT to provide solutions for both our business and personal challenges. This includes, but is not restricted to, the increased use of electronic transactions in financial services such as online banking and electronic trading, the growing use of the internet for social interaction, communication and entertainment, the move to having electronic medical records for health care, the growth in global commerce and services, and the adoption of satellite navigation for both personal and organisational use.

This effectively means that organisations large and small are going to have to make a concerted effort to operate and function very differently from the way they do currently if they are to directly influence the issues highlighted above. Whether or not we decide to believe the science, there will be a time in the not-too-distant future when organisations and, indeed, individuals will have no choice but to adhere to legislation and governance related to reduction of CO_2 and other GHGs.

Green IT for Sustainable Business Practice sets out to provide guidance to IT service providers who want to improve their standing in the eyes of their users and customers. The book is also designed to be used by organisations who wish to understand the way in which IT can be asked to support the organisation's Green agenda. By helping the organisation to realise its environmental aspirations, and by making a recognised contribution to the reduction of the organisation's GHG emissions, IT service providers can use Green IT as a means to ensure that IT is seen as a force of good against evil in a world in which a large number of cases perceives IT as more of a hindrance than an enabler; this can only be a good thing.

Regardless of the environmental issues with which organisations have to contend, there are many other factors driving us to adopt best practice, especially in the ICT industry. Therefore, the commitment needed from the ICT industry to reduce carbon emissions can be achieved using two distinct approaches.

First, there is an opportunity to identify and highlight the areas of ICT that are directly contributing to an organisation's GHG emissions, and to recommend solutions to reduce both the primary and secondary emissions associated with the delivery of ICT into the organisation. Recent studies have shown that, globally, the electricity consumption of Personal Computers (PCs) is growing by 5 per cent year on year. In an average Small-to-Medium-sized Enterprise (SME) electricity consumption accounts for 10 per cent of an IT department's budget, alarmingly rising to over 50 per cent in some extreme cases. Recent studies have also found that the cost of electricity to run a typical computer over its lifetime is now even greater than its purchase price. Perhaps the most worrying consideration is that between 2000 and 2005, the amount of electricity consumed by data centres worldwide doubled – and it was estimated in 2007 by the US Environmental Protection Agency (EPA) that by the end of 2011, in the United States alone, 10 new power stations will need to have been built to cope with this ever-growing demand.

Second, organisations will need to appreciate that investment in IT can actually help to reduce the emissions associated with the organisation as a whole, even if this means that the carbon emissions associated with ICT increase. An example of this is where organisations are investing in intelligent building-monitoring tools that require investment in the ICT infrastructure. The investment in the new infrastructure may lead to the carbon emissions associated with the IT department increasing; however, it will also lead to a decrease in the organisation's overall carbon footprint.

The Carbon Trust describes a carbon footprint as 'the total GHG emissions caused directly and indirectly by a person, organisation, event or product'.[2] The footprint calculation needs to include all six of the Kyoto Protocol recognised GHGs: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) and is measured in tonnes of CO_2 equivalent (tCO_2e). The CO_2 equivalent allows the different GHGs to be compared on a like-for-like basis, relative to one unit of carbon. CO_2e is calculated by multiplying the emissions of each of the six GHGs by its 100-year global-warming potential.

The overall carbon footprint is made up of emissions from all the activities across the organisation. These can include direct emissions that result from activities that the organisation controls and its energy usage, and indirect emissions from products and services that the organisation does not directly control. The investment in ICT in order to reduce the organisation's overall carbon footprint is sometimes referred to as 'silicon trading'.

A key intention of this book is to help organisations and individuals to understand the critically important political, financial, social and legal drivers surrounding Green IT. As with many 'Green' initiatives, the perception is that if the term 'Green' is used, then it is going to cost money and require substantial investment. Fortunately, in the majority of cases, it is actually the complete opposite. Green IT, as with any best-practice programme, is a common-sense approach to delivering cleaner, less expensive ICT infrastructure which will deliver both environmental and financial efficiencies across the organisation and assist the organisation in lowering its overall carbon footprint.

2 THE DEFINITION OF GREEN IT

Within the ICT industry there are many commentators who cannot decide whether Green IT is the correct description for what is a relatively new concept. But whatever the arguments with regard to terminology, there is a set of clear definitions when describing the subject matter.

Green IT is a collection of strategic and tactical initiatives that directly reduces the carbon footprint of an organisation's computing operation. This can manifest itself in many different forms, the vast majority of which are discussed in this book. However, Green IT is not just focused on reducing the environmental impact of the ICT industry. It is also focused on using the services of ICT to help reduce the organisation's overall carbon footprint, regardless of the type, shape or size of the organisation.

There are few individuals or organisations that would argue that IT or telecommunications do not impact on their lives. In fact, it is hard to think of one organisation or set of circumstances where IT does not have any influence. Therefore, the potential for IT to deliver Greener goods, services or individual lifestyles is enormous. Traditionally, in many organisations IT is perceived (rightly or wrongly) as a barrier to progress, when in reality it should be the complete opposite. It is no exaggeration to state that IT and the related telecommunications have revolutionised the way in which businesses operate and individuals lead their lives.

A prime example of this is the way the retail banking industry now operates compared to the pre-internet age. Before the internet was widely available and trusted, the majority of consumers performed their personal banking on the high street. In reality (for those of us old enough to remember), it meant having to make a journey to the nearest branch office, standing in a queue with numerous other bank customers and waiting to be seen by a bank employee before discussing your banking needs. Nowadays, the majority of personal banking is performed over the internet, and the banking industry as a whole has been revolutionised.

However, does this provide a Greener solution? As with any debate, there are arguments to be made on both sides. The Green IT lobby will point to fewer car journeys being made to the branch offices by the bank's customers, and a reduced requirement to heat and light buildings, all of which are perfect examples of a Greener way of working. However, others will point to the fact that to deliver the online banking solution, huge amounts of IT infrastructure are needed,

which leads not only to increased power consumption, but also to increased embodied emissions.

Another example of IT enabling a business to dramatically change the way it operates is the loyalty card schemes now adopted by the majority of supermarkets and high-street stores. The loyalty card scheme has revolutionised the manner in which supermarkets manage their supply chain. By being able to collect, collate and manipulate extensive data on their customers' spending habits, the supermarkets are able accurately to predict demand patterns and order their stock accordingly. This leads to less waste being sent to landfill and therefore fewer associated GHG emissions. Once again this is a business or industry sector using its IT capabilities to deliver more efficient and effective means of operating.

Green IT also encourages and supports Greener behaviour by the organisation's employees, customers and suppliers. By various means, including awareness campaigns and ongoing education, and in some cases legislation, the whole culture of an organisation can be changed.

However, it is also widely accepted that for a cultural change to take place in an organisation, there has to be a visible commitment from the top downwards. For the organisation's executive body to only report and be driven by its financial performance is no longer good enough or acceptable. Therefore, more and more organisations are now making key strategic decisions based on their Triple Bottom Line (TBL).

TBL Accounting attempts to link the social and environmental impact of an organisation's activities, in a measurable way, to its economic performance in order to show improvement, or to make evaluation more in-depth. In practical terms, TBL accounting means expanding the traditional reporting framework to take into account ecological and social performance in addition to financial performance. This is more commonly referred to as people, profit and planet. With the introduction of TBL accounting, organisations will be acutely aware of how their own working practices will have an effect on the associated working practices of their subsidiaries and suppliers. For example, the organisation will not tolerate the use of child labour and would commit to paying fair and equitable salaries to its employees, would maintain a safe work environment and tolerable working hours, and would not otherwise exploit a community or its labour force. If the organisation is not directly responsible for working practices, it may decide to support schemes such as Fairtrade.[3] A TBL business also typically seeks to reinvest a proportion of its wealth by contributing to the strength and growth of its community with health care and education schemes.

Of course, successful cultural change can start from the 'bottom up' by implementing quick and easy initiatives and by driving through a collective focus of sustainability across the whole organisation. For example, simply by encouraging one or two individuals to switch off their PCs before they go home at night, a 'chain reaction' can be set off within the organisation which will lead to other individuals and eventually whole departments doing likewise. Once the hearts and minds of the individuals have been won, organisations will quickly experience a collective change taking place.

There will, however, always be the pessimists who will doubt whether the culture of an organisation can really be changed, never mind in a relatively short space of time. In recent times and in many countries, we have seen examples of a change in culture that very few people would have predicted a few years previously, including a ban on smoking in public places. Of course, legislation was a key driver in implementing this change in the way people lead their lives and perhaps it can be argued that without a change in the law that made smoking in public places an offence, it would never have happened. However, in many countries now, Green-related legislation is already in place and new environmental laws such as the Climate Change Act in the UK will be the driver to cultural change. In April 2010, the UK Carbon Reduction Commitment (CRC), the UK's first mandatory carbon-trading scheme, came into effect, aiming to reduce the current level of carbon by 1.2 million tonnes of CO_2 per year by 2020. The scheme is expected to affect around 5,000 UK organisations, in both the public and the private sector.

Finally, by implementing a Green IT policy, organisations can ensure the sustainability of the resources used by IT. Later in the book, we investigate ways in which we can reduce, reuse and recycle infrastructure. In essence, this will lessen the environmental impact of continually upgrading and replacing the organisation's software and hardware.

USEFUL REFERENCE SITES

Name	Purpose	Link
BCS (British Computer Society) Data Centre Specialist Group	Organisation	www.dcsg.bcs.org
Carbon Reduction Commitment (UK)	Legislation	www.decc.gov.uk
Carbon Trust	Organisation	www.carbontrust.co.uk
Climate Change Act (UK)	Legislation	www.decc.gov.uk
Climate Group	Organisation	www.theclimategroup.org
Department for Environment, Food & Rural Affairs (Defra) (UK)	Organisation	www.defra.gov.uk
Department of Energy & Climate Change (UK)	Organisation	www.decc.gov.uk
EU Code of Conduct for Data Centres	Voluntary Scheme	www.dcsg.bcs.org
Environment Agency (UK)	Organisation	www.environment-agency.gov.uk
Environment Protection Agency (US)	Organisation	www.epa.gov
Energy Star	Organisation	www.energystar.gov
Energy Saving Trust	Organisation	www.energysavingtrust.org.uk
EPEAT	Voluntary Scheme	www.epeat.net
Gartner Group	Organisation	www.gartner.com
Global e-Sustainability Initiative (GeSI)	Organisation	www.gesi.org
Global Action Plan	Organisation	www.globalactionplan.org.uk
Green Grid	Organisation	www.thegreengrid.org

Green IT Magazine	Publication	www.greenitmagazine.com
Greenpeace	Organisation	www.greenpeace.org.uk
ISO 14000–14001	Standard	www.iso.org/iso/iso_14000_essentials
Kyoto Protocol	Legislation and Guidance	www. unfccc.int/kyoto_protocol/items/2830.php
PAS 2050	Voluntary Scheme	www.bsigroup.com/upload/Standards%20&%20Publications/Energy/PAS2050.pdf
QA Ltd	Training	www.qa.com
Restriction of Hazardous Substances (RoHS)	Legislation	www.rohs.gov.uk
WEEE Directive	Legislation	www.environment-agency.gov.uk/business/topics/waste/32084.aspx
SMART 2020	Guidance	www.smart2020.org
Wikipedia	Reference	www.wikipedia.org
World Wide Fund for Nature	Organisation	www.wwf.org.uk

ABBREVIATIONS

AMR	Adaptive Multi-Rate
ANSI	American National Standards Institute
ASA	Advertising Standards Authority
AT&C	Aggregated Technical and Commercial loss
BIA	Business Impact Analysis
BMS	Building Management System
BSI	British Standards Institute
CAB	Change Advisory Board
CCFL	Cold Cathode Fluorescent Lamp
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CH_4	Methane
CI	Configuration Item
CIO	Chief Information Officer
CMS	Configuration Management System
CO_2	Carbon Dioxide
CoC	Code of Conduct
CPU	Central Processing Unit
CRC	Carbon Reduction Commitment
CRT	Cathode Ray Tube
CSF	Critical Success Factor
CSI	Continual Service Improvement
CSIP	Continual Service Improvement Programme
CSO	Chief Sustainability Officer
CSR	Corporate Social Responsibility

CSV	Comma Separated Values
Defra	Department for Environment, Food and Rural Affairs
DG JRC	Directorate General Joint Research Centre
EEAS	Energy Efficiency Accreditation Scheme
EEE	Electrical and Electronic Equipment
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
ERU	Emission Reduction Unit
EU ETS	European Union Emission Trading System
GEC	Green Electronics Council
GeSI	Global e-Sustainability Initiative
GHG	GreenHouse Gas
HFC	Hydro fluorocarbon
HHM	Half Hourly Meter
HR	Human Resources
IaaS	Infrastructure as a Service
ICT	Information Communication and Technology
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
IPCC	Intercontinental Panel on Climate Change
IPCC	Intergovernmental Panel on Climate Change
ISP	Internet Service Provider
IT	Information Technology
ITIL	IT Infrastructure Library
ITSCM	IT Service Continuity Management
ITT	Invitation to Tender
KPI	Key Performance Indicator
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MFD	Multi-Functional Device
NAPM	National Association of Paper Merchants
N_2O	Nitrous Oxide

NIEA	Northern Ireland Environment Agency
OGC	Office of Government Commerce
OPEX	Operational Expenditure
PaaS	Platform as a Service
PAH	Polycyclic Aromatic Hydrocarbon
PDF	Portable Document Format
PFC	PerFluoroCarbon
PIR	Post Implementation Review
POP	Persistent Organic Pollutant
PRINCE2	PRojects IN Controlled Environment
PSU	Power Supply Unit
PUE	Power Utilisation Efficiency
PVC	Polyvinyl Chloride
QA	Quality Assurance
RACI	Responsible, Accountable, Consulted, Informed
RAM	Random Access Memory
RIO	Return on Investment
RoHS	Restriction of Hazardous Substances
ROI	Return On Investment
RTF	Rich Text Format
SaaS	Software as a Service
SACM	Service Asset & Configuration Management
SAN	Storage Area Network
SCD	Supplier and Contract Database
SEPA	Scottish Environment Protection Agency
SF_6	Sulphur Hexafluoride
SIP	Service Improvement Plan
SLA	Service Level Agreement
SLM	Service Level Management
SLR	Service Level Requirements
SOA	Service-Oriented Architecture
SWAC	Sea Water Air Conditioning
TBL	Triple Bottom Line

TCO	Total Cost of Ownership
tCO_2e	Tonnes of Carbon Dioxide Equivalent
UHIE	Urban Heat Island Effect
UNEP	United Nations Environment Programme
UPS	Uninterrupted Power Supply
USB	Universal Serial Bus
VGA	Video Graphics Array
VPN	Virtual Private Network
WEEE	Waste Electrical and Electronic Equipment Directive
WWF	World Wide Fund for Nature

GLOSSARY OF TERMS

Accounting The process responsible for identifying actual costs of delivering IT services, comparing these with budgeted costs and managing variance from the budget.

Advertising Standards Authority (ASA) UK independent watchdog committed to maintaining high standards in advertising.

Agreement A document that describes a formal understanding between two or more parties. An agreement is not legally binding, unless it forms part of a contract.
See **Service Level Agreement**, **Operational Level Agreement**.

Application sizing The activity responsible for understanding the resource requirements needed to support a new application, or a major change to an existing application. application sizing helps to ensure that the IT service can meet its agreed service level targets for capacity and performance.

Architecture The structure of a system or IT service, including the relationships of components to each other and to the environment they are in. Architecture also includes the standards and guidelines which guide the design and evolution of the system.

Assessment Inspection and analysis to check whether a standard or set of guidelines is being followed, that records are accurate or that efficiency and effectiveness targets are being met.
See **Audit**.

Asset Any resource or capability. Assets of a service provider include anything that could contribute to the delivery of a service. Assets can be one of the following types: management, organisation, process, knowledge, people, information, applications, infrastructure and financial capital.

Asset management Asset management is the process responsible for tracking and reporting the value and ownership of financial assets throughout their life cycle.

Audit Formal inspection and verification to check whether a standard or set of guidelines is being followed, that records are accurate or that efficiency and

effectiveness targets are being met. An audit may be carried out by internal or external groups.
See **Assessment**.

Automatic Meter Reading (AMR) Meters measure gas and electricity supply not covered by traditional HHMs.

Availability Ability of a configuration item or IT service to perform its agreed function when required. Availability is usually calculated as a percentage.
See **Availability management**.

Availability management A process responsible for defining, analysing, planning, measuring and improving all aspects of the availability of IT services. Availability management is responsible for ensuring that all IT infrastructure, processes, tools, roles etc. are appropriate for the agreed service level targets for availability.
See **Availability**.

Baseline An established point for ongoing comparison.

Basel action network A non-governmental organisation whose mission is to prevent the globalisation of the toxic chemical crisis.

Best practice Proven activities or processes that have been successfully used by multiple organisations. ITIL is an example of best practice.

Brainstorming A technique that helps a team to generate ideas. Ideas are usually not reviewed during the brainstorming session, but at a later stage.

Budget A list of all the money that an organisation or business unit plans to receive, and plans to pay out, over a specified period of time.

Building management system A computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems and security systems.

Business case A means of presenting information necessary to support a series of business decisions. Those decisions will (over time) increasingly commit an organisation to the achievement of the outcomes or benefits possible as a result of agreed investment in business change.

Business Relationship Management (BRM) A formal approach to understanding, defining and supporting a broad spectrum of inter-business activities related to providing and consuming knowledge and services.

Capacity Management The process responsible for ensuring that the capacity of IT services and the IT infrastructure is able to deliver agreed service level targets in a cost-effective and timely manner. Capacity management considers all

resources required to deliver the IT service, and plans for short-, medium- and long-term business requirements.

Capacity plan A capacity plan is used to manage the resources required to deliver IT services. The plan contains scenarios for different predictions of business demand, and costed options to deliver the agreed service-level targets.

Capacity planning The activity within capacity management responsible for creating a capacity plan.

CApital EXPenditure (CAPEX) The cost of purchasing something that will become a financial Asset, for example, computer equipment and buildings. The value of the asset is depreciated over multiple accounting periods.

Carbon accounting Accounting activities undertaken to measure the amount of carbon dioxide equivalents that will not be released into the atmosphere as a result of flexible mechanisms projects created under the Kyoto Treaty.

Carbon allowances The amount of carbon emissions an organisation is permitted under a cap-and-trade scheme.

Carbon credit Units that can be used to finance carbon reduction schemes between trading partners and around the world. Credits can be exchanged between businesses or bought and sold in international markets at the prevailing market price.

Carbon dioxide (CO_2) A colourless, odourless gas; a compound consisting of the elements carbon and oxygen. CO_2 is a GHG. Atmospheric CO_2 has increased by about 35 per cent since the beginning of the age of industrialisation.

Carbon footprint The total set of GHG emissions caused directly and indirectly by an individual, organisation, event or product.

Carbon neutral Achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount being offset. This concept may be extended to include other GHGs measured in terms of their CO_2 equivalence.

Carbon offset See **Offset** (carbon).

Carbon Quality Assurance Scheme A scheme to advise consumers of government-approved offsets so that consumers can offset with confidence and know they are buying offsets based on accurate emission calculations and internationally approved emissions reductions.

Carbon Reduction Commitment (CRC) A mandatory cap-and-trade scheme in the UK that will apply to large non-energy-intensive organisations in the public and private sectors. It is anticipated that the scheme will have cut carbon emissions by 1.2 million tonnes of carbon per year by 2020.

Carbon trading Sometimes referred to as emissions trading, a market-based tool to limit GHGs. The carbon market trades emissions under cap-and-trade schemes or with credits that pay for or offset GHG reductions.

Carbon Trust A company created by the UK government to help businesses and public organisations to reduce their emissions of CO_2 into the atmosphere, through improved energy efficiency and developing low carbon technology.

Cathode ray tube A vacuum tube containing an electron gun and a fluorescent screen used to create images in the form of light emitted from the fluorescent screen. The image may represent electrical waveforms (oscilloscope), pictures (television, computer monitor), radar targets and others.

Certification Issuing a certificate to confirm compliance to a standard. Certification includes a formal audit by an independent and accredited body. The term 'certification' is also used to mean awarding a certificate to verify that a person has achieved a qualification.

Certified emission reductions (CERs) Represent carbon credits (or climate credits) issued by the Clean Development Mechanism (CDM) executive board for emission reductions achieved by CDM projects.

Chief Information Officer (CIO) Accountable for the planning and implementation of IT systems to support cost-effectiveness, service quality and business development. Responsible for all aspects of the organisation's IT and systems.

Chief Sustainability Officer (CSO) Accountable for the development, coordination and administration of sustainability policies and practices.

Classification The act of assigning a category to something. Classification is used to ensure consistent management and reporting.

Clean development mechanism An arrangement under the Kyoto Protocol allowing industrialised countries with a GHG reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries.

Client A generic term that means a customer, the business or a business customer. For example, client manager may be used as a synonym for account manager.

The term 'client' is also used to mean:

- a computer that is used directly by a user, for example a PC, handheld computer or workstation;
- the part of a client-server application with which the user directly interfaces, for example an email client.

Climate credit See **Carbon credit**.

Climate change Changes in the Earth's temperature that are often linked to rising sea levels as well as extreme weather events such as flooding and drought.

Climate Change Act The UK's legally binding long-term framework to cut carbon emissions, the first of any country in the world.

Cloud computing An internet-based development and use of computer in which dynamically scalable (and often virtualised) resources are provided as a service over the internet. The concept incorporates Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) as well as Web 2.0.

Code of conduct A set of rules or guidance outlining the responsibilities of or proper practices for an individual or organisation. EU examples include the Code of Conduct on Data Centres Energy Efficiency.

Code of practice A guideline published by a public body or a standards organisation, such as ISO or BSI. Many standards consist of a code of practice and a specification. The code of practice describes recommended best practice.

Cold Cathode Fluorescent Lamp (CCFL) Fluorescent lamps comprised of elongated internally phosphor-coated glass tubes filled with one or more gases which, when excited by an electrical signal, form plasma causing the coating to fluoresce and to illuminate the environment.

Compliance Ensuring that a standard or set of guidelines is followed, or that proper, consistent accounting or other practices are being employed.

Component A general term that is used to mean one part of something more complex. For example, a computer system may be a component of an IT service; an application may be a component of a release unit. Components that need to be managed should be configuration items.

Compound annual growth rate The year-over-year growth rate of an investment over a specified period of time.

Conference call A telephone call in which the calling party wishes to have more than one party listen in/contribute to the call.

Configuration A generic term, used to describe a group of configuration items that work together to deliver an IT service, or a recognisable part of an IT service. Configuration is also used to describe the parameter settings for one or more CIs.

Continual Service Improvement (CSI) CSI is responsible for managing improvements to IT service management processes and IT services. The performance of the IT service provider is continually measured and improvements are made to processes, IT services and IT infrastructure in order to increase efficiency, effectiveness and cost effectiveness.

Contract A legally binding agreement between two or more parties.

Copenhagen Summit 2009 The 2009 United Nations Climate Change Conference, commonly known as the Copenhagen Summit, was held at the Bella Centre in Copenhagen, Denmark, between 7 December and 18 December 2009. The conference included the Fifteenth Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change and the Fifth Meeting of the Parties (COP/MOP 5) to the Kyoto Protocol. According to the Bali Road Map, a framework for climate change mitigation beyond 2012 was to be agreed there.

Corporate Social Responsibility (CSR) How businesses align their values and behaviour with the expectations and needs of stakeholders – not just customers and investors, but also employees, suppliers, communities, regulators, special interest groups and society as a whole. CSR describes a company's commitment to be accountable to its stakeholders.

Countermeasure Can be used to refer to any type of control. The term countermeasure is most often used when referring to measures that increase resilience, fault tolerance or reliability of an IT service.

Course corrections Changes made to a plan or activity that has already started, to ensure that it will meet its objectives. Course corrections are made as a result of monitoring progress.

CPU throttling The process when the CPU tries to avoid overheating and getting damaged. If the temperature of the CPU exceeds some specified limits, the system will throttle down the CPU, allowing it to cool down and avoid damage. This process may also take place when the computer is idle. The CPU will take a lower frequency so it consumes less.

CRAMM A methodology and tool for analysing and managing risks. CRAMM was developed by the UK government, but is now privately owned. Further information is available from http://www.cramm.com/

Critical Success Factor (CSF) Something that must happen if a process, project, plan, or IT service is to succeed. KPIs are used to measure the achievement of each CSF. For example, a CSF of 'protect IT services when making changes' could be measured by KPIs such as 'percentage reduction of unsuccessful changes', 'percentage reduction in changes causing incidents' etc.

Culture A set of values that is shared by a group of people, including expectations about how people should behave, ideas, beliefs and practices. See **Vision**.

Customer Someone who buys goods or services. The customer of an IT service provider is the person or group who defines and agrees the service level targets. The term 'customer' is also sometimes informally used to mean users, for example, 'this is a customer-focused organisation'.

Data centre A facility used to house computer systems and associated components, such as telecommunications and storage systems. Data Centres generally include redundant or back-up power supplies, redundant data communications connections, environmental controls (e.g. air conditioning, fire suppression) and security devices.

Demand management Activities that understand and influence customer demand for services and the provision of capacity to meet these demands. At a strategic level demand management can involve analysis of patterns of business activity and user profiles. At a tactical level it can involve use of differential charging to encourage customers to use IT services at less busy times.
See **Capacity management**.

Department for Environment, Food and Rural Affairs (Defra) A UK central government department with responsibilities that include achieving a healthy, natural environment, dealing with environmental risks and promoting a sustainable, low-carbon and resource-efficient economy.

Development The process responsible for creating or modifying an IT service or application. Also used to mean the role or group that carries out development work.

Development environment An environment used to create or modify IT services or applications. Development environments are not typically subjected to the same degree of control as test environments or live environments.
See **Development**.

Direct Cost A cost of providing an IT service which can be allocated in full to a specific customer, cost centre, project etc., for example, cost of providing non-shared servers or software licences.
See **Indirect cost**.

Directorate General Joint Research Centre (DG JRC) The Directorate General Joint Research Centre (DG JRC) of the European Commission (EC) is mandated to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union (EU) policies. The JRC functions in an advisory capacity to policy-making directorates general, such as enterprise, environment and health and consumer protection, while serving also as the hub for intramural research at the EU level.

Document Information in readable form. A document may be paper or electronic, for example, a policy statement, service level agreement, incident record, diagram of computer room layout.

Effectiveness A measure of whether the objectives of a process, service or activity have been achieved. An effective process or activity is one that achieves its agreed objectives.
See **KPI**.

Efficiency A measure of whether the right amount of resources have been used to deliver a process, service or activity. An efficient process achieves its objectives with the minimum amount of time, money, people or other resources.
See **KPI**.

Electronic Product Environmental Assessment Tool (EPEAT) US-based procurement tool to help evaluate, compare and select desktop computers, notebooks and monitors based on their environmental attributes.

Embodied energy The amount of energy required to manufacture and to supply to the point of use, a service or product.

Emission reduction unit Refers to the reduction of GHGs, where it represents one tonne of CO_2 equivalent reduced.

Emissions trading An administrative approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants. An example is European Union Emission Trading System.

Energy audit An inspection, survey and analysis of energy flows in a process or system with the objective of understanding the energy dynamics of the system under study.

Energy Act 2004 An Act to make provision for the decommissioning and cleaning up of installations and sites used for, or contaminated by, nuclear activities; to make provision about radioactive waste; to make provision for the development, regulation and encouragement of the use of renewable energy sources; to make further provision in connection with the regulation of the gas and electricity industries; to make provision for the imposition of charges in connection with the carrying out of the Secretary of State's functions relating to energy matters; to make provision for giving effect to international agreements relating to pipelines and offshore installations; and for connected purposes.

Energy Efficiency Accreditation Scheme (EEAS) A methodology to recognise and reward achievements by organisations in reducing energy consumption. At its close in May 2008 the EEAS had accredited over 230 organisations and had been used as a model for recognising energy efficiency by organisations in the UK and as far afield as Asia and South America. In May 2008 the EEAS closed to new business and in June the Carbon Trust Standard was launched.

Energy star An international voluntary labelling scheme for energy efficiency.

Energy Saving Trust An independent, UK-based organisation focused on promoting action that leads to the reduction of carbon dioxide. The source of free and impartial advice and information for people across the UK looking to save energy, conserve water and reduce waste.

Environment Agency UK government organisation responsible to the Secretary of State for Environment, Food and Rural Affairs and an assembly sponsored public body responsible to the National Assembly for Wales.

The principal aims of the agency are to protect and improve the environment and to promote sustainable development.

Environmental Management System (EMS) Similar to other management systems that manage quality or safety, an EMS assesses an organisation's environmental strengths and weaknesses, helps to identify and manage significant impacts, measures efficiency, ensures that the organisation complies with environmental legislation and provides benchmarks for improvements.

Fair Trade Aimed at securing better prices, decent working conditions, local sustainability and fair terms of trade for farmers and workers in the developing world. By requiring companies to pay sustainable prices (which must never fall lower than the market price), Fair Trade addresses the injustices of conventional trade, which traditionally discriminates against the poorest, weakest producers.

Fault Synonym for error.

Flexible mechanisms A number of mechanisms defined under the Kyoto Protocol designed to lower the overall costs of achieving emissions targets. These mechanisms enable organisations to achieve emission reductions or to remove carbon from the atmosphere cost-effectively in other countries.

Fossil fuels Fuels formed by natural resources such as anaerobic decomposition of buried dead organisms. The age of the organisms and their resulting fossil fuels is typically millions of years, and sometimes exceeds 650 million years. These fuels contain a high percentage of carbon and hydrocarbons.

Gartner Group A leading, global information technology research and advisory company.

Global e-Sustainability Initiative (GeSI) Formed in 2001, GeSI promotes sustainable development in the ICT sector. It fosters global and open cooperation, informs the public of its members' voluntary actions to improve their sustainability performance and promotes technologies that foster sustainable development.

Global Compact A United Nations initiative to encourage businesses worldwide to adopt sustainable and socially responsible policies, and to report on their implementation. The Global Compact is a principle-based framework for businesses, stating 10 principles in the areas of human rights, labour, the environment and anti-corruption.

Global warming The progressive gradual rise of the Earth's surface temperature thought to be caused by the Greenhouse effect and responsible for changes in global climate patterns. An increase in the near surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of GHGs.

Governance Ensuring that policies and strategy are actually implemented, and that required processes are correctly followed. Governance includes defining

roles and responsibilities, measuring and reporting, and taking actions to resolve any issues identified.

GreenHouse Gases (GHGs) Gases in an atmosphere that absorb and emit radiation within the thermal infrared range. Common GHGs include water vapour, CO_2, methane, nitrous oxide, ozone and chlorofluorocarbons.

Greenhouse Gas Protocol A widely used international accounting tool for government and business leaders to understand, quantify and manage GHG emissions.

Green IT The study and practice of using computing resources in an environmentally efficient way.

Green IT Champion The person within an organisation who is responsible for delivering and owning Green IT initiatives and plans that will ultimately reduce the organisation's carbon emissions relating to IT and associated communications technology.

Green IT policy A deliberate plan of action to guide decisions and achieve rational outcomes within the area of Green IT.

Green IT programme The process of managing multiple interdependent projects that lead towards an improvement in an organisation's Green IT performance.

Greenpeace A non-governmental environmental organisation, Greenpeace uses direct action, lobbying and research to achieve its goals. The global organisation does not accept funding from governments, corporations or political parties, relying on 2.86 million individual supporters and foundation grants.

Green roofing Vegetated layers that sit on top of the conventional roof surfaces of a building.

Green wash The practice of falsifying or exaggerating the environmental credentials of an organisation for political or financial gain or to enhance reputation.

Grid computing The application of several computers to a single problem at the same time. Grid computing usually depends on software to divide pieces of a program amongst several computers, sometimes up to many thousands.

Guideline A document describing best practice that recommends what should be done. Compliance to a guideline is not normally enforced.

Half Hourly Meter (HHM) Electronic meters which record power usage in blocks of half an hour or less.

Health and Safety Executive (HSE) The body responsible for the encouragement, regulation and enforcement of workplace health, safety and welfare, and for research into occupational risks in England, Wales and Scotland.

Hydrofluorocarbons (HFCs) Compounds containing only hydrogen, fluorine and carbon atoms. Introduced as alternatives to ozone-depleting substances in serving many industrial, commercial and personal needs, HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful GHGs with global warming.

IEEE 1680 Standard A standard that provides clear and consistent performance criteria for the design of electronic products, thereby providing an opportunity to secure market recognition for efforts to reduce the environmental impact of electronic products.

Industrial Revolution A period from the 18th to the 19th centuries in which major changes in agriculture, manufacturing, mining and transport had a profound effect on the socioeconomic and cultural conditions starting in the UK, then subsequently spreading throughout Europe, North America and eventually the world.

Information Technology (IT) The use of technology for the storage, communication or processing of information. The technology typically includes computers, telecommunications, applications and other software. The information may include business data, voice, images, video etc. IT is often used to support business processes through IT services.

Intelligent buildings Buildings with computer and electrical systems that sense the areas to heat and cool for maximum efficiency and then transfer air with the appropriate temperature from one place to another. Ordinary buildings often have thermostats and timers, which are often limited in that they must be set to heat or cool. Intelligent buildings have computers and sensors throughout and can not only switch from heating to cooling automatically but can also heat and cool different parts of the building simultaneously.

International Standards Organisation (ISO) The ISO is the world's largest developer of standards. ISO is a non-governmental organisation which is a network of the national standards institutes of 156 countries. Further information about ISO is available from http://www.iso.org/

Intercontinental Panel on Climate Change (IPCC) Established jointly by the UN Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC is also regarded as the official advisory body to the world's governments on the state of the science of climate change.

Institute of Electrical and Electronics Engineers (IEEE) An international non-profit, professional organisation for the advancement of technology related to electricity.

Internet Service Provider (ISP) An external service provider that provides access to the internet. Most ISPs also provide other IT services such as web hosting.

ISO 14000 A family of environmental management international standards to help organisations minimise how their operations negatively affect the environment.

IT infrastructure All of the hardware, software, networks, facilities etc. that are required to develop, test, deliver, monitor, control or support IT services. The term 'IT infrastructure' includes all of the IT but not the associated people, processes and documentation.

IT infrastructure library A series of books describing a best practice framework for the provision of quality IT services.

IT Service Continuity Management (ITSCM) The process responsible for managing risks that could seriously impact IT services. ITSCM ensures that the IT service provider can always provide minimum agreed service levels, by reducing the risk to an acceptable level and planning for the recovery of IT services. ITSCM should be designed to support business continuity management.

IT Service Management (ITSM) The implementation and management of quality IT services that meet the needs of the business. IT service management is performed by IT service providers through an appropriate mix of people, processes and IT.
See **Service Management**.

ITIL A set of best practice guidance for IT service management. ITIL is owned by the Office of Government Commerce (OGC) and consists of a series of publications giving guidance on the provision of quality IT services, and on the processes and facilities needed to support them. See http://www.itil.co.uk/ for more information.

Key Performance Indicator (KPI) A metric that is used to help manage a process, IT service or activity. Many metrics may be measured, but only the most important of these are defined as KPIs and used to actively manage and report on the process, IT service or activity. KPIs should be selected to ensure that efficiency, effectiveness and cost effectiveness are all managed.
See **Critical Success Factor**.

Kyoto Protocol An international environmental Treaty produced at the UN Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The Treaty is intended to achieve stabilisation of GHG concentrations in the atmosphere. It establishes legally binding commitments for the reduction of greenhouse and other gases.

Landfill Land waste disposal site in which waste is generally spread in thin layers, compacted and covered with a fresh layer of soil each day.

Legacy system Usually an old computer system or application program that continues to be used, typically because it still functions for the users' needs, even though newer technology is available.

Life-cycle assessment The investigation and valuation of the environmental impacts of a given product or service caused or necessitated by its existence.

Life cycle The various stages in the life of an IT service, configuration item, incident, problem, change etc. The life cycle defines the categories for status and the status transitions that are permitted, for example:

- the life cycle of an application includes requirements, design, build, deploy, operate, optimise;
- the life cycle of a server may include: ordered, received, in test, live, disposed etc.

Liquid crystal display An electronically modulated optical device shaped into a thin, flat panel made up of any number of colour or monochrome pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector. It is often utilised in battery-powered electronic devices because it uses very small amounts of electric power.

Live Refers to an IT service or configuration item that is being used to deliver service to a customer.

Live environment A controlled environment containing live configuration items used to deliver IT services to customers.

Managed services A perspective on IT services which emphasises the fact that they are managed. The term 'managed services' is also used as a synonym for out-sourced IT services.

Market space All opportunities that an IT service provider could exploit to meet the business needs of customers. The market space identifies the possible IT services that an IT service provider may wish to consider delivering.

Methane A relatively potent GHG consisting of carbon and hydrogen. Interestingly, cattle account for 16 per cent of the world's annual methane emissions into the atmosphere

Metric Something that is measured and reported to help manage a process, IT service or activity.
See **KPI**.

Mission statement A short statement that defines what an organisation is, why it exists and its reason for being.

Modelling A technique that is used to predict the future behaviour of a system, process, IT service, configuration item etc. Modelling is commonly used in financial management, capacity management and availability management.

National Association of Paper Merchants (NAPM) Accredited trade association for paper and board merchants and wholesalers.

Next Generation Networks (NGN) Term used to describe some key architectural evolutions in telecommunication and access networks that will be deployed over the next 5–10 years. The general idea behind NGN is that one network transports all information and services (voice, data and all different media such as video) by encapsulating these into packets. NGNs are commonly built around the Internet Protocol, and therefore the term 'all-IP' is also sometimes used to describe the transformation towards NGN.

Nitrous oxide (N_2O) A GHG. Sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production and biomass burning.

Northern Ireland Environment Agency (NIEA) Responsible for implementing environmental policy and strategy in Northern Ireland and promoting key themes of sustainable development, biodiversity and climate change.

Offset (carbon) A financial instrument representing a reduction in GHG emissions.

Open Source Software Computer software that is available in source code form for which the source code and certain other rights normally reserved for copyright holders are provided under a software licence that permits users to study, change and improve the software.

Organisation A company, legal entity or other institution. Examples of organisations that are not companies include the International Standards Organisation or the ITSMF. The term 'organisation' is sometimes used to refer to any entity which has people, resources and budgets, for example, a project or business unit.

Passive Infra-Red (PIR) occupancy sensing Technology that uses sensors to turn lights on and off based on occupancy.

Percentage utilisation The amount of time that a component is busy over a given period of time. For example, if a CPU is busy for 1,800 s in a one-hour period, its utilisation is 50 per cent

Perfluorocarbons (PFCs) A group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly CF_4 and C_2F_6) were introduced as alternatives, along with hydrofluorocarbons, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are powerful GHGs.

Persistent Organic Pollutants (POPs) Chemical substances that persist in the environment, bio-accumulate through the food chain and pose a risk of causing adverse effects to human health and the environment.

Policy Formally documented management expectations and intentions. Policies are used to direct decisions, and to ensure consistent and appropriate development and implementation of processes, standards, roles, activities, IT infrastructure etc.

Polycyclic Aromatic Hydrocarbons (PAHs) A diverse class of organic compounds. There are several hundred PAHs, which usually occur as complex mixtures rather than as individual compounds. The most well-known PAH is benzo[a]pyrene (BaP). PAHs are flammable, colourless solids or crystals at room temperature with no perceptible odour.

Post Implementation Review (PIR) A review that takes place after a change or a project has been implemented. A PIR determines if the change or project was successful, and identifies opportunities for improvement.

Practice A way of working or a way in which work must be done. Practices can include activities, processes, functions, standards and guidelines.
See **Best practice**.

Procedure A document containing steps that specify how to achieve an activity. Procedures are defined as part of processes.
See **Work instruction**.

Production environment Synonym for live environment.

Programme A number of projects and activities that are planned and managed together to achieve an overall set of related objectives and other outcomes.

Project A temporary organisation, with people and other assets required to achieve an objective or other outcome. Each project has a life cycle that typically includes initiation, planning, execution, closure etc. Projects are usually managed using a formal methodology such as PRINCE2.

Quality The ability of a product, service or process to provide the intended value. For example, a hardware component can be considered to be of high quality if it performs as expected and delivers the required reliability. Process quality also requires an ability to monitor effectiveness and efficiency, and to improve them if necessary.
See **Quality Management System**.

Quality Assurance (QA) The process responsible for ensuring that the quality of a product, service or process will provide its intended value.

Quick win An improvement activity which is expected to provide a return on investment in a short period of time with relatively small cost and effort.

RACI matrix An acronym for Responsible, Accountable, Consulted and Informed. A RACI matrix helps to identify all the activities or decision-making authorities undertaken in an organisation and sets them against individuals

or roles. At each intersection of activity and role, it is possible to assign somebody responsible, accountable, consulted or informed for that activity or decision.

Renewable energy Energy which comes from natural resources such as sunlight, wind, rain, tides and geothermal heat that is naturally replenished.

Retire Permanent removal of an IT service, or other configuration item, from the live environment. Retired is a stage in the life cycle of many configuration items.

Return On Investment (ROI) A measurement of the expected benefit of an investment. In the simplest sense it is the net profit of an investment divided by the net worth of the assets invested.

Rights Entitlements, or permissions, granted to a user or role, for example the right to modify particular data, or to authorise a change.

Rio Declaration on Environment and Development Generally shortened to the 'Rio Declaration'. A document produced at the 1992 UN Conference on Environment and Development normally referred to as the Earth Summit. The Rio Declaration consisted of 27 principles intended to guide future sustainable development worldwide, reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, and seeking to build upon it.

Risk A possible event that could cause harm or loss, or affect the ability to achieve objectives. A risk is measured by the probability of a threat, the vulnerability of the asset to that threat and the impact it would have if it occurred.

Risk assessment The initial steps of risk management. Analysing the value of assets to the business, identifying threats to those assets and evaluating how vulnerable each asset is to those threats. Risk assessment can be quantitative (based on numerical data) or qualitative.

Risk management The process responsible for identifying, assessing and controlling risks.
See **Risk assessment**.

Running costs Synonym for operational costs.

Sarbanes Oxley Act (SOX) US law that came into force in July 2002 and introduced major changes to the regulation of corporate governance and financial practice. It is named after Senator Paul Sarbanes and Representative Michael Oxley, who were its main architects, and it set a number of non-negotiable deadlines for compliance.

Scottish Environment Protection Agency Responsible for implementing environmental policy and strategy in Scotland and promoting key themes of sustainable development, biodiversity and climate change.

Sea Water Air Conditioning (SWAC) A method for cooling data centres and other buildings by drawing sea water from a depth of approximately 1,600 feet (500 m) to a cooling station onshore, where heat exchangers enable it to circulate fresh water in a closed loop to buildings. After passing through the heat exchangers, the warmed sea water will be returned to the ocean at a shallower depth, using a diffuser that ensures proper mixing and dilution.

Server A computer that is connected to a network and provides software functions that are used by other computers.

Service A means of delivering value to customers by facilitating outcomes that customers want to achieve without the ownership of specific costs and risks.

Service Improvement Plan (SIP) A formal plan to implement improvements to a process or IT service.

Service Level Agreements (SLAs) Written agreement between an IT service provider and customer defining key service level targets and the responsibilities of each party.

Service Level Management (SLM) The process responsible for negotiating service level agreements, and ensuring that these are met. SLM is responsible for ensuring that all IT service management processes, operational level agreements and underpinning contracts are appropriate for the agreed service level targets. SLM monitors and reports on service levels, and holds regular customer reviews.

Service management Service management is a set of specialised organisational capabilities for providing value to customers in the form of services.

Service management life cycle An approach to IT service management that emphasises the importance of coordination and control across the various functions, processes and systems necessary to manage the full life cycle of IT services. The service management life-cycle approach considers the strategy, design, transition, operation and continuous improvement of IT services.

Service Oriented Architecture (SOA) A flexible set of design principles used during the phases of systems development and integration. A deployed SOA-based architecture will provide a loosely integrated suite of services that can be used within multiple business domains.

Silicon trading A term used to describe the practice of growing the carbon footprint of ICT to reduce the overall carbon footprint of the organisation.

Small-to-Medium Enterprise (SME) A term used to describe organisations with between approximately 50 and 249 employees. Despite governments and many of the multinational organisations targeting this group for special financial business support, there is no single definition for a SME.

SMART 2020 A study commissioned by The Climate Group that stated that ICT could drive efficiency across the economy and deliver emission savings of

15% – 7.8 $GtCO_2e$ – of global BAU emissions by 2020. SMART is an acronym for Standards, Monitoring, Rethink, Transform.

Specification A formal definition of requirements. A specification may be used to define technical or operational requirements, and may be internal or external. Many public standards consist of a code of practice and a specification. The specification defines the standard against which an organisation can be audited.

Stakeholder All people who have an interest in an organisation, project, IT service etc. Stakeholders may be interested in the activities, targets, resources or deliverables. Stakeholders may include customers, partners, employees, shareholders, owners etc.

Storage Area Network (SAN) Technology that allows multiple servers to connect to a centralised pool of disk storage.

Storage management The process responsible for managing the storage and maintenance of data throughout its life cycle.

Strategic The highest of three levels of planning and delivery (strategic, tactical, operational). Strategic activities include objective setting and long-term planning to achieve the overall vision.

Strategy A strategic plan designed to achieve defined objectives.

Sulphur hexafluoride A compound composed of one sulphur and two oxygen molecules. Sulphur dioxide emitted into the atmosphere through natural and anthropogenic processes is changed in a complex series of chemical reactions in the atmosphere to sulphate aerosols.

Supplier A third party responsible for supplying goods or services that are required to deliver IT services. Examples of suppliers include commodity hardware and software vendors, network and telecom providers and outsourcing organisations.
See **Supply chain**.

Supplier and Contract Database (SCD) A database or structured document used to manage supplier contracts throughout their life cycle. The SCD contains key attributes of all contracts with suppliers, and should be part of the service knowledge management system.

Supplier management The process responsible for ensuring that all contracts with suppliers support the needs of the business, and that all suppliers meet their contractual commitments.

Supply chain The activities in a value chain carried out by suppliers. A supply chain typically involves multiple suppliers, each adding value to the product or service.

Sustainability The ability to maintain a certain process or state.

Sustainable urban drainage system A sequence of water management practices and facilities designed to drain surface water in a manner that will provide a more sustainable approach than what has been the conventional practice of routing run-off through a pipe to a watercourse.

TBL accounting A term used to refer to an organisation reporting on the financial, environmental and social returns or impacts of its investments. Such reports provide a picture of the long-term stability of an enterprise in terms of its economic vitality, social relationships with stakeholders, and environmental compliance and integrity. TBL accounting can assist businesses and their stakeholders to evaluate impact on different dimensions of sustainable development.

Teleconferencing Teleconference is the live exchange of information between people remote from one another but linked by a telecommunications system.

Thick client A client computer which does as much processing as possible and passes only data for communications and storage to the server.

Thin client A client computer which depends primarily on the central server for processing activities, and which mainly focuses on conveying input and output between the user and the remote server.

Throughput A measure of the number of transactions, or other operations, performed in a fixed time, for example, 5,000 emails sent per hour, or 200 disk I/Os per second.

Total Cost of Ownership (TCO) A methodology used to help make investment decisions. TCO assesses the full life-cycle cost of owning a configuration item, not just the initial cost or purchase price.

Transaction A discrete function performed by an IT service, for example transferring money from one bank account to another. A single transaction may involve numerous additions, deletions and modifications of data. Either all of these complete successfully or none of them is carried out.

Transition A change in state, corresponding to a movement of an IT service or other configuration item from one life-cycle status to the next.

Trojan infections Malicious programs that can cause damage to your computer. The name derives from the horse of the same name, as it appears as something different from what it actually is.

Trend analysis Analysis of data to identify time-related patterns.

United Nations An international organisation whose stated aims include facilitating cooperation in international law, international security, economic development and social progress.

United Nations Environment Programme The UN system's designated entity for addressing environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action.

Urban Heat Island Effect (UHIE) The effect of a built-up area which is significantly warmer than its surroundings.

US Environmental Protection Agency (EPA) An agency of the government of the United States charged to protect human health and the environment, by writing and enforcing regulations based on laws passed by US Congress. The EPA was proposed by President Richard Nixon and began operation on 2 December 1970, when its establishment was passed by Congress, and signed into law by President Nixon, and has since been chiefly responsible for the environmental policy of the United States.

Videoconferencing A set of interactive telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously.

Virtualisation The abstraction of computer resources. In case of server consolidation, many small physical servers are replaced by one larger physical server, to increase the utilisation of costly hardware resources such as the CPU.

Vision A description of what the organisation intends to become in the future. A vision is created by senior management and is used to help influence culture and strategic planning.

Voiceconferencing See **Teleconferencing**.

Voluntary Emission Reduction (VER) An emission reduction that has been achieved outside of compulsion. VERs are carbon credits developed by carbon offset providers which are not certified.

Waste Electrical and Electronic Equipment Directive An EU directive that imposes the responsibility for the disposal of waste electrical and electronic equipment on the manufacturers of such equipment.

Web 2.0 A term describing a second generation of web development and design including the development and evolution of web-based communities, hosted services and applications, such as social-networking sites, video-sharing sites, wikis and blogs.

Windows Active Directory Developed by Microsoft, Windows Active Directory allows administrators to assign policies, deploy software and apply critical updates to an organisation. Active Directory stores information and settings in a central database and can operate on a small installation with a few computers, users and printers to tens of thousands of users, many different domains and large server farms spanning many geographical locations.

Windows Task Scheduler Developed by Microsoft, Task Scheduler is a component of Microsoft Windows that provides the ability to schedule the launch of programs or scripts at predefined times or after specified time intervals.

Wireless connectivity The transfer of information over a distance without the use of electrical conductors or wires. The distances involved may be short (a few metres as in television remote control) or long (thousands or millions of kilometers for radio communications). When the context is clear, the term is often shortened to 'wireless'. Wireless communication is generally considered to be a branch of telecommunications.

World Wide Fund for Nature Launched on 23 November 1961, a globally recognised charitable organisation, dedicated to addressing issues relating to species and habitat survival and other environmental issues.

World Wide Web (WWW) Commonly known as the Web, it is a system of interlinked hypertext documents contained on the internet.

NOTES

1. In January 2010 the UN climate science panel was accused of wrongly linking global warming to an increase in the number and severity of natural disasters such as hurricanes and floods. In a report by *The Sunday Times* on 24 January 2010, the Intergovernmental Panel on Climate Change (IPCC) was accused of basing its claims on an unpublished report that had not been subjected to routine scientific scrutiny, and ignored warnings from scientific advisers that the evidence supporting the link was too weak. In reply, the IPCC released a press statement accusing *The Sunday Times* of running a misleading and baseless story attacking the way in which the Fourth Assessment Report of the IPCC handled an important question concerning recent trends in economic losses from climate-related disasters. It said that *The Sunday Times* article got the story wrong on two key points. The first was that the Report incorrectly assumed that a brief section on trends in economic losses from climate-related disasters was all that the IPCC Fourth Assessment Report (2007) had to say about changes in extremes and disasters, when, in fact, the Fourth Assessment Report reaches many important conclusions, at many locations in the report, about the role of climate change in extreme events. Second, the IPCC felt the problem with the article in *The Sunday Times* was its 'baseless attack on the section of the report on trends in economic losses from disasters'. The IPCC felt that this particular section of the Report was a balanced treatment of a complicated and important issue, and that it clearly made the point that one study detected an increase in economic losses, corrected for values at risk, but that other studies had not detected such a trend.

2. The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low-carbon economy. It provides specialist support to help businesses and the public sector cut carbon emissions, save energy and commercialise low-carbon technologies. To learn more about the Carbon Trust, visit their website at http://www.carbontrust.co.uk

3. Fairtrade is a scheme that focuses on responsible commercial working practices, from producers and farmers all the way through to the consumer. By requiring organisations to pay sustainable prices (which must never fall lower than the market price), Fairtrade addresses the injustices of some conventional trading practices, which traditionally discriminate against the poorest and weakest producers. It enables them to improve their position and have more control over their lives.

4. The Carbon Trust has a series of posters on its website that are free to download to anyone who wishes to register with them.

5. In 2009, 10 mobile phone companies including Apple, LG, Motorola, Nokia and Sony Ericsson agreed to manufacture phones designed to use a universal charger based on a micro-USB connector. Discussions between the phone companies and EU commission officials produced a 'Memorandum of Understanding' indicating that the first generation of 'inter-chargeable' mobile phones will reach the EU market from 2010 onwards.

6. http://www.timesonline.co.uk/tol/news/environment/article6973577.ece

7. Adapted from an article posted on the WWF-UK website www.wwf.org.uk/news

8. http://www.theclimategroup.org/our-news/news/2008/6/19/smart-2020-enabling-the-low-carbon-economy-in-the-information-age/

9. http://www.unglobalcompact.org

10. Information reproduced and adapted with the permission of Gary Mills of Fusion Group.

11. Source: EU2 Analysis and Market Survey for European Building Technologies in Central and Eastern European Countries – GOPA.

12. The ISO 14000 family addresses various aspects of environmental management. The very first two standards, ISO 14001:2004 and ISO 14004:2004, deal with Environmental Management Systems (EMSs). ISO 14001:2004 provides the requirements for an EMS and ISO 14004:2004 gives general EMS guidelines. The other standards and guidelines in the family address specific environmental aspects, including: labelling, performance evaluation, life-cycle analysis, communication and auditing.

13. http://business.timesonline.co.uk/tol/business/related_reports/best_green_companies/

14. Lewis Carroll, famous English author, mathematician, logician, Anglican deacon and photographer.

15. You can read the Act in full on the Office of Public Sector Information (OPSI): UK Statute Law Database – The Climate Change Act 2008 web page.

16. AMR meters have been developed for gas and electricity so that consumers can access data on supplies. These meters provide consumers with access to their energy supply data. There is a wide range of AMR equipment available; however, CRC will only capture AMR meters which can be read remotely.

17. The Carbon Trust Standard certifies that an organisation has genuinely reduced its carbon footprint and is committed to making further reductions

year-on-year. Assessment against the Standard is undertaken by independent third-party assessors, based on the evidence provided by the participating organisation.

18. Information adapted from the carbon reduction commitment user guide issued by the Department of Energy and Climate Change.

19. Adapted from an article written for www.climatechangecorp.com by Dr Michael Gell of Zanfeon Ltd. For regular updates to the CRC, please refer to the UK Department of Energy and Climate Change.

20. Diagram reproduced with the permission of the Sustain IT UK Centre for Economic and Environmental Development.

21. Gartner Group.

22. Environment Agency – Department for Business Enterprise and Regulatory Reform – WEEE Business User Fact Sheet.

23. Duty of Care – Section 34 of the EPA90 Act imposes a duty of care on those concerned with the controlled waste. This applies to those who produce, import, carry, treat or dispose of controlled waste. The legal definition of waste is 'any substance or object which the producer or the person in possession of it discards or intends or is required to discard'. Waste is therefore anything you own, or your business produces, that you want to get rid of. It can be household, commercial or industrial waste. Certain wastes are not included within the definition; these are agricultural wastes, wastes from mines and quarries and certain radioactive wastes.
Special Waste Regulations – These regulations cover the disposal, carrying or receiving of special wastes. Guidance is available on what constitutes a special waste but in general it covers hazardous and toxic wastes, for example acids, industrial solvents, pharmaceutical compounds, waste oils and wood preservatives.

24. Exporting Harm: The High-Tech Trashing of Asia (pdf). Basel Action Network. http://www.ban.org/E-waste/technotrashfinalcomp.pdf

25. For the full 2007 EPEAT Environmental Benefits Report, see http://www.epeat.net/Docs/EnvironmentalBenefits2007.pdf

26. The GEC is a program of the International Sustainable Development Foundation which is a not-for-profit organisation located in Portland, Oregon, USA. The GEC was established in 2006 with a mission to inspire and support the effective design, manufacture, use and recovery of electronic products to contribute to a healthy, fair and prosperous world. Through its partnerships with the electronics industry and environmental organisations, government agencies, manufacturers and other interested stakeholders, the GEC implements market-driven systems to recognise and reward environmentally preferable electronic products and builds the capacity of individuals and organisations to design and manage the life cycle of

electronic products to improve their environmental and social performance. For more information, visit www.greenelectronicscouncil.org

27. http://www.computerweekly.com/Articles/2008/09/30/232493/councils-network-exposed-after-server-sold-on-ebay.htm

28. http://www.greenroofs.com/projects/pview.php?id=21

29. Information provided by Recycled Paper Supplies http://rps.gn.apc.org/index.htm

30. Source: publishing house Piper Jaffray & Co; US investment bank.

31. The Energy Saving Trust is an independent, UK-based organisation focused on promoting action that leads to the reduction of CO_2 emissions. They are a source of free advice and information for people across the UK looking to save energy, conserve water and reduce waste. For more information, visit their website at http://www.energysavingtrust.org.uk

32. Tests performed and published by CNet.com, http://reviews.cnet.com/green-tech/monitor-power-efficiency/?tag=greenGuideBodyColumn.1

33. Computer Aid International is a UK-registered charity that aims to reduce poverty through practical ICT solutions. Computer Aid provides high-quality, professionally refurbished computers for reuse in education, health and not-for-profit organisations in developing countries. Computer Aid has provided over 150,000 PCs to more than 100 countries across Africa and South America, making them the world's largest ICT for Development provider. To learn more about Computer Aid, visit their website at http://www.computeraid.org

34. Electricity Consumption and Efficiency Trends in European Union – Status Report 2009 European Commission Joint Research Centre Institute for Energy.

35. Corin Ltd are a part of the Corin Group who develop, produce and manufacture reconstructive orthopaedic devices.

36. Spotify is a registered trademark of Spotify Ltd.

37. The Data Protection Act 1998 requires anyone who handles personal information to comply with a number of important principles. It also gives individuals rights over their personal information.

38. The Office of Government and Commerce (OGC) is an independent office of Her Majesty's Treasury, a department of state in UK government.

39. Service Portfolio describes a service provider's services across its conceptual or pipeline services, its operations services within the service catalogue and retired services.

40. An SLR is a customer requirement for an aspect of a service. It is based on business objectives and is used to negotiate service level targets as part of an SLA.

41. A full explanation of business risk and risk management is provided as part of the conclusion to this book.

42. A CI is any component of a service which we wish to record, maintain attribute information, manage and control through Change Management.

43. A CMS is a supporting system holding information on assets and CIs which are in the scope of SACM.

44. Organisational Change Management is addressed in Chapter 12.

45. The CAB is a group of advisers or parties interested in a change. It may have fixed or floating membership.

46. A function is a role or group of people with responsibility for specific outcomes, needing specific resources and capabilities for the purpose.

47. This is a centralised location for the monitoring of services ensuring timely response to events.

48. PUE is the ratio of power delivered to IT equipment to the total amount of power used by the data centre facility to support it, i.e. in cooling or power distribution.

49. W. Edwards Deming was a well-known management theorist. His theories were designed to lead to higher quality and productivity as well as enhanced competitive position.

50. UNEP is the United Nations system's designated entity for addressing environmental issues at a global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action.

51. To find out more about the Global Action Plan, see their website: http://www.globalactionplan.org.uk/

52. PRINCE2 (PRojects IN Controlled Environments) is a process-based method for effective project management. PRINCE2 is a de facto standard used extensively by the UK Government and is widely recognised and used in the private sector, both in the UK and internationally. The method PRINCE2 is in the public domain, offering non-proprietarily best practice guidance on project management. PRINCE2 is a registered trademark of OGC.

53. To learn more about Professor JP Kotter, see: http://www.kotterinternational.com

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GREEN IT
FOR SUSTAINABLE BUSINESS PRACTICE
An ISEB Foundation Guide

Mark G. O'Neill

It is widely cited that the IT industry is on a par with the aviation industry for carbon emissions. Experts predict that these emissions will double in the next few years. As evidence for man-made climate change mounts, there is an increasing demand for authoritative sources of useful information to help people use IT more efficiently.

Are you confused by the profusion of Green IT information and directives? Are you actively concerned to avoid 'Green Wash'? This book provides all the tools to create an action list to identify and address Green IT requirements. It is ideal for IT service providers and also contains a wealth of advice, hints and tips for the general IT user.

- **Practical guide to achieving greener IT**
- **How to establish a Green IT Policy**
- **Cost savings strategies**
- **Overview of Green IT regulations, policy and legislation**
- **Support for the ISEB Foundation Certificate in Green IT**

ABOUT THE AUTHOR

Mark G. O'Neill is an IT Professional with 20 years' experience, including senior roles and large scale IT Service Management and Infrastructure implementation programmes. Mark has extensive experience in Best Practice consultancy and training both in the UK and overseas. Recently appointed Head of Service Management and Green IT Learning Consultancy, he was responsible for developing the UK's first officially accredited Green IT training course.

Increasing worldwide concern for the environment has brought into sharp focus the emissions and energy inefficiencies of IT systems. Mark G. O'Neill provides strategies and practical approaches to resolving the environmental problems that IT poses, thereby enabling savings for the benefit of all concerned.

Bob Crooks
Defra Lead for Green IT

Business & Management

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