



Ministry for the
Environment
Manatū Mō Te Taiao

Information and Communication Technology Equipment: Good Practice Guidelines for Environmental Sustainability

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1 Introduction

These Guidelines provide advice to government agencies on how they can factor environmental considerations into their decisions when purchasing, using and disposing of information and communications technology (ICT) equipment. They should also be helpful to business users and others involved in purchasing and using ICT equipment, including the household sector.

The Guidelines draw on current good practice in New Zealand government agencies and businesses, as well as emerging practice in other countries. Major providers of ICT equipment have also been consulted, as they are facing increasing pressure from their customers and governments to take more account of environmental sustainability issues in the manufacture of their products.

Readers seeking a quick guide should refer to section 7, which summarises the advice contained in these Guidelines and provides directions to the relevant part of the text. Please note that the recommendations provided are not intended as comprehensive evaluation criteria. Clearly there will be trade-offs with many other factors, such as established supplier relationships and (of course) price.

Purpose

The purpose of these Guidelines is to promote environmentally sustainable practices when buying, using and disposing of ICT equipment in New Zealand.

There is a growing concern, both within New Zealand and internationally, about the environmental and health problems associated with waste electronic and electrical equipment (WEEE). Computer monitors, components and circuit boards contain highly toxic substances such as lead, beryllium, mercury, cadmium and brominated flame retardants. Redundant desktop computers and their peripherals, especially cathode ray tube (CRT) monitors and television sets (TVs), are of major concern due to the significant amounts of lead they contain.

Exacerbating the problem, there has been a rapid growth in the number of computers and other electronic equipment during the last 10 to 15 years. A 2006 report on e-waste in New Zealand estimated that there are 16 million electronic devices currently in use, including 10 million CRTs, with nearly 1 million being added each year.¹ Much of this equipment is now reaching the end of its life and is being disposed of in landfills in the absence of any other more environmentally sound methods. There are real concerns that if this practice continues there is a risk that in the future, hazardous substances will leach from landfills into surrounding land and waterways, polluting our environment and incurring major restoration costs. The prudent course of action is to eliminate this threat, even if it does not affect today's generation.

¹ J MacGibbon, L Zwimpfer, *e-Waste in New Zealand: Taking Responsibility for End-of-Life Computers and TVs*, Ministry for the Environment, Wellington, 2006.

The Government, through the Ministry for the Environment, is working with electronic equipment suppliers to find a long-term sustainable solution. In the meantime, these Guidelines are intended to provide some direction to users of this equipment by describing how they can contribute to environmental sustainability by modifying their practices when buying, using and disposing of ICT equipment.

Although the Guidelines have been structured to provide specific advice, we recognise that individual organisations will need to balance environmental considerations with other factors, such as functionality and, of course, costs. No attempt has been made to weight the various factors, as this will vary from organisation to organisation. The aim of the Guidelines is to increase the level of awareness of the growing problem of e-waste and inefficient ICT energy use, and encourage people with responsibilities for buying, using and disposing of ICT equipment to take whatever steps they can to reduce any negative environmental impacts.

Scope

These Guidelines cover the following ICT equipment:

- computer servers
- desktop computers
- computer monitors
- laptop computers
- scanners
- desktop printers
- multifunction devices
- facsimile machines
- mobile phones
- hand-held devices (eg, PDAs – personal digital assistants).

Although the Guidelines cover buying, using, and disposing of ICT equipment, a particular focus is on the *purchase* of equipment, because users can exercise the most influence over a reduction of toxic materials in their purchase decisions. International pressures are driving major ICT suppliers and manufacturers to build greater sustainability into their equipment design and manufacturing processes, and New Zealand buyers can help by supporting suppliers that are making an effort in this regard.

The Guidelines also provide ‘good practice’ advice on how ICT equipment can be used in more environmentally sound ways, especially in terms of conserving energy and, in the case of printers, conserving paper.

Context

The Ministry for the Environment is the central government agency with the designated lead role to assist government agencies to become more sustainable, and to take a leadership role in reducing greenhouse gas emissions, waste minimisation and improving energy efficiency. Forty-eight agencies have formally signed up to a programme known as Govt³, covering the three pillars of sustainability – environmental, social and economic. The programme has four specific work areas:

- procurement of office consumables and equipment
- waste minimisation and recycling
- transport
- buildings.

For more information on this programme, please refer to <http://www.mfe.govt.nz/issues/sustainable-industry/govt3/>.

The New Zealand Waste Strategy (NZWS)² also provides a context for these guidelines by addressing how government agencies and business can demonstrate leadership in minimising and managing waste. Obsolete computer equipment has well-documented adverse environmental and health effects when disposed of irresponsibly. The environment, government agencies and business can benefit from the thoughtful reuse or recycling of waste electrical and electronic equipment.

Representatives from the television (TV) and information technology (IT) industries have also formed a working group³ to develop a product stewardship scheme for TV and IT waste. Although the details of the scheme are still being developed, the agreed underlying principle is for suppliers of equipment to take responsibility for the environmentally safe disposal of this equipment when it reaches the end of its life.

In February 2007 the Prime Minister, in her Statement to Parliament, reaffirmed the Government's commitment to sustainability by recognising the government sector as a significant purchaser of services, and announcing the Government's intention to use its purchasing power "to help drive innovation, cleaner production, and improved cost effectiveness over the whole life cycle of goods and services".⁴

² Ministry for the Environment, *The New Zealand Waste Strategy: Towards Zero Waste and a Sustainable New Zealand*, Ministry for the Environment, Wellington, 2002.
<http://www.mfe.govt.nz/publications/waste/waste-strategy-mar02/index.html>.

³ The IT/TV Product Stewardship Working Group, facilitated by WasteMINZ.
<http://www.wasteminz.org.nz/>.

⁴ Rt. Hon Helen Clark Prime Minister's Statement to Parliament, 13 February 2007
<http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=28357>

The Prime Minister also acknowledged the Government's commitment to work with the Green Party on refinements to the Waste Minimisation (Solids) Bill.⁵ This Bill puts in place provisions to decrease waste disposal, including a levy on industrial waste, targets for reducing waste in landfills, and implementing producer responsibility programmes and public procurement programmes for stimulating innovation in the development of markets for products and services that result in waste reduction.

Evaluation and review

These Guidelines are consistent with the clear policy directions from the Government and will help to promote effective waste disposal practices. However, the Guidelines will also be evaluated and reviewed by both the Ministry for the Environment and the Ministry of Economic Development, with assistance from other government agencies buying and disposing of ICT equipment. The proposed contract clauses and tender processes will be tested in the marketplace with future requests for proposals (RFPs). An assessment of practices in government agencies and businesses is also proposed, to evaluate the effectiveness of the Guidelines in terms of sustainable use and equipment disposal, and to determine if any specific training or other forms of support are required for procurement officers or IT support personnel.

⁵ The Waste Minimisation (Solids) Bill was introduced to Parliament in June 2006; the Local Government and Environment Select Committee is expected to report back to the House end of October 2007.

2 Buying ICT equipment

Manufacturer commitment

Manufacturers should be able to demonstrate that they have a commitment to environmental good practice, and that their equipment has been designed with environmental impacts in mind.

Most ICT equipment available in New Zealand is manufactured overseas, so there is limited opportunity to influence the design of the equipment. However, organisations purchasing ICT equipment should require suppliers to provide information on the steps being taken by the manufacturer to reduce the environmental impact of their products. In some regions of the world, such as Europe and North America, governments are increasingly regulating the manufacturing process to reduce waste, and New Zealand customers can benefit from this.

Manufacturers are also starting to adopt Corporate Social Responsibility (CSR), which recognises an obligation to consider the interests of customers, employees, shareholders, communities, and ecological considerations in all aspects of their operations. This obligation is seen to extend beyond their statutory obligation to comply with legislation.

The Eco-Management and Audit Scheme (EMAS) is the EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environment management system and report on their environmental performance through the publication of an independently verified environmental statement. They are recognised by the EMAS logo, which guarantees the reliability of the information provided.

Guideline 2.1

Specify suppliers who have environmental good practice systems that meet the ISO 14000 / ISO 14001 series standards, or EMAS and CSR reporting, as part of their business practices.

Fewer toxic components

In January 2003 the European Parliament and the Council of the European Union issued an RoHS (Restriction of Hazardous Substances) Directive [2002/95/EC](#) on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and Directive 2002/96/EC on waste electrical and electronic equipment.⁶ The two directives were designed to tackle the fast-increasing waste stream of electrical and electronic equipment.



Directive 2002/96/EC requires increased recycling of electrical and electronic equipment to limit the total quantity of waste going to final disposal. It also requires producers to take responsibility for taking back and recycling electrical and electronic equipment. This is intended to provide incentives for manufacturers to design electrical and electronic equipment in an environmentally more efficient way, which takes waste management aspects fully into account. Consumers should be able to return their equipment free of charge.

In order to prevent the generation of hazardous waste, Directive 2002/95/EC requires the substitution of various heavy metals (lead, mercury, cadmium and hexavalent chromium) and brominated flame retardants (polybrominated biphenyls [PBB] or polybrominated diphenyl ethers [PBDE]) in new electrical and electronic equipment put on the market from 1 July 2006. The directive does, however, provide for some exemptions, including lead in the glass of CRTs and mercury in lamps for flat-panel displays.

Although RoHS compliance has not been legislated in New Zealand, many other countries are following the European Union's lead, some with their own variations (as in China),⁷ and it is widely expected that RoHS will become a world-wide standard. There is no recognised logo for RoHS but manufacturers have chosen their own way to display compliance with the EU RoHS Directive.⁸

Guideline 2.2

State a preference for compliance with the RoHS EU Directive 2002/95/EC and request that the product manufacturer verifies the product to be RoHS compliant with EU Directive [2002/95/EC](#).

⁶ Directives of the European Parliament and of the Council of 27 January 2003 on (1) Waste Electrical and Electronic Equipment (WEEE) – Directive 2002/96/EC; and (2) Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment – Directive 2002/95/EC. http://ec.europa.eu/environment/waste/weee/index_en.htm.

⁷ *China RoHS Solutions*. <http://www.chinarohs.com/>.

⁸ There is no single internationally agreed symbol, label or mark for RoHS compliance, and as a result many products will not have an identifiable logo. It is therefore important to request that the product manufacturer verifies the product to be RoHS compliant. This verification method may vary from one manufacturer to another.

Using recycled content

In 1999 a computer supplier announced the world's first desktop PC using 100 per cent recycled plastic in all the plastic parts.⁹ However, it appears this was not commercially sustainable, and the company's 2006 Corporate Responsibility Report states that 28 per cent (by weight) of all plastic resins contain recycled plastic content, with a net recycled plastic content weight representing 8.1 per cent of total purchases (against a corporate goal of 5 per cent).¹⁰ The EU RoHS Directive precludes the use of some recycled materials because of the use of substances such as flame-retardant bromides.

Guideline 2.3

State a preference for recycled-content materials and ask suppliers to state their corporate goals and achievements in using recycled plastic content.

Energy efficiency

ENERGY STAR® is a programme started by the United States government in 1992¹¹ to promote energy-efficient consumer products. It has become an international energy efficiency mark utilised in the US, Canada, Europe, Australia and Asia. In New Zealand it is administered and promoted by the Energy Efficiency and Conservation Authority (EECA).¹²



In New Zealand, the ENERGY STAR mark identifies the most efficient computers and imaging equipment, heat pumps, TVs, DVD players, audio equipment, washing machines and dishwashers. The ENERGY STAR website lists qualified products available in New Zealand¹³.

ENERGY STAR specifications are regularly reviewed. In 2007, new specifications have been introduced for computers and imaging equipment, (copiers, fax machines, mailing machines, multi-function devices (MFDs), printers and scanners). For example, the new desktop computer specification requires 80 per cent or greater AC power supply efficiency. Power management states include idle (operating system running but no programs), sleep (nothing is running but the computer can wake up fast and start) and stand-by (an off condition where about two watts of power are used).

The New Zealand ENERGY STAR website is updated regularly with new content and lists of qualified products.

⁹ IBM Launches World's First Desktop PC with 100% Recycled Plastic Resin, 1 March 1999. <http://www.ibm.com/ibm/environment/news/epr.shtml>.

¹⁰ IBM Corporate Responsibility Report 2006. http://www.ibm.com/ibm/responsibility/pdfs/IBM_CorpResp_2006.pdf.

¹¹ ENERGY STAR. See: <http://www.energystar.gov/>.

¹² Energy Efficiency and Conservation Authority (EECA) <http://www.eeca.govt.nz>

¹³ ENERGY STAR www.energystar.govt.nz

Guideline 2.4

Specify ENERGY STAR compliance and ensure conformance with the latest ENERGY STAR computers and imaging equipment specifications. Specify computers, monitors and integrated computer-monitor systems that meet ENERGY STAR Version 4.0 and are configured for automatic energy-saving features, as per current ENERGY STAR specifications.

Printer functionality

Desktop printers and multi-function devices can now default to duplex printing (printing both sides), which reduces the amount of paper used for printing documents. “Secure print” functionality also enables users to send a file to any printer on the network, but the device holds the print operation until the user enters a PIN code at the device, enabling the file to be printed. Using this function can help reduce the amount of waste printing when documents are sent to the printer but are never retrieved, or are accidentally sent to print more than once.

Guideline 2.5

Specify duplex printing and secure print functionality. Set as default on all devices.

LCD display screens

Liquid crystal displays (LCDs) consume about half the power of an equivalent-sized cathode ray tube (CRT) screen. LCDs also have direct user benefits in terms of saving desk space, and they are better for your health. CRT monitors radiate three electron beams that are continually refreshing the entire screen 60 to 85 times each second. Although your brain doesn’t register the constant refreshing, your eyes do, and they have to work harder to absorb the information. LCD monitors don’t refresh in this way: pixels are constantly on or off, which greatly reduces eye fatigue and strain. An LCD monitor also generates less heat than a CRT, lessening the air conditioning loads in an office.

Guideline 2.6

Specify LCD monitors.

Minimal packaging

Computer equipment often comes packaged in materials that cannot be reused, separated or recycled. Materials such as polystyrene are generally made without recycled content, and in most New Zealand communities are currently non-recyclable. Excessive packaging is also wasteful, and paper manuals and disks packaged with each computer often add to the waste. Suppliers should be encouraged to minimise the amount of packaging, and to provide a take-back option for reuse or recycling if the buyer is unable to reuse or recycle it. For example, manuals can be provided already installed on the computer to read online. Environmentally sustainable options are encouraged by a voluntary code of practice under the government/industry Packaging Accord,¹⁴ and preference could be given to suppliers who are signatories to this Accord.

Guideline 2.7

Specify packaging made of recycled content that is also recyclable in New Zealand, and take-back and recycling of all packaging as an option if local recycling arrangements do not meet needs.

Life-cycle impact reduction certification

In some countries, certification bodies have been established to evaluate and compare equipment based on its environmental attributes. For example, EPEAT (Electronic Product Environmental Assessment Tool, see www.epeat.net) is used to evaluate products in the USA. Products are evaluated against performance criteria and awarded a bronze, silver or gold registration. In January 2007 President Bush signed an Executive Order mandating federal agencies to buy EPEAT-registered products.



Other recognised certification labels for ICT equipment, which also include a third party check (as opposed to the monitored self-claim of EPEAT), include TCO (www.tcodevelopment.com), Nordic Swan (www.svanen.nu/Eng/) and the EU Eco-label (www.eco-label.com). The EU Eco-label “flower” on computers guarantees:



- reduced energy consumption during use and stand-by
- limited use of substances harmful to the environment and health
- reduced use of natural resources by encouraging recycling
- an extended product lifetime through easy upgrades
- reduced solid waste production through a take-back policy.

¹⁴ Packaging Accord, 2004. <http://www.packagingaccord.org.nz/>.

The New Zealand Ecolabelling Trust operates, on behalf of the Government, the Environmental Choice NZ eco-label. This is a voluntary, multiple-life-cycle, impact-specification-based programme to recognise efforts made by manufacturers to reduce the environmental impacts of their products and provide a credible and independent guide for consumers.¹⁵ The Trust has published specifications for around 30 product categories, including copying machines, printers, fax machines and multifunction devices (EC-24-05) and personal computers (EC-27-05).



There are also voluntary product declarations, such as ECMA-370. This standard specifies environmental attributes and measurement methods for ICT and consumer electronics products according to known regulations, standards, guidelines and currently accepted practices.¹⁶

It includes a company environmental profile as well as environmental product attributes, and together these provide a comprehensive “eco declaration”. Unlike the life-cycle assessment eco-labels above, product declarations are self-claim. They provide data relevant to environmental impact data, but have not been compared against a standard set by an independent party.

Guideline 2.8

Request some form of environmental certification, whether from an independent agency or in the form of a recognised voluntary product declaration.

Obsolescence and spare parts

Planned obsolescence and design-for-disposal use up natural resources and cause waste. Spare parts and maintenance support should be available for the life of the equipment. Suppliers should state the expected life in years.

Guideline 2.9

Require spare parts and service to be available for the expected life of the equipment.
Require information on the expected life of the equipment.

¹⁵ Environmental Choice New Zealand. <http://www.enviro-choice.org.nz>.

¹⁶ ECMA-370 Standard. <http://www.ecma-international.org/publications/standards/Ecma-370.htm>.

Disassembly

Some manufacturers are experimenting with snap-in, snap-out assemblies. Equipment that can be easily disassembled using universally available tools reduces the cost of recycling.

Guideline 2.10

State a preference for equipment that can be easily disassembled.

Take-back options

The Government's Waste Strategy aims to encourage producer responsibility and product stewardship, whereby suppliers take responsibility for the end-of-life disposal of equipment they manufacture. One option is a take-back scheme. Equipment leases are the most straightforward take-back option, whereby purchasers are effectively buying a computing "service" rather than a piece of hardware. While this is an attractive option from an e-waste management point of view, some organisations view leasing as a more expensive option than purchasing.

An approach adopted in the USA is to require suppliers to offer, at the time of purchase, a take-back or recycling service that meets the Environmental Protection Agency standards defined in the *Plug-In to eCycling Guidelines for Materials Management*.¹⁷ These guidelines apply to Plug-In partners who, through contracts or other arrangements, utilise reuse, refurbishment, recycling or disposal services. Plug-In partners take appropriate due diligence measures to ensure that downstream facilities and operations use practices that are consistent with the guidelines. Areas covered by the guidelines include:

- priority given to reuse and refurbishment
- landfill or incineration as a last resort
- legal compliance with transportation, processing and management
- legal compliance with any materials exported
- licensed recycling facilities
- proper business records of all recycled equipment
- safeguarding of occupational and environmental health in the recycling process.

All suppliers should be able to offer cost-effective asset disposal and product end-of-life management services, either directly or in partnership with local refurbishers/recyclers.

Guideline 2.11

Require supplier take-back, reuse or a recycling service for equipment being replaced or upgraded.

¹⁷ *Plug-In to eCycling: Guidelines for Materials Management*, US EPA, 2004, EPA530-K-04-004. <http://www.epa.gov/osw>.

3 Sustainable Use Guidelines

Computer servers

Server infrastructure has a significant environmental impact. The need for 24/7 operation in air-conditioned environments typically consumes large amounts of energy. There are often unavoidable reasons for a distributed server infrastructure, but where possible, consolidation into centralised facilities, whether in-house or outsourced to a data centre, can reduce energy requirements.

Guideline 3.1

Consider consolidating server infrastructure into centralised facilities wherever possible, whether this be in-house or at an outsourced data centre.

Desktop computers

A study carried out by Canterbury University¹⁸ on a wide range of Pentium PCs found that the power use of a PC (excluding the monitor) is 30 to 60 watts. The Energy Efficiency and Conservation Authority (EECA) also commissioned a study on the impact of turning a computer hard drive on and off. They discovered that the average life of a hard drive is 500,000 hours (57 years), or 500,000 starts. This suggests the optimum would be to turn off the hard drive if it is not being used for an hour, but since most hard drives are junked in less than 10 years, the turn-off time could be reduced to as low as 10–15 minutes without any adverse effect.

Very efficient power-saving tools have been developed for laptop computers in order to conserve battery power, and similar management tools are becoming available on desktop computers. Typically, these tools give the user the option to set default inactivity times to turn off the monitor, turn off all hard disks, switch to system standby or hibernate.

Guideline 3.2

- (a) Set the default inactivity period to turn off hard disks after 30 minutes.
- (b) Instruct all staff to power off computers at the end of each working day and carry out periodic audits to verify compliance.
- (c) Programme automatic screen-saver notices to appear as a reminder to users to switch off.

¹⁸ S Round, *Computer Power Consumption Tests*, Department of Electrical & Electronic Engineering, University of Canterbury, 2005.

Computer monitors

The Canterbury University study referred to above reported that the average power use for CRT monitors is 60–75 watts, and about half that for equivalent-sized LCD displays. As the life of a monitor is directly related to the amount of time it is powered on, turning them off when not in use not only saves electricity but also extends their life.

Guideline 3.3

- (a) Set a default inactivity period to turn off monitors after 10 minutes.
- (b) Instruct all staff to turn off monitors at the end of each working day and carry out periodic audits to verify compliance.
- (c) Convert from CRT to LCD displays, being mindful of finding environmentally sound disposal options for the old CRT monitors.

Laptop computers

As noted above, laptop computers have been designed to be energy efficient. Power usage is typically 30–40 watts (processor and screen), but in standby mode (screen and hard drive off) power usage can be as low as five watts.

Laptops have the advantage of allowing staff to work more flexibly (eg, from hotels when travelling, or potentially to telework from their homes for one or two days a week). Organisations that support flexible working options such as telework and electronic meetings using audio or videoconferencing contribute to a more sustainable environment through reduced staff travel time and therefore reduced environmental impact from travelling.

Guideline 3.4

- (a) Consider the benefits of laptops compared to desktops, especially for mobile staff.
- (b) Encourage telework practices and promote the use of teleconferencing technologies as an alternative to travel.

Scanners

Multi-function devices (MFDs) typically incorporate a scanning function as well as photocopying, printing and sometimes fax. MFDs also have good power management tools.

Guideline 3.5

Use networked MFDs with a scanning function wherever possible instead of stand-alone scanners.

Desktop printers

Desktop printers, while convenient for users, can be costly to maintain and operate. On the other hand, when printers are networked and shared among groups of users (the most common scenario), no one is responsible for turning them off at night. Current good practice is to consolidate printing functions into networked MFDs that are deployed on the basis of one per floor. As noted above, MFDs have good power management tools and duplex printing (both sides) can be set as a default.

Desktop printers typically have less functionality than MFDs and only more recent models have started to provide duplex printing as a default option.

The Ministry for the Environment provides sustainability guidelines for office consumables such as paper and ink cartridges, so these are not repeated here. Refer to the Ministry's website for this information.¹⁹

Guideline 3.6

- (a) Replace desktop printers with shared MFDs, especially those without duplex printing capabilities.
- (b) Set printing defaults to duplex, black and white, and ensure that when users override these defaults for special purposes, the defaults are automatically restored.
- (c) Instruct staff to turn off the devices at the end of the day.

Multi-function devices

Multi-function devices, with photocopying, printing, scanning and fax functionality, are proving to be the most efficient equipment for producing paper-based documents. They provide good management tools for setting printing defaults (duplex, mono) as well as for powering down after preset periods of inactivity, saving power.

MFD suppliers should be able to assist with work-flow studies²⁰ to determine the optimum deployment of equipment. Excessive loading can cause equipment failure ahead of the design life, increasing the turnover of equipment and generating additional e-waste. Service contracts can help to extend the life of equipment.

As mentioned previously, the "Secure print" functionality also enables users to send a file to any printer on the network, but the device holds the print operation until the user enters a PIN code at the device, enabling the prints to be produced. Again, duplexing copies and printing reduces the amount of consumables used.

¹⁹ Ministry for the Environment, *Guidelines for Office Consumables*.
<http://www.mfe.govt.nz/issues/sustainable-industry/govt3/topic-areas/office-consumables/>.

²⁰ Advising clients on what equipment they need and where.

Guideline 3.7

- (a) Set printing defaults to duplex, black and white, and ensure that when users override these defaults for special purposes, the defaults are automatically restored.
- (b) Ensure staff are trained to make use of the “secure print” functionality.
- (c) Require potential suppliers to undertake workflow studies to optimise the deployment of MFDs and maximise their useful life.

Fax machines

As with scanners, fax functions are typically built into MFDs and, as noted above, these are the most efficient. However, some offices require a greater level of confidentiality, and this would justify the deployment of stand-alone fax machines.

Guideline 3.8

Unless prevented by confidentiality requirements, consolidate fax functionality into MFDs.

4 Equipment Disposal Guidelines

Security cleansing guidelines

The first step for any disposal process should be to remove any stored data and information from the equipment. As noted in the Introduction, these Guidelines are not intended to replace the guidelines for government agencies provided by the Government Communications Security Bureau. They are included simply to draw attention to this issue because it is integral to environmentally sound ICT disposal practices.

Computers

All data should be removed from computer disk drives before disposal, and users should obtain documented evidence that this has occurred.

There are a number of alternatives available for achieving this. The option selected will depend on the level of confidentiality of the information stored on the hard drives. Agencies or companies dealing with classified information, such as the Ministry of Defence and the Ministry of Foreign Affairs and Trade, or sensitive personal information such as held by the Police or the Ministry of Health, will require the highest level of security. Typically this will involve in-house processes to security wipe hard drives and may even involve the physical destruction of the equipment. Other organisations may be able to rely on trusted computer recyclers and refurbishers to reliably data-wipe hard drives before the equipment is reused or otherwise disposed of.

Software products used for security wiping should produce certification of the security wiping. For example, if there is a bad sector on the hard drive that the software is unable to access, certification that the drive has been cleansed will not be produced. Other precautions (such as physical destruction) can then be taken to ensure the data cannot be recovered.

Three techniques are commonly used for media sanitisation: overwriting, degaussing²¹ and destruction. In most cases, overwriting provides an acceptable level of security if recognised software and processes are used. For classified and highly confidential information, overwriting is only acceptable if the equipment is to remain at the previous level of classification and remain in a secure, controlled environment.²²

²¹ “Degaussing” the process of decreasing or eliminating an unwanted magnetic field.

²² Government Communications Security Bureau guidelines, p. 128.
<http://www.gcsb.govt.nz/publications/nzsit/nzsit-400.pdf>.

An internationally recognised standard for security wiping hard drives is that specified by the US Department of Defense Standard 5220.22-M for media sanitisation.²³ This process involves randomly writing data to hard drives to write over the original information. This process is repeated a minimum of three times – triple overwrite (the first time with a character, the second time with its complement, and the third time with a random character). To achieve an even higher level of security, this process can be repeated a further four times, making a total of seven security wipes. The net result is randomly reformatted information recorded as a pattern of 0s and 1s.

Guideline 4.1

- (a) Use security-wiping software compliant with the US Department of Defense Standard 5220.22-M, or equivalent.
- (b) Obtain certification verifying successful security wiping.
- (c) Arrange physical destruction of hard drives with bad sectors. Drilling hard drives is preferred to acid baths.
- (d) For organisations with classified or highly sensitive information, hard drives should be security wiped before leaving the organisation's premises.
- (e) Request evidence of chain of custody for the entire disposal process, including equipment collection, the data security wiping process, and removal of company-identifiable asset tags and stickers.

Mobile phones and hand-held devices

Although mobile phones and personal digital assistants (PDAs) are still viewed as different devices to desktop and laptop computers, there is a rapid convergence in functionality. Already it is possible to send and receive email and video communications on a mobile phone, and devices such as the Blackberry are increasingly taking over some of the functions more traditionally confined to a computer. The storage capacities of iPods and other MP3 players, and even USB drives, already exceed the capacity of many older computers. This means that organisations need to exercise the same care in terms of security wiping these devices before disposal.

Users of GSM communication devices with SIM cards (mobile phones and data cards) have the option of removing the SIM card before disposal, thereby maintaining the confidentiality of their phone directories. They have the added advantage that the SIM card can be transferred to the user's new phone. Users of Telecom cellphones do not have this choice and need to take steps to erase directory information.

²³ US Department of Defense Standard 5220.22-M, *Section 5: Software and Data Files*.
http://www.qsg.com/usdod_standard_dod_522022m.htm.

Data cleansing of hand-held PDAs can be managed quite efficiently, and even remotely, as these rely on regular synchronisation with the organisation's network. In the case of a unit being stolen or misplaced, the network can automatically delete all stored data and render the unit inoperable if unauthorised use is attempted. The same process can be used to security wipe the units before disposal. Physical destruction is not necessary.

Guideline 4.2

- (a) Remove SIM cards from all GSM mobile devices before disposal.
- (b) Manually delete all directory information from Telecom phones before disposal by returning to the factory settings.
- (c) Use the auto-synchronisation facility to delete all data in hand-held PDAs before disposal.
- (d) Develop procedures and policies for restricting the storage of sensitive data on portable media, including cellphones, PDAs, USB drives, MP3 players, CDs and DVDs.

Computer take-back schemes

Guideline 4.3

Suppliers should be required to take responsibility for equipment they supply when it reaches the end of its life.

The guidelines for buying ICT equipment presented above recommend that buyers specify a requirement for surplus equipment take-back or disposal via a credible refurbisher or recycler. For organisations dealing with relatively large volumes of equipment, this is not expected to present any difficulty. Suppliers of new equipment are generally very happy to arrange for the disposal of surplus equipment as part of the contract for new equipment – although often at a cost. However, this does not necessarily ensure the equipment will be disposed of in an environmentally acceptable way.

The IT/TV Product Stewardship Working Group is developing an industry-supported product stewardship scheme that is expected to reinforce take-back schemes. The Ministry for the Environment is also in the process of developing WEEE recycling guidelines that will link to the manufacturers' product stewardship scheme. The Ministry expects this work to be completed early in 2008, at which time the guidelines will be published on its website; this will include guidelines for households. In the meantime, the best advice available has been published by the Ministry as the *Safe Use and Disposal of Computer Equipment*. It is primarily aimed at households, but the contact information is relevant to all.²⁴

²⁴ Ministry for the Environment, *Safe Use and Disposal of Computer Equipment*.
<http://www.mfe.govt.nz/publications/waste/use-disposal-computer-equipment-oct06/index.html>.

Guideline 4.4

In computer procurement contracts, specify a requirement for take-back, or a reuse and recycling service that meets the Ministry for the Environment's recycling guidelines, or an equivalent standard.²⁵

Computer monitors

Computer monitors present a special challenge in terms of environmentally friendly disposal. Currently there is no facility in New Zealand with the capability of recycling CRT monitors. While some are being landfilled, responsible recyclers are making efforts to find overseas markets where they can be converted into television sets or broken down, with 95 per cent of the materials being recycled. However, the cost of transport, typically to Asia or Australia, can not easily be recovered, and this is the current dilemma. In the meantime, refurbishers are doing their best to keep CRTs operating, but with the rapid growth in LCD displays the traditional markets for refurbished computers in New Zealand – schools and private citizens – are diminishing.

Although ultimate disposal may be something other users downstream need to deal with (computer monitors turned over by government agencies on average every three to four years can have many more years of useful service, for example), organisations should still seek to dispose of their equipment responsibly.

Guideline 4.5

Ensure monitors are disposed of through a trusted refurbisher or recycler.²⁶

Printers, scanners and fax machines

There is little market for refurbished desktop printers, scanners or fax machines, because the cost of new equipment is now so low. Replacement parts such as print heads for inkjet colour printers cost almost as much as a whole new printer; and this presents a difficult if not impossible challenge for refurbishers. It should therefore be assumed that surplus desktop printers, scanners and fax machines will almost always be destined for recycling rather than refurbishment.

²⁵ The Ministry guidelines are to be published in 2008, at which time it may be appropriate to delete the option of “an equivalent standard”, as this could lead to uncertainty and debate in determining what is equivalent.

²⁶ The Ministry for the Environment expects to publish recycling guidelines in early 2008 that will provide guidance in identifying “trusted refurbishers and recyclers”. In the meantime, the Computer Access NZ Trust (CANZ), funded by the Ministry of Education, accredits refurbishers to promote the reuse of surplus government computers in schools and the community.

Guideline 4.6

Ensure computer peripheral equipment and fax machines are disposed of through a trusted recycler.

Multi-function devices

The preferred method of funding multi-function printers is through a service charge based on the number of pages printed. In these cases, the hardware is not owned by the agency and responsibility for disposal remains with the supplier. In situations where the equipment is owned by the organisation, an effective take-back scheme is typically provided by the supplier of the new equipment.

Guideline 4.7

Specify a preference for MFD service contracts rather than hardware purchase.

Mobile phones and hand-held devices

Both of New Zealand's main service providers – Telecom and Vodafone – operate take-back schemes for end-of-life mobile phones. This differs from other countries, where the manufacturer of the handsets – Nokia, Motorola, Sanyo, Samsung and Sony Ericsson, for example – are expected to take a more active role in terms of producer responsibility. Given the relatively small size of the New Zealand market it is not necessarily inappropriate that the service providers have taken on this role without any direct contribution from the handset manufacturers.²⁷

Both Vodafone and Telecom accept any handsets at their retail stores, by free post or office collection bins (currently Vodafone only) and arrange for them to be shipped offshore to certified recyclers for de-manufacturing, sorting, refurbishment and resale, or shredding and recycling.²⁸

Guideline 4.8

Require your service provider to supply a collection service, reuse and recycling service for surplus devices.

²⁷ The Ministry for the Environment has published a product stewardship case study on the cellphone sector; see: <http://www.mfe.govt.nz/publications/waste/product-stewardship-cell-phones-may06/html/page4.html#fig21>.

²⁸ Vodafone: http://www.vodafone.co.nz/aboutus/12.4.4.1_mobile_recycling.jsp?item=global&subitme=recycling
Telecom: <http://www.telecom.co.nz/content/0,8748,203938-1548,00.html#recycle>.

5 Contract Clauses

Overview

Recommended good practice is to include sustainability-specific clauses in ICT procurement contract documentation, including RFIs (requests for information), RFPs (request for proposals) and supply contracts. The overall weighting of sustainability issues in tender evaluation may differ from organisation to organisation, but given the increasing importance of sustainability to New Zealand (and the world), government agencies and businesses are encouraged to consider allocating a significant overall weighting to environmental considerations.

Specific guidance in this area will be considered as part of a broader sustainable procurement project for the Government, being led by the Ministry of Economic Development (MED). MED is preparing a government-wide toolkit for sustainable procurement, which is expected to incorporate the environmental considerations contained in these Guidelines.

In the meantime, the Ministry for the Environment recommends that all organisations buying ICT equipment take full account of the various environmental issues, and either set environmental performance standards as minimum qualifications for supply, or allocate a weighting of 10 per cent to 20 per cent to environmental impact reduction in their tender evaluation. This does not mean that organisations should necessarily pay a price premium for products that are more environmentally acceptable.

Given the relatively small market in New Zealand for ICT equipment, we should not expect that policies and practices in this country will have a huge effect on global manufacturing practices. However, New Zealand is far from being alone in giving more consideration to environmental issues for ICT equipment. As early as 2003 the European Union implemented a ban on certain hazardous substances through the EU RoHS Directive (see section 2). This came into effect last year, and New Zealand stands to benefit. The move away from CRT monitors to flat-screen LCD panels is another significant trend that New Zealand is benefiting from. If New Zealand moves in step with countries with a similar awareness of the environment, we can expect to reap similar benefits.

The other challenge that purchasing managers face is the level of effort required to verify suppliers' claims. Suppliers can easily claim compliance with all the suggested contract clauses in this section but it would take considerable effort to verify all the claims. This is where a collaborative effort across government can provide benefits. Suppliers would be challenged to prove their claims by giving documented evidence, but this would only need to be validated by one agency, the results of which could be shared across government and (preferably) with the commercial sector as well. If some rigour is applied to the process (including, for example, validating the processes for recycling packaging materials), suppliers would quickly be prevented from making false claims.

Recommended clauses and discussion

Manufacturer commitment

Describe the manufacturer's approach to sustainability, providing details on any specific steps taken in the design and manufacture of products to reduce any detrimental environmental impacts and facilitate the safe and efficient disposal of equipment at end-of-life.

Toxic materials reduction

RoHS compliance is required. Any variations should be stated.

Energy use

Energy Star compliance is required. Any variations, and which version, should be stated.

Product stewardship

A demonstrated commitment to product stewardship is required (eg, engagement with IT/TV Product Stewardship Working Group or commitment to another product stewardship scheme). This is expected to include a take-back, reuse and recycling service option with documented chain of custody through to recycling or safe disposal (including Basel Convention²⁹ compliance). Special consideration should be given to how the safe disposal of refurbished equipment donated to schools and community groups can be supported when this reaches the end of its life.

Commitment to equipment maintenance

Suppliers are required to commit to maintenance support, including spares (if required), for the expected life of the equipment. Suppliers should state the expected life in years.

Resource efficiency

Describe features of the product that permit increased resource efficiency, including materials used in construction and the capability of upgrades for extending the replacement cycle to four or more years.

²⁹ The Basel Convention is international legislation that New Zealand is a party to. Administered by the Ministry of Economic Development – www.med.govt.nz.

Reduced impacts over the whole of the product life cycle

Compliance with a recognised eco-label or recognised voluntary product declaration is preferred. Relevant labels are the EU Flower, Nordic Swan, TCO (Sweden), Eco Mark (Japan), Blue Angel (Germany), Greenmark (Taiwan), AELA (Australia) and Environmental Choice (New Zealand) as well as ENERGY STAR for power management. EPEAT and ECMA are examples of voluntary product declarations.

Packaging – removal and recycling

Packaging made from materials with reduced environmental impact is preferred. This includes bio-based and recyclable fill (eg, moulded paper or starch-based loose fill) packaging that is reusable by the supplier, and packaging of non-renewable origin but recyclable in New Zealand. Suppliers are also required to provide for the removal of all equipment packaging after delivery.

Process improvements

Suppliers are required to state compliance with any internationally recognised environmental management standards, such as the ISO 14000 / ISO 14001 series.

6 Further information

Government agencies in Australia have combined to produce the *Green Office Guide*,³⁰ a guide to help agencies buy and use environmentally friendly office equipment. This includes useful information for computers, printers, fax machines, scanners and MFDs.

The Department of the Environment and Water Resources in the Australian Government has also produced an environmental purchasing guide and useful checklists³¹ for fax machines, personal computers and monitors, as well as printers, photocopiers and multi-function devices. The checklists include suggested weightings to assist organisations in tender evaluation.

New Zealand and Australia combined forces in 1998 to create the Australasian Information Security Evaluation Program,³² which is charged with ensuring the ready availability of a comprehensive list of independently assured IT products that meet the needs of Australian and New Zealand government agencies in securing their official resources. This includes media sanitisation products.

³⁰ *Green Office Guide*. <http://www.energyrating.gov.au/library/detailsgreenofficeguide.html>.

³¹ Australian Government, *Voluntary Tools for Environmental Purchasing*.
<http://www.environment.gov.au/settlements/government/purchasing/index.html>.

³² AISEP. http://www.dsd.gov.au/infosec/evaluation_services/aisep_pages/aisep.html.

7 A quick guide to: Buying ICT equipment, sustainable use, security cleansing and equipment disposal



Buying ICT equipment

Ref	Choose:	Avoid:
2.1	Suppliers who have implemented, or are planning to implement, an environmental management system that is consistent with ISO 14001: EMS ³³ : 2004, EMAS, ³⁴ or a demonstrated equivalent standard. Independent accreditation to ISO 14001 and public CSR ³⁵ reporting is preferred.	Suppliers who cannot provide evidence of sustainable manufacturing processes
2.2	Equipment that meets the European Union Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC, where feasible.	
2.3	Equipment made from materials with recycled content.	
2.4	Equipment with the US Energy Star mark for power use.	
2.5	Printers that have duplex printing functionality.	
2.6	Liquid crystal display (LCD) monitors.	Cathode ray tube (CRT) monitors.
2.7	Suppliers who provide the option to take back equipment packaging where this cannot be reused or recycled by the buyer.	
2.8	Eco-label certified equipment, where the labels have a third-party check or where there are independent verification processes for self-claim certification.	
2.9	Suppliers who provide spare parts and service for the life of the equipment.	Suppliers unwilling to support equipment beyond 3–4 years.
2.10	Equipment that can be easily disassembled for maintenance.	
2.11	Suppliers who provide take-back options for ICT equipment with a reuse and recycling service, and can also demonstrate environmentally sound disposal practices.	Suppliers who do not take responsibility for end-of-life equipment by providing safe environmental reuse, recycling or disposal.

³³ EMS – Environmental Management System.

³⁴ EMAS – Eco-Management and Audit Scheme.

³⁵ CSR – Corporate Social Responsibility.

Sustainable use



Ref	Choose:	Avoid:
3.1	Server centralisation or outsourcing to data centres.	Proliferation of server infrastructure in multiple sites (with associated costs of air-conditioned environments).
3.2	To set hard disks to turn off after 30 minutes of inactivity.*	Leaving non-critical computers powered on when not in use for more than 20–30 minutes.
3.2	A screen saver message reminding staff to turn equipment off when not in use.	Leaving screen savers running, as these consume power.
3.3	To set monitors to turn off after 10 minutes of inactivity.*	
3.3	To train staff to turn off monitors, printers, scanners and other ICT equipment at night.	
3.4	Laptops for office and staff flexibility.	
3.4	To encourage the use of conferencing technologies – audio and video – for staff training and meetings, to reduce the need for travel.	
3.5 3.6 3.7 3.8	Centralised multi-function networked printing and scanning devices, deployed based on a workflow studies.	Proliferation of desktop peripherals such as printers, scanners, fax machines.
3.6 3.7	To set printing defaults to duplex, black and white, and set these to automatically restore if they are changed.	Staff re-setting printing defaults to single-sided.

* These defaults are already set for Energy Star-compliant products.



Security-cleansing guidelines

Security cleansing of hard drives is a critical first step in the disposal of computer equipment. These security-cleansing guidelines are included primarily to draw attention to the issue, and are not intended as a substitute for, or to replace, the guidelines provided by the Government Communications Security Bureau on their website for government agencies (see *Security in the Government Sector* <http://www.security.govt.nz/sigs/html/index.html>).

Ref	Choose:	Avoid:
4.2	Security-wiping software compliant with US Department of Defense standard 5220.22-M, or equivalent.	Recyclers who do not use recognised security-wiping software and other secure disposal practices.
4.2	Recyclers who provide certification of successful security wiping.	Recyclers who do not provide certification of security wiping.
4.2	Physical destruction of hard drives with bad sectors by drilling.	Chemical and heat methods of destruction such as acid bath destruction.
4.2	In-house security cleaning of equipment used for highly classified and sensitive material.	
4.3	Recyclers who can provide evidence of the chain of custody for the entire disposal process.	
4.3	To remove SIM cards from all GSM mobile devices before disposal.	
4.3	To manually delete all directory information from Telecom phones before disposal and return to factory settings.	
4.3	The auto-synchronisation facility to delete all data in hand-held PDAs before disposal.	Storage of sensitive data on portable media.
4.3	Procedures and policies for restricting the storage of sensitive data on portable media.	

Equipment disposal



Ref	Choose:	Avoid:
4.4	Take-back or reuse and recycling services in computer procurement contracts.	Buying equipment from companies that do not specify disposal procedures.
4.5 4.6	Trusted recyclers and refurbishers to dispose of monitors, computers, computer peripherals and fax machines using environmentally sound methods. ³⁶	Sending monitors, computers, computer peripherals and fax machines to landfills.
4.7	Service contracts for ICT equipment such as multi-function printing devices, hand-helds and mobile phones.	
4.8	Service providers who provide a collection service for the reuse and recycling of surplus handsets.	Sending surplus handsets to landfills.

³⁶ The Ministry for the Environment is developing good practice WEEE recycling guidelines. These will be available early 2008. Adherence to these guidelines could be made a contractual requirement for all refurbishers and recycling providers.