

# Scotland's Digital Future: Scottish Public Sector Green ICT Strategy

RECYCLE **DONATE** LOCAL GOVERNMENT  
EPAT GOVERNMENT BUYING STANDARDS WEEE  
RE-USE **CARBON FOOTPRINT** HEALTH SECTOR  
ENERGY STAR **ICT LIFE-CYCLE** ENERGY EFFICIENCY  
PROCUREMENT **GREEN ICT** CLIMATE CHANGE  
CENTRAL GOVERNMENT PROCUREMENT REFORM (SCOTLAND) ACT, 2014  
EDUCATION SECTOR **EMBED GREEN BEHAVIOURS**  
CLIMATE CHANGE (SCOTLAND) ACT, 2009 **DISPOSAL**  
**SUSTAINABILITY** PACKAGING REDUCTION WORKFORCE

## Contents

<b>INTRODUCTION</b> .....	<b>3</b>
<b>WHO IS THE STRATEGY AIMED AT?</b> .....	<b>4</b>
<b>WHY IS GREEN ICT IMPORTANT?</b> .....	<b>4</b>
<b>LEGISLATION AND SCOTTISH GOVERNMENT POLICY</b> .....	<b>5</b>
PROCUREMENT REFORM (SCOTLAND) ACT, 2014.....	5
CLIMATE CHANGE (SCOTLAND) ACT, 2009.....	5
WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) .....	5
<b>ICT DELIVERY OF GREENER PUBLIC SERVICES</b> .....	<b>6</b>
<b>ICT LIFECYCLE</b> .....	<b>6</b>
PROCUREMENT.....	7
ICT OPERATIONS.....	9
DISPOSAL OR RECYCLE .....	12
<b>WORKFORCE - EMBEDDING BEHAVIOURAL AND CULTURAL CHANGE</b> .....	<b>14</b>
ICT PROFESSIONALS .....	14
GENERAL WORKFORCE .....	15
<b>MEASUREMENT AND PROGRESS REPORTING</b> .....	<b>16</b>
GREEN ICT MATURITY ASSESSMENT MODEL .....	17
GREEN ICT WORKBOOK.....	17
GREEN ICT REPORTING .....	18
<b>REVIEW DATE</b> .....	<b>19</b>
<b>CONTACT</b> .....	<b>19</b>
<b>ANNEX A – MATURITY MODEL</b> .....	<b>20</b>
<b>ANNEX B - WORKBOOK</b> .....	<b>21</b>
<b>ANNEX C – BEST PRACTICE EXAMPLES – PROCUREMENT</b> .....	<b>22</b>
<b>ANNEX D – BEST PRACTICE EXAMPLES – OPERATIONS</b> .....	<b>22</b>
<b>ANNEX E – BEST PRACTICE EXAMPLES – DISPOSAL</b> .....	<b>26</b>
<b>ANNEX F - CASE STUDIES - PROCUREMENT</b> .....	<b>27</b>
<b>ANNEX G - CASE STUDIES - OPERATIONS</b> .....	<b>30</b>
<b>ANNEX H - CASE STUDIES - DISPOSAL</b> .....	<b>37</b>
<b>ANNEX I - ALIGNMENT WITH DIGITAL PUBLIC SERVICES WORK STREAMS</b> .....	<b>38</b>

## Introduction

One of the drivers for the strategy [Scotland's Digital Future: Delivery of Public Services](#) was to ensure that our ICT infrastructure is deployed in an energy-efficient manner and, by delivering services digitally, reduce carbon impact. This reflected a recommendation of the [Review of ICT Infrastructure in the Public Sector in Scotland](#) report by John McClelland which said it was important that we ensure the way in which we deploy and manage our ICT operations in the public sector minimises its effect on the environment, in terms of energy usage and emissions as data processing equipment, and supporting facilities can be significant contributors to greenhouse gas emissions.

### **Scottish public sector Green ICT Vision :**

A cost effective and energy efficient ICT estate that reduces the environmental impact and continually looks at more sustainable ways of working for the public sector.

Green ICT is a frequently used term that commonly refers to ways of managing climate change due to ICT. Green ICT aims at reducing emissions and other waste produced across the ICT lifecycle – from procurement, operation of ICT in an organisation and disposal.

The services delivered in Scotland's public sector are extensive and underpinned by ICT. Consequently the ICT estate is considerable, consisting of hundreds of data centres, thousands of applications and a great many end user devices. Such a large ICT estate offers great potential to contribute to a greener environment by reducing waste and improving efficiency. The environmental impact of ICT is more than just the energy it uses in operation, it spans from procurement, through operation to eventual reuse, recycling and disposal. It is essential that the Scottish public sector ICT infrastructure is operated in a green and cost effective manner.

The strategy recognises the dual role of ICT in respect of environmental issues. On the one hand, ICT generates significant greenhouse gas emissions. On the other, ICT is an enabler to change the way government operates and provides services and realise efficiency and environmental improvements on a much wider and a larger scale. For example, by making use of technologies such as teleconferencing, an organisation can reduce travel costs, improve productivity and produce lower carbon emissions.

The strategy provides principles and guidelines on how public sector organisations in Scotland will contribute to meeting the Scottish Government's environmental targets. Progress on how ICT is contributing to those targets will be monitored through the [measurement and benefits framework](#) against which all digital delivery is made and for this strategy specifically

**Benefit 11** – We are helping to reduce Scotland’s carbon footprint.

This strategy aligns with other programmes (see [Annex I](#)) of work in the strategy [Scotland’s Digital Future: Delivery of Public Services](#); for example the data centre consolidation workstream which focuses on consolidation and re-use to achieve potentially significant cost-savings associated with energy consumption.

This strategy provides the principles and guidelines that Scottish public sector organisations will use to:

- reduce carbon emissions;
- plan for carbon reduction; and
- align with meeting the Scottish Government’s environmental targets on reducing carbon footprint.

## Who is the strategy aimed at?

In line with the approach of and commitments in [Scotland’s Digital Future: Delivery of Public Services](#), this strategy has been developed with and for the Scottish public sector in delivering their ICT services. The sectors in scope are:

- Central Government including Police and Fire;
- Local Authorities;
- Health;
- Further and Higher Education.

This strategy will also be available to the third sector and in particular is appropriate where they are supporting the direct delivery of public services.

## Why is Green ICT Important?

*From the website <http://greenit.net/whygreenit.html>:*

“Global carbon emissions attributable to ICT have been estimated at 2% to 2.5% of world totals - about the same as the airline industry - and as high as 5-6% of developed nation totals. McKinsey forecasts that the ICT sector’s carbon footprint will triple during the period from 2002 to 2020. For office buildings, ICT typically accounts for more than 20% of the energy used, and in some offices up to 70%.

Although energy costs typically comprise less than 10% of an overall IT budget, in a few years they could rise to more than 50% according to a 2006 Gartner report. Many large organisations - such as Google - already claim that their annual energy costs exceed their server costs.”

## Legislation and Scottish Government Policy

The Green ICT policy is not itself underpinned by legislation or mandate. It will, however, contribute to the mandatory and reporting elements established in other aspects of Scottish Government Legislation and policy initiatives:

### Procurement Reform (Scotland) Act, 2014

The sustainable procurement duty of [The Procurement Reform \(Scotland\) Act, 2014](#) refers to the 'environment', and requires certain authorities to produce procurement strategies and annual reports. The key element pertinent to the Green ICT strategy is that before carrying out a regulated procurement initiative, public authorities should consider how in conducting the procurement process they can improve the economic, social, and environmental wellbeing of the authority's area.

This is underpinned by self-assessment and prioritisation tools, and a maturity model which will allow procurement staff to assess the behavioural indicators of their organisation, and will feed into the legislative requirement of reporting. These tools should go live in April 2015 with the first requirements for reports to be submitted in 2016, and applies to procurement professionals.

### Climate Change (Scotland) Act, 2009

[The Climate Change \(Scotland\) Act, 2009](#), sets out targets to reduce Scotland's greenhouse gas emissions by at least 42% by 2020 and 80% by 2050, compared to a 1990-1995 baseline.

To ensure the delivery of these targets, the Act also requires that the Scottish Ministers set annual targets for Scottish emissions from 2010 to 2050, and publish a report on proposals and policies setting out how Scotland can deliver annual targets for reductions in emissions once emissions targets are fixed.

The Report, [Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027](#) published in June 2013 shows that Scotland is on track to meet targets and how, with concerted effort across public sector organisations, they could be met up to 2027.

### Waste Electrical and Electronic Equipment (WEEE)

The EC Directive on Waste Electrical and Electronic Equipment (2002/96/EC) was made law in the UK in 2007.

[The WEEE](#) regulations have interdependencies with the [Scottish Landfill Tax](#) which comes into force in April 2015, and also with [Scotland's Zero Waste Plan](#) so all three documents should be read together.

WEEE obligations do not cover all aspects of waste and asset disposal (e.g. data removal and destruction, and the transportation of waste for disposal). These additional costs can sometimes be offset the residual value of old equipment, but this needs to be negotiated with the supplier conducting the waste removal. Also, some WEEE is defined as “special waste” which means it contains hazardous material and must be disposed of with a fully completed consignment note by a registered waste carrier, the [Scottish Environment Protection Agency \(SEPA\) Website](#) contains more information on the identification and disposal of “special waste”.

## ICT delivery of greener public services

It is vital that the Scottish public sector makes best use of innovative ICT to transform and deliver digital public services. These services will be designed, delivered and available to the public in forms which minimise carbon impact and actively support the wider green agenda.

The Scottish public sector is committed to delivering services online, and offer customer services and experiences that are rich in information and join up traditionally separate services. Driving public services and communications online will help secure cost effective service, reduce paper handling, processing and storage, and will also reduce transportation and travel costs for citizens and organisations alike.

Organisations will work together to aggregate the demand and maximise the savings in these and other innovative technologies to continue this transformation, delivering more effective customer centric services with reduced carbon impact and improved cost effectiveness.

## ICT lifecycle

In order to reduce pollution and carbon emissions, the whole lifecycle of ICT equipment must be considered.

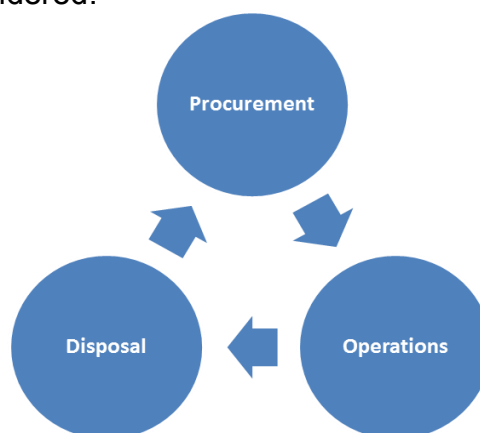


Figure 1: ICT Lifecycle

## Procurement

### Procurement principles

- Consider extending the life of existing systems
- Go for Services not Assets: Cloud services, virtualise, consolidate
- Packaging reduction, re-use, repair and re-cycling methods

Organisations must encourage and incentivise green practices from suppliers by considering a high weighting for green credentials in the awarding of contracts that appropriately encompass green solutions.

In order to achieve this, and ensure alignment with the assessment and prioritisation tools of [The Procurement Reform \(Scotland\) Act, 2014](#), ICT procurement processes will need to consider the following (the maturity levels and considerations are aligned directly to the Green ICT Maturity Model in [Annex A](#) and the ICT maturity Workbook in [Annex B](#)):

Maturity Level	Considerations
1	<ul style="list-style-type: none"> <li>➤ work pro-actively with suppliers to notify them of your organisations Green ICT commitment;</li> <li>➤ begin a consultation process to seek alignment of your organisations and suppliers green strategies;</li> <li>➤ begin a risk and opportunity exercise to identify suppliers with positive and negative impacts on sustainability (see also level 4).</li> <li>➤ examine if existing equipment can be postponed and existing equipment “sweated” beyond the end of life point, rather than purchasing at set refresh points (whilst taking into consideration that newer equipment can be more energy efficient so a balanced approach will need to be adopted to factor the age of equipment into whole-of-life costs);</li> <li>➤ examine if upgrades can be done via specific components;</li> <li>➤ embed <a href="#">Government Buying Standards</a>, Energy Star and <a href="#">EPEAT</a> standards; into all ICT procurement decisions;</li> <li>➤ strike a balance between the need for capital funding models and “pay as you consume” models to ensure that the relevant procurement models are adopted to meet the ICT needs of the organisation;</li> <li>➤ take into account the major elements of the life-cycle analysis and whilst striking a balance between sustainability and reasonable costs.</li> </ul>
2	<ul style="list-style-type: none"> <li>➤ routinely use sustainability tests in all procurement frameworks;</li> <li>➤ stipulate that suppliers provide energy usage and environmental information in tenders;</li> <li>➤ stipulate a set minimum amount of re-cycled material.</li> </ul>

<p style="text-align: center;"><b>3</b></p>	<ul style="list-style-type: none"> <li>➤ work pro-actively with suppliers to formally communicating your organisations Green ICT policies;</li> <li>➤ set targets in contracts to measure the outcomes of sustainable benefits;</li> <li>➤ record benefit sharing, to publicise, advertise and promote continual improvement sustainable/Green ICT outcomes.</li> <li>➤ establish a risk assessment process to formally manage and monitor risks throughout the whole of the contract life cycle.</li> <li>➤ ensure that purchasing requirements give consideration to existing application portfolios and data libraries/schemas (e.g. in the Government Apps store) before commissioning new software solutions.</li> </ul>
<p style="text-align: center;"><b>4</b></p>	<ul style="list-style-type: none"> <li>➤ work pro-actively with suppliers to target suppliers with positive impacts on sustainability (identified in level 1) to continually improve sustainability performance, and allow for the identification of opportunities to enhance sustainable benefits;</li> <li>➤ incorporate suppliers with negative impacts on sustainability (identified in level 1) into the audit process as part of risk management.</li> <li>➤ ensure that purchasing requirements first consider a move towards open source software development prior to commissioning new software.</li> </ul>
<p style="text-align: center;"><b>5</b></p>	<ul style="list-style-type: none"> <li>➤ ensure improvements stemming from supplier engagement programmes are publicised (e.g. awards or press releases) and shared with other organisations;</li> <li>➤ identify opportunities for further collaboration and innovation with suppliers;</li> <li>➤ constantly apply sustainability to ICT policies;</li> <li>➤ formally recognise that procurement is a key strategic element in delivering the organisation's sustainable/Green ICT objectives.</li> </ul>



## ICT Operations

ICT has a key role to play in reducing the impacts of carbon emissions on wider business operations and by using ICT solutions the Scottish public sector can reduce their energy usage and work more effectively.

### ICT Operations principles

- Minimise power consumption
- Follow data centre standards for efficient operations to help reduce power consumption
- Develop a road map for the transition from hosting own data to hosting in cloud based services to further reduce power consumption
- Reduce paper consumption
- Embed green behaviours in operational practices and services

Examples of best practice where technology can be used to enable change in Public Sector operations using ICT include:

### Data centres and cloud computing

Research indicates that data centre rationalisation, leading to colocation and virtualisation and ultimately to hosting data, where appropriate, in cloud based services offers the biggest win by far in greening ICT operations (e.g. consolidation can result in a reduction in a 25%-30% running costs; virtualisation can result in a 20% reduction in running costs, see the case studies in [Annex F](#), and Data Centre Optimisation best practice in [Annex D](#)).

Through the analysis of the use of data centres throughout the public sector in Scotland it has been identified that most do not proactively measure their energy consumption or understand the total cost of running their data hosting facilities. ICT industry financial analysis indicates that power consumption can account for a third of the cost of running such a facility.

The [Scottish public sector data centre and hosting strategy](#) sets direction and provides guidance to support organisations in moving to an approach based on a shift to service consumption and cloud provision, and away from an individual silo approach by using aggregated demand and economies of scale.

The strategy sets out how the public sector will adopt the following approaches for achieving significant efficiency and energy savings: [cloud computing](#), [virtualisation](#) and [colocation](#).

## **Using ICT to reduce consumables**

Greater use of mobile devices make it easier to use electronic documents without printing them. These reduce running costs and environmental impact, by providing electronic methods of working such as collaborative tools which will minimise the need for multiple copies and paper consumption. Electronic archiving of documents needs less space than paper ones which benefits organisations through reduced building capacity, controlled access to information and speedier response to requests for information.

## **End user devices and peripherals**

End user devices and peripherals include, amongst others, desktop PCs and laptops, mobile and smart phones, tablets, printers, scanners, copiers and fax machines.

Organisations should carefully consider whole-of-life environmental cost of devices before replacing them. Extending the service life of existing devices may be more favourable than purchasing new devices; for example desktop PCs reaching the end of their normal service life may be re-configured as thin clients or utilised in low use environments (although modern equipment could be more energy efficient than existing equipment so a balanced approach will need to be adopted to assess the full implications and associated costs). Device rationalisation and optimisation policies should be adopted. Opportunities will be sought to reduce the device to staff ratio, subject to satisfying business needs.

Many organisations have already successfully implemented software that shuts down PCs when they are not in use, this software has proved extremely effective at reducing the overall amount of energy used to run a PC. All organisations should enforce green settings on printers, copiers and multi-function devices. Managed printing services can also reduce unnecessary printing and should be appropriately adopted more widely across organisations. According to Zero Waste Scotland, this is probably where most carbon savings can be made so all organisations in the Scottish public sector should focus on this (see best practice examples and case studies for more information).

## **Networks, including SWAN (Scottish Wide Area Network)**

SWAN is a “network of networks” serving voice and data requirements for the Scottish public sector and joining up disparate silo networks. It will be an enabling layer for the delivery of public services in Scotland and also allow sharing and collaborative working and procurement across the public sector.

More than 4,600 sites will be connected to the initial network including schools, hospitals, GP surgeries, pharmacists and local council offices. Key benefits include reduced costs, improved service and the ability to share data across government departments, fostering co-operative working. Migrating onto this common network infrastructure will release many environmental savings, including those from removal of equipment supporting duplicated circuits and surplus bandwidth.

In order to achieve this, and ensure alignment with the assessment and prioritisation tools of [The Procurement Reform \(Scotland\) Act, 2014](#), ICT procurement processes

will need to consider the following (the maturity levels and considerations are aligned directly to the Green ICT maturity model in [Annex A](#) and the ICT maturity workbook in [Annex B](#)):

Maturity Level	Considerations
1	<ul style="list-style-type: none"> <li>➤ establish baselines against which to monitor improvements in Green ICT performance.</li> <li>➤ develop a strategy to reduce data capacity/retention limits (e.g. archiving/deletion of emails, use of shared spaces such as Knowledge Hub etc.);</li> <li>➤ develop a strategy to promote digital by default to increase take-up of on-line services by customers.</li> </ul>
2	<ul style="list-style-type: none"> <li>➤ reduce the number of data centres through consolidation and rationalisation;</li> <li>➤ promote new developments in ICT to encourage flexible and remote working amongst staff (e.g. the cloud as way of rationalising estates to reduce running costs and environmental impacts associated with office space/commutes to work);</li> <li>➤ migrate to Public Services Network, Scottish Wide Area Network or similar to reduce the need for circuit and equipment duplication;</li> <li>➤ move towards IaaS/PaaS etc.</li> </ul>
3	<ul style="list-style-type: none"> <li>➤ reduce the number of data centres to work towards virtualisation as the norm;</li> <li>➤ routinely monitor and report environmental and socio-economic outcomes of all ICT operations</li> <li>➤ ensure contract sustainability governance is in place (e.g. contract steering group to monitor progress and performance against key procurement milestones).</li> </ul>
4	<ul style="list-style-type: none"> <li>➤ host data in cloud based service, where appropriate;</li> <li>➤ align Green ICT strategy with all related business strands (travel, estates, HR etc.);</li> <li>➤ produce statements highlighting the benefits from implementing sustainable procurement strategies, and share these across the organisation and relevant stakeholders;</li> <li>➤ compare Green ICT strategy of your organisation with those of comparable organisations.</li> <li>➤ improve solution design to enhance good sustainability outcomes, and consulting all stakeholders (including suppliers) during development.</li> </ul>
5	<ul style="list-style-type: none"> <li>➤ externally scrutinise and aligning Green ICT strategy with the strategies of similar organisations to allow for standardised assessment and peer review;</li> <li>➤ formally benchmark the Green ICT strategy against other organisations, independently audited and reported internally and externally.</li> </ul>

## Disposal or Recycle

### Disposal principles

- Re-pair - if broken fix it
- Re-use, Re-furbish for other purposes
- Re-cycle
- Clean and re-sell/donate - charitable and registered voluntary and community groups
- Dispose in line with regulations.

Once ICT equipment or services are considered surplus to requirements, or in need of replacement, adoption of a clear “waste hierarchy” will ensure that it is possible to:

- Reuse (by far the best environmental option) or refurbish surplus equipment to avoid unnecessary procurement of new equipment within the public sector;
- recycle and reuse components of ICT equipment;
- where practical and feasible, donate surplus equipment to benefit charitable or similar initiatives in Scotland or beyond, subject to security and full traceability requirements being met (this may be influenced by the approach taken to “sweating” equipment beyond its end-of-life point as discussed in procurement, as equipment may ultimately be too old to be of any further use);
- equipment capable of holding information should be wiped clean of any data prior to being re-used by another party or sent for destruction (this may require specialist companies to be engaged in order to carry this task out, which in turn may result in additional costs, which will need to be factored into end-of-life costs);
- many charities receiving surplus equipment for donation will carry out PAT testing but it is advisable to confirm this in advance to ensure that the equipment is safe.

If equipment is genuinely waste, new mandatory policy and standards for disposal of ICT equipment will ensure that government is environmentally and socially responsible. Government will strive to eliminate waste sent to landfill and seek the use of “energy from waste” schemes for disposal of any residual materials from unwanted ICT equipment.

Organisations should develop a detailed re-use and recycling policy and procedure for the disposal of ICT equipment ensuring that the required clearances are obtained from appropriate authority for recycling.

Scottish public sector organisations must ensure that all ICT equipment is recycled safely and securely at the end of the life of equipment. This includes all devices, such as:

laptops	desktops
monitor	keyboards
mouse	printers including Multi-Function Devices
mobile phones	desktop phones including batteries etc

These must be recycled subject to environmental legislation. These must be recycled subject to WEEE regulations . [The Scottish Landfill Tax](#) which comes into force in April 2015, and also with Scotland's Zero Waste Plan. The issue of disposal also has interdependencies with [Government Buying Standards](#), so all initiatives should be considered together.

In order to achieve this, and ensure alignment with the assessment and prioritisation tools of [The Procurement Reform \(Scotland\) Act, 2014](#), ICT procurement processes will need to consider the following (the maturity levels and considerations are aligned directly to the Green ICT Maturity Model in [Annex A](#)):

Maturity Level	Considerations
<b>1</b>	➤ <b>Repair before disposal.</b> Examine if equipment can be repaired and reused before disposal (i.e. "sweated" beyond the end of life point) whilst acknowledging that a balance has to be struck between green issues an fair and reasonable costs.
<b>2</b>	➤ <b>Re-use and refurbish.</b> Examine if end-of-life equipment can be reused to meet other needs within the organisation (e.g. reuse components from obsolete equipment, reuse PC's as thin clients or in low use environments etc.).
<b>3</b>	➤ <b>Re-cycle in line with regulations.</b> If the equipment is genuinely waste, develop a mandatory policy for the disposal of obsolete ICT equipment (e.g. building into contracts terms and condition for suppliers to take back and recycle the equipment, following WEEE regulations etc.).
<b>4</b>	➤ <b>Donate.</b> If end-of-life equipment cannot be repurposed within the organisation, examine if it can be donated (e.g. to community and charitable organisations) subject to satisfactory PAT testing and wiping of existing data.
<b>5</b>	➤ <b>Donate.</b> If donating to other organisations, proactively working with the organisation to ensure that they are environmentally responsible and transparent in their own ICT operations and disposal policies.

## **Workforce - embedding behavioural and cultural change**

People are using ICT and digital tools in their daily life whether its at home or in the workplace. Although its usage is unconsciously embedded it is rare that people are taught how to efficiently use it.

Organisations have a role to ensure that their workforce use ICT equipment and applications as efficiently as possible to ensure that energy and cost savings can be achieved. To achieve this the Scottish public sector needs to develop staff to think environmentally friendly.

To enable people to make informed decisions it is important to motivate and encourage engagement in the workplace to deliver environmental changes and change habitual behaviours.

Organisations are encouraged to:

- deliver information in an engaging and positive way;
- maximise the message conveyed with interactivity and discussion;
- link individual actions to the bigger picture to personalise the issue and help people to recognise the power of collective will.

It is recognised there are two groups of ICT users in the workforce who view its implementation and usage in different ways, there are the ICT professionals and the general workforce.

### **ICT professionals**

Examples of areas that ICT professionals should consider when delivering their digital services to promote a greener environment include:

- adopt a data hosting road map moving from data centre rationalisation to colocation and virtualisation and ultimately to hosting data, where appropriate, in cloud based services to achieve potentially considerable financial savings (e.g. in power consumption);
- looking at power consumption and reduction in power consumption when upgrading ICT hardware;
- operating systems that allow computers and other hardware to be put into sleep mode during periods of inactivity;
- investigating carbon offset programs to offset ICT carbon emissions;
- implement desktop virtualisation using ultra small and thin clients on the desktop which will reduce power consumption, reduce PC maintenance costs, increase security and set up new workgroups quickly;
- switching off non-essential servers;
- using energy management software tools.

## General workforce

Education programmes that introduce behaviour changes should be encouraged, such as:

- turning off equipment at night (*although this is not required if power management tools are deployed - see best practice examples and case studies*);
- printing less;
- reducing email traffic;
- using video conferencing
- raising the consciousness of staff of the negative impacts associated with “non-Green” behaviours

In order to achieve this, and ensure alignment with the assessment and prioritisation tools of [The Procurement Reform \(Scotland\) Act, 2014](#), ICT procurement processes will need to consider the following (the maturity levels and considerations are aligned directly to the Green ICT Maturity Model in [Annex A](#)):

Maturity Level	Considerations
1	<ul style="list-style-type: none"> <li>➤ establish a commitment to a Green ICT Champion to drive sustainability;</li> <li>➤ provide basic training in Green ICT, and establishing (but not delivering) a programme of advanced and/or refresher training to senior/key staff;</li> <li>➤ communicate Green ICT principles to all staff to promote energy efficiently principles (e.g. turn off computers at night; digital by default to reduce staff travel via use of on-line collaboration tools).</li> </ul>
2	<ul style="list-style-type: none"> <li>➤ provide training to embed basic Green ICT principles across all the workforce;</li> <li>➤ completing advanced/refresher training in green ICT to all senior/key staff.</li> </ul>
3	<ul style="list-style-type: none"> <li>➤ include delivery of environmental and socio-economic outcomes in Green ICT into performance objectives and appraisals of senior/key staff.</li> </ul>
4	<ul style="list-style-type: none"> <li>➤ include Green ICT objectives in competencies for the recruitment of key staff where appropriate.</li> </ul>
5	<ul style="list-style-type: none"> <li>➤ undertake a review to determine future priorities (including a skills audit of the workforce to plan future skills requirements; matching ICT capacity to demand with minimal requirements to reduce the staff to device ratio, etc.).</li> </ul>

## Measurement and progress reporting

This approach builds upon the experience of the [UK HMG Green ICT maturity model](#). The UK model has much to recommend it but it has been recognised by Scottish public sector organisations that it is time consuming to complete. With this in mind, a light touch version has been developed to allow organisations to quickly understand their Green ICT maturity.

Measurement, monitoring and progress reporting are important in understanding how Scottish public sector organisations are implementing green principles in delivering their ICT.

To measure progress organisations will need to self-assess against a Green ICT Maturity Assessment Model (see [Annex A](#)). This is a framework for tracking the progress of each Scottish public sector organisation. It assesses sustainability across different areas of ICT:

- purchasing ICT services;
- managing and Operating ICT services;
- disposing of ICT.

For an organisation to assess itself they will use the workbook in the maturity assessment model that contains a comprehensive set of best practice actions and principles to reduce the environmental impact of the their ICT (see [Annex B](#))

Effectively greening government means making informed changes. It is important to understand and balance the environmental impact of public sector organisations, the ICT it operates, the processes it enables and the outcomes it delivers. Ultimately, organisations must understand the environmental impact of any change it makes. A good understanding will allow forward planning and achievement of aims within the time and resources available.

The Scottish public sector must demonstrate the embedding of green ICT principles into the ICT estate and its business processes, and show progress towards its commitments. It is vital therefore, that the Scottish public sector accounts for and measures progress in a consistent way.



The Scottish public sector will do this through a stepped approach making use of the following tools:

## **Green ICT Maturity Assessment Model**

The Green ICT maturity assessment model provides a common framework to show progress across the whole of the Scottish public sector. It provides a mechanism to embed green ICT impact assessments into government processes and practices, whilst recognising different starting points and opportunities. Each Scottish public sector ICT department is expected to track and report its maturity level.

The Model provides the means to assess sustainability across the whole ICT lifecycle (see [Annex A](#)).

## **Green ICT Workbook**

This [Green ICT Workbook](#) forms part of the maturity assessment and provides a tool for driving progress. It contains a comprehensive set of green ICT best practice actions and principles to reduce the environmental impact of ICT across the Scottish public sector estate. A variety of best practice actions that can be adopted by organisations to achieve a high level of Green ICT maturity.

It is essential that the ICT requirements of ICT professionals are in alignment with the framework used by procurement professionals. For this reason the procurement maturity model aligns with the Green ICT workbook developed for use by ICT professionals in the Scottish Public Sector ([Annex B](#)).

ICT professionals are encouraged to complete this workbook to assess the behavioural indicators of their own organisation. The best practice examples ([Annex C](#)) and case studies ([Annex F](#)), provide suggestions on how to progress through the levels. By completing the Green ICT workbook, and using the best practice examples and case studies to improve maturity levels, the decisions of ICT professionals should ultimately be in alignment with those of procurement professionals, and the wider public sector with regards to sustainability.

## Green ICT Reporting

### Procurement Reform (Scotland) Act, 2014.

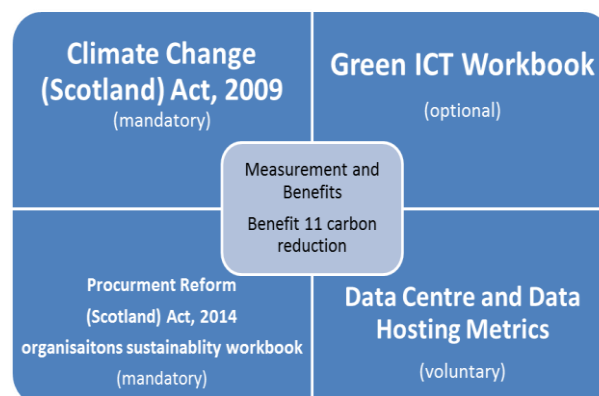
Wider mandatory reporting of carbon emissions and energy consumption will be reported by all public sector bodies as part of the Procurement Reform (Scotland) Act, 2014. In addition more specific details will be captured through the sustainability reporting that around 150 major public sector bodies are mandated to report to the Energy and Climate Change team.

These reporting methods do not specifically measure an organisations ICT energy impact as the requirement is to capture the organisations total energy consumption.

### Climate Change (Scotland) Act, 2009 reporting.

There is a voluntary element to the energy and climate report that is more specific to a sector or discipline and ICT specific information will form part of the 2015/2016 report.

In achieving energy reduction ICT must be considered as an integrated part of how an organisation works and the services it uses and delivers.



Implementation of this strategy will, therefore, take into consideration and align with other initiatives which have elements of greening government.

To be effective and achieve the best results the Scottish public sector should follow the guidance in this strategy and assess themselves against the maturity indicators of the three lifecycle phases to encourage their continuous improvement and to contribute against their organisations green performance.

### Data Hosting and Data Centre Strategy reporting.

As the implementation of the data hosting and data centre strategy progresses, work will be undertaken to define a reporting mechanism that will enable organisations to monitor and understand their energy consumption. This will help to identify areas for carbon reduction that will contribute in reducing their data centres PUE to a level of less than 1.8

## Review Date

This is Version 1 of this document. The review date is set for March 2018.

## Contact

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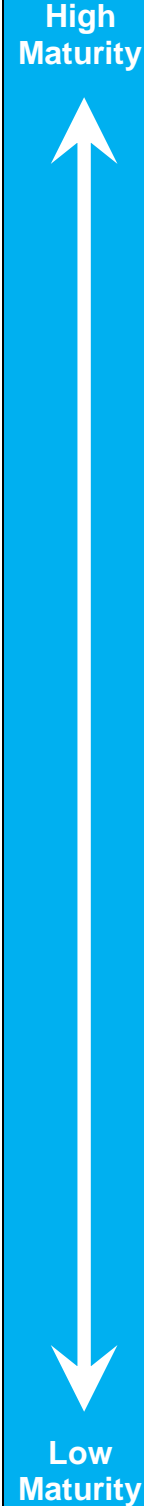
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## Annex A – Maturity Model

The maturity model is a scorecard whereby all public sector bodies can track their progress from wherever they are starting, and show the value-added from their Green ICT work both in term of adopting best practices and also from embedding green ICT thinking into everyday business processes and practices.

 <p style="text-align: center;">High Maturity</p> <p style="text-align: center;">Low Maturity</p>	<b>Level 5</b>	<b>Leader</b>	<ul style="list-style-type: none"> <li>➤ Green ICT achievements are independently audited and shared with other organisations for peer review;</li> <li>➤ Stakeholders are routinely engaged when formulating and reviewing Green ICT policies.</li> </ul>
	<b>Level 4</b>	<b>Progressive</b>	<ul style="list-style-type: none"> <li>➤ Green ICT strategy is fully aligned with all business strands throughout the organisation;</li> <li>➤ Regular examination and benchmarking of Green ICT polices against comparable organisations;</li> <li>➤ Beginning to identify high-risk stakeholders (including sub-contractors) and incorporating into own risk management/ audit processes.</li> </ul>
	<b>Level 3</b>	<b>Embedded</b>	<ul style="list-style-type: none"> <li>➤ Sustainability through Green ICT is an intrinsic part of all senior staff objectives;</li> <li>➤ Environmental and socio-economic outcomes of Green ICT routinely monitored;</li> <li>➤ Formal engagement programme with key stakeholders to achieve multilateral integration of Green ICT objectives.</li> </ul>
	<b>Level 2</b>	<b>Compliance</b>	<ul style="list-style-type: none"> <li>➤ All staff have received basic training in Green ICT as a minimum and understand how it facilitates sustainability;</li> <li>➤ Strategies in place to promote flexible and remote working as a major contributor to green and sustainable goals;</li> <li>➤ Baselines for monitoring progress have been established;</li> <li>➤ Consultation begun with key stakeholders on multilateral integration of Green ICT objectives;</li> <li>➤ Whole of life costs and sustainability tests regularly factored into ICT procurement decisions.</li> </ul>
	<b>Level 1</b>	<b>Foundation</b>	<ul style="list-style-type: none"> <li>➤ Basic concepts and the need for Green ICT as a major driver in sustainability are understood and senior staff have expressed commitment;</li> <li>➤ Beginning to gather information to use as a baseline against progress;</li> <li>➤ Basic actions are taken when considering ICT life-cycle (e.g. reuse before purchase, following Government buying standards etc.);</li> <li>➤ Key stakeholders are informed of the organisation's commitment to Green ICT.</li> </ul>

## Annex B - Workbook

Measurement, monitoring and progress reporting are important in understanding how Scottish public sector organisations are implementing green principles in delivering ICT.

The workbook that organisations will use to assess their Green ICT maturity provides a common framework to show progress across the whole of the public sector. It provides a mechanism to embed green ICT impact assessments into public sector processes and practices, whilst recognising different starting points and opportunities.

The workbook to assist the Scottish public sector in understanding their Green ICT maturity level will assess organisations on 3 areas through the lifecycle of ICT commodities:

- Procurement;
- Operations;
- Disposal.

There is no requirement to provide evidence what has been done in working towards the maturity levels, the workbook is a self-assessment tool, and is purely for the benefit of individual organisations in question.

[The workbook can be accessed by clicking here](#)

## Annex C – Best Practice Examples – Procurement

	Subject	Background	Best Practice
Procurement	Supply Chain	Checking the green credentials of suppliers to minimise the environmental impact of purchases.	Ask suppliers to: <ul style="list-style-type: none"> <li>➤ Set out how they are taking steps to reduce toxicity levels in products;</li> <li>➤ How they use carbon neutral resources in manufacturing;</li> <li>➤ What steps they are taking to minimise packaging</li> <li>➤ What steps they are taking ensure the transport of goods is carbon neutral.</li> <li>➤ Building into contracts that suppliers take back/ recycle packaging.</li> <li>➤ Specify computers with high-efficiency Power Supply Units (power supply units convert mains AC power to the DC power needed by computers. Efficient computers minimise energy loss from this conversion in the form of heat (minimum 80% conversion))</li> <li>➤ Purchasing ICT devices that comply with Electronic Product Environmental Assessment Tool certification, most up-to-date Energy Star ratings, EuP Framework etc.</li> </ul>
	“Sweating” Equipment Beyond End Of Life Cycle	Extending set refresh points of devices to reduce the environmental impact of waste equipment.	<ul style="list-style-type: none"> <li>➤ Repair or upgrade specific components of older devices where cost effective (e.g. repair/upgrade if a few or cheaper components are involved).</li> </ul>
	Whole-Of-Life Costs	As a rule of thumb high quality equipment, has a longer shelf life and can be repaired or upgraded easier.	<ul style="list-style-type: none"> <li>➤ Investigate reparability/upgradability of equipment before purchasing or leasing, and factor into procurement and running costs to help extend refresh points/”sweat” equipment for longer periods;</li> <li>➤ Liaise with procurement specialists to ensure that contract awards take broad view of “lifetime” costs, and do not simply focus on what is on the initial price ticket.</li> </ul>

## Annex D – Best Practice Examples – Operations

	Subject	Background	Best Practice
Operations	Device Reduction and Consolidation	<p>A strategy to reduce the number of devices (laptops, PCs tablets, mobile phones, printers etc.) to reduce power consumption. Industry standard ratios are:</p> <p>PCs and laptops – 1 device per employee; Printers/copiers etc. – 1 device to every 10 employees.</p>	<p>Undertake audit to establish the current ratios;</p> <ul style="list-style-type: none"> <li>➤ PCs and laptops/employee:</li> <li>➤ Undertake a persona survey of employees to establish what device they actually need to carry out their role.</li> </ul> <p>Printers/copiers:</p> <ul style="list-style-type: none"> <li>➤ Replace individual devices with multifunctioning devices;</li> <li>➤ Re-locate devices to shared areas rather than at end of desks etc.</li> </ul>
	Employee Behaviour	<p>Change end-user behaviour to embed efficiency principles that become automatic over time e.g.</p> <ul style="list-style-type: none"> <li>➤ turning off desk-top PCs at the end of the day;</li> <li>➤ deleting unwanted emails/clearing out deleted and sent emails folders;</li> <li>➤ discouraging staff from using/download screensavers (monitors left running with an active screen savers use the same amount of energy as when the screen is in full use).</li> <li>➤ deleting obsolete or duplicate files;</li> <li>➤ using cloud based file hosting services (subject to security policies) for large attachments, rather than sending by email;</li> <li>➤ Setting printers to duplex and black &amp; white as default to discourage single sided and colour printing.</li> </ul>	<p>Group and peer discussion, e.g. introducing a Green champion into a team (could be combined with general green issues, not just ICT). Supported by internal “marketing” campaigns; rewarding positive behaviours through awards at team or divisional level, and publicising achievements so staff can see the bigger picture.</p>

	Subject	Background	Best Practice
Operations	Automated Power Management	<ul style="list-style-type: none"> <li>➤ Software that automatically powers down devices (monitors, hard drives etc.) following dormancy of a pre-specified period. „Wake-on-LAN’ software automatically powers up equipment to install software upgrades at night when electricity costs are cheaper.</li> <li>➤ Printers are on average active for just 12 calendar days per year; if not in sleep mode they waste energy 97% of the time.</li> </ul>	Re-set power management settings on devices, or purchase/install software if power management settings on devices do not conform to desired standards.
	Data Centre Optimisation	<p>The EU Code of Conduct for Data Centres, 2008, describes best practices for efficient operation.</p> <p>On average almost 40% energy used by data centres is for information storage and retrieval, which is in turn governed by disk speed (faster retrieval speeds demand more energy).</p> <p>A powered-up but idle server requires at least 50% of the power used when fully operational, therefore a single server running at 80% load uses considerably less energy than 4 servers each running at 20% load.</p>	<p>Examples of best practice include:</p> <ul style="list-style-type: none"> <li>➤ Store infrequently accessed data on slower disks to reduce energy consumption;</li> <li>➤ Delete unused data to free up disk space and reduce the number of disks required;</li> <li>➤ Back up on tape not disk;</li> <li>➤ Move to virtual servers by partitioning servers that run in parallel on the same hardware without any interference;</li> <li>➤ When designing new services, use physical or virtual servers before considering the purchase of new servers;</li> <li>➤ Configure several „virtual’ servers onto a single server to increase capacity and decreases energy requirements (and also reduce hardware and support costs)</li> <li>➤ Further best practice examples can be found at: <a href="http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/ICT_CoC/2014_best_practice_guidelines_v5_1_1r.pdf">http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/ICT_CoC/2014_best_practice_guidelines_v5_1_1r.pdf</a></li> </ul>



	<b>Subject</b>	<b>Background</b>	<b>Best Practice</b>
<b>Operations</b>	Remote Meeting and Home Working	Use of tools (audio/video/web conferencing) allowing employees to work without being in the same location, to lower carbon emissions through reduced travel and power consumption in the office.	<ul style="list-style-type: none"> <li>➤ Introducing dedicated audio/video conference suites and giving priority or sole use to remote meetings;</li> <li>➤ Implementing reward schemes for employees who do not travel to meetings;</li> <li>➤ raising the consciousness of staff of the impacts associated with “non-Green” behaviours (e.g. placing messages on travel booking forms about the environmental costs associated with travel to meetings, increasing the awareness of Line Managers when authorising travel expenses etc.).</li> <li>➤ Greater use of hot-desking facilities rather than named/allocated desks for individuals so employees do not feel that there is a mandatory requirement to come into work.</li> </ul>
	Thin Client Computing	Provides users with the same functionality as desktops, but at considerable power savings as there is no local processor (the terminal is attached direct to a server). This results in less heat generation, so: Reduction in cooling of office space; Reduced frequency of upgrades as no hard drive or local processing capacity.	<ul style="list-style-type: none"> <li>➤ Thin clients have an increased impact on data centres, in terms of increased energy consumption. The trade-offs needs to be assessed according to the individual circumstances of each organisation.</li> </ul>

## Annex E – Best Practice Examples – Disposal

	Subject	Background	Best Practice
Disposal	Disposal	Waste Electrical and Electronic Equipment directive has resulted in the disposal of electronic equipment being the responsibility of responsibility manufacturers and suppliers who should pay for the collection of equipment when it has reached end of life and either recycle or responsibly dispose of it.	When purchasing ICT equipment obtain contact details from the manufactures/supplier when equipment is genuinely waste.

## Annex F - Case Studies - Procurement

Procurement						
Topic	Organisation	Background	Solution	Results	Acknowledgements	Further Information
Collaborative ICT Procurement.	The Scottish Government	Existing traditional individual procurement arrangements identified as leading to inherent inefficiencies.	Introduce a collaborative framework agreement for the Scottish public sector to create a standardised approach to procurement for the purchase of ICT products. The framework is based upon mandatory energy efficiency criteria (minimum Energy Star 5 and EPEAT Sliver rating).	<p>Carbon emissions reduced by 16,300 tonnes over three years (by replacing 159,000 corporate desktops).</p> <p>Subsequent iterations of the framework stipulate a maximum size/configuration/physical arrangement of desktop equipment, with the aim of further reducing carbon emissions by 62 kg per PC over a three year period.</p>		<a href="http://www.gov.scot/Topics/Economy/digital/digitalservices/greenict">http://www.gov.scot/Topics/Economy/digital/digitalservices/greenict</a>

Procurement						
Topic	Organisation	Background	Solution	Results	Acknowledgements	Further Information
Total Costs of Ownership and Whole of Life Costs.	Stockholm County Council, Sweden.	Replace c. 40,000 desktops and laptops on a rolling basis.	Introduce environmental requirements for purchasing IT (in line with common EU green public procurement criteria) balanced against Most Economically Advantageous Tender (MEAT) including life-cycle costs.	Carbon emissions reduced by 2,000 tonnes per annum (equivalent to c. £350,000 per annum)		<a href="http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue10_Case_Study25_Stockholm_IT.pdf">http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue10_Case_Study25_Stockholm_IT.pdf</a>

Procurement						
Topic	Organisation	Background	Solution	Results	Acknowledgements	Further Information
Lease of hardware/ Services.	Consip SA (centralised Public Purchasing) Italy.	Existing traditional ownership of hardware plus associated maintenance costs identified as leading to inherent inefficiencies.	Establish framework (including minimum environmental criteria) for ICT services, covering 160,000 workstations of various public bodies, including management of ICT platforms, leasing of hardware, software licenses and virtualisation services.	Carbon emissions reduced by 14,000 tonnes per annum (equivalent to 5 million euros per annum).		<a href="http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue38_Case_Study81_CO2NSIP_ICT_equipment.pdf">http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue38_Case_Study81_CO2NSIP_ICT_equipment.pdf</a>

## Annex G - Case Studies - Operations

Operations						
Topic	Organisation	Background	Solution	Results	Awards	Further Information
Data Centre – Consolidation	Aberdeen University, Robert Gordon University, Aberdeen College and Banff & Buchan College.	Existing data centre facilities across all four institutions inadequate for future requirements, and unsustainable based on existing performance.	Introduce a shared service approach to data centres, backed by energy efficient design (North East of Scotland Shared Data Centre).	Carbon emissions reduced by 1,400 tonnes per annum (£250K per annum).	<ul style="list-style-type: none"> <li>➤ First Prize (Public Sector category) Computer Weekly European User Awards.</li> <li>➤ Data Centre Project of the year, Computing UK.</li> </ul>	<a href="http://www.abdn.ac.uk/news/5455/">http://www.abdn.ac.uk/news/5455/</a>
	St Andrews University.	<ul style="list-style-type: none"> <li>➤ Existing data centre facilities inadequate for future requirements.</li> <li>➤ University wide drive to be carbon neutral for energy supply by 2016.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reduce data centres from 50 to 2 (including increased virtualisation).</li> <li>➤ Enhanced detailed telemetry to facilitate a high degree of component optimisation.</li> </ul>	➤ 30% reduction in energy (total annual savings over £61,000 per annum).	<ul style="list-style-type: none"> <li>➤ BCS CEEDA Gold award</li> <li>➤ Corporate Participant in European Code of Conduct on Data Centres (EUCOC).</li> <li>➤ The design was used for the development of the BREEAM datacentre scheme.</li> </ul>	<a href="http://www.gov.scot/Resource/0046/00465172.pdf">http://www.gov.scot/Resource/0046/00465172.pdf</a>

Operations						
Topic	Organisation	Background	Solution	Results	Awards	Further Information
	Bassetlaw District Council, Derbyshire.	➤ Council wide issue that the available electricity supply capacity was limiting future expansion of all electronic services.	➤ Reduce the number of its physical servers from thirty-six to four.	<ul style="list-style-type: none"> <li>➤ Air conditioning running costs reduced by 25%</li> <li>➤ Electricity bills reduced by £10,000 pa (equating to carbon savings of c. 11 tonnes).</li> </ul>	➤ Principles adopted by other Local Authorities (e.g. Doncaster Metropolitan Borough Council)	<a href="http://www.ukauthorities.com/GreenICT/Examples/tabid/84/Default.aspx#">http://www.ukauthorities.com/GreenICT/Examples/tabid/84/Default.aspx#</a>

Operations						
Topic	Organisation	Background	Solution	Results	Acknowledgements	Further Information
Data Centre – Virtualisation.	Sheffield Hallam University	Excessive server count leading to space and outage problems.	Replace 120 physical servers with 300 „virtual’ servers.	<ul style="list-style-type: none"> <li>➤ More services for less cost - £2500 saving on hardware each time a virtual machine is deployed.</li> <li>➤ Better server utilisation (50-70% versus an average of 5% for physical servers).</li> <li>➤ 20% saving in energy consumption.</li> </ul>		<a href="http://www.suste.it.org.uk/cases/s hort-case-studies.php">http://www.suste.it.org.uk/cases/s hort-case-studies.php</a>
	City of Leeds Council	Data centre review resulted in excessive sever count.	“Virtualise” 138 servers to 10 severs.	Carbon emissions reduced by 767 tonnes per year.		<a href="http://www.ukau thority.com/GreenICT/Greening councilICTexam ples/tabid/84/Default.aspx#">http://www.ukau thority.com/GreenICT/Greening councilICTexam ples/tabid/84/Default.aspx#</a>



Operations						
Topic	Organisation	Problem	Solution	Results	Acknowledgements	Further Information
Data Centre – Cooling	Fife Council	Existing air conditioning in data centres is 10 years old and does not take into account significant developments in cooling over time.	Redesign the layout of racks to reduce the amount of cooling required (switch to “cold isle” layouts and introduce a “free cooling” system to filter cold air from outside the building).	Electricity bills reduced by £42,000 per annum (equating to carbon savings of 135 tonnes per year).		<a href="http://www.gov.scot/Topics/Economy/digital/digitalservices/greenict">http://www.gov.scot/Topics/Economy/digital/digitalservices/greenict</a>
Print Reduction	Department For Work and Pensions	Unsustainable printing costs and energy usage in printing.	Introduce a managed print service - 30,000 legacy printers replaced with 8,200 energy star rated multifunctioning devices.	Electricity consumption reduced by 63%.  Financial savings via default double-sided printing.  Help desk calls halved (and 90% reduction in the number of site visits by engineers to deal with faulty printers).	Green ICT Awards Public Sector Project of the year, 2011.	<a href="http://news.xerox.co.uk/news/green-it-award-goes-to-the-department-208377">http://news.xerox.co.uk/news/green-it-award-goes-to-the-department-208377</a>

Operations						
Topic	Organisation	Problem	Solution	Results	Acknowledgements	Further Information
Desktop Video Conferencing Integration	Natural Environment Research Council	Unsustainable costs resulting from travel to meetings.  High-level commitment at CEO level to reduce the CO2 emissions.	Installation of high definition desktop video conference equipment.	Carbon emissions reduced by c. 15 tonnes (equating to £32,000 per annum)  Reduction in travelling times (and thus staff costs) of equating to c. 1,400 hours per annum.		<a href="http://www.gov.scot/Resource/0046/00465173.pdf">http://www.gov.scot/Resource/0046/00465173.pdf</a>

Operations						
Topic	Organisation	Problem	Solution	Results	Acknowledgements	Further Information
Thin Client Terminals	Queen Margaret University, Edinburgh	Unsustainable running costs of existing desktop PC's.	Replace standard desktops with 1,250 thin client terminals.	<ul style="list-style-type: none"> <li>➤ Longer refresh periods (typically 8 years versus 4 years for desktops).</li> <li>➤ Provision of natural ventilation and heating in buildings due to reduction in heat produced by thin client terminals.</li> <li>➤ Annual electricity consumption to power thin clients reduced by £50K per annum).</li> <li>➤ Annual electricity consumption to ventilate buildings reduced by £60K per annum.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Green Business Awards 2011, Highly Commended, Energy Efficiency Category.</li> <li>➤ Green Gown Award 2011, Highly Commended.</li> </ul>	

Operations						
Topic	Organisation	Problem	Solution	Results	Acknowledgements	Further Information
Automated Power Management  Employee Behaviour	Staffordshire County Council	Desk top PCs being left on overnight leading to unnecessary costs.	Used software that: <ul style="list-style-type: none"> <li>➤ automatically shut down PCs at the end of the day;</li> <li>➤ track which PCs were left on when the programme is run and send automated reminder to users.</li> </ul>	Cost savings over £40,000 per year.		<a href="http://www.ukauthority.com/GreenICT/GreeningcouncilICTexamples/tabid/84/Default.aspx">http://www.ukauthority.com/GreenICT/GreeningcouncilICTexamples/tabid/84/Default.aspx</a>
	University of Liverpool			<ul style="list-style-type: none"> <li>➤ Reduction in PCs being on standby from twenty hours per day to less than one;</li> <li>➤ Cost saving of more than £30,000 per year (equivalent to £70 p/a per PC).</li> </ul>		<a href="http://www.data synergy.co.uk/casestudies/liverpool.aspx">http://www.data synergy.co.uk/casestudies/liverpool.aspx</a>

## Annex H - Case Studies - Disposal

Disposal						
Topic	Organisation	Problem	Solution	Results	Acknowledgements	Further Information
Donation of Equipment	City and Islington College.	Unsustainable disposal costs of old IT following desktop refresh.	Donate IT equipment that cannot be reused elsewhere in the organisation.	1,000 desktops donated in one year, equating to 30 tonnes of waste that would need to be disposed of under Waste Electrical and Electronic Equipment (WEEE) Regulations.	Mayor of London Green Awards 2010, Sliver Award.	<a href="http://www.suste.it.org.uk/cases/s hort-case-studies.php">http://www.suste.it.org.uk/cases/s hort-case-studies.php</a>  See also "Reducing ICT Waste at Nottingham Trent University" available via the same link.

## Annex I - Alignment with Digital Public Services work streams

Digital Public Services Work Stream	Green ICT Standard and Principle
Secure and easy sign-in to online services	<p>Ensure policy development considers Green ICT principles. Create technical standards which support interoperability to facilitate common design standards and consistency in accessibility, when verifying identity.</p> <p>Where possible when considering options to deliver policy seek to reuse and build upon existing assets; where the need to procure is identified ensure this adheres to the principles outlined within this document.</p>
A single point of entry to services and the redesign of services for digital delivery – mygov.scot	Ensure green ICT principles are reflected in policy development. Deliver more sustainable, streamlined public sector online services and ICT projects through the consolidation of websites and CMS systems.
Privacy and Openness: using data appropriately	Develop policy which ensures technical standards support interoperability to facilitate responsible sharing of data for operational delivery and for research and statistics, where appropriate.
Workforce	Embed green ICT principles into Senior Management objectives to promote joined-up ways of green working across all business functions within the organisation.
	Embed green ICT principles into Senior Management objectives to promote joined-up ways of green working sectors and across sectors.
	Match employees with appropriate devices to reduce device-employee ratios, and increase flexible working to reduce the carbon footprint of organisations.
ICT Workforce	Undertake green ICT skills audit to plan future skills requirements and inform change programmes.
High level ICT Operating Framework	Embed the principle of re-use before buy into all architecture and design principles and common standards to eliminate duplication and reduce spend.

Digital Public Services Work Stream	Green ICT Standard and Principle
Scottish Wide Area Network	Consolidation by migration to shared or „doud’ services where appropriate, based upon Government buying standards, to facilitate identification of duplicate systems and applications, communication circuits and surplus.
	Ensure responsible decommissioning of circuits/equipment enabling circuits, that have reached end-of-life point in line with waste hierarchies to minimise impacts on landfill.
	Ensure network capacity, resilience and fault tolerance is not over specified to reduce power consumption.
National approach to Data Management and storage	Data centres comply with EU Code of Conduct. Ensure best practice energy efficient initiatives are carried out
	Consolidate number of data centres and migrate services to cloud services
Open standards (including Open Source) Principles.	<p>Procurement: Open source licensing enables re-use of solutions and also simplifies the creation of shared services.</p> <p>ICT Operations: Open standards should reduce vendor lock-in allowing the Scottish public sector organisations to more easily transition to green solutions in the future (for example lower power consumption services).</p> <p>Recycle: Open source licensing allows existing solutions to be refurbished or re-purposed to meet new requirements.</p>
Measurements and Benefits	Monitor reductions in carbon savings, as a baseline for further savings.
	Monitor reductions in ICT spend, via collaborative ICT procurement, as a baseline for further savings.



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