Sustainability principles for ITC and digital technology in the FHE sector

Introduction

Climate breakdown and the ecological crisis are two defining issues of our time, and we are at a crucial moment. The impacts of climate change are both global and unprecedented in scale. The knock-on effects on our societies are already palpable, with communities suffering as a result. Without drastic action today, adapting to these impacts in the future will be more difficult and costly.

The manufacture, use and disposal of computers, servers and other electronic devices and ancillaries have a significant environmental and societal impact. They require large amounts of natural resources in their manufacture, the energy to run them emits high amounts of Carbon emissions, and programmed obsolescence and the low recycling rates results in millions of tonnes of e-waste each year. All the while digital technology is rapidly becoming a significant global source of greenhouse gases.

Although there are many benefits of ITC and digital technologies, including environmental, societal and economic benefits, service providers and policy makers must understand the nature and scale of the negative impacts, so they are equipped to make informed decisions.

Aim of this briefing note

This briefing note has been written for ITC professionals and procurement teams supporting the purchase of ITC equipment working within the Further and Higher Education Sectors (FHE). Its purpose is to assist colleagues develop meaningful institutional policies that contribute to the delivery of organisational carbon objectives. It describes key environmental principles and how these can be applied in practice to reduce the negative environmental impact of digital technology.

Institutions are encouraged not to develop a separate or stand-alone 'sustainable ITC / digital technology' policy, instead they are encouraged to embed the principles and activities described in this note into existing ITC / digital technology organisational policies and processes. This will ensure that sustainability becomes mainstreamed into business activities rather than an 'add on' that can be overlooked and sidelined.

Scope

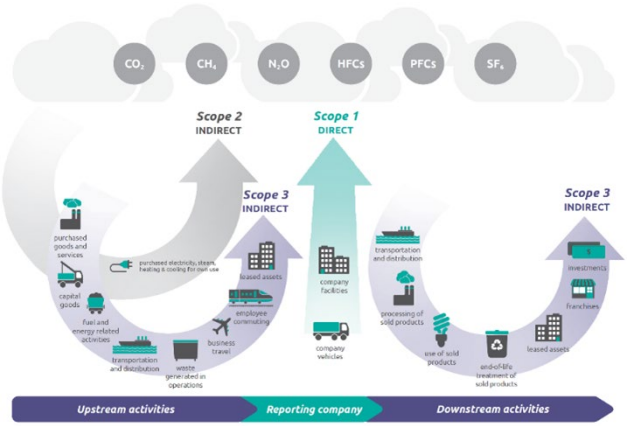
The scope of this briefing note extends to

- ITC hardware including peripherals, covering all aspects of life cycle from purchase, use and end of life.
- Digital services and software including applications and 3rd party technology services like Security Operations

The environmental and social impact of ITC and digital technology

The environmental impact of goods and services is often quantified using carbon emissions and these have been split into three scopes by the Greenhouse Gas Protocol:

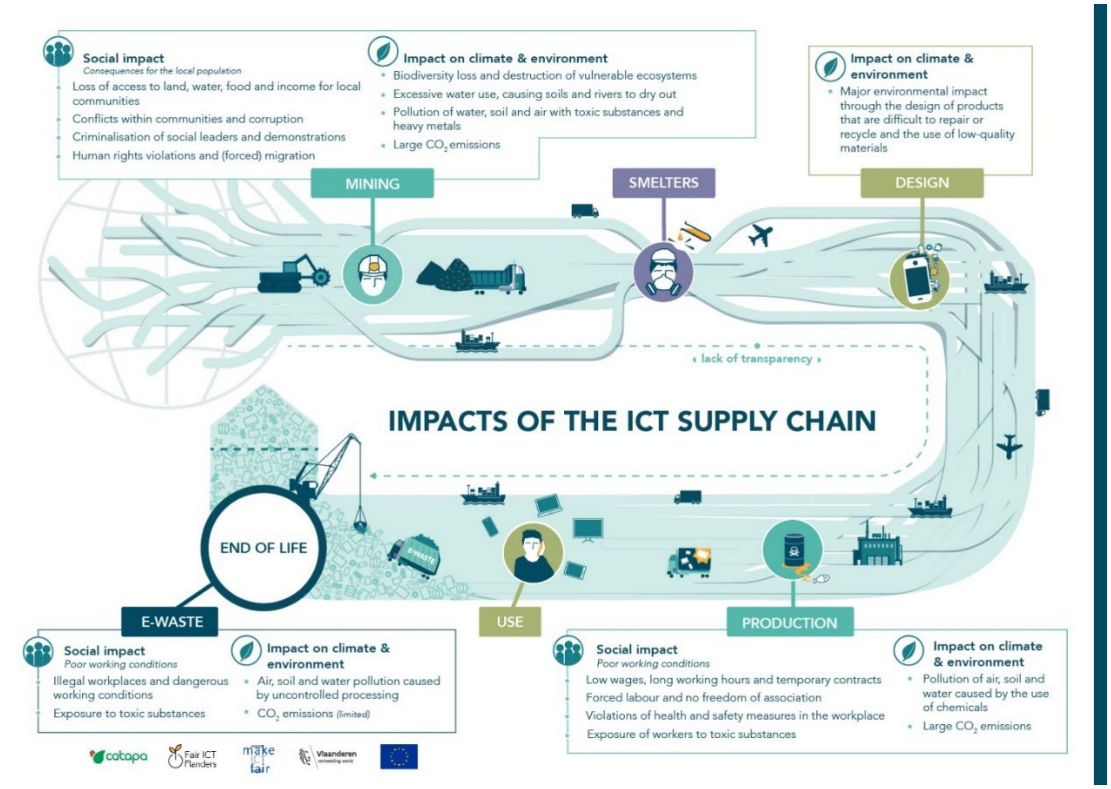
- **Scope 1 emissions** are direct emissions from owned or controlled sources, for example gas fired boilers and fuel used in fleet vehicles.
- **Scope 2 emissions** are indirect emissions from the generation of purchased energy, for example purchased electricity.
- **Scope 3 emissions** are the remaining indirect emissions that occur as a consequence of the activities of an organisation (e.g., the emissions from the manufacture & supply of goods and services purchased, or from staff travel and commuting).



Although IT equipment, servers and digital technology use a lot of energy whilst they are in use, the impact associated in the manufacture and disposal of hardware is significant. Research by Circular Computing suggests that the device build or manufacture accounts for 75-85% of total carbon emissions, transport accounts for 6-12%, with the remaining emissions coming from its use. This illustrates the greenhouse gas emissions associated with *manufacture* of electronic devices represents a larger fraction of the total emissions compared to everyday use.

Software, and by extension Artificial Intelligence (AI) components, can also consume significant amounts of energy, which arise from their creation and development, as well as their use. Research quoted by Earth.Org suggests training a popular AI model produces nearly 300 tons of CO2 equivalent, there is more information on the carbon impact of software here.

Although carbon emissions have become the standard measure of environmental impact - other environmental problems, chemical pollution, loss of biodiversity or depletion of natural resources are not captured in this metric nor are societal impacts. The diagram below provides an overview of these impacts.



Source: CAPATA

To deliver any meaningful change and genuine reductions in an organisational environmental footprint, institutions will need to address how they manage ITC equipment and digital technology across all its life cycle – i.e. manufacture, transportation, use and disposal.

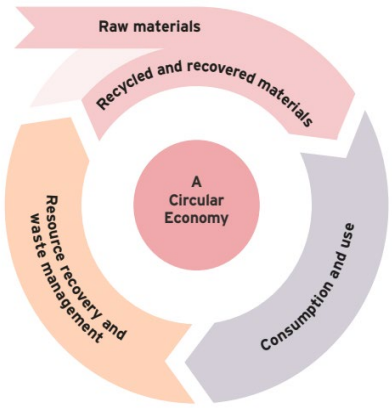
Workers and Human Rights & Safety in ITC Supply Chains

While the focus of this document is the environmental (particularly climate and waste) impacts of ITC, it should be noted that the social impacts also have a high relevance from a sustainability perspective if not addressed also. This document does not focus on this area as the UK FHE sector (or almost all of it) has parallel activity well under way on workers and human rights in our ITC supply chain. This is through a partnership with Electronics Watch, an organisation that actively monitors workers' rights conditions in our electronic supply chains.

Electronics Watch was set up by a European wide group of publicly funded bodies including several from the UK FHE sector and has grown to a membership of over 1000 organisations (universities, purchasing consortia, local authorities, national governments etc). All UKUPC member universities in Scotland, England and Northern Ireland are now members of Electronics Watch as well as a small number in Wales. Electronics Watch have been successful in freeing over 11,000 people from modern slavery in recent years as well as improving the working conditions of thousands more. Engagement with Electronics Watch is encouraged for Procurement, Sustainability & ITC stakeholders within institutions, as maximising engagement maximises the leverage and positive outcomes that their work can achieve.

Key environmental principles

The current 'take-make-consume and dispose' pattern of growth is not a sustainable model of growth and has significant social and environmental consequences. A zero-waste, or circular economy is an economic model that moves away from a throwaway society to one where, resources are fully valued both financially and environmentally for the full extent of their life cycle.

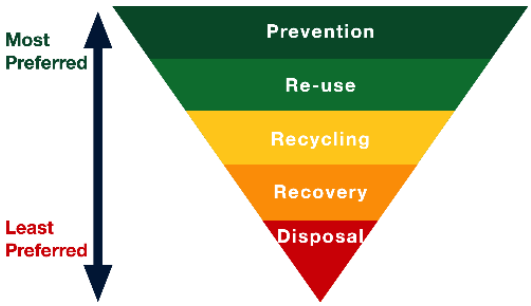


In a Zero Waste economy the emphasis is not placed on recycling. Instead, emphasis is placed on keeping resources in circulation at their highest material value, for as long as possible - this concept is known as the circular economy.

The diagram illustrates how a circular economy ensures that resources are kept in use as long as possible, thus extracting maximum value from them. Circulating products and materials retains embodied energy and reduces greenhouse gas emissions.

Source: DEFRA 2018 (Our waste, our resources: a strategy for England)

The waste hierarchy is an important concept and the cornerstone of sustainable waste management. The waste hierarchy ranks options for waste management according to environmental (and, typically, financial) preferability, as the diagram on the right illustrates.



It is important that materials are managed as high up the waste hierarchy as possible, this not only reduces the carbon impact of processing the waste but also means that the material has a higher value.

Priority goes to preventing the creation of waste in the first place, followed by preparing waste for reuse; to recycling, and then recovery. Disposal – in landfill for example – is regarded as the worst option.

Managing ITC equipment in line with the principles of the circular economy and robustly applying the principles of the waste hierarchy will result in a reduction of organisational carbon emissions across all scopes of carbon and, in many cases, substantial cost savings. In practice this means:

1. Purchasing environmentally preferable products – these products that have less of an impact on society or the environment compared to competing products and can be demonstrated through transparent sustainability credentials. According to Gartner, these are products or manufacturers that:
    - Have minimal greenhouse gas emissions
    - Are efficient in the use of resources

- Employ optimal proportions of renewable energy in operation
- Employ responsible water management in production and use
- Adopt circular practices that involves resource reuse and remanufacturing
- Minimise the waste in their production and use

2. Not generating the waste in the first place, for example by keeping items in use for longer and choosing items that can be fixed or easily upgraded, will maximise use of natural resources, reduce waste and reduce costs through lower purchasing and waste management costs.
    - For example, adopt Revolvit (see case study at the end of this doc for more info) to upgrade devices thereby keeping institutions own laptops and desktops in use for longer.
3. Choosing products and items that can be recycled at the end of their useful life in established recycling routes - to keep valuable resources in circulation while also reducing waste management costs through rebates on high value materials.

Embedding sustainability into the ITC equipment and digital technology lifecycle

The only way to reduce the environmental and societal impacts of ITC equipment and digital technology is to manage it in the most sustainable way possible across its full lifecycle – from extraction of raw materials, processing and manufacturing, transportation, in use and disposal.

The next section provides practical advice around the proactive management ITC equipment and digital technology, including what to consider and how to embed good practice in institutional policies and procedures, across three areas where institutions have opportunities to have impact: During Procurement; When a product is in use; and at the end of life / disposal stage.

Procurement Stage		
Consideration	**Questions to ask**	**Example of where to embed**
Asset sharing	Do existing assets meet organisation needs? Is there actually a need to purchase something new? Do other colleagues have the asset already, how can we facilitate the sharing of these within and between institutions?	Commit to buying only what's needed in organisational policies. Develop, maintain and share institutional asset registers. Create device policies with emphasis on sustainable asset management. Develop/enhance organisational leavers processes to ensure asset recovery for reuse.
Technical specifications for devices, equipment etc.	Could a reused / remanufactured / ex demo	Commit to purchasing repairable and/or refurbished

	item be purchased instead of new, especially for equipment that will only be used for basic functions? How long is the device expected to last and can the lifespan be extended? How will the device be used in the long term – can it go to other departments once the original owner no longer needs it?	equipment in organisational policies. Clarify institutional expectations around device lifespans in organisational policies. Ask existing ICT supplier if they sell refurbished tech / buy back surplus technology. Some websites to check: Back Market | Back Market
Environmental data for products	What data is available on the products your purchasing? This could be carbon emissions, biodiversity impact or any other relevant metric provided by the supplier. What data would be beneficial for your organisation to collect to support climate strategies or other institutional commitments? How is this data calculated by suppliers? Is the methodology transparent and sufficiently detailed to be applicable to the product being purchased? What steps is the supplier taking to improve the accuracy of this data? Is it possible to display this data to buyers alongside cost or product specifications?	Ask questions of the suppliers during the pre-tender engagement to establish what they can provide. Include as a weighted question in tender documents and include as a contract clause / schedule to ensure reporting of this data against institutional purchases is provided regularly (e.g. quarterly) by the supplier. Include product specific data within supplier catalogues to highlight more sustainable options.
Warranty period	What is the appropriate length of time on a warranty given the use of the equipment? What are the implications of future repairs on the warranty?	Include warranty requirements in tender specifications, if necessary, caveating repairs. Ensure that end users are aware of use warranty conditions and ensure that

		information is readily available to them.
Standardising devices and equipment	Can the organisation adopt standard models for frequently bought items and facilitate internally managed swapping schemes e.g. chargers and spare parts? How can ITC colleagues support the institution more effectively through the increased use of the same device?	Set out approved devices for the institution in the Procurement policy and / or ICT policy. Inform users about the sustainability of their device choices including carbon cost to encourage a sustainable mindset. Set up a central scheme to collect in and redistribute surplus peripherals and equipment.
Managing the development of ITC policies, assets and budgets centrally	What delivers best value for the organisation? For example, can the institutions obtain more price leverage in the market when buying in bulk? How can assets be managed so they remain in use for as long as possible? Can the organisation take a consistent approach to refresh cycles? How can data on spend and carbon be collected and analysed to improve performance?	Organisational financial directives. Procurement policy. ICT device policy. Sustainability / CSR policy. Organisational report on environmental and financial costs of ITC.
Purchasing from environmentally preferable suppliers / purchasing the most environmentally product	Does the supplier have any environmental credentials? Be aware of greenwash e.g. “carbon neutral” or “carbon positive” claims where off setting is used, see info here the green claims code checklist - gov.uk (www.gov.uk)	Apply Sustain Supply Chain Code of Conduct. Ask questions around the environmental preferability of their products and the supply chain, both in tender specifications and during new supplier interviews.

	Can you compare carbon impact of different devices alongside cost comparisons? Px3 Ltd – IT Carbon Footprint Experts is an example of a tool that allows independent device carbon comparability	Ask vendors to qualify their credentials in the areas listed earlier in this document: Key Environmental Principles. Ask for carbon data at the tender stage and set out expectations for accuracy and sharing frequency.
Maximising the lifespan of assets	Could life of devices be extended through refurbishment? Can the supplier provide clarity on future support for hardware and software issues from supplier? Is the device repairable, check websites like this: Laptop Repairability Scores - ifixit How long will software and operating systems be supported? Will new assets by compatible with existing devices/ systems / ICT requirements?	Embed requirements and related KPI's in tender documents. Commit to purchasing refurbishing equipment in relevant organisational policies. Commit to reusing digital equipment wherever possible.
Asset leasing	Do suppliers offer leasing options? What are the environmental and financial benefits of leasing compared to purchasing?	Financial directives.
Asset use		
Asset longevity	How can staff be trained to ensure that assets are used properly, for example understanding default settings, installing software updates, regular disk clean up, powering down fully? Can the institution develop and adopt a code of conduct	Include in IT training in staff inductions with training refreshers every 2/3 years. Develop mandatory IT training for all staff. Agree standard approach for carry cases etc.

	around ITC, that sets out among other things, expectations for all users in terms of caring for work devices? Can the institution provide equipment to prolong the life of ITC equipment, for example screen protectors and laptop carry cases as standard?	
Plan for long term use	Can devices / equipment be used by others in the organisation when the original user no longer needs it? What action needs to be taken to facilitate this?	ICT device policy. Sustainability / CSR policy.
Keep assets in use for as long as feasible	Can devices have new software installed to provide extended asset life span?	ICT policy.
End of use		
Waste hierarchy	First ask can the device be reused (either in current institution or by an external partner)? If device has to be recycled what process will be used? What is the location of the mechanical process of recycling, where will the shredded materials go? If disposal (i.e. not recycling) is being considered, ask why? This is the least preferable option.	Include end of life reuse/ recycling into waste management policy. Resources: Waste hierarchy guidance (publishing.service.gov.uk)
Component parts	Can component parts be taken out of devices which are no longer working? Either for internal reuse or donated externally?	ICT policy, specifically what happens to devices at end of life. Resources:

		Project launched to optimise WEEE raw material reuse and recovery (circularonline.co.uk))
Reuse *Note: Data destruction does not have to make devices unusable.*	Has data been wiped to an irretrievable standard? Can students be supported with reused devices e.g. long-term loan or hardship support? Can the institution set up staff buy back schemes? Can external organisations or charities have devices donated to them? If possible keep local – the less far items have to be transported the better for carbon.	Ask ICT suppliers if they offer data destruction service during tendering process. Student Hardship policy Staff benefits policy. ICT policy. GDPR policy. Resources: ISO 27001 Disposal and Destruction Policy Template Download – ISO Templates and Documents Download (iso-docs.com)
Institutional responsibility	Is onward processing legal, accredited, auditable? Ask contractors what the onward destination and processing will be when devices are collected for reuse or recycling. When a device goes onto 3rd party for reuse/ recycling/ disposal, institutions are still liable for what happens to the devices as the originator.	Institutional Risk Register Waste & Resources policy.

Case studies

1. Revolvit, from | APUC (apuc-scot.ac.uk)

2. Sustainable IT - Circular Computing™
3. University of Reading standardises on Microsoft Surface to achieve sustainability goals.

Conclusion

The use ITC equipment and digital technology bring great opportunities in the workplace and there is no doubt that they offer genuine benefits to society. However, these benefits also come at a cost to the environment. The impact of ICT equipment and digital technology is significant and needs to be addressed urgently. By being proactive and embedding the principles described in this briefing note into organisational policies, procedures and practices institutions will be able to positive steps to reducing the negative impacts whilst maximising the benefits of their use of ITC equipment and digital technology.

Further Details

This document was released in May 2024 by members of the Circular Economy & Waste Subgroup as part of the EAUC & HEPA Responsible Procurement Group.

Further details of the Responsible Procurement Group, including additional resources, can be found on the EAUC website: https://www.eauc.org.uk/responsible_procurement_group