Practical Strategies for Carbon-Conscious ICT Procurement

CFIT Mini Guide

Circular & Fair ICT Pact

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About the Circular and Fair ICT (CFIT) Pact series of Mini Guides

The Circular and Fair ICT (CFIT) Pact Mini Guides are bite-size resources developed to focus on a topic relevant to the network's interests, integrating insights and practical strategies. Each guide covers a specific subject, including:

- Lifetime Extension
- Remanufacturing and Reuse in ICT Public Procurement
- Critical Raw Materials
- End-of-Life Management

The Mini Guides provide best practices, procurement criteria, and top tips for replication, offering a comprehensive view of sustainable practices and strategies for circular and fair ICT procurement.

Glossary of Terms

- **Carbon Footprint**: The total amount of greenhouse gas (GHG) emissions, expressed in carbon dioxide equivalent (CO_2e), generated over the life cycle of a product, service, or activity.
- **Life Cycle Assessment (LCA)**: A systematic method to assess the environmental impacts of a product throughout its life cycle, from raw material extraction to disposal.
- **Product Carbon Footprint (PCF)**: The carbon emissions associated explicitly with the life cycle of a product, including production, use, transportation, and end-of-life phases.
- **Product Category Rules (PCRs)**: Specific rules for conducting life cycle assessments for a product category, ensuring consistency and comparability in data and methods.
- **Scope 1 Emissions**: Direct emissions from owned or controlled sources, such as vehicles or on-site combustion.
- **Scope 2 Emissions**: Indirect emissions from the consumption of purchased electricity, steam, or heat consumption.
- **Scope 3 Emissions**: All other indirect emissions that occur in the value chain, including production, transportation, and disposal of products.
- **Ecolabels**: Certification systems (e.g., EPEAT, TCO Certified) that verify products meet specified environmental and social standards.
- **Circular Economy**: A system that focuses on reducing waste and keeping resources in use for as long as possible through strategies like reuse, repair, and recycling.
- **Embodied Carbon**: The carbon emissions associated with the production and manufacturing of a product, including raw material extraction and processing.
- **End-of-Life Management**: Processes to manage ICT devices after their use, including recycling, refurbishing, and responsible disposal.

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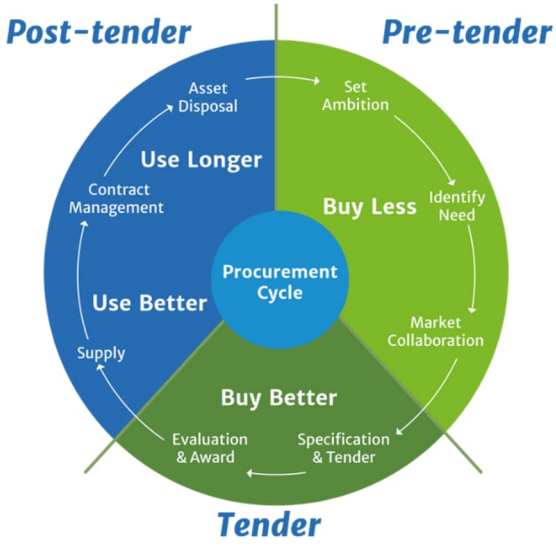
1 Introduction

This Circular and Fair ICT (CFIT) Pact Mini Guide is designed to provide public procurers and related actors with practical strategies and tools for supporting **carbon-conscious ICT procurement**.

It includes methods for leveraging decision-making tools to achieve CO2 reductions and carbon neutrality and measuring and communicating the carbon footprint of ICT products.



CFIT procurement cycle as introduced in the CFIT Framework for Circular and Fair ICT Procurement

Developed in collaboration with experts and informed by the experiences of CFIT participants, this guide aligns with the core strategies of the **CFIT Framework**: "**Buy Less, Buy Better, Use Better, and Use Longer**." It is organised into actionable steps that correspond with the Pre-tender, Tender, and Post-tender stages of the CFIT procurement cycle.

Limitations of the Mini Guide

This guide focuses on ICT hardware procurement, addressing strategies to reduce carbon emissions during production, use, and disposal. It does not extensively cover other critical aspects of ICT's environmental impact, such as:

- *Data Centres and Cloud Services: While these contribute significantly to ICT's energy consumption and emissions, they are beyond the scope of this guide.*
- *Software Efficiency: Energy use driven by inefficient or outdated software is not addressed, though software optimization can reduce operational carbon emissions.*
- *Broader Infrastructure: Network equipment, telecom infrastructure, and other ICT-related systems are not included.*

While the CFIT Framework already offers a holistic approach to sustainable ICT procurement, future resources may expand on these principles to address areas like data centres, cloud services, software efficiency, and broader ICT infrastructure, further enhancing the guidance provided.

Why is Carbon-conscious ICT procurement so important?

The ICT sector accounts for between **4% - 10% of global carbon emissions,** with projections indicating that the ICT carbon footprint could reach 14% by 2040.[1] [2] ICT also contributes to one of the **fastest-growing waste streams** on the planet: e-waste. ICT energy consumption is projected to grow from **6% today to around 25% by 2050**.[3]

[1] https://ciandt.com/ca/en-ca/article/climate-crisis-and-technology-sector
[2] https://sustainableict.blog.gov.uk/2023/04/27/why-sustainable-ict-is-vital/
[3] https://sustainableict.blog.gov.uk/2023/04/27/why-sustainable-ict-is-vital/

These figures underscore the urgent need for public sector organisations to adopt carbon-conscious ICT procurement strategies. By aligning with CFIT's *Buy Less, Buy Better, Use Better, Use Longer* framework, procurement professionals can shift to more sustainable practices that reduce emissions, extend product lifespans, and minimise waste.

CFIT Strategy	How does carbon-conscious ICT procurement contribute?
Buy Less	Reduce the need for new devices by **extending lifespans**, prioritizing repair, and promoting shared use. This reduces emissions tied to **resource extraction, production**, and logistics.
Buy Better	Choose **durable and repairable products**, including refurbished and remanufactured options. Prioritize devices with **verified sustainability criteria** to reduce embodied carbon.
Use Better	Extend device efficiency with **care and maintenance policies**. Promote responsible energy use to reduce **operational emissions**.
Use Longer	Extend product lifetimes through **reuse and repair**. Keeping devices in use longer avoids the **carbon-intensive production** of new products and reduces e-waste.

Figure 1: Carbon-conscious ICT Procurement and the CFIT Strategy

The growing impact of ICT procurement

Production, use, and disposal of ICT products have a disproportionate environmental impact. For example, around **80% of a device's carbon emissions occur during manufacturing and transportation** before it is even used[4]. While e-waste, if not addressed, poses significant carbon and other environmental risks and represents lost opportunities for material recovery and reuse.

Focus on proven strategies

Emissions data and evidence of impact can vary, so accurate carbon footprints should be an aspiration but not the only focus. Get started on some proven strategies to reduce ICT's footprint effectively. For example:

- **Extending device lifespans** is the most impactful approach. Retaining devices for an additional two years can cut emissions by up to 37.5%.[5]
- Labels, tools, and standards can **verify sustainability claims**, including device durability, repairability, and the use of renewable energy in manufacturing.
- **Supplier accountability** frameworks and reporting ensure transparency, enabling measurable progress toward carbon reduction goals.

[4] https://www.open.edu/openlearn/nature-environment/reducing-digital-carbon-footprint-through-responsible-procurement
[5] Sutton-Parker, J. and Procter, R. (2023). *Determining UK government scope 2 and 3 computer greenhouse gas emissions.* Procedia Computer Science, 224, pp.336–342. Available at: https://doi.org/10.1016/j.procs.2023.09.045

Public procurement as a driver for change

As major ICT buyers, public sector organisations have a unique opportunity to lead by example. By adopting carbon-conscious procurement practices, they can:

- Drive supplier innovation toward low-carbon, circular solutions.
- Influence markets to prioritise longevity through durability and repairability.
- Reduce global energy use and carbon emissions while achieving cost savings.

Practical action despite uncertainty

Measuring exact emissions can be complex, but the **impact of certain strategies is clear**. Extending product life, prioritising repair, and making informed procurement decisions **significantly reduce carbon footprints**.[6] This guide outlines achievable actions across all stages of procurement—**pre-tender, tender, and post-tender**—to enable procurement professionals to act confidently and drive real, measurable change.

"Don't let perfection be the enemy of good"![7] Many procuring organisations can struggle with getting started and taking first actions for carbon. By beginning to do something, and measuring one thing, you're taking that first step towards improving your climate activity.

Figure 2 highlights that **75%–85%** of the average laptop's carbon footprint comes from **production**, mainly due to raw materials mining and processing, and energy-intensive manufacturing Transport adds **6%–12%**, while use accounts for **5%–15%**, depending on energy efficiency. End-of-life disposal contributes just **1%** but can be reduced through **recycling** and **refurbishment**.

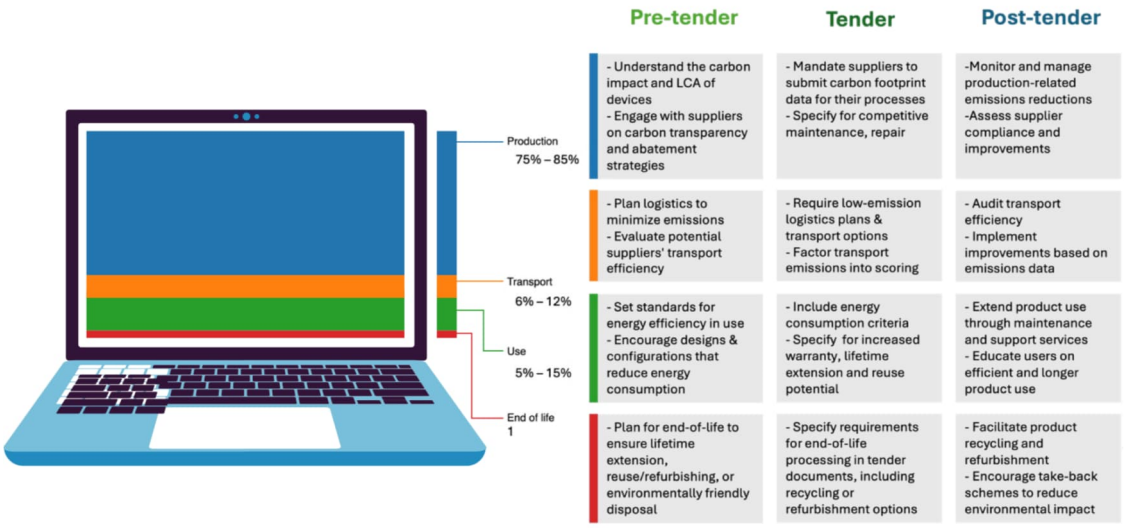


Figure 2: the carbon footprint of the average new laptop[8]

[6] Cordella, M, Alfieri, F, Sanfelix, J. Reducing the carbon footprint of ICT products through material efficiency strategies: A life cycle analysis of smartphones. *J Ind Ecol*. 2021; 25: 448–464. https://doi.org/10.1111/jiec.13119

[7] https://sustainableict.blog.gov.uk/2024/05/07/dont-let-perfection-be-the-enemy-of-good/

[8] Circular Computing, *The Carbon Footprint of a Laptop*. Available at: https://circularcomputing.com/news/carbon-footprint-laptop/

*Box 1**: Understanding GHG emissions for ICT procurement***

Greenhouse gas (GHG) emissions are a critical concern for sustainable procurement, particularly in the ICT sector. These emissions are categorized into three scopes that help organizations identify and manage their environmental impact.

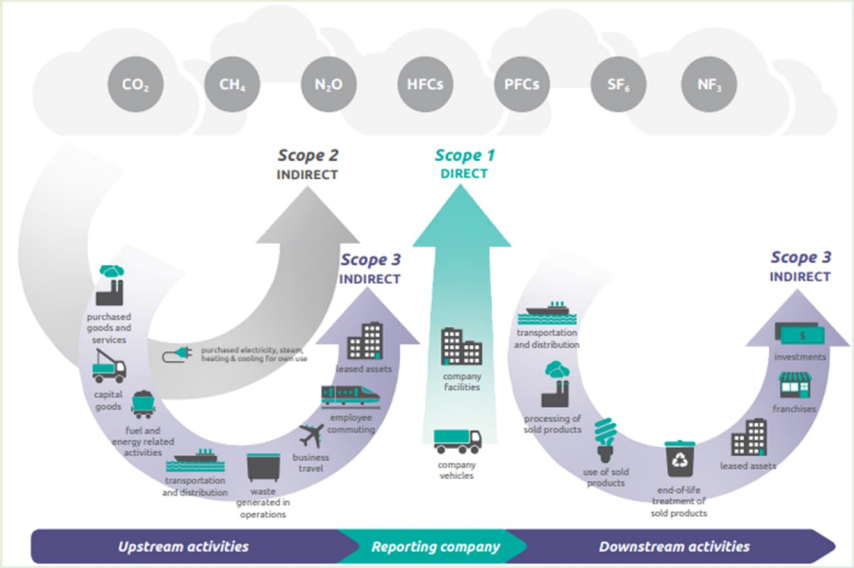


Figure 3: Overview of GHG Protocol scopes and emissions across the value chain (Source: GHG Protocol (2011), Figure 1.1 of Scope 3 Standard).

Scope 1: Direct Emissions

- **Definition:** Direct emissions from sources that are owned or controlled by your organization.
- **Examples in ICT procurement:** Emissions from organisation-owned vehicles used for transporting ICT equipment, on-site fuel combustion in generators powering ICT facilities, and emissions from refrigerants used in air conditioning units within data centres.

Scope 2: Indirect Emissions

- **Definition:** Indirect emissions from the consumption of purchased electricity, steam, heating, and cooling.
- **Examples in ICT procurement:** Emissions from the electricity used to power data centres, offices, and other facilities where ICT equipment is used. This includes the emissions generated from electricity consumption by servers, networking equipment, and other infrastructure essential for ICT operations.

Scope 3: Value Chain Emissions

- **Definition:** All other indirect emissions that occur in the value chain of your organization.
- **Examples in ICT procurement:** Emissions from the production and transportation of ICT products, including raw material extraction, manufacturing processes, and logistics. It also includes emissions from the disposal of ICT equipment at the end of its life cycle, such as recycling or landfilling.

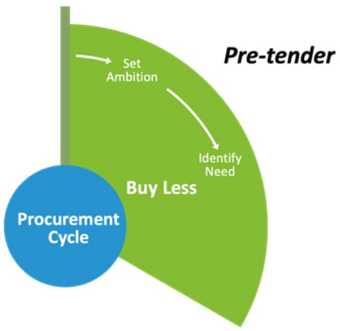
Source: Embedding Project

This guide presents actionable steps to help procurement professionals achieve measurable progress, aligning with the CFIT **Buy Less, Buy Better, Use Better, Use Longer** Framework.

Next: Explore strategies for the PRE-TENDER procurement phase to reduce carbon footprints and drive sustainable outcomes.

2 Pre-tender

The pre-tender stage is crucial for establishing the foundation of carbon-conscious procurement strategies. This section outlines the first steps for procuring organisations to have an opportunity for carbon-conscious ICT options. ICT-related carbon footprints can be addressed before tendering by:



- **Conducting an ICT inventory** 🗂️ 📊 to map assets, identify carbon hotspots, and assess lifecycle emissions
- **Communicating emissions and reduction potential** 📣 🗨️ by sharing goals and tailoring messages to stakeholders
- **Assessing ICT needs** 🖥️ 🛠️ to match devices with user requirements, optimise usage, and reduce unnecessary upgrades
- **Collaborating with the market** 🤝 🌍 to engage suppliers early, set sustainability expectations, and explore low-carbon solutions

2.1 Conduct an ICT inventory

A possible starting point for addressing carbon emissions of ICT is to map current ICT assets. This can allow you to:

- Estimate the carbon emissions associated with the lifecycle of existing ICT equipment.
- Generate data that can support a better understanding and communication of your organisational ICT carbon footprint.
- Support procurement planning with scenarios for carbon impacts of different device utilisation.

The GHG Protocol[9] provides different methods to measure and calculate your emissions based on data availability.

Getting started on emissions factors

The **Spend-Based Method** estimates emissions based on the economic value of ICT products and services. It applies industry average emissions factors, offering a simple approach for broad evaluations based on your category spend.

[9] Full details are outlined in the Technical Guidance for Calculating Scope 3 Emissions.

⚠️ *While useful for getting started and identifying key areas to investigate further, this method can create anomalies—for instance, if a particular brand costs more than a comparable device, its footprint may appear higher despite having a lower actual carbon impact.*

The **Average Data Method** refines the spend-based approach by considering the physical quantities of ICT assets, such as the number of devices, combined with the average emissions factors. This can result in more accurate assessments across different types of equipment.

The **Supplier-Specific Method** uses actual emissions data from suppliers to make precise assessments. Additionally, the **Life Cycle Analysis (LCA) Method** calculates emissions based on the quantity of products or services, using specific lifecycle assessment factors for each item. These last two approaches can be used by buyers with more influence over their supply chains and access to more reliable data. Figure 4 shows a hierarchy of decision data from these methods.

⚠️ *There is currently no standard for LCA or product carbon footprints, so be cautious when comparing device data. Although LCA can help with planning and decision-making, it is not currently considered mature enough to be used as an award criterion.*

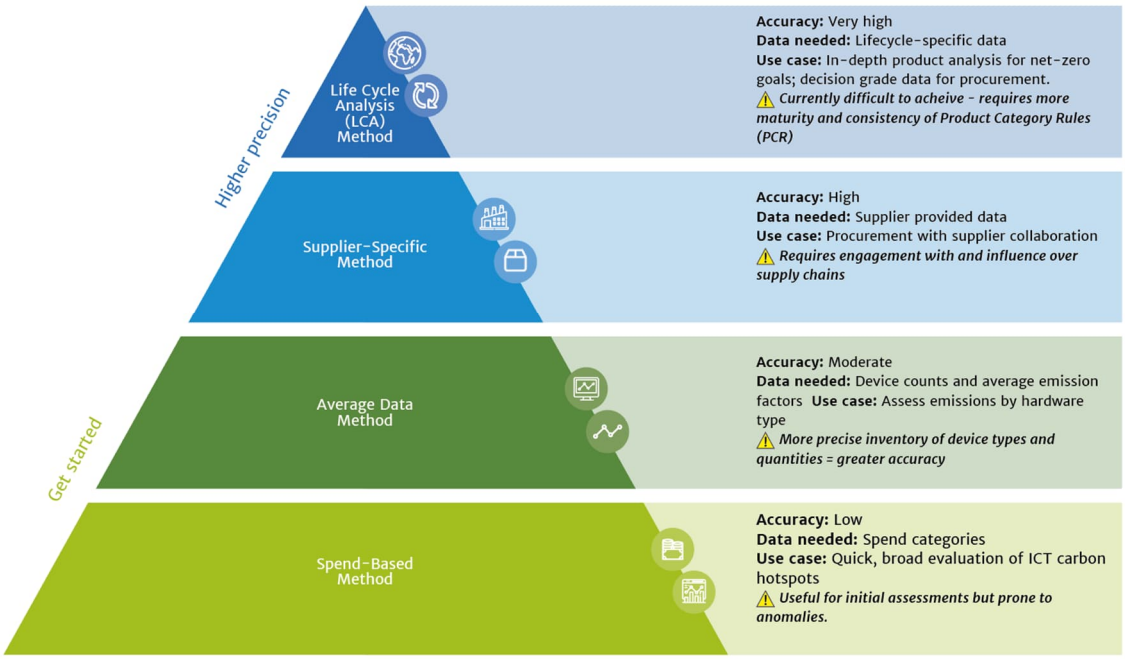


Figure 4: Getting started on ICT emissions factors

The GHG Protocol provides different methods to measure and calculate your emissions based on data availability (full details are outlined in the Technical Guidance for Calculating Scope 3 Emissions).

Box 2: **PRE-TENDER CASE STUDY - UK Government uses average data method for inventory and sustainable procurement scenarios**

The UK Government used a data-driven approach to estimate ICT emissions, focusing on the type and quantity of devices such as desktops, notebooks, and displays. Without needing detailed model-specific information, the method used average carbon footprint values from a database of over 2,000 device models. This provided a clear estimate of **Scope 3 supply chain emissions** and highlighted opportunities for reducing emissions by selecting low-carbon devices and extending their lifespan. For additional context, emissions were also translated into an equivalent number of car miles, making the data more relatable.

- **Carbon baseline**: Average emissions values for each device type identified high-impact areas. For example, switching to low-carbon notebooks and desktops could reduce emissions by 53% and 31%, respectively.
- **Extended lifecycles**: Extending device use from 5 to 8 years could cut annualized emissions by 37.5%, spreading supply chain impacts over a longer period.
- **Quantified reductions**: Combining sustainable procurement with lifecycle extension could achieve an overall emissions reduction of up to 65%.

Hardware Type	Units	Scope 3 Per Device (kgCO2e)	Scope 3 Total (kgCO2e)	Car Miles Equivalent	5-year Annualised Supply Chain (kgCO2e)	8-year Annualised Supply Chain CFP (kgCO2e)	Lowest Available Scope 3 (kgCO2e)	Selection by CFP Reduction (%)
Desktops	383,466	221	84,745,986	307,095,180	16,949,197	10,593,248	153	31%
Notebooks	724,750	266	192,783,500	698,592,187	38,556,700	24,097,938	124	53%
Tablets	68,795	110	7,567,450	27,422,271	1,513,490	945,931	65	41%
Thin clients	49,711	108	5,368,788	19,454,950	1,073,758	671,099	106	2%
Monitors	983,009	324	318,494,916	1,154,134,353	63,698,983	39,811,865	169	48%
Screens	12,207	1,184	14,453,088	52,373,851	2,890,618	1,806,636	970	8%
Total Computers	1,226,722	237	290,465,724	1,052,564,589	58,093,145	36,308,216	N/A	N/A
Total Displays	995,216	335	332,948,004	1,206,508,204	66,589,601	41,618,501	N/A	N/A

Recommendations and impact

- **Accurate reporting**: The study emphasized the need for tools that use real-world data for reliable emissions tracking. Older models, such as Jisc, often overestimated energy use, underscoring the importance of precise measurements.
- **Policy integration**: Findings were integrated into the 2022 UK Government ICT strategy, encouraging the inclusion of **Scope 3 reporting** and sustainability criteria in procurement policies.

By leveraging accurate data and planning, the UK Government demonstrated how pre-tender actions can drive significant ICT emissions reductions, supporting long-term net-zero goals.

"Having access to never previously available Scope 3 data is essential to evolving our policies, procurement practices, accurate government reporting and ensuring our technology partners focus on low carbon footprint production and supply." Adam Turner, Sustainable Technology Advice and Reporting (STAR) team

Source: Determining UK government scope 2 and 3 computer greenhouse gas emissions

Box 3: ***PRE-TENDER CASE STUDY: Developing a carbon inventory methodology for IT in Government of Canada procurement***

The Government of Canada, committed to net-zero emissions by 2050, partnered with WSP Canada to develop a robust methodology for quantifying **Scope 3 emissions** for IT hardware. Recognizing the complexity of IT hardware emissions, this method provides a lifecycle approach, accounting for production, distribution, and end-of-life phases.

Key characteristics include:

- **A Dual-pathway approach**:
  - **Path A**: Uses Environmental Product Declarations (EPDs) from manufacturers to ensure precision where direct product data is available.
  - **Path B**: Estimates emissions for products lacking EPDs by relying on average emissions factors and typical specifications for broader applicability.
- **Lifecycle consideration**: Emissions are assessed from raw material acquisition to end-of-life, ensuring a comprehensive view of hardware impacts.
- **Adaptability**: The dual-pathway design allows flexibility based on data availability, making it applicable across diverse IT categories.

Recommendations and procurement alignment

- **Sustainability integration**: Findings support incorporating Scope 3 reporting and sustainability criteria in IT procurement practices.
- **Net-zero alignment**: The methodology aligns with Canada's federal climate policies, providing actionable insights to reduce emissions in government operations.

By introducing a scalable and adaptable emissions quantification method, the Canadian Government could use the data for communicating with colleagues on carbon impacts of ICT and apply it to pre-tender planning to drive sustainable procurement aligned with national climate goals.

Considerations for assessing the carbon of ICT inventory

While useful, these carbon inventory methods also introduce specific considerations that can influence their implementation and success. Figure 5 provides some challenges and considerations you might face when applying these methodologies.[10]

[10] HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons), and SF_6 (Sulfur Hexafluoride) are greenhouse gases commonly used in electronics manufacturing and industrial processes. They have a much higher global warming potential (GWP) than CO_2, meaning even small amounts can significantly contribute to climate change.

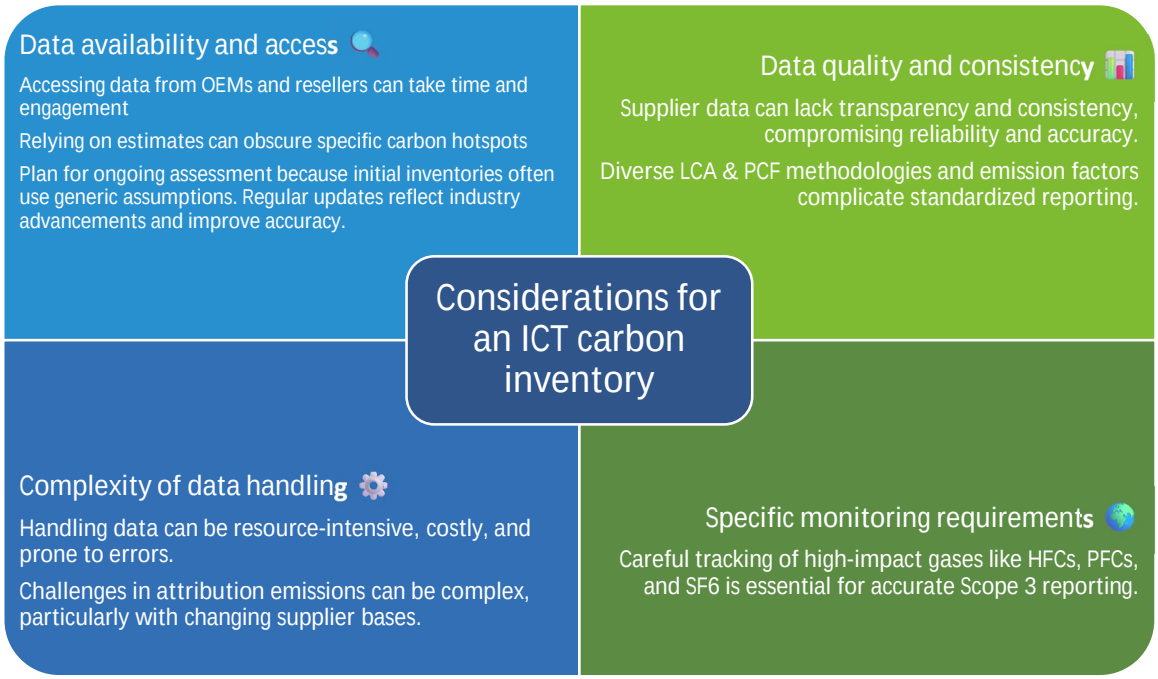


Figure 5: Considerations for an ICT carbon inventory

As many assessments and subsequent procurement processes rely heavily on the accuracy and availability of manufacturer-provided data, organisations must push for standardised product category rules (PCRs) that can enhance the comparability and reliability of environmental reporting.

Box 3: ***Scope of EPEAT and TCO labels for carbon***

EPEAT and **TCO Certified** ecolabels focus on reducing environmental impacts across ICT product lifecycles, though carbon footprint reporting is evolving.

- **EPEAT** has introduced low embodied carbon thresholds for photovoltaics and aims to expand this to ICT categories in the future, creating clearer carbon benchmarks. Updating EPEAT criteria requires disclosure of the product carbon footprint and manufacturer use of renewable electricity. Additional EPEAT criteria incentivize the use of renewable electricity by suppliers of components with highest known carbon impacts, and certification of suppliers to energy efficiency certifications.[11]
- **TCO Certified** mandates at least 15% renewable electricity in final assembly under its Generation 10 label, leading to lower product carbon footprints. Future updates will independently verify carbon reduction activities during manufacturing.[12]

Both labels offer credible, independently verified sustainability criteria, enabling buyers to prioritize energy efficiency, responsible manufacturing, and repairability.

2.2 Communicate emissions and reduction potential

Communicate to colleagues what carbon reduction means for your organisational ICT and its impact on the carbon reduction policy and actions. Communication should focus on what the ICT strategy can contribute, particularly towards buying less or using better and longer.

[11] https://www.epeat.net/

[12] https://tcocertified.com/

From strategy to communication: Identifying the audience

Reducing the carbon footprint of ICT operations in public organisations requires awareness, urgency, and leadership support. Clear KPIs and collaboration between environmental and ICT managers are essential for progress.

Table 1 provides an overview of who and how to target. Measuring emissions alongside costs and user needs helps identify the most efficient actions.

Stakeholder	Level of influence	Role in decision-making	Communication strategy
Senior leadership	High	Strategic Direction	Present cost-benefit analyses and align with organizational goals.
ICT managers	High	Implementation Planning	Collaborate on technical feasibility and key performance indicators (KPIs).
Finance officers	Medium	Budget Approval	Highlight cost savings, return on investment (ROI), and financial implications.
Environmental managers	Medium	Sustainability Compliance	Align ICT impacts with sustainability policies, goals and reporting requirements.
End-users/staff	Low - Medium	Choice, Adoption and Usage	Educate on benefits, provide training, and encourage sustainable use practices.

Table 1: Stakeholder influence and communication framework

Effective communication clarifies stakeholder roles and delivers tailored messages to specific audiences. For instance, demonstrating to finance officers the benefits of device lifetime extension for budgets and carbon can support the choice of more repairable and modular products.

Making ICT emissions data clearer with visual tools

Charts, infographics, and visual tools make ICT emissions data more accessible and clarify its impact on overall carbon emissions.

For example, the Government of Canada uses visual aids (see Figure 6) to illustrate the significant impact of ICT manufacturing and shipment on emissions. A graph shows that between 2015 and 2020, ICT device manufacturing contributed 287,000 CO2e, far higher than more minor contributors like container ships, transoceanic flights, CHP plants, and data centre emissions.

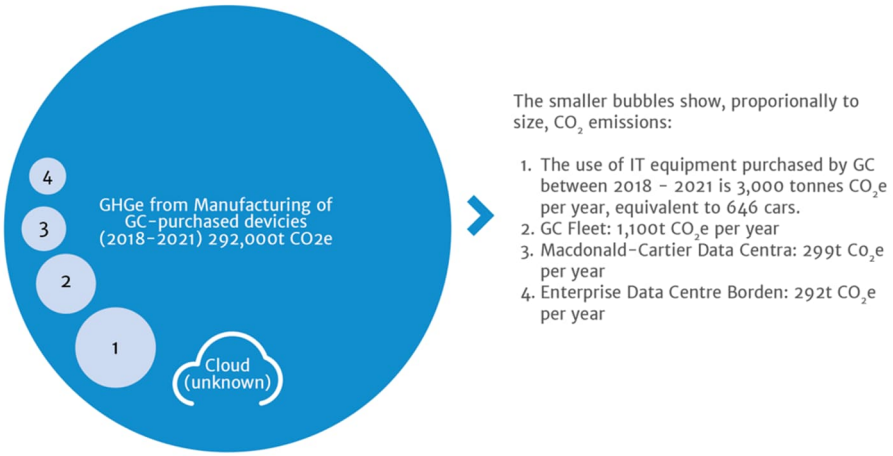


Figure 6: Visualization from the Government of Canada, highlighting technology-related emissions to inform policy and procurement strategies.

Regular communication for responsibility and active participation

Regular, targeted communication integrates ICT into the organisation's CO2 reduction strategy, emphasising its role in meeting environmental goals.

Clear messaging should highlight the organisation's commitment to reducing its ICT carbon footprint and encourage thoughtful technology use. For example:

- Do employees need a second screen or new devices if the current ones are functional?
- Can smartphones replace desk-based tools for certain tasks?

Communications must align ICT strategies with broader environmental objectives, showing employees how their choices contribute to sustainability goals. This fosters a culture of responsibility and active participation.

Box 4: ***PRE-TENDER CASE STUDY - Rijkswaterstaat's approach to device replacement***

Rijkswaterstaat in the Netherlands adopted a simple approach to ICT device management, focusing on sustainability and resource efficiency. Traditionally, notifications for device replacements were based on pre-set timeframes, prompting users to replace devices irrespective of their actual condition.

To shift this dynamic, Rijkswaterstaat implemented a new method, where they began querying users on the current operational efficiency of their devices before suggesting replacements. This inquiry asked if the device still met the user's needs and if a replacement was truly necessary, thereby encouraging the extension of the device's lifespan and reducing unnecessary electronic waste. This strategy aims to lower carbon emissions associated with producing new devices while fostering a culture of conscious consumption and sustainability within the organization.

Before

1. Automatic notification for device replacement based on time.
2. Device replaced regardless of condition.
3. Accumulation of electronic waste.

After

1. User receives inquiry about device performance.
2. Assessment of whether the device meets current needs.
3. Device replaced only if necessary.
4. Extended device lifespan and reduced waste.

Collaboration across teams

- **Sustainability teams**: Set goals, monitor compliance, and align strategies with organisational objectives.
- **Procurement teams**: Integrate sustainability targets into purchasing decisions, focusing on eco-friendly suppliers and products.
- **ICT teams**: Implement strategies, optimise device usage, and manage end-of-life practices.

Senior management support is critical, empowering teams to align strategies. Regular strategy sessions among key stakeholders ensure cohesive action and alignment with environmental goals.

Establish a clear statement of intent

Create a master statement that outlines the procuring organisation's goals for reducing ICT carbon emissions as part of a broader organisational CO2 strategy. This statement should:

- Set clear expectations for all departments involved with ICT management.
- Align internal actions and strategies with broader environmental objectives.
- Reinforce the importance of collective action within the organisation.

Box 5: ***PRE-TENDER CASE STUDY - UK sets statement of intent through a green ICT strategy***

The UK's "Greening government: ICT and digital services strategy 2020-2025" highlights internal communication as essential for aligning departments and employees with sustainability goals.

Key communication components

1. **Promoting digital citizenship**
   - Encourages **all employees** to adopt sustainable ICT practices, linking individual actions to organizational goals.
2. **Cross-department collaboration**
   - Aligns sustainability practices **across departments**, ensuring clarity on roles and shared objectives.
3. **Embedding sustainability**
   - Sets **clear expectations** for employees, integrating green practices into daily operations.
4. **Monitoring and reporting**
   - Progress tracking fosters **accountability** and motivates continued adoption of sustainable practices.

Approaches in the strategy

- **Policy statements** provide clear goals guide departments and staff.
- **Employee guidance** highlights actions like prolonging device life and reducing unnecessary ICT use.
- **Reporting mechanisms** ensure transparency and regular updates.

Internal communication ensures sustainability goals are actionable, fostering collaboration and accountability across government operations.

Source: *Greening government: ICT and digital services strategy 2020-2025*

Box 7: ***PRE-TENDER CASE STUDY: Planning for circular and sustainable mobile phones in Flanders***

The Government of Flanders focused on extending smartphone lifespans and reducing carbon impacts through thorough pre-tender planning, including testing and data-driven decisions to gain organizational support.

Key pre-tender actions

1. **Setting clear goals**
   Objectives prioritized modular, repairable devices with longer lifespans, aligning with climate goals and sustainability priorities.
2. **Practical testing and market research**
   Two pilot tests were conducted to assess user satisfaction, functionality, and repair needs:
   - Public Waste Agency of Flanders (OVAM) trialled Fairphone 4 with 30 users.
   - Government of Flanders' Department of Environment and Spatial Development (DOMG) compared Fairphone 5 to standard Android and iOS devices, evaluating carbon footprint, functionality, and Total Cost of Ownership (TCO).
3. **Data-driven decisions**
   Results showed modular, repairable devices reduced carbon emissions, improved lifecycle costs, and met user needs for performance and functionality.

Outcomes

- Testing validated the practicality, cost-efficiency, and reduced carbon footprint of Fairphone models.
- Insights built internal support for adopting sustainable alternatives by demonstrating real-world benefits.

Source: *CFIT Case Study Flanders - strategies to introduce more sustainable and fair smartphones*

2.3 Assessing ICT needs

Not all strategies for reducing ICT carbon emissions involve direct procurement actions. Alternative approaches focus on managing and using existing equipment, such as desktops and laptops, within working environments. Below are some effective non-procurement strategies that can significantly contribute to decarbonisation.

Working Setups

The carbon footprint of various working setups varies considerably, impacted by the choice and combination of equipment used. Below are some typical setups and their associated carbon emissions. The data accounts for the CO2e impact from three main lifecycle phases: manufacture, use, and disposal. [13]

- **Desktop + screen**: A typical setup emits about 621 kg CO2e.
- **Laptop + screen**: When a laptop is used with a screen, emissions slightly increase to 691 kg CO2e, representing an 11% increase. This scenario assumes a laptop replacement cycle of four years.
- **Desktop + 2 screens**: Expanding the setup to two screens with a desktop results in emissions of 903 kg CO2e, marking a 45% increase.

[13] Note: the carbon calculations are based on replacement periods – a laptop replacement cycle of four years has been assumed, while a desktop replacement cycle is six years (University of Oxford)

- **Laptop + screen at office + screen at home**: This setup, accommodating hybrid working environments, results in 928 kg CO2e, nearly a 49% increase.
- **Desktop + screen + laptop**: The most equipment-intensive setup analysed, combining a desktop and a laptop, each with a screen, leads to 1,030 kg CO2e, a 66% increase compared to the basic desktop and screen setup.

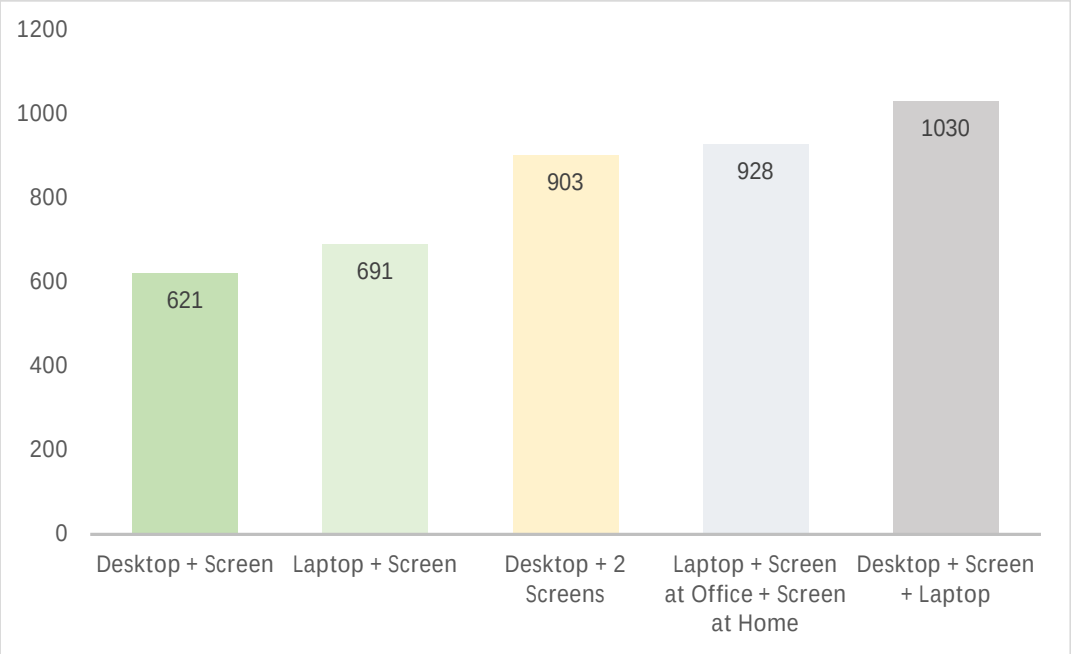


Figure 7: The carbon footprint of working setups (University of Oxford)

These figures underline the impact of equipment choices and combinations on an organisation's carbon footprint, suggesting that strategic planning regarding IT setups can significantly influence environmental outcomes.

Figure 8 below showcases the Government of Canada's plans for ICT in the workplace, which would minimise environmental impact while enhancing operational efficiency. The setup includes:

- **Single ultrawide monitor**: This reduces the need for multiple screens, minimising energy use and desk space.
- **Repairable laptop**: Emphasizes sustainability through repairability, extending device lifespan and reducing electronic waste.
- **Secure USB key**: Facilitates robust two-factor authentication, bolstering security with minimal environmental impact.
- **EcoLabel certified hardware**: All components meet the highest environmental performance standards, demonstrating a commitment to sustainability.
- **No phone for office staff**: This policy eliminates unnecessary devices for office-based employees, reducing electronic waste and energy consumption.
- **Ergonomic design**: Ensures the setup is comfortable for home and office use, supporting employee well-being and productivity.

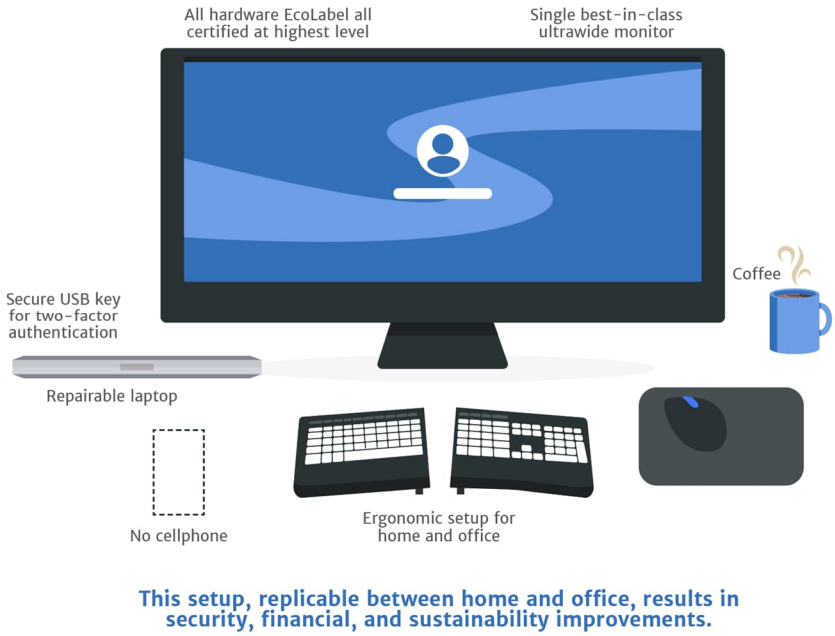


Figure 8: A low-carbon ICT setup

Tailoring ICT equipment to staff's specific needs—eliminating phones for office-based personnel and desktops for non-office staff—reflects a targeted approach to reducing unnecessary device use and its associated carbon footprint.

User profiling

Adapting user profiling for ICT to focus on reducing carbon emissions involves rethinking device procurement and usage based on actual needs and the environmental impact of technology choices.

User profiling aims to enhance device longevity and decrease the frequency of device replacement and upgrades, as demonstrated in Table 2.

User Type	Description	Procurement strategy
Basic users	Engage in tasks like emailing, web browsing, and basic office applications.	Provide with refurbished or lower-specification new devices, reducing the need for manufacturing new, high-end devices
Medium users	Require devices for multimedia editing or programming.	Provide with mid-level devices that balance performance with sustainability, opting for good performance with lower environmental impact
Super users	Need high-performance devices for intensive tasks like data analysis or 3D modelling.	Target for upgrades rather than replacements to extend the lifecycle of high-spec devices, reducing replacement frequency

Table 2: Examples of user profiles

By profiling users and understanding their device usage, you can tailor their ICT procurement to minimise waste and reduce carbon emissions. This involves selecting the appropriate types of devices for each user category and considering the entire lifecycle of these devices, from production to disposal.

2.4 Market collaboration

Early and ongoing engagement with suppliers helps to gauge market readiness for carbon initiatives and fosters a collaborative approach towards comprehensive carbon reduction across the supply chain. Conducting market consultations before finalising procurement specifications allows for a realistic set of expectations that suppliers can meet.

Early engagement

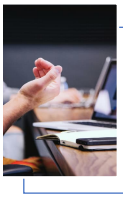
Why: Early consultation ensures suppliers understand carbon reduction goals, enabling them to align with low-carbon requirements and propose solutions (e.g. X as a service, longer warranties, remanufactured products)

Set clear expectations

Why: Transparent carbon-linked criteria, including LCAs, PCFs and other data, guide suppliers to align their processes and bids with carbon reduction priorities.

Market research

Why: Identifying low-carbon technologies and evaluating supplier capacity supports realistic, innovative low-carbon procurement approaches



Knowledge sharing

Why: Workshops and forums promote collaboration, address barriers, and share best practices for low-carbon innovation, driving supplier alignment with emissions goals.

Support for smaller suppliers

Why: Training and resources help SMEs build carbon literacy and capacity, enabling their participation in low-carbon procurement efforts and vakue-chain collaboration

Pre-tender market collaboration checklist

1. **Supplier engagement**
   - ☐ Consult suppliers early to assess readiness and capabilities.
   - ☐ Identify innovative, low-carbon technologies or solutions.
2. **Set clear expectations**
   - ☐ Define sustainability criteria and lifecycle CO2 reporting requirements.
   - ☐ Communicate carbon reduction goals and performance targets.
3. **Market research**
   - ☐ Analyse market trends for low-carbon alternatives.
   - ☐ Evaluate supplier capacity to meet carbon reduction objectives.
4. **Knowledge sharing**
   - ☐ Host workshops or forums to discuss challenges and opportunities.
   - ☐ Promote best practices for emissions reduction.
5. **Support for smaller suppliers**
   - ☐ Direct suppliers to resources that can improve carbon literacy and reporting capabilities (e.g. training)
   - ☐ Provide resources to support emissions management strategies.

Box 8: ***PRE-TENDER CASE STUDY - Training potential suppliers to meet bidding terms***

The UK Crown Commercial Service (CCS) has demonstrated the importance of supplier training to support sustainability goals. By requiring suppliers bidding for government contracts over £5 million to submit a Carbon Reduction Plan (CRP) and offering live, interactive CRP supplier training sessions, CCS has achieved several significant outcomes:

Increased carbon literacy
Suppliers have gained a clearer understanding of how to create and submit CRPs, ensuring alignment with government net-zero commitments and sustainability goals.

> ***Supplier feedback****: "The training was invaluable for understanding the CRP requirements and ensuring we meet the standards expected for government contracts."*

Improved supplier readiness
The training sessions, accessible to suppliers of all sizes, have enhanced supplier preparedness for bidding. This has reduced barriers for small and medium enterprises (SMEs) and leveled the playing field.

> ***Supplier feedback****: "As an SME, we initially found the CRP process daunting, but the training provided clarity and actionable steps to align with sustainability goals."*

Enhanced supply chain transparency
CRPs provide a detailed picture of supplier emissions and reduction efforts, enabling the government to better assess and manage the carbon impact of its supply chain.

Stronger supplier relationships
The interactive nature of the training sessions has fostered open communication and collaboration between CCS and its suppliers, strengthening long-term partnerships.

Standardized sustainability practices
The training ensures suppliers adopt consistent carbon reduction measures, embedding sustainability into procurement and driving sector-wide alignment with net-zero goals.

Accelerated Net-Zero progress
By asking suppliers to commit to achieving net zero by 2050, CCS has pushed its supply chain to contribute to national climate objectives, enhancing collective accountability for carbon reduction.

Pre-tender carbon-conscious checklist

1. Conduct an ICT inventory 📋

☐ Map existing ICT assets to identify carbon footprint and hotspots.
☐ Decide on an emissions calculation method
☐ Estimate lifecycle emissions for current devices.
☐ Create scenarios for device utilisation (e.g., extending lifespans).

2. Define emissions reduction strategies 🎯 ♻️

☐ Set clear carbon reduction goals for ICT procurement.
☐ Identify opportunities to prioritise low-carbon solutions.
☐ Include lifecycle assessments (LCA) as part of pre-tender planning, where possible.
☐ Prioritize extending the lifespan of ICT devices where possible.

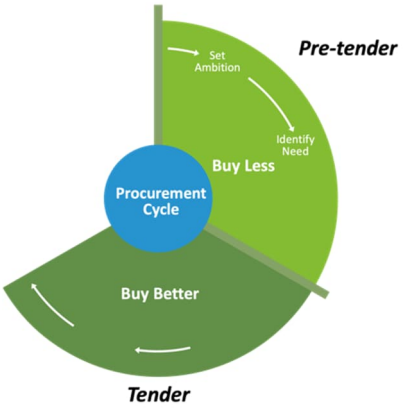
3. Engage the market early 🤝

☐ Consult suppliers to gauge their readiness for carbon reduction initiatives (e.g. extended warranty).
☐ Assess data availability from suppliers and encourage then to share LCA/PCF data.
☐ Identify feasible end-of-life options like refurbishment or take-back schemes.

Next: Explore strategies for the TENDER phase to reduce carbon footprints and drive sustainable outcomes.

3 Tender

Using carbon-related tender criteria can reduce the environmental impact of ICT products throughout their lifecycle. This section helps procurers understand various options to address carbon impacts during the tender phase, promoting informed decision-making.



Sustainable criteria employed by public procurers can minimise ICT-related carbon emissions. For example, integrating sustainability criteria in tender documents ensures alignment with product lifespan extension and reuse initiatives. Prioritising these criteria encourages low-carbon ICT solutions while meeting functional and environmental goals.

However, some criteria are more effective than others, and some require careful consideration. This section offers an overview of both effective criteria and additional options.

3.1 Using LCAs in criteria for ICT procurement

Integrating Life Cycle Assessments (LCAs), including Product Carbon Footprints (PCFs), into ICT procurement can encourage carbon-conscious decision-making. LCAs provide transparent data on carbon impacts, helping procurement teams identify carbon hotspots and explore low-carbon options.

However, challenges remain. While Product Carbon Footprints (PCFs) and Life Cycle Assessments (LCAs) follow global standards like ISO 14040/44[14], inconsistent Product Category Rules (PCRs)[15] hinder direct comparisons between ICT products.

The absence of standardised PCRs results in varying assumptions and data sources, ultimately leading to carbon estimate discrepancies. Inconsistent methodologies and the lack of standardisation make it challenging to compare products effectively. Additionally, complex supply chains further complicate the collection of accurate data. This variability in reporting hampers the integration of Life Cycle Assessment (LCA) data into procurement processes. [16]

[14] https://www.iso.org/standard/37456.html

[15] https://www.environdec.com/pcr/the-pcr

[16] Fraunhofer IZM, 2023. *PCR Roadmap: Harmonizing Product Carbon Footprint Methods for ICT*. January 2023. https://www.izm.fraunhofer.de/content/dam/izm/de/documents/Abteilungen/Environmental_Reliability_Engineering/Projekte/PCR%20roadmap_January_2023.pdf

Harmonising LCA standards and requiring consistent supplier reporting are essential to address these issues.

Figure 9 provides an overview of LCAs for use in the ICT procurement process.

Figure 9 : How LCAs can support carbon reduction in ICT procurement

Recommendations for LCAs in tender criteria

LCAs are valuable tools for measuring the environmental impact of products, but variability in methodologies requires caution. Procurement teams should:

Set clear expectations

- Require LCAs aligned with recognised standards such as ISO 14040/44 or IEC TR 62921[17].
- Specify lifecycle stages: production, transport, use, and disposal.

Focus on carbon hotspots

- Prioritise emissions data from high-impact lifecycle phases, particularly production, which drives most ICT carbon emissions.

Mandate verification

- Require third-party-verified LCAs to ensure data reliability and comparability.

Box 9: ***CUT AND PASTE CRITERION*** ✂

Life cycle assessment (LCA) is mandatory

The contractor must, within one (1) month of delivery of the products (excluding accessories), provide a Life Cycle Assessment (LCA) of the relevant product or similar product of similar construction. The latter is allowed only if no LCA has been made available by the manufacturer for the product in question.

The LCA results must include at least the climate impact, i.e. *carbon footprint*, expressed in carbon equivalents, calculated according to the guidelines of the Greenhouse Gas Protocol: 'Product Life Cycle Accounting and Reporting Standard'](https://ghgprotocol.org/product-standard) or similar guidelines that clearly define the scope. The total result must be broken down in at least the life cycle stages of raw material extraction, production, (downstream) transport and use. End-of-life is optional; if end-of-life is quantified in the LCA, the end-of-life results must be shown separately. This way, the contractor provides insight into the environmental hotspots.

The purchasing organisation expects manufacturers and its distributors/partners/resellers to nominally use LCAs made available by the manufacturers, thus indirectly standardising.

If manufacturers offer LCA analysis based on ISO14040 and ISO14044 standards, this standard should be used.

The purchasing organisation agrees that if LCAs contain a range in the calculation of the carbon footprint, the median of this calculation will count as the result. In the calculation, products have a lifetime of use (lifetime of product) of four (4) years, with the exception of displays: they have a lifetime of use of five (5) years.

Verification for the purchasing organisation
An LCA is requested in this criterion, because it provides insight into the environmental impact (and thus the hotspots) of the entire chain. These insights can be used for drawing up the action plan or for decisions regarding a subsequent tender. This way, the government wants to contribute to sustainability in the longer term. The government also wants to be able to account for the environmental impact of their purchases.

Related contract provision
Periodic consultations take place between the contractor and the client on achieving a structural reduction in carbon emissions in line with the climate agreement and the objectives of the central government's business operations (climate neutral by 2030). From these consultations, the contractor will provide an action plan for achieving these objectives.

Source: Government of the Netherlands SPP-criteria tool

[17] https://ictfootprint.eu/en/iec-tr-629212016-factsheet

Box 10: ***TENDER CASE STUDY - The Netherlands integrates LCAs into ICT procurement***

The Dutch Government embedded Life Cycle Assessments (LCAs) into its ICT procurement strategy to measure and reduce carbon emissions. This approach aligns with the country's goal of achieving climate neutrality by 2030 and sets a model for using LCAs to inform sustainable procurement decisions.

Key actions

1. **Market engagement**
   Pre-tender consultations ensured suppliers understood LCA requirements, fostering collaboration and realistic implementation.
2. **Mandatory LCA reporting**
   Suppliers were required to provide LCAs for all IT products, including laptops, monitors, and other hardware. The assessments detailed CO_2 emissions across the product lifecycle:
   - **Production**: Raw material extraction and manufacturing
   - **Transport**: Delivery emissions
   - **Use**: Energy consumption during operation
   - **End-of-Life**: Disposal and recycling impacts
3. **Standardized LCA data**
   To ensure comparability, LCAs had to follow international guidelines such as the Greenhouse Gas Protocol Product Standard or equivalent ISO standards. This provided consistent and reliable data to support decision-making.
4. **Carbon reduction and offsetting**
   Suppliers used LCA results to identify hotspots for emissions reduction and were required to offset remaining emissions through credible schemes like the Gold Standard.

Outcomes

- **Improved carbon transparency** as LCAs provided robust data, enabling the government to target the **highest-emission lifecycle phases**, particularly production.
- **Supplier accountability,** with LCAs pushing suppliers to optimize processes, reduce emissions, and provide verified data.
- **Policy integration** as LCA data became a foundation for procurement criteria, driving decisions toward low-carbon IT solutions.

Source: CFIT Case Study Dutch Government - driving carbon reductions

3.2 Sustainable Procurement Criteria

This section outlines procurement criteria designed to minimise the carbon impact of ICT products from production through their operational life. These criteria, synthesised from the practices and tools used by CFIT participants, are adaptable to different procurement settings.

Different types of criteria can be used to influence different carbon reduction actions:

- **Selection criteria** - Shortlist suppliers based on environmental management systems and standards
- **Minimum requirements** - Focus on processes and products that meet high standards from manufacture to disposal through, for example:
  - management and manufacturing systems
  - lifecycle assessments
  - product carbon footprint calculations
  - labels

    - specific energy performance standards
- **Award criteria** - Incentivise suppliers to adopt practices that exceed basic carbon standards compliance, such as more extended warranties, spare availability, and enhancing the energy efficiency of products beyond the industry standards.
- **Contract conditions** - Ensure suppliers are accountable for their carbon claims and commitments. This includes mandatory lifecycle assessments and detailed reporting on carbon emissions and reduction efforts, crucial for transparent and effective sustainability reporting.

Prioritising the most effective criteria

A device's embodied impact is heavily concentrated in the production phase. To achieve the most significant carbon reductions, procurement actions must prioritise extending the lifetime of devices, reducing the need for new production and distributing embodied carbon over a longer period. Figure 10 shows procurement criteria options for carbon impact across the lifecycle phases.

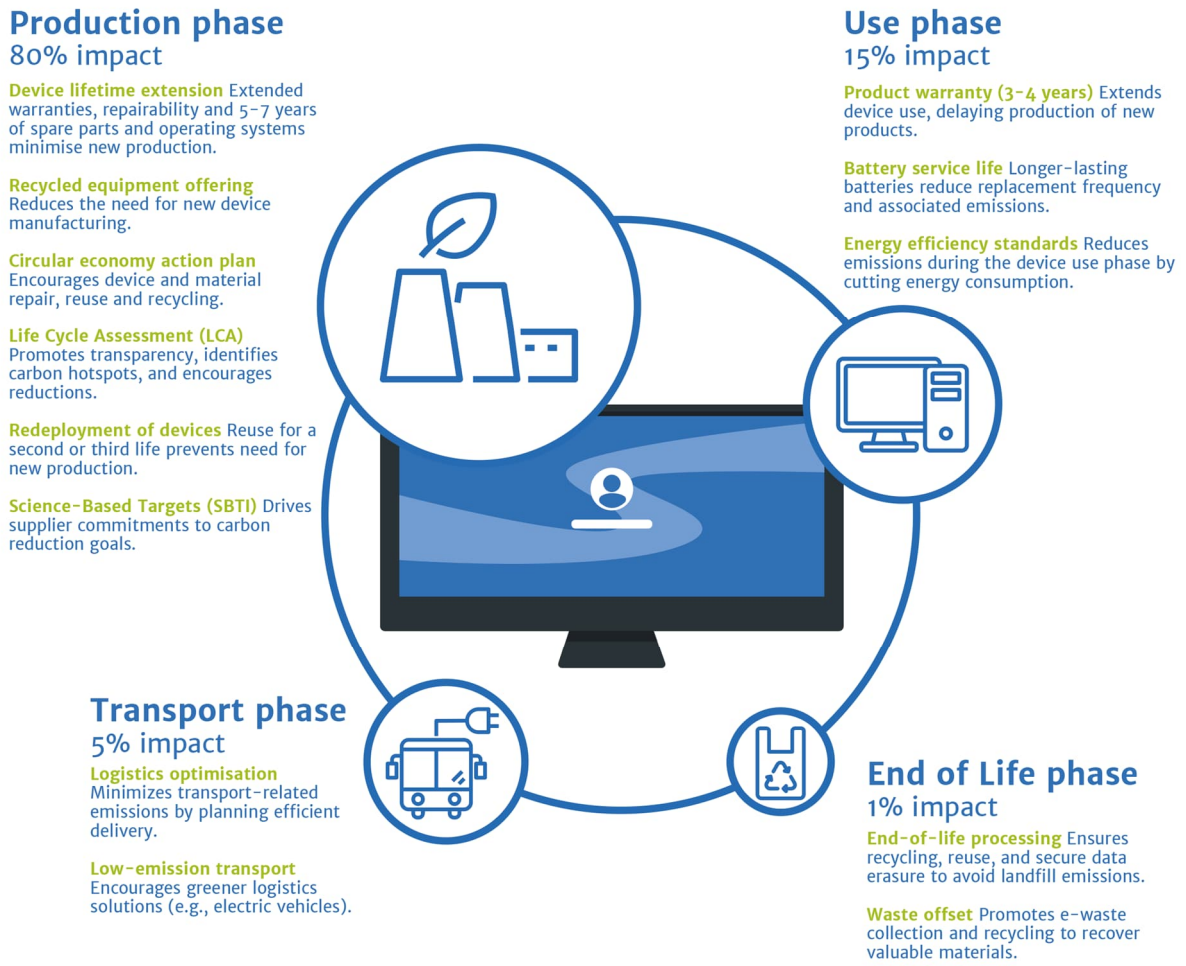


Figure 10: Carbon impact of ICT devices across lifecycle phases

Even if a device has a higher estimated PCF at purchase, its annualised carbon footprint reduces dramatically when its lifespan is extended. Therefore, procurement

should prioritise criteria for durability and longevity over competing factors. The following criteria can be considered.

Production phase-related criteria

The production phase accounts for the largest share of a device's total carbon footprint. To mitigate embodied carbon, these criteria focus on promoting longer product life, repairability, and resource-efficient manufacturing. They also focus on LCAs, labels, and standards to drive transparency across supply chains.

No.	Link	Criterion	Description	Carbon impact
1		Life Cycle Assessment (LCA) is mandatory	MINIMUM REQUIREMENT - Requires suppliers to provide LCA data following ISO 14040/44 or GHG Protocol standards, promoting transparency and identifying carbon hotspots.	Drives **production stage** reductions and **transparency** increases
2		Redeployment of leased products	MINIMUM REQUIREMENT - Requires 95% redeployment for second or third life of rental products, significantly reducing the need for new production.	Mitigates new **production emissions** via extended use
3		Spare parts availability for 5–7 years	MINIMUM REQUIREMENT - Extends device life by ensuring repairability and replaceable parts, reducing demand for new production.	Reduces embodied carbon through **lifetime extension**
4		5 years of operating system security updates	MINIMUM REQUIREMENT - Ensures extended device usability, avoiding unnecessary early replacements and reducing production emissions.	Reduces embodied carbon through **lifetime extension**
5		Mandatory replaceable parts	MINIMUM REQUIREMENT - Ensures critical components can be replaced, supporting repairs and reducing the need for new production.	Reduces embodied carbon through **repairability**
6		Mandatory recycled equipment offering	MINIMUM REQUIREMENT - Requires suppliers to provide refurbished or reused products, reducing reliance on new production.	Minimizes embodied carbon at the **production stage**
7		EcoVadis score (Advanced for manufacturers)	MINIMUM REQUIREMENT - Requires advanced sustainability ratings for manufacturers to ensure reduced emissions in production.	Cuts emissions in **production processes**
8		Environmental management system (plants)	MINIMUM REQUIREMENT - Mandates ISO 14001/EMAS standards for suppliers' plants to systematically reduce emissions during production.	Reduces emissions at **production processes**
9		Secure and data-compliant reuse	MINIMUM REQUIREMENT - Ensures devices are securely wiped and reused, extending their lifecycle and reducing the need for new production.	Reduces **production and disposal impacts**
10		Longer battery service life rated higher	AWARD CRITERION - Encourages batteries that last longer and degrade less, reducing	Mitigates **production emissions**

			frequent replacements and emissions from production.	
11		Science-Based Targets (SBTi)	AWARD CRITERION - Rates suppliers on near-term and net-zero emissions targets, driving systemic carbon reductions across supply chains.	Supports long-term **production emissions** cuts
12		Better circular economy plan rated higher	AWARD CRITERION - Rewards plans for material reuse, repair, and recycling, reducing emissions from raw material extraction.	Mitigates production and **end-of-life emissions**
13		Product warranty (3 years)	CONTRACT CLAUSE - Supports extended product use through mandatory repair, lowering demand for premature replacements.	Reduces **production emissions** year-on-year

Table 3: Production phase-related criteria

Box 11: ***TENDER CASE STUDY - Malmö reduces ICT carbon through longevity and circularity***

The **City of Malmö** carried out an assortment revision, within their ICT procurement framework, with a special focus on extending device lifespans and promoting circular practices. This approach targets the largest carbon impact, which comes from production.

Key climate criteria

1. **Five years of security updates for smartphones**
   Suppliers must provide at least five years of security updates. This ensures devices remain usable longer and reduces the need for early replacements. Extending their lifespan spreads production emissions over more years.
2. **At least one TCO Certified smartphone**
   In the assortment revision, at least one of the four smartphone models must be labelled TCO Certified. This demand was set even though at the time of the assortment revision, only one phone model (Fairphone) in the market had achieved the TCO Certified label. Fairphone has a strong focus on circularity. For instance, it is modular, making it easier and cheaper to repair, which increases the likelihood of extending its lifespan.
3. **Demand for durable products**
   Smartphones must meet a minimum IP-65 rating. One of the four phones should be rugged and suitable for professionals who work partly outdoors. Additionally, the computers within the framework should have passed durability testing in accordance with the American standard MIL810H or the G standard for drop testing, shock resistance, vibration resistance, display resistance, and temperature resistance. Adhering to this standard helps reduce the risk of products breaking prematurely due to accidents.
4. **Prices for common spare parts**
   The tenderers were requested to submit prices for common spare parts. The cost of these spare parts was subjected to competition, specifically regarding smartphone components such as batteries and screens.

Box 12: ***TENDER CASE STUDY - Reducing carbon footprint through remanufactured laptops in Ireland***

The Irish Government has implemented a national framework contract for remanufactured notebook computers, aiming to reduce carbon emissions and promote sustainability in public procurement.

Environmental impact

Choosing remanufactured laptops over new ones offers significant environmental benefits:

- **Carbon emissions reduction -** each remanufactured laptop prevents approximately 316 kg of CO_2 emissions.
- **Resource conservation -** This choice saves over 190,000 liters of water and preserves about 1,200 kg of natural resources per device.

Framework details

The framework, valued at up to €30 million, allows public bodies to procure remanufactured laptops, supporting the transition to a circular economy.

Projected outcomes

Over its duration, the framework is expected to facilitate the purchase of approximately 60,000 remanufactured laptops, leading to:

- **Total CO_2 reduction**: Around 19 million kg.
- **Water savings**: Approximately 11 billion liters.
- **Resource preservation**: About 72 million kg of mined materials.

Sources: CFIT Case Study Ireland - framework agreement for remanufactured notebooks
Case study on the European Commission website

Use Phase-related criteria

The operational life of a device contributes to its carbon impact through energy consumption. These criteria aim to reduce energy use, optimise device efficiency, and prolong battery life to minimise emissions during usage.

No.	Link	Criterion	Description	Carbon impact
14		Products meet Energy Star criteria	MINIMUM REQUIREMENT - Ensures energy-efficient devices, reducing emissions during the use phase.	Cuts **use-phase energy consumption**
15		Optimal power management settings	MINIMUM REQUIREMENT - Requires devices to come with energy-saving settings by default, minimizing unnecessary energy use.	Cuts emissions during **use phase**
16		Battery charging software required	MINIMUM REQUIREMENT - Optimizes charging, prolongs battery life, and lowers energy usage, reducing use-phase emissions.	Mitigates **use-phase carbon impacts**
17		More energy-efficient products rated higher	AWARD CRITERION - Rewards products exceeding baseline energy efficiency standards, reducing emissions during use.	Reduces **operational emissions**
18		Higher energy performance for power supplies	AWARD CRITERION - Recognizes efficient power supplies, reducing energy waste during device operation.	Reduces emissions from **device use**

Table 4: Use Phase-related criteria

Transport phase-related criteria

While transport contributes a smaller share of emissions, it remains an important area for reduction. These criteria encourage efficient delivery methods, minimal packaging, and reporting to reduce fuel use and transportation impacts.

No.	Link	Criterion	Description	Carbon impact
19		Zero-emission transport requirements	MINIMUM REQUIREMENT - Requires delivery methods with lower emissions, reducing transportation carbon impacts.	Lowers emissions during **transport phase**
20		Reporting of deployed vehicles	CONTRACT CLAUSE - Requires suppliers to report on logistics strategies that reduce fuel use and emissions.	Reduces emissions in **transport**
21		Consolidated deliveries to reduce emissions	MINIMUM REQUIREMENT - Encourages fewer, consolidated deliveries to minimize fuel consumption and emissions.	Mitigates **transport impact**
22		Minimal packaging and recycled packaging	MINIMUM REQUIREMENT - Promotes less packaging and use of recycled materials, reducing emissions from transport and disposal.	Cuts emissions from **transport**

Table 5: Transport phase-related criteria

End-of-Life phase-related criteria

Proper end-of-life management ensures devices are reused, recycled, or repurposed, minimising waste and recovering valuable materials. These criteria focus on secure disposal, waste offsetting, and processes that reduce emissions at the end of a product's lifecycle.

No.	Link	Criterion	Description	Carbon impact
23		Collecting, erasing, reusing, and recycling	MINIMUM REQUIREMENT - Ensures devices are securely erased and reused or recycled, reducing waste and emissions.	Reduces emissions at **end-of-life**
25		Mandatory End-of-Life management process	MINIMUM REQUIREMENT - Contractor provides an End-of-Life management process to minimise environmental impact, including reuse of products and accessories.	Reduces emissions at **end-of-life**
26		Waste offset for laptops, tablets, and phones	MINIMUM REQUIREMENT - Requires suppliers to offset e-waste by collecting and recycling equivalent volumes, certified by TCO Certified Edge, E-waste Compensated or equivalent.	Mitigates emissions during **disposal**

Table 6: End-of-Life phase-related criteria

Procuring organisations can adopt these procurement criteria, among others, to ensure that their ICT purchases support their carbon reduction and sustainability agendas.

Building reporting into contract conditions

Contract conditions can be used to require regular emissions reporting from suppliers. This enables purchasing organisations to track progress, identify improvements, and hold suppliers accountable. Clear reporting frameworks help procurement teams address emissions hotspots and drive continuous improvements.

The Dutch Government established mandatory reporting requirements for contractors to provide clear and detailed insights into their climate performance. Contractors were required to submit monthly sales reports, which included key climate data like carbon footprints and emissions offsets. Annual corporate responsibility reports also highlighted climate-related information, enabling the government to track progress toward sustainability targets.

Box 13: ***Cut and paste criterion ✂***

Mandatory reporting items

1. Climate
   - The total CO2 emissions of all products delivered (including rented ones) during the previous calendar year.
   - The total realized CO2 reduction of the previous calendar year compared to the period calendar year minus 1 year (e.g. reduction in 2021 compared to CO2 emissions 2020).
   - The percentage CO2 reduction (cumulative) of the previous calendar year compared to a national or other standard (*e.g. compared to the Dutch Climate Agreement, based on a linear reduction from 2019 to 2030*).

2. CO2 compensation:
   - The contract with the provider of the CO2 compensation or a reference to the contract with the CO2compensation provider.
   - Mention of the certifications used (e.g. Gold Standard) and the associated projects.
   - Contribution to the realization of at least three relevant Sustainable Development Goals (SDGs).
   - Independent annual verification of the total amount of CO2 compensated over the previous calendar year.

Proposed verification:
Contractors must submit an annual report detailing all the specifications listed above. The report should include supporting documentation such as contracts, certification proofs, and independent verification statements.

Source: Case Study Dutch Government - Circular & Fair ICT Pact

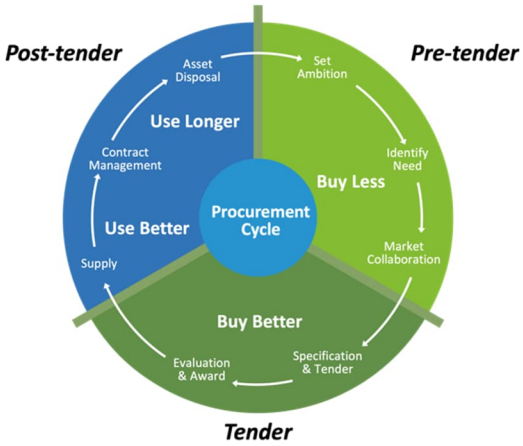
Carbon-conscious tender checklist

1. **Ask for Life Cycle Assessments (LCA)** 📊
   ☐ Require suppliers to submit LCAs aligned with ISO 14040/44 or GHG Protocol.
   ☐ Verify data consistency through third-party certification.
2. **Prioritise production phase carbon mitigation** 🛠️
   ☐ Require product warranties and device support for extended use.
   ☐ Include criteria for spare parts availability and mandatory replaceable components.
   ☐ Encourage redeployment and secure reuse of devices.
3. **Address energy efficiency during use** ⚡
   ☐ Mandate Energy Star or equivalent standards for energy performance.
   ☐ Include power management settings and battery optimization software.
   ☐ Incentivize suppliers to exceed baseline energy efficiency targets.
4. **Reduce transport-related emissions** 🚚
   ☐ Require consolidated deliveries to reduce emissions.
   ☐ Specify minimal packaging and encourage recycled materials.
   ☐ Assess supplier logistics for zero-emission transport strategies.
5. **Manage end-of-life responsibly** ♻️
   ☐ Mandate secure data erasure, reuse, and recycling.
   ☐ Include waste offsets for ICT products (e.g., laptops and tablets).
   ☐ Require detailed end-of-life management plans to minimise environmental impact.
6. **Ensure supplier accountability** 📄
   ☐ Rate suppliers on science-based targets (SBTi) and carbon reduction commitments.
   ☐ Require reporting on carbon impacts and lifecycle emissions.
   ☐ Reward advanced circular economy plans for reuse and recycling.

Next: Explore strategies for the POST TENDER phase to reduce carbon footprints and drive sustainable outcomes.

4 Post tender

Effective management and strategic implementation during the Post-tender phase can lower the carbon footprint of ICT devices by extending their lifespans, optimising energy use, and enhancing end-of-life disposal practices.



4.1 Use Better: Key actions

Effective management of IT equipment usage can also be crucial in reducing emissions. Here are some insights into how different management strategies can impact the carbon footprint of a typical PC per year (See also Figure 11):

- **Continuously active PC**: Keeping a PC active without interruption can lead to approximately 73 kg of CO2e emissions.
- **With default power-saving features**: Activating the default power-saving settings can reduce emissions to 37 kg CO2e, a 49% reduction.
- **Shut down when not in use**: Completely shutting down the PC when it is not in use can further reduce emissions to 17.6 kg CO2e, a 76% decrease.
- **Turned off when not in use**: The most effective reduction strategy—turning the PC off—can decrease emissions to 14.7 kg CO2e, an 80% reduction from the continuously active scenario.

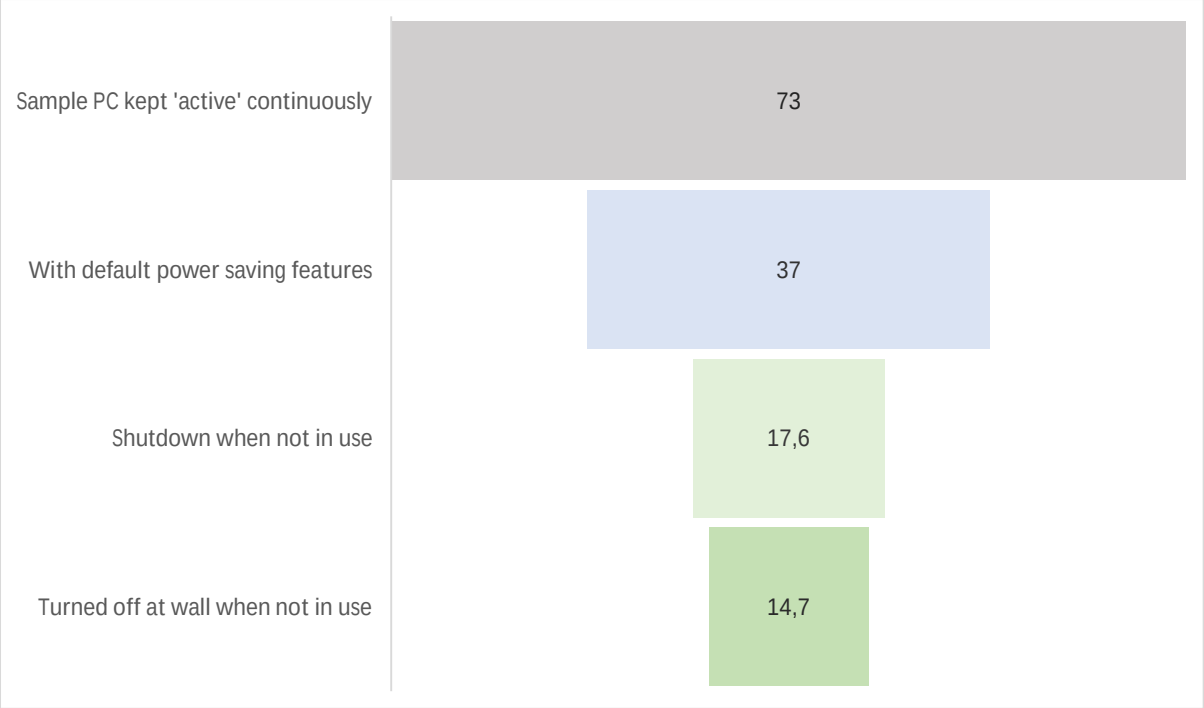


Figure 11: Efficiency in use (kg CO2e per year per desktop PC) (University of Oxford)

Implementing power management strategies such as these reduces the carbon footprint of IT equipment and encourages a culture of energy consciousness within organisations. These strategies are particularly effective when combined with an awareness campaign that educates staff about the benefits and methods of energy-saving practices.

4.2 Use longer: Key actions

Procuring organisations must actively champion initiatives that prioritise repair, maintenance, and extended device use over frequent replacements. Tangible actions to promote using better and longer include policies, incentives, training and establishing end-of-life programs.

Policies for longevity

Develop policies emphasising device care, proper storage, and reuse before considering replacements. For example, guidelines on acceptable device performance thresholds before upgrades should be established.

Box 14: ***POST TENDER CASE STUDY - Embedding sustainability into ICT procurement through spend controls***

The UK Government has integrated sustainability into ICT procurement with updated spend controls under the Technology Code of Practice. Departments must demonstrate alignment with the Greening Government ICT and Digital Services Strategy outcomes, including net-zero, circular economy, and social value, to secure funding for ICT projects.

For digital projects exceeding £100,000 and technology projects over £1 million, sustainability assessments are now mandatory. This ensures that environmental impacts are considered at the project design stage, driving carbon reductions and aligning budget decisions with sustainability goals.

The **Sustainable Technology Advice & Reporting (STAR)** group supports departments in meeting these new requirements, transitioning sustainability from a voluntary initiative to standard practice.

Source: 'Business as usual' for mandating Sustainable ICT (UK Gov)

Implementing effective internal strategies can significantly enhance the longevity of your ICT assets, significantly saving CO2 emissions. The CFIT Mini-guide to Lifetime Extension outlines several key approaches for maintaining and optimising the lifecycle of ICT devices within organisations.

ICT care strategy	Description
Asset management plan	Implement inventory tracking and lifecycle management for ICT assets.
Preventive maintenance	Establish regular cleaning and maintenance schedules. Engage IT professionals for checks.
Environmental controls	Maintain temperature-controlled environments and manage dust in ICT equipment areas.
Usage policies	Update software regularly, ensure proper handling and storage of devices.
Energy management	Use power-saving settings and educate on optimal charging practices.
Security measures	Keep antivirus software updated, conduct regular scans, and ensure data backups.
Employee training	Provide training on the importance of ICT care, maintenance, and responsible use policies.
Vendor support and warranties	Manage warranty periods and establish relationships with vendors for support and maintenance.

Table 7: ICT care strategy for longevity

Incentive programs

Incentive programs can drive sustainable practices by encouraging departments or individuals to extend the lifespan of ICT devices through responsible use and energy-saving actions. Recognising efforts such as reduced repair requests, extended device usage, and measurable carbon savings can motivate change.

Programs can offer practical incentives like rental agreements, buy-out options, and repair prioritisation. By implementing initiatives that balance employee flexibility with environmental goals, organisations can promote long-term device use and reduce procurement needs.

Box 15: ***POST TENDER CASE STUDY - Viken County extends device life through rental models***

Viken County in Norway implemented a smartphone rental model to reduce carbon emissions and promote device longevity. This approach aligned with their goal of optimizing resource use and reducing electronic waste.

Key Actions

1. **Rental model implementation**
   Viken introduced a three-year smartphone rental agreement for employees and high schools. Employees retained the same device for the entire rental period, encouraging responsible use and extending device life.
2. **Repair and reuse prioritization**
   Devices were repaired whenever possible. If repair costs exceeded replacement, refurbished or similar devices were provided to maintain the same lifecycle.
3. **Buy-out option for employees**
   At the end of the rental period, employees had the option to buy their devices. This incentivized continued use beyond the initial contract period, extending the product lifecycle.
4. **Promoting shared use**
   Devices supported dual-SIM functionality, enabling combined personal and work use. This reduced the need for multiple phones.

Outcomes

- **Extended device lifespan**: By discouraging early replacements and promoting repair, devices stayed in use longer.
- **Carbon reductions**: Most of a phone's carbon emissions occur during production, so extending usage significantly lowered the environmental impact.
- **Cost optimization**: The rental model spread costs over time, reducing upfront expenditures.
- **Employee engagement**: Flexible options, including buy-outs and dual-SIM capabilities, increased employee satisfaction and reduced unnecessary device purchases.

Source: Case Study Dutch Government - Circular & Fair ICT Pact.

Device care champions

Identify sustainability advocates across departments to drive local initiatives and awareness raising, share success stories, and track progress.

Box 16: ***POST TENDER CASE STUDY: NHS Digital green ICT strategy***

NHS Digital (UK) implemented a *Green ICT Strategy* to reduce environmental impacts by extending device lifespans and optimizing IT infrastructure. A key element was fostering internal engagement through their *Green Digits* sustainability champions, who drove awareness and supported initiatives across the organization.

Key actions

1. **Employee engagement through the "Green Digits"**
   A group of sustainability champions from across NHS Digital promoted initiatives, raised awareness of device care, and supported best practices for extending device life.
2. **Extending device lifespans**
   A *device buyback service* allowed staff to purchase used devices, reducing premature recycling and encouraging reuse. Devices not sold were responsibly recycled to minimize waste.
3. **Optimizing IT infrastructure**
   NHS Digital migrated ICT systems to cloud-hosted platforms and consolidated data centres, decommissioning legacy infrastructure. This improved energy efficiency and reduced reliance on new hardware, lowering embodied carbon.

Outcomes

- **Cultural shift** as *Green Digits* champions helped embed sustainability practices across teams, fostering long-term behavioural change.
- **Reduced demand for new devices** through extended lifespans, responsible reuse, and improved employee awareness.
- **Improved energy efficiency** by consolidating IT infrastructure and migrating to cloud services.

Source: Greening government ICT and digital services: 2019 to 2020 annual report

Workshops and training sessions

Conduct regular workshops to educate staff on responsible device handling and maintenance techniques. Include demonstrations of power management tools and repair opportunities.

Box 17: ***POST TENDER CASE STUDY - Employee engagement drives device longevity and carbon savings***

Atos research highlights the crucial role of employee engagement in extending device lifespans and reducing carbon emissions. The study shows that **75% of employees** are **willing to keep devices longer** when they understand the environmental benefits, demonstrating the power of awareness and education.

Key insights include:

- Educating employees about the carbon impact of manufacturing devices, which accounts for around **80% of a laptop's footprint**, builds support for sustainability.
- Condition-based refresh cycles, combined with remanufacturing, enable devices to achieve an **8–10-year lifespan**, reducing e-waste without affecting user satisfaction.
- Promoting energy-saving habits, such as powering down devices when not in use, further reduces emissions and improves workplace sustainability.

By engaging employees and aligning IT practices with sustainability goals, organizations can drive behaviour change, extend device use, and achieve measurable environmental benefits.

Source: Atos Sustainable Workplace research finds device lifespan can double while still delighting users

Prioritising reuse, refurbishing and remanufacturing

Procuring refurbished electronics can extend the electronics' lifespan and reduce raw materials consumption. These devices have been repaired and updated to serve new users, support environmental goals, and offer cost-effective technology solutions.[18]

Remanufacturing a laptop, for example, could save over 300kg of CO2 emissions compared to buying new[19]. Some suppliers now offer contracts where the 'refresh' of a device through remanufacture can be built into the service. See the ***CFIT Mini Guide on Remanufacturing*** for more details and strategies.

Establishing collection and recovery programs

Set up take-back programs or participate in collection schemes to recover used electronics. Devices should be prioritised for refurbishment, resale, or recycling to minimise waste and extend material use.[20]

Urban mining recovers valuable metals like gold, copper, and aluminium from e-waste, reducing the need for virgin materials. [21] Key actions include:

- Developing recycling technologies to recover metals from complex waste streams
- Designing products for easy disassembly and recycling
- Ensuring compliance with chemical restrictions and local regulations [22]

[18] https://www.epa.gov/smm-electronics/basic-information-about-electronics-stewardship
[19] https://circularcomputing.com/sustainable-it/
[20] https://www.epa.gov/smm-electronics/basic-information-about-electronics-stewardship
[21] https://www.epa.gov/smm-electronics/basic-information-about-electronics-stewardship
[22] DEFRA, Helping businesses create a greener, more sustainable future through ICT

When devices cannot be reused, ensure responsible recycling to recover valuable materials. Recycling significantly cuts carbon emissions compared to primary production. For example, producing one ton of gold emits 17 tons of CO_2, while recycling avoids this impact.

In 2022, formal recycling efforts prevented 93 million tonnes of CO_2 emissions by avoiding virgin material extraction. Supporting these processes reduces emissions, conserves resources, and drives a circular economy. [23]

Box 18: ***Cut and paste criterion ✂***

Secure computer collection, sanitisation, re-use and recycling

Technical Specification
Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Confidential handling and secure data erasure*;
- Functional testing, servicing, repair and upgrading to prepare products for reuse;
- Remarketing of products for reuse;
- Dismantling for component re-use, recycling and/or disposal.

In providing the service, the contractor must report on the proportion of equipment prepared or remarketed for re-use and the proportion of equipment prepared for recycling. Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU and with reference to the list of components for selective treatment.

Verification
The tenderer must provide details of the arrangements for collection, data security, preparation for re-use, remarketing for re-use and recycling/disposal. This must include, during the contract, valid proof of compliance for the WEEE handling facilities to be used.

Source*: Irish GPP Criteria Search*

4.3 Monitoring and reporting

Monitor the lifecycle of procured electronics and report on sustainability metrics, such as the percentage of devices recycled or refurbished, to track progress and adjust practices as necessary.

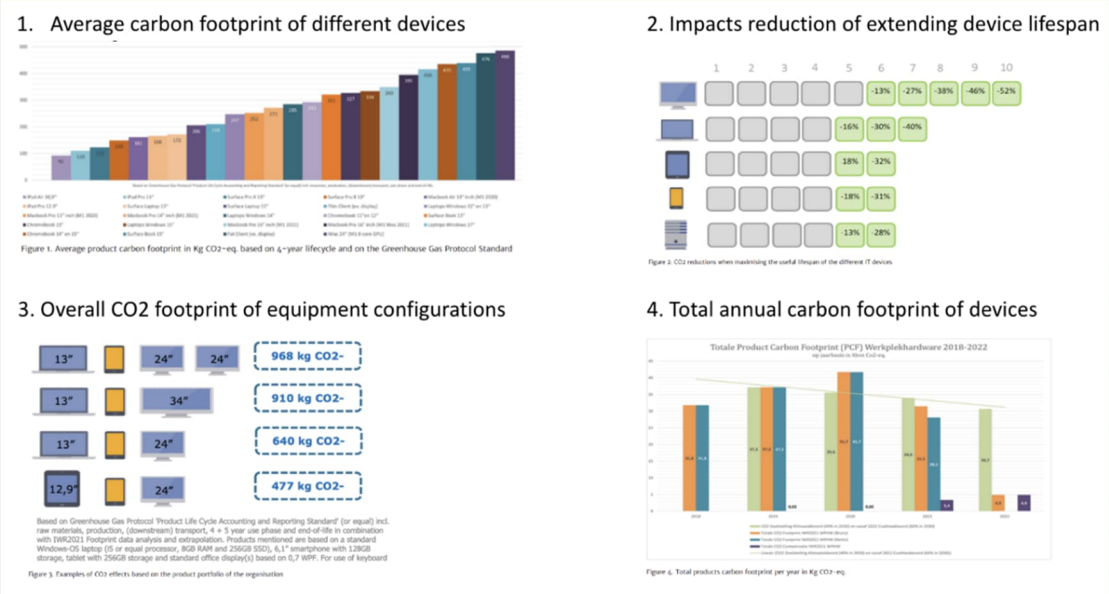
[23] ITU, End-of-life management of ICT equipment guide: https://www.itu.int/dms_pub/itu-t/oth/4B/04/T4B0400000B0013PDFE.pdf

Box 19: ***POST TENDER: TENDER CASE STUDY - Dutch Government integrates LCAs to reduce ICT emissions***

The Dutch Government implemented a structured post-tender approach to manage and reduce the carbon impact of ICT devices. By embedding clear reporting requirements and performance monitoring into contracts, they ensured ongoing emissions tracking and accountability while driving continuous improvement.

Key actions

1. **Mandatory carbon reporting**
   Contractors were required to submit detailed reports on the carbon footprint of purchased devices.
   - **Monthly Sales Reports**: Included emissions data for each device and any compensation efforts.
   - **Annual Sustainability Reports**: Provided a comprehensive overview of total emissions, reduction measures, and progress toward government targets.
2. **Performance monitoring and collaboration**
   The IWR (Informatie Werkplaats Rijksoverheid) managed contract performance, sharing regular updates with high-level decision-makers like Chief Information Officers and strategy boards.
   - Reports highlighted the average carbon footprint of devices.
   - Recommendations included extending device lifespans and optimizing equipment configurations to reduce emissions.
3. **Carbon offsetting and accountability**
   Contractors were required to offset emissions from ICT products through certified programs like the Gold Standard, ensuring any remaining carbon impacts were addressed.



Outcomes

- **Enhanced carbon transparency**: Regular reporting gave visibility into emissions and identified the lifecycle stages with the highest impacts, particularly production.
- **Actionable insights**: Data-driven recommendations supported better IT planning, such as prioritizing device longevity and reducing procurement demand.
- **Continuous improvement**: Ongoing reporting enabled collaboration with suppliers to optimize processes and align performance with sustainability goals.

Source: *CFIT Case Study Dutch Government - driving carbon reductions*

Consider using tools for energy management and GHG emissions reporting. These can help analyse the energy performance and savings opportunities across the organisation's ICT assets.

Box 20: **Useful tool** 🛠️

RETScreen
RETScreen, developed by Natural Resources Canada (NRCan), helps evaluate energy savings, costs, and emissions reductions. This tool supports energy performance analysis across ICT systems, enabling governments to identify opportunities for decarbonization and cost savings. RETScreen's flexibility allows users to track emissions from ICT equipment and energy consumption, aiding in sustainable IT management.

Learn more: RETScreen Website.

Box 21: ***Useful tool*** 🛠️

TCO Certified Report Generator
The TCO Certified Report Generator provides IT Product Sustainability Reports based on verified data. These reports allow organizations to measure the sustainability impact of their certified ICT products across four key pillars:

- **Climate**: Carbon footprint data, including scope 2 (use phase) and scope 3 (supply chain).
- **Circularity**: Metrics on material footprint and annualized e-waste reduction potential.
- **Substances**: Use of safer chemicals and compliance with accepted substance lists.
- **Supply Chain**: Compliance with social responsibility standards, including worker protections.

The tool generates detailed insights by aggregating verified data on purchased products, helping procurement teams assess their portfolio's sustainability performance and set improvement targets.

Learn more: TCO Report Generator

Effective tracking of key metrics is essential for reducing the environmental impact of ICT procurement. The table in box 22breaks down **what to track**, **why it matters**, and **how to track it** – with practical strategies and tools to make reporting simple and actionable.

Box 6: Carbon-conscious ICT procurement tracking and reporting template

Metric	What to track	Why it matters	How to track
🏭 **Device carbon footprint**	- Carbon emissions per device (production, use, transport, end-of-life). - Supplier-provided footprint data.	Identifies carbon hotspots to reduce environmental impact.	- Request supplier reports (LCAs, PCFs). - Use tools like **TCO Certified Report Generator**.
⏳ **Device longevity**	- Devices used beyond 5 years. - Number of refurbished/reused devices. - Spare parts availability.	Extends device life, reduces new production emissions.	- Track purchase and refresh cycles. - Use asset management software. - Monitor repair and reuse rates.

	- Devices collected for reuse or buy-back.		
⚡ **Energy efficiency**	- Devices meeting energy standards (e.g., ENERGY STAR). - Energy savings through power management. - Annual energy consumption (kWh).	Cuts emissions and saves on energy costs during use.	- Request energy certification data. - Enable power-saving defaults on devices. - Track energy bills for IT equipment.
✅ **Supplier performance**	- Suppliers with green certifications (ISO 14001, TCO Certified). - Frequency of sustainability reports. - Commitments to emissions reductions.	Ensures accountability and progress from suppliers.	- Include reporting requirements in contracts. - Regular supplier reviews and audits.
♻️ **End-of-Life management**	- Devices returned for reuse, refurbishment, or recycling. - Percentage of materials recovered. - E-waste reduction data.	Reduces waste and supports the circular economy.	- Track through take-back programs. - Partner with certified e-waste recyclers. - Use reporting tools from suppliers.
💰 **Cost and savings**	- Total lifetime cost of devices (including repairs and energy use). - Savings from extended device life. - Repair costs vs. full replacements.	Demonstrates cost benefits of sustainable practices.	- Use Total Cost of Ownership (TCO) calculators. - Track repair and replacement expenses.
👥 **Employee engagement**	- Number of workshops/training sessions. - Adoption of energy-saving practices. - Feedback on device satisfaction and usage.	Encourages behaviour that extends device life and reduces energy use.	- Run engagement campaigns. - Monitor workshop participation. - Collect user feedback through surveys.

5 Conclusion and next steps

Reducing the carbon footprint of ICT procurement is an urgent and achievable priority for public sector organisations.

This guide provides practical, step-by-step strategies for driving meaningful action at every stage of the procurement cycle: **pre-tender, tender, and post-tender**.

Taking decisive action now can contribute to global climate goals, improve resource efficiency, and achieve significant cost savings.

Key actions to take now

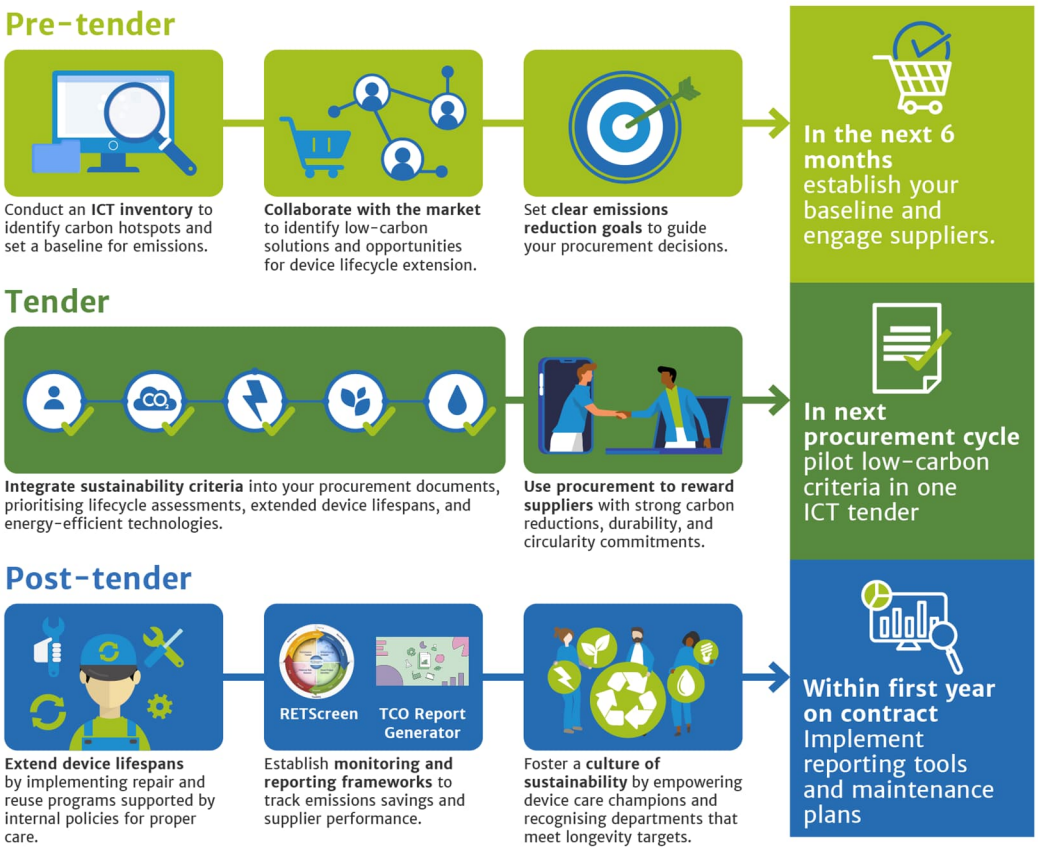


Figure 12: Key actions for lower carbon ICT

The benefits of action

By following this guide's strategies, you can:

Extend device lifespans to reduce emissions by up to 37.5%

Save costs with repair, reuse, and refurbishing, avoiding early replacements

Inspire the market to align with carbon-neutral goals

Track progress with clear KPIs and monitoring tools for transparency

Every small action adds up to a significant carbon reduction impact. Start now by implementing one or more of the strategies outlined in this guide. Engage your internal teams, collaborate with suppliers, and measure your progress to demonstrate leadership in carbon-conscious ICT procurement.

Public buyers can drive sustainable change by aligning with the strategies employed by CFIT participants. The ICT market has a significant impact on carbon emissions. Procurement plays a pivotal role in accelerating this transformation; however, success relies on collaboration and a unified buyer's voice. Together, we can shape a low-carbon, circular, and fair ICT future.