GLOBAL ELECTRONICS COUNCIL®

Purchaser Guide for Circularity

Global Electronics Council ®
GEC Purchaser Guide for Circularity
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This is version 1 of the GEC Purchaser Guide for Circularity. Version 2 will be published after the release of our updated EPEAT Circularity Criteria, planned for completion in October 2024. Version 2 will include relevant references to our updated Criteria. Look to download the next version of the Guide later this year.

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About GEC

The Global Electronics Council ® (GEC) is a mission-driven nonprofit launched in 2006 dedicated to accelerating the market for sustainable electronics. We value the tremendous societal good that technology provides, yet recognize that it also can be linked to adverse environmental and/or social impacts. GEC seeks to address these impacts by leveraging the power of public and private sector institutional purchasers. We provide numerous resources to purchasers to help them procure credible, sustainable, and circular technology products and services. One of our best-known resources is our Type-1ecolabel EPEAT ®, which covers more technology products than any other comparable ecolabel. In addition, the EPEAT ecolabel is a resource for manufacturers to demonstrate that their products conform to the highest sustainability standards. To learn more, visit www.gec.org and www.epeat.net or follow GEC on LinkedIn and X.

GEC Purchaser Guide Series

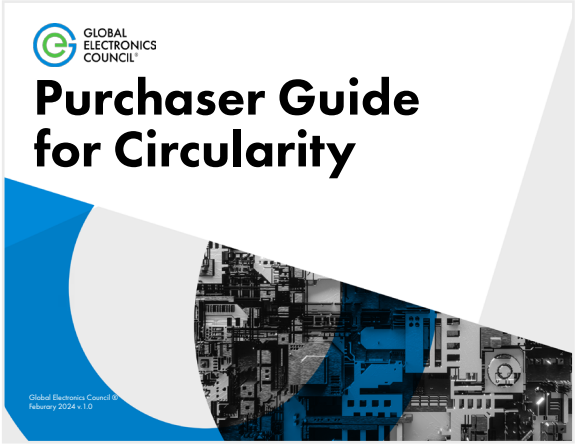
This Guide is the third document in the GEC Purchaser Guide series. These Guides aim to empower public and private sector purchasing decisions on emerging and forward-thinking sustainability issues. Each Guide provides a set of questions and examples of supplier-provided supporting documentation that can be used as part of the technology procurement process, as well as an overview of relevant terminology. All Guides were developed over multiple stages of research and working group discussions, with additional stakeholder input.

Acknowledgments

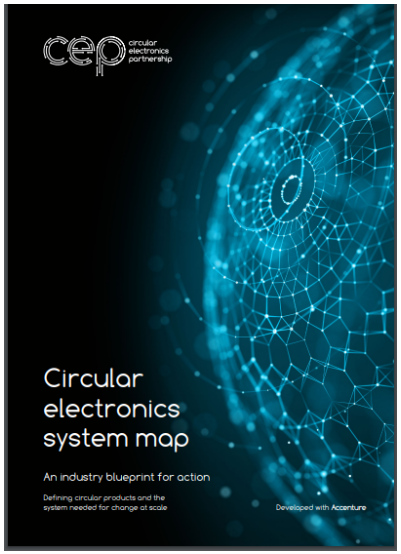
Global Electronics Council is very grateful to all the representatives from business, government, civil society organizations, universities, NGOs, and other institutions who are committed to bringing greater transparency to the sustainability benefits of circularity and who assisted in the development of this Guide. In particular, we thank GEC's initial multi stakeholder Working Group for providing their expertise at meetings and on working drafts. Additionally, we appreciate the contributions from the Circular Electronics Partnership (CEP), both Partners and Members, who provided comments during the process.

About This Guide

This Guide was prompted by institutional purchasers, both public and private, who approached GEC and shared their challenges with assuring that the technology products they purchased supported a circular economy. In response, GEC created a Guide that addressed these concerns: 1) providing purchasers with a concise set of circularity procurement questions that could be clearly understood by technology companies, and 2) identifying credible supporting documentation that technology companies could provide purchasers in response. The Guide intends to create consistency in both the questions asked of suppliers and the documentation provided in response so that purchasing organizations can leverage these efforts in their sustainability and circularity reporting process. Additionally, in acknowledgment that procurement decisions alone cannot make purchases "circular", we provide basic guidance on responsible end-of-use policies and procedures.



Many of the questions and related documentation, within this Guide, can be met by seeking out EPEAT registered products. EPEAT, a global Type 1 ecolabel, simplifies the procurement process with a defined set of circularity requirements and the added assurance that suppliers have submitted evidence to third-party verifiers for review. Requiring EPEAT in purchasing policies can reduce the amount of time spent gathering and analyzing data from suppliers, as well as the pressure for extensive in-house sustainability expertise within procurement; this can be particularly helpful for SMEs, but also for large enterprises.



This Guide also supports Action 2.1 on CEP's Circular Electronics Roadmap (Roadmap) to help move the technology industry towards circularity, as well as aligns with CEP's Circular Electronics Systems Map (Blueprint). Additionally, the Global Electronics Council and International Telecommunication Union (ITU), both CEP Partners, coordinated the development of complementary purchaser guides. ITU's guidance covers the entire procurement and contracting process, whereas GEC's Guide focuses on product/company attributes. We recommend also referencing ITU's Circular and sustainable public procurement – ICT equipment guide. Although ITU's guide is intended for public procurement, private-sector purchasers can find the concepts valuable as well.

What is Circularity?

Circularity emphasizes the efficient use of resources. The envisioned ideal is to never discard or lose the initial investment of natural capital stocks that went into creating products from extracted resources. In a circular economy, the lifetime of products is maximized through repair, refurbishment, remanufacturing, and finally recycling. The output of one process is the feedstock for another, closing material chains. Raw material extraction would therefore become minimized and with it, resources are conserved, greenhouse gas emissions are reduced, and air and water quality improved.

Circularity and sustainability are closely related. Sustainability covers a broader spectrum of environmental and social concerns, from pollution to labor rights. Circularity focuses on a subset of these issues and is related to designing out waste and increasing efficiencies within systems.

Circularity demands innovative thinking. The power of circularity is best harnessed with a shift in mindset and new holistic models for the production and consumption of goods, such as:

- Product design to enable repair, reuse, and ultimately recycling
- Product design to incorporate the use of recycled content plastics and metals as well as overall dematerialization strategies
- Product design for interoperability to reduce waste
- Innovative business models such as “rent versus buy” and shared services
- Novel material sourcing such as urban mining to enable more sustainable use of limited resources
- Reverse logistics, including customer engagement to recapture products to recover materials
- Increased customer and commercial appeal for reused and remanufactured products
- Customer access to product durability and repairability information at the point of purchase
- Customer access to repair information and services throughout product ownership
- Customer confidence in secure data deletion to enable reuse
- Reuse, remanufacturing, and recycling capacity expansion in an environmentally, and socially responsible manner
- Innovative creation of end-use markets, value chain partners, and cross-sector relationships to enable closed-loop material recovery and use

How to Use This Guide

The first section of this Guide provides examples of procurement questions and associated supporting documentation for use by purchasers within the procurement process. It identifies the types of inquiries and possible information to solicit from vendors about the circularity of their products and their contribution and aspirations in promoting a circular economy. Purchasers can use the procurement questions to engage in dialogue with their suppliers, develop preferences or requirements, and evaluate their supplier base.

While purchasers can leverage best practices to consider circularity in their procurement, it's recognized that current practices alone will not achieve the scale of change needed for a truly circular economy. Therefore, the transformational circularity questions focus on business practices from internal commitments to external partnerships and engagements that can fundamentally stimulate the industry toward change.

The second section addresses complementary end-of-use policies and procedures. Procurement decisions alone cannot enable a circular economy; therefore, organizations must pair their purchasing policies with responsible end-of-use policies and procedures as well.

Procurement Questions and Supporting Documentation

A. Current Best Practices to Drive Circularity
    1. Product Attributes
    2. Vendor Commitment and Practices

B. Transformational Circularity

End-of-use

A. Policies and Procedures
B. Data Privacy

Organizations should incorporate both procurement and end-of-use practices in order to support circularity.

Procurement Process Questions

The questions within each of the areas are not organized in any particular order. A purchaser's sustainability priorities or IT operations are expected to influence which questions they choose to prioritize.

The crafting of each question is meant to elicit a meaningful response from vendors. Some topics may include a series of questions. Purchasers may wish to reword certain parts or even entire questions to meet their specific needs. GEC has included an "objective" for each question that captures its underlying objective, with the hope that this will assist any purchaser who pursues such rewording.

While the Guide provides examples of questions and associated supporting documentation, it does not recommend a specific methodology for evaluating responses. The questions within the Guide can be tailored for use in a pass/fail, simple scoring, or a weighted attribute evaluation approach.

Supporting Documentation

Following each question is a list of potential supporting documentation that a vendor may submit. In some instances, the supporting documentation may take several forms and/or have relevant equivalents.

This Guide does not dictate a preference for one form or another, as it seeks to provide clarity without being overly prescriptive. Some supporting documentation may require more effort than others to collect and report. This Guide does not include information about which supporting documentation may require more effort, because that depends on the resources and existing sustainability commitments of the vendor.

Additionally, the Guide is intended as a beginning point for purchasers. It does not go in-depth as to how to weigh, prioritize, or perhaps penalize certain responding answers. These decisions will vary from organization to organization.

If the process of prioritizing questions and evaluating responses seems overwhelming, remember that purchasers can always secure products that meet circularity objectives by seeking out EPEAT registered products. EPEAT registered products address many of the topics in this guide including:

- Use of recycled content and bio-based plastic materials
- Longer-life products through durable design and longer-life batteries
- Product design for repair, reuse, and recycling
- Availability of spare parts and repair information and services
- Secure data deletion to enable circularity
- Environmentally responsible end-of-life management of recovered products.
- Sustainable packaging
- Use of renewable electricity in manufacturing and the supply chain[1]

[1] GEC is updating its EPEAT circularity criteria and anticipate the release of new "Sustainable Use of Resources / Circularity" criteria in 2024. These updated criteria will be more ambitious and address additional circularity requirements for the ecolabel such as recycled content metals and critical minerals, increased transparency, and additional criteria focused on product longevity and repairability.

Procurement Questions and Supporting Documentation

A. Current Best Practices

1. Product Attributes for Circularity

1.1 Product Attributes - Longevity

Objective: The purpose of this question is to assess whether the product design considers longevity. Is the product designed to last longer than alternatives? Is it feasible to repair and/or replace parts? This is particularly important for parts/components that typically may fail or break, resulting in an unusable product or a product with limited functionality that will shorten the product's lifetime.
Question(s): Which components in the product are most likely to fail or break within the established contract period, and are these components replaceable by a qualified technician? For components that are most likely to fail or break, what part(s) need to be replaced to restore product functionality? For products that rely on batteries for primary energy, are the batteries replaceable by the user with commercially available tools? What warranty options are available and associated costs?
Examples of Supporting Documentation: • List of components in the product that are most likely to fail within the established contract period • A statement that these components are replaceable by a qualified technician, including pertinent information such as: life expectancy prior to component failure; general cost to repair/replace components and where to find them; where products may be sent for service/technician locations • For products that rely on batteries for primary energy, instructions on how the battery can be replaced • Warranty options that support product longevity

1.2 Product Attributes – Post-consumer Content

Objective: The purpose of this question is to determine the extent to which the product contains post-consumer recycled content either as recycled material or reused/remanufactured components.
Question(s): What is the percentage of post-consumer content in the product, sourced from recycled materials or reused/remanufactured components? Of the recycled materials and reused/remanufactured components within the product, what percentage is derived from post-consumer sources?

Examples of Supporting Documentation:
Documentation of the post-consumer recycled materials or reused components in the product, including one of the following:
• List of the materials and components containing post-consumer materials and percentage of post-consumer content for each.
• Vendors may be provided with the resources below:
  • Material Circular Indicator (MCI) score (Ellen MacArthur Foundation)
  • Circularity Dataset Initiative's Product Circularity Data Sheet (PCDS)

1.3 Product Attributes – Disassembly, Reusability and Recyclability

Objective: The purpose of this question is to determine if the product is designed to facilitate its disassembly to recover reusable components and recyclable materials in the product.
Question(s): How can product, components, and/or materials be easily recovered at the end of the product's useful life?
Examples of Supporting Documentation: • Description or list of materials and components that are considered recoverable provided by the vendor's operation or by a partner organization • Description of the method for disassembly for reuse of component parts

1.4 Product Attributes – Recovery of Scarce Resources

Objective: The purpose of this question is to determine if the product design allows for recovery and recycling of critical minerals and rare earth elements. Electronic products contain numerous metals and minerals that are rare or available in limited quantities across the globe, such as, lithium in batteries, gallium in semiconductors, and rare earth elements dysprosium and neodymium in magnets*. Preservation of these and other scarce global resources can be possible if sourced from recovered material streams. **See Terminology section for example list*
Question(s): Identify metals and minerals in the product considered rare or found in limited quantities, and whether sourcing for any of these minerals or metals derives from recovered materials. Are any other alternative sources of rare or critical materials expected in the manufacture of this product within the next five years?
Examples of Supporting Documentation: • Identification of rare and critical minerals and metals type and location in the product • Availability of disassembly instructions for recovery of components containing rare and critical minerals in the product • Describe the efforts to identify and/or develop alternative sources of minerals and metals for applications in this product

1.5 Product Attributes – Manufacturer Designs Enable and Do Not Hinder Secondary Material Recovery

Objective: The purpose of this question is to assess whether substances added to materials within the product will reduce the potential for these materials to be used as secondary raw materials in the future.
Question(s): Is the product recyclable? Examples of chemical substances that may impact recyclability include halogenated flame retardants, phthalates, and some coatings, especially on plastics.

Examples of Supporting Documentation:
• Documentation on the type of chemical substances used in the product that can limit/prohibit recycling or reuse of materials such as:
  • Flame retardants
  • Phthalates

1.6 Product Packaging Attributes – Sustainable Packaging Content and Readily Recyclable

Objective: The purpose of these questions is to assess the extent to which product packaging design took into consideration use of recycled content and/or regenerative materials, as well as enables recyclability. Such considerations reduce raw material extraction and depletion of natural resources.
Question(s): Are materials used in the product derived from recycled or rapidly renewable content? Does recycled content include materials diverted from waste streams? Does rapidly renewable content include only materials derived from sources that meet standards for sustainability, such as use of certified forest wood content? Are packaging components designed to be separable by material type without the use of specialized tools?
Examples of Supporting Documentation: • Certification of recycled content sourcing (e.g., UL 2809 Environmental Claim Validation Procedure or SCS Global Services Recycled Content Standard) • Certification of sector-specific biobased sourcing (e.g., Forest Stewardship Council or Sustainable Forestry Initiative for wood products associated with packaging) • Explanation of how to process recovered materials or chemical constituents at end-of-life

2. Vendor Commitment and Practices

2.1 Vendor Commitment and Practices – Renewable Energy

Objective: Vendors can actively shape circularity from an energy* and fuels perspective by making regenerative sources central to business operations. **See Terminology section for example list*
Question(s): Is electricity used to power operations and manufacturing sourced from renewable energy sources? How is the vendor working with your supply chain to transition their electricity usage to renewable sources?
Examples of Supporting Documentation: • Percentage of electricity contributed from renewable sources • Supply chain engagement plan and progress towards their increased use of renewable sources

2.2 Vendor Commitment and Practices – Product Recovery, Reuse, and Recycling

Objective: The purpose of this question is to assess the vendor's commitment to product recovery and retaining the highest possible value for the products it recovers, as well as minimizing product disposal.

Question(s):

a. Does the vendor offer a product recovery program for the products covered under this contract?
b. Does the vendor apply a pollution prevention hierarchy/methodology when assessing hardware within the product recovery program that prioritizes product and component reuse over material recycling?
c. With whom does the vendor collaborate or partner to ensure environmentally responsible end-of-life disposition, and to which internationally recognized responsible recycling standard are they certified?
d. Historically, what has been the final destination for product types covered under this contract, including:
    - % Product reuse (e.g., may be through service/leasing or resale)
    - % Product reuse through donations to underserved/underprivileged communities
    - % Component recovery for reuse
    - % Material recycling
    - % Disposal by incineration (without energy recovery) and landfill
e. Does the vendor have a zero-waste-to-landfill policy for recovered equipment?

2.2 Examples of Supporting Documentation:

- Documentation of product recovery program, including answers to questions "a" – "c"
- Actual achievement of product recovery program (% breakdown by categories in question "e")

2.3 Vendor Commitment and Practices – Closed-Loop Component and Material Recovery

Objective: The purpose of this question is to assess the manufacturer's commitment to component reuse and material recycling. A closed-loop system illustrates the vendors' interest in maximizing their initial material investment and provides manufacturers with an incentive to design products for the cost-effective recovery of components/materials.
Question(s): What programs does the vendor have to reuse components in new or refurbished products from your products recovered from customers? What programs does the company operate to use recovered materials from products recovered from customers?
Examples of Supporting Documentation: • Documentation of reuse of components in new or refurbished products • Documentation of the amount of materials (e.g., plastics and/or metals by weight) that is recovered from old products and used in the production of new products, and how the amount has increased over time

2.4 Vendor Commitment and Practices – Donation Program

Objective: The purpose of this question is to assess the vendors' commitment to extending the life of their products by having a charitable program that promotes product reuse, such as donating fully functional products to underserved/underprivileged populations. Sensitivity of ensuring that products aren't "dumped" in underserved/underprivileged populations – the manufacturer further needs to provide reparability information and have a plan for addressing associated costs.
Question(s): Does the vendor have a program to provide the types of products covered under this contract to underserved/underprivileged populations? Does that program ensure the continued use of the products by providing repairability information and/or ensuring the continuing repairability of the product? Does the program assess the capability of the underserved/underprivileged economy to responsibly manage the product when it ultimately reaches end-of-life?

Examples of Supporting Documentation:
• Description of the program that is relevant to products covered under the contract
• Evidence of list of parts that break and the availability of instructions for repair
• Description of the company's commitment to continuing repairability such as an extension of warranty, offer of financial support for repairability or other steps
• Description of the company's commitment to support local capacity building for responsible recycling once the product reaches end-of-life
• Documentation verifying that products are:
  • No older than 3 generations from the most current family or generation of the product
  • Readily compatible with current versions of major software platforms and programs
  • Readily compatible with network requirements of underserved/underprivileged economies
 	
**See Resources section for an example of a credible donation and refurbishment program Good Things Foundation (CEP Alliance Partner)*

B: Transformational Circularity

3.1 Transformational Circularity – Public Commitment

Objective: The purpose of this question is to evaluate whether the vendor has demonstrated a commitment to circularity in any policies, processes, or initiatives (such as an increased focus on designs for circularity, product longevity, reuse, and recycling, or new programs intended to advance circularity within and outside of the industry).
Question(s): Describe specific aspects of your circularity commitment and implementation: a. Does the vendor have a circularity policy for the IT hardware/equipment under this contract ? Have you publicly stated any circularity goals? b. What programs or processes are in place to support these goals or policies? c. Does the vendor have metrics to track progress toward goals? What progress have you made towards meeting those goals? d. Does the vendor have a publicly available plan or timeline for reaching circularity goals or transitioning to a circular business model?
Examples of Supporting Documentation: • A copy of the circularity policy(ies) that address(es) IT hardware/equipment • Proof of publicly available goals and progress toward meeting these goals • Circularity initiatives outlined in a CSR Report released within the past 24 months

3.2 Transformational Circularity – Changing Internal Operational Behaviors

Objective: Establishing a company-wide understanding of the principles underlying a shift in the company's operating procedures can be extremely helpful in generating bottom-up support and employee investment in major changes. The purpose of this question is to assess efforts made to achieve employee buy-in on circularity activities and processes.
Question(s): What initiatives or programs are in place internally to educate product design and sourcing/procurement teams on circularity concepts and their impacts on new business models and processes underway?
Examples of Supporting Documentation: • Outline of employee circularity training program or presentation • Educational resources distributed to employees to increase understanding of circularity concepts and internal circularity initiatives underway

3.3 Transformation Circularity – Cross-sector Programs/Initiatives/Actions

Objective: A truly circular economy will require cooperation between organizations and industry sectors to keep materials in productive use and out of the waste stream. The purpose of this question is to determine whether the manufacturer has a strategy to develop and use alternative sources of raw materials that divert under-utilized waste materials or by-products from other sectors for the manufacture of its product or use in its operations.
Question(s): Does the vendor have a strategy and goals for developing and using alternative sources of raw materials that divert under-utilized waste materials or by-products from other sectors? Are you currently actively seeking or sourcing raw materials considered waste or by-products from other sectors,particularly under-utilized waste or by-products? Can you provide specific examples of how you are sourcing such raw materials and the results? Do you actively participate in working groups with diverse stakeholders and industry partners (such as policy professionals, investors, etc.) to advance circularity?
Examples of Supporting Documentation: • Corporate policy, commitment or strategy • Documentation of sourcing of waste or by-products from other sectors and the results • Proof of participation in collaborative working group(s) to address circularity challenges (such as a webpage verifying membership or participation)

3.4 Transformational Circularity – Changing Supply Chains

Objective: Supply chains work most efficiently when all parties establish a common understanding of terms, material flows, and processes. To advance circular principles, shift vendors to embrace action, and scale impact across industries. The objectives must be successfully communicated to suppliers and distributors.
Question(s): What initiatives are being carried out externally to educate supplier and distributor partners on circularity concepts and their impacts on new business models and processes being underway?

Examples of Supporting Documentation:
• Describe the supplier circularity education program
  • Provide examples of materials given to vendors
• Describe supplier commitments to actions that advance circularity
  • Provide examples of materials received from suppliers

End-of-use

The first half of this Guide focused on defining what attributes to look for when purchasing a product that supports circularity. However, to complete the circular process, well-established and defined end-of-use policies and procedures must be in place that support repair, refurbishment, remanufacturing, and recycling. The second half of this Guide is meant to provide a starting point for consideration in developing or augmenting end-of-use practices that ensure products and materials are recovered for reuse.

In this section, basic sample policy and procedure language is provided that can be adapted for individual organizational needs; it is not comprehensive and will vary from organization to organization based on internal and external priorities. It covers the following topics:

- Responsible end-of-use options
- Data security and sanitization
- Employee awareness and training
- Continuous improvement

Policies and Procedures

The circular economy emphasizes the reduction of waste and the continuous use of resources by keeping products and materials in use for as long as possible. As technology rapidly evolves, companies frequently replace obsolete devices, resulting in a growing stream of electronic waste. Therefore, any organization that supports circularity must develop internal policies that address responsibility at end-of-use as well. Developing clear and well-defined end-of-use policies and procedures is important for any successful implementation of circularity goals.

Sample Policy

Policy Statement: At [Organization Name], we are committed to responsibly addressing the end-of-use of our technology assets in an environmentally conscious and socially responsible manner. We recognize the importance of minimizing electronic waste, reducing our environmental footprint, promoting the efficient use of resources, and supporting a circular economy. This policy outlines our approach and required end-of-use actions.

Responsible End-of-Use Options

A. Reuse by technology product or service provider: Whenever possible, we will investigate if an asset can be cost-effectively leased from a technology provider similarly committed to reducing electronic waste, and supporting a circular economy.

B. Reuse within the organization: Where appropriate, we will look for opportunities to reuse assets within the organization.

C. Repair: Whenever possible, we will investigate if an asset can be cost-effectively repaired before replacing it with new technology.

D. Refurbishment and Resale: If reuse or repair are not feasible or possible, we prioritize refurbishment and resale of technology assets. This option extends the lifespan of the equipment and reduces electronic waste. We engage with reputable refurbishment partners who adhere to strict data sanitization protocols and quality standards.

E. Donation: We actively seek opportunities to donate technology assets that are still functional but no longer needed within the organization. Donations are made to charitable organizations, educational institutions, or community initiatives, enabling technology access for underserved communities. We seek to ensure the receiving organization has access to repair information and responsible recycling partners for proper asset disposition for when the equipment ultimately reaches end-of-life.

F. Recycling: In cases where refurbishment or donation is not feasible, we ensure responsible recycling of technology assets. We collaborate with recycling partners who follow environmentally sound practices and comply with all applicable laws and regulations, and maintain certifications to electronic recycling standards. Hazardous materials are handled and disposed of safely, minimizing the environmental impact.

Data Security and Sanitization

A. Data Erasure: Before decommissioning, all technology assets undergo a thorough data erasure process to ensure the complete removal of sensitive information. We employ industry-recognized data sanitization methods to safeguard confidentiality and protect against data breaches.

B. Asset Tracking: Throughout the decommissioning process, we maintain accurate records of all technology assets, including their serial numbers, specifications, and disposal details. This allows for traceability and accountability at each stage of the end-of-use process.

Employee Awareness and Training

A. Employee Education: We provide training and awareness programs to employees to ensure their understanding of the responsible end-of-use options available and the importance of their participation in the process.

B. Responsible Practices: We encourage employees to adopt responsible practices within their work environment, such as reducing energy consumption, properly disposing of electronic waste, and participating in recycling initiatives.

Continuous Improvement

A. Monitoring and Evaluation: We regularly monitor and evaluate our end-of-use practices to ensure compliance with this policy. We conduct periodic reviews and audits to identify areas for improvement and implement necessary changes.

B. Innovation and Collaboration: We actively seek opportunities for collaboration with suppliers, customers, and industry partners to stay informed about emerging technologies, regulations, and best practices in responsible disposition. We strive for continuous improvement and innovation in our technology recovery practices.

By adhering to this policy, [Organization Name] demonstrates our commitment to circularity and contributes to the creation of a more sustainable future. Together, we can minimize electronic waste, protect sensitive information, and promote responsible end-of-use practices of our technology assets.

Sample Procedures

Responsible End-of-Use Options

A. Reuse by Technology Product or Service Provider:

1. Evaluate the total life cycle cost of ownership for leased versus owned equipment.
2. Evaluate the vendor's commitment to reducing electronic waste and supporting a circular economy.

B. Reuse within the Organization:

1. Map out technological specification needs per function within the organization. The required technological power and speed may vary from function to function (i.e., graphic designers vs administration).
2. Identify technology assets that may be underperforming for a particular function but may be sufficient for another function within the organization.
3. Redeploy assets, where appropriate, within the organization, based on specification needs and reusability of assets.

C. Repair:

1. Identify technology assets that could be cost-effectively repaired.
2. Engage with reputable partners to evaluate and execute needed repairs, in keeping with and reference to any warranties.
3. Ensure partners have meaningful data privacy protocols in place while assets are under their control.

D. Refurbishment and Resale:

1. Identify technology assets suitable for refurbishment and resale based on their condition, functionality, and market demand.
2. Engage with reputable refurbishment partners to assess and refurbish the assets according to established quality standards and data sanitization protocols.
3. Ensure all necessary documentation, such as transfer of ownership, warranties, and maintenance history, is provided to the refurbishment partner.

E. Donation*:

1. Conduct an internal assessment to identify technology assets that are still functional but no longer needed within the organization.
2. Evaluate potential charitable organizations, educational institutions, or community initiatives that could benefit from the donated technology assets.
3. Establish partnerships or donation programs with the selected recipients to facilitate the donation process.
4. Ensure the donated assets are properly prepared, including data sanitization, packaging, and transportation logistics.

**See Resources section for example of a credible donation and refurbishment program Good Things Foundation (CEP Alliance Partner)*

F. Recycling:

1. Identify technology assets that cannot be refurbished or donated and require recycling.
2. Collaborate with certified recycling partners who follow sustainability best practices and comply with relevant laws and regulations.
3. Arrange for the proper collection, transportation, and handling of the assets to the recycling facility.
4. Ensure the recycling process complies with all applicable regulations and focuses on the responsible recovery of valuable materials while minimizing waste and environmental impact.

Data Security and Sanitization

A. Data Erasure:

1. Develop and implement a standardized data erasure process using industry-recognized methods, such as secure data wiping.
2. Ensure that all data erasure activities are documented and include verification steps to confirm the successful removal of sensitive information.
3. Regularly review and update the data erasure process to align with the latest data security best practices and technological advancements.

B.Asset Tracking:

1. Establish a centralized asset tracking system to capture and maintain accurate records of all technology assets throughout the disposition process.
2. Assign unique identifiers, such as serial numbers or asset tags, to each asset to enable easy tracking and traceability.
3. Document disposal details, including the date, method (refurbishment, donation, or recycling), and relevant partner/vendor information.
4. Regularly reconcile the asset tracking system with physical inventories to ensure data accuracy and completeness.

Employee Awareness and Training

A. Employee Education:

1. Develop and deliver comprehensive training programs that educate employees on the responsible end-of-use options outlined in our policy.
2. Provide information on the environmental and social impacts of technology disposal and the benefits of responsible practices.
3. Ensure employees understand their roles and responsibilities in supporting the organization's end-of-use disposition efforts.

B. Responsible Practices:

1. Encourage employees to adopt responsible practices within their work environment, such as reducing energy consumption, properly disposing of electronic waste, and participating in recycling initiatives.
2. Promote the use of power-saving features on technology devices and encourage employees to turn off equipment when not in use.
3. Communicate the importance of responsible end-of-use disposition and the positive impact it has on the environment and the community.

Continuous Improvement

A. Monitoring and Evaluation:

1. Implement a monitoring system to assess the effectiveness of the end-of-use disposition processes and measure key performance indicators (KPIs).
2. Regularly review and evaluate data on refurbishment, donation, and recycling rates to identify areas for improvement.
3. Conduct internal audits and assessments to ensure compliance with the policy and identify any gaps or areas of non-compliance.

B. Innovation and Collaboration:

1. Foster a culture of innovation and collaboration by actively seeking feedback and suggestions from employees regarding end-of-use disposition practices.
2. Encourage employees to stay informed about emerging technologies, regulations, and best practices related to responsible disposition.
3. Explore partnerships with suppliers, customers, and industry partners to share knowledge, exchange best practices, and identify opportunities for improvement and innovation in technology recovery practices.

By following these procedures, [Organization Name] ensures a systematic and responsible approach to the end-of-use of technology assets. We prioritize reuse, repair, refurbishment and resale whenever possible, then donation of functional assets to benefit others, and responsibly recycling of assets that cannot be reused. Through robust data security and asset tracking practices, we safeguard sensitive information and maintain accountability at each stage of the disposition process. Additionally, we ensure that our employees have proper training, with periodic awareness campaigns, as well as continually seek opportunities for innovation and collaboration that strengthen our responsible end-of-use policies and procedures.

Legal Obligations

Understanding legal obligations and regulations is important when developing an internal policy for responsible end-of-use of technology. Organizations should familiarize themselves with the applicable laws and regulations governing electronic waste management, data protection, privacy, and hazardous material disposal. These can include local, regional, and national regulations, as well as international agreements and standards. Regular monitoring of evolving regulations is advisable to update internal policies and procedures as needed, as well as ensure compliance with data protection and privacy laws. By incorporating data protection and privacy requirements into your policies, organizations can minimize the risk of data breaches, protect customer and employee privacy, and uphold their legal obligations.

Final Thoughts

Strong procurement and end-of-use practices go hand-in-hand in developing effective strategies for organizations to support circularity and sustainability. This guide has provided a framework for private and public sector purchasers to evaluate product-level and company-level attributes for consideration during the procurement process, as well as examples of internal policies and procedures that promote responsible technology end-of-use practices. By adopting the principles outlined in this guide, organizations can contribute to a more circular economy and responsible stewardship of technology.

GEC wishes you success on your circularity journey!

Appendix I: Terminology

Chemical recycling	An end-of-life treatment technology (i.e., solvent purification, depolymerization, pyrolysis) for plastics to obtain constituent molecules such as polymers, monomers, oligomers, or feedstock chemicals.
Closed-loop	A system where end-of-life products, components, or materials are collected and processed back into the same supply stream to make new products, with minimal loss of material.
Commercially available tools	Implements or devices used in repair or preparation for reuse that are either included in the point-of-sale packaging or generally available for purchase by individuals or organizations not affiliated with the manufacturer (e.g., screwdriver, hexagon slot key, pliers, prying lever, tweezers, multi-meter, voltage tester, soldering iron, hot glue gun, magnifying glass, etc.).
Critical minerals and rare earth elements	Critical minerals: • Aluminum • Antimony • Bismuth • Cobalt • Gallium • Germanium • Graphite (natural and synthetic) • Indium • Lithium • Manganese • Silicon metalloid • Tellurium • Tantalum • Tin • Tungsten • Zinc Rare earth elements: • Cerium • Dysprosium • Lanthanum • Neodymium • Praseodymium • Samarium • Terbium • Ytrrium
Disposal	Any end-of-life operation which does not lead to materials recovery, recycling, reclamation, or reuse of equipment or components, with or without energy reclamation. This includes operations that result in the deposition of waste into, or on, land or water, or treatment via incineration.

End-of-life	Life cycle stage of electronic equipment and components when they are no longer intended for use and are destined, or intended to be destined for, dismantling, material recovery, recycling, or disposal.
End-of-use	A point in the life cycle of electronic equipment when the equipment user no longer wants the device, which may have sufficient functionality to be of use to another entity and as such has not reached "end-of-life".
Post-consumer recycled content	Material generated by households or by commercial, industrial, and institutional facilities, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain. This does not include pre-consumer waste associated with material recovery during manufacturing operations.
Purchaser(s)	In this guide, purchasers include institutional buyers, including local, state and national governments, health care systems, research facilities, school districts, higher education institutions and private companies.
Rapidly renewable / certified forest wood content sources	Rapidly renewable content is derived from plants or fungi that take ten years or fewer to grow. Examples of rapidly renewable materials include pulp and paper fibers made from various feedstocks such as hemp, flax, bagasse, arundo donax, wheat straw, kenaf, bamboo and bioplastics made from feedstocks such as corn starch, sugarcane, and a variety of other sources like potatoes, algae, mycelium (mushroom "roots"), and food waste. Third-party schemes for sustainable forest management and chain of custody include the Forest Stewardship Council (FSC) Chain of Custody standard, the Programme for the Endorsement of Forest Certification (PEFC) Chain of Custody standard, and national forest certification systems that have been endorsed by the PEFC Sustainability Benchmark, such as the Sustainable Forestry Initiative (SFI) program, Canadian Standards Association (CSA) Group Sustainable Forest Management Program, and Brazilian National Forest Certification Program (CERFLOR).
Recycled content	Proportion, by weight, of recycled material in a product or packaging.
Recycling	Operations by which products, components, materials, or waste are processed and converted into raw materials for use in the production of new products or processes, not including energy recovery or disposal.

Refurbishment	Proportion, by weight, of recycled material in a product or packaging. Functional or aesthetic maintenance or repair of a product to restore to original or near original or upgraded functional state.[1]
Renewable Energy / Electricity Sources	Electricity generated from renewable sources such as wind, solar, hydropower and biomass.
Reuse or use by a new user	Using a product again for the originally intended purpose, a similar purpose, or in an upgraded state, possibly after refurbishment, repair, or hardware upgrading.[2]

[1] Criteria for the Sustainability Assessment of Network Equipment for the Global Electronics Council EPEAT Ecolabel and the TÜV Rheinland Green Product Mark – April 2021

[2] NSF/ANSI 426-2019 Environmental Leadership and Corporate Social Responsibility Assessment of Servers

Appendix II: Resources

The resources listed below provide purchasers with useful ICT background information.

- ATEA Sustainability Focus Reports
  - 2023 Report: Time for climate accountability
  - 2022 Report: Get more from less – extending the lifespan of IT products
  - 2020 Report: Closing the loop on materials

- Circular Economy papers
  - Behavior: How behavior ecology can be adapted for consumer electronic ecosystems in a circular economy, offering models for e-waste based on hierarchically nested decision-making, "Ecological foraging models as inspiration for optimized recycling systems in the circular economy" (E. G. Ryen, G. Gaustad, C. W. Babbitt, and G. Babbitt, Resources, Conservation and Recycling, vol. 135, pp. 48–57, Aug. 2018)
  - Definitions: Comparative analysis of circular economy definitions noting that recycling is the most common component in examined definitions, followed by reuse, and reduction."Conceptualizing the circular economy: An analysis of 114 definitions" (J. Kirchherr, D. Reike, and M. Hekkert, Resources, Conservation and Recycling, vol. 127, pp. 221–232, Dec. 2017)
  - Design: Business and product design strategies for slowing and closing resource loops as a means of achieving the circular economy,"Product design and business model strategies for a circular economy" (N. M. P. Bocken, I. de Pauw, C. Bakker, and B. van der Grinten, Journal of Industrial and Production Engineering, vol. 33, no. 5, pp. 308–320, Jul. 2016).
  - Indicator Dashboard: Quantitative indicator "dashboard" for assessing the circular economy in organizations, including natural resource depletion, in-use stock growth, and useful service lifetime of materials, "Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations" (S. Pauliuk, Resources, Conservation and Recycling, vol. 129, pp. 81–92, Feb. 2018)

- Circular Electronics Partnership (CEP)
  - Circular Electronics Roadmap: An Industry Strategy Towards Circularity
  - Circular Electronics System Map: An Industry Blueprint for Action

- Circular & Fair ICT Pact (CFIT)
  - CFIT is an international procurement-led partnership, under the UN One Planet Sustainable Public Procurement (SPP) programme

- Donation & Refurbishment example
  - Good Things Foundation (CEP Alliance Partner) and GTF Report: The economic impact of digital inclusion in the UK

- Ellen MacArthur Foundation
  - Material Circular Indicator (MCI) Tool

- European Commission Reports
  - "Ecodesign preparatory study on mobile phones, smartphones and tablets: final report" for opportunities to use recycled content in ICT. (A. Berwald et al., Fraunhofer, Aug. 17, 2021)
  - "Analysis of material efficiency aspects of personal computers product group: technical report" (P. Tecchio, F. Ardente, M. Marwede, C. Clemm, G. Dimitrova, and F. Mathieux, Joint Research Centre (JRC), Jan. 2018) on the durability, reusability, reparability and recyclability aspects of personal computers including results from International Data Corporation's survey on failure rates, and frequent failure causes and components ("Pay Now, Save Later: The Business Case for Rugged Devices," T. Mainelli, IDC,Nov. 2016)

- French Repairability Index mandates product labeling that informs purchasers about the repairability of products.

- Global Electronics Council (GEC) (CEP Partner)
  - GEC's ecolabel EPEAT
  - GEC Purchaser Guide series
  - State of Sustainability Research on Climate Change Mitigation
  - State of Sustainability Research on Chemicals of Concern
  - State of Sustainability Research on Sustainable Use of Resources

- Global Enabling Sustainability Initiative (GeSI) (CEP Partner)
  - Science-based targets

- Green Chemistry and Commerce Councils (GC3)
  - GC3 Blueprint of Green Chemistry Opportunities for a Circular Economy

- Greenhouse gas emissions savings
  - "Life cycle assessment of emerging technologie on value recovery from hard disk drives," (H. Jin et al., iNeMI, Resources, Conservation and Recycling, vol. 157, p. 104781, Jun. 2020). The International Electronics Manufacturing Initiative (iNEMI) estimated greenhouse gas emission savings, for different value recovery pathways for hard disk drives (HDDs), as compared to shredding.

- International Telecommunications (ITU) (CEP Partner)
  - ITU's Circular and sustainable public procurement – ICT equipment guide complementary circularity purchasers guide for public procurement
  - ITU's End-of-life management of ICT equipment guide
  - ITU's Assessment matrix for circular scoring (ITU-T L.1023) provides a comprehensive evaluation tool with criteria that address three issues: product durability; the ability to recycle, repair, reuse, and upgrade products; and manufacturer information and services that facilitate repair, reuse, and recycling of products.

- Methodology for Assessing Procurement Systems (MAPS)

- Platform for Accelerating the Circular Economy (PACE)
  - 2019 Report: "A New Circular Vision for Electronics: Time for a Global Reboot" (PACE, WEF (CEP Partner), WBCSD (CEP Partner), ITU (CEP Partner), UN, and ILO)

- Responsible Business Alliance (RBA) (CEP Partner)
  - RBA's Practical Guide Responsible Sourcing

- Recycling standards
  - Electronic recyclers standards: Sustainable Electronics Recycling International's (SERI) Responsible Recycling ("R2")
  - Recycling and reuse of electronic equipment standards: e-Stewards

- Repair, reuse, and recycling studies
  - "The current status of the consumer electronics repair industry in the U.S.: A survey-based study" (M. Sabbaghi, W. Cade, S. Behdad, and A. M. Bisantz, Resources, Conservation and Recycling, vol. 116, pp. 137–151, Jan. 2017). A U.S.-based survey of the consumer electronics repair industry studying common electronic products and components in the marketplace and the barriers to successful repair of these devices.
  - "Design for Recycling Principles Applicable to Selected Clean Energy Technologies: Crystalline-Silicon Photovoltaic Modules, Electric Vehicle Batteries, and Wind Turbine Blades" (A. Norgren, A. Carpenter, and G. Heath, Journal Sustainable Metallurgy, vol. 6, no. 4, pp. 761–774, Dec. 2020) Research paper on strategies for implementing design principles to facilitate repair, reuse, and recycling, while considering the trade-offs between functionality, longevity or durability, reliability, cost, and recyclability.

- Resource vulnerabilities: examples of academic and industry efforts to identify resource vulnerabilities for materials in electronics using metrics that capture environmental, supply chain, and socio-political risks
  - "Criticality of metals and metalloids" (T. E. Graedel, E. M. Harper, N. T. Nassar, P. Nuss, and B. K. Reck, PNAS, vol. 112, no. 14, pp. 4257–4262, Apr. 2015)
  - "Disruption risks to material supply chains in the electronics sector" (S. Althaf and C. W. Babbitt, Resources, Conservation and Recycling, vol. 167, p. 105248, Apr. 2021)
  - "Material Impact Profiles. Which materials to prioritize for a 100 percent recycled and renewable supply chain" (Apple, Inc, 2019)
  - "Fair Materials Sourcing Roadmap 2023," (Fairphone, Amsterdam, The Netherlands, Feb. 2023)

- U.S. Environmental Protection Agency (EPA)
  - A Sustainable Management of Electronics
- Verifiable data
  - Circularity Dataset Initiative's Product Circularity Data Sheet (PCDS)
- Waste compensation example
  - Closing The Loop
- Waste from Electrical and Electronic Equipment (WEEE)
  - EU Regulation
- World Business Council For Sustainable Development (WBCSD) (CEP Partner)
  - Circular Economy
- World Economic Forum (WEF) (CEP Partner)
  - Circular Transformation of Industries

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