



Guidance on green ICT procurement



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Additional information and materials relating to this report can be found at: www.itu.int/itu-t/climatechange.

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Guidance on green ICT procurement

Executive summary

Information and Communication Technologies (ICTs) are the most widely used technologies worldwide. Basic telecommunication services, Internet or innovative devices demand energy and material consumption that need to be reduced in order to achieve a sustainable economic growth. In this regard, the ICT sector must step forward with change and innovation, to promote sustainable business practices and effective standardization in its processes.

ICT companies have the power and legitimacy to innovate, transform and de-materialize the economy, but the increasing proliferation of ICTs has led to concerns regarding their environmental impact. ICT Goods, Networks and Services (GNS) require relevant investments and generate particular environmental impacts that deserve special considerations.

Within this framework, all kinds of procurement decisions should and can be made with a greener perspective. This report provides directions to ICT companies to promote and establish effective and efficient procurement practices and to make “green” solutions available to their customers, embedding greater awareness of environmental issues in their business transactions. Some standard considerations for ICT companies are also provided in this document. Also, a systematic guidance to address an environmentally sustainable step-by-step procurement process is included, detailing green considerations to be used when procuring products and services. This will lead to the implementation of effective and environmentally-friendly procurement practices, which take into account ICT good, network or service Life Cycle Considerations (LCC).

To summarize these considerations, a relevant systematized series of principles are presented at the end of this document in a How to buy? What to buy? Who to buy from? structure, as a contribution to improve and promote environmental sustainability in the ICT sector’s procurement transactions. Moreover, this document states good practices of ICT organizations, related to the correct implementation of one/more of the proposed principles.

This document provides information on how to address the environmental impact of ICTs in a standardized way, and uses ITU-T Methodologies to assess the environmental impact of ICTs in goods, networks and services and in Organizations.

1 Introduction

Considering the ongoing efforts of the ICT sector on issues related to the environment and climate change, the Standardization Bureau of the International Telecommunication Union (ITU-T) is developing a set of internationally agreed methodologies to help the ICT sector assess its own the environmental impact, including greenhouse gas emissions (GHG) and energy consumption of ICTs in organizations. These Recommendations have been developed within ITU-T Study Group 5, which is the leading ITU Study Group responsible for evaluating the effects of ICTs on the environment, for identifying the positive effects of ICTs and for publishing guidelines for using ICTs in an eco-friendly way¹.

Information and Communication Technologies (ICTs) have been widely recognized as a major linchpin to climate change abatement, through the improvement of their internal energy efficiency and the development of green ICT solutions. Due to its nature, an ICT supply chain also includes several environmental impacts that have to be managed properly (i.e., wastes, CO2 emissions, etc.). Indeed, The ICT supply chain is one of the most globalized supply chain, with suppliers spread all over the globe. Since the environmental impact generated in the ICT sector supply chain can be directly related to procurement processes and practices, the entire ICT sector is called upon to manage them with increased responsibility.

1.1 Objectives

- Propose systematized series of guiding principles for ICT organizations, to improve and promote environmental sustainability in the ICT sector's procurement transactions.
- Provide relevant guidance for the inclusion of energy efficiency, environmental protection and carbon emission offset and reduction criteria in the design and implementation of efficient and sustainable procurement processes.

1.2 Scope

This report is framed within ITU's mandate to lead and develop methodologies to assess the environmental impact of ICTs, and provide a set of criteria to promote green and sustainable procurement transactions in the ICT sector.

In this regard, this document represents a contribution to help ICT organizations include environmental sustainability criteria in their procurement processes and challenges.

Through the procurement process stages that are proposed in this document, a few best practices implemented by some of ITU's ICT members are also included.

2 Supply chain and life cycle assessment

A supply chain is the group of planning, manufacturing and producing operations required to bring a product/service to the market. It covers activities that range from sourcing of raw materials to the delivery of a completed product, and can also be extended to the disposal of waste.

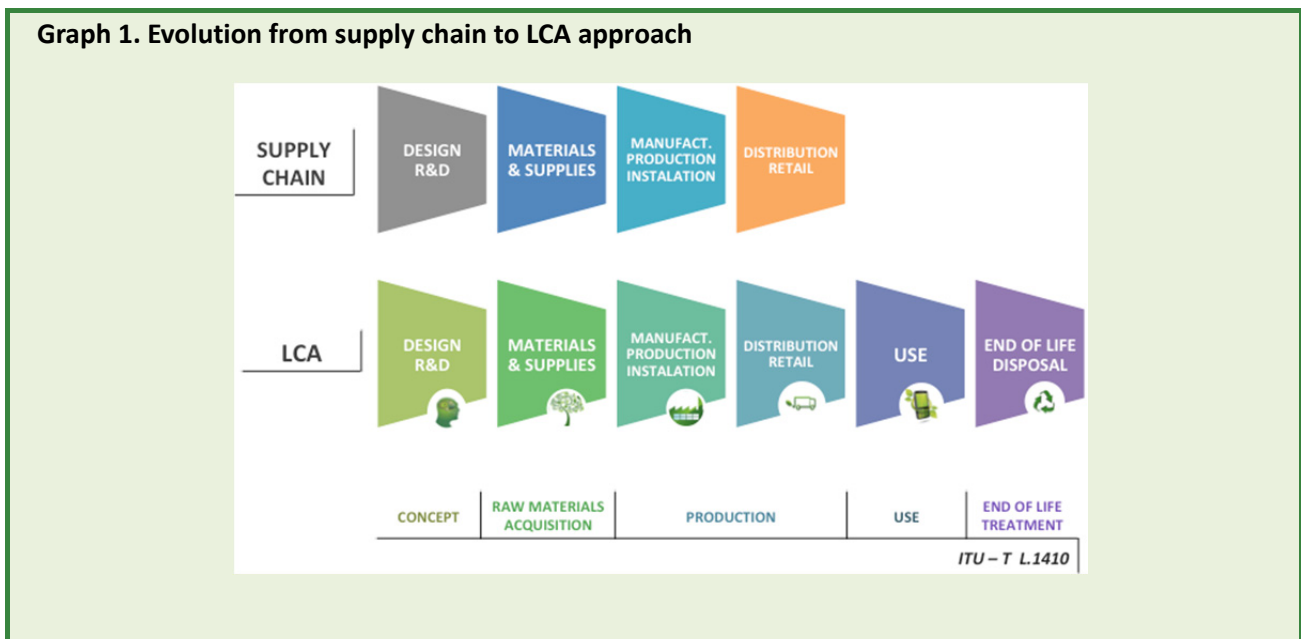
To extend the conception of ICT Goods, Networks and Services (GNS) production through life cycle considerations and address its environmental impacts, there is a need to include a few more stages to a product/service supply chain. ITU's mandate on climate change and environment has provided ICT companies with a methodology to perform a Life Cycle Assessment (LCA) to evaluate the environmental

¹ ITU-T Study Group 5. www.itu.int/net/ITU-T/info/sg05.aspx

impact of their ICT goods, networks and services through the implementation of Recommendation ITU-T L.1410².

The methodology on how to apply a LCA study is detailed in Recommendation ITU-T L.1410 – Part I³, in four high-level cycle stages for ICT goods, networks and services: Raw material acquisition, Production, Use and End of Life Treatment⁴; in addition, the Design of ICT goods must also be addressed⁵. Annexes A, C, D, F and G of Recommendation ITU-T L.1410 give additional information on the processes and interfaces to be considered in a LCA study.

The graph below shows the evolution in the conception of production processes from a supply chain to a Life Cycle Assessment approach, and the operational stages required to generating a product/service and delivering it to the market in the most efficient and environmentally-friendly way.

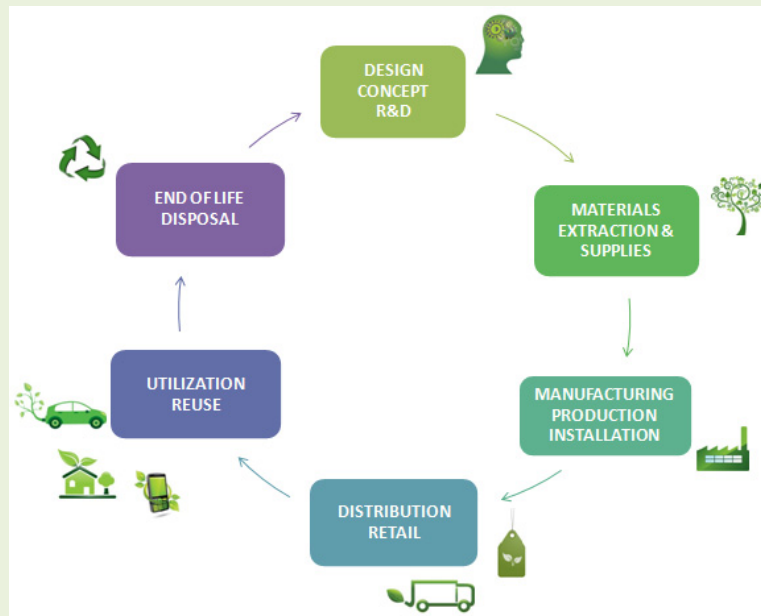


A detailed LCA must also include some generic processes needed to carry out operations, such as transportation and travel, electricity usage, raw material recycling, etc.⁶.



By definition, a LCA considers the full life cycle of a product or service, where each step is dependent on the outcome of and the methodologies used in other activities. A general LCA approach applied to an ICT organization can be schematized as:

² ITU-T L.1410 “Methodology for environmental impact assessment of Information and communication technologies (ICT) goods, networks and services”. www.itu.int
³ ITU-T L.1410 “Part I. ICT lifecycle assessment: Framework and Guidance”
⁴ ITU-T L.1410 – I.2.2.3.6 Life Cycle stages.
⁵ ITU-T L.1410 – I.2.2.3.6 Life Cycle stages / I.2.2.3.6.1 ICT goods.
⁶ ITU-T L.1410 – Annex C Generic Processes.

Graph 2. Standard LCA for an ICT company



<p>R&D CONCEPT DESIGN</p>	<p>This stage includes the design, development and testing of products and services that allow ICT companies to meet customer needs and preferences. Business R&D expenditure differs in ICT manufacturing and services industries, according to their product conceptualization and design. This phase is critical for subsequent stages, as it impacts strategic decisions like type and quantity of natural resources needed, recyclability features of the product, etc.</p>
<p>MATERIALS & SUPPLIES</p>	<p>To address the fostering of sustainable natural resources, it is important for ICT companies to reduce the overall costs and environmental impact of raw materials and supplies provision, by working closely with key suppliers and operations. In the ICT sector, this stage includes the processes of raw material extraction and supply acquisition, required to create ICT outputs.</p>
<p>MANUFACT. PRODUCTION INSTALLATION</p>	<p>ICT organizations transform materials and supplies into one a specific good, network or service. The primary aim of the manufacturing and production stage is to optimize resources and promote efficiency in operations. In the ICT sector, this stage may include some related processes such as assembling-packaging, storage, transportation, provision and installation of goods, networks and services.</p>
<p>DISTRIBUT. RETAIL</p>	<p>Once a product has been manufactured or a service has been developed, it is vital to organise a sustainable distribution and sale process. Efficient distribution, logistics and transportation, combined with effective marketing and sales can optimize the allocation of products and services provided by ICT companies. As ICT supply chain is globalized, this stage also takes place in other manufacturing and production stages.</p>

	<p>ICT products can be used for a broad range of everyday activities. The responsibility of a product's life cycle is extended also to a customer (use) and post-customer (re-use) stage. There is a wide diversity of ICT services, infrastructure, components and devices available in the market that should be managed properly.</p>
	<p><i>As rapid innovation and changing fashions make products quickly obsolete, a mountain of waste electrical and electronic equipment (e-waste) is growing... The ICT industry does not have direct control over a lot of equipment ... when it reaches the end of its useful life⁷. To address sustainable disposal and end-of-life treatment, there are recycling, trade-in, disposal, transfer and decommissioning practices that can be carried out by an ICT company, in order to dispose of materials in a more sustainable way.</i></p>

2.1 References

Although ITU methodologies cover all aspects of LCA approaches in ICT companies, an ICT organization may also refer to methodological specifications and standards published by other internationally recognized entities, which have also been accounted for within ITU-T methodologies:

Box 1: International and regional standards

International Organization for Standardization (ISO). ISO 14040:2006. "Environmental management -- Life cycle assessment – Principles and Framework" / ISO 14044:2006. "Environmental management -- Life cycle assessment –Requirements and guidelines"⁸.

European Commission Joint Research Centre (2011). International Reference Life Cycle Data (ILCD) System Handbook: "General Guide for Life Cycle Assessment – Detailed Guidance"⁹.

British Standards Institute-Publicly Available Specification. BSI PAS 2050:2008 "Specification for the assessment of the life cycle greenhouse gas emissions of goods and service"¹⁰.

ETSI standards development organization. Environmental Engineering (EE). Life Cycle Assessment (LCA) of ICT equipment, networks and services: General methodology and common requirements¹¹.

In addition to a LCA approach, ICT companies have to meet local environmental regulations in terms of waste management, materials used in the manufacturing processes, emissions control and others. To achieve this purpose efficiently, most ICT companies are recommended to use well structured environmental management systems to manage the legal and environmental aspects of each company's processes and sites.

It is also recommended that e-waste is managed locally, with respect to good environmental practices. Furthermore, the Basel Convention prohibits the exportation of hazardous waste, including e-waste, from a developed country to an underdeveloped country.

⁷ GeSI, E-Waste Initiative. www.gesi.org/Initiatives/ClimateChange/tabid/71/Default.aspx

⁸ www.iso.org/iso/store.htm

⁹ <http://lca.jrc.ec.europa.eu/lcaainfohub/datasetArea.vm>

¹⁰ www.bsigroup.com/en/Standards-and-Publications/How-we-can-help-you/Professional-Standards-Service/PAS-2050/PAS-2050/

¹¹ www.etsi.org

3 The ICT industry

Because of the particularities of each LCA approach in specific ICT companies, the ICT sector is classified into industry categories. The International Standard Industrial Classification of all economic activities (ISIC)¹² issued by the United Nations Statistical Commission, states a set of ICT industry categories for the ICT organizations according to the particularities of their productive economic activity:

Table 1. ICT sector industry categorization (OECD)

ICT manufacturing industries	
- 2610	Manufacture of electronic components and boards
- 2620	Manufacture of computers and peripheral equipment
- 2630	Manufacture of communication equipment
- 2640	Manufacture of consumer electronics
- 2680	Manufacture of magnetic and optical media
ICT trade industries	
- 4651	Wholesale of computers, computer peripheral equipment and software
- 4652	Wholesale of electronic and telecommunications equipment and parts
ICT services industries	
- 5820	Software publishing
- 6110	Wired telecommunications activities
- 6120	Wireless telecommunications activities
- 6130	Satellite telecommunications activities
- 6190	Other telecommunications activities
- 6201	Computer programming activities
- 6202	Computer consultancy and computer facilities management activities
- 6209	Other information technology and computer service activities
- 6311	Data processing, hosting and related activities
- 6312	Web portals
- 9511	Repair of computers and peripheral equipment
- 9512	Repair of communication equipment

Below there are some examples of the present ICT industries and related organizations.

- ICT manufacturing industries. Organizations that develop products for information processing and communication, including transmission and display, and use of electronic processing data to detect, measure and control physical processes. These industries include mainly ICT Technology and Infrastructure developers and distributors such as Alcatel Lucent, Nokia, Samsung, Sony-Ericsson, IBM, Huawei, Toshiba, Apple among others.
- ICT service industries for telecommunications. These are mainly telecom operators with network operations and provision of telecommunication services such as telephony or data communication accesses or broadcasting services: e.g., Telefónica, Vodafone, AT&T, China Mobile, NBC, among others.
- ICT service industries for software and others. Organizations that develop products that are intended to enable information processing and communication by electronic means. These are usually software programming for distribution and customer use from mobile or home devices: e.g. Google, Symantec, Apple, Microsoft, among others.

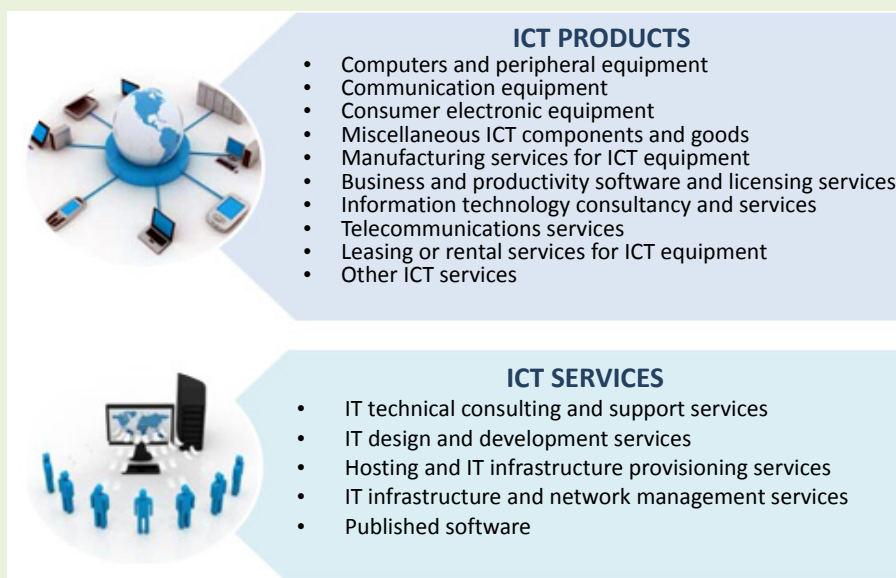
¹² OECD ICT sector definition (based on ISIC Rev.4). Box 5, 2006-07. www.oecd.org/dataoecd/25/52/43281062.pdf

Due to the nature of this document, it is also important to define product and service provision and LCA approaches within an ICT company, according to each business' particular operations.

Recommendation ITU-T L.1410 states that life cycle assessments must be defined for functional units: *Each ICT good, network or service LCA, addresses the production and performance characteristics of a functional unit, in accordance to its magnitude of function or service, duration of operating lifetime and expected level of quality*¹³, which means that a particular LCA must be addressed for each good, network and service that is produced.

In 2009, OECD addressed ten broad categories of **ICT products**¹⁴. In 2007, OECD elaborated the following **ICT service** classification¹⁵.

Graph 3. ICT products and services categorization



To deliver goods, networks and services, ICT companies procure the following general categorized products and services in different LCA stages:

Graph 4. ICT organization inputs



¹³ ITU-T L.1410 – I.2.2.2 Functional Unit

¹⁴ OECD – Information Economy product definitions based on the central product classification. (Version 2). 2009. www.oecd.org/dataoecd/16/46/42978297.pdf

¹⁵ OECD. Classifying Information and Communication Technology (ICT) Services. www.oecd.org/dataoecd/39/25/38226951.pdf

For each ICT group of industries, inputs and outputs, there are different considerations that an ICT organization must be aware of, in terms of operational effort, expenditure, relevance to business, and environmental impact. Considering the stages of a general LCA approach of ICT organizations (*Graph 3*), each ICT industry category can present strong activity in the following processes.

Table 2. Impact of LCA unit processes per ICT industry category

LIFE CYCLE STAGE	UNIT PROCESS	ICT INDUSTRY		
		Manufacture	Trade	Services
Design	R&D	•		•
	Product Concept / Design			
Materials and Supply Acquisition	Raw Materials extraction	•		
	Supply acquisition		•	•
Production Manufacturing Installation	Manufacturing			
	Assembly / Packaging	•	•	•
	Storage / Transport		•	
	GNS Provision / Installation	•	•	•
Distribution Retail	Distribution / Retail		•	•
	Logistics / Transport	•		
Use	Product utilization	•	•	•
	Reuse			
End of Life	Decommissioning	•	•	•
	Disposal / Recycling			

At present there are some ICT companies (mostly ICT product manufacturers) that have introduced consistent LCA approaches in their operations. **Example: ALCATEL LUCENT**

“Alcatel-Lucent has developed, and is leading industry consortia effort, on a simplified LCA framework that more efficiently evaluates eco-impact information for ICT products than previous approaches. The framework combines simplified processes to more easily derive environmental information for Information and Communication Technology ICT equipment and assets with a level or precision suited to industry needs”



Alcatel-Lucent

4 ICT procurement process and common environmental practices

4.1 Green in every Step

A process is a set of activities that are put together to combine operational strategies and resources to deliver a product onto the market. According to the OECD, *an activity (process) can be said to take place when resources such as equipment, labor, manufacturing techniques or products are combined, to produce specific goods or services*¹⁶. On the other hand, *the ICT sector is defined as a combination of manufacturing and services industries that capture, transmit and display data and information electronically*¹⁷.

The procurement processes of ICT organizations can be complex, expensive, time consuming and vulnerable to waste. An organization's procurement system is one of the market's many interactions with other parties, and is definitely one of the most significant in terms of expenditure. As any other process in a supply chain or LCA, a procurement process can bring about important cost savings and service enhancements to support the entire organization's profitability and market share.

Graph 5. Procurement process impact on LCA



As the purchase of goods and services in ICT organizations involves a wide range of sectors and practices where environmental issues are significant, it is therefore imperative that the present procurement systems become more innovative and environmentally-friendly.

*The ICT sector is an R&D intensive economic engine, underpinning growth*¹⁸. By applying sustainable business practices among procurement transactions, ICT companies can lower their carbon footprint, produce more environmentally-friendly products and services, and reduce or optimize their energy consumption, which would result in more sustainable and innovative business operations for the ICT sector.

4.2 The procurement process map

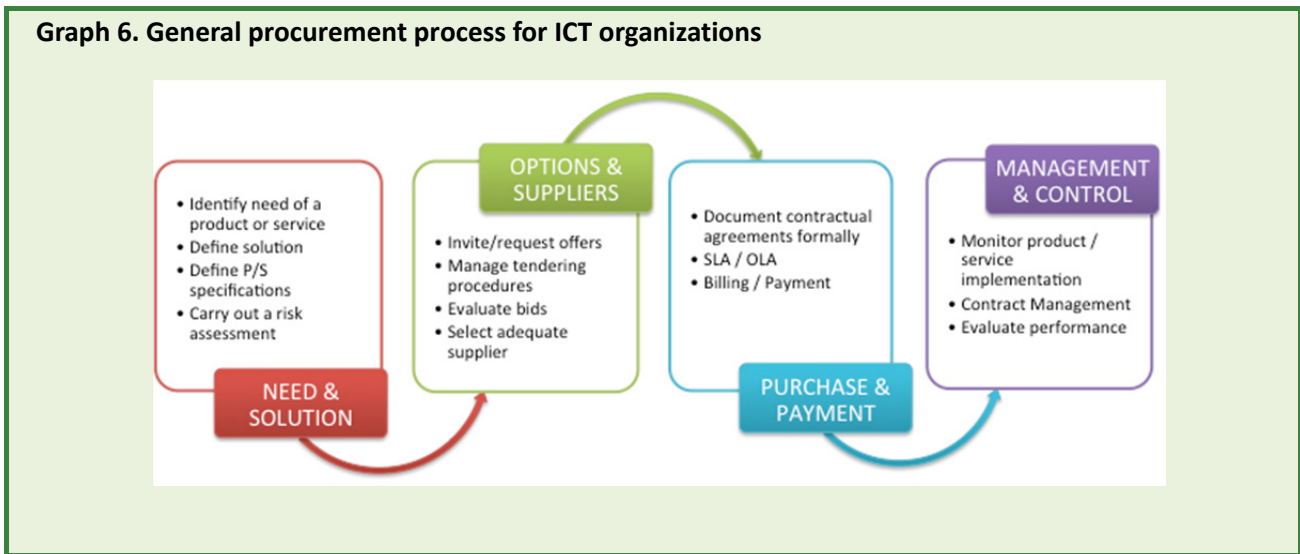
To acknowledge the impacts and opportunities in their procurement practices, ICT companies are encouraged to write down a procurement process map. To address all procurement related variables of an ICT organization there are important considerations that must be taken into account within supply, demand, infrastructure and products. Procurement of products and services required to operate ICT organizations

¹⁶ United Nations Statistics Division. ISIC Rev 3.

¹⁷ UNSD. International Standard Industrial Classification of All Economic Activities, (ISIC Rev. 3.1)

¹⁸ JRC European Commission. The 2009 Report on R&D in ICT in the European Union; JRC Scientific and Technical Reports. <http://ftp.jrc.es/EURdoc/JRC49951.pdf>

can be complex; therefore all associated impacts must be addressed. A general procurement process map approach can be schematized as:



In this framework, some parameters are addressed through a procurement process map:

- Key stakeholders;
- Operational procedures and gaps;
- Customer demand monitoring;
- Inventory and warehousing;
- Present process strengths and weaknesses;
- Business process re-engineering potential;

To efficiently manage the above considerations, procurement officials/departments must be supported to improve present purchasing practices. Moreover, it is necessary to generate the required resources, training and technical assistance (in-house or outsource) to facilitate the implementation and success of specific purchasing considerations. Global purchases represent an efficient alternative from an operational and an environmental perspective (LCA).

Most of ICT companies have mapped consistent procurement models. **Example: TELEFONICA**



4.2.1 Step 1

4.2.1.1 Identify needs – define solutions

As ICT organizations have their own approach to functional and business requirements, once a need for a resource is identified within the company's specific strategy, a sourcing analysis should be developed to ensure that all associated options, costs and benefits of the products/services to be acquired are addressed.

The first stage in any procurement process is to identify the need of a resource to accomplish a production activity. Generally, the detailed analysis of each procurement event depends primarily on its relative expenditure, although other variables (standardization, industry development, risk, **environment**, etc.) can be set as priority for specific purchasing cases. This cost-benefit and environmental analysis can provide direction to ICT organizations to engage effective and efficient procurement processes and cost-effective and ready-to-market solutions.

Due to the diversity of products and services needed to perform supply chain and LCA approaches in the ICT sector, general procurement considerations for each industry category can be addressed to facilitate the choice of environmentally preferred products and services. (*See next chapter. Relevant Considerations to assess green ICT procurement transactions*)¹⁹

Within all these considerations, the ICT organization has to define functional and performance specifications of goods or services to be procured, ensuring that sources, data and methods used to assess every product/service definitions, are relevant and complete. When defining an ICT organization's need and its solution, the following issues are relevant for consideration:

- Client's needs and expectations;
- Degree of standardization across required products and services;
- Market studies;
- Mandatory and highly desirable requirements;
- Support requirements and compatibility issues;
- Environmental considerations such as energy consumption, product's carbon footprint, local environmental regulations, disposal options, etc.

To ensure the quality of each purchase event, the ICT organization also can undertake a risk assessment, to most properly manage and minimize risks associated to a solution purchase and implementation of a product/service.



“At **Telecom Italia** S.p.A. ... the policy aimed at reducing the size of the fleet and modernizing it in favor of vehicles that comply with stricter environmental standards is proceeding as planned: during 2010, 4200 Euro3 standard vehicles were replaced with 3,000 Euro4 standard vehicles, including 350 petrol/LPG fuelled vehicles. The reduction in the number of vehicles included 250 personally assigned vehicles”.

Telecom Italia - Annual Report 2010.

NEED &
SOLUTION



¹⁹ See Chapter V *Best practices to assess green ICT procurement transactions*.

4.2.2 Step 2

4.2.2.1 Evaluate options – select suppliers

Once the organization has defined the specific terms of products and services to be procured, it has to invite and request offers from suppliers that can potentially provide an effective solution. To request offers from the market place, each ICT organization may select particular methods for collecting Expressions of Interest (EOI) from suppliers and manage transparent and competitive tendering procedures on a case-by-case basis. This process can be open or restricted, and must include a supplier's selection and contract-award criteria.

After the receipt of bids from suppliers, the organization must properly and accurately obtain the best commercial deal for the supply of the solution and select the adequate supplier, ensuring that the most cost-effective and environmentally-friendly solution is selected based upon the business goals of the company, and that the selection process is fair and transparent.

When defining its environmental policies and instruments, the OECD for example has defined an *EPR (Extended Producer Responsibility)* approach *that seeks to integrate signals related to the environmental characteristics of products and production processes throughout the product chain*²⁰. In such reports, organizations are called upon to share with the producers the responsibility for the environmental impact of the product's end of life. The group of suppliers and partners that are required to support the operations of most ICT companies, may also develop more sustainable products, materials and operating practices, as present market trends call upon organizations to evaluate the environmental impact of ICT use in ICT and non ICT organizations, which can include as well ICT sector suppliers.

To evaluate the alternatives of a solution, the following issues are relevant for consideration:

- Organization's procurement policy, procedures and delegations;
- Quality Assurance, insurance contingency and incentives issues;
- Product/Service competitive advantage;
- Suppliers background;
- Market and Industry trends;
- Environmental considerations such as International standardized methodologies implementation, assessment of environmental impact, waste fees, etc.
- Price.

The procurement methods adopted to address this part of the procurement process in ICT organizations will vary depending on the complexity of requirements, market issues and related expenditure. One of the common methods to evaluate tenders is the Total Cost of Ownership (TCO) approach, to address life cycle costs of products and services.



At **Nokia**, "Our comprehensive set of Nokia Supplier Requirements provides clear guidance on what we expect from our suppliers. These requirements include environmental and social expectations, which are based on international standards such as ISO 14001, SA 8000, OH SAS18001, as well as PCMM, ILO and UN conventions. The Nokia Supplier Requirements are part of the contractual agreement with suppliers and accordingly all Nokia suppliers must follow them regardless of location or size.

Nokia Sustainability Report, 2010.



OPTIONS & SUPPLIERS

²⁰ Environmental Policies and Instruments - Extended Producer Responsibility. OECD.
www.oecd.org/document/19/0,3746,en_2649_34281_35158227_1_1_1_1,00.html

4.2.3 Step 3

4.2.3.1 Procurement and payment

When the best solution for an identified need is addressed (in terms of business convenience, technical considerations and risk) ICT organizations should proceed with the purchase and pay for the product/service. Billing and payment procedures are specific for each organization, and may be addressed according to particular payment policies.

To secure that the implementation or delivery of purchased products/services is appropriately accomplished, it is imperative that functional and commercial terms related to the procurement transaction be documented in formal contractual arrangements between the parties, so they both can ensure appropriate mechanisms for effective implementation and timely delivery, within the allocated budget. These terms and conditions can be agreed upon formally through Service or Operating Level Agreements (SLAs/SLOs), to ensure that both the ICT organization and the provider clearly understand their respective commitments.

Procurement is a production process that can support more efficient and profitable business transactions. Present global market trends are thought to become an interesting source of cost reduction if related to more profound environmentally-friendly businesses. *The ICT sector may have considerable impacts on economic performance, as it is characterized by very high rates of technological progress, output and productivity growth. These characteristics imply a considerable contribution of the sector to economy-wide performance.*²¹

When purchasing a product or service, and managing it through a specific lifecycle stage, the following issues are relevant for consideration:

- Organization's procurement policy, procedures and responsibilities;
- Organization's payment policy, procedures and responsibilities;
- Legal contracting concerns;
- Environmental pricing;
- Environmental taxation;
- Waste fees;
- Financing and investment mechanisms.

At this stage of the process, electronic procurement methods can potentially enable ICT organizations to operate in a faster and more efficient way. E-procurement involves the technological infrastructure needed to automate process transactions, achieve better service quality, increase efficiency, and lower costs.



“Microsoft has implemented a suite of online tools that provide a seamless e-procurement process... For example, MS Market automates project initiation and setting up purchase orders, so suppliers don't have to wait for paper forms to make their way back and forth between employees. MS Invoice enables vendors to submit invoices or credit memos online, and MS Inquire allows them to track payment progress. Payments are directly deposited into the vendor's bank account; funds are secured and transmitted within 24 to 48 hours”

Microsoft - Company Information/Procurement, 2011.



PURCHASE
PAYMENT

²¹ OECD - Guide to measuring the Information Society, 2009. www.oecd.org/dataoecd/25/52/43281062.pdf

4.2.4 Step 4

4.2.4.1 Manage and control

To ensure that the procured resources are managed, maintained and disposed of efficiently, and that the asset's operational life cycle meets the agreed specifications and value, it is necessary to constantly evaluate the performance of what has been procured. Purchased resources (products and services) must be systematically reviewed and evaluated with respect to their use, performance and functionality and return.

Present market trends and operational challenges have encouraged the implementation of speed-to-market management techniques to address effective data collection and production management such as Just-in-time (JIT) manufacturing and distribution, Quick Response (QR), Efficient Customer Response (ECR), Vendor Managed Inventory (VMI), etc. The implementation of ICT tools in the stages of a product or service LCA can lead organizations to improve their customer's response, increase the efficiency of productive activities, reduce cycle times and increase profit.

Every ICT organization must define a set of concrete goals to foster with more sustainable procurement transactions. Performance indicators describing responses and opportunities are the best way to assess efficiency in the application of greener procurement practices, and to track the effectiveness of applied procurement processes.

When monitoring the success/failure of procurement processes and when controlling the performance of purchased resources, the following issues are relevant for consideration:

- SLA/OLA;
- Maintenance and warranty issues;
- General and specific contract agreements;
- End of life/disposal specifications;
- Suppliers management.

In 2007, the Global e-Sustainability Initiative (GeSI) and the Electronic Industry Citizen Coalition EICC launched E-Tasc, a strategic management tool that *aims to provide a leading solution for supply chain transparency and improved corporate responsibility*²².



GeSI
GLOBAL e-SUSTAINABILITY
INITIATIVE

E-TASC (Electronics – Tool for Accountable Supply Chains) is a web-based tool utilized by companies to manage their own factories, communicate with their customers, and assess their suppliers on corporate responsibility risks. It is based on a comprehensive set of ethics, labour rights, health and safety, and environmental criteria.

The tool includes a risk assessment that automatically provides a report identifying potential risk areas and best practice examples to help improve performance... E-TASC also includes a tool to help members conduct an initial risk assessment of suppliers before proceeding to the more in-depth self-assessment.

GeSI. Supply chain Initiative 2011

²² E-TASC - Introduction to E.Tasc. <http://e-tasc.achilles.com/introduction.htm>

5 Relevant considerations to assess green ICT procurement transactions

Today, environmental demands in all human activities are increasing. The overall aim of the following considerations is to make suggestions on how to consider environmental issues in the procurement process of ICT organizations, within a lifecycle perspective. An approach to standard considerations, elements and interactions required for an efficient and profitable procurement operation is presented in terms of the following pictograph:

Graph 7. ICT procurement considerations



5.1 ICT procurement process considerations

Each ICT organization performs according to its corporate goals and products. In order to achieve more efficient procurement transactions, purchasing practices must be based on well-designed and managed procedures, and green considerations in procurement practices represent an opportunity and a priority for ICT organizations.

In an ICT organization's procurement process, the inclusion of standardized energy, environment and carbon decision-making criteria is highly encouraged. Through its procurement system, an ICT organization can potentially reduce the environmental impact of goods, networks and services used in society. Several variables related to procurement transactions can be addressed within the operation of all the life cycle stages of a product.

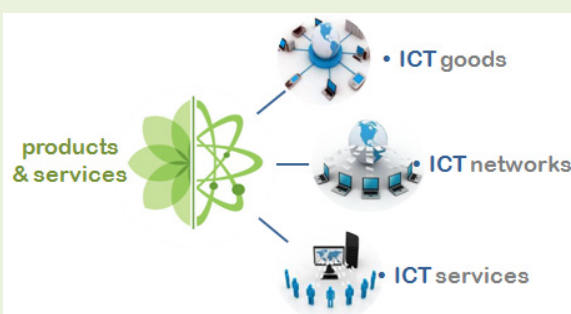
To assess green procurement practices, ICT companies can implement the following approaches:

- Define your company, products and services according to **STANDARDS**.

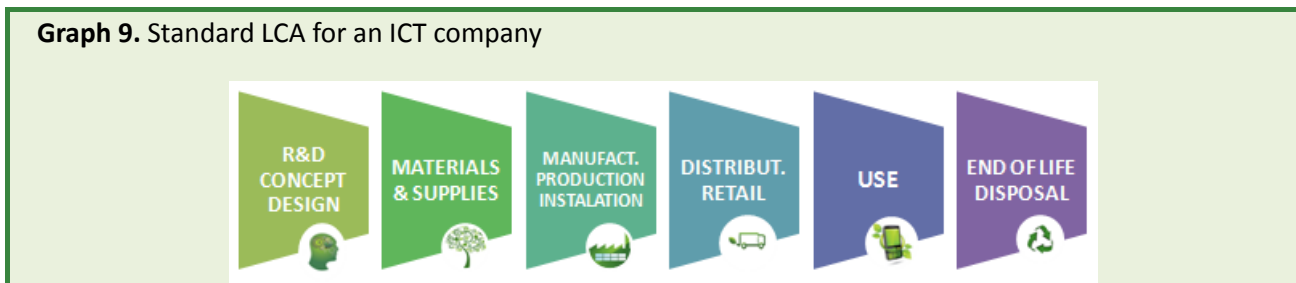
Perform a detailed analysis and data collection of inputs (products and services) that must be procured, in order to deliver the desired ICT outputs (GNS).

- ◇ Allocate an ICT organization in a standardized industry category (see Chapter III The ICT Industry)
- ◇ For standard categories of ICT Products – ICT Services – ICT Inputs, see Chapter III The ICT Industry.

Graph 8. ICT products and services categorization



- Approach an environmental life cycle assessment (LCA) according to standards.
 - ◇ *Follow Recommendation ITU-T L.1410 “Methodology for environmental impact assessment of Information and communication technologies (ICT) goods, networks and services. The methodology to apply LCA assessment is detailed in ITU-T L.1410 – Part I “ICT lifecycle assessment: Framework and Guidance”²³.*



- Define your procurement process map.
 - ◇ *For details to define standard procurement processes, see Chapter IV ICT Procurement process/The procurement process map.*



- ◇ *For relevant green considerations to be addressed while in the Need & Solution part of the process, see Chapter V Relevant Considerations to assess green ICT procurement transactions/ICT sector green considerations for products and services-**What to buy?***
- ◇ *For relevant green considerations to be addressed, while in the Options & Suppliers part of the process, see Chapter V Relevant Considerations to assess green ICT procurement transactions/ ICT sector green considerations for suppliers-**Who to buy from?***
- Procure environmentally friendly and energy efficient products and services towards more efficient procurement practices and businesses. **Think GREEN**
 - ◇ *As stated in ITU-T Recommendation L.1420, an ICT organization is called to assess its environmental impact in terms of energy consumption and GHG emissions, based on ISO 14064-1 and [b-GHG Protocol], and according to the five principles of organizational assessment: Relevance, Completeness, Consistency, Accuracy and Transparency.*

We plan to achieve the following results with our “Sustainable product portfolio” program in the years 2010 to 2012:

- Defining criteria that determine the sustainability of products
- Incorporating sustainability into product-relevant core processes and objectives
- Preparing employees for resulting changes
- Implementing an evaluation process
- Establishing a Sustainable Product CR key performance indicator
- Improving customer communication

Deutsche Telekom. 2010/2011 Corporate Responsibility Report

²³ ITU-T L.1410 (approved) www.itu.int



5.2 ICT sector green considerations for suppliers

To better address sourcing strategies and to align them to a typical lifecycle, an ICT company can engage effectively with suppliers by using common practices and standards at each LCA stage. To endorse an extended environmental impact assessment throughout the productive practices of the ICT sector and the trade of environmentally-friendly products and services, ICT organizations may develop their procurement practices to implement the following set of standards and requirements in coordination with suppliers:

- Develop a matrix of criteria that provides a normative basis to guide product development, procurement and supplier management;
- Promote the application of Recommendation ITU-T L.1410 to evaluate the life cycle energy consumption and GHG impact of first and second order effects of the ICT activities of the suppliers and partners that are **not ICT organizations**. *Goods, networks and services to evaluate, are listed in Recommendation ITU-T L.1420 Annex A*²⁴.
- Promote/demand the use of Recommendation ITU-T L.1420, “Methodology for energy consumption and greenhouse gas emissions impact assessment of information and communication technologies in organizations”, to quantify and report energy consumption and GHG emissions of the suppliers and partners in the ICT sector;
- Encourage suppliers to reduce waste production and management costs, reduce their GHG emissions, enhance product reusability, promote green products design and reduce the use of hazardous materials;
- Promote the purchase of products that meet internationally recognized “green” labeling standards such as EPEAT, Energy Star or Blue Angel;
- Implement these considerations within contractual requirements for suppliers.
- Assess your current suppliers on their environmental practices.

At the time of delivering and requesting information regarding tender evaluation, organizations and suppliers must share standardized approaches, to enhance their transactions success. As stated in Recommendation [ITU-T L.1420] the evaluation, quantification and reporting of energy consumption and GHG emissions of ICT activities, must be performed with transparency – “Where the results of life cycle GHG emissions assessment are communicated to a third party, the organization communicating these results shall disclose GHG emissions-related information sufficiently to allow such third parties to make associated decisions with confidence”.²⁵

Strategies developed with suppliers ensure that materials can be provided on time to meet current and foreseeable demand, avoiding bottlenecks and waste of resources that result from inadequate procurement planning.

²⁴ ITU-T L.1420. Annex A. List of goods to be considered when assessing the impact of ICT activities in organizations.

²⁵ ITU-T L.1420 – Principles of organizational assessment



5.3 ICT sector green considerations for products and services

The world's systems of production, trade and consumption of products and services have put the planet's natural resources at risk. It is imperative that every ICT organization strives to foster global growth and development by ensuring a sustainable exploitation of all natural resources: decoupling economy growth from the use of natural resources is an imperative.

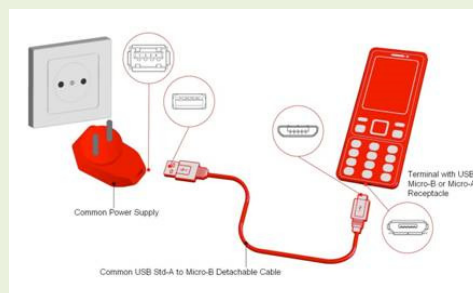
Throughout their product life cycle, ICT organizations have to deal with environmental impacts related to the creation and transformation of products that consume natural assets (such as water, air, fossil fuel, etc.). The following considerations become significant for ICT organizations aiming to procure more environmentally-friendly products and services.

Relevant considerations that an ICT organization may take into account at the time of defining its needs and specifications for procurement are presented in **Annex A**. These considerations represent a general approach of Green issues to be addressed in the procurement practices related to each LCA stage of an ICT company.

A relevant example of green considerations in product design and thinking that the ICT sector must address in a LCA approach is Recommendation ITU-T L.1000 on the Universal Charger approved in June 2011. The key elements of Recommendation ITU-T L.1000, are the establishment of a universal charger standard with the following considerations: a micro USB as the standard connector, a detachable cable, a no-load of power consumption below 0.03W, a charging current of 750 mA, and the use of eco-friendly materials.

Recommendation ITU-T L.1000 provides high level requirements for a universal power adapter and charger solution that will reduce the number of power adapters and chargers to be produced and recycled by widening their application to more devices and increasing their lifetime. The solution also aims to reduce the energy consumption. The longer life cycle and possibility of avoiding device duplication reduces the demand on raw materials and waste. The power adapter and charger solution is designed to serve the great majority of mobile terminals, or other ICT device²⁶.

Graph 11. The Universal Charger²⁷



Source: GeSI

²⁶ ITU-T L.1000, Summary. www.itu.int/ITU-T/workprog/wp_item.aspx?isn=7301

²⁷ GeSI. "The Universal Charger". Press Release, 17 June, 2010.

All manufacturers should include the universal charger concept in their design processes, and should define and procure all the required materials needed for manufacturing. ICT companies that purchase completed chargers from third parties should request the characteristics of Recommendation ITU-T L.1000. Telecom operators may include the universal charger in mobile phones specifications, as the only solution in their markets.



Box 2: Universal phone charger standard approved

One-size-fits-all solution will dramatically cut waste and GHG emissions. ITU has given its stamp of approval to an energy-efficient one-charger-fits-all new mobile phone solution (Geneva, 2009)

ITU Universal Charging Solution made greener/leaner.

ITU's one-size fits all universal charging solution has been further improved to maximize the benefits for end users by extending its use to a wider variety of devices and making it even more energy efficient. It will no longer be necessary to provide a new charger with every new ICT device. ITU Membership also agreed to specify a no-load power consumption of the power adapter below 0.03W which is the most efficient available today... Chargers built according to the new standard will be safer and use eco-friendly materials... (Geneva, 2011)

Source: ITU –Press Release, 22 October 2009/9 May 2011.


6 Conclusions

To assess sustainability among its practices, ICT companies must engage to become key actors towards combating climate change, and proceed with corporate definitions and standardized approaches that can facilitate upcoming specific process re-engineering considerations within a green perspective. Also, to entail more efficient means of managing resources, ICT organizations can take advantage of cleaner energy technologies and innovative ICT alternatives among their procured GNS and practices.

By acknowledging the elements in their supply chain operations and their evolution to Life Cycle Assessment considerations, ICT organizations can have a direct effect on corporate value and better address environmental and operational challenges. Through a consistently staged Life Cycle Assessment (LCA) conception and the use of standardized methodological frameworks, critical aspects related to the product/service environmental specifications can be identified, so the final product/service is delivered at the end of the cycle in an environmentally-preferred way.

To achieve some of their business objectives, ICT companies must rely on complex procurement processes, which deal with hundreds of suppliers, materials and solutions from different industries, countries and markets. To better address these challenges, an ICT company must first understand its industry particularities, define its outputs (good, networks and services delivered to the market) and address the inputs (products, services, materials) required for production.

A structured mapping and step-by-step application of standardized procurement processes analysis can enable ICT organizations to simplify their procedures, meet the goals of the organization and assess the environmental impact through the inclusion of energy, environment and carbon criteria in their purchasing activities. To manage effective and sustainable procurement practices in an ICT good, network or service LCA, ICT companies must incorporate green thinking considerations in every step of their procurement process.



To ensure adequate procurement planning and operation, the ICT industry must consider standardized best practices and common green strategies at the time of making the “How to buy? What to buy? Who to buy from?” decisions in order to achieve the production and delivery of more environmentally-friendly products and services. Operational processes of an effective supply chain and/or LCA approach must minimize the time from the conceptualization of the products and services to their delivery; optimize resource transformation and more precisely meet customer demands, maximize efficiency, reduce costs and promote sustainable profit.

Annex A: Relevant considerations for goods networks and services procured by ICT industries

PROCURED PRODUCTS AND SERVICES PER LCA STAGE ON ICT COMPANIES								
LCA STAGES	RAW MATERIAL	NETWORK & DATA CENTERS INFR	INFORMATION SYSTEMS	OPERATING/CONSULTING SERVICES	MARKET PRODUCTS	MARKETING AND ADVERTISING	CONTENTS	CONSUMABLES
R&D Concept Design	<ul style="list-style-type: none"> - Design for easy recycling of materials - Avoiding use of hazardous substances 	<ul style="list-style-type: none"> - Hire services for Eco-design in datacenters (energy efficient) 	<ul style="list-style-type: none"> - IT & Communication equipment - Virtual meetings services 		<ul style="list-style-type: none"> - Define & buy green devices for fixed and mobile users 	<ul style="list-style-type: none"> - Advertising material (recycled material) 		<ul style="list-style-type: none"> - Office supplies (recycled material) - Eco-design for office buildings
Raw materials extraction Materials and Supply acquisition	<ul style="list-style-type: none"> - Electric & Electronic material - Metals - Plastics - Greening the Fleets (EURO 4, fuel, biofuels, electric) 	<ul style="list-style-type: none"> - Greening the Fleets (EURO 4, fuel, biofuels, electric) - Energy Efficient Network equipment, Data Center equipment, Power supply equipment 			<ul style="list-style-type: none"> - Define eco-design and safe material characteristics of devices (example free of PVC) 			
Production Manufacture Provision Installation	<ul style="list-style-type: none"> - Energy efficient supply chain - PVC: Elimination in ICT products - Paper / Plastic 	<ul style="list-style-type: none"> - Network optimization 						<ul style="list-style-type: none"> - Packaging Recycling Materials - Greening the Fleets (EURO 4, fuel, biofuels, electric)
Marketing Retail Transport Logistics		<ul style="list-style-type: none"> - Greening the Fleets (EURO 4, fuel, biofuels, electric) 			<ul style="list-style-type: none"> - Greening the Fleets (EURO 4, fuel, biofuels, electric) 			
Use Reuse	<ul style="list-style-type: none"> - Further treatment of waste fractions 			<ul style="list-style-type: none"> - Alternatives of Reuse of devices 	<ul style="list-style-type: none"> - Universal Charger Use - Components recycling (batteries, cable, etc) 	<ul style="list-style-type: none"> - Advertising material based on recycled material. 		<ul style="list-style-type: none"> - Buy energy-saving applications
End of Life Disposal Recycling			<ul style="list-style-type: none"> - Recyclability characteristics. 	<ul style="list-style-type: none"> - Services of recycling & storage 				

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An energy-aware survey on ICT device power supplies
Boosting energy efficiency through Smart Grids
Information and Communication Technologies (ICTs) and climate change adaptation and mitigation:
the case of Ghana
Review of mobile handset eco-rating schemes
Guidance on green ICT procurement
Greening ICT supply chains – Survey on conflict minerals due diligence initiatives
Toolkit on environmental sustainability for the ICT sector

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