

## How to Extend the Lifetime of ICT: Examples and Case Studies from the EU GPP Criteria

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**Abstract:** Public procurers in the EU can apply procurement criteria to elicit tenders and select products from the manufacturers and suppliers of products with reduced environmental impacts. The European Green Public Procurement Criteria (EU GPP), published as Staff Working Documents of the European Commission, and periodically updated at product group level, represent an important reference for the selection and application of voluntary green criteria throughout Europe.

Recently, the revision process of the EU GPP Criteria for Computers and Monitors has focused attention on criteria that can be used to extend the lifetime of these devices, when considered as a key strategy to reduce their environmental impacts.

This paper describes criteria that may be applicable to the selection of ICT devices and services that are characterised by:

- a more reliable design, including resistance to damage and wear,
- repair and upgrade features (e.g. key components are easy to be replaced),
- long term support (warranty and service agreement, availability of spare parts, software updates and information)
- sufficient adaptability to future conditions of use (e.g. standardised components and ports, upgradable components)
- reusability at the end of the first useful life (e.g. software to ensure a secure data deletion)
- reused second hand devices that have been fully checked, serviced and upgraded.

This paper describes the EU GPP criteria based on these strategies, which are associated to the setting of criteria based on these strategies in Green Public Procurement. Case studies and lessons learnt from public procurers in different EU Member States are also described.

### Introduction

Relevant environmental impacts are associated to the production of ICT devices. In particular, the extraction and processing of raw materials, and the manufacturing of electronic components as integrated circuits (ICs), and displays represent the main environmental hotspots for small mobile devices such as notebooks, tablets and smartphones (Gupta et al., 2020, Clement et al., 2020, Alcaraz et al., 2018).

By improving product design to follow strategies for lifetime extension such as durability, repair, reuse and upgrade, the overall impact during the manufacturing phase can be reduced.

The total value of reported ICT public procurement contracts in the EU was estimated to be about EUR 50.3 billion in 2011 (European

Commission, 2014). Estimations about the public market value of ICT equipment in 2019 in a selection of European countries, vary between an expenditure per person from 90 to more than 250 Euros (European Commission, 2021).

Green Public Procurement (hereinafter GPP) is “a process whereby public authorities seek to procure goods, services and works with reduced environmental impact through their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured” (European Commission, 2008).

The procurement practices aiming to keep products and materials in the value chain for a longer period, are also described as Circular

Public Procurement (CPP) practices (European Commission, 2017).

The European Commission has been publishing, and periodically updating, EU GPP Criteria for several product groups.

This paper describes how EU GPP Criteria can be applied to extend the lifetime of ICT devices, including computers, monitors, tablets and smartphones, by ensuring the procurement of more durable, repairable, upgradable, reusable and/or refurbished/ remanufactured devices as well as services aiming to extend their useful lifetime.

In this paper are also described some case studies from procurements in different EU Member States that were analysed during the process of revision of the GPP Criteria

### The EU GPP Criteria

The EU GPP Criteria are developed and updated through a transparent and open process. The Joint Research Centre (JRC)<sup>1</sup> provides the scientific and technical background for the criteria development, which is directed by the Directorate General for Environment of the European Commission. Once the GPP criteria receive a positive opinion from the other Commission Services, they are published as Staff Working Documents (SWD) on the DG Environment webpage<sup>2</sup>.

For each set of criteria there are two ambition levels:

- the core level, designed to allow for easy application of GPP, focussing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum;
- the comprehensive level, taking into account more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals.

The use of the EU GPP Criteria is currently voluntary: they can be, if deemed appropriate by the individual authority, integrated into their tender documents. Nevertheless, according to the Circular Economy Action Plan, the

Commission is going to propose, through the upcoming Circular Electronics Initiative:

- regulatory measures for computers, tablets and smartphones on energy efficiency but also durability, reparability, upgradability, maintenance, reuse and recycling;
- right to repair measures including a right to update obsolete software;
- regulatory measures on chargers (e.g. common chargers, more durable cables, decoupling of device/ charger);
- measures to improve the collection and treatment of waste (including take back schemes for mobile phones, tablets and chargers);
- a review of EU rules on restrictions of hazardous substances in electrical and electronic equipment.

Moreover the European Commission is going to propose minimum mandatory GPP criteria and targets in sectoral legislation (European Commission, 2020; Pouikli, 2021).

### The EU GPP Criteria for Computers, Monitors, Tablets and smartphones

In March 2021, the Commission published the new EU GPP Criteria for computers, monitors, tablets and smartphones (European Commission, 2021; Alfieri et al. 2021). The SWD (2021) 57 final (European Commission, 2021) provides a set of procurement clauses (Technical Specifications, Award Criteria and Contract Performance Clauses) which aim to achieve the procurement of devices and services with:

- a more reliable design, including resistance to damage and wear, and a longer battery endurance (in cycles);
- repair and upgrade features (e.g. key components easy to be replaced);
- long term support (warranty and service agreements, availability of spare parts, software updates)
- sufficient adaptability to future conditions of use (e.g. standardised components and ports, upgradable components as storage drives and RAM)
- reusability at the end of the first useful life (e.g. preparation for reuse; secure data deletion)

<sup>1</sup> Product Bureau Team – Unit B.5.: Circular economy and Industrial Leadership: <https://susproc.jrc.ec.europa.eu/product-bureau/product-groups>

<sup>2</sup> [https://ec.europa.eu/environment/gpp/eu\\_gpp\\_criteria\\_en.htm](https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm)

- refurbished / remanufactured devices that have been fully checked, serviced and upgraded.

The paragraphs below provide additional details on how these different strategies are reflected in the GPP criteria.

### *Mobile equipment durability testing*

The GPP criteria suggest procuring equipment tested against different stress conditions: drops/shocks, temperature stress, dust and water ingress. The main testing references are the IEC60068 series (2013) and the MIL-STD-810H test procedures (US DoD 2019). These tests are relevant for mobile devices, especially in case the devices are expected to be used in harsh working environments, where “rugged” level performance could be necessary.

Another important aspect is the degradation of the battery performance (State of Health)<sup>3</sup>. The GPP Criteria provide minimum thresholds and award criteria to select devices with a slower battery degradation. Battery management software is also suggested as a procurement feature, as it can contribute to a longer battery lifetime.

### *Repair and upgrade features*

The GPP Criteria list a number of components that can be requested as repairable, upgradeable and/ replaceable (see Table 1). In order to make the repair and upgrade of these devices feasible, the following conditions need to be fulfilled:

- spare parts are available for a certain number of years after procurement of the device;
- the joining / sealing techniques do not prevent such processes.
- the instructions on how to replace the critical components must be provided.

Moreover, inclusion of a functionality for secure data deletion allows for an easy deletion of user data contained in all data storage, before repair or upgrade.

Product Group	Critical Components
Desktop Computers	CPU, GPU (PCIe), External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard
Notebooks	Battery, Display panel/Display assembly, Storage (SSD, HDD,

	RAM), External/internal PSU, Keyboard, System/motherboard
Tablets	External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard
Smartphones	Battery, Display panel/Display assembly, External/internal PSU
Monitors	Connectivity cables, Power cables, External PSU

**Table 1: Minimum Critical components covered by the EU GPP Criteria**

### *Long term support and warranty*

In public procurement the technical support is often provided by services agreements with organisations that could be different from the hardware manufacturers.

A service agreement can be beneficial from an environmental point of view whenever it contributes to extending the product lifetime. A service agreement should not be considered a way to effectively replace non-functioning products, but instead it should be considered a tool to manage the ICT fleet in a resource efficient manner. For this reason, a service agreement should include an efficient maintenance, diagnosis and management of the failures, access to the manufacturer's warranty, periodic scan for upgrading possibilities (e.g. after 3 years) covering performance aspects like CPU, memory (RAM) or disk, and a prioritisation of repair rather than replace, whenever possible.

According to the proposed criteria the procurement of these ICT devices should be accompanied by a service agreement for at least two years of services (core level).

Currently, laptops are replaced after 3-4 years however there are organisations that are extending the use period of laptops to 5-6 years (McLennan, 2020).

### *Adaptability to future conditions of use*

The aim of these criteria is to ensure that equipment is future-proof and, at the same time, compatible with older equipment and peripherals. From one side the criteria make reference to the more advanced standardised protocols for port (USB Type-C™) and power supply (USB-C Power Delivery), but at the same time the interoperability with an older legacy system (backward compatibility) should be ensured by the use of adapters. The use of standardised interfaces can make the reuse of

<sup>3</sup> Current full charge capacity (in mAh) expressed as a percentage of the design capacity (rated capacity)

accessories possible. For this reason the decoupling of procurement from accessories is also suggested.

#### *End of life management*

The EU GPP end of life criteria aim to go beyond the WEEE mandatory treatments, by enhancing reuse processes, e.g. requiring a preparation for a reuse service and reporting on the status of the proportion of equipment prepared or remarketed for reuse and the proportion of equipment prepared for recycling.

#### *Refurbished / remanufactured devices*

Another relevant option for “product lifetime extension” is the procurement and use of refurbished/remanufactured IT equipment. The GPP Criteria suggest that this should be requested by a separate procurement route from the one used for brand new products.

Quality control procedures and a minimum warranty or service requirement can ensure the minimum quality of the equipment delivered as part of the contract.

In case the refurbished/remanufactured device is equipped with a new battery, criteria on battery performance are also suggested.

### **Case study examples of implementation**

Despite not yet being common practice, several public procurers across Europe are already prioritising lifetime extension in the procurement of ICT devices. Here below is a list of initiatives that have been reviewed during the criteria development process:

- Craaford et al. (2018) describes the experience of municipalities in Sweden in procuring remanufactured computers.
- The Danish city of Aalborg has been working on making their equipment more reusable. They discovered that the practice of engraving laptops with its logo was making laptops much more difficult and expensive to reuse and this policy has been changed (McLennan A. (2020).
- the Italian Region of Tuscany is a frontrunner in applying several new EU GPP criteria, taking inspiration from a draft version of the EU GPP criteria to include in

their most recent tender criteria a minimum endurance for batteries (in cycles), data erasure functionalities, and standardised ports and adapters (Regione Toscana, 2020). The tender is currently in the evaluation stage.

- An analysis of German and Spanish tenders published in the European Portal TED <sup>4</sup> showed that, in some large procurement processes some of these criteria have been already applied, in particular requesting durability, minimum battery endurance in cycles, interchangeability of specific components (e.g. RAM, CPU), long term services, support and warranties (up to 6 years and 3 years for batteries).
- The European Commission itself has via DG DIGIT applied GPP criteria for device lifetime extension such as easy accessibility and replaceability of components, information requirements on the battery endurance and durability testing. (TED, 2017)
- Finally, a new initiative called “Circular & Fair ICT Pact<sup>5</sup>” aims to put in practice common minimum criteria across Europe, in order to leverage the potential power of public procurement and to influence product and service design toward lifetime extension and circularity.

More examples can be found in the European Commission “GPP Good Practice”<sup>6</sup> and in the EU Interreg projects ProCirc<sup>7</sup> and Circular PP<sup>8</sup>.

### **Conclusions**

While GPP criteria for ICT equipment addressing energy consumption in the use phase have been considered by procurers since several years, the potential to extend product lifetime and directly minimise the environmental impacts of production is less exploited. It seems that until now, public “frontrunners” have found their own ways to include environmental criteria beyond the energy efficiency of the equipment.

The new EU GPP Criteria for Computers, Monitors, Tablets and Smartphone mark an important reference point in progress towards a harmonised approach on lifetime extension that

<sup>4</sup> <https://ted.europa.eu/TED/browse/browseByMap.do>

<sup>5</sup> <https://www.oneplanetnetwork.org/sustainable-public-procurement/interest-group-circular-fair-ict-pact>

<sup>6</sup> [https://ec.europa.eu/environment/gpp/case\\_group\\_en.htm](https://ec.europa.eu/environment/gpp/case_group_en.htm)

<sup>7</sup> Interreg North Sea Region ProCirc. Available at: <https://northsearegion.eu/procirc/>

<sup>8</sup> Interreg Baltic Sea Region <http://circularpp.eu/circularpp/>



consists of criteria that are simple for procurers to understand and implement. The EU GPP Criteria demonstrate how different procurement strategies and criteria can be applied to ensure a longer lifetime of ICT devices in the public sector. Selecting devices with more durable hardware (reliable and repairable) at design level should be accompanied by long-term support services (maintenance, software update, availability of spare parts and repair information, hardware upgrade) in order to be effective.

Finally, the EU GPP Criteria also enable public procurers to extend the lifetime of devices deployed in their organisation by giving them a second life, either within the public organisation or elsewhere, through the criteria for refurbished/remanufactured devices.

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