User Guide to the

Life Cycle Costing Tool

for Green Public Procurement of

Imaging Equipment

The LCC Tool for Imaging Equipment

What is the LCC tool for?

The purpose of the tool is to encourage and facilitate the wide application of life cycle costing (LCC) among public authorities in the European Union, so that organisations can **make more cost-effective decisions** in their procurement processes for imaging equipment.

Purchasing price is only a fraction of all costs of any given product or service. Calculating life cycle costs allows you to be aware of future expenditure and select more cost-effective solutions. To do so, the LCC tool allows you to consider:

- **Initial acquisition costs** (purchase and installation),
- **Operating and maintenance costs** (especially related to energy, consumables and replacement of parts),
- **Other costs** (such as residual value), and
- **Costs of environmental externalities**, namely those associated with climate change/CO_2 emissions due to the energy consumption during operation.

This guide provides you with the key aspects to consider when using LCC in public procurement, especially during the preparatory and tendering stages, and introduces briefly the main sections and elements of the LCC tool itself.

Who is this tool intended for?

The LCC tool has been developed for procurement practitioners in public organisations in the European Union.

It is designed for procurement both below and above the thresholds for application of the EU procurement directives (Directives 2014/24/EU on public procurement and 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors).

However, it can also be used by private sector purchasers and even the general public.

For which products can this tool be used?

This user guide contains basic information to start using LCC in the procurement of **imaging equipment** - that is printers, copiers, multifunctional devices and scanners marketed for office or domestic use, or both - as defined in the revised EU GPP Criteria for imaging equipment.

Other types of imaging equipment (such as digital duplicators or mailing machines) are not covered even though the recommendations could still apply.

The tool also distinguishes between pure purchase contracts (where only the supply of the equipment is included) and any other type of mixed or service contracts (in which maintenance or the supply of cartridges might be included).

When to use the tool?

The tool has been designed to be used during tendering processes. However, that is not the only stage in a procurement process when it can be applied. You can use the tool:

BEFORE TENDERING
To assess the LCC of the current situation and roughly evaluate different solutions to help guide pre-tendering market engagement activities, or to narrow down different technological solutions.
DURING TENDERING
To compare offers during the evaluation and award of contracts, as foreseen in Directives 2014/24/EU on public procurement and 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors.
AFTER TENDERING
To evaluate the performance of the awarded solution in comparison to the previous situation or other offers, to monitor and communicate results and help prepare future tenders.

I. Prior to the tendering process

Before starting the tendering process, it is important to know what your real needs are, what solutions exist to cover them and which have lower life cycle costs. To do so you need to involve internal stakeholders and consult with the market.

Not all cost drivers are easily included in LCC; you should be aware of that and decide which elements to include in the LCC and which to consider separately as additional criteria, to select the best solution for your needs and for the environment.

Determine your needs

An organisation's needs for imaging equipment are not the machines themselves but the capacity to print, copy and scan documents.

Prior to tendering, you need to define those needs, differentiating by work units and staff profiles to better define the specifications for possible solutions.

You should also evaluate existing equipment stock and utilisation, as well as related contracts, including printing services that are currently externalised but that could be produced in-house depending on the type of equipment or services purchased.

Identify solutions for those needs

There are many options to cover your needs in an environmentally friendly and cost-effective manner when you take your time to evaluate the options.

Consultation with internal stakeholders and the market is key, especially when you plan to reorganise the service and equipment.

Can we internalise some printing needs?

Some colour-headed documents, flyers and other colour documents could be printed in-house if the appropriate new equipment is acquired, reducing the need to outsource certain printing services, which could lead to reducing overall costs and avoiding stock accumulation (e.g. headed documents that become outdated due to image change or reorganisation of departments).

Do we need to buy equipment or are there other solutions?

Consider whether it is best to just buy equipment through a supply contract or if a printing service contract would be more appropriate, if you require ongoing services.

You could require equipment optimisation audits as part of the contract and include clauses for the upgrade and reuse of equipment if no in-house resources are available for this.

Consider also if you could relocate, donate or sell some existing equipment before it reaches its end-of-life.

How can I save resources and reduce unnecessary print outs?

Modern imaging equipment has many functionalities that allow for reduced paper consumption and wasted print outs that nobody collects at the end of the day.

Analyse these options to include relevant criteria in the tender documents. These include: automatic duplex capability (automatic recto-verso printing) of imaging equipment, default settings to save toner or ink, network connection of printers, printing rights by profile, confirmation of printing by the machine using individual user codes, etc.

Identify relevant cost drivers and parameters

Different solutions have different costs throughout their life cycle. Analysing the expenses and organisational impacts of each potential solution at this preliminary stage will help you unveil "hidden" costs and better evaluate alternatives from an economic point of view.

Operation and maintenance costs - including associated externalities - will be particularly relevant.

When identifying cost drivers, make sure to provide clear and objective definitions and refer to industry-acknowledged standards to facilitate acceptance of the process and the provision of data by bidders (the EU GPP criteria can be a good starting point for this). If you are unsure about any of them, consult with internal stakeholders and/or the market to find out.

In addition to the cost drivers, you will also need to define the basic parameters for the LCC (discount rate, your electricity cost, etc.).

Consult with relevant parties

It is important to involve and enter into dialogue with other departments of your organisation, end-users and suppliers.

Internal departments can help identify and prioritise cost drivers and define the parameters for the LCC calculations (i.e. usage patterns, appropriate discount rate, electricity cost and $CO_{2\text{-eq}}$ emissions from your energy contract if you include externalities, etc.).

Users will be able to identify any real needs and concerns when changing systems, for example how certain changes might affect workflows and procedures.

Suppliers will be helpful in identifying the product types and solutions on the market to best meet your needs, compatibility and interoperability issues, and especially the type of information and standards available for the different cost drivers and parameters you want to consider in your procurement. Consulting with suppliers in advance also helps to ensure their acceptance of the use of LCC in the call for tenders.

Use all of this information in your decision process to select the type of solution you want, the criteria to consider and how LCC will be used in the tendering process.

Data needed from other units

Before using the LCC tool for procurement you must liaise with other departments or units within your organisation to gather all data needed for the LCC tool, as not all of it will be automatically available to you. In some cases, you may also need to consult other public sector bodies.

For example, you might need to identify the person in charge of the electricity supply contract to obtain the information on the cost of electricity (to be able to calculate operational costs) and associated $CO_{2\text{-eq}}$ emissions of your electricity (if you plan to include the associated externalities in the LCC calculation).

Using LCC prior to the tendering process

The LCC tool can be used at this stage to help you select the type of solution to purchase or service to contract, by comparing different solutions using preliminary data gathered in the consultation process.

II. How to use LCC during the tendering process

If in your tendering process you plan to use life cycle costs instead of pure acquisition price to evaluate economic offers, state it clearly in the tender documents, provide the LCC Tool with the common parameters to ensure transparency, ask for the data that you need for the LCC calculations, and make sure to provide clear definitions and standards to ensure the comparability of offers.

Reflect on what additional environmental criteria to consider, to select the best solution, from an economic and environmental point of view.

Decide your LCC parameters

The LCC Tool has been designed to allow you to consider different cost categories and, at a preliminary stage, it is important to have the full costs picture for better planning. However, you do not need to include all these categories in the tendering process if there is a good reason to exclude them.

For each parameter, define in the tender documents exactly what is included and, if relevant, what standard they have to comply with, to obtain comparable offers.

Include other environmental criteria

Some parameters, such as energy consumption, will be part of LCC and therefore, evaluated in the award phase. However, minimum environmental performance requirements (such as minimum energy efficiency) and other environmental criteria (related to noise and substances emissions among others) should be defined to ensure that the acquired solutions are environmentally preferable from the start.

How to consider maintenance and consumables costs in purchase contracts

When purchasing new imaging equipment, an important cost driver will be the cost of the toner or ink cartridges to be used in the machines as well as the replacement costs of different parts that require regular maintenance (drums, transfers, fusers).

Investing in equipment that uses high-yield and low-cost cartridges will reduce operation costs, as fewer cartridges will be necessary, and labour costs for replacement will also be lower. Investing in equipment with a longer useful lifespan of components will also lead to lower maintenance costs, especially due to lower labour costs.

If the supply of cartridges and maintenance are included in the contract (mixed contract), you need to ensure you specify the requirements in the tender documents and that bidders present their costs in the same way (e.g. as a fixed annual fee, including maintenance call-outs, cartridges and spare parts).

If the contract does not include the supply of cartridges and maintenance tasks, then you will need to estimate these costs on an objective basis, such as your labour costs for replacement and costs under your existing contract for the supply of cartridges and parts. As you don't know in advance which equipment bidders will propose, the LCC tool allows you to calculate different operation costs based on information provided by the bidder about the frequency of replacement of cartridges and parts, and information provided by you about the costs of these items, including labour.

Bidders will provide the reference codes for cartridges and parts as well as their yield/lifespan, which must be supported in the tender with test results or certification. You will then need to ask your current suppliers of cartridges/parts for the costs of those parts that you will have if the different offered imaging equipment is acquired in order to introduce them in the tool for the award of the contract. As this information will be input after bidders have submitted their tenders, make sure to explain in the tender documents how you will proceed, to ensure transparency and objectivity.

EU GPP Criteria for imaging equipment

Use the EU GPP Criteria for imaging equipment to identify relevant environmental criteria - and industry standards - for this product group:
http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

The standard for energy consumption

The revised EU GPP Criteria for imaging equipment require that imaging equipment complies with the energy efficiency requirements defined in the EU Voluntary Agreement on Imaging Equipment. This agreement, as well as the main European ecolabels, base their energy requirements on the latest version of the Energy Star standard (version 3.0) as it is the most widely available standard for energy efficiency in this international sector.

In a green procurement where you plan to use LCC to evaluate the economic offer, you should specify in the tender documents that all equipment must comply with the energy requirements defined in the EU Voluntary Agreement on Imaging Equipment and require bidders to provide the energy consumption of the equipment (TEC value) calculated as defined in the Agreement, for the calculation of operation costs in the LCC Tool. This way you ensure a minimum energy efficiency and evaluate lower energy consumption in the award process through LCC.

As a means of proof, bidders may provide the technical documentation of the equipment including the energy consumption. You can also find this information in the Energy Star certified products database.

Can we define other award criteria linked to energy consumption?

As imaging equipment is an energy-consuming product, operation costs based on energy consumption have been included in the LCC Tool. As energy consumption in usage will be included in the LCC and thus considered as part of the cost award criterion, this should not be duplicated elsewhere in the award criteria.

However, it is perfectly possible to combine LCC with technical specifications which set minimum requirements for energy-efficiency, as proposed above. It is also possible to combine LCC with award criteria based on other aspects of environmental performance such as emissions of pollutants (dust, ozone, etc.) and noise, among others.

Should we consider CO_2 externalities in the LCC or as a separate award criterion?

The procurement directives make it clear that LCC can include costs of environmental externalities, as well as costs directly incurred by the owner or user. To do this, it must be possible to determine and verify the cost of the externality – and this is the case for $CO_{2\text{-eq}}$ emissions based on energy consumption. You can choose whether to include the cost of $CO_{2\text{-eq}}$ emissions in the LCC, or whether to apply a separate award criterion for it.

If you choose to include them in the tool, the externality cost of $CO_{2\text{-eq}}$ emissions will have to be specified. At the EU level, a report for DG Transport on the "Update of the Handbook on External Costs of Transport" by Ricardo-AEA from 2014, proposed a central value of 90 EUR/tonne (in 2010 prices) from a range between 48-168 EUR. In some countries, the Government might provide other figures. Therefore, practitioners will need to specify the costs for the climate change externality making sure that the figure they use is in line with the requirements defined in article 68.2 of Directive 2014/24/EU on public procurement. In the tool, it is proposed to use 90 EUR/tonne $CO_{2\text{-eq}}$.

If you apply a separate award criterion based on $CO_{2\text{-eq}}$ emissions, you may assign a higher weighting to this than it would have had if considered within the LCC. This approach may make sense if you are particularly concerned about the climate impact of the solution you purchase.

Cost drivers included in the LCC tool and used to evaluate the economic offers in the contract award	Other aspects to include in the tender as technical specifications, award criteria or contract clauses
• Acquisition costs • Delivery and installation costs • Service, printing and maintenance costs • Operation costs (Energy consumption) • Fees, taxes and other costs • Externalities ($CO_{2\text{-eq}}$ emissions linked to energy consumption)	• Service requirements • Technical specifications of the equipment (type of printer, colour printing or not, printing speed, default settings, etc.) • Minimum energy efficiency (lower energy consumption is evaluated as part of the LCC operation costs linked to energy consumption) • Other environmental criteria (e.g. substances and noise emissions, reparability and spare parts, restriction of hazardous substances…) • Packaging and end of life management, etc.

Note: Based on Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), producers are responsible for financing the collection, treatment, recovery and environmentally sound disposal of electric and electronic waste. It is assumed that all products include, in their purchase price, those waste management costs and, therefore no end of life costs have been included in the tool.

Define it clearly in the tender documents

Be transparent on how you will evaluate the offer, especially on how the economic offer will be evaluated and then weighed against other award criteria. Inform bidders in the tender documents that you will evaluate the economic offer using a life cycle costing approach and include the LCC tool to be transparent and simplify explanations.

The tool should include the parameters defined by the contracting authority for the LCC calculations (section A).

To facilitate data input in the tool, request bidders to present the appropriate information through the "Bidder response sheet" of the tool, making sure that, for each item of imaging equipment included in the lot or tender, there is a column for the bidders to input their data.

Bidders have to provide all the required data in order to calculate LCC and be eligible for award of the contract. Making suppliers aware of this as part of preliminary market engagement and in the tender documents is important for a successful tender.

Establish contract clauses

Include reporting requirements and penalties in the tender documents in the event that the contractor does not comply with the tender requirements and the products do not conform to the declared information, to keep contractors accountable for their products and service performance.

Consider including a clause to provide external test reports on energy consumption for the supplied products based on the standard specified in the tender documents, as real-life consumption will differ from standardised test results.

Evaluate offers

With the information provided in the bids, you can evaluate the economic offers based on the life cycle costs calculated with the LCC Tool.

Each bidder will complete the LCC tool with their information in the “Bidder response sheet” and LCC will be calculated automatically.

LCC results are shown per column (i.e. per type of equipment) and in total (i.e. aggregating the results of each column). To be fully transparent, make sure to communicate in the tender documents which figures will be used to evaluate offers.

Once you have the LCC results for each bid, you will need to calculate the cost score for each bid based on the cost award criterion weighting and formula indicated in the tender documents.

By combining this with the other award criteria established in the tender documents, you will be able to select the most economically advantageous tender.

Furthermore, the tool allows you to see the results of each column graphically in the "Graphic results" sheet. You can also use this tab to compare the results of different offers (up to 10). To do so, copy the aggregated results of each offer in a different column of the "Graphic results" sheet of the LCC tool.

Steps to complete and use the LCC Tool

1 **Decide the cost categories to be included in the LCC and the offers' structure**

The tool has been designed to include different cost categories and options. If you do not have the appropriate data for "other costs", exclude them from the calculations.

Based on the type of contract you tender for, show or hide the relevant cost categories both in the "Inputs and Results" as well as in the "Bidder response sheet"; but never add or delete (rows, columns or sheets), to ensure the tool works properly.

Also, define required parameters such as the estimated number of annual prints of each type, what costs will be used to evaluate maintenance costs and what figures to use if you include the environmental externalities in the calculations.

Based on the tender lots structure, define how each offer should be presented, so that bidders know where to input their data and how it will be aggregated if several columns of the tool are used for the same offer.

2 **Complete Section A (green box) of the LCC Tool with your parameters**

The tool will use data provided by the bidder and parameters provided by you, the contracting authority, to calculate life cycle costs. Based on the cost categories decided, fill in section A of the "Inputs and Results" sheet of the tool with your parameters (evaluation period, discount rate, electricity costs, replacement costs, etc.). This will be the basis for the calculations and should be included in the tool provided in the tendering documents, to ensure transparency.

Make sure to protect all sheets of the tool except the "Bidder response sheet", so that bidders cannot tamper with them accidentally, but can still input their data in the appropriate cells and see their results.

3 **Request bidders to complete the "Bidder response sheet" of the tool**

In the tender documents, require bidders to present the appropriate information through the "Bidder response sheet" of the tool and to protect that sheet when sending their offers to ensure that no data manipulation can happen during the evaluation process.

The information in this sheet is linked to the "Input and Results" sheet so it is important to keep the provided structure to ensure the correct calculation of LCC results.

4 **Use the LCC results to evaluate the cost award criterion**

As different formulas and weightings are used by contracting authorities to evaluate costs, the LCC tool does not itself calculate a score for each tender – but provides the cost values to be included in this calculation. Calculate the cost score for each bid based on the LCC results and the cost award criterion weighting and formula indicated in the tender documents.

By combining this with the other award criteria established in the tender documents, you will be able to select the offer with the best overall results.

Tool functions overview

The LCC Tool contains six sheets, but the main one is the “LCC Inputs and Results” where the LCC parameters and information is compiled and results presented.

1. As a public authority, you have to complete section A - green box.

2. Brief explanations and recommendations are provided in pop-up comments to guide you on the information to be provided in each parameter included in the tool. Hover over the cell to read the comment.

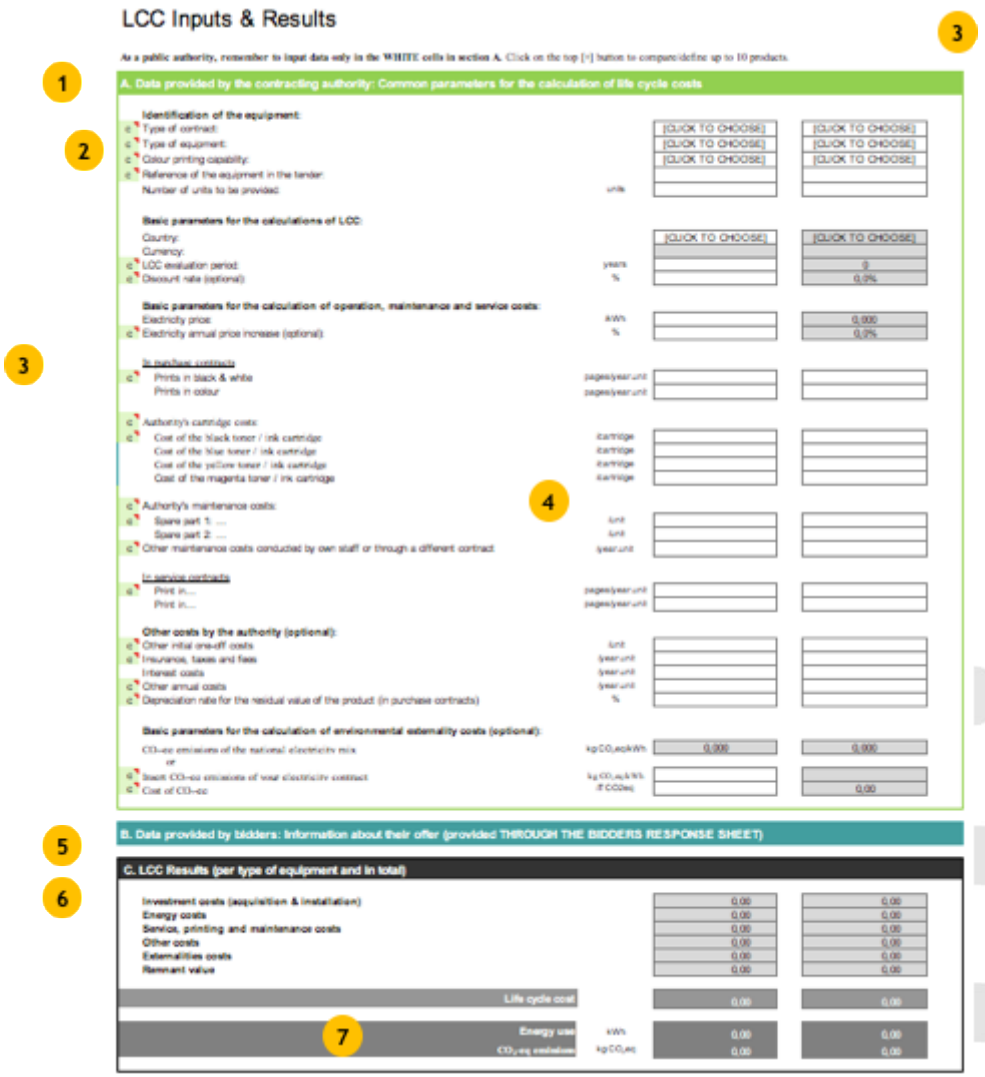
3. Click on the [+/-] sign at the top to show or hide more columns to include the different types of imaging equipment included in your tender, and on the left to hide or show certain cost drivers and parameters.

4. Several cost drivers and parameters are foreseen in the tool which might or might not be relevant for your call for tenders. If irrelevant, hide the corresponding lines to avoid inputting data. Remember to also hide these from the “Bidder response sheet” to ensure coherence. For example, if you purchase the equipment instead of leasing or renting it, or if you decide not to include the environmental externalities.

5. Data provided by bidders through the “Bidder response sheet” are automatically copied and shown in section B - turquoise box.
Click on the [+/-] sign to show or hide them.
Costs and other data to be provided by bidders require appropriate definitions in the tender documents to ensure comparability of offers. Make sure that these are properly included (e.g. the norm for cartridges yield or for the energy consumption of imaging equipment).

6. LCC costs are presented in section C - black box - by cost category; and provided by type of imaging equipment as well as aggregated for all equipment items included in the tool. The formulas used to calculate the final life cycle costs are explained in the “Definitions and Formulas” tab of the LCC tool. The graphic representation of results is provided in the "Graphic results" tab in the form of a bar chart showing the contribution of each cost category to the LCC results.

7. The tool also provides you with the estimated total energy consumption and $CO_{2\text{-eq}}$ emissions of each type of imaging equipment and for all the equipment items included in the tool for the duration of the evaluation period.



III. After the tendering process

Monitor compliance with the tender requirements and performance levels promised by the contractor; apply sanctions if appropriate; identify lessons for future tenders; communicate results to motivate internal acceptance and buy-in and promote replication by other stakeholders.

If LCC was part of the tender

Ensure that your contract explicitly mentions the performance levels included in the bidder response sheet as part of the terms.

Monitor performance during contract management to ensure compliance with claims made by contractors – for example in relation to maintenance frequency and costs, if included in the tender, or regarding the energy performance of equipment by testing them according to the standard defined in the tender specifications – and apply sanctions when non-compliance is found (in line with Article 70 of Directive 2014/24/EU on public procurement).

Test against the energy efficiency standard defined in the tender, not real consumption

When calculating the weekly energy consumption, the Voluntary Agreement test procedure defines a number of printing jobs per day which might be below the real printing jobs defined in the tool (to estimate cartridges costs).

As the standard test follows certain cycles of stand-by, heat-up, printing and back to idle states, it is not possible to apply a simple cross-multiplication to adjust for different usage patterns. The further the real number of jobs per day is from the test ones, the more different real energy consumption will be from declared energy consumption in the test.

That is why, to monitor compliance, you need to test the equipment according to the standard defined in the tender specifications and not based on real consumption data.

Use this stage to record relevant information for future tenders. This will allow you to improve results in future similar calls for tenders.

If LCC was not included in the tender

If LCC was not used during the tendering process but you requested information for all relevant parameters (especially related to operation and service costs), use the LCC Tool to estimate the life cycle costs of the different offers – including the awarded one - and compare between them and to the current situation, if data was identified in the preparatory stage. This will help you develop a baseline of data to inform contract management and future tenders.

Communicate results

Use all this information to communicate results and plan measures for future tenders. This is especially important if you changed the type of solutions acquired as the results can help to motivate acceptance, buy-in and further improvements.

If possible, share your experience (successes, draw-backs and lessons) with other authorities to encourage replication. One way to share your results at the European level is through the European Commission's collection of GPP Good Practices, published regularly in the EC GPP News Alert.

Background and acknowledgments

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As set out in the Communication "Public Procurement for a Better Environment" (2008), the European Commission is encouraging public authorities to green their purchasing decisions. In this context, life cycle costing is considered as a useful tool that could deliver financial savings as well as reductions in the environmental impact of purchases made by public authorities.

The European Commission would like to facilitate the wide use of LCC by providing tools that can help the application of LCC among public authorities in the European Union and commissioned this work.

For its development, the project team has referred to other existing tools, guidelines and data sources, namely:

- Technical specifications of the Life cycle costing (LCC) calculation tool produced by Studio Fieschi & soci Srl and Scuola Superiore Sant'Anna for the European Commission DG-Environment, under service contract N°070201/2014/692192/SER/ENV.F.1 (July 2016).
- Tool and User Guide for Total Cost of Ownership in public procurement–Office IT Equipment produced by FORCE Technology (in cooperation with Operate A/S and Responsible Procurement Excellence) for the Danish Environmental Protection Agency (January, 2015).
- For the CO_2eq emissions of national electricity mix: Thinkstep AG Environmental Footprint datasets –data developed in the framework of the LCI datasets for EU Environmental Footprinting implementation (2014-2021).

Furthermore, the team also thanks the government of Flanders (Belgium), Germany and Slovakia, the three members of the EC GPP Advisory Group, for providing their feedback on the LCC Tool.

DG Environment