

User Guide to the

Life Cycle Costing Tool

for Green Public Procurement of

Vending Machine Services



The LCC Tool for Vending Machine Services

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 vending machine services.

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** (if relevant),
- **Income or cost** for the provision of the service,
- **Operating and maintenance costs** (especially related to energy and water, and where relevant, the cost of products directly covered by the authority),
- **Other costs** (such as insurance), and
- **Costs of environmental externalities**, namely those associated with climate change/CO₂-eq 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](#)). It can also be used by private sector purchasers.

For which products can this tool be used?

This user guide contains information to start using LCC when contracting for **food and/or beverage vending machine services**, that is self-service machines with food (snacks, sandwiches, fruit) and beverages ready to consume or reheat.

Based on the availability of uniform data for determining operation costs, the following type of vending machines are covered:

1. Refrigerated non-transparent fronted can and bottle machines where the products are held in (vertical or horizontal) stacks
2. Refrigerated transparent fronted can and bottle, confectionery and/or snack machines
3. Refrigerated transparent fronted machines entirely for perishable foodstuffs
4. Refrigerated multi-temperature transparent fronted machines
5. Drink machines dispensing hot drinks or dispensing both hot & cold drinks

Other types of machines (such as water fountains, spring water dispensers or other types of cold drinks dispensed in liquid form) are not 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 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 vending products (snacks, coffee, soft drinks, etc.) vary depending on the purpose of the service to be provided, the potential customers or users (such as internal staff, university students, hospital visitors...), use patterns and context elements and infrastructure (e.g. nearby shops or social projects and initiatives).

Prior to tendering, you should evaluate your vending needs - including the assessment of existing services - to better define the specifications for possible solutions.

Avoiding unnecessary or underused machines can help to avoid environmental and economic costs. The placement of machines will affect their usage rates and should be taken into account to determine the correct scope and volume for the contract.

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 a service.

Identify relevant cost drivers and parameters

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

Should we evaluate the selling price of products?

The tool has been designed to be used in contracts for the acquisition of vending machines and supplies, for vending machine services and in concessions.

It includes all costs incurred by the authority as well as the CO₂-eq externalities associated with the machines' energy consumption.

Under Article 68.1 of Directive 2014/24/EU, it is possible to include costs incurred by users (other than the contracting authority itself) in LCC calculations. End user prices have not been included in the tool due to the additional complexity this would introduce depending on the contract model. But if public authorities pay fully or partially for the products distributed through the machines, these costs can be included in the LCC tool.

However, at the preliminary stage it is essential to consider product prices for users and to address them in the tender documents either by specifying maximum prices for different product categories or by evaluating prices elsewhere in the contract award criteria. This will help to ensure that machines are well used, avoiding unnecessary economic and environmental costs.

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 revised [Food and Catering 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, electricity cost, etc.).

Consult with relevant parties

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

Internal departments can help identify and prioritise cost drivers and define the parameters for the LCC calculations (i.e. appropriate discount rate, electricity cost and CO₂-eq emissions from your energy contract if you include externalities, etc.) as well as sustainability issues to take into consideration.

Users will be able to identify needs and concerns in changing systems, for example in relation to taste preferences, healthy choices, sustainability (e.g. ingredients, packaging), price brackets, payment methods, non-provision of single use cups, etc.

A market consultation with service providers and manufacturers will be helpful in identifying the type of machines, products and solutions on the market, determining how to best meet your needs, and especially the type of information and standards available for the different cost drivers and parameters you want to consider in your decision making and procurement. It is also a good opportunity to discuss environmental aspects of the contract, including product types, packaging, energy and water use.

Consulting with service providers in advance also helps to ensure their acceptance of the use of LCC in the call for tenders. In addition, informing providers that you will be taking account of the energy and water consumption of machines may motivate them to invest in more efficient machines.

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 CO₂-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 type of 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 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 on 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 energy efficiency requirements and other environmental criteria (for example, sustainability and health criteria for products or global warming potential of refrigerant gases) should be defined to ensure that the acquired solutions are environmentally preferable from the start.

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 machine 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.

EU GPP Criteria for vending

Use the revised EU GPP Criteria for food and catering services, which include vending machines, to identify relevant environmental criteria - and industry standards - for this product group:
http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Can we consider other economic award criteria?

In some vending machine contracts, often concessions, contracting authorities may have to consider two economic elements to award the contract: the income offered by bidders to the contracting authority (for allowing them to install vending machines in their premises) and the proposed list of prices for the products sold in the machines.

The EU LCC Tool includes the first element and therefore it can be used to evaluate overall costs or income of the service to the authority, taking into consideration the operation costs of the machines as well as the revenue proposed by bidders.

The second element (sale prices of distributed products) is not included in the EU LCC Tool as they are costs incurred by the users and not the authority, however they can still be considered as an award criterion under the terms set out in Article 67 of Directive 2014/24/EU. Be aware when including more than one economic criterion that you will need to combine them in a way which fairly reflects the overall cost of tenders.

Can we define other award criteria linked to energy consumption?

As vending machines are energy-consuming products, operation costs due to the energy consumption of the machines 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 costs 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 based on recognised standards (such as EN 50597 for refrigerated machines or EVA-EMP 3.1.b for hot and hot and cold machines) included in the EU GPP criteria. It is also possible to combine LCC with award criteria based on other environmental aspects (such as global warming potential of refrigerated machines or percentage of organic products offered).

Should we consider CO₂ 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 CO₂-eq emissions based on energy consumption. You can choose whether to include the cost of CO₂-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 CO₂-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 CO₂-eq.

If you apply a separate award criterion based on CO₂-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.

II. How to use LCC during the tendering process

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
<ul style="list-style-type: none">• Service costs or income• Operation costs (Energy and water consumption)• Fees, taxes and other costs• Externalities (CO₂-eq emissions linked to energy consumption)	<ul style="list-style-type: none">• Service requirements• Technical specifications of machines (size, coffee from full grains, possibility to use reusable instead of disposable cups, smart machines with restocking alerts...)• Minimum energy efficiency (lower energy consumption is evaluated as part of the LCC operation costs linked to energy consumption)• Other sustainability criteria (e.g. organic and fair and ethical trade products...)

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.

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 machines and supplied 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 machines 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 machine) 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 contracting options (from purchase of machines to concessions).

Based on the contract model you tender for, show or hide (don't add or delete) the cost elements that are relevant for the model. For example, hide the acquisition and installation costs if you don't purchase the machines but rather are contracting a service.

Hide also those cost categories, such as "other costs", for which you do not have the appropriate data, to exclude them from the calculations; and make the changes both in the "Inputs & Results" sheet as well as in the "Bidders response sheet" so that bidders know which data to provide and where. But never add or delete (rows, columns or sheets), to ensure the tool works properly.

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 (e.g. evaluation period, discount rate, electricity costs). 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 vending machines 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 machines instead of contracting them as a service or concession, 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. regarding the energy consumption of the machines).
- 6 LCC costs are presented in section C - **black box** - by cost category; and provided by type of machine as well as aggregated for all machines 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-eq} emissions of each type of machine and for all the machines included in the tool for the duration of the evaluation period.

LCC Inputs & Results

As a public authority, remember to input data only in the WHITE cells in section A. Click on the top [+/-] buttons to collapse up to 10 products.

A. Data provided by the contracting authority: Common parameters for the calculation of life cycle costs

1 Identification of the vending machines:

2 a) Reference of the machine type in the tender: [CLICK TO CHOOSE] [CLICK TO CHOOSE]

b) Type of vending machine: [CLICK TO CHOOSE] [CLICK TO CHOOSE]

c) Number of machines to be provided (if defined by the contracting authority): units [CLICK TO CHOOSE] [CLICK TO CHOOSE]

Basic parameters for the calculations of LCC:

Country: [CLICK TO CHOOSE] [CLICK TO CHOOSE]

3 LCC evaluation period: years [CLICK TO CHOOSE] [CLICK TO CHOOSE]

4 Discount rate (optional): % 0 0.0%

Basic parameters for the calculation of operation costs:

Electricity price: kWh 0.000

5 Electricity annual price increase (optional): % 0.0%

6 Water price (optional): liter 0.000

Water annual price increase (optional): % 0.0%

7 **Estimated consumption of:**

Product 1: unit/year machine

Product 2: unit/year machine

Product 3: unit/year machine

Product 4: unit/year machine

Product 5: unit/year machine

Product 6: unit/year machine

Product 7: unit/year machine

Product 8: unit/year machine

Product 9: unit/year machine

Product 10: unit/year machine

8 **Estimated litres of drinks dispensed into cups:** liter/year machine

Basic parameters for the calculation of maintenance/service costs in purchase contracts:

9 Maintenance/service costs conducted by own staff or through a different contract: liter/year machine

Other costs by the authority (optional):

10 Other initial one-off costs: unit

Insurance, taxes and fees: liter/unit

11 Other annual costs: liter/unit

12 Depreciation rate for the residual value of the product (in purchase contracts): % liter/unit

Basic parameters for the calculation of environmental externality costs (optional):

13 CO_{2-eq} emissions of the national electricity mix: kg CO_{2-eq}/kWh 0.000 0.000

or

14 Insert CO_{2-eq} emissions of your electricity contract: kg CO_{2-eq}/kWh

15 Cost of CO_{2-eq}: €/CO_{2-eq} 0.00

B. Data provided by bidders: Information about their offer (provided THROUGH THE BIDDERS RESPONSE SHEET)

C. LCC Results (per type of vending machine and in total)

Investment costs (acquisition & installation)	0.00	0.00
Operation costs (energy, water and products if relevant)	0.00	0.00
Service/maintenance costs	0.00	0.00
Other costs	0.00	0.00
Externalities costs	0.00	0.00
Service income	0.00	0.00
Remnant value	0.00	0.00
Life cycle cost	0.00	0.00
Energy use	kWh	0.00
CO_{2-eq} emissions	kg CO_{2-eq}	0.00

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 the energy performance of the machines 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](#)).

Use this stage to record relevant information for the next tender (e.g. if there was enough competition, if bidders provided all relevant information in the appropriate way, etc.). 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 and 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](#).



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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 - Self-service machines produced by FORCE Technology (in cooperation with Operate A/S and Responsible Procurement Excellence) for the Danish Environmental Protection Agency (January 2015).
- [LCC Tool](#) for procurement of coffee and other vending machines developed by the Swedish National Agency for Public Procurement (November 2016).
- For the CO₂eq 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) and Slovakia, both members of the EC GPP Advisory Group, for providing their feedback on the LCC Tool.

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