



Ministry of Environment , Climate  
Change and Technology

# USER GUIDE FOR COMPUTERS

Life Cycle Costing Assessment (LCCA)



Version 1.0

Promoting Energy Efficient Buildings through  
Strengthening Low Carbon Energy  
Island Strategies (LCEI) Project





**Ministry of Environment,  
Climate Change and Technology**

Strengthening Low Carbon Energy Island  
Strategies (LCEI) Project



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# Abbreviations

<b>ACPI</b>	Advanced Configuration and Power Interface
<b>CO<sub>2</sub> -eq</b>	Carbon Di-oxide equivalent
<b>DISCOM</b>	Electricity Distribution Company
<b>EE</b>	Energy Efficiency
<b>ETEC</b>	Annual Total Energy Consumption
<b>kWh</b>	Kilo watt hour
<b>LCC</b>	Life cycle cost
<b>LCCA</b>	Life cycle cost assessment

# 1. Introduction

This guide has been developed for the implementation of life cycle costing-based procurement as per the notification from the Ministry of Finance under the clause 10.77 of the 3<sup>rd</sup> Amendment (2020/R-51) to PFR 2017/R-20. The notification directs all the public procurers to undertake life cycle costing assessment to determine least lifecycle cost option during procurement of the prioritised appliances and equipment as per the procedure mentioned therein.

This user guide is developed for the procurement of computers including:

1. Desktop computers: Integrated Desktop Computers and Thin Clients;
2. Portable computers: Notebooks, Two-In-One Notebook, Portable Thin Client, Portable All-In-One Computer and Tablets; and
3. Computer monitors.

The tool guide for Computers facilitate the user on the following aspects:

1. Introduction to LCCA;
2. Objective, applicability and when to use the tool;
3. Preparation of the bid documents including the list of parameters and evaluation criteria to be included in the bid;
4. Definitions and formula for the bid evaluation;
5. Software requirement and compatibility to use the LCCA tool; and
6. Steps to use the LCCA Tool.

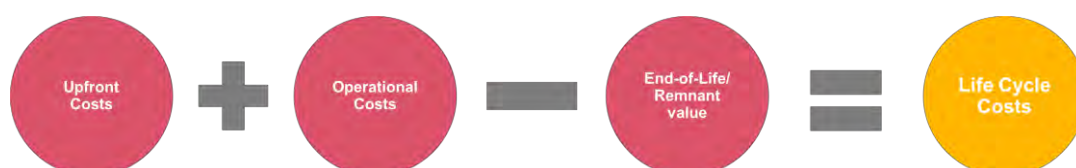
## 1.1. Life cycle cost assessment (LCCA)

***The lowest upfront cost (acquisition & installation) bid may not be the most economical bid over the life cycle of an equipment or appliance***

Life cycle costing-based procurement considers upfront costs (acquisition & installation), operational costs and end-of-life/remnant costs over the lifetime of a product with the objective to holistically assess the total cost of ownership of the product throughout its usable life.

Life-cycle cost assessment (LCCA) provides organisations the ability to determine their procurement expenses by holistically incorporating all lifecycle cost factors. LCCA enables organisations to determine the most cost-effective option among different competing alternatives to purchase, own, operate, maintain, and finally, dispose of a product.

*Figure 1: An overview of LCCA cost interactions*



The LCCA becomes critical in the scenario of energy efficiency, wherein organisations focus on procuring the highest efficiency products. Such products can often have higher upfront costs (acquisition & installation) which in turn can increase economic stress on the organisations' financial budget with moderate energy savings in the long run. The LCCA methodology analyses all the relevant costs including the upfront costs (acquisition + installations), operation costs (energy, service and maintenance costs) and end-of-life/remnant costs, to present the best economic procurement option with adequate emphasis on energy efficiency. In summary, the LCCA can help organisations move towards achieving a balance between economic and energy efficient options.

### 1.1.1. Upfront Cost (Acquisition and Installation)

Upfront costs include acquisition and installation costs related to a product. Cost for the acquisition of the product includes the price at which the product is bought incorporating all commissioning, freight, transport and taxes. Installation costs include other one-time costs such as the labour or technician costs to install the product.

### 1.1.2. Operational Costs

The operating cost is often the most critical cost component of the LCCA. The operational costs include costs towards operating the equipment, largely electricity costs in case of electrical equipment and Service/maintenance costs during the operational/useful life of a product. The electricity costs are the costs of electricity supply, all taxes and fees included (MVR/kWh) and serves to calculate operational costs linked to the energy consumption of the product. The operational costs also include Service/maintenance costs, which covers labour costs and the cost of any spare parts or replacements required during the operational/useful life of a product.

### 1.1.3. End-of-Life Costs

End-of life costs or remnant value is the depreciated value of the product at the end of its useful life. This value reduces the total life cycle cost as it assumes that the product could be sold at the end of the evaluation period. In case of some equipment (especially electronic equipment) and under certain regulations requiring regulated disposal of equipment, the end-of-life cost may increase the total life cycle cost.

## 1.2. What is the objective of the tool?

### ***Enable an economical and energy efficient procurement***

The objective of this tool is to assist the procurement officers and bid evaluators involved in public procurement activities in the Maldives, to determine the least cost products based on energy efficiency-based life cycle costing. The tool enables a balance between cost economics and energy efficiency, providing subsequent energy and cost savings for the organisations in the long run.

## 1.3. Who is this tool intended for?

The tool has been designed for the procurement officers and bid evaluators associated with the public sector organisations in the Maldives. The tool is designed with a user centric approach to promote anyone with basic spreadsheet experience of Microsoft Excel™ to be able to use it. The tool provides enough information as notes and definitions of various parameters for the user understanding and

ease of access. Further, there are no calculations at the user end barring basic data entry parameters. These data entry parameters will be included in the procurement documents and can be easily entered in the model with the reference of the bidder responses/proposals.

## 1.4. When to use the tool?

This tool can be used for the products following procurement methodology as per the LCCA. The tool can be used at different stages during the procurement process, as listed below:

### 1.4.1. Before bidding/Bid preparation

Before tendering and during bid preparation the tool can help the procuring entity in market assessment activity for various product options. The procuring entity through the tool can assess any preliminary product proposals for identifying different cost elements and define general performance requirements for the new products to be procured.

### 1.4.2. During bidding/Bid evaluation

During bidding and evaluation, the tool can be used to compare the offers received from bidders. The evaluator can compare the life cycle cost (LCC), energy utilisation and the estimated carbon footprint (CO<sub>2</sub> emissions) of different offers, during the evaluation phase.

### 1.4.3. After bidding/After bid award and finalisation

After the bidding process the procuring entity can use the tool to verify and evaluate the performance of the awarded solution. Comparative analysis can be conducted of the operations of the previous procurements to the current procurement. Further, post bidding the tool could be used to monitor the results and help set benchmarks for the future bids.

# 2. Preparation of the bid document

This user guide is developed for the procurement of computers:

1. Desktop computers: Integrated Desktop Computers and Thin Clients;
2. Portable computers: Notebooks, Two-In-One Notebook, Portable Thin Client, Portable All-In-One Computer and Tablets; and
3. Computer monitors.

In the bid document, under the “Statement of Requirement”, the procuring entity will provide specifications for type of computers, utilisation profiles and other parameters as listed in this section. The bid document will mention that the criteria for evaluation of the bids would be based on Life cycle cost assessment (LCCA).

## 2.1. Parameters to be provided in the bid document by procuring entity

The Table 1 lists the general LCCA parameters which will be provided by the procuring entity in the bid documents. These parameters have been fixed in the tool by default but can be changed by the procuring entity as per the process requirements.

*Table 1: Parameters to be provided by procuring entity in the bid document*

<b>Parameters fixed by Procuring entity for life cycle costing assessment</b>				
<b>Sr. No.</b>	<b>Parameter</b>	<b>Definition</b>	<b>Source of Data</b>	<b>Fixed value</b>
1.	Life of the Equipment	Number of years over which to calculate and compare life cycle costs of different solutions.	Procuring entity	10 <sup>[1]</sup>
2.	Discount rate	The discount rate is used to calculate the present value of future costs.	Procuring entity	10% <sup>[1]</sup>
3.	Electricity annual price increase (optional)	Average price increase of electricity in the Maldives. It should include all non-recoverable taxes and fees and be adjusted to eliminate the effect of inflation.	Procuring entity/ Electricity utility	2% <sup>[1]</sup>
4.	Salvage value Percentage	Remaining value of the Computer at the end of life.	Procuring entity	5% <sup>[1]</sup>

<sup>1</sup> The value is considered as a conservative assumption for the particular LCCA based procurement.



<b>Parameters fixed by Procuring entity for life cycle costing assessment</b>				
<b>Sr. No.</b>	<b>Parameter</b>	<b>Definition</b>	<b>Source of Data</b>	<b>Fixed value</b>
5.	Operational office days per year	Total number of working days for the office.	Procuring entity	250 <sup>[1]</sup>
6.	Daily office hours	Total number of working hours for the office.	Procuring entity	8 <sup>[1]</sup>
7.	Assumed idle utilisation time of the computers in a day (%)	The state in which the operating system and other software have completed loading, a user profile has been created, the machine is not asleep, and activity is limited to those basic applications that the system starts by default.	Procuring entity	30% <sup>[1]</sup>
8.	Assumed sleep mode of the computer in a day (%)	A low power state that the computer is capable of entering automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly “wake” in response to network connections or user interface devices with a latency of 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.	Procuring entity	10% <sup>[1]</sup>
9.	Assumed off mode of the computer in a day (%)	The power consumption level in the lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer’s instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.	Procuring entity	60% <sup>[1]</sup>
10.	Assumed on mode of the computer monitor in a day (%)	Duration during which the monitor screen is on and consuming power.	Procuring entity	65% <sup>[1]</sup>

Parameters fixed by Procuring entity for life cycle costing assessment				
Sr. No.	Parameter	Definition	Source of Data	Fixed value
11.	Assumed off mode of the computer monitor in a day (%)	Duration during which the monitor screen is off and is not consuming any power or is in a low power state.	Procuring entity	35% <sup>[1]</sup>
12.	CO <sub>2</sub> -eq emissions of the national electricity mix	Grid emission factor.	Procuring entity	0.72 <sup>[2]</sup>

The Table 2 lists the bid specific parameters to be provided in the bid documents.

*Table 2: Bid specific parameters to be provided by the procuring entity*

Bid Specific Parameters to be provided by the Procuring Entity				
Sr. No.	Parameter	Definition	Source of Data	
1.	Number of Computers to be provided	Number of Computers to be procured as defined in the tender documents.	Procuring entity should provide this value in the bid documents as per the requirement.	
2.	Type of Computer	The type of computer to be procured as defined in the tender documents.	Procuring entity should provide this value in the bid documents as per the requirement.	
3.	Service/maintenance costs	Cost or fee for the services required in the tender documents during the contract period related to the use of computers and monitors (warranty, software and hardware maintenance, repairs, upgrades, etc.).	Procuring entity should provide this value based on previous service experience or existing service contracts. Please note that this value should be kept constant for all the bids that are to be evaluated under a procurement and should be provided in the bid documents.	
4.	Electricity price	Cost of electricity supply, all taxes and fees included	The procuring entity should use the highest electricity consumption band	

<sup>2</sup> UNFCCC:

[https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/29357641\\_Maldives-BUR1-1-First%20BUR%20of%20Maldives.pdf](https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/29357641_Maldives-BUR1-1-First%20BUR%20of%20Maldives.pdf)

<b>Bid Specific Parameters to be provided by the Procuring Entity</b>			
<b>Sr. No.</b>	<b>Parameter</b>	<b>Definition</b>	<b>Source of Data</b>
		(MVR/kWh). It serves to calculate operation costs linked to the energy consumption of the Computers.	for Government/Institutions set by the Utility Regulatory Authority (URA). If the procuring entity is based in the Greater Male' Region, then the applicable tariff will be from the Greater Male' Region and if the procuring entity is based in the outer islands, then the tariff applicable for that particular region should be used. For example: If the procuring entity is based in the Greater Male' Region, then the electricity tariff of the highest defined electricity consumption band (electricity consumption >600 kWh) under the 'Government & Institutes' consumer category will be applicable and currently it is MVR 4.35/kWh.

## 2.2. Bidder input parameters

The following set of parameters will be requested from the bidders in the bid document for the evaluation of bids. Please note the following parameters will be entered into the tool by the procuring entity with the data provided in the bidder's proposal:

*Table 3: Parameters to be provided by the bidder and entered by the Procuring entity*

<b>Parameters to be provided by the bidder and entered by the Procuring entity</b>			
<b>Sr. No.</b>	<b>Parameter</b>	<b>Definition</b>	<b>Source of Data</b>
1.	Bidder's Name	Name of the bidding entity.	Bidder
2.	Manufacturer details	Name of the Computer manufacturer.	Bidder
3.	Computer Name and Model Number	Name and model of the Computer based on the bid.	Bidder
4.	Acquisition costs	Cost per unit for the acquisition of the Computer by the procuring entity based on all requirements set in the bid documents.	Bidder

Parameters to be provided by the bidder and entered by the Procuring entity			
Sr. No.	Parameter	Definition	Source of Data
5.	Installation costs	Cost per unit for the delivery, installation and any other cost at the start of the contract based on all requirements set in the bid documents. Leave blank if they are included as part of the acquisition cost.	Bidder
6.	Electricity Consumption in idle, sleep and off state	Electricity consumption under various states of computer operations such as idle, sleep and off state.	Energy consumption under the defined categories will be submitted by the bidders in reference with the relevant IEC/ISO standard. or As specified by the tender documents.

### 2.3. Documents to be submitted by Bidder

The following documents shall be requested to be submitted by the bidder for verification of information provided for LCCA.

1. Declaration of conformance as provided in section 7.
2. Product catalogue including product model number.
3. Signed and sealed 'Bidder technical details submission form' refer section 6.4.

### 2.4. Evaluation criteria

The following criteria shall be included in the bid document by the Procuring Entity. The bid evaluation criteria will be based on the least cost bid/offer identified by the life cycle costing formula, as provided below:

$$\text{Life cycle costs} = \text{Upfront cost} + (\text{Electricity costs})_{NPV} + (\text{Service/Maintenance Costs})_{NPV} - (\text{Remnant value})_{NPV}$$

Where,

- *Upfront Costs = (Acquisition costs + Installation costs) X Number of Computers*
- *(Electricity Costs)<sub>NPV</sub> = Annual electricity consumption of per unit of Computer X Electricity Price X Electricity Present Value Factor X Number of Computers*

- *(Service/Maintenance Costs)<sub>NPV</sub> = Annual Maintenance Costs X General Present Value Factor X Number of Computers*
- *(Remnant value)<sub>NPV</sub> = Acquisition costs X Salvage Value Percentage X Present Value Factor (for the duration of the Life of the Equipment) X Number of Computers*
- *NPV refers to Net Present Value, calculated by the following formula:*
  - *Net Present Value Factor = 1 / (1+Discount rate) ^ (Life of the Equipment)*

**Sample format to be used in the bid document is provided in section 6.**

# 3. Bid Evaluation Parameters

The Procuring Entity should consider the following definitions and formula for the bid evaluation.

## 3.1. Data provided by the Bidder

The following set of metrics are provided by the bidder as a part of their response to the bid.

### Metrics for the economic offer for the bid

The following metrics cover the economic costs of the product as defined in the bid and quoted by the bidders:

#### A. Acquisition cost of the Equipment

Cost for the acquisition based on all requirements set in the bid documents. This cost will include all commissioning, freight, transport and taxes.

#### B. Installation cost - including delivery and any other one-off costs

Installation costs include other one-time costs such as the labour or technician costs to install the product.

### Metrics for the Electricity consumption of the Computer

The following metrics govern the parameters for electricity consumption:

#### A. Off Mode

The power consumption level in the lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.

#### B. Sleep Mode

A low power state that the computer is capable of entering automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly "wake" in response to network connections or user interface devices with a latency of 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.

### C. Idle Mode

The state in which the operating system and other software have completed loading, a user profile has been created, the machine is not asleep, and activity is limited to those basic applications that the system starts by default.

## 3.2. Data provided by the Procuring entity

### Identification of the Equipment

#### A. Reference of the machine type in the bid

Short identifier of the equipment that will be considered in each column of the tool based on the types included in the tender documents or lot to be evaluated with the tool.

#### B. Type of Computers

Dropdown menu to select the type of the Computer that will be evaluated in the tool in each column. For e.g., if the quotations have been invited for Desktop computer then in the tool please select Desktop computer from the dropdown list.

#### C. Number of Computer to be provided

Number of Computer to be delivered/installed by bidders as defined in the bid documents.

### Basic parameters for the calculations of LCCA

#### A. Life of the Equipment

Number of years over which to calculate the life cycle costs. It should be equivalent to the average lifetime of the equipment in your organisation.

#### B. Discount rate

Coefficient used to transform future cost into present value. This is called discounting and consists of applying a selected discount rate such that each future cost occurred during the evaluation period is adjusted and expressed in relation to the present time. The following present value factors are evaluated based on discount rate:

$$\text{Electricity Present value Factor} = 1 / (\text{discount rate} - \text{electricity price increase}) \times [1 - ((1 + \text{electricity price increase}) / (1 + \text{Discount rate})) ^ (\text{Life of the Equipment})]$$

$$\text{General Present value Factor} = 1 / \text{discount rate} \times [1 - (1 / (1 + \text{Discount rate})) ^ (\text{Life of the Equipment})]$$

### C. Service/Maintenance costs

Average Service/maintenance costs per equipment. These should include both labour costs and cost of any equipment and parts required during the life of the equipment.

### D. Salvage rate

Rate at which the equipment reduces their value due to normal usage and market developments.

## Basic parameters for the calculation of operation costs

### A. Electricity price

Cost of electricity supply, all taxes and fees included (MVR/kWh). It serves to calculate operation costs linked to the electricity consumption of the equipment. The per unit electricity costs/tariffs can be obtained from the Electricity utility/Distribution Company (DISCOM).

### B. Electricity annual price increase

Average price increase of electricity in the region of procuring entity.

## 3.3. Tool Result metrics

The following metrics depict the results of the bid evaluation:

### Standalone metrics

#### A. Upfront costs (acquisition & installation)

Acquisition and installation costs of each type of Computer assumed to occur at the beginning of the contract.

$$\text{Upfront Costs} = (\text{Acquisition costs} + \text{Installation costs}) \times \text{Number of Computers}$$

#### B. Electricity Costs

Cumulative annual cost due to the electricity use of each type of Computer during the evaluation period expressed in net present value.

$$\text{Electricity Costs} = \text{Annual electricity consumption of per unit Computer} \times \text{Electricity Price} \times \text{Electricity Present Value Factor} \times \text{Number of Computers}$$

#### C. Service/maintenance costs



Cumulative annual service and/or maintenance costs for each type of Computer during the evaluation period expressed in net present value.

$$\text{Service/Maintenance Costs} = \frac{\text{Annual Maintenance Costs} \times \text{General Present Value Factor}}{\text{Number of Computers}}$$

#### D. Remnant value

Value of the Computer in terms of percentage of depreciation of its initial value at the end of the evaluation period. This value is negative and reduces the total life cycle cost as it assumes that Computers could be sold at the end of the evaluation period.

$$\text{Remnant value} = \text{Acquisition costs} \times \text{Salvage Value Percentage} \times \text{Present Value Factor (for the duration of the Life of the Equipment)} \times \text{Number of Computers}$$

$$\text{Present value Factor} = 1 / (1 + \text{Discount rate})^{\text{Life of the Equipment}}$$

#### E. Electricity use

Electricity use of each type of Computer during the evaluation period (kWh) calculated based on the annual Electricity consumption.

$$\text{Electricity use during product life} = \text{Annual Electricity Consumption} \times \text{Life of the Equipment} \times \text{Number of Computers}$$

#### F. CO<sub>2</sub>-eq emissions

CO<sub>2</sub> Emissions associated with the operations or usage of the Computers.

$$\text{CO}_2\text{eq emissions} = \text{CO}_2\text{eq emissions of the national electricity mix} \times \text{Electricity use}$$

#### G. Life cycle cost

Total costs of each type of Computer during the evaluation period. Electricity, Service/Maintenance and Remnant Costs are calculated in net present value.

$$\text{Life cycle costs} = \text{Upfront Costs} + (\text{Electricity costs})_{NPV} + (\text{Service/Maintenance Costs})_{NPV} - (\text{Remnant value})_{NPV}$$

Comparative metrics depicting best option

**A. Reference Annual Electricity Saving in comparison to least Acquisition cost Computer**

Highlights Electricity savings compared to the computers with the lowest acquisition costs.

$$\text{Reference Annual Electricity Saving} = \text{Electricity consumption of least acquisition cost product} \\ - \text{Electricity consumption of least LCC product}$$

**B. Reference Annual Electricity Saving costs in comparison to least Acquisition cost Computer**

Highlights Electricity savings costs compared to the computers with the lowest acquisition costs.

$$\text{Reference Annual Electricity Saving Costs} = \text{Electricity consumption costs of least acquisition} \\ \text{cost product} - \text{Electricity consumption costs of least LCC product}$$

**C. Reference Carbon Emissions reduced in comparison to least Acquisition cost Computer**

Highlights carbon emission reductions compared to the computer with the lowest acquisition costs.

$$\text{Reference carbon emission reductions} = \text{Carbon emission reductions of least acquisition cost} \\ \text{product} - \text{carbon emission reductions of least LCC product}$$

# 4. LCCA Evaluation Tool

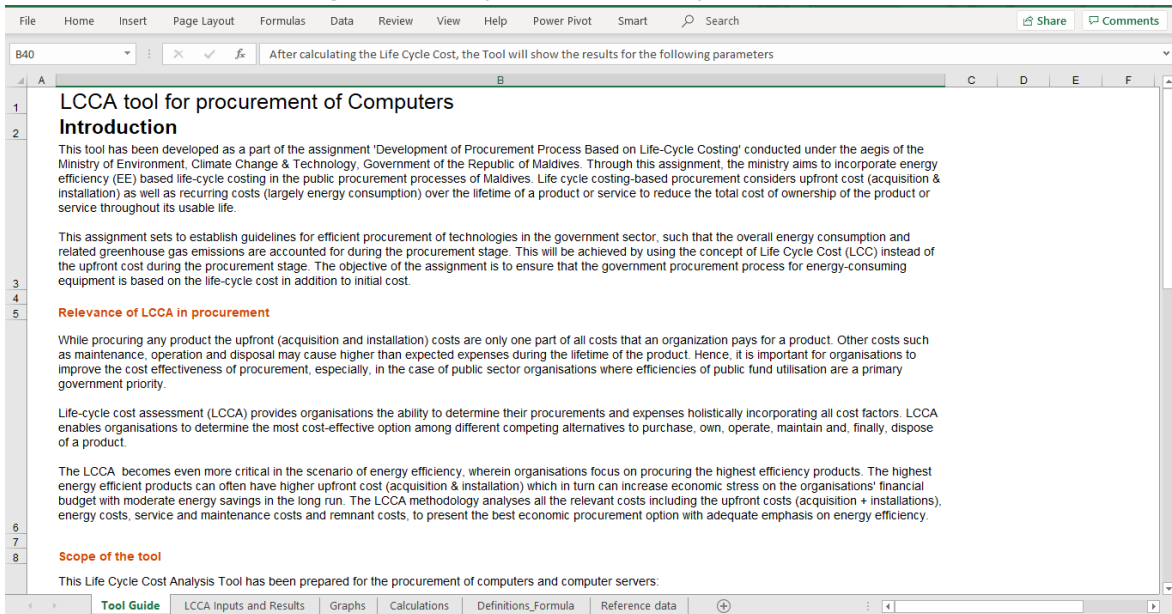
The following sections highlight points on the usage of the LCCA evaluation tool.

## 4.1. Software requirement and compatibility

The tool is originally developed on Microsoft Excel™ - a spreadsheet-based tool. Please use the following steps to access the tool:

1. Ensure that the Microsoft Excel™ is available on your computer system.
2. Download the tool files (e.g., Computers\_Tool.xlsx) from the authorised source.
3. Save a copy of the tool files to the desired location on your computer.
4. Navigate to the saved location and double click to open the tool. The following window should appear -

Figure 2: A snapshot of the tool upon installation



## 4.2. Structure of the tool

The tool contains six tabs or sub-sheets:

1. **Tool Guide** briefly outlines the guidelines to operate the tool. The tool guide covers the introduction to the assignment, relevance of LCCA in procurement, scope of the tool, structure of the tool and how to use the tool.
2. **LCCA inputs & results**, where the LCCA parameters and information are compiled and results are presented. The LCCA results are presented for each product offered. The

procurement agency will only interact with this sheet for any data inputs. There is provision to add up to 15 different products for LCCA.

3. **Calculations**, this sheet shows the calculations needed to transform all present and future costs to net present value. Separate calculations have been made for the Electricity costs, Service/Maintenance Costs and Remnant Value.
4. **Graphs**, this sheet provides a graphical representation of the LCCA results in the form of bar charts. One analysis in this sheet shows the contribution of each cost category to the total LCC of each type of product included in the tool. Another analysis shows a comparison between the least LCC product and least upfront cost (Acquisition + Installation) product, analysing both the products in terms of costs, electricity use and CO<sub>2</sub> -eq. emissions.
5. **Definitions & formulas**, this sheet provides definitions for each parameter and formula used in the tool. Procurement authorities will have to make sure to specify in the bid documents the standards and data format to ensure consistency between offers (especially in relation to energy use for the calculation of operation costs).
6. **Reference data**, blank sheet to store any temporary data.

**NOTE:** The tool needs to keep its precise structure for the formulas and calculations to work. Therefore, it is important to ensure that:

- i. Do not edit the worksheet structure.
- ii. Do not edit formula/delete cells/ rows/ columns. If you do not require data in certain fields, you can hide the unnecessary rows/columns. You can do it by using the [+/-] signs on the left and top margins or in the Format menu.
- iii. Do not add cells/ rows/ columns.
- iv. Input data only in the intended fields.

# 5. Steps to complete and use the LCCA Tool

Organizations using this tool for the procurement should follow the instructions given below while preparing their bid documents.

## 5.1. How to use the tool

1. The procuring entity must only interact with the "LCCA Inputs and Results" sheet for all the data inputs.
2. The Procuring entity, must only fill the **white cells** in **section A** and **Section B** of the "LCCA Inputs and Results" tab. The **Dark Grey** cells are calculated automatically based on information from other cells and tabs.
3. All the data entry is to be done by the Procuring entity. The data for **section A** will be provided by the bidder and should be asked in the bid documents. The **section B** data is to be determined by the Procuring entity.

Figure 3: Representation of the LCCA Inputs and Results Sheet

The screenshot displays the 'LCCA Inputs & Results' spreadsheet. It is organized into several sections:

- General Details:** Fields for Bidder's Name, Manufacturer, and Computer Name and Model Number.
- Economic offer for the contract broken down by:** A table with columns for Acquisition cost, Installation cost, and Electricity Parameters of the equipment (Energy consumption, Sleep, Idle).
- Electricity Parameters of the equipment:** A table with columns for Energy consumption of the computer (On, Sleep, Idle) and Energy consumption of the monitor (Power in off mode, Power in on mode).
- Equipment description:** A table with columns for Notebook computers (AA, BB, CC, DD, EE) and rows for Type of equipment, Reference of the equipment type in tender, and Number of equipment to be provided.
- Basic parameters for the calculations of LCC:** A table with columns for Life of the Equipment, Discount rate, Salvage value Percentage, Depreciation rate for the residual value of the product, and Maintenance/service costs.
- Basic parameters for the calculation of Operational costs:** A table with columns for Electricity price and Electricity annual price increase (optional).
- Time use profile for computers:** Fields for Operational office days per year and Daily office hours.

4. The cells have different colour codes for every interaction:

Colour Coding	Description
	The white cells are the input cells for data entry. Please enter relevant values in these cells. Comments are given on the left column in the sheets for guidance.
	The dark grey cells are automatically filled/calculated with data from previously filled cells or are formula based. Please do not edit/alter these cells.
	The light grey cells can be altered by the procuring entity but remain constant for a particular procurement. Certain standard values have been locked in these cells.
	The comment cells on the left column against input fields provide comments and notes for clarity. The procuring entity can refer the text in these cells to know more about the input parameter or result.

5. In the 'comment cell' next to input fields, explanations are provided for the inputs. Detailed information is provided in the "Definitions & Formulas" tab defining the formula and definitions.
6. The section 'C' and Section 'D' of the LCCA Inputs and results sheet, provide results and best procurement option respectively. The details on the output section are given in section 5.2. The following result parameters are available:
  - i. Life Cycle Cost (LCC) of the product
  - ii. Electricity consumption in kWh
  - iii. Cost of electricity consumption in MVR
  - iv. The best option on the basis of least LCC
  - v. CO<sub>2</sub>-eq emissions during the product life
  - vi. Electricity Saving (kWh): Least upfront cost product vs Least LCC product
  - vii. Electricity Saving costs (MVR): Least upfront cost product vs Least LCC product
  - viii. Carbon Emissions reduced: Least upfront cost product vs Least LCC product
7. The 'Graph' sheet represents the results and comparative analysis in a bar graph format. The following analysis are covered:

- i. LCCA Results: Covers the representation of consolidated products in terms of costs, energy consumed and carbon emissions.
- ii. Least LCC product vs Least upfront cost (acquisition + installation) product: Presents a comparative analysis of the Lowest LCCA Bid and Lowest Upfront cost bid in terms of costs, energy consumption and carbon emissions.

## 5.2. Results structure of the tool

The results are presented in the 'LCCA Inputs and Results' sheet with deep dive analysis on product cost trends in 'Graphs' sheet.

### 5.2.1. LCCA Inputs and Results

The section 'c' of the sheet summarises all the cost factors such as upfront costs, electricity costs, service costs and remnant costs post calculations during the evaluation period in present net value. The section presents LCCA costs of the procurement with respect to product/bidder with the lowest cost highlighted in **Yellow**. The section also highlights Electricity use during the product life and CO<sub>2</sub>-eq emissions during the product life.

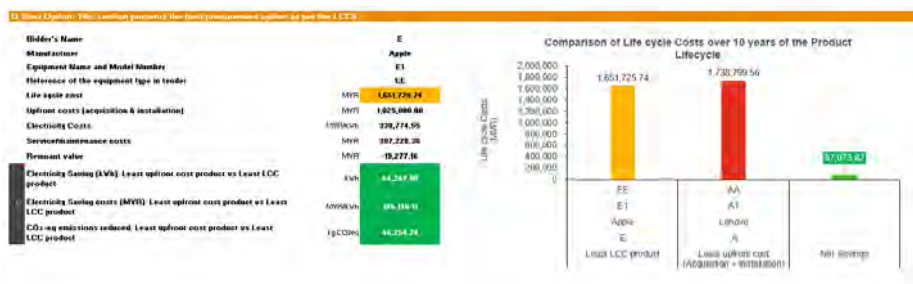
Figure 4: Representation of the section C: LCCA Results

C. LCCA Results (per type of Equipment and in total): This section presents the LCCA results across the products						
Upfront costs (acquisition & installation)	MVR	925,000.00	927,500.00	930,000.00	932,500.00	1,025,000.00
Electricity Costs	MVR	323,330.68	418,403.01	463,423.96	446,385.91	339,774.95
Service costs	MVR	307,228.36	307,228.36	307,228.36	307,228.36	307,228.36
Salvage value	MVR	(17,848.45)	(17,397.64)	(17,445.83)	(17,494.03)	(15,277.16)
<b>Life cycle cost</b>	<b>MVR</b>	<b>1,738,799.56</b>	<b>1,632,732.72</b>	<b>1,680,212.49</b>	<b>1,688,600.08</b>	<b>1,651,725.74</b>
Electricity use during the product life	kWh	191,790.00	164,955.00	155,760.00	154,880.00	117,548.00
CO <sub>2</sub> -eq emissions during the product life	kg CO <sub>2</sub> eq	130,888.80	118,767.60	115,027.20	111,513.60	84,634.56

The section 'D' of the sheet presents the best procurement option as per the LCCA methodology with three comparative factors:

- i. **Annual Electricity Saving (kWh):** Least upfront cost (acquisition & installation) product vs Least LCC product
- ii. **Annual Electricity Saving costs (MVR):** Least upfront cost (acquisition & installation) product vs Least LCC product
- iii. **Carbon Emissions reduced:** Least upfront cost (acquisition & installation) product vs Least LCC product

Figure 5: Representation of the section D: Best Option

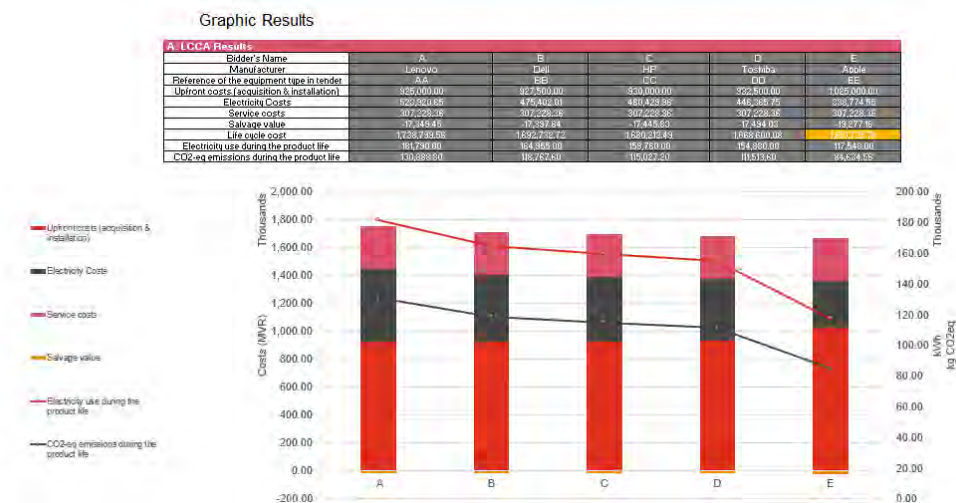


## 5.2.2. Graphs

The graphs sheet represents the tool results in graphical format. The sheet is segregated into two sections, section A: LCCA Results and section B: Least LCC product vs Least upfront cost (Acquisition + Installation) product comparison.

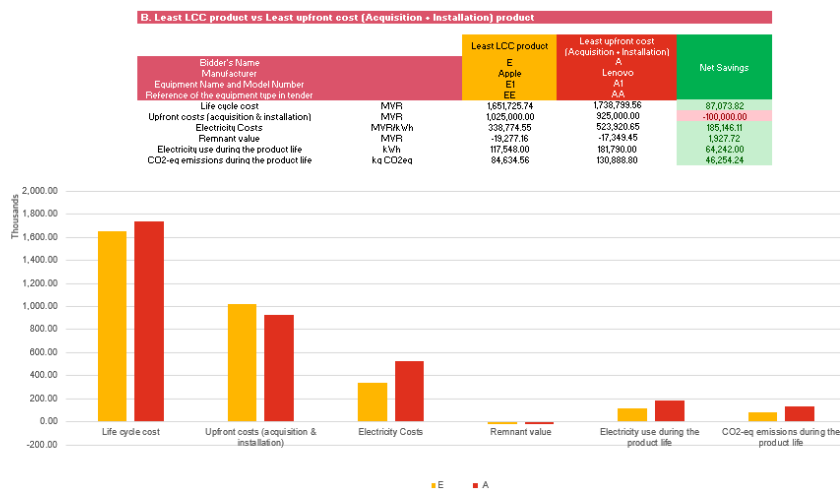
Section A summarises the costs parameters and plots all the results on a bar graph format. The left Y (Vertical) axis in the graph represents the costs in Thousand MVR and the right Y (Vertical) axis in the graph represents the Electricity use and CO<sub>2</sub>-eq emissions during the product life as depicted in Figure 6: Representation of the section A: LCCA Results.

Figure 6: Representation of the section A: LCCA Results



Section B presents a comparative analysis between least LCC product vs least upfront cost (acquisition + installation) product, analysing both the bids in terms of costs, electricity use and CO<sub>2</sub>-eq emissions. The section also presents net savings (see column) between both the bids marking **Green** for savings and **Red** for losses.

Figure 7: Representation of the section B: Least LCC product vs Least upfront cost (Acquisition + Installation) product





# 6. Annex 1 – Sample formats to be used in bid document

The procuring entity should include the sections 6.1, 6.2, 6.3 and 6.4 as part of the bid documents.

## 6.1. Statement of requirement

The products applicable include range of computer systems including:

1. Desktop computers: Integrated Desktop Computers and Thin Clients;
2. Portable computers: Notebooks, Two-In-One Notebook, Portable Thin Client, Portable All-In-One Computer and Tablets; and
3. Computer monitors.

1.	Number of Computers to be procured	[provided by procurement entity]
2.	Type of Computer to be procured	[provided by procurement entity]

## 6.2. Form 2: Evaluation Parameters

The following parameters are fixed for the life-cycle costing assessment

Sr. No.	Parameter	Definition	Value
1.	Life of the Equipment	Number of years over which to calculate and compare life cycle costs of different solutions.	10 <sup>[3]</sup>
2.	Discount rate	The discount rate is used to calculate the present value of future costs.	10% <sup>[1]</sup>
3.	Electricity annual price increase	Average price increase of electricity in the Maldives. It should include all non-recoverable taxes and fees and be adjusted to eliminate the effect of inflation.	2% <sup>[1]</sup>
4.	Salvage value Percentage	Remaining value of the Computer at the end of life.	5% <sup>[1]</sup>

<sup>3</sup> The value is considered as a conservative assumption for the particular LCCA based procurement.

Sr. No.	Parameter	Definition	Value
5.	Operational office days per year	Total number of working days for the office.	250 <sup>[1]</sup>
6.	Daily office hours	Total number of working hours for the office.	8 <sup>[1]</sup>
7.	Assumed idle utilisation time of the computers in a day (%)	The state in which the operating system and other software have completed loading, a user profile has been created, the machine is not asleep, and activity is limited to those basic applications that the system starts by default.	30% <sup>[1]</sup>
8.	Assumed sleep mode of the computer in a day (%)	A low power state that the computer is capable of entering automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly “wake” in response to network connections or user interface devices with a latency of 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.	10% <sup>[1]</sup>
9.	Assumed off mode of the computer in a day (%)	The power consumption level in the lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer’s instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.	60% <sup>[1]</sup>
10.	Assumed on mode of the computer in a day (%)	Duration during which the monitor screen is on and consuming power.	65% <sup>[1]</sup>
11.	Assumed off mode of the computer in a day (%)	Duration during which the monitor screen is off and is not consuming any power or is in a low power state.	35% <sup>[1]</sup>
12.	CO <sub>2</sub> -eq emissions of the national electricity mix	Grid emission factor.	0.72 <sup>[4]</sup>

<sup>4</sup> UNFCCC: [https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/29357641\\_Maldives-BUR1-1-First%20BUR%20of%20Maldives.pdf](https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/29357641_Maldives-BUR1-1-First%20BUR%20of%20Maldives.pdf)

Sr. No.	Parameter	Definition	Value
13.	Service/maintenance costs	Cost or fee for the services required in the tender documents during the contract period related to the use of computers and monitors (warranty, software and hardware maintenance, repairs, upgrades, etc.).	[provided by procurement entity]
14.	Electricity price	Cost of electricity supply, all taxes and fees included (MVR/kWh). It serves to calculate operation costs linked to the energy consumption of the Computers.	[provided by procurement entity]

### 6.3. Evaluation Criteria

The bid evaluation criteria will be based on the least cost bid/offer identified by the life cycle costing formula, as provided below:

Life cycle costs = Upfront cost + (Electricity costs)<sub>NPV</sub> + (Service/Maintenance Costs)<sub>NPV</sub> – (Remnant value)<sub>NPV</sub>

Where,

- *Upfront Costs = (Acquisition costs + Installation costs) X Number of Computers*
- *(Electricity Costs)<sub>NPV</sub> = Annual electricity consumption of per unit of Computer X Electricity Price X Electricity Present Value Factor X Number of Computers*
- *(Service/Maintenance Costs)<sub>NPV</sub> = Annual Maintenance Costs X General Present Value Factor X Number of Computers*
- *(Remnant value)<sub>NPV</sub> = Acquisition costs X Salvage Value Percentage X Present Value Factor (for the duration of the Life of the Equipment) X Number of Computers*
- *NPV refers to Net Present Value, calculated by the following formula:*
  - *Net Present Value Factor = 1 / (1+Discount rate) ^ (Life of the Equipment)*

## 6.4. Bidder technical details submission form

This form should be filled and submitted by the bidder.

Sr. No.	Parameter	Value
1.	Bidder's Name	
2.	Name of the Computer manufacturer	
3.	Computer Name and Model Number	
4.	Acquisition costs Cost per unit for the acquisition of the Computer by the Procuring entity based on all requirements set in the bid documents.	
5.	Installation costs Cost per unit for the delivery, installation and any other cost at the start of the contract based on all requirements set in the bid documents. Leave blank if they are included as part of the acquisition cost.	
6.	Electricity Consumption in idle state (Watt)	
7.	Electricity Consumption in sleep state (Watt)	
8.	Electricity Consumption in off state (Watt)	
9.	Electricity Consumption of the monitor (if separate equipment such as in desktops) in off mode (Watt)	
10.	Electricity Consumption of the monitor (if separate equipment such as in desktops) in on mode (Watt)	

The following documents must be submitted by the bidder while submitting the bid response:

1. Declaration of conformance as provided in section 7.
2. Product catalogue including product model number.
3. Signed and sealed 'Bidder technical details submission form' refer section 6.4.

# 7. Annex 2 – Declaration of conformance

(This declaration letter for conformance is to be submitted by the Bidder along with the Proposal.)

Date:

Place:

[Address of the procuring entity]

Dear Madam/Sir,

Sub: Invitation of Request for Proposal for providing \_\_\_\_\_

We hereby confirm the following:

1. The Proposal is being submitted by \_\_\_\_\_ (Name of the Bidder) who is the Bidder in accordance with the conditions stipulated in the RfP.
2. We have examined in detail and have understood and abide by; all the terms and conditions stipulated in the RfP document issued by \_\_\_\_\_ (Name of procuring entity) and in any subsequent communication sent by \_\_\_\_\_ (Name of procuring entity).
3. The product information provided against this procurement is as per the requirements of the RfP document and standards mentioned therein to the best of our knowledge and as per the original specification provided by the manufacturer.
4. We would be solely responsible for any errors or omissions in our Proposal.

For and on behalf of :

Signature :

(Authorised Signatory)

Name of the Person :

Designation :