

# Life-Cycle Costing (LCC) calculation tool

Webinar – **Life Cycle Costing (LCC) in public procurement**

Tuesday 9 June 2015, 14:30 – 16:00 (CEST GMT+1)

STUDIOFIESCHI  
& SOCI 



# INDEX

- 1. INTRODUCTION**
- 2. LIFE-CYCLE COSTING (LCC)**
- 3. PROJECT TIMELINE**
- 4. Sub-task D: PAs NEEDS IDENTIFICATION**
- 5. Sub-task A: PRELIMINARY ANALYSIS**
- 6. Sub-task B: TOOL DESIGN (TOOL CONCEPT)**
  - INPUTS**
  - DIRECT COSTS OUTPUTS**
  - EXTERNALITIES OUTPUTS**
  - KEY MESSAGES/WARNINGS**
- 7. CONCLUSIONS**

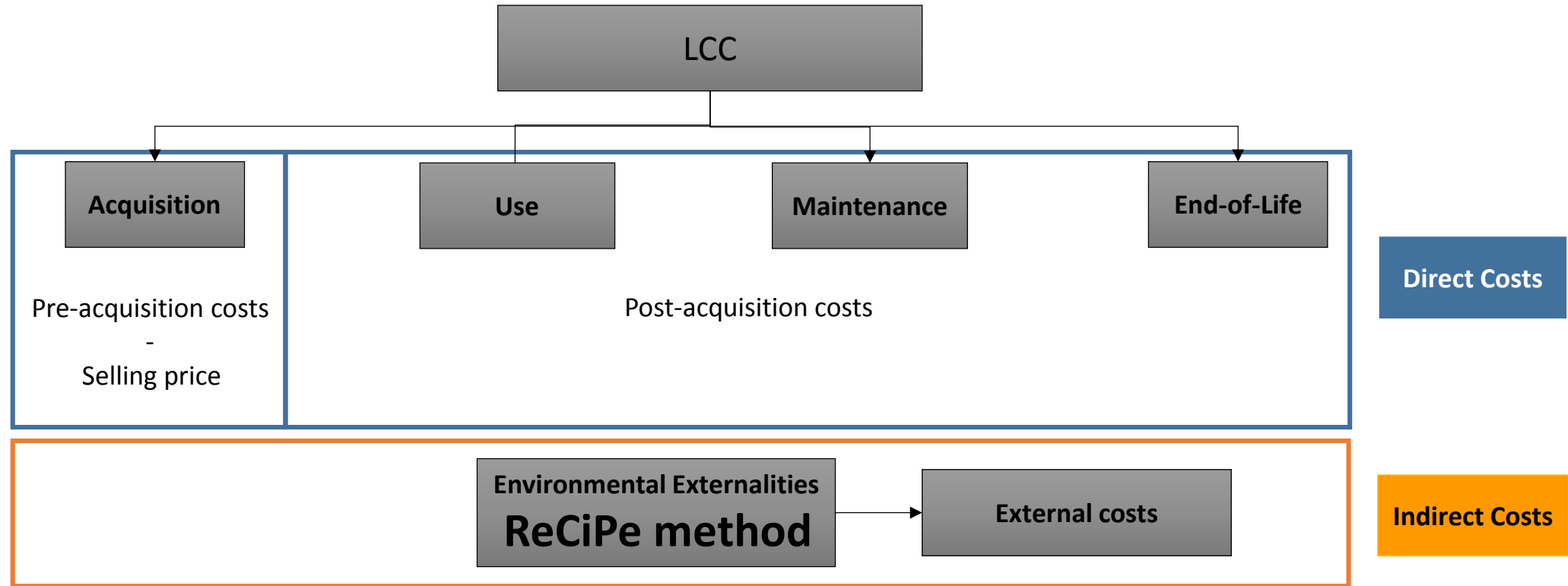
# 1. INTRODUCTION

The new **Directive 2014/24/EU** significantly innovates the process of tenders awarding, through assigning a relevant importance to LCC. New contract award criteria have been introduced in Article 67 : *“The most economically advantageous tender from the point of view of the contracting authority shall be identified on the basis of the price or cost, using a cost-effectiveness approach, such as **life cycle costing** [...]”*.

Based on its perceived benefits, **the European Commission would like to encourage and facilitate the wide use of LCC by making available tools and approaches** that could help the application of harmonized LCC methods among public authorities in Europe.

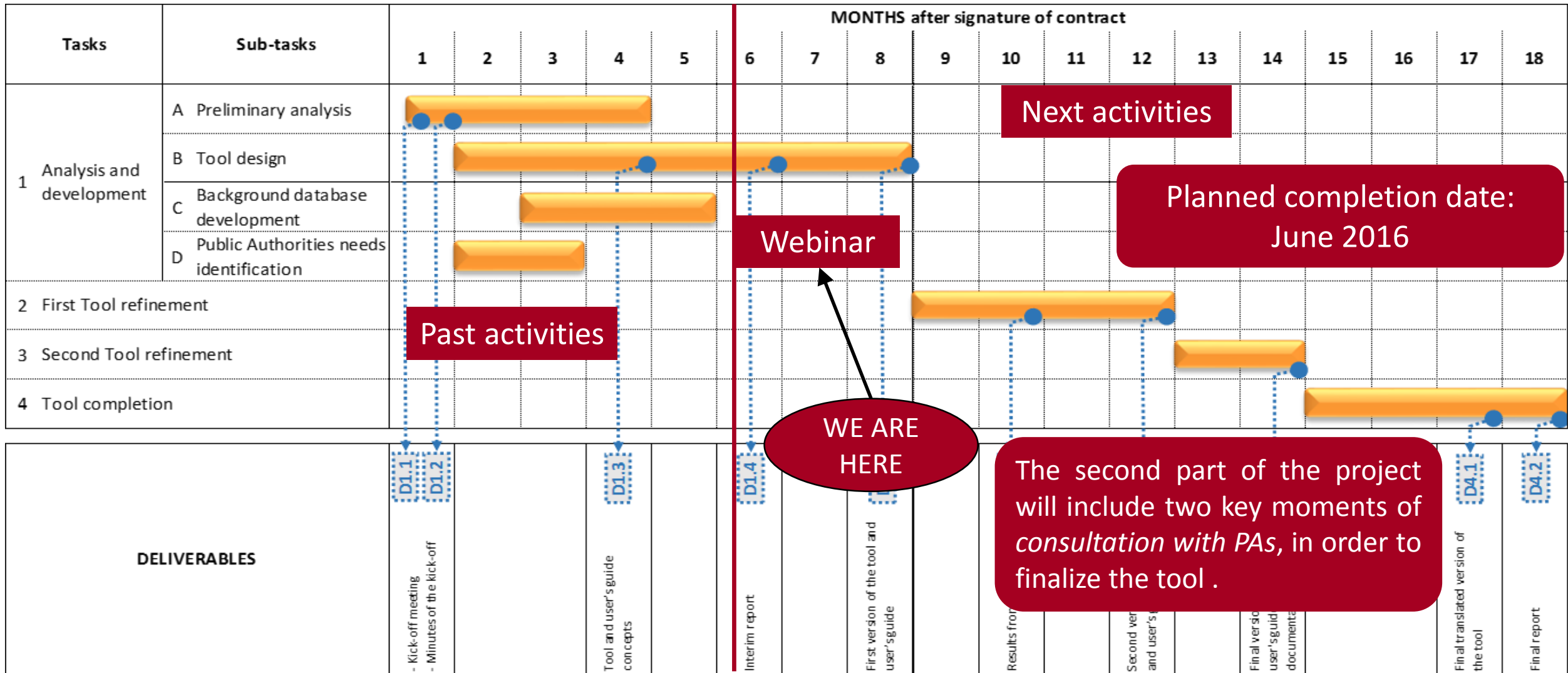
# 2. LIFE-CYCLE COSTING (LCC)

Life-Cycle Costing is a methodology where costs of a given asset are considered throughout its life-cycle  
(2014/24/EU - Art. 67)



Costs imputed to environmental externalities linked to the product, service or works during its life-cycle, provided their monetary value can be determined and verified. (2014/24/EU - Art. 68)

# 3. PROJECT TIMELINE



# 4. Sub-task D: PAs NEEDS IDENTIFICATION

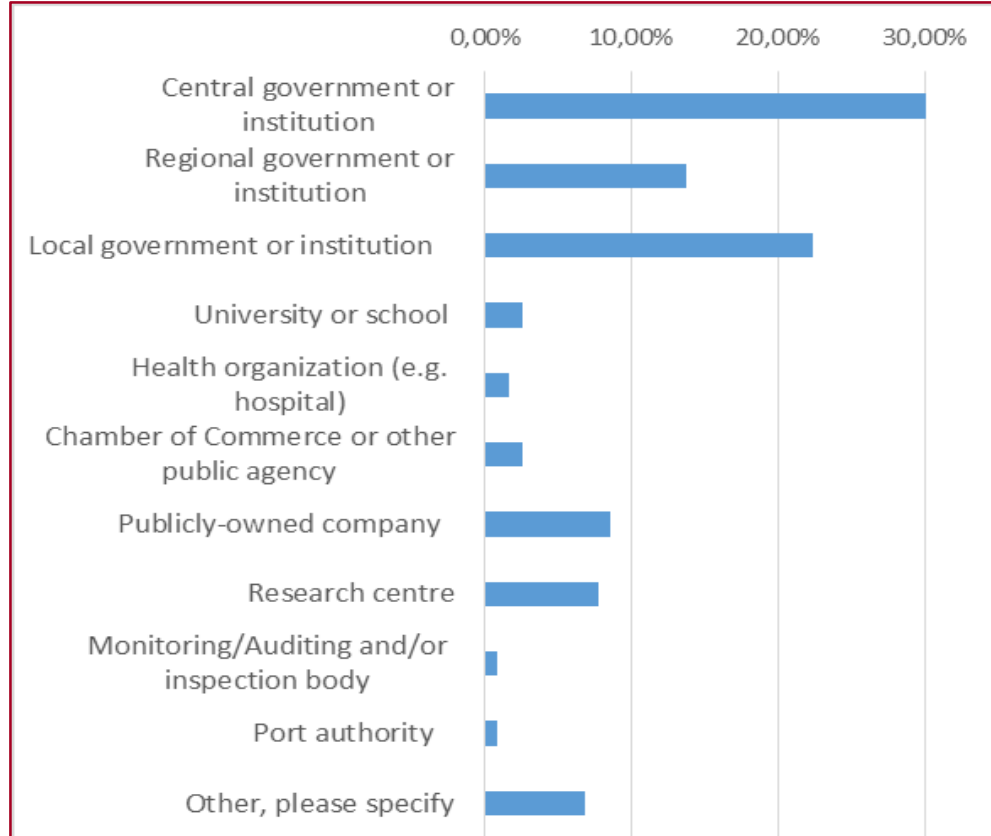
A survey among public administrations has been carried out, with the purpose of:

- Identifying the needs of public authorities to implement the Life Cycle Costing approach and to promote the use of the tool
- Collecting information to design an appropriate tool for the Life Cycle Costing analysis

The survey results show that though GPP practices are commonly applied to at least some categories of products by public administrations, **the application of LCC still remains limited**. Barriers to application and actions designed to overcome them are judged relevant by the respondents. The comprehension and application of LCC within PAs is still at a very early stage and much effort is still needed to support PAs in LCC implementation. **The development of an ICT tool, therefore, would be appreciated by PAs**, as the lack of simple tools and guidelines has been identified as one of the main barriers for further implementation of LCC.

**119 public organisations replied to the questionnaire**

Type of public organization



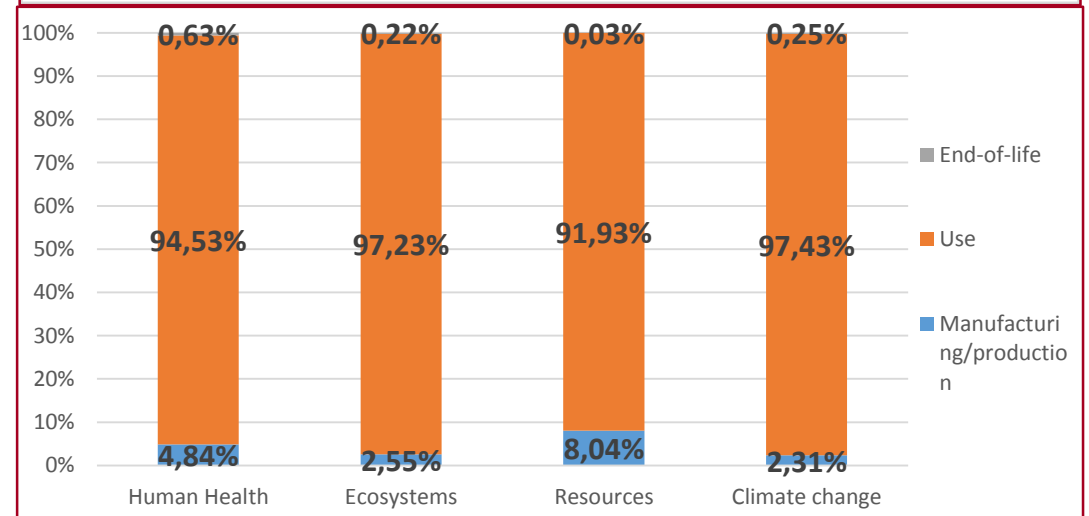
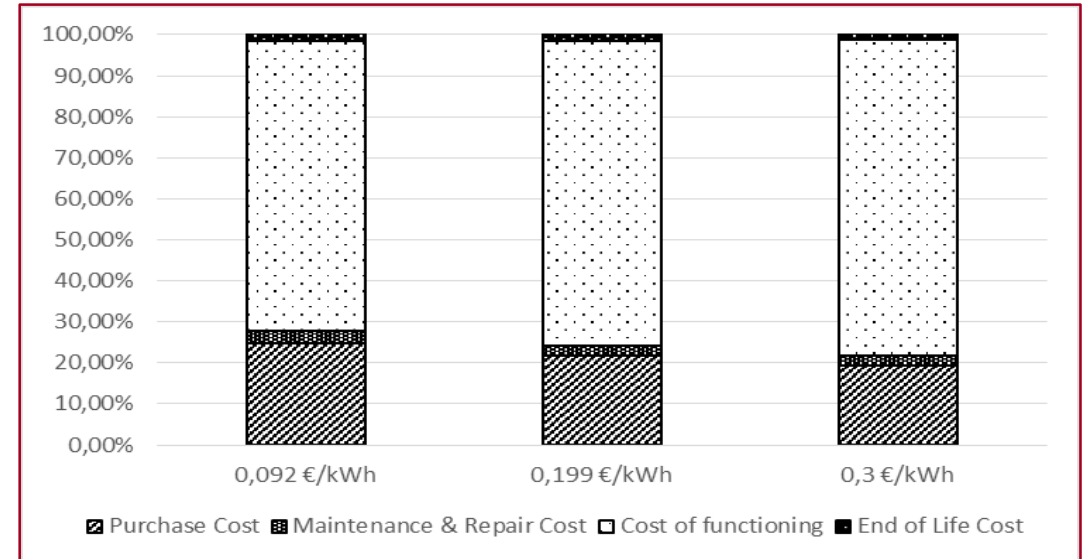
# 5. Sub-task A: PRELIMINARY ANALYSIS

The preliminary analysis was performed as follows:

- **Definition:** general definition of the product category. Where possible, definitions are taken from existing standards and EU Directives
- **Included products:** within the product category, a list of relevant products has been identified and defined. Definitions are taken from standards, EU Directives, EU GPP Criteria, preparatory studies for Ecodesign Directive, expert communications, etc.
- **Structure of direct costs:** for each of the included products, a **screening LCC** has been performed for the identification of the relevant cost items
- **Screening of externalities:** for each of the included products, a life cycle-based environmental assessment has been performed to identify relevant externalities

The analysis confirms that use phase and in particular energy consumption represent a core item for both the assessment of direct costs and externalities.

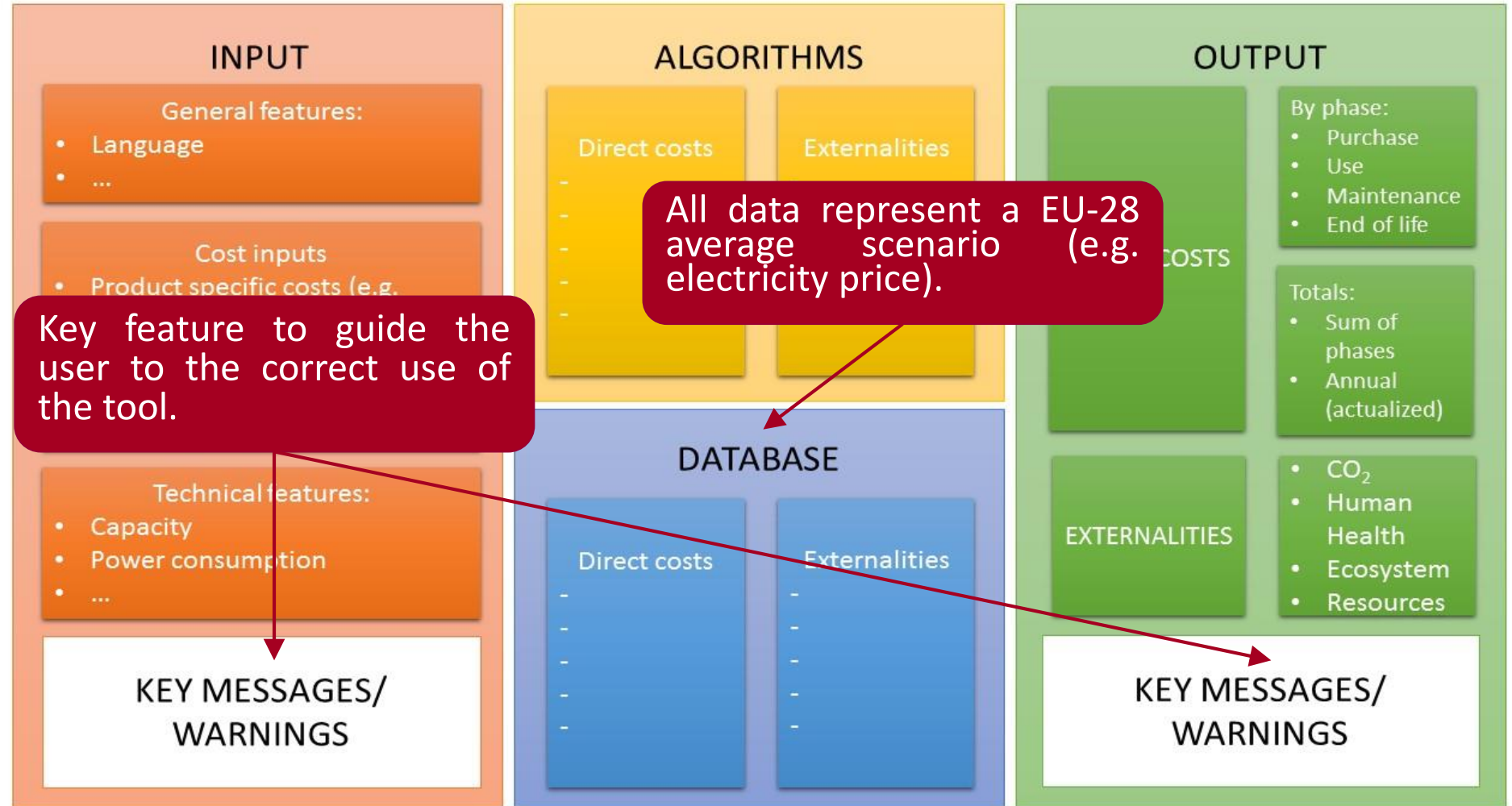
The results of the analysis provide the basis for designing the tool.



# 6. Sub-task B: TOOL DESIGN (TOOL CONCEPT)

A **User's guide** is **provided** as separate document, explaining in detail the tool capabilities and providing instructions to the user through illustrative examples.

The output, i.e. **direct costs plus externalities**, offer the user a **comprehensive set of information for decision making**.





# 6. TOOL CONCEPT: INPUTS

Given the high number of products that fall under the various categories included in the tool, a series of *user forms* for data input have been predefined.

For some inputs, the information may be available to the user in a different form compared to the one requested. For this reason, where possible, alternative sets of inputs are made available to the user (e.g. energy consumption for washing machines may be filled in kWh/year or with n° of cycles per year and the consumption per cycle in kWh/cycle).

The screenshot shows a software interface for entering product data. The dialog box is titled 'Insert/edit product [White goods / Washing machines]'. It features a dropdown menu for 'SELECT PRODUCT FOR INPUT DATA EDITING' and a text field for 'OR INSERT NEW PRODUCT NAME'. The inputs are organized into three sections: 'ECONOMIC INPUTS', 'TECHNICAL INPUTS', and 'OTHER INPUTS'. Each input field includes a numerical value, a unit, and a green arrow icon for adjustment. The 'ECONOMIC INPUTS' section includes fields for Economic period (10 Y), Purchasing price (2670 €), Installation cost (160 €), Transportation cost (0 €), Price of electricity (0,138 €/kWh), Price of natural gas (0,04 €/kWh), Price of water (2,64 €/m3), Price of detergent (2 €/kg), Maintenance cost (80 €/y), Cost of disposal (0 €), Product life (8 Y), and Interest rate (2,5 %). The 'TECHNICAL INPUTS' section includes Rated capacity (6 kg), Detergent consumption (161 kg/year), Water consumption (85050 liters/year), Natural gas consumption (1915 MJ/year), Electricity consumption (800 kWh/year), a checked checkbox for 'No value available', N° of cycles per year (500), and Energy consumption per cycle (1,6 kWh/cycle). The 'OTHER INPUTS' section includes N° of purchased products (1). At the bottom, there are three buttons: 'CONFIRM', 'CANCEL', and 'REMOVE PRODUCT'. The background shows a spreadsheet with columns for 'kWh/anno', 'kWh/ciclo', and 'cicli/anno'.

INPUT	Value	Unit
Economic period	10	Y
Purchasing price	2670	€
Installation cost	160	€
Transportation cost	0	€
Price of electricity	0,138	€/kWh
Price of natural gas	0,04	€/kWh
Price of water	2,64	€/m3
Price of detergent	2	€/kg
Maintenance cost	80	€/y
Cost of disposal	0	€
Product life	8	Y
Interest rate	2,5	%
Rated capacity	6	kg
Detergent consumption	161	kg/year
Water consumption	85050	liters/year
Natural gas consumption	1915	MJ/year
Electricity consumption	800	kWh/year
N° of cycles per year	500	
Energy consumption per cycle	1,6	kWh/cycle
N° of purchased products	1	

# 6. TOOL CONCEPT: INPUTS

Some important remarks about inputs:

- In the application of LCC methodology, categories of costs like **insurance costs, cost of ownership, costs of money, etc.** are excluded, as they are not directly linked to the direct costs of the products, but to financial and administrative issues
- **Discount rates** shall be inserted in the tool by the user. A default value will be included in the database if no other information is available
- **Energy and consumables prices** shall be inserted in the tool by the user. Default values will be included in the database if no other information is available. Default values will always represent a EU-28 average scenario.

**Double counting** may occur **during input phase.**

For example:

- Delivery and installation costs may be already included in the purchasing cost
- Maintenance costs need to be excluded during the period covered by assistance service and warranty

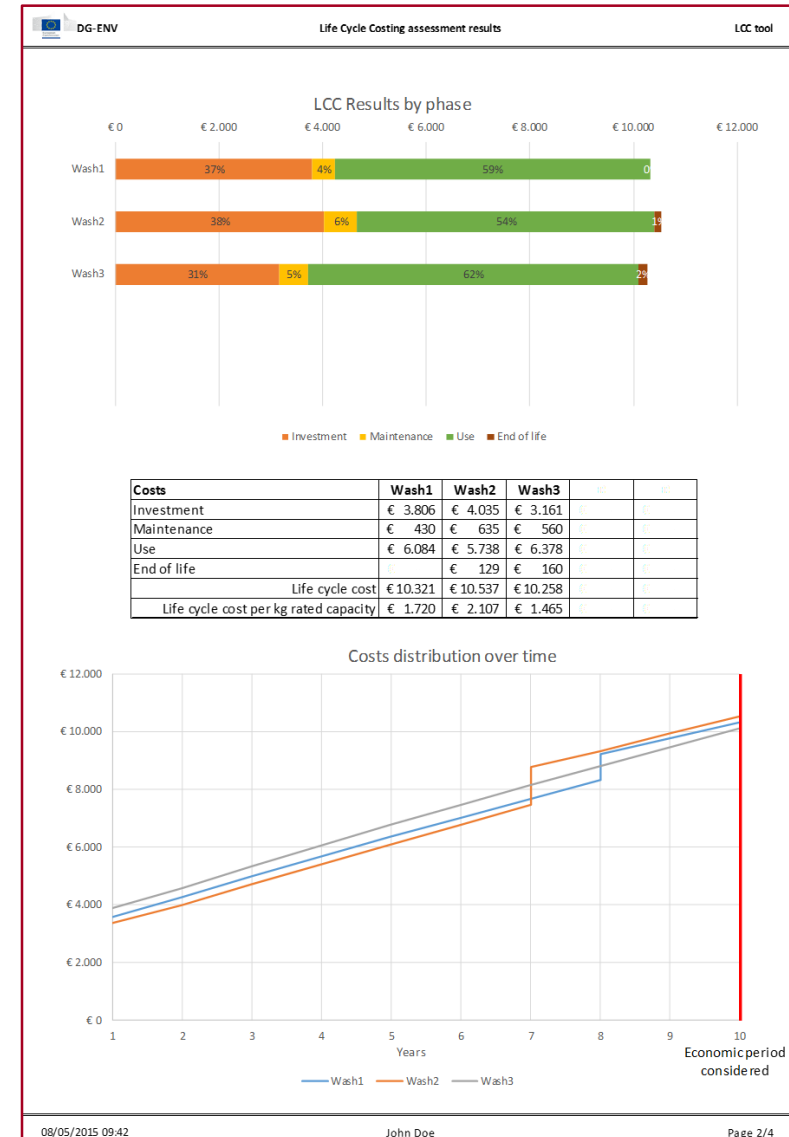
The tool prevents the occurrence of double counting issues:

- Through **internal routines** and **instructions** to the user

# 6. TOOL CONCEPT: DIRECT COSTS OUTPUTS

The economic assessment produces three outputs:

- Bar chart with the overall LCC, split in accordance with the costs indicated in Directive 2014/24/EU
- Resume table with the numeric results of the assessment
- Chart with the cost distribution over time



# 6. TOOL CONCEPT: EXTERNALITIES OUTPUTS

The tool includes four environmental impact categories:

- **Human health**
- **Ecosystem**
- **Resource availability**
- **Climate Change**

ReCiPe method has been chosen for the calculations of potential impacts for the abovementioned areas of protection and impact indicators.

Monetization:

- **Climate Change** can be monetized using approaches acknowledged by the Commission such as that contained in the Clean Vehicles Directive (DIRECTIVE 2009/33/EC).
- **Resource availability** is already expressed in monetary terms by ReCiPe
- **Human health** can be monetized using the factors suggested by Heijungs<sup>1</sup>
- Monetization factors for **Ecosystems** produce **1000-times higher results** compared to the other impact categories, therefore are deemed not sufficiently robust and reliable for the purposes of this work. Externalities related to ecosystems could be therefore **left out**.

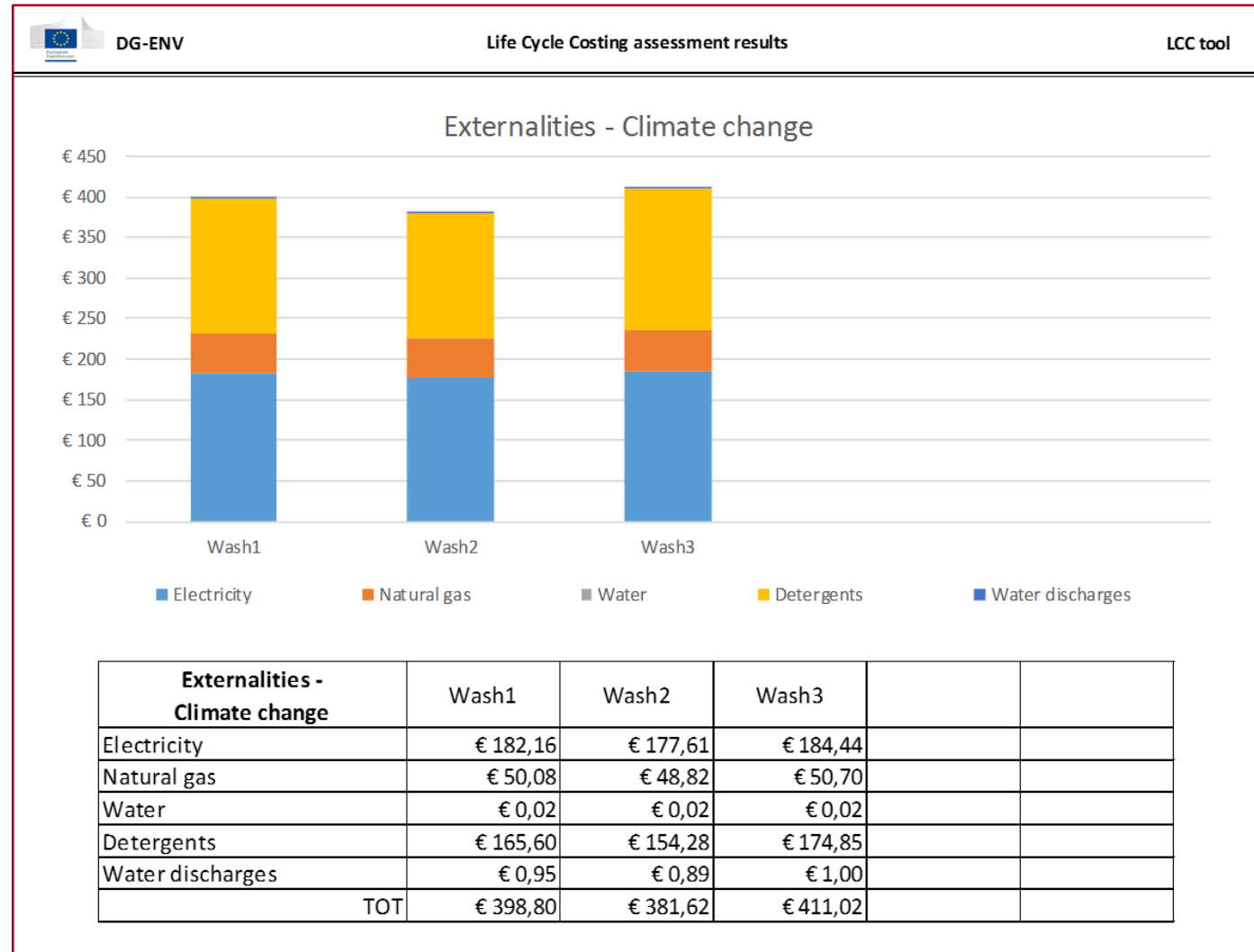
1) R. Heijungs, «The weighting step in life cycle impact assessment - Three explorations at midpoint and endpoint level - Weighting with damage costs,» 2008.

# 6. TOOL CONCEPT: EXTERNALITIES OUTPUTS

Externality outputs include a bar graph and a table with the calculated values, showing the contributions of the various items.

**The four calculated externalities are reported separately.** There are two main reasons behind this approach:

- None of the assessments can be considered fully inclusive of all potential externalities associated with a product life cycle
- **Having Climate Change among the assessed impact categories may involve double counting.** In fact, the characterization of the impacts related to Climate Change also occur along the pathway for the evaluation of Ecosystems and Human Health impacts.



# 6. TOOL CONCEPT: EXTERNALITIES OUTPUTS

The analysis confirmed that **use phase and in particular energy consumption** represents a major item for both the assessment of direct costs and externalities.

However, for some of the products (e.g. personal computers), the **manufacturing phase** generates as well a relevant share of the potential environmental impacts.

To ensure a comprehensive modelling of the manufacturing phase, the user should know the composition of the assessed products (i.e. Bills of materials). Purchasing authorities should hence ask such information to the tenderers, who may find it hard to get. Moreover, the verification of these data would be problematic, since agreed standards are not available.

The expected efforts for getting good data on manufacturing would pose a serious threat to the quality of the results.

Currently, we are looking for a way to solve this limitation. Possible solutions are:

- Based on the impact contributions emerged from the initial environmental assessment (sub-task A), **add to the externalities of the use phase a default share** to estimate the contribution from manufacturing
- **Exclude manufacturing phase** from the calculation of externalities (?)

# 6. TOOL CONCEPT: KEY MESSAGES/WARNINGS

**Warnings and Key Messages:** set to guide the user in correctly capitalizing on the tool features. They are subdivided into:

- **Warnings:** Each time the user performs an action that modifies the tool settings (e.g. input of a new product, editing of old data, etc.) the tool shows a message asking for confirmation. If the user inputs non-valid information (e.g. letters instead of numbers), the tool shows a message asking the user to repeat the action with valid data
- **Key Messages:** they contain details regarding the tool features. The user can access these messages through buttons with a question mark.



# 7. CONCLUSIONS

The work done so far provides the basis for developing a sound tool for implementing LCC among Public Authorities.

LCC complexity and the scope of the tool (i.e. the product categories) impose a number of limitations and require particular caution.

A careful selection of input data and precise instructions will allow the user to get solid results. Such results will allow Public Authorities to use the LCC approach according to Public Procurement Directive 2014/24/EU.

Suggestions are welcome and essential to fulfill the project goals and get a step forward in the implementation of LCC in public sector.

**Please send us your comments within two weeks from the date of the webinar.**



# Thanks for your attention

## Any question?

STUDIOFIESCHI  
& SOCI ●●



Maurizio Fieschi – [fieschi@studiofieschi.it](mailto:fieschi@studiofieschi.it)

Ugo Pretato – [pretato@studiofieschi.it](mailto:pretato@studiofieschi.it)

Fabio Iraldo – [fabio.iraldo@sssup.it](mailto:fabio.iraldo@sssup.it)