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LIFE-CYCLE COSTING AND ENVIRONMENTAL CRITERIA: The experience of Consip

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**Seminari e approfondimenti
a cura del Gruppo di Lavoro acquisti verdi**



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The Italian legislation adopted in the new code the provisions of the DIRECTIVE 2014/24/EU about the Life Cycle Costing in the articles 95 and 96 of the D.Lgs n.50 April 18th 2016

i.e. the *NEW ITALIAN PUBLIC PROCUREMENT CODE*

A brief focus on LCC application in the public procurement in our country:

- LCC in the **Italian legislation**
- **Examples** of LCC applications
- An **application** of LCC in public tenders
- Can **PEF** support the **transition** to a LCC approach?
- How to get **monetization** of externalities?
- Conclusions

LCC in the NEW ITALIAN PUBLIC PROCUREMENT CODE

(D.Lgs n.50 April 18th 2016)

Art.95 CONTRACT AWARD CRITERIA

2. 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** in accordance with Article 96.

Art.96 LIFE CYCLE COSTING

1. Life-cycle costing shall to the extent relevant cover parts or all of the following costs over the life cycle of a product, service or works:

(a) costs, borne by the contracting authority or other users, such as:

(i) costs relating to acquisition,

(ii) costs of use, such as consumption of energy and other resources,

(iii) maintenance costs,

(iv) end of life costs, such as collection and recycling costs.

(b) 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**; such costs may include the cost of emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs.

Art.96 LIFE CYCLE COSTING

2. Where contracting authorities assess the costs using a life-cycle costing approach, they shall indicate in the procurement documents the data to be provided by the tenderers and the method which the contracting authority will use to determine the life-cycle costs on the basis of those data.

The method used for the assessment of costs imputed to environmental externalities shall fulfil all of the following conditions:

- (a) it is based on **objectively verifiable and non-discriminatory** criteria. In particular, where it has not been established for repeated or continuous application, it shall not unduly favour or disadvantage certain economic operators;
- (b) it is **accessible** to all interested parties;
- (c) the data required can be **provided with reasonable effort** by normally diligent economic operators, including economic operators from third countries party to the GPA or other international agreements by which the Union is bound.

What about LCC for GPP so far?

LCC makes good sense regardless of public authorities environmental objectives. By **applying LCC** public purchasers take into account the cost of resource use, maintenance and disposal which can be not reflected in the purchase price: often this will lead to a **win-win situation** whereby a **greener product**, work or service is also **cheaper overall**.

- When LCC is used in a **tender**, the calculation method and the data required should be **set out in the tender document**
- If LCC includes the **cost of externalities**, **specific rules** should be set out **for monetization** of cost in order to ensure that this methods are fair and transparent

- ✓ The **Swedish National Agency for Public Procurement** have several product specific LCC calculation tools available online (in Swedish)
- ✓ The **UK-based Whole Life Cost Forum** has a focus on the construction sector and contains many information
- ✓ The **SMART SPP project** developed and tested a tool for public authorities to assess LCC and CO₂ emissions to compare bids

➔ The project specifically focused on the following products and services:

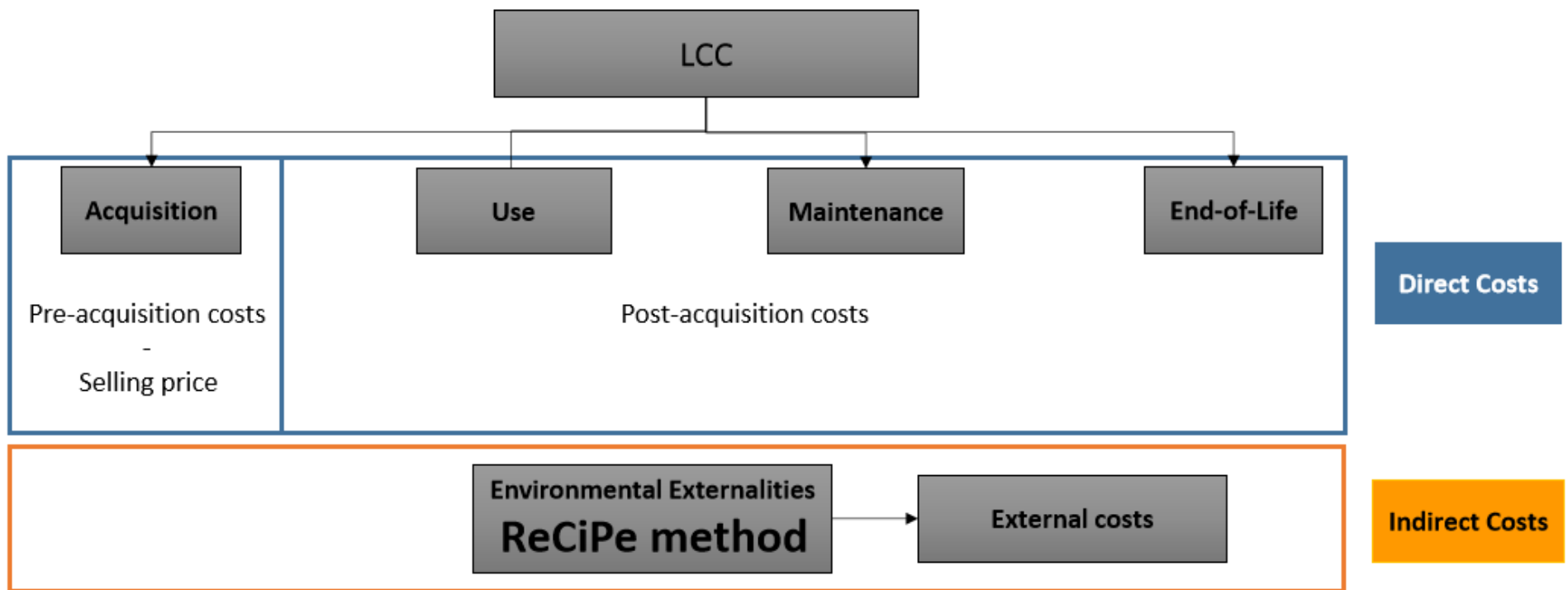
- **Lighting systems** (LED indoor and outdoor (street) lighting)
- **Electric vehicles systems** (charging points and cars)
- **Vending machines**

SMART SPP developed a specific approach aimed at assessing **financial benefit** (through **LCC**) and calculating **CO₂ savings**.

Following the new rules of the public procurement reform on LCC, the EC had commissioned a **first study** to develop a **LCC tool** for a number of *electricity-using product, covering office IT equipment, office and street lighting, white goods, vending machines and electrical medical equipment*.

- The study was conducted by **Studio Fieschi** and the **Scuola Superiore Sant'Anna**
- The deliverables of the study include a **LCC tool**, a **user guide** and **technical specifications** detailing the background of the proposed tool

The tool considers **direct** and **indirect costs** along the **life cycle** of the product:



Some important **remarks** about the **inputs** of the tool:

- *Category of costs like **insurance cost**, **cost of ownership**, **cost of money** are excluded*
- ***Discount rates** shall be **inserted** in the tool **by the user***
- ***Energy and consumable price** shall be **inserted by the user**. Default values are available but they always represent a Eu-28 average scenario*



Double counting may occur in the input phase! For example:

- **delivery** and **installation** phase **costs** may be already **included** in the **purchasing cost**
 - **maintenance costs** need to be **excluded** during the period covered by **assistance service** and **warranty**
- ➔ Fortunately the tool prevents double counting through internal routines and instruction to the user

The tool includes 4 environmental impact categories (*Climate change, Resource availability, Human health, Ecosystem*) and expresses the environmental impacts in **monetary terms** as follows:

- **Climate change** can be monetized using approaches acknowledged by the Commission such as that contained in the CVD (2008/33/EC)
- **Resource availability** is already expressed in monetary terms by ReCiPe
- **Human health** can be monetized using the factors suggested by Heijungs in *Heijungs, 2008*



Monetization for **Ecosystems** produce 1000 times higher results compared to the other impact categories of the tool, therefore are deemed not sufficiently robust and reliable and **externalities related to ecosystems are therefore left out**

Is Italy ready for this?



A **common complete** and **accepted** methodology to monetize externalities is missing



An **accurate** and **populated** italian LCA database is not ready



To date it is possible for the public procurement entities to use an actual life cycle costing approach only for **motorize vehicles** through the evaluation of the energetic and environmental life cycle costs, ref: D. Lgs March the 3rd 2011 – Directive 2009/33/CE)

An example of monetization

An example of **how** environmental **externalities may be included** in LCC is provided by the ***Clean Vehicles Directive*** (Directive 2009/33/CE)

Under this Directive, contracting authorities are obliged to **take energy consumption and emission into account** in their purchases of road transport vehicles.

The Annex to the Directive provides a set of common costs to be applied:

CO2	NOx	NMHC	Particulate matter
0,03-0,04 EUR/kg	0,0044 EUR/g	0,001 EUR/g	0,087 EUR/g

Note: higher costs may be applied, up to a maximum of two times the stated values

An example of monetization

Even if the LCC approach settled for the motorized vehicles doesn't consider the environmental externalities generated in the production phase and in the EOL phase and accounts just for some pollutants, it is a **proxy** of the LCC of these goods.

- This allows **emissions to be priced** for inclusion in the **evaluation** and **comparison of bids**.
- Values are also provided in the Directive for the **energy content of different fuel types** and the **lifetime mileage** of different vehicle categories.



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Joint Leasing of green vehicles

Joint leasing of green vehicles

Consip SpA, Italy

€80 million framework contract for vehicle leasing. Car emissions had to be as low as 79 gCO₂/km for passenger cars and 134 gCO₂/km for heavy duty vehicles. A car sharing service and automated usage monitoring was implemented for fleet optimisation.

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19303 t of CO₂ eq savings

5616 toe of energy savings



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Joint Leasing of green vehicles

Energy and CO₂ savings

	CO ₂ emissions (t CO ₂ e/year)	Energy consumption (toe/year)
Low Carbon Solution	35,576	11,991
Conventional solution	54,879	17,607
Savings	19,303	5,616

How to get monetization?

Monetization of **externalities** is nowadays a **battleground**: a solid and accepted monetization methodologies seems **far** to come. Moreover LCA is not yet ready to support in any case LCC studies aimed at including external costs.

- So far **LCA** has been developed as *supporting decision tool* and not as decision tool. It needs an expert judgement to evaluate its results
- Nevertheless, starting from the PEF methodology and PEFCRs approach LCA practitioners, procurement entities, companies and public authorities should clearly **set the goal and the scope** of the LCA studies at the basis of LCC calculations in order to **further develop** the **LCC methodology**



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Joint Leasing of green vehicles

Cost savings

In comparison to the previous tender, the following impressive results were achieved in leasing costs:

Lots				
1	2	3	4	5
6,58% ⁴ reduction	15,76% reduction	3,45% reduction	n.a.	n.a.

Over the vehicle lifetime there is an estimated reduction in fuel consumption costs of €14,229,426 in comparison to the conventional solution. When monetising CO2 emissions at a cost of 4.58 €/ton, this figure rises to €14,318,376

Joint Procurement of Energy performance Contracting in the health sector

Consip SpA, Italy

This was a tender for a framework contract divided into 16 geographical lots, by the Italian Central Purchasing Agency (Consip SpA). The contract is an energy performance contract for the health sector.

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205747 t of CO₂ eq savings

58112 toe of energy savings

Energy and CO₂ savings

The table below summarises the main results in terms of energy savings. These savings are assessed assuming a time span of 2.5 years. This timeframe was chosen because the energy efficiency measures must be completed within three years of the beginning of the contract:

	CO ₂ e emissions	Energy consumption
Low Carbon Solution	613,310 (t CO ₂ e /2,5 years)	173,226 (toe/2,5 years)
Benchmark	819,057 (t CO ₂ e /2,5 years)	231,338 (toe/2,5 years)
Total savings: Benchmark - Low Carbon Solution	205,747 t CO ₂ e/2,5 years	58,112 toe/2,5 years

Cost savings

The projected energy savings over the lifetime of the service will lead not only to a reduction in CO_{2e}, but also to direct savings of 85,612,100 €/2.5 years in heating costs with respect to the benchmark:

	Heat Cost (year)	Heat Cost (2,5 years)
Low Carbon Solution	102,080,160 (€)	255,200,400 (€)
Benchmark	136,325,000 (€)	340,812,500 (€)
Savings: Low Carbon Solution – Benchmark	34,244,840 (€/year)	85,612,100 (€/2,5 year)



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Low carbon business travel service

Joint Procurement of Low-Carbon Business Travel Services

Consip SpA, Italy

Framework contract for Mobility Service (savings of CO₂, costs and travel downtimes), incl. CO₂ reporting, environmentally-friendly hotel solutions and video conference services. The tender uses the common environmental criteria developed by the Italian Ministry of Environment for vehicles and catering.



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9618 t of CO₂ eq savings

2130 toe of energy savings

Energy and CO₂ savings

To assess the environmental benefits of the tender, Consip conducted a tailor-made calculation. The key assumptions for the calculations includes that - without the FA - the current split of business travel between car, airplane and train remains the same. and that the low-carbon-tender solutions could potentially contribute to a shift of 20% car and airplane travel to train travel.

	CO ₂ e emissions	Energy consumption
Low Carbon Solution	33,039 t CO ₂ e/year	9,842 toe/year
Business as usual (benchmark)	37,849 t CO ₂ e/year	10,908 toe/year
Annual savings	4,809 t CO ₂ e/year	1,065 toe/year
Total savings (over the duration of the contract)	9,618 CO ₂ e	2,130 toe

Joint Procurement of energy efficient Desktop-PCs and Displays

Consip SpA, Italy

Framework contract for computers (Desktop-PCs and Displays) to ensure an efficiency performance that is 60% higher than the Computers produced according to the Energy Star Standard. The total lifetime electricity cost savings are € 2,300,000 for the whole contract. Specifications and award criteria disclose clearly the parameters on energy efficiency and reduced noise emissions.

[Click here to download the full tender model.](#)



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5162 t of CO₂ eq savings

1096 toe of energy savings

Energy and CO₂ savings

The energy efficient technology of GPP2020 is clearly demonstrated by the savings achieved by these Desktop-PCs and Displays in comparison with the products of the last tender (from 2013) that offer the same functionality.

	CO ₂ e emissions	Energy consumption
Low Carbon Solution	12,385 (t CO ₂ / life cycle)	2,629 (toe/life cycle)
Benchmark (last tender)	17,547 (t CO ₂ e/life cycle)	3,725 (toe/life cycle)
Total savings: Low Carbon Solution – Benchmark (Last Tender)	5,162 t CO ₂ e/life cycle	1,096 toe/life cycle

Cost savings

The projected energy savings over the lifetime of the Desktop-PCs and Displays will lead not only to a reduction of 5,162 t CO₂e, but also to direct savings of over 2,294,109 (€/life cycle) in electricity costs with respect to the Benchmark (last tender from 2013):

	Electricity Cost (year)	Electricity cost (life cycle)
Low Carbon Solution	1,100,878 (€)	5,504,391 (€)
Benchmark (last tender)	1,559,700 (€)	7,798,500 (€)
Savings: Low Carbon Solution – Benchmark	458,822 (€/year)	2,294,109 (€/life cycle)



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Notebook computers

Joint procurement of energy efficient notebook computers in Italy

Consip

A framework contract for the purchase of notebook computers procured laptops which were 60 percent more energy efficient than the Energy Star standard. Savings in electricity costs totalled €500,000 over the lifetime of the contract.

Consip, Italy

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1783 t of CO₂ eq savings

239 toe of energy savings



Notebook computers

Energy and CO₂ savings

The minimum energy efficiency requirements of the laptops (Energy Star standard) were actually comfortably exceeded by the laptops purchased. In fact, the laptop of the Low Carbon Solution is 60% more energy efficient than the Energy Star threshold referred to the configured laptop. The award criteria had a significant impact in promoting this outcome.

The energy efficient technology of GPP2020 is clearly demonstrated by the savings achieved by these laptops in comparison to an Energy Star compliant laptop, and laptop of the last tender.

	CO ₂ e emissions	Energy consumption
Low Carbon Solution	1.250,6 (t CO ₂ e /life cycle)	167,7 (toe/life cycle)
Last Tender	1.648,1 (t CO ₂ e /life cycle)	221,0 (toe/life cycle)
Conventional solution (standard Energy Star)	3.033,2 (t CO ₂ e /life cycle)	406,7 (toe/life cycle)
Total savings: Low Carbon Solution – Last Tender	397,5 t CO ₂ e/life cycle	53,3 toe/life cycle
Total savings: Low Carbon Solution – Conventional Solution (life cycle)	1.782,6 t CO ₂ e/life cycle	239,0 toe/life cycle



Notebook computers

Cost savings

The projected energy savings over the lifetime of the laptops will lead not only to a reduction of 1.782,6 t CO₂e, but also to a direct saving of over 500.000 (€/life cycle) in electricity costs in respect to Conventional Solution Technology (equating to €23 on average per laptop), and a direct saving of over 120.000 (€/life cycle) in electricity costs respect to Last Tender Technology:

	Electricity Cost (year)	Electricity cost (life cycle)
Low Carbon Solution	78.008 (€)	390.040 (€)
Conventional solution (standard Energy Star)	189.200 (€)	946.000 (€)
Last Tender	102.799,2 (€)	513.996 (€)
Savings: Low Carbon Solution – Conventional Solution	111.192 (€/year)	555.960 (€/life cycle)
Savings: Low Carbon Solution – Last Tender	24.791,2 (€/year)	123.956 (€/life cycle)



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Print & Copy management

Joint Procurement of resource-efficient print and copy management solutions

Consip SpA, Italy

The criteria require compliance with the last version of Energy Star and apply an innovative system based on service provision rather than buying printers. Advanced GPP criteria include training courses, compliance with hazardous substances and resource efficiency criteria.

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22085 t of CO₂ eq savings

2961 toe of energy savings

Energy and CO₂ savings

	CO ₂ e emissions	Energy consumption
The existing printer fleet	4,807 t CO ₂ e/year	7,496,535 kWh/year (=645 TOE/year)
The Print&Copy (2°) scenario of printer fleet	390 t CO ₂ e/year	608,556 kWh/year (=52 TOE/year)
Annual savings	4,417 t CO ₂ e/year	6,887,979 kWh/year (=592 TOE/year)
Total savings (life cycle)	22,085 t CO ₂ e/lifetime	34,439,895 kWh/lifetime (=2,961 TOE/lifetime)



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Print & Copy management

Energy and CO₂ savings in monetary terms

	Energy and CO ₂ emission cost (€/year)	Energy and CO ₂ emission cost (€/life cycle)
The existing printer fleet	1,533,054 (€)	7,665,271 (€)
The Print&Copy (2°) scenario of printer fleet	124,451 (€)	622,254 (€)
Savings	1,408,603 (€)	7,043,017 (€)

Cost savings

	Savings from paper consumption. Each user is limited to use its maximum quantity of clicks	
Saving	293,940,000 (number of sheets of paper)	3,527,280 (€)
CO ₂ Saved	2,939 (tons)	20,635 (€/tons)

What if.....?

- A **common LCA database**: are the national initiatives going in the same direction (ILCD network)?
- **LCA studies built on rules** which ensure **comparability** and **reproducibility**: are EPD programmes able to do so?
- One (or more) **accepted monetization methodology**: GHG quantification in monetary terms is always a good picture of the environmental externalities generated by a product?
- A **common basis to consider** an LCA a **good LCA**: are we setting at international level an accepted degree of uncertainty for the results of an LCA study? In Italy



Can PEF be the answer?

Product Environmental Footprint (2013/179/EU) is settling specific rules for the LCA of defined products and commodities sectors through the **Product Environmental Footprint Category Rules** (PEFCR).

- The **PEFCRs** are supposed to define the **processes** of the life cycle to mandatory take into account and the **impact categories** more affected by the product category considered.
- **PEF** is aimed at reaching **comparability** and the definition of **benchmarks** which on one hand will help the drafting of **accepted criteria** and on the other hand could represent the basis for the **monetization process**.



To date we have **monetization** of externalities **methodologies only** for the Global Warming Potential (**GWP**) and Ozone Depletion Potential (**ODP**) indicators and an **Italian LCA database is not available**

PEFCRs set of **rules** complement general methodological guidance for environmental footprint by providing further specification **at product level** and describing how to communicate the PEF study result.

- ➔ After the publication of the **PEF methodological guide**, in the last 2 years the PEFCR pilots have been implemented
- ➔ The last series of **stakeholders consultation** on the PEFCR pilots ended few days ago (**September 2016**)

Some **good news**:

- clear definition of the **functional unit**
- clear definition of the **system boundaries**
- selection of the **EF impact categories** to be included in the PEF study of olive oil
- description of the **main assumptions** and **limitations**
- list of the **most relevant life cycle stage** and **processes** on the basis of the pilot studies
- provision on how to manage with **allocation**
- **benchmarking**
- provision on how to manage with **communication of the results**

Italian legislation **pushes** for the use of **LCC** in the public procurement:

- **BUT** an accepted and unambiguous monetization of externalities methodology and a national LCA database are NOT available
- **FORTUNATELY** we have some good example of LCC application in public tenders (i.e. LCC for motorize vehicles)
- **HOPEFULLY** Product Environmental Footprint could represent, with its PCR approach, an interesting starting point
- **UNFORTUNATELY** monetization of externalities is available for few LCA impact indicators and monetization methodologies are still immature
- **STRATEGICALLY** a collaboratation among Universities, the Ministry of Environment, Procurers, associations of producers and strategic stakeholders could define accepted methodologies, data and tools in order to **accelerate the transition of full LCC in public tenders**



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