KURDISTAN REGIONAL GOVERNMENT

Ministry of Planning

Explanatory Note on Life-Cycle Costing in Evaluation and Comparison of Bids

June 2016

Explanatory Note on Life-Cycle Costing in Evaluation and Comparison of Bids

First- General aspects

A. Definition of Life-Cycle Costing

The International Standards Organization defines life-cycle costing (LCC) as an "economic assessment considering all agreed projected significant and relevant cost flows over a period of analysis expressed in monetary value. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability."[1]

In the evaluation and comparison of bids, the purpose of applying LCC is to identify the most cost effective solution from among those being offered by bidders. More broadly, LCC may be integrated into the project design and development process, including for the assessment of the cost effectiveness of alternative possible technological solutions (e.g., in the selection of systems that affect energy consumption of a building).

B. Key role of LCC

LCC is a key tool in the practical implementation of principles and policies such as "value for money" and "sustainable procurement", which are introduced in the Public Procurement Regulations No. (2) of 2016. From a sustainability perspective, the notion of value for money should be predicated on an understanding that true value for money can only be conceptualized on a full asset life-cycle basis.

As the KRG procurement system evolves toward a more sophisticated, professional model, in accordance with Public Procurement Regulations No. (2) of 2016, it is departing from the one-dimensional, outdated approach of always focusing on the lowest bid price as the ultimate criterion for the award decision in most if not all proceedings.

Such a one-size-fits-all application of the lowest bid price award criterion to all procurement transactions not only fails to take into account in many cases important quality and performance issues, but also masks costs that the procuring entity will incur during the service life of the item being procured. Depending upon the nature of a procurement, it well may be that the lower the bid price, the higher the costs during the service life of the item, and the lower the quality.

Thus, while the lowest bid price criterion for award of contracts may have a residual role to play (e.g., in procurement of commodities, or in the request for

---

[1] ISO Standard, *Buildings and Constructed Assets, Service-life Planning, Part 5: Life-cycle Costing* (ISO 15686-5) http://www.iso.org/iso/catalogue_detail?csnumber=39843.

quotations method for lower-value procurement of standardized items), many transactions handled by a modern procurement system require a more sophisticated approach in order to identify the bid that offers the best combination of quality and price.

The introduction in Public Procurement Regulations No. (2) of 2016 of the value for money principle, and the notion of award of the procurement contract to the most advantageous bid, implicate the application of non-price bid evaluation criteria., such as those related to quality and performance. In some cases, the application of such criteria may mean that the most advantageous bid is not the lowest priced bid. In such cases, LCC has a central role to play. LCC can document to stakeholders and control authorities that the most advantageous bid, though it might not have the lowest bid price, offers the lowest overall cost over the full lifecycle of the procurement and superior quality as compared to bids that may have lower bid prices, but have lower quality and higher costs during the period of use.

Moreover, LCC may be particularly useful in assessing and choosing among competitive technology alternatives (e.g., in the procurement of vehicles, between diesel, natural gas, and hybrid electric forms), in a project design process, as well as at the procurement stage.

C. Sustainable procurement

LCC plays a key role in the design and implementation of sustainable procurement policies and practices, in particular "green procurement". LCC can be used to demonstrate that green products do not necessarily cost more, even if their initial purchase price might be higher in some cases, due to their economical operational cost during the service period.

Second- Variable factors in assessing life-cycle cost

A. Components of life-cycle costing

Calculating life-cycle costs involves measuring a variety of costs associated with the acquisition, operation and ownership of the object of the procurement. The exact nature of those costs varies according to the subject matter of the procurement.

Costs such a acquisition, improvements, and disposal at the end of service life are sometimes referred to as "deterministic", while costs that may be somewhat less precisely forecast, such as repair and spare parts, failure and downtime, are referred to as "probabilistic". Probabilistic costs are typically a function of the degree of reliability and maintenance profile of what is being procured.[2]

Acquisition costs

This component encompasses the procurement cost (which may, depending upon the nature of the subject matter, include construction costs, as in the case of an industrial facility such as a power plant). In some contexts, these may be referred to as "capital costs". Acquisition costs include cost of delivery and installation, and any commissioning required under the procurement

In some cases, such costs may include infrastructure costs, such as modification of existing facilities in order to handle new equipment being procured. Different types of technological solutions may involve different degrees and types of infrastructure costs.

Operating/usage costs

Depending upon the nature of the subject matter of the procurement, this could involve:

- energy consumption for light bulbs, pumps, vehicles, equipment of various types
- "consumables" (e.g., ink and paper for a printer of copy machine);
- water consumption for plumbing fixtures and other devices.

In many cases, operating/usage costs constitute a large percentage of the costs to the procuring entity. They could far outstrip any cost saving achieved by purchasing initially lower priced items whose operating/usage costs are more expensive than higher priced items with lower operating/usage costs, or even outstrip the purchase price itself.

For the purposes of comparing fuel costs, an average yearly (or other unit of time) figure for usage of the object needs to be used (e.g., in the case of a vehicle, average yearly mileage). Typically, it may be assumed that the yearly usage will remain constant during all the years of the service life of the object. In the case comparison of vehicles, a specified average speed may be applied in the assessment.

Maintenance and repair costs

This involves calculating the costs of regular maintenance and repair, including spare parts, during the service life of the subject matter of the procurement.

[2] See, for example, Ngapuli I. Sinisuka Herry Nugraha, (2013),"Life cycle cost analysis on the operation of power generation", Journal of Quality in Maintenance Engineering, Vol. 19 Iss 1 pp. 5 - 24 Permanent link to this document: http://dx.doi.org/10.1108/13552511311304447

Maintenance costs could, depending upon the nature of the acquisition, include not only maintenance of the object of the procurement itself, but also maintenance of associated facilities.

Service life

The length of the service life of the object of the procurement s relevant to the procuring entity as the longer the service life, the less frequent the necessity of replacement, thus lowering costs. However, typically, the procuring entity would specify in the bidding documents the minimum service life and apply the LCC on the basis of a uniform analysis period for all bids. To the extent that service life may extend beyond the LCC analysis period and be deemed of value to the procuring entity, it can be factored into the assessment as residual value.

End of life costs/residual value

This component refers to the resale or depreciated value, if any, at the conclusion of the service life of the object; otherwise, the disposal costs, including any collection and recycling, renovation, or decommissioning costs are calculated.

Exclusion of "sunk costs"

A general principle of LCC is that costs that are incurred by the procuring entity and are the same regardless of the alternative that is selected (sometimes referred to as "sunk costs") are not included in the assessment. While this principle may have particular relevance to the use of LCC in project design, it may be kept in mind also for the context of LCC in bid evaluation.

B. Sources of information

LCC assessments are only as good as the data that is fed into them. Accordingly, the procuring entity should seek to ensure that it obtains reliable data. Information used in LCC calculations may be drawn from sources such as literature (e.g., studies on the comparative performance of various types of equipment), manufacturer's specifications, fuel usage data compiled by the procuring entity or other entities or organizations).

In some cases, in particular in the use of LCC for project design, certain factors applied in an LCC exercise may be deemed to be the same for all the bids (e.g., maintenance costs)

C. Breakdown of LCC results

Annexed to this note are illustrations of basic LCC assessments. They illustrate the application of LCC to arrive at a comparative LCC assessment of, in each of the cases, two competing bids. The manner in which the results of an LCC assessment are broken down, and the degree of further granularity, will depend in particular upon the nature of the transaction and the LCC methodology being applied. For example, in the case of an LCC assessment in the procurement of a fleet of buses, additional layers of granularity beyond those in the annexed illustration may include:

1. Capital cost per bus per mile
2. Capital cost per bus per mile per seat
3. Total operation cost per bus per mile
4. Total operation cost per bus per mile per seat
5. Total life cycle cost of the procurement
6. Life cycle cost per bus per mile
7. Life cycle cost per bus per mile per seat

As another example, in the case of procurement of a power plant, such costs may be broken down in terms of cost per kilowatt hour (kWh).

Third- Administrative aspects

Disclosure

A procuring entity intending to apply LCC in the evaluation of bids must disclose that fact in the bidding documents. The bidding documents must also specify the LCC methodology to be applied and the information to be provided by bidders in order to enable the LCC assessment to be conducted. Any data required to be provided by bidders should be such as can be provided with reasonable levels of effort.

Present-value-of-money calculations

In order to assess more accurately the comparative economic impacts of bids, LCC assessment typically involves the assessment of future costs on the basis of calculating the present monetary value (sometimes referred to as the “discounted value”) of those future outlays.

Depending upon how it is formulated in any individual case, discounting to present value is a cost-benefit analysis technique that may take into account factors such as inflation and the “time value” of money. The latter is the premise that money is worth more today, i.e., at the present time, than in the future, as money set aside for future costs could alternatively be invested today for a profit (opportunity cost). Thus, the notion of time value of money might be relevant regardless of whether there is inflation or not. Present-value calculations are implemented using a discount rate[3].

Costs of externalities

Depending upon the nature of the object being procured, the suggestion may arise that LCC calculation should also take into account costs that are not directly borne by the procuring entity. An example of such costs are “environmental externalities” associated with the production, use and disposal of the object being procured.

In order to include such externalities in an LCC analysis it would be necessary to determine and verify the monetary value of the external impacts and the mitigation costs. Any such extension of the assessment to the costs of environmental externalities must be transparent and based on objective data and methodology, the details of which must be disclosed in the bidding documents[4]. However, that sort of extended costing assessment may be more in the sphere of what is referred to as “life-cycle assessment” (LCA), which has a different scope and may involve techniques and considerations other than those governing strictly LCC exercises[5].

Standard LCC methodologies

The General directorate may issue standard methodologies to be applied in the use of LCC for various types of procurement transactions, and indicate the extent to which any of those methodologies may be mandatory.

---

[3] Microsoft Excel has an Net Present Value (NPV) calculation function, including a discount rate coefficient. See https://support.office.com/en-sg/article/NPV-function-5c52df05-07cb-48e0-a006-97225eb960bc.

[4] See, for example, EU Directive on public sector procurement, art. 68.2.

[5] In regard to LCAs, see International Institute for Sustainable Development, *Life Cycle Costing in Sustainable Public Procurement: A Question of Value* (December, 2009), p. 9 https://www.iisd.org/publications/life-cycle-costing-sustainable-public-procurement-question-value

Annex
Examples of LCC assessments

Procurement of trucks
Evaluation of two bids using Life-cycle costing (price in dollars)

1. **Bid prices**

Bid prices (read at bid opening)

Bid prices EXW//CIF	65000	70,000
Adjustment for delivery date (monetary equivalence)	6000	1000
Total	71000	71000

2. **Costs of operation and maintenance**

Fuel – cost per year	(8000)	(6000)
Net present value for 6 years	34840	26130
Spare parts – guaranteed (average) for each year	(5000)	(4000)
Net present value for 6 years	21775	17420
Total	56615	43550

3. **Residual value at end of operating life (depreciation to be subtracted)**

Operational life	(6 years)	(8 years)
Depreciated value	0	2500

4. **Total life-cycle cost** **127,615** **112,050**

Final ranking of bids	**2**	**1**

Examples of life-cycle costing analysis

Energy efficient light bulbs 

	Traditional 100 W	Eco efficient 20 W
Life cycle	1 year	8 years
Energy consumption	100 W x 8000 h = 800 kW	20 w x 8000 h = 160 kW
Price	8 x 1.25 euros = 10 euros	12 euros
Usage cost (0.11 euros / kWh)	0.11 x 800 = 88 euros	0.11 x 160 = 17.6 euros
Total cost for consumer	10 + 88 = 98 euros	12 + 17.6 = 29.6 euros

Source: "Sustainable Procurement –Key Concepts-UNEP's Experience" (Brussels, 20 September 2011), http://www.irfnet.ch/files-upload/news-gallery/green_public_procurement/2.YAKER_UNEP.pdf