

SWEDISH ENVIRONMENTAL MANAGEMENT COUNCIL	DATE	2011-07-04	PAGES	1 (5)
APPLICATION DOCUMENT	INFORMATION REGARDING LIFE CYCLE COST CALCULATION FOR OUTDOOR LIGHTING			

# LIFE CYCLE COSTS (LCC) FOR OUTDOOR LIGHTING - DESCRIPTION OF THE TOOL AND ITS PARAMETERS

## LCC IN THE PROCUREMENT

The LCC tool for outdoor lighting can be used in the evaluation of tenders to clarify the actual (compiled) costs that the procuring entity/authority will need to pay for the product during its service life. The tool can also help in the needs analysis to improve planning for the purchase and to make an estimate of what an environmentally appropriate alternative would cost in comparison with existing systems or a conventional new product - perhaps this can result in a saving instead of an increase in the price! In the needs analysis, the Swedish Environmental Council's general calculation tool can also be of assistance, see

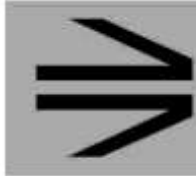
[www.msr.se/sv/Upphandling/LCC-och-miljoekonomi/Generell-LCC-kalkyl/](http://www.msr.se/sv/Upphandling/LCC-och-miljoekonomi/Generell-LCC-kalkyl/).

When the tool is used in the needs analysis, there are no specific demands on how it should be used. The user may instead try different scenarios (see chapter on uncertain parameters below) to arrive at the best solution. If the tool is used in the tender evaluation, however, the Swedish Public Procurement Act (LOU) will apply, and just as in other requirements, the LCC requirements must comply with this legislation. However, this document focuses on how LCC is used in the tender evaluation.

If LCC is used in the tender documentation, it must be used as an award criterion when evaluating the economically most profitable tender. The tender documentation must clearly describe the parameters that will be included in the calculation. The documentation and measuring methods that will be applied also need to be described, so that it is clear what information the tenderer must provide. Below is an example of which information the procuring entity should provide in the tender documentation and which information should be requested from the suppliers in order to make the evaluation. The tool also contains explanations for each parameter, see comments in the Excel spreadsheet (the red triangles). Don't forget to specify if the prices will apply with or without VAT.

## THE PROCURER DEFINES THE FOLLOWING CONDITIONS IN THE TENDER DOCUMENTATION

<b>Calculation conditions</b>
Number of years the calculation comprises (years of use) i.e. an economic life cycle, see chapter "Definition and explanation of the tool's parameters" below.
Annual real interest rate. Real interest rate is defined as interest rate minus inflation during the life cycle. See chapter "Conditions" for more information
Annual energy price change over and above inflation (in percent)



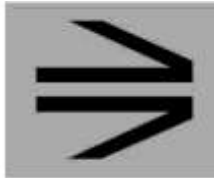
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<b>Running and maintenance cost</b>		
<b>Operating time</b> Usage time per year for lighting, before any controls/regulation (h/year).	<b>or</b>	<b>Operating time level 1 and 2</b> It is possible in the spreadsheet to calculate for a special type of control by entering "luminaire with regulation". Operating time will be divided into two levels. The procuring entity must then clarify what the supplier must report so that the figures the supplier provides are comparable.
<b>Replacement costs per light source, each (SEK)</b> The procuring authority specifies the costs for replacing light sources, excluding costs for the light source itself. If different costs are estimated for different light sources, this must be specified.		
<b>Electricity price (SEK/kWh)</b>		
<b>Replacement costs per light source<sup>1</sup></b>		
<b>Other installation costs are specified as needed (control equipment, etc.)</b>		
<b>Specification for maintenance service including operating times between maintenance</b>		

THE SUPPLIER MUST PROVIDE THE FOLLOWING DATA

<b>INVESTMENT COSTS</b>
<b>Luminaires</b>
Type of luminaire
Manufacturer/Name
Number of luminaires
Price per luminaire (SEK)
<b>Light sources</b>
Power output per light source, including operating losses or information on power level 1 and 2 (when dimmed) (W)
Number of light sources per luminaire (qty)
Price per unit (SEK/unit)
<b>Installation</b>
Material and labour costs per luminaire for installation (SEK)

<sup>1</sup> Cost for replacement of light source, excluding costs for the light source itself. If different costs are estimated for different light sources, this must be specified.



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<b>Other costs for installation</b> The procuring entity specifies what this entails, if applicable.
<b>OPERATING COSTS</b>
<b>Maintenance costs</b>
Lifespan of light source calculated as per SS- EN 12665 or equivalent
Maintenance costs per luminaire If this is included, it should be specified what the maintenance service will comprise.
Operating times between maintenance (hours) If this is included, it must be specified under a maintenance service.

From the above parameters, it is important to select those parts that are appropriate for the procurement in question. In simpler procurements or call-offs, all parameters may not need to be included, such as maintenance costs that must be clearly specified if they are to be included in the tender documentation.

The conditions that apply for the procurement must be clearly specified by the procurer and it must be clear what the supplier will provide. The information requested from the suppliers must also be produced in a standardized and uniform manner in order to permit a comparison. Of course, the evaluation must also compare equivalent products, which must be specified in the tender documentation.

## DEFINITION AND EXPLANATION OF THE TOOL'S PARAMETERS

The tool analyzes an economic life cycle. Accordingly, the tool only takes costs that impact the procuring entity into consideration and not other environmental costs that impact society. In order to guarantee that the investment becomes environmentally compatible, we recommend that the tool is used as a supplement to the Swedish Environmental Management Council's environment criteria, perhaps as part of a needs analysis or as an award criterion.


The user can enter the necessary parameters into the calculation and this includes the costs that arise during the *period of ownership*. The tool includes red tabs with examples. However, explanations are provided below for some important parameters in the tool.

## CONDITIONS

The conditions at the top of the spreadsheet define the terms for the calculation. The procuring entity provides this information.

The interest used internally within the procuring entity is entered as the cost of capital and consequently can vary depending on the organization. Interest must be entered as real interest, i.e. an interest rate that is unaffected by inflation (nominal interest minus inflation).

An interest rate of 4-5% is usually recommended for municipalities and counties. Energy price increases can also be entered here.

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## INVESTMENT COSTS

The supplier enters information here on light sources and luminaires, such as power output, price and installation costs. If the lighting has control and regulation systems and this has been specified, the supplier fills in the costs for this here.

## RUNNING AND MAINTENANCE COST


It is important that the information provided by the suppliers is standardized so as to permit a comparison of different products. Under operating and maintenance costs, the procuring entity must therefore specify a number of particulars such as operating time and electricity price. The procuring entity must also decide if the calculation is to be made with or without regulation. It is possible to include control systems in the spreadsheet, but with limited options. If control systems are included, the procuring entity must clearly specify what information the supplier is expected to provide to ensure that the tenders are comparable. The supplier provides information on price, power and, if the procuring entity requests this service, maintenance costs.

### Maintenance

Maintenance costs comprise both the replacement of light sources and the maintenance of luminaires. Light source replacement is linked to the lifespan of the light source, but the maintenance costs for luminaires can be viewed as a requested service from the procurer during the contract period. If such is the case, then this must be clearly specified in the tender documentation. Replacement costs for light sources should be defined by the procuring organization to provide an general idea of these costs and comparable figures.

## PRESENT VALUE

The present value method is used to recalculate all expected expenses in the investment and any earnings to a present value in order to compare future costs with those of today. This is because a Swedish Krona today has a different value from a Swedish Krona tomorrow, as a Swedish Krona today can be invested or provide a return in some other way. Therefore, all future costs are recalculated to the time of the purchase. The extent to which the future costs are counted down depends, among other things, on the rate of interest chosen and this can accordingly have a major significance for the final overall cost. The interest rate used by the organization is defined in the calculation under *annual real interest rate*. A high value here affects the future costs such as operation and maintenance costs and ascribes these less significance in the total calculation.

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## UNCERTAIN PARAMETERS

There are many uncertain factors in the tool, such as that it is difficult to have advance knowledge on parameters such as energy price increases. Even interest is an uncertain factor in this context. The calculation will change according to what cost of capital is used. This interest rate varies somewhat between different organizations and should be determined within the organization.

Another uncertain factor that affects cost is the number of years the lighting system will be used. This can be the economic lifespan or the total lifespan that the product will have in its existing condition. Lifespan must be defined by the procuring entity and will have a significance for the final total cost as the purchase price from a cost standpoint becomes less important the more years the product is used.

To understand how these uncertain parameters effect the final outcome, a "test calculation" can be made with a number of different values. In the procurement itself, however, it is important to not exaggerate these uncertain factors and to clearly specify what figures you will be using. This will ensure that the suppliers are aware of the conditions for evaluation and that there will be equal treatment and transparency, two basic criteria for public procurement.

## Example

See the bottom of the next page for an example of how the spreadsheet may be filled in:  
[www.msr.se/sv/Upphandling/LCC-och-milioekonomi/LCC-for-utomhusbelysning/](http://www.msr.se/sv/Upphandling/LCC-och-milioekonomi/LCC-for-utomhusbelysning/)