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	APPLICATION DOCUMENT	INFORMATION REGARDING LIFE CYCLE COST CALCULATION FOR PROFESSIONAL KITCHENS			

LIFE CYCLE COSTS (LCC) FOR REFRIGERATORS AND FREEZERS FOR COMMERCIAL USE - DESCRIPTION OF TOOL AND ITS PARAMETERS

LCC IN THE PROCUREMENT

The Swedish Environmental Management Council's tool is primarily adapted for use in the tender evaluation to demonstrate the real cost that the procuring division/authority will need to pay for the refrigerator and freezer equipment during the usage period. The tool can also help in the needs analysis to improve planning the purchase and to make an estimate of what an environmentally compatible alternative will cost in comparison with a conventional product - perhaps this can result in a decrease instead of an increase in the price!

However, this document focuses on how LCC is used in the tender evaluation. In order to use LCC as an award criterion when assessing the economically most profitable tender, the tender documentation must clearly describe the parameters that will be included in the calculation, documentation and measurement methods to be applied, so that it is clearly evident which information the tender must provide. Below are some examples 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. In the calculation, the parameters that the procuring entity should provide are marked with red squares. Accordingly, this information should be entered by the purchaser and defined in the tender documentation.

THE PROCURER DEFINES THE FOLLOWING CONDITIONS IN THE TENDER DOCUMENTATION

CALCULATION CONDITIONS	
Quantity (Number of refrigerators/freezers that will be procured)	each
Number of years the calculation comprises (years of use)	year
Discount rate stated in %	%
Electricity price	SEK/kwh
Size of refrigerator/freezer given for example in outer dimensions ¹	mm
Annual use of refrigerator/freezer	Number of days

The red squares in the calculation indicate information that the procurer shall provide.

¹ Used as needed. Alternatively, net volume can be filled in further down in the calculation if this is known.

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THE SUPPLIER SPECIFIES THE FOLLOWING PARAMETERS

ACQUISITION COST	
Purchasing price including delivery costs per refrigerator/freezer	SEK
OPERATION AND MAINTENANCE COSTS	
The net volume of the refrigerator/freezer in litres calculated according to EN 441 or equivalent ²	litre
Energy consumption calculated in accordance with EN 441 or equivalent	(kwh/48h/m ³)

It is important to choose the items from the aforementioned parameters that are appropriate to the procurement in question. It is very important in the tender documentation to define the applicable conditions, i.e. the right-hand column in the first table. It must also be clearly specified what the supplier will contribute. The information requested from the suppliers must also be produced in a standardized and uniform manner in order to permit a comparison. For example, there are standards on how energy consumption should be calculated. For more information on this, see below under energy costs. Naturally the evaluation must also compare similar refrigerators/freezers with regard to size and capacity, which must be defined 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 "Number of years of use" and "Quantity" parameters are the only parameters in the tool that must be entered in order to define the prerequisites for the calculation. The procuring entity provides this information.

For the cost of capital (or discount rate), the interest used internally within the procuring entity is filled in. This can therefore vary depending on the organization, but many municipalities use a calculation interest of 4-5 percent. The cost of capital is used to calculate future costs as a present value. See the headings "present value" and "sensitivity analysis" below.

The supplier provides the purchase price for each refrigerator and freezer, including any delivery costs, calculated per unit.

² This parameter can also be filled in by the procuring entity if a certain net volume is desired.



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ENERGY COSTS

It is important that the energy consumption is defined in the same way by all suppliers. If it is not, the results will not be comparable. Energy consumption is calculated as total electricity consumption in kWh over a test period of 48 hours, divided by the product's net volume in m³. Total electricity consumption is defined as specified in BS EN 441-9:1995.

PRESENT VALUE

Example:
SEK 1,000 is paid into a bank account at 5% interest. In two years, this money would have grown to SEK 1,102. However, the present value is SEK 1,000.

The present value method is used to recalculate all expected expenses in the investment 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 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 *cost of capital*. A high value here affects future costs such as operation and maintenance costs and ascribes these less significance in the total calculation.

SENSITIVITY ANALYSIS

Real rate of interest =
Nominal rate of
interest - Inflation

The interest is therefore an uncertain factor in this context. The calculation will change according to what cost of capital is used. The interest will vary somewhat between different organizations and should be calculated within the organization. Either real interest or nominal interest rates can be used for this, with the real interest rate roughly equalling the nominal rate minus inflation. If you would like to include inflation in the calculation, you can use the nominal interest rate. To understand how the cost of capital affects the final costs, a sensitivity analysis has been included in the LCC tool. This analysis shows what costs would be if cost of capital were not used, i.e. if this value was 0%.

Another uncertainty is the energy cost, which could change in the future. A change in price, such as an electricity price increase, could significantly affect the values in the calculation. The tool therefore provides a sensitivity analysis for this parameter, which shows how the total cost would be affected if the operating costs were to increase by 20%. This figure is in no way an estimation of how electricity costs in reality will change, but it does demonstrate the parameter's sensitivity to possible changes.

Another uncertain factor that affects refrigerator and freezer costs is the number of years the product will be in use. 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 procurer and will have a significance for the final total cost because the purchase price from a cost standpoint becomes less important the more years the product is used.