

Life cycle costs

Explanations and calculation



Life cycle costs

Shutdown and disposal costs

Servicing costs

Failure costs

Operating costs



Energy costs

Operating years

Acquisition costs

kWH

Rate of interest

Setup and commissioning costs

A view on Life-Cycle-Costs

Up until a few years ago, plant builders and owners took only the acquisition and installation costs into consideration when selecting pump systems. If the efficiency of a product or system in its entirety is to be determined, however, all costs incurred must be taken into account. All costs arising during the entire life cycle are called the life cycle costs or LCC for short. Calculating LCCs is particularly important in the area of pumps. Pumps have a relatively high lifetime at a potential running time of more than 8,000 hours a year (e.g. swimming pool pumps).

In the process, various systems must be considered separately: in the centrifugal pump system, the two large groups of sewage and cleanwater pumps can be differentiated. Whilst sewage pumps require high operational safety in order to be operated optimally under LCC aspects, this operating safety can be assumed in the case of clean water pumps since they do not handle media that damage the pump hydraulics.

Formula for calculating the life cycle costs

$$LCC = C_{ic} + C_{in} + C_e + C_o + C_m + C_s + C_{env} + C_d$$

Explanation of the individual factors

C_{ic} = Acquisition costs

The acquisition costs include only the purchasing or investment costs incurred before the commissioning of a pump system (e.g. the purchasing price of the pump, pipelines, and additional services, such as the initial equipping with replacement parts or qualification measures for the personnel).

C_{in} = Setup and commissioning costs

The setup or commissioning costs consist of the costs arising from the setup or commissioning of the entire plant or relevant components. Among other things, this includes the mechanical and electrical connection of the plant and the commissioning or connection of additional auxiliary systems and other components. If external companies are used for some tasks, the own personnel costs must also be calculated at the corresponding hourly rate to obtain a comparison of the services and to make sure the LCC analysis is not falsified.

C_e = Energy costs

The energy costs are often the largest cost factor and thus dominate the LCC. This mainly affects the clean water pumps with their high annual running times.

This can immensely increase the percentage of energy costs, especially you are trying to keep the acquisition costs as low as possible and to choose the presumably cheaper pump if two alternatives are available.

Determining the energy costs proves to be difficult if the pump is not constantly running at a duty point and its power consumption is uneven. Even in case of ideal working conditions, numerous additional factors must be taken into consideration when determining energy costs, as can be seen when taking the energy cost calculator into closer consideration.

Life-Cycle-Costs Calculator for Pumps

Life-Cycle-Costs (LCC) calculation for your pumpsystems

Here you see the total costs of your LCC-calculation for the 2 pumps:

Summing-up	Pump A	Pump B
Acquisition costs (C _{ic})	0,00 €	0,00 €
Setup and commissioning costs (C _{in})	0,00 €	0,00 €
Sub-total of the initial non-recurring costs:		
Energy costs (C _e)	0,00 €	0,00 €
Operating costs (C _o)	0,00 €	0,00 €
Servicing costs (C _m)	0,00 €	0,00 €
Failure costs (C _s)	0,00 €	0,00 €
Environm. protection costs (C _{env})	0,00 €	0,00 €
Sup-total of annual costs: Costs accum. for 15 years:		
Shutdown and disposal costs (C _d)	0,00 €	0,00 €
Required reserve for system shutdown:		
LCC = Life-Cycle-Costs for 15 years operation:	0,00 €	0,00 €

I calculate with:

costs mechanic: 75€/h

costs operator: 30€/h

electric rate: 20Cent/kWh

15 years of operation

3.5% rate of interest

1.4% inflation

Savings pump B
0,00 €
compared to pump A.

RESET

LCC = C_{ic} + C_{in} + C_e + C_o + C_m + C_s + C_{env} + C_d

Using the [life cycle cost calculator](http://www.herborner-pumps.com/gb/energieeinsparung/lcc-rechner.php) for pumps available to you under <http://www.herborner-pumps.com/gb/energieeinsparung/lcc-rechner.php> you can calculate the individual life cycles tailored to your system and compare various pumps with each other at any time.

C_o = Operating costs

The costs of use can also be called operating costs. These costs contain all work costs connected with the operation of the pump or pump system. This includes routine work, such as the cleaning of upstream filters or factors associated with mobile or on-site system monitoring.

C_m = Servicing costs

The servicing costs include the work costs incurred within the scope of regular maintenance or planned and expected repairs that are not allocated to the operating costs. In addition personnel costs, this also applies to spare parts and materials that have to be purchased within the scope of maintenance work or repairs.

C_s = Failure costs

The production failure costs are the result of an unexpected standstill or breakdown of the pump and the connected production failure. For this reason, the percentage of these costs in the overall life cycle costs can rise precipitously depending on which far reaching consequences the breakdown of the pump has for the rest of the production line.

If the costs of a pending production failure are unacceptably high despite well-designed pumps and built-in safety systems, a redundant system with a replacement pump can be installed. Investment costs may thus double in individual cases, which, however, can be compensated by minimising production failure costs.

A special focus should be placed on the production failure costs, especially when considering sewage systems with sophisticated pumping media.

C_{env} = Environmental protection costs

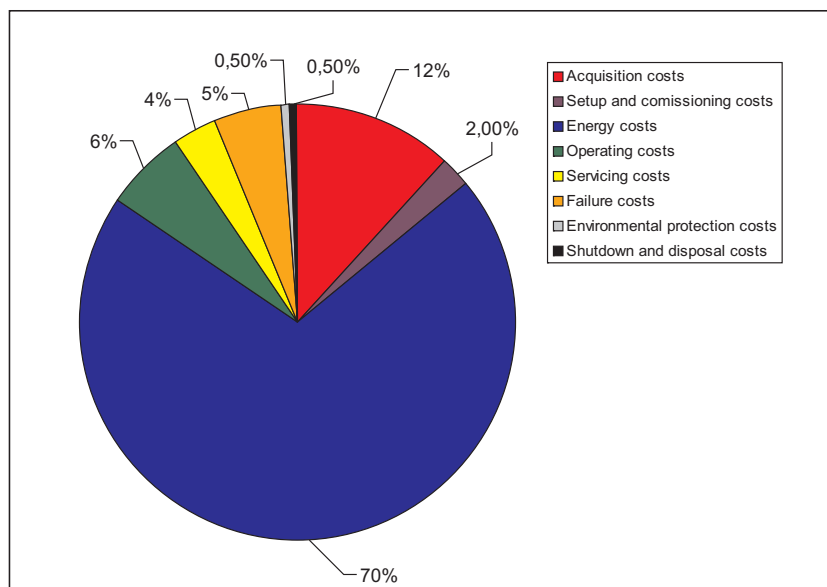
The environmental protection costs comprise the disposal costs of operating additives, components to be exchanged and the unsellable waste caused by the failure of parts. When toxic or hazardous media is pumped, the possibility of an accident with effects on the environment must be taken into consideration when determining the environmental costs.

Measures that increase the reliability and lifetime of the overall pump system can contribute to a reduction in the environmental costs.

C_d = Shutdown and disposal costs

The shutdown and disposal costs arise at the end of the life cycle of a pump or pump system. These costs include the disassembly of the plant, the disposal of the waste parts, and any recovery of the original state.

In this case, inflation must be taken into consideration as well (see the right entry screen) and then the amount should be converted to the current value using a discounting factor. Contrary to popular opinion, the energy costs are often the largest cost factor and thus dominate the life cycle. This primarily affects clean water pumps with high annual running times.



The diagram above once again clarifies the various percentages of the cost factors described above. In the process, it becomes clear that the life cycle costs of a pump are considerably influenced by energy costs. Through the selection of an appropriate, energy-efficient drive, however, this percentage can be considerably reduced even if a higher acquisition price is initially necessary. As seen across the lifetime of the pump, this investment amortises within a few years.



We reserve the right to make changes in line with technical further developments!

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