

Life Cycle Costing: Capturing Total Costs Over the Entire Period of Use

Life cycle costing (LCC) captures all costs of a product, plant or service over its entire life cycle – from procurement through operation and maintenance to disposal. It replaces the isolated consideration of the purchase price with a holistic total cost perspective (total cost of ownership). For technical buyers it is a central tool for making procurement decisions on a sound economic footing and for making subsequent costs visible at an early stage.

Key facts

- Life cycle costing evaluates acquisition, operating, maintenance and disposal costs over the entire service life.
- In practice, 60 to 80 per cent of life cycle costs often only arise after the purchase – the acquisition price is therefore only a fraction of the true cost.
- Typical fields of application are capital goods, components with high consumption or maintenance requirements as well as make-or-buy and award decisions.
- Key influencing factors are service life, discount rate, energy and maintenance costs as well as failure and downtime costs.
- LCC is closely related to total cost of ownership analysis and is frequently integrated into tenders and supplier selection.
- Legally, LCC is recognised as an award criterion in public procurement; the detailed methodology should be checked on a case-by-case basis.

Definition: life cycle costing

Life cycle costing is a method of economic evaluation that determines, totals and – for periods spanning several years – discounts to present value all costs of a good or service over its entire life cycle. It is also referred to as life cycle costing (LCC) or life cycle analysis (in the cost context).

Distinguishing it from total cost of ownership

LCC and total cost of ownership (TCO) analysis are often used synonymously but differ in focus: TCO typically considers costs from the buyer's perspective over a defined period of use, whereas LCC consistently maps the entire life cycle from development to dismantling. In procurement practice the boundaries blur; what matters is that, alongside the acquisition price, operating, maintenance, failure and disposal costs are included. In addition, process costing provides detailed figures for individual process steps that can feed into the LCC calculation.

Cost categories over the life cycle

A practical LCC calculation typically divides costs into five blocks: procurement and investment costs, operating costs (energy, consumables, personnel), maintenance and service costs, failure and downtime costs, and end-of-life costs including residual values. A clean cost breakdown of these blocks

is a prerequisite for making bids from different suppliers comparable. A uniform cost schema, communicated to suppliers already in the enquiry, is helpful here.

Importance for technical procurement

For buyers, LCC shifts the focus from price comparison to value: a cheaper component with higher wear or higher energy requirements can be significantly more expensive over its service life than the supposedly expensive alternative. The method also strengthens the argumentation towards senior management and supports cross-functional sourcing, because engineering, maintenance and controlling discuss on a common cost basis.

Methods and procedure of life cycle costing

LCC follows a structured process: define objectives and the assessment period, build the cost structure, collect data, evaluate costs over time and compare scenarios. The quality of the result stands and falls with the data basis and the assumptions.

Period, interest and present value

At the outset, the assessment period is defined – often 10 to 15 years for machinery, or the planned product lifetime for serial components. Future costs are discounted to present value using an internal rate of return or cost of capital rate in order to make payments at different points in time comparable. The discount rate noticeably influences the result: the higher it is set, the more the initial investments dominate. In practice, sensitivity calculations with several interest rates have become established to test the robustness of the decision.

Data sources and reference data

Reliable reference data is the bottleneck of any LCC calculation. Sources, alongside bid documentation, are primarily histories from your own service and maintenance functions, manufacturer datasheets, consumption figures from operations and experience from comparable projects. Where robust data is lacking, ranges with pessimistic and optimistic scenarios help. Reference data from previous tenders and contract executions should be systematically maintained so that future calculations rest on a valid basis.

Comparative calculations and scenarios

The real informative value arises in comparison: several bid variants are calculated with identical assumptions on service life, utilisation, energy prices and maintenance intervals. A sensitivity analysis of the most critical parameters – such as energy price, availability or maintenance effort – is sensible. For capital goods, the comparison of rent, buy or lease is often also included; in project procurement for plant and special-purpose machinery, LCC is increasingly part of the technical-economic evaluation.

Important KPIs and metrics of life cycle costing

LCC delivers several metrics that make procurement decisions measurable. Alongside absolute life cycle costs, relative and time-related metrics are particularly informative.

Key metrics at a glance

The core metric is the sum of discounted life cycle costs per plant, component or unit of use. Typically derived from this are costs per operating hour, per unit produced or per year. In addition, availability,

mean time between failures (MTBF) and the life cycle cost ratio (share of subsequent costs in total costs) serve as control metrics.

KPIs in tenders and supplier evaluation

In tenders, LCC metrics can be anchored as award criteria, for example availability guarantees, defined maintenance intervals or binding consumption figures. These figures feed into ongoing supplier evaluation and link the initial procurement decision with operational supplier management. Those who assess supplier risks early – for example via a risk matrix – can price failure costs into the calculation more realistically.

Risks and controls in life cycle costing

LCC is only as good as its assumptions. Incorrectly set parameters, incomplete data and contractual gaps can overturn the result – and trigger expensive surprises afterwards.

Typical sources of error

Common mistakes are an assessment period that is too short, optimistic maintenance intervals, ignored downtime costs and missing price adjustments for energy or spare parts. The effort for installation, training and acceptance is also often overlooked. It is also problematic when suppliers state consumption and maintenance figures aggressively without these being contractually secured. A documented risk policy specifies which ranges and safety margins are applied in which categories.

Contractual safeguards

Promised life cycle values should be contractually fixed: agreed availabilities, spare parts supply over defined periods, maintenance price clauses and, if applicable, a performance bond as a security instrument. In international procurement, Incoterms – such as Incoterms CPT – govern the point at which transport and risk costs pass to the buyer, which directly affects the cost calculation. Legal details such as the choice of jurisdiction clause should be examined on a case-by-case basis.

Subsequent review and ongoing operation

LCC only unfolds its effect if forecast and actual costs are regularly reconciled. Within sales and operations execution (S&OE) and technical operations, consumption figures, downtime and maintenance effort are continuously recorded and reconciled with the calculation. If the values deviate, this provides starting points for renegotiations, technical adjustments or targeted procurement optimisation in the next tender round.

Current developments: sustainability, digitalisation and resilience

Life cycle costing is increasingly being extended to include sustainability and resilience aspects. At the same time, digital tools greatly facilitate data collection and scenario calculations.

Life cycle costing and sustainability

Ecological and economic life cycle perspectives are converging: energy-efficient plant not only lowers operating costs but also Scope 1 emissions at one's own site. Companies are increasingly linking LCC with CO2 considerations across the entire life cycle in order to evaluate procurement decisions economically and climatically at the same time. Upstream emissions from suppliers (Scope 3) are often still considered separately but are gradually migrating into integrated life cycle perspectives.

Digital support and data integration

Modern ERP and data analytics tools make it possible to feed operating and maintenance data from production automatically into LCC models. A structured procurement ETL process – i.e. the extraction, transformation and loading of procurement and consumption data – creates the data basis for sound calculations. Machine data from maintenance can be enriched with reference data and historical contract executions, making forecasts more precise and scenario calculations faster.

Resilience as a cost factor

Supply chain disruptions have shown that failure scenarios must be evaluated realistically in LCC. Approaches from supply chain resilience management are increasingly flowing into cost calculations: additional costs for second sources, higher safety stocks or more expensive but more reliable suppliers are weighed against the risk of standstills. The costs of weak life cycle planning are also particularly evident in emergency ordering – spare parts without framework agreements and with short lead times are typically considerably more expensive.

Typical metrics

Sum of discounted life cycle costs: project-specific

Core metric of LCC; comparison value across all bid variants with identical assumptions.

Life cycle cost ratio (subsequent costs / total costs): typically 60–80 %

Shows what proportion of costs only arises after purchase; the higher, the more important LCC.

Cost per operating hour: industry-dependent

Comparative metric for plant and machinery over the service life.

Availability: typically > 95 %

Lower availability increases downtime costs and must be priced into the LCC.

Variance forecast vs. actual costs: Target: < ±10 %

Regular reconciliation of the LCC calculation with actual operating and maintenance costs.

Practical example

A mid-sized mechanical engineering company should compare two bids for a new compressed air supply: a cheaper unit was roughly 20 per cent below the competitor's bid in purchase price. However, a life cycle costing over twelve years using the plant's historical energy prices, realistic maintenance intervals and the downtime costs of production produced a different picture: owing to higher energy consumption and more frequent maintenance call-outs, the total costs of the supposedly cheaper bid were around 15 per cent higher over its lifetime. On the basis of the LCC, the buyer chose the more expensive unit and contractually fixed the promised consumption and availability figures.

- Specify a uniform cost schema (cost breakdown) in the enquiry so that both bids are calculated on a comparable basis.
- Use consumption and maintenance data from your own installed base as reference data in the calculation instead of uncritically adopting manufacturer figures.
- Contractually fix promised consumption figures and availability and reconcile them regularly with actual values.
- Produce a sensitivity calculation for energy price and utilisation to safeguard the robustness of the decision.

Conclusion

Life cycle costing shifts the buyer's focus from the purchase price to total costs over the entire period of use. It makes hidden subsequent costs such as energy, maintenance, downtime and disposal visible and thereby creates a robust basis for award decisions. What is decisive for quality are a clean cost breakdown, reliable reference data and documented assumptions on interest, period and prices. Those who contractually secure forecast values and continuously reconcile them with actual costs turn LCC from a one-off calculation into a lasting management instrument. For technical buyers it is thus one of the most effective levers of procurement optimisation – particularly for capital goods and long-lived components.

Frequently asked questions

What is life cycle costing?

Life cycle costing (LCC) captures all costs of a product or plant over its entire life cycle – from procurement through operation and maintenance to disposal. It ensures that not only the purchase price but also subsequent costs are factored into procurement decisions. Future costs are usually discounted to their present value.

What is the difference between life cycle costs and total cost of ownership?

The terms are often used interchangeably in practice. TCO typically looks at costs from the buyer's perspective over a defined period of use, whereas LCC maps the entire life cycle including development and disposal. For buyers, the key point is that both approaches share the same core: a total cost perspective rather than the pure price.

How are life cycle costs calculated?

First, all relevant cost categories are captured: procurement, operation, maintenance, downtime and disposal including residual values. These costs are estimated over the assessment period and discounted to present value using a calculation interest rate. Finally, the totals of the bid variants are compared and reviewed in a sensitivity analysis for critical assumptions.

When is life cycle costing worthwhile in procurement?

LCC is particularly worthwhile for capital goods, components with high energy or maintenance requirements, long service lives and high criticality of failure. For pure trade items with low subsequent costs, the effort often outweighs the benefit. As a rule of thumb: the greater the share of subsequent costs in total costs, the more valuable the method.

What data is needed for an LCC analysis?

You need bid data, energy and consumption figures, maintenance intervals and costs, failure rates as well as disposal costs and residual values. Good sources include your own operational and maintenance histories, datasheets and experience from comparable projects. Where data is missing, ranges and scenarios should be used instead of false precision.

Is life cycle costing permitted in public tenders?

Yes, in public procurement, evaluation based on life cycle costs is generally recognised as an award criterion, provided the calculation methodology is transparent and comprehensible for bidders. However, the specific requirements for evidence and documentation should be checked with the responsible procurement authority or legally on a case-by-case basis.