Man 02 Life cycle cost and service life planning

(all buildings)

Aim

To deliver whole life value by encouraging life cycle costing and service life planning. This entails improving design, project specification, life-cycle maintenance and operation. Additionally, this issue emphasizes the importance of transparent capital cost reporting to promote economic sustainability.

Overview

Assessment type	Credits available	Applicable assessment criteria
Fully fitted	4	All
Shell and core	4	All (see ref 1.0)
Shell only	4	All (see ref 1.0)
Residential: fully fitted	4	All
Residential: partially fitted	4	All
EU taxonomy	-	None

Minimum standards

Rating level	Credits
-	None

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Shell and core / Shell only – Component level LCC plan** The component level LCC plan must include all component types installed by the developer.

Building type specific notes

Ref	Building type specific note
2.0	**Refurbishment projects, Historic buildings:** Component level LCC options appraisal; In some cases, an explicit requirement from the relevant conservation authority may require the preservation of heritage features. As a result, some component types specified in criterion 4.a-d may fall outside the scope of the project. If a whole component type group falls outside the scope of the project due to legislation for historic buildings written confirmation from the conservation authority must be provided as evidence.

Assessment criteria

This issue is split into two parts:

- Elemental LCC options appraisal - two credits
- Component level LCC options appraisal - two credits

Two credits – Elemental LCC options appraisal

One credit – develop an elemental LCC options appraisal

1. An outline, entire asset elemental life cycle cost (LCC) options appraisal has been carried out at the Concept Design stage (programhandlingsskedet) in line with ISO 15686-5:2017.
2. The elemental LCC plan (see Definitions):
   - 2.a. Provides an indication of future replacement costs over a period of analysis as required by the client (e.g. 20, 30, 50 or 60 years).
   - 2.b. Includes service life, maintenance and operation cost estimates.
3. Demonstrate, using appropriate examples provided by the design team, how the elemental LCC plan has been used to influence building and systems design and specification to minimise life cycle costs and/or maximise critical value (see Definitions).

One credit – comparing design options appraisals

4. At least two LCC design option appraisals have been compared for criteria 1 to 3 (see M1 and M2)

Two credits – Component level LCC options appraisal

5. A component level LCC options appraisal (at least two) has been developed by the end of Technical Design stage (bygghandlingsskedet) in line with ISO 15686-5:2017, and includes the following component types (where present):
   - 5.f. Envelope, e.g. cladding, windows, or roofing.
   - 5.g. Services, e.g. heat source, cooling source or controls, also intelligent lighting controls against standard controls.
   - 5.h. Finishes, e.g. walls, floors or ceilings.
   - 5.i. External spaces, e.g. alternative hard landscaping, boundary protection.
6. Demonstrate, using appropriate examples provided by the design team, how the component level LCC options appraisal has been used to influence building and systems design, and specification to minimise life cycle costs and/or maximise critical value (see Definitions).

Methodology

M1: Appropriate LCC examples

The options selected to demonstrate how life cycle costs have been minimised and/or critical value maximised must be appropriate in terms of their relative impact on project costs, future building maintenance burden and size (volume or area) and the stage of the project (see criteria 3 and 6).

The LCCs at each stage should:

- Include comparison cash flow scenarios for each design stage option appraisal in order to determine the most appropriate option and,
- Consider at least two design option appraisals (for elemental LCC – only applicable for two credits)

This allows project teams and clients to make informed choices about the long-term financial implications of different design decisions.

At the Concept design stage (programhandlingsskedet), when considering the outputs from the elemental LCC plan, examples could be in the form of elemental appraisals (where appropriate), evolutions in concept design to reduce maintenance or replacement costs or contracts for further elemental analysis.

At the Technical Design stage (bygghandlingsskedet), when considering the outputs from the component level options analysis, examples are likely to be in the form of component

specifications coupled with justifications for their selection (i.e. how they reduce life cycle costs and maximise critical value). Please note that LED lamps are not to be included as an option, as these are now a standard form of lighting. As a principle, only make meaningful comparisons between systems which would genuinely be used in the project.

The study period for the elemental LCC plan should ideally be agreed by the client, in line with the design life expectancy of the building. However, where the life expectancy of the building is not yet formally agreed (due to being at very early design stages), the default design life of 60 years should be used for modelling purposes.

M2: Pre-defined specifications

Where the building is constructed to a pre-defined set specification, such as a company-wide building standard or specification document which limits the options which can be considered due to all buildings within a chain being required to be constructed to the same standard and branding, either:

- Complete LCC with options appraisals based on those items which are subject to change
- Where there is no scope to make changes for all or some of the building elements, credits may only be achieved where a compliant LCC plan and options appraisals was carried out for pre-defined company specification.

Compliance notes

Ref	Terms	Description
CN1	Independent assessment of the sections of the issue	Both sections of the issue can be awarded independently from one another. For example, the project team can still target the two credits for the component level LCC option appraisal at the Technical Design stage (bygghandlingsskedet) even if they have not been awarded the first two credits at the Concept Design stage (programhandlingsskedet) for developing an elemental life cycle cost plan.
CN2	Life cycle cost – Multiple assessments on the same site	Where there are multiple assessments on a site and a single life cycle cost (LCC) plan will be carried out, it is acceptable to use this plan as evidence provided that the results of the LCC plan can be applied to all of the assessed buildings and therefore may have a positive influence on the material specification of such buildings. Where the design of some assessments differ to the extent that the LCC plan cannot reasonably be applied, a separate LCC plan is necessary to achieve credits for this issue. Where multiple assessments are covered under a single LCC plan, there must be sufficient detail for each building to enable them to be adequately assessed.
CN3	Component level LCC options appraisal – assessing types 5.a–5.d	The component level LCC option appraisal should review all of the component types (where present) mentioned in criterion 5. However, you do not need to consider every single example cited under each component; only a selection of those most likely to draw valued comparisons. This is to ensure that a wide range of options are considered and help focus the analysis on components which would benefit the most from appraisal.

Evidence

Criteria	Interim design stage	Final post-construction stage
Elemental LCC options appraisal		
1, 2, 4	Elemental LCC plan.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
3	Confirmation from the design team as to how the LCC has influenced design/specification and drawings/specifications to support this.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence to show how the outcomes of LCC options appraisal have been implemented within the final design.
Component level LCC options appraisal		
5	Component level LCC options appraisal.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
6	Confirmation from the design team as to how the LCC has influenced design/specification and drawings/specifications to support this.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence to show how the outcomes of LCC options appraisal have been implemented within the final design

Definitions

Capital cost
The capital cost for the building includes the expenses related to the initial construction of the building:

- Construction, including preparatory works, materials, equipment and labour
- Site management
- Construction financing
- Insurance and taxes during construction
- Inspection and testing.

Costs relating to land procurement, clearance, design, statutory approvals and post occupancy aftercare should not be included.

Component level LCC options appraisal
A component level LCC plan is commonly used for cost planning specification choices of systems or component levels during design development. Component level LCC appraisal for service life planning requires the environment of the building and other local conditions to be identified, and the fundamental requirements to be met in planning the service life of the building. Decisions should be made on:

- The likely design life of the building (rather than the contractual design life)
- Minimum functional performance criteria for each component over the building's design life
- Components that must be repairable, maintainable or replaceable within the design life of the building. Only the key differentiators between components and systems need to be comparatively modelled.

Critical value
Critical value aims to maximise whole life value of the building based on client requirements and differs from minimising life cycle cost. This is a more specific analysis of how the building's ongoing maintenance and operation can impact business needs. For instance:

- Where any disruption to business is costly, a specification with long periods between maintenance cycles and reduced maintenance time may be desirable.
- Where maintaining aesthetics are important, a maintenance cycle may be based on aesthetic upkeep rather than functional lifespan.
- Where maximum other factors are of importance, such as recyclability and re-usability, biodiversity and/or climate impact, an alternative, costlier specification may be required.
- Where capital costs are constrained, the specification with the lowest LCC may not be affordable, and instead, the best available option within the budget is chosen.

Elemental LCC plan
This is commonly used for developing solutions at project level during option appraisals. Costs are normally at building elemental level on the entire asset. Information may be a mix of typical benchmark costs for key elements, comparative cost modelling or approximate estimates. It is expressed as cost per square metre of gross internal floor area (GIFA) and presented for elemental analysis, aligned to the level of capital cost plans.

Life cycle cost (LCC)
The cost of an asset or its parts throughout its life cycle, while fulfilling the performance requirements; a methodology for systematic economic evaluation of life cycle costs over a period of analysis, as defined in the agreed scope.

Additional information

When to undertake life cycle costing
Life cycle costing is relevant throughout the building or constructed asset's life cycle, in particular during the project planning, design and construction and also during the in-use phases. For further information please refer to ISO 15686-5:2017.

Standardised method for life cycle costing (SMLCC) for construction
ISO 15686-5:2017 describes the standardised method for life cycle costing (SMLCC) for construction procurement. The objectives of this standard are to provide:

- LCC practitioners with a standardised method of applying life cycle costing, applicable to the construction industry and to the key stages of the procurement process.
- Process mapping the LCC stages – to help structure how to plan, generate, and interpret and present the results for a variety of different purposes and levels of LCC planning.
- Instructions on how to define the client's specific requirements for life cycle costing and the required outputs and forms of reporting – and to decide on which method of economic evaluation to apply.
- Simplification and demystification – by providing practical guidance, instructions and definitions, together with informative worked examples on how to undertake life cycle costing (for construction).
- An industry accepted methodology to facilitate a more accurate, consistent and robust application of LCC estimation and option appraisals, thereby creating a more effective and robust basis for LCC analysis and benchmarking. ISO 15686-5:2017 also seeks to help eliminate confusion over scoping and terminology and to address concerns over the uncertainty and risks that are undermining confidence in life cycle costs used for construction procurement.

Level of detail in LCC options appraisals
Since the same subjects addressed in Component level LCC options appraisal can be raised in Elemental LCC options appraisal, a way to distinguish the level of complexity is that the Elemental LCC focuses on generic, system-level alternatives (e.g. concrete frame vs timber frame, heat pump vs district heating), whereas the Component level LCC compares specific products and detailed specifications within the chosen system.