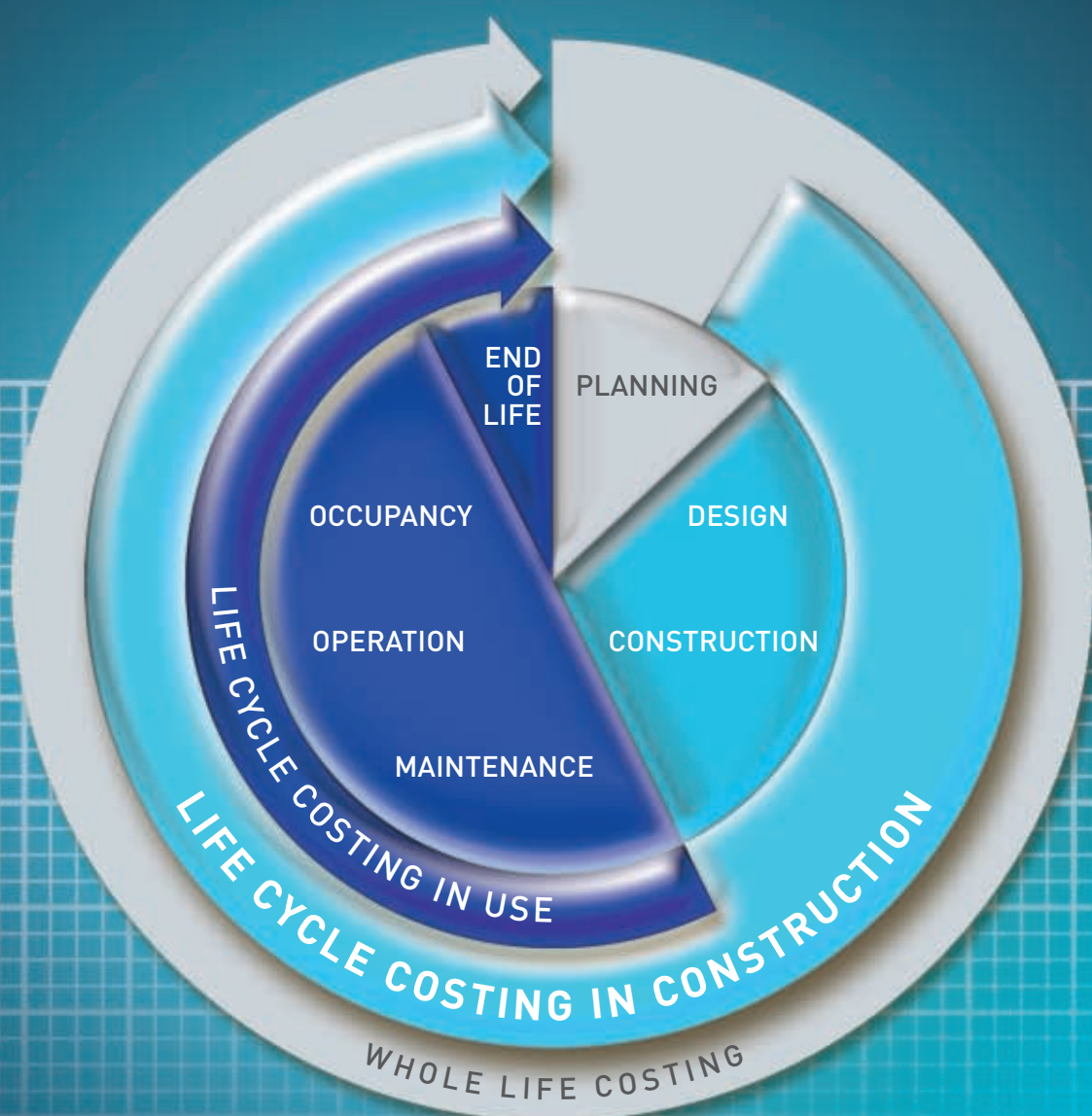


Standardized Method of Life Cycle Costing for Construction Procurement

A supplement to BS ISO 15686-5 Buildings & constructed assets
– Service life planning – Part 5: Life cycle costing



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A supplement to BS ISO 15686-5:2008 Buildings and constructed assets – Service life planning – Part 5: Life cycle costing



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FOREWORD

Publishing Information

This Published Document provides practical guidance on the application in the UK of BS ISO 15686-5. It is published by BSI and came into effect on 30 June 2008. It was prepared by BSI Technical Subcommittee B/500/3, Durability.

Acknowledgements

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Paul Frances	Defence Estates
Adrian Wilkins	Faithful+Gould
Phil Heenan	OGC, Policy Team Leader of Smarter Construction

In the course of its preparation, this document underwent wider consultation amongst practitioners, clients and industry subject experts. Amongst those organizations consulted were:

BSI Consumer and Public Interest Network
Chartered Institution of Building
Construction Confederation
Construction Products Association
Department of Communities and Local Government
Fibre and Cement Manufacturers' Association
Home Office
Institution of Structural Engineers
Scottish QS Faculty Board
Royal Institution of Chartered Surveyors (RICS) Quantity Surveyor's Measurement group

and the following companies and practices:

Bovis Lend Lease
Vita Lend Lease

Carillion
Cyril Sweett
Davis Langdon LLP
E C Harris
Faithful+Gould
Gardiner and Theobald
Gleeds
Operon
Rider Levett Bucknall
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The committee particularly wishes to acknowledge the contribution made by the late Dr D P Wyatt, who as an active member for many years contributed significantly to the development of this document and of BS ISO 15686-5.

Use of this document

The context of this document, and, in particular, its relationship with BS ISO 15686-5, is discussed in the Introduction.

As a guide, this Published Document takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

It has been assumed in the preparation of this Published Document that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

This Published Document is not to be regarded as a British Standard.

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INTRODUCTION

1

What is life cycle costing?

- 1.1 The definitions of life cycle costing used in this document are from the International Standard BS ISO 15686-5: Life cycle Costing. Key definitions include:

Life cycle cost (LCC) is 'cost of an asset, or its parts throughout its life cycle, while fulfilling the performance requirements'.

(BS ISO 15686-5, 3.1.1.7)

Life cycle costing is 'methodology for the systematic economic evaluation of life cycle costs over a period of analysis, as defined in the agreed scope'.

Note: life cycle costing can address a period of analysis which covers the entire life cycle, or selected stage(s) or periods of interest therein.

(BS ISO 15686-5, 3.1.1.8).

- 1.2 There are also some references to whole life costing, which has a broader scope than life cycle costing: (Refer to Annex A for a menu of the cost headings included in whole life costing and life cycle costing.)

Whole life costing is 'methodology for the systematic economic consideration of all whole life costs and benefits over a period of analysis, as defined in the agreed scope'.

Note: the projected costs or benefits may include finance, business costs, income from land sale, user costs.

(BS ISO 15686-5, 3.1.1.15)

The objectives of the Standardized Method for Life Cycle Costing (SMLCC) for Construction Procurement are to provide:

1. A UK standard cost data structure for life cycle costing, which aligns with BS ISO 15686-5 and with the BCIS Standard Form of Capital Cost Analysis (SFCA) and industry recognized occupancy cost codes. (Refer to Annex A, B and C)
2. Life cycle costing practitioners with a standardized method of applying life cycle costing, applicable to the UK construction industry and to the key stages of the procurement process.
3. Process mapping the life cycle costing stages – to help structure how to plan, generate, interpret and present the results for a variety of different purposes and levels of life cycle cost planning.
4. 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.
5. Simplification and demystification – by providing practical guidance, instructions and definitions, together with informative worked examples on how to undertake life cycle costing (for construction).
6. An industry accepted methodology, to facilitate a more accurate, consistent and robust application of life cycle costing estimation and option appraisals – thereby creating a more effective and robust basis for life cycle cost analysis and benchmarking.

This document 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.

What is BS ISO 15686, and why does it need a supplement?

- 1.3 BS ISO 15686 is a multi-part series of international standards giving guidance on various aspects of planning the service life of buildings and constructed assets. It has a wide audience of users, covering all those involved in procuring, designing, constructing and managing, or owning and running buildings. Part 5 covers life cycle costing. It provides guidelines, definitions, principles and informative text on the application of life cycle costing techniques in the context of service-life planning. It also covers some aspects of whole life costing and investment appraisal. It describes links to other aspects of guidance in the rest of the BS ISO 15686 series, such as how cost and environmental appraisal can be used to improve the sustainability of building constructed assets (notably energy performance and carbon emissions). However, it does not cover specific national issues, such as UK cost data conventions and other key aspects, which will be covered by this publication.

Who needs this standardized methodology?

- 1.4 Construction consultants, their professional associations and construction procurement clients and funders jointly need an industry-accepted methodology on how to define the specific briefing requirements and then undertake life cycle costing. By standardizing the application of life cycle costing, in practice it can become more widely used across all forms of private- and public-sector construction procurement. The primary users of this document are expected to be life cycle costing practitioners and clients who commission life cycle costing and also building owners and facilities managers.

Who produced this publication?

- 1.5 This guide was the result of cross-construction-industry collaboration and was produced by a technical drafting team and consultative working group. It is a supplement to BS ISO 15686-5: 2008 Buildings and constructed assets – Service life planning – Life cycle costing. It is hereafter referred to as the *Standardized Method of Life Cycle Costing (SMLCC) for Construction Procurement*.

When to undertake life cycle costing

- 1.6 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. This publication focuses on the application of project life cycle costing for construction procurement. (See Figure 1.1.)

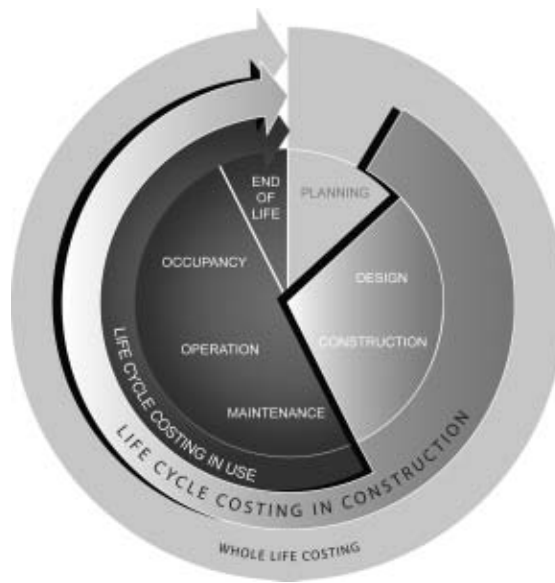


Figure 1.1 Life cycle cost planning at different stages during a building or constructed asset's lifespan.

(adapted from BS ISO 15686-5, figure 4)

How is life cycle costing typically used for construction procurement?

- 1.7 Life cycle costing is an economic evaluation method that takes account of all relevant costs over the defined time horizon (period of study), including adjusting for the time value of money (i.e. net present value [NPV], or internal rate of return, or payback period, if required). The two most common ways in which life cycle costing is used in the UK construction industry are:
 1. to generate a cash flow prediction over a given period of time;
 2. to undertake an option appraisal study, in order to evaluate various solutions to a given design and construction problem.
- 1.8 Cash flow predictions are commonly used in public- and private-sector construction procurement to establish an expenditure profile (e.g. six-monthly or yearly, over the period of study) which can be used to set up a sinking fund for LCCs and also input into a wider economic evaluation (e.g. whole life costing). LCC cash flow predictions are also used as part of a budgeting process.
- 1.9 A prediction of a cash flow over a given period of time may be generated for a single asset (e.g. a boiler) or for a multiple of assets (e.g. an air-conditioning system, or a whole building level).

- 1.10 An option appraisal may use the cash flows of multiple solutions to a problem in order to compare the results – with or without a ‘base case’ (e.g. in Private Finance Initiative [PFI] construction procurement, the base case would be a public-sector comparator; for a component study, the base case could be one type of boiler).
- 1.11 LCC planning of a cash flow or option appraisals can be undertaken at different stages and levels of study, as broadly defined in item 2.9 and items 4.5 and 4.7.

Life cycle costing may be part of a wider economic project evaluation

- 1.12 Life cycle costing may well form part of a wider economic project evaluation, which considers:
- whole life costs (including non-construction costs such as finance, business costs and also income from sales and disposals etc.);
 - whole life value; best value;
 - economically most advantageous tenders (EMAT).

Alternatively, it may feed into a project financial or economic investment appraisal or into a business case.

- 1.13 Life cycle costing may also be considered as part of an environmental or sustainability assessment.

What costs to include/exclude and how to express them

- 1.14 Section 3 of this publication identifies what costs can be included or excluded and how to express them. This includes clarifying the differences between whole life costs (WLC) and LCC. Section 3 also provides a common cost breakdown structure and definitions for the UK construction industry.
- 1.15 Cost data are available from various historical and industry sources such as the BCIS Building Running Costs On Line Service, the International Occupiers Property Databank (OPD) or clients’ and consultants’ cost databases. Some costs, such as energy, may come from a predictive calculation.
- 1.16 Cost data from buildings in use and from manufacturers are available but should be used with caution.
- 1.17 This standardized method of life cycle costing provides a common cost breakdown structure for the UK construction industry, which should help to overcome the confusion over terminology and thereby significantly improve the confidence and robustness of LCC predictions and analysis of future construction projects.

GUIDING PRINCIPLES

2

The process of life cycle costing

- 2.1 The main steps in the process of life cycle costing are:
- define carefully the purpose and scope of the life cycle costing;
 - plan the procedure;
 - establish the rules and methodology to be applied;
 - compile the available information and record the data assumptions;
 - undertake the calculations and validate the results;
 - apply risk and sensitivity analysis;
 - interpret the results carefully;
 - report the results and document all the information and assumptions used;
 - review the report with the client and obtain agreement to the final outputs;
 - do an LCC analysis for comparative benchmarking purposes (optional);
 - release a final authorized and signed copy of the life cycle costing report.
- 2.2 Iterations of the process may be required, and the level of detail and form of analysis and reporting will change over the period of the construction project's procurement life cycle.

Agreeing the brief for life cycle costing

- 2.3 The key requirements in formalizing the brief for life cycle costing are:
- agree the purpose;
 - agree the precise scope of costs to be included and excluded and how to express them (using the standard menu of costs included in Annex A);
 - agree the period of analysis and the method of economic evaluation;
 - agree the level of detail of the LCC plan;
 - establish the specific study inputs and rules (such as: base dates, units of costs and time, discount or inflation rates; indexation for location and tender price adjustment – base build elements; the extent of risks and uncertainty and other sensitivity analysis that is to be applied);
 - confirm whether there is a standard project benchmark or base case to use as a comparator.
- 2.4 The brief will need to be tailored to the client's specific project requirements. In some cases, the life cycle costing practitioner may need to propose a basis for the LCC planning, particularly to clients unfamiliar with life cycle costing. Certain factors may significantly affect the outcomes. It is therefore important to understand the implications of applying certain factors (such as the period of analysis, or the discount rate used) and to make sure these are properly considered at the outset.

Undertaking life cycle costing and analyzing the results

- 2.5 Life cycle costing is a systematic economic evaluation method used to establish an expenditure profile over the period of study. It comprises the following key elements:
- costing of predicted events or activities (to the applicable scope of costs and level of detail);
 - timing of the predicted events or activities;

- analysis of the results (i.e. challenging and validating the outputs against the project brief);
 - applying factoring methods and sensitivity analysis to the results (as defined in Section 6).
- 2.6 Life cycle costing may feed into a project economic investment and or project option appraisal, which may also draw on techniques such as environmental assessment, risk assessment modelling and benefit assessment. All of these techniques share the same basic principles that they should be objective, evidence based and performed at an appropriate level of detail, as agreed in the project-scoping brief.
- 2.7 LCC planning can be used to compare different design solutions with different cash flows, with or without having a base case (e.g. comparing alternative cladding forms with a brick and block work cavity wall construction).
- 2.8 The level of study will depend on the stage of project procurement and the available data to input.
- 2.9 An LCC plan may cover a single asset or multiple assets. Possible levels of study are:
- multiple assets or portfolio/estate level;
 - single asset or whole building level;
 - cluster level (multiple element, e.g. all windows and doors);
 - element level (e.g. a roof);
 - system level (e.g. an air-conditioning system);
 - component or sub-component level (e.g. a boiler).

Refer to the worked examples included in Annex D, which illustrate how to undertake a life cycle costing at a whole building level and also at a system and component detailed level.

- 2.10 The most appropriate available data sources should be used. These may be in the public domain or not, but the origin should be recorded. Refer to Section 7.
- 2.11 Identify the relevant risks and uncertainty and agree the mitigation and sensitivity analysis to be applied.

Refer to Section 6 and the example of an LCC risk log included in Annex E.

LCC reporting and producing the required outputs

- 2.12 Define the reporting and form of the required outputs in the scoping of the client's particular brief, including what will be the specific use of the outputs and precise cost-breakdown requirements. In addition, agree how the life cycle costing calculations will be checked and validated and then reported, reviewed and sanctioned by the client.

(See Section 4, which describes the typical uses of the LCC plan and outputs required for specific purposes, including discounting of future costs and dealing with end of life cost.)

- 2.13 Reporting of the LCC plan may be at a lesser level of detail than the underlying analysis. For example, analysis may be at elemental level, whereas reporting may be at whole-building level.
- 2.14 Life cycle costing has many variables, so it is important to record the purpose, scope and the form and level of economic evaluation and also all the underlying assumptions, information and data sources used. See Section 7 for general guidance and instructions.

- 2.15 The limitations of the LCC plan and known interfaces with other reports should be reported.
- 2.16 Retain the records and/or original data sources for an appropriate period of time after completion of the LCC plan and the final report.
- 2.17 It is important to understand what costs (and incomes, if applicable) are included in the LCC plan, to avoid omissions or double counting.
- 2.18 This publication provides a standard form for LCC analysis, in Annex F, to help structure capturing project LCCs for use in future cost planning and benchmarking studies. This form should be used in practice to enable and inform the accuracy of comparative LCC analysis, including highlighting any customization or specific divergence in the client's project brief.

LIFE CYCLE COST DATA

3

STRUCTURE AND DEFINITIONS

What costs to include or exclude and how to express them

- 3.1 Agreement should be reached as to the precise scope of what relevant costs are to be included or excluded and how to express them before attempting to undertake a life cycle costing study.
- 3.2 This section provides a UK cost data structure for life cycle costing and clarifies which costs are part of the whole life cost (WLC) and which should normally be included under the major cost headings for LCC as shown in Figure 3.1.

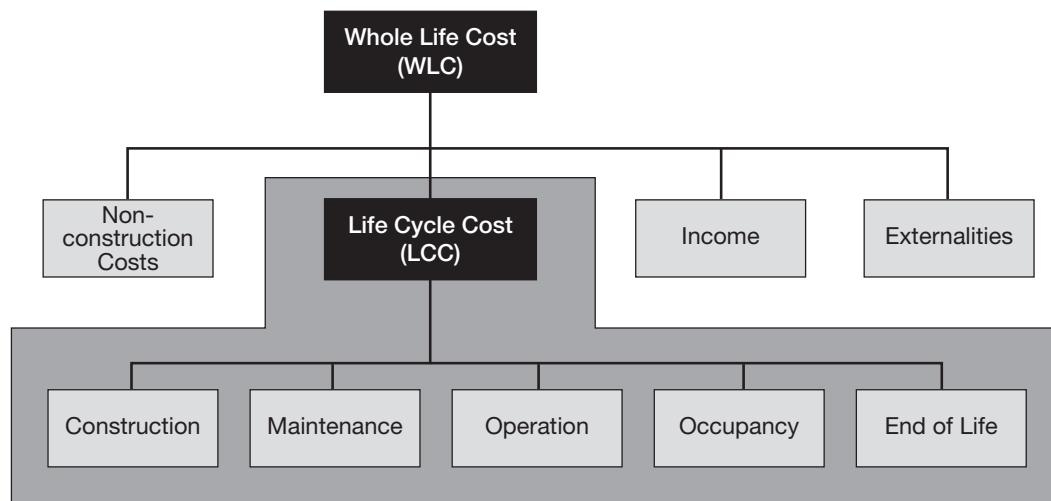


Figure 3.1 Illustrating the difference between whole life cost (WLC) and life cycle cost (LCC).

(adapted from BS ISO 15686-5, figure 2)

- 3.3 Figure 3.1 is based on the BS ISO 15686-5 standard cost breakdown structure and menu of costs.
- 3.4 Occupancy costs are included in BS ISO 15686-5 as part of the non-construction costs, but it is common practice in the UK to include relevant occupancy costs within the LCC.
- 3.5 Major repairs and replacement costs are commonly known as the 'life cycle replacement costs', excluding the annual planned preventative maintenance, minor repairs and unscheduled maintenance.
- 3.6 This publication provides a standardized method for life cycle costing based on linking the capital costs convention in BCIS Standard Form of Cost Analysis format (which may be for a new build, major capital investment or refurbishment of an existing constructed asset) to the generation of the LCC plan.

(See Annex C, which maps how the UK construction industry accepted capital costs categories link to life cycle costing and to the total occupancy cost conventions using the BCIS standard form of cost analysis elemental cost categories and the International Total Occupancy Cost [ITOC] codes.)

UK LCC data structure and definitions

3.7 The standard cost breakdown for life cycle costing, for UK construction procurement, is provided in Table 3.1.

Table 3.1 UK LCC data structure and definitions

Item	Life Cycle Cost Category	Definitions
1.0	Construction costs	Costs payable by the client, for and in connection with the initial new building works and/or refurbishment works.
1.1	Construction works costs	Cost of initial construction of the building and external works. Presented in the BCIS Standard Form of Cost Analysis (SFCA) format – adopting the elemental cost structure and coding: 1. Substructure 2. Superstructure 3. Finishes 4. Fittings 5. Services 6. External works 7. Preliminaries 8. Contingency (including risk allowances) 9. Contractor's design fees.
1.2	Other construction related costs <i>Note – Excluded from the life cycle costing of maintenance activities, but could be included in the overall life cycle costing study</i>	Costs in connection with the initial construction. For example: • Design related consultancy fees • Special client costs – e.g. launch events and associated marketing costs • Decanting (when not in the preliminaries) • Infrastructure charges • Infrastructure adoption and maintenance costs • Highway costs • Utility charges • Licenses and permits • Planning application/permission fees and building regulation fees • Planning gain and other community financial contributions • Party wall costs • Rights to light costs • Client's design development and project risk register contingency, i.e. risk allowances (if not included to 1.1).
1.3	Client definable costs	Other construction related costs that the client wants to include in the life cycle cost plan. For example for schools projects abnormalities and enhancements are costed separately.

Item	Life Cycle Cost Category	Definitions
<i>Note 1 – Construction works should be presented as the BCIS Standard Form of Cost Analysis (SFCA) elements and sub-elements for buildings and external works.</i> <i>Note 2 – Where separate enabling works contracts are included in the construction costs they should be shown separately in 1.2. Enabling works are defined as works required to allow the construction works to proceed, but have no future life cycle costs to the client, e.g. land remediation. Otherwise include in 6.1 whole life costs.</i> <i>Note 3 – Construction costs for works or furniture, fittings and equipment (FF&E) that will not be maintained by the client, which will not therefore contribute to ongoing liabilities for life cycle costing, should be shown separately. For example roads to be adopted or equipment maintained/replaced by the occupier or user.</i> <i>Note 4 – The initial costs of items forming part of occupancy costs, such as information and communication technology (ICT) or unfixed furniture, fittings and equipment (FF&E) should be shown separately.</i> <i>Note 5 – Refer to Section 5 'Metrics' for guidance on presenting and comparing the costs.</i> <i>Note 6 – Value added tax (VAT) is normally excluded (but if it is included, it must be stated separately).</i>		
2.0	Maintenance costs	
2.1	Major replacement costs	Scheduled replacement of major systems and components. This will form the detailed asset life cycle replacement cost programme.
2.2	Subsequent refurbishment and adaptation costs	Scheduled refurbishment and adaptation during the period of analysis. Exclude refurbishment and adaptation carried out as part of the initial construction, which should be included under the construction costs in 1.1.
2.3	Redecorations	Scheduled redecorations. Excludes redecorations carried out in connection with 2.1, 2.2, 2.4 and 2.5.
2.4	Minor replacement, repairs and maintenance costs	Scheduled replacement of parts and scheduled maintenance and repairs to components and associated making good and minor redecorations including planned preventative and/or reliability centred maintenance.
2.5	Unscheduled replacement, repairs and maintenance costs	Allowance for unforeseen or unplanned maintenance arising from early failure, inappropriate use etc.
2.6	Grounds maintenance	Where it is costed separately (e.g. tree replacement, lawn mowing and landscape maintenance). Note – normally grounds maintenance is included with the external works element.
2.7	Client definable costs	Other maintenance related costs that the client wants to include in the life cycle cost plan.

Item	Life Cycle Cost Category	Definitions
<i>Note 1 – Major replacement (2.1) and subsequent refurbishment (2.2) redecorations (2.3) should generally be shown in BCIS SFCA element and sub-element cost structure categories, for buildings and external works – as listed in item 1.1 above.</i> <i>Note 2 – Minor replacement, repairs and maintenance costs (2.4) and unscheduled replacement, repairs and maintenance costs (2.5) and grounds maintenance (2.6) can be presented in an elemental cost structure, but are normally calculated as whole building costs. (Note – see the informative worked example Annex D).</i> <i>Note 3 – The split between ‘major’ and ‘minor’ replacement will depend on the funding arrangements and contractual interface agreements, and should be defined on each project. For example, if a life cycle major replacement fund is set up, it may be defined by the life of the components or the cost of the replacement. It is recommended that the detailed splits by assets or sub-asset should be made transparent and recorded in an interface agreement.</i> <i>Note 4 – Redecorations costs can be included within their associated elemental costings – e.g. they may be part of maintenance, costs, or in with other major LCC works sections – depending on the client specific requirements.</i> <i>Note 5 – Include all costs or income from disposal of replaced components and parts, where applicable.</i> <i>Note 6 – Include and show separately all overheads, associated temporary works, access costs, out of hours premium, design and commissioning costs etc., in connection with replacement, maintenance and repairs.</i> <i>Note 7 – Include inspections (statutory and others) carried out as part of maintenance contract work. General inspections commissioned separately by or on behalf of the client should be included in ‘3.3 Administrative costs’.</i> <i>Note 8 – Include costs for the contractor’s management of the works and on- costs etc. – including any life cycle fund and management of the direct employed labour (DEL) where those costs are considered to be direct overheads to the work.</i> <i>Note 9 – Refer to Section 5 ‘Metrics’ for guidance on presenting and comparing the costs.</i> <i>Note 10 – Value added tax (VAT) is normally excluded (but if it is included, it must be stated separately).</i>		
3.0	Operation costs	Costs of operating the building and external works arising from the building itself rather than from its occupancy, excluding maintenance costs.
3.1	Cleaning costs	Cleaning costs include periodic, routine and specialist cleaning: 3.1.1 Windows and external surfaces Cleaning windows, curtain walling, glazed screens, cladding, sun screening etc. Exclude the cleaning of external wall surfaces accompanied by restoration (e.g. stonework); this should be included in ‘Maintenance costs’.

Item	Life Cycle Cost Category	Definitions
3.1	Cleaning costs (continued)	3.1.2 Internal cleaning Cleaning of internal surfaces. Includes; • Cleaning floors, vacuum cleaning and shampooing carpets • Cleaning internal surfaces of windows • Cleaning internal wall surfaces • Dusting and cleaning ledges, furniture and fittings • Emptying waste bins • Consumables to toilet facilities (e.g. paper towels, laundering roller towels, soap etc.) • Other client definable items. Excludes washing down walls or paintwork done in lieu of redecoration, which is included in 2.3 Redecorations. 3.1.3 Specialist cleaning • Kitchen cleaning • Atrium cleaning • Other user definable items. 3.1.4 External works cleaning • Cleaning of roads, paved areas etc. • Cleaning street furniture • Litter collection • Emptying waste bins • Snow clearing • Graffiti removal • Other client definable items.
3.2	Utilities costs	3.2.1 Fuel Show cost of different fuels separately e.g. • Gas • Electricity • Fuel oil • Solid fuel (define) • Other (e.g. wood chips for biomass boilers). Include any income from renewable energy (e.g. income from selling energy back to the national grid, or generated for other usages). Exclude cost of boiler men and such labour attending on mechanical and electrical equipment, which are included in '3.3 Administrative costs'.

Item	Life Cycle Cost Category	Definitions
3.2	Utilities costs (continued)	3.2.2 Water and Drainage - Water rates - Effluents, sewerage and drainage charges - Others.
3.3	Administrative costs	User support costs related to the operation of the building and external works 3.3.1 Property Management All costs involved in managing the operation and maintenance of the building. Includes: - Supervisory staffing e.g. building supervisor, maintenance manager, facilities managers etc - Professional staff or consultants e.g. architects, engineers, surveyors - Clerical staff and administrative staff - General and regulatory surveys commissioned by or on behalf of the client. Excludes: - Contractors management of the works and of any life cycle fund and management of direct employed labour (DEL) whose costs are considered direct overheads to the work and should therefore be included in '2.0 Maintenance costs' - Inspections, including statutory inspections, carried out as part of maintenance - Dilapidation surveys and residual life surveys and inspections carried out in connection with disposal should be included in 5.1 Disposal inspections. - Strategic asset management, estate agents fees etc. 3.3.2 Staff engaged in servicing the building Contractors or directly employed staff attending upon the equipment directly serving the building. Including operatives partly responsible for maintenance and/or operation of equipment whose costs cannot be allocated to specific functions such as caretakers.

Item	Life Cycle Cost Category	Definitions
3.3	Administrative costs (continued)	Include: • Labour attending upon the mechanical and electrical equipment • Security staff for the building (i.e. operatives resource time) • Toilet attendants • Caretakers • Consumables – materials and equipment required by staff engaged in servicing the building. Exclude: • Porters • Reception. 3.3.3 Waste management/disposal Contractors or directly employed staff engaged in the collection, compaction, removal and disposal and or recycling or waste from buildings or their grounds. Includes: General waste Toxic waste Confidential waste Sanitary waste Recycling costs Other client definable items.
3.4	Overheads costs	Property insurance Premiums for insuring the property.
3.5	Taxes (if applicable)	Rates and other local charges payable in connection with owning the building.
3.6	Client definable costs	Other operation related costs that the client wants to include in the life cycle cost plan.

Item	Life Cycle Cost Category	Definitions
<i>Note 1 – Staff costs should include salaries, wages, expenses, overtime, insurances, administrative support, overheads, accommodation, supply of uniforms, travel costs, pensions etc.</i> <i>Note 2 – Exclude costs that relate to the occupancy of the building such as laundry and bathroom consumables to hotel rooms.</i> <i>Note 3 – Security, include the cost of staff, or contractors involved in providing security to the building. The cost of maintaining security equipment should be included in maintenance. The cost of staff or contractors involved in providing security in connection with the occupancy of the building should be included in occupancy costs.</i> <i>Note 4 – Include and show separately all overheads, associated temporary works, access costs, out of hours premium, design and commissioning costs etc., in connection with operation costs.</i> <i>Note 5 – Refer to Section 5 'Metrics' for guidance on presenting and comparing the costs.</i> <i>Note 6 – Value added tax (VAT) is normally excluded (but if it is included, it must be stated separately).</i>		
4.0	Occupancy costs	User support costs relating to the occupation of the building.
4.1	Internal moves (churn)	
4.2	Reception and customer hosting	
4.3	Security	Refer to operations and maintenance costs notes on security.
4.4	Helpdesk	
4.5	Switchboard/telephones	
4.6	Post room – mail services/courier and external distribution services	
4.7	ICT and IT services	
4.8	Library services	
4.9	Catering and hospitality	
4.10	Laundry	
4.11	Vending	
4.12	Occupant's furniture, fittings and equipment (FF&E)	May also include specialist equipment, such as medical equipment, equipment management etc.
4.13	Internal plants and landscaping	
4.14	Stationery and reprographics	
4.15	Porters	

Item	Life Cycle Cost Category	Definitions
4.16	Car parking charges	Split into customer parking/staff and operational parking.
4.17	Client definable costs	Other occupancy costs that the client wants to include in the life cycle cost plan – e.g. business support costs such as: • disaster recovery • archiving • transport costs • other client definable items.
<i>Note 1 – Occupancy costs are classified in the BS ISO menu of costs as part of the ‘non-construction costs’ included under ‘User support costs (3) Administration’, and are therefore excluded from life cycle costing. In the UK clients may require that some of these costs form part of a life cycle cost study.</i> <i>Note 2 – Where an initial investment is required, e.g. information and communication technology (ICT) services, or unfixed furniture, fittings and equipment (FF&E) the initial cost should be shown separately under ‘Construction’ in 1.1.</i> <i>Note 3 – Include and show separately all overheads, associated temporary works, access costs, out of hours premium, design and commissioning costs etc., in connection with occupancy costs.</i> <i>Note 4 – Refer to Section 5 ‘Metrics’ for guidance on presenting and comparing the costs.</i> <i>Note 5 – Value added tax (VAT) is normally excluded (but if it is included, it must be stated separately).</i>		
5.0	End of life costs	Costs payable and credits accruing at end of period of analysis.
5.1	Disposal inspections	Cost of inspections carried out in connection with demolition, dilapidations or other contractual requirements.
5.2	Demolition	Cost of demolition of the building at end of life or period of interest and landfill and recycling or disposal costs.
5.3	Reinstatement to meet the contractual requirements	Cost of dilapidations or for complying with other contractual obligations to return the building to a set standard of repair.
5.4	Client definable costs	Other end of life costs that the client wants to include in the life cycle cost costing.
<i>Note 1 – The ‘end of life’ for most life cycle costing calculations will be the end of the study period, and/or investment period, and not the end of life of the building.</i> <i>Note 2 – Include and show separately all overheads, associated temporary works, access costs, out of hours premium, design and commissioning costs etc., in connection with end of life costs.</i> <i>Note 3 – Refer to Section 5 – Metrics for guidance on presenting and comparing the costs</i> <i>Note 4 – Value added tax (VAT) is normally excluded (but if it is included, it must be stated separately).</i>		

Whole Life Cost Elements: these costs may be relevant, if LCC is part of a wider economic evaluation		
	Whole Life Cost Category	Definitions
6.0	Non-construction costs	
6.1	Land and enabling works	Site costs (acquisition costs of the land and existing building).
6.2	Finance costs	Interest or cost of money and wider economic impact.
6.3	Rental costs	
6.4	User support costs (1) – strategic estate management	Includes in-house resources and real estate/ property management/general inspections, acquisition, disposal and removal.
6.5	User support costs (2) – space charges	PFI/PPP Service/Unitary charges, parking charges, charges for associated facilities.
6.6	Taxes on costs	Taxes on non-construction costs.
6.7	User definable costs	Other whole life costs that the user wants to include in the whole life cost plan.
<i>Note 1 – ‘User support costs (3) Administration’ is classified as ‘Non-construction cost’ in the BS ISO but has been included in the UK Supplement LCC structure as ‘4.0 Occupancy costs’</i>		
7.0	Income	Income and other costs
7.1	Income from sales	Residual value on disposal of interest in land, constructed assets or salvaged materials, including grants etc.
7.2	Third party income during occupation	Rent and service charge payments PFI/PPP service/unitary payments.
7.3	Taxes on income	Taxes on land transactions and tax rebates (if applicable).
Item	Whole Life Cost Category	Definitions
7.4	Loss of income	Disruption, downtime loss of income and any relevant demands (e.g. contractual performance payment deductions).
7.5	Client definable income	Other income that the user wants to include in the whole life cost plan.
8.0	Externalities	Costs associated with the asset, which are not necessarily reflected in the transaction costs between provider and consumer.
8.1		Client defined externalities to be included – if required.

Units of costs: real, nominal and discounted costs

- 3.8 In elemental LCC planning, the principal unit of costs for all elements of cost in scope shall be expressed in pounds sterling to two decimal places per square metre of gross internal floor area (GIFA).
- 3.9 In component LCC planning, the design and service-life performance criteria should be costed for against the systems, elements or components in scope. Special design and functional performance requirements shall be identified where applicable (e.g. energy usage and carbon-emissions targets).
- 3.10 Annual, periodic and cyclical costs are calculated at real costs (i.e. current prices with no allowance for inflation) within a cash flow over the required time period.
- 3.11 Nominal costs are expected costs at the date when the cost is due to be paid (e.g. technology replacement costs at the time when it is replaced or becomes obsolete).
- 3.12 The LCCs can be discounted and expressed as an NPV or some other form of economic valuation, such as internal rate of return (IRR) or payback period (PB).

Guidance on how to do a discounted life cycle costing is provided in BS ISO 15686-5: Annex B.

- 3.13 Lump sums and percentage adjustments shall be apportioned to the appropriate elements or cost categories.
- 3.14 Design fees and other consultancy fees, included in scope, should be stated for each element of the LCC plan, e.g. construction, maintenance, operation, occupancy and end of life.
- 3.15 Preliminaries, on costs, overheads and profit, out-of-hours working allowances, site preparation costs etc. should be shown separately, if required to be included in the scope of the life cycle costing.
- 3.16 Contingency should include the employer's contingency and any allowances for uncertainty and risks.
- 3.17 A list of costs specifically excluded from the life cycle costing should be stated, e.g. furniture, information and communications technology (ICT) etc.

Glossary of cost definitions commonly used in the UK construction industry

- 3.18 The following cost definitions are commonly used in the UK construction industry and should be read as being in addition to the definitions provided in Section 8.
 - **annual equivalent** the present value of a series of discounted cash flows expressed as a constant annual amount.
 - **base cost, or benchmark cost** the existing or selected situation against which improvement options can be compared or a specific solution selected as a benchmark against which other options can be measured.
 - **base rate** the interest rate selected as the basis of the discount rate. This could be the current bank rate or client's opportunity cost of capital. The base rate is commonly adjusted by the inflation rate to give the discount rate.
 - **depreciation** the distribution of the monetary value of an asset over the period of time commonly related to its productive or useful life.

- **design life** intended service life, or expected service life, or service life intended by the designer.
 - **discount rate** the interest rate used for bringing future costs to a comparable time base.
 - **hard facilities management costs** the cost of necessary replacement, redecoration, repair and corrective, responsive and preventative maintenance necessary for the continued specified functional performance of the asset.
 - **inflation/deflation** a sustained and measurable increase/decrease in the general price level.
 - **internal rate of return** the discount rate that, when applied to a cash flow containing positive and negative amounts, gives an NPV of zero.
 - **physical life of a component** the time at which a component fails to meet the performance criteria required of it and has to be removed and replaced.
 - **residual life** when applied to an asset it is that remaining at the end of the study period.
 - **residual value** the value assigned to an asset at the end of the period of study.
 - **service life** period of time after installation during which a building, or its part, meets or exceeds the performance requirements.
 - **sinking fund** fund accumulated by equal payments made at regular time periods into an account which attracts a given interest rate to accumulate a required sum of money established prior to undertaking the sinking fund calculations.
 - **soft facilities management costs** all costs incurred in operating and managing the facility or constructed assets, including administration support services, cleaning, security, rent, rates, insurances, energy, local taxes and charges etc.
 - **sunk costs** costs of labour, goods and services already incurred or irrevocably committed.
 - **terminal value** the scrap value of a component or asset at the point of its replacement.
 - **Treasury discount rate** the rate specified as the discount rate by the Government Treasury to be used as the discount rate for public-sector whole life costing calculations.
- 3.19 There will be other cost definitions peculiar to a sector, or to the client's specific project funding and accounting protocols. For example, for the Building Schools for the Future programme, in order to comply with the project funding requirements, the construction costs are split into the base build costs, separate from other supplementary costs, such as:
- **abnormal costs**
 - work to the existing site (e.g. phasing, demolition, temporary accommodation, protection, tight site working arrangements etc.);
 - site investigation works (obstructions, site levels, contamination etc.);
 - foundations (extra over base build);
 - statutory bodies (e.g. planning, listed buildings, service connections, diversions);
 - environmental costs (e.g. acoustics standards, petrol interceptors, land drainage);
 - **enhancement costs**
 - environmental treatment (e.g. solar panelling, triple glazing, new technologies);
 - security provisions (e.g. extra provisions for inner-city situations);
 - site landscaping (e.g. trim trail, running tracks etc.);
 - other user-definable items (e.g. additional teaching areas, extra car parking).

Note: specific guidance on schools-sector cost structuring can be found on the Partnerships for Schools (PFS) website (www.p4s.org.uk).