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briefing note contents

What is Whole Life Costing, Life Cycle Analysis and Life Cycle Costing?

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This Briefing Note was produced on behalf of Willmott Dixon by WD Re-Thinking Ltd

Definitions: Whole Life Cost and Life Cycle Cost

The terms Whole Life Cost (WLC) and Life Cycle Cost (LCC) have been used interchangeably – and their meanings have become confused. Furthermore, the components of a whole life cost calculation have varied from client to client, consultant to consultant and among contractors.

With no common ground, clients could not be sure what they were asking for, comparisons were impossible and it was difficult to work out whether actual costs had matched up to the estimates.

This unsatisfactory situation began to be addressed in June 2008, with the publication of two documents on life cycle costing: an international standard and a UK supplement.

The international standard, BS/ ISO 15686-5 Buildings & Constructed Assets, set out clear definitions for the two terms:

Whole Life Costing (WLC)

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

Another definition is "an economic assessment considering all agreed projected significant and relevant cost flows over a period of analysis expressed in monetary value. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability".

Life Cycle Cost (LCC)

This is the cost of an asset, or its part throughout its cycle life, while fulfilling the performance requirements.

Source: BS/ ISO 15686-5 Buildings & Constructed Assets: Service Life Planning: Life Cycle Costing

Its UK supplement, 'Standardised Method for Life Cycle Costing for Construction Procurement' clarifies the definitions for the UK market and sets down in detail how companies should go about working out a life cycle cost plan.

Broadly, life cycle costs are those associated directly with constructing and operating the building; while whole life costs include other costs such as land, income from the building and support costs associated with the activity within the building. The expertise of the construction industry is best placed to deliver life cycle costs, which its clients can then use to calculate whole life costs.

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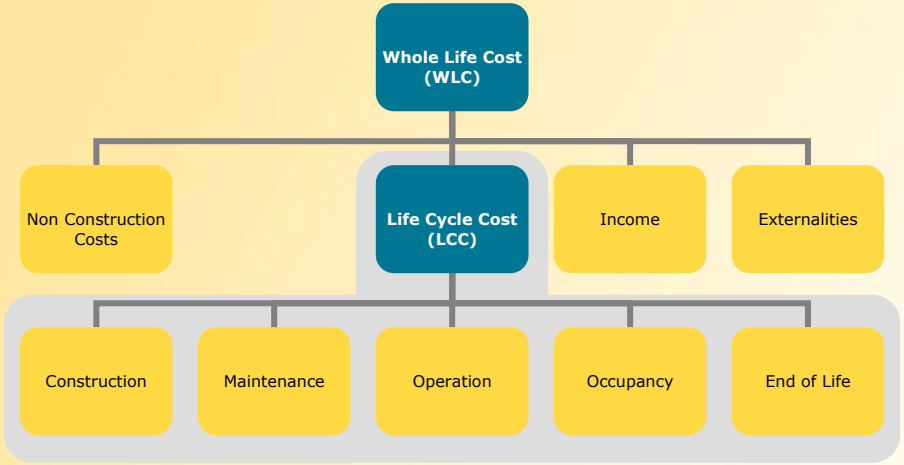
Agreement on these definitions and a consistent approach should enable life cycle costing and whole life costing to become more widespread.

The diagram below illustrates the difference between WLC and LCC (*adapted from BS ISO 15686-5*).



What is Life Cycle Analysis?

LCA is an assessment of the environmental impact of a product or service throughout its life-cycle, from cradle-to-grave. The Building Research Establishment's "Green Guide" is a database of the LCA of a variety of construction products. The Green Guide rates each product on an A+ to E ranking system, where A+ represents the best environmental performance/least environmental impact, and E the worst environmental performance/most environmental impact.

The environmental rankings are based on Life Cycle Assessments (LCA), using BRE's Environmental Profiles Methodology 2008.

The Life Cycle Assessments of elements can be obtaining the Green Guide rating for the generic element (see http://www.thegreenguide.org.uk/) OR obtain validation of the environmental product declarations or other independently validated LCAs available on the chosen products, if available. **http://www/green book live.com**

Why are these included in the Willmott Dixon 10 Point Plan?

Willmott Dixon Construction recognises that the choice of materials/products for each project has direct and indirect impacts on the environment, as well as the capital and operational costs. Carrying out this WLC and LCA exercise enables project teams to demonstrate that they have considered the environmental and economic impacts of their decisions and chosen the best materials/products for the job.

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On every project whole life cost comparisons should be carried out on 5 chosen elements/products *and* their alternatives. The following considerations are made:

- Identify the period of analysis with reasons for choice if less than 60 years is chosen.
- Identify the discount rate to be applied. This should be 3.5% unless project requirements give other discount rates to apply.
- Inflation should be assumed at zero, unless project requirements give other inflation rates to apply.
- Investigate the replacement periods of the chosen products, using generic data from BCIS or manufacturers data. These costs to be put on the form in the relevant years.
- Identify on going recurring costs such as energy costs, maintenance etc.

The five key elements on the project that have significant impact are chosen (e.g. windows, frame, roof, floor slab, internal walls, external walls). The 5 chosen should be those that:

- Have high capital costs,
- Are products that may generate energy, waste or water savings
- Reduced maintenance and running costs.
- New products that are unknown to the project team.

BREEAM Requirements

Two credits are available as follows:-
1st credit is obtained if carried out at RIBA Stages B or C
LCC study must cover construction, operation, maintenance and end of life.
Study period of 25 or 30 (as appropriate) **AND 60 years**
It should be expressed in real, discounted and non-discounted cash flows

Analyses at strategic and system level of at least two of:

Structure,
Envelope
Services, finishes

The option with lowest discounted LCC preferred assuming it results in lower energy consumption, reduction in maintenance, prolonged replacements or dismantling / recycling / re-use.

The Model needs to be updated during stages D and E

Note you can only get 2nd credit if 1st credit obtained.

The Feasibility stage study should be incorporated in the specification, final design and construction

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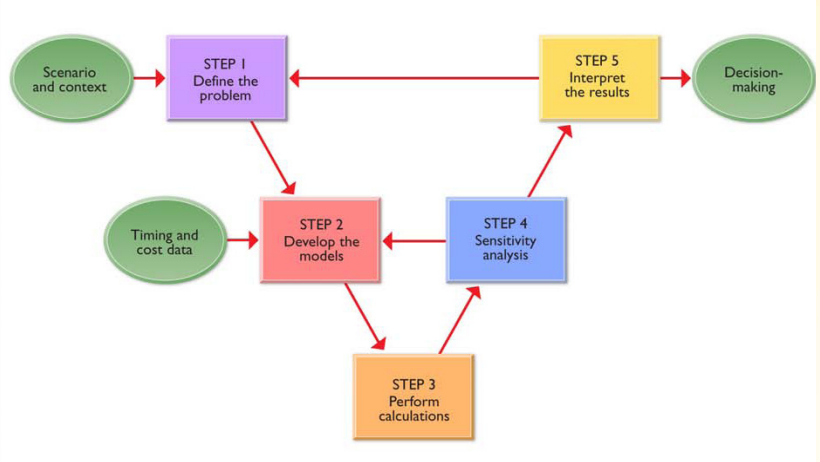
Practical Application

The scenarios that affect the WLC are explored and WLC models on a number of levels

a) Whole building
b) Sub-elemental
c) Component level
d) Discounted and present day value (NPV)

Each WLC/ LCC exercise should follow this basic step by step approach. It is important to define what is required by the exercise.



Source BSRIA BG 5/2008

Application of WLC / LCC techniques provides our clients and end-users with improved awareness of the factors that drive cost and the resources required by them for building. It is important that these cost drivers are identified so that most management effort is applied to the most cost-effective areas of the building.

These techniques do not accurately predict the cost of occupying and operating the building over it's life, but they do allow economic judgements to be made between alternative technical solutions.

Whole life costing should be carried out at different stages through out the project from feasibility to detailed design stages. As the design progresses a more detailed WLC/LCC analysis can be undertaken by incorporating actual manufacturers cost and life expectancy data.

Where the choice of design solution provides for reductions in energy usage input from Services Consultants will be required to calculate these reductions prior to a WLC calculation being carried out.

In order to carry out meaningful detailed analysis a significant amount of time and effort is required in order to obtain the relevant data. In the short term Willmott Dixon are adopting a BSRIA WLC spread sheet to carry out these calculations in order to build into a comprehensive database.

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