BUILDING ACT CONSIDERS LIFE CYCLE COSTS

Life cycle costing allows the costs of different design and material options to be compared over the life of a building. It is now used as part of the assessment of proposed changes to building regulations.

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Life cycle costs are the costs incurred over the life of a building, including the initial cost and ongoing costs such as those involved in operation, maintenance, renovation and disposal. The Building Act makes mention of life cycle costs by having, as one of its purposes, the consideration of 'the costs of a building (including maintenance) over the whole of its life' and 'the need to facilitate the efficient use of energy...'

What is life cycle costing?

Building design and material choice affect ongoing costs. Life cycle costing allows the options to be compared on a consistent basis, and shows which are the most economical, long term. The technique considers the time value of money, such that a cost incurred in the future is valued at a lower amount than the same expenditure now. The discounting of future costs depends on the discount rate, which is normally the real cost of borrowing – say, a typical mortgage of about 9% per year less inflation.

For example, brick cladding on a house may have a higher initial cost than painted fibre cement or ply sheet claddings, but its maintenance cost will be lower. Figure 1 shows the equivalent annual costs for different types of cladding. All costs are discounted to the present and then spread out over the life of the cladding (assumed to be 50 years for fibre cement sheet and 80 years for clay brick). Cavity batten, jointing and painting costs are included in the fibre cement option. Figure 1 indicates that brick cladding is cheaper below a 5% discount rate, whereas above 5% fibre cement is cheaper, for the particular initial and maintenance costs assumed.

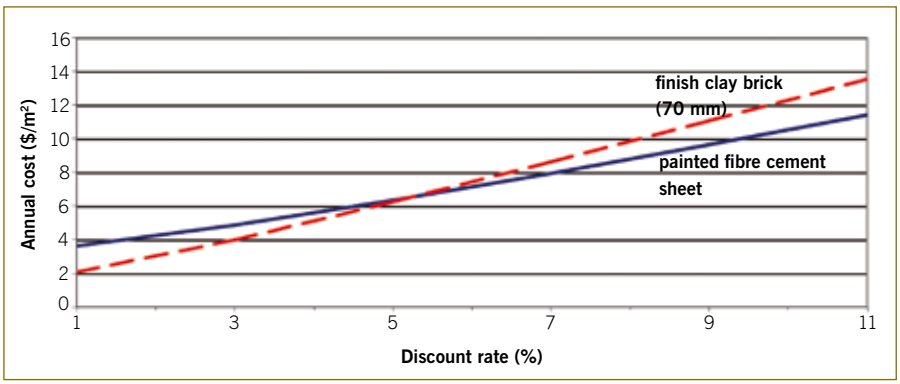

Figure 1: Life cycle costs – clay brick versus fibre cement cladding.

Cost-benefit of Building Code changes assessed

Life cycle costing can be applied to assess New Zealand Building Code changes. Under general Cabinet directives, a regulatory impact statement (RIS) is required for any new regulation or change, and this includes changes to Standards. This RIS often includes a cost-benefit analysis so that costs and expected benefits are quantified in monetary terms, where possible. So, although the new Act does not specifically mention benefits, these will usually be included as well as costs when considering new or amended building regulations.

The analysis need not indicate a net benefit for the regulation to be approved. →

Table 1: Recent examples of the use of cost-benefit analysis for proposed Code changes.

NZBC Clause	Actual/proposed change	Costs and benefits considered
B1 *Structure*	Adoption of a new loading standard.	Initial cost changes in typical buildings. Earthquake and wind damage changes dependent on time of event.
B2 *Durability*, E2 *Moisture*	Drained cavities, extra waterproofing around openings.	Extra construction costs. Reduced water damage savings.
G6 *Airborne and impact sound*	Sound attenuation for apartments.	Sound reduction costs. Health benefits for occupants.
H1 *Energy efficiency*	Increased thermal insulation in new housing.	Insulation/double glazing costs. Space conditioning energy savings.

If there is a net cost associated with the proposed change, or if the benefits are difficult to express in dollar amounts, Government may still approve the measure if other policy objectives, such as improved health and safety, or carbon emission savings, are achieved.

Table 1 shows some recent examples of the use of cost-benefit analysis for proposed changes. In all cases, there are extra initial costs which are partly or totally offset by ongoing cost savings.

LIFE CYCLE COSTING VERSUS LIFE CYCLE ANALYSIS

Articles sometimes confuse life cycle costing with life cycle analysis. Life cycle costing is a subset of a much wider and more difficult analysis contained in life cycle analysis. Life cycle costing only quantifies the dollar amounts of design options and regulation changes. Life cycle analysis has a much wider scope and is concerned with the sustainability impact of design options and regulations.

There are four aspects to sustainability – environmental, economic, social and cultural. Environmental aspects may include greenhouse gas emissions, water pollution, depletion of non-renewables, air pollution, ecological toxicity, and embodied energy. Economic factors include the same ones as in life cycle costing, but may also include economy-wide multiplier effects, whereby the proposed change affects economic growth. Social and cultural issues include how the proposed change affects society and may include consideration of cultural impacts, and impacts on families, local communities, and ethnic groups.

Life cycle costing derives a single value for each option, representing its total cost over the life of the measure. However, life cycle analysis will derive a variety of results for each impact, usually in different units of measure. It then becomes a question of how to rate each impact (e.g. low, medium or high). Further, decisionmakers may require a single score for each option (i.e. a green rating scheme), in which case the different aspects need to be combined. This is often done by a group of experts who assess a weighting that should be given to each aspect in terms of the overall impact on society. There is no 'right' answer as to what this weighting should be and different communities and decisionmakers will have different priorities.

OLD BUILD ARTICLES ON LIFE CYCLE COSTS

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Also see *Life cycle costs of selected claddings for non-residential buildings*. BRANZ Study Report 097 (2002). Available from www.branz.co.nz.