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Reference: 2003 Independent Living BC Non-Profit Housing  
Design and Construction Standards  
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**SUBJECT:**

Evaluation of Alternatives - Life Cycle Costing Protocol

**REFERENCE:**

*2003 Independent Living BC Non-Profit Housing Design and Construction Standards (ILBC Standards)*, Section 4 - Construction Standards, section 01240 Evaluation of Alternatives, page 80.

**PURPOSE:**

This protocol outlines the methodology required by BC Housing for review of alternatives to the *ILBC Standards*. Prior to acceptance of an alternative, a review of both qualitative and quantitative factors must be submitted to BC Housing. The qualitative and quantitative evaluation methodologies are outlined below.

**DESCRIPTION:**

**Methodology:**

Acceptance of proposed alternatives is based on a clear demonstration of the qualitative and quantitative superiority of the alternative to the *ILBC Standard*. A comparison of the qualitative characteristics as well as a quantitative life cycle cost analysis must be presented as noted in this bulletin, for review by BC Housing.

The **qualitative review** shall include such factors as compliance with referenced standards, manufacturer warranties, installation and training standards, history of use, functional features, durability, maintenance requirements, and appearance. A summary table which compares the characteristics of the ILBC Standard and the proposed alternative shall be submitted with the proposal.

The **quantitative review** requires an estimate of the *annual ownership cost* of the alternative material or assembly. Annual ownership cost is referred to as *ultimate cost* in this methodology. The *ultimate cost* takes into account both present and future costs in the calculation of the total cost of materials and assemblies. While there are several methods available to calculate the *ultimate cost*, the Present Value Method shall be used for BC Housing projects. Use of other methods is not acceptable unless prior approval is obtained from BC Housing.

The general formula to calculate the Present Value is as follows:

Present Value =	Investment or Capital Costs	+	Present Value of Operating and Maintenance Costs
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Future Operating and Maintenance Costs must be discounted at a yearly rate to obtain the Present Value in current dollars. The discount rate for BC Housing projects shall be a nominal 5% per year unless notified otherwise. The nominal discount rate includes an allowance for future escalation and is considered to be equal for all components that are included in the calculation.

The following criteria and information has been developed to assist in preparing a life cycle cost study for evaluation of alternatives.

**Data Required to Complete Life Cycle Costing:**

The preparation of a life cycle cost study shall include the following information as a minimum. Additional factors may be included as required.

***Fixed Financial Criteria:***

- ◆ Nominal Discount Rate = 5% (Actual Discount Rate minus the Escalation Rate Over the Same Period of Time)
- ◆ Length of Study = 35 years

***Investment Cost:***

- ◆ Initial Capital Cost including all labour and material costs

***Annual Costs:***

- ◆ Maintenance Costs
  - Maintenance or servicing contracts
  - Allowances for minor repairs and replacement of parts
  - Upkeep and cleaning
- ◆ Operating Costs
  - Energy costs
  - Municipal costs
  - Direct building operation costs
- ◆ Users Costs
  - Changes as a result of servicing or staffing requirements

***Periodic Costs:***

- ◆ Replacement Costs
  - Costs to replace worn out or obsolete equipment and building systems and components
- ◆ Repair Costs
  - Estimated cost to repair or replace parts of the building which become defective
- ◆ Alteration and re-decoration costs

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- Costs to alter, change or re-decorate resulting from repairs or replacement
- ◆ **Salvage Value:**
  - Material or equipment salvage value at the end of their useful life; typically salvage value will be offset by costs of demolition, removal or shipping of materials or equipment.

#### **Sensitivity Analysis:**

BC Housing may require further analysis of parameters and assumptions of highly volatile costs to test the effect price changes may have on capital and operating costs. For example, energy prices should be reviewed to estimate what impact escalating fuel prices may have on the estimate of *ultimate cost* over the length of the study. In such cases, the *discount rate* used will be the *actual rate* (*actual rate = standard interest rate of 7%*) and the various components being studied can be escalated at differing rates depending on anticipated cost changes for the product or system and inflation. This is a more complex form of life cycle cost study and may require review by a qualified quantity surveyor or construction cost consultant.

#### **Sample Life Cycle Cost Calculation:**

Refer to the attached sample life cycle cost comparison for two roofing products, including a table and graph.

**END**

#### **Attachments:**

1. Table: Sample Alternative Product Costing
2. Graph: Sample Alternative Product Costing