



Life Cycle Cost Analysis

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Purpose

- Life cycle cost (LCC) analysis will consider the tradeoff between increased purchase price and decreased operating expenses for more efficient designs compared to a baseline.
- Total ownership cost (TOC) similarly accounts for purchase and operating costs.
- Payback period is another expression of this tradeoff.

Inputs: Life Cycle Cost

- **INSTALLED OWNER COST:**
the price paid by the purchaser for a transformer
 - installation costs will be included if they differ with efficiency
- Possible data sources
 - survey of current or recent purchase prices
 - calculated = manufacturer costs plus markups (manufacturer, distributor, installer)

Inputs: Life Cycle Cost

- **OPERATING EXPENSE:**
 - energy and maintenance costs (annually)
 - lifetime of the transformers (years)
 - discount rate for calculating present value of future operating expenses (e.g., 8% real)
- **Possible approach and data sources**
 - annual energy consumption based on loading
 - current and forecasted regional energy prices
 - gather and analyze data on lifetimes, discount rates

Method

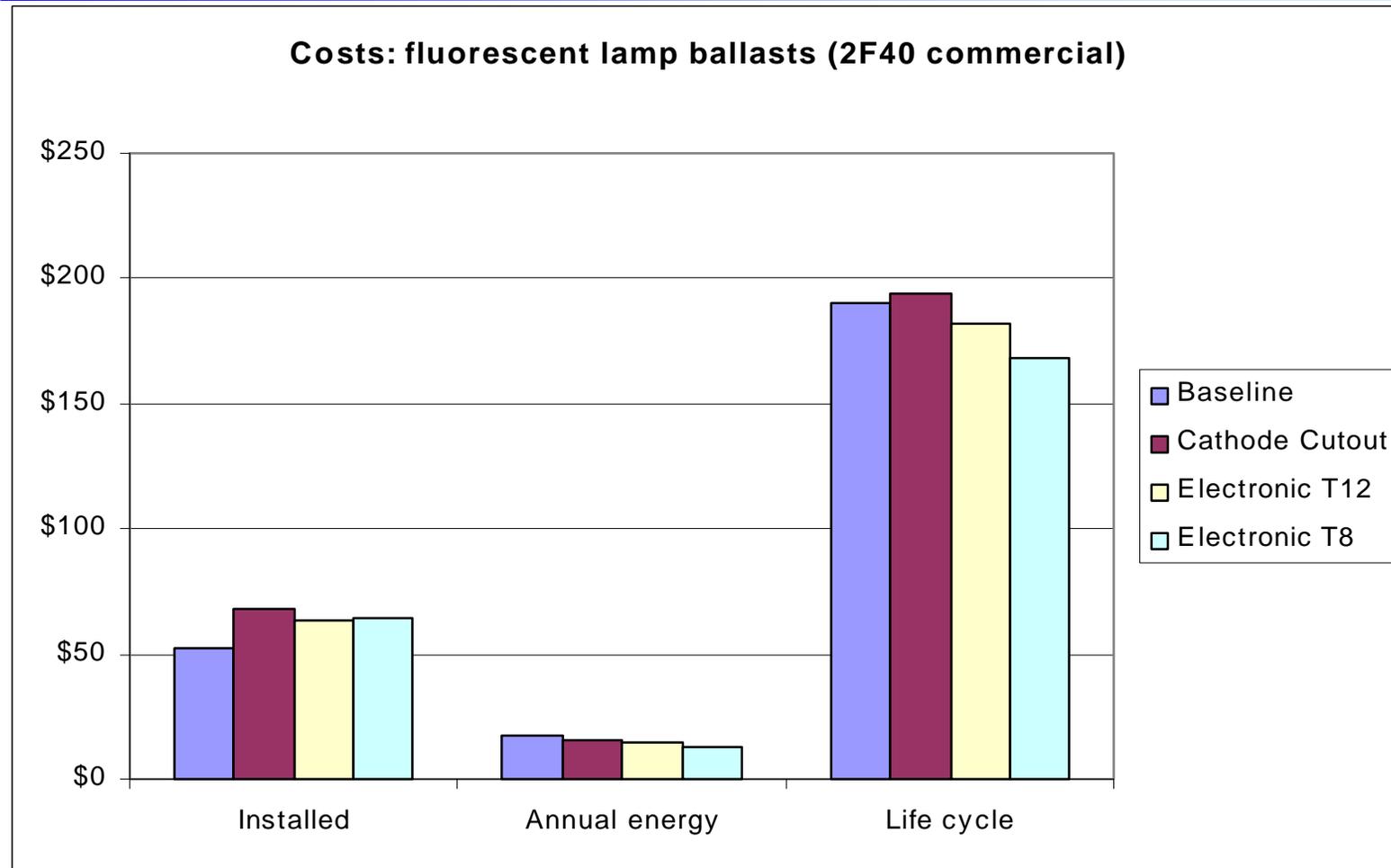
- $LCC = P + \sum [O / (1+r)^t]$ where
 - + P = Installed owner cost
 - + O = Annual operating expense
 - + r = Discount rate
 - + t = years (sum over transformer lifetime)

Results

- LCC savings:
 - $\text{LCC @ efficiency level above baseline} - \text{LCC @baseline}$
- Analyze a range of possible efficiency improvements
- Efficiency levels corresponding to reduced LCC (LCC savings) are generally considered further

EXAMPLE: LCC Results

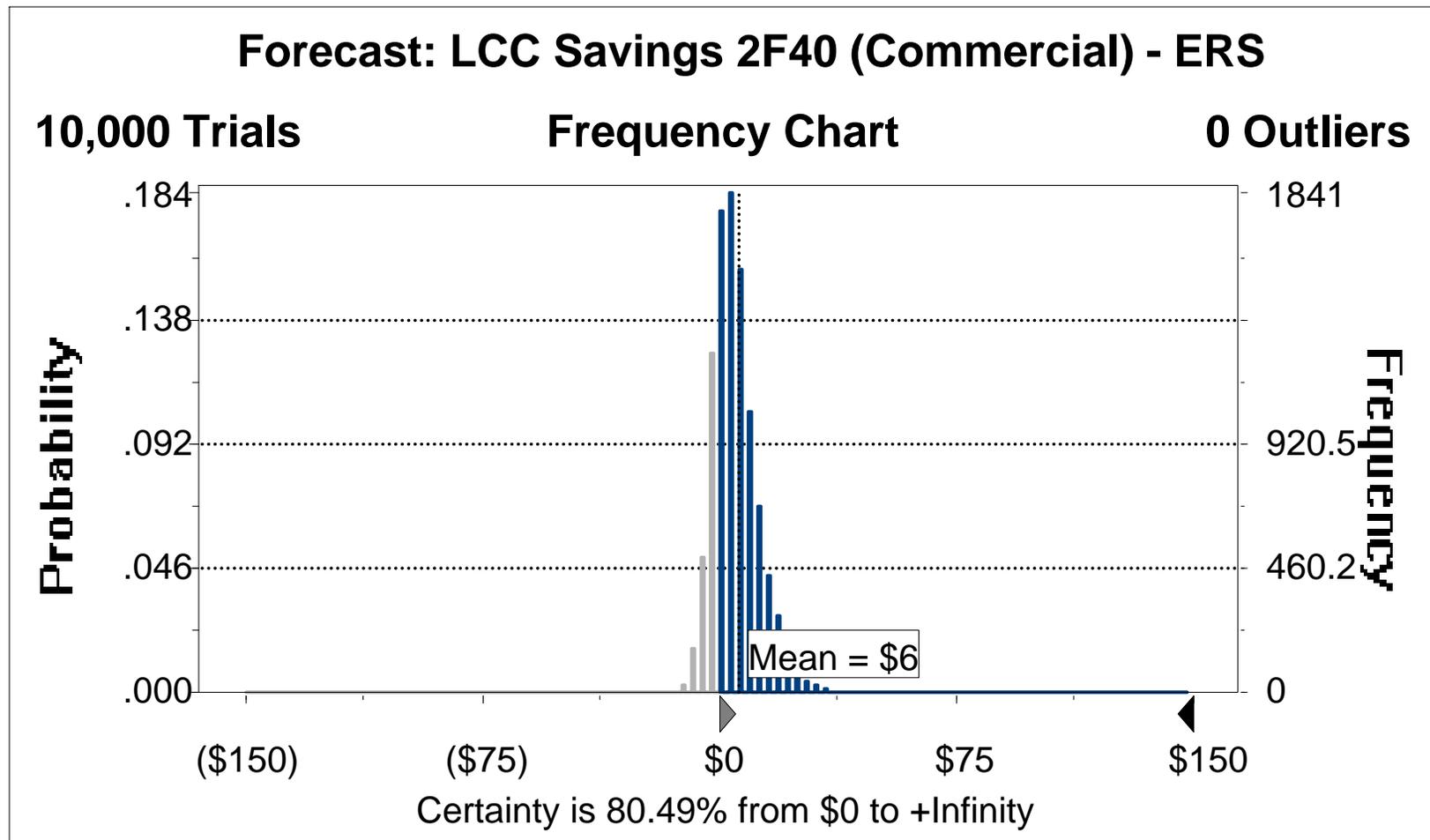
Baseline and 3 efficiency options



Variability and Uncertainty

- Objectives:
 - Analysis of variability among purchasers and operating conditions
 - Rigorous treatment of uncertainty
- Technical Approach:
 - Use distributions for each input, not point estimates
 - Commercial software
 - User access via Web, training

EXAMPLE (ballasts): LCC savings with variability



Interpreting LCC results with variability

- RESULTS
 - Average LCC savings
 - Percent with net savings (or with net cost)
- Importance analysis
 - identify key inputs that contribute most to uncertainty or variability