

Preparing a Benefit-Cost Analysis for a Port Infrastructure Development Program Grant

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IMMARAD

U.S. MARITIME ADMINISTRATION



- **All project sponsors should submit a benefit-cost analysis (BCA) as part of their PIDP grant application**
- **Use of the BCA in PIDP**
 - Assessment of project cost-effectiveness
 - Merit criteria evaluation

- **USDOT must determine that the project will be cost effective in order for it to be selected**
- **Cost-effectiveness determinations based on results of the BCA**
 - Projects must be found to have estimated benefits that are reasonably likely to exceed costs in order to be considered cost effective

- **USDOT economists will review the applicant's BCA**
 - Examine key assumptions
 - Correct for any technical errors
 - Perform sensitivity analysis on key inputs
 - Consider any unquantified benefits

- **USDOT considers the relative magnitude of estimated project benefits and costs**
- **Assign projects to one of four benefit-cost ratio ranges**
 - BCR > 3.0
 - BCR 1.5 - 3.0
 - BCR 1.0 - 1.5
 - BCR < 1.0
- **Also assign a confidence rating to the assessment (high, medium, low)**

- Covers all USDOT discretionary grant programs
- Updated January 2020
- Available at <https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance>

- **Updated monetization values**
- **Additional guidance and recommended values**
- **Additional clarifications on analysis period assumptions**

- **BCAs should provide enough information for a reviewer to follow the logic and reproduce the results**
 - Spreadsheet or database files showing the calculations
 - Technical memos describing the analysis and documenting sources of information used (assumptions and inputs)
 - Present annual benefit & cost streams by type (not just summary output)

- **Should measure costs and benefits of a proposed project against a baseline alternative (“base” or “no build”)**
- **“Do’s”**
 - Factor in any projected changes (e.g., increased traffic or cargo volumes) that would occur even in the absence of the requested project
 - Factor in ongoing routine maintenance
 - Consider full long-term impacts of no build (e.g. facility closure)
 - Explain and provide support for the chosen baseline
- **“Don’t’s”**
 - Assume that the same (or similar) improvement will be implemented later
 - Use unrealistic assumptions about alternative traffic or freight flows

- **Most benefit estimates depend on usage estimates**
- **Provide supporting info on forecasts**
 - Geographic scope, assumptions, data sources, methodology
- **Provide forecasts for intermediate years**
 - Or at least interpolate—don't apply forecast year impacts to interim years
- **Exercise caution about long-term growth assumptions**
 - Consider underlying capacity limits of the facility

- **Should cover both initial development and construction and a subsequent operational period**
- **Generally tied to the expected service life of the improvement or asset**
 - I.e., the number of years until you would anticipate having to take the same action again
 - Lesser improvements should have shorter service lives
- **Avoid excessively long analysis periods (over 30 years of operations)**
 - Use residual value to cover out-years of remaining service life for long-lived assets
 - Recommend 20 years maximum for capacity expansion projects

■ Inflation Adjustments

- Recommend using a 2018 base year for all cost and benefit data
- Index values for the GDP Deflator included in the BCA guidance

■ Discounting

- Use a 7% discount rate

- **Project scope included in estimated costs and benefits must match**
 - Don't claim benefits from an entire project, but only count costs from the grant-funded portion
- **Scope should cover a project that has independent utility**
 - May need to incorporate costs for related investments necessary to achieve the projected benefits
- **Project elements with independent utility should be individually evaluated in the BCA**
 - BCA evaluation will cover both independent elements and the submitted project as a whole

- **Should be presented on an annual basis**
 - Don't assume constant annual benefits without a good reason to do so
- **Negative outcomes should be counted as “disbenefits”**
 - E.g., work zone impacts
- **Avoid double-counting benefits**

- **Recommended values found in BCA Guidance**
 - See footnotes for discussion of non-vehicle time, long-distance travel, business travel
- **Consider vehicle occupancy where appropriate**
 - Local/facility-specific values preferred
 - National-level values provided in BCA Guidance
- **If valuing travel time reliability:**
 - Carefully document methodology and tools used
 - Show how valuation parameters are distinct from general travel time savings

- **Avoid double counting operating savings and other impacts**
 - E.g., truck travel time savings, fuel consumption reductions
- **Localized, specific data preferred**
 - Standard per-mile values for light duty vehicles and commercial trucks provided in BCA Guidance

- **Typically associated with reducing fatalities, injuries, and property damage**
- **Projected improvements in safety outcomes should be explained and documented**
 - Justify assumptions about expected reductions in crashes, injuries, and/or fatalities (and document any CMF used)
 - Show clear linkage between project and improved outcomes
 - Use facility-specific data history for baseline where possible
- **Crash-related injury and fatality data may be available in different forms**
 - MAIS/KABCO injury scales
 - Fatal/Injury crashes vs. fatalities/injuries
 - BCA Guidance provides values covering all of these

- **For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption**
- **Recommended unit values for CO₂, SO₂, VOCs, NO_x, and PM_{2.5} found in BCA guidance**
 - Be careful about the measurement units being applied

- **Primary benefits typically experienced directly by users of the improved facility**
- **Includes both “existing” users (under baseline) and “additional” users attracted to the facility as a result of the improvement**
 - Standard practice in BCA would value benefits to additional users less than those for existing users (see BCA guidance)

- **Projected magnitude**

- Should be based on careful analysis of the market and potential for diversion from other modes that might be attributable to the project

- **Benefits estimates should not be based on comparing user costs of “old” and “new” mode**

- Would be reflected in benefits to additional users

- **Reductions in external costs would be relevant**

- E.g., emissions costs, pavement damage

- **If using 1997 HCAS values...**

- Don't apply urban values to rural truck travel
- Should net out highway user fees paid by trucks from marginal pavement damage costs

- **Resilience**
 - Consider expected frequency of events and their consequences
- **Noise Reduction**
- **Emergency Response**
 - FEMA methodology for fire and ambulance services
- **Quality of Life**
- **Property Value Increases**
 - Is a measure rather than a benefit—avoid double-counting

- **Should quantify magnitudes/timing of the impacts wherever possible**
- **Should clearly link specific project outcomes to any claimed unquantified benefits**

- **Include all costs of implementing the project**
 - E.g., design, ROW acquisition, construction
 - Regardless of funding source
 - Include previously incurred costs
- **Three forms of capital costs**
 - Nominal dollars (project budget)
 - Real dollars (base year)
 - Discounted Real dollars (use in BCA)

- **Net maintenance costs may be positive or negative**
 - New facilities would incur ongoing maintenance costs over the life of the project
 - Rehabilitated/reconstructed facilities may result in net savings in maintenance costs between the build/no-build

- For assets with remaining service life at the end of the analysis period, may calculate a “residual value” for the project
- Simple approach: assume linear depreciation
- Be sure to properly apply discounting

- **Net Present Value (Benefits – Costs)**

- **Benefit-Cost Ratio (Benefits / Costs)**
 - Denominator should only include capital costs (i.e., net maintenance costs and residual value should be in the numerator)

■ Economic Impact Analysis (EIA)

- BCA measures the value of a project's benefits and costs to society
- EIA measures the impact of increased economic activity within a region attributable to a project
- EIA represents the translation of “first order” benefits into other economic outcomes—not added benefits to be counted in BCA

■ Transfers

- Revenues
- Taxes

- Applications must be submitted by 8:00 p.m. E.D.T. on May 18th, 2020.
- Email any questions to ports@dot.gov

■ Questions?