



BUILD Grants

Better Utilizing Investments to Leverage Development Transportation Discretionary Grants Program

Preparing a Benefit-Cost Analysis

Presented by:
Office of the Under Secretary
for Policy
United States Department of
Transportation



BCA and BUILD

- All project sponsors should submit a benefit-cost analysis (BCA) as part of their BUILD grant application
- USDOT will consider a project's demonstrated benefits and costs in evaluating applications



+ What is a BCA?

- Comparison of the monetized value of a project's impacts on users and society (benefits) to the resources required to implement the project (costs)
- What it is not
 - Economic Impact Analysis
 - Financial Analysis
 - Fiscal Analysis



+ What Makes a Good BCA?

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





USDOT BCA Review

- 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





BCA Guidance

- Covers all USDOT discretionary grant programs
- Contains most recent recommended values
- Available at:
<https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance>



+ **Baselines**

- Should measure costs and benefits of a proposed project against a baseline alternative (aka “base case” or “no build”)
- “Do’s”
 - Factor in any projected changes (e.g., increased traffic volumes) that would occur even in the absence of the requested project
 - Factor in ongoing routine maintenance
 - Consider full impacts of no build (e.g. bridge closure/posting)
 - 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 flows under build/no-build—consider “next best” alternative



+ Demand Forecasts

- Most benefit estimates depend on ridership or 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
- Carefully explain/justify deviations between baseline and build case
 - Especially if projecting decreased travel/demand after infrastructure improvements





Analysis Period

- 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 taking 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



+ **Inflation and Discounting**

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■ Inflation Adjustments

- Recommend using a 2017 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





Scope of the Analysis

- 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



+ Benefits

- Should be estimated and presented for different types of impacts/benefits
 - Do not need to be tied to the categories in the selection criteria (but should be consistent with outcomes claimed in application narrative)
- Tips
 - Don't assume constant annual benefits without a good reason to do so
 - Negative outcomes should be counted as “disbenefits”
 - Avoid double-counting different types of benefits



+ Travel Time Savings

- Recommended values found in BCA Guidance
 - See footnotes for discussion on non-vehicle time, long-distance travel, business travel
 - Note that commuting time is not business time
- Consider vehicle occupancy where appropriate
- If valuing travel time reliability:
 - Carefully document methodology and tools used
 - Show how valuation parameters are distinct from general travel time savings



+ Operating Cost Savings

- Avoid double counting operating savings and other impacts
 - Ex: truck travel time savings; reduced fuel usage
- Vehicle op costs - typically a function of distance traveled
 - May also have increased fuel consumption from traffic delay/idling
- Localized, specific data preferred
 - Standard per-mile values for light duty vehicles and commercial trucks provided in BCA guidance





Safety Benefits

- Typically associated with reducing fatalities, injuries, and property damage from crashes and other incidents
- Projected improvements in safety outcomes should be explained and documented
 - Show clear linkage between the project and those improved outcomes
 - Use facility-specific data history where possible—not just statewide averages
- Available crash-related injury data may need to be converted from KABCO scale to MAIS (see BCA Guidance document)



+ Emissions Reduction Benefits

- 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



+ **Benefits to Existing and Additional Users**

- 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)



+ Modal Diversion

- 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 the “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





Other Benefits

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





Unquantified Benefits

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





Costs

- Include all costs of implementing the project
 - Ex: design, ROW acquisition, construction
 - Regardless of funding source
 - Include previously incurred costs
- Costs should be stated in constant dollars
 - Match base year used to monetize benefits
 - Likely need to convert YOE costs from project budget (show/explain in the analysis)





Maintenance Costs

- 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 and no-build





Residual Value

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





Comparing Benefits to Costs

- 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)



+ Other Issues

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- 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
- “Avoided” Costs



+ More information



- Visit – <https://www.transportation.gov/BUILDgrants>
- Email – BUILDgrants@dot.gov
- Applications – Must be submitted on or before 8:00 PM E.D.T. on **July 15, 2019**



+ Question and Answer Session

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