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

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

USDOT BCA Guidance

- Covers all USDOT discretionary grant programs
- June 2018 Update
  - Additional clarification
  - Recommended monetary values
- Available at:

https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance

Transparent & Reproducible Analysis

- BCAs should provide enough information for a reviewer to follow the logic and reproduce the results
  - Spreadsheet 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)

Baselines

- 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 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)
- "Don't's"
  - Assume that the same (or similar) improvement will be implemented later
  - Use unrealistic assumptions about alternative traffic flows

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

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 having to take the same action again
- 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

- Inflation Adjustments
  - All monetary values in the BCA should be expressed in common base year (recommend using 2017)
- Discounting
  - Future cost and benefit streams should be discounted using a 7% rate

Scope of the Analysis

- Clearly define project scope in the application narrative
- Project scope included in estimated costs and benefits must match
  - Don't claim benefits from an entire project, but only count costs from the BUILD-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 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

Travel Time Savings

- Recommended values found in BCA Guidance
- Consider vehicle occupancy where appropriate
- Avoid double counting travel time savings and other impacts
- 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
  - E.g., truck travel time savings, fuel usage reductions
- Localized, specific data preferred
  - National 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
- Projected improvements in safety outcomes should be explained and documented
  - Show clear linkage between project and improved outcomes
  - Use facility-specific data history where possible
  - Justify assumptions about reductions in crashes, injuries, and/or fatalities
- Recommended monetary values found in BCA Guidance

Emissions Reduction Benefits

- For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption
- Recommended unit values for SO_2, VOCs, NOx, and PM 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 "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

Difficult-to-Quantify Benefits

- Examples
  - Resilience
  - Noise reduction
  - Emergency response improvements
  - Property value increases
  - Quality of life
- Should quantify magnitudes/timing of the impacts wherever possible
- Should clearly link specific project outcomes to any claimed unquantified benefits

Capital Costs

- Include all costs of implementing the project
  - E.g., design, ROW acquisition, construction
  - Regardless of funding source
  - Include previously incurred costs
- Present costs in the year they are incurred
  - Apply inflation adjustments correctly (Year of Expenditure (YOE) Costs vs. Base Year Costs)
  - Apply discounting

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/no-build

Residual Value

- For assets with remaining service life at the end of the analysis period, should calculate a "residual value" for the project
- Simple approach: assume 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

- 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 19, 2018**

+ Question and Answer Session