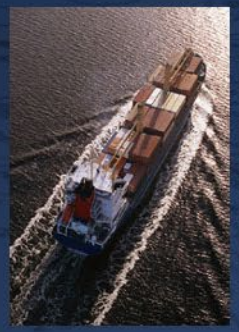
FY 2022 Port Infrastructure Development Program
Preparing a Benefit-Cost Analysis for a Large Project



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What is BCA?

- **Benefit-cost analysis (BCA) is a systematic process for *identifying*, *quantifying*, and *comparing* expected economic benefits and costs of a proposed infrastructure project.**

Why do we do BCA?

- Provides a useful benchmark from which to evaluate and compare potential transportation investments
- Adds a degree of rigor to the project evaluation process

What do I need to do a BCA?

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- Clear understanding of the problem the project is intended to solve (baseline conditions) and how the project addresses the problem (measures of effectiveness)
- Well-defined project scope and cost estimate
- Monetization factors for key project benefits

- **Sources of information may include:**
  - Project planning and engineering documents
  - Industry technical references and analytical tools
  - DOT BCA Guidance

BCA and PIDP

- **Applicants for large projects (as defined in the NOFO) 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
  - Evaluation of the Economic Vitality merit criterion

Cost Effectiveness

- **For large projects, USDOT must determine that the project will be cost effective in order for it to be selected under the PIDP**
  - For amounts made available under the FY22 Consolidated Appropriations Act, this requirement does not apply to projects located in noncontiguous states and territories
- **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

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 Evaluation

- **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)**

USDOT BCA Guidance

- Covers all USDOT discretionary grant programs
- Updated March 2022
- Available at https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance-discretionary-grant-programs-0

What's New?

- **New and updated monetization values**
- **Additional guidance and new examples on:**
  - Valuing pedestrian, cycling, and transit infrastructure improvements
  - Valuing the benefits of improved health from active transportation and reduced crowding on transit
- **Additional guidance on benefits from reduction in stormwater runoff and wildlife impacts**

Transparent & Reproducible Analysis

- **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)

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 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

Demand Forecasts

- **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

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
  - Lesser improvements should have shorter service lives
  - Recommend 20 years maximum for capacity expansion projects or other operational improvements
- **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**
  - Recommend using a 2020 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 for all benefits and costs (except CO_2)
  - Recommend using a 2020 base year for discounting

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 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**

Safety Benefits

- **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**
  - KABCO injury scales
  - Fatal/Injury crashes vs. fatalities/injuries
  - BCA Guidance provides values covering all of these

Travel Time Savings

- **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

Operating Cost 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

Emission Reduction Benefits

- **For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption**
- **Recommended unit values for CO_2, SO_2, NOx, and $PM_{2.5}$ found in BCA guidance**
  - Be careful about the measurement units being applied
- **Reductions in CO_2 emissions should be discounted at 3 percent, while all others should be discounted at 7 percent**

Amenity Benefits

- **Pedestrian, cycling, and transit facility/vehicle improvements can improve the quality or comfort of journeys**
- **Recommended values for different types of improvements found in BCA Guidance**
  - Pay attention to whether value is on a “per-trip” or “per-person-mile” basis
- **Carefully document baseline amenities, as well as specifically how the proposed project will add any amenity benefit category being claimed**

Health Benefits

- Trips diverted to active transportation (walking and cycling) from other modes may yield health benefits to users
- Recommended monetization values, on a per trip basis, are found in BCA Guidance
- Absent local data on existing mode share and estimates age profiles of users, applicants may apply national averages included in the BCA Guidance.

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
  - Values for noise and congestion costs included in Guidance
  - 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

- **Agglomeration Economies**
- **Noise, Stormwater Runoff, and Wildlife Impact Reduction**
- **Emergency Response**
- **State of Good Repair**
- **Resilience**
  - Consider expected frequency of events and their consequences
- **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

Capital Costs

- **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)

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, may calculate a "residual value" for the project**
  - Recall service life does not necessarily match the physical life of the asset
- **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 Types of Economic Analysis

- **Examples**
  - Economic Impact Analysis
  - Financial Impacts
  - Distributional Effects
- **Issues**
  - Use different approaches and answer different questions than does BCA
  - Do not represent additional benefits to include in BCA

Application Deadline and Contact

- Applications must be submitted by 11:59 p.m. E.D.T. on May 16th, 2022.
- Email any questions to PIDPGrants@dot.gov

Q&A

- Questions?