



U.S. Department of Transportation
Office of the Under Secretary

Preparing a Benefit-Cost Analysis for INFRA Grants

**Office of the Assistant Secretary for
Transportation Policy**

Office of the Chief Economist

BCA and INFRA

- ◎ All project sponsors should submit a benefit-cost analysis (BCA) as part of their INFRA grant application
- ◎ Use of the BCA in INFRA
 - Assessment of project cost-effectiveness
 - Evaluation of the Economic Vitality selection criterion

INFRA Cost Effectiveness Requirements

◎ Large Projects

- USDOT must determine that the project will be cost effective in order for it to be selected

◎ Small Projects

- USDOT must consider project cost-effectiveness in making selections

◎ Cost-effectiveness determinations based on results of the BCA

- Projects must have estimated benefits that are reasonably likely to exceed costs in order to be found cost effective

Support for National or Regional Economic Vitality

- Supporting Economic Vitality includes projects that:
 - Achieve a significant reduction in traffic fatalities and serious injuries on the surface transportation system;
 - Improve interactions between roadway users, reducing the likelihood of derailments or high consequence events;
 - Eliminate bottlenecks in the freight supply chain;
 - Ensure or restore the good condition of infrastructure that supports commerce and economic growth;
 - Sustain or advance national or regional economic development in areas of need, including projects that provide or improve connections to the Nation's transportation network to support the movement of freight and people; and
 - Reduce barriers separating workers from employment centers, including projects that are primarily oriented toward reducing traffic congestion and corridor projects that reduce transportation network gaps to connect peripheral regions to urban centers or job opportunities.

- The Department will evaluate this selection criterion by relying on quantitative, data-supported analysis, including an assessment of the applicant supplied benefit-cost analysis.

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
- ◎ **Same evaluation standard applied to Large and Small projects**

Updated BCA Guidance

- ◎ Covers both INFRA and TIGER
- ◎ Revised format (single document)
- ◎ Additional topics covered
- ◎ Additional and updated recommended 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 40 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 2016 base year for all cost and benefit data
- Index values for the GDP Deflator included in the BCA guidance

◎ Discounting

- All BCAs should use a 7% discount rate
- May also include 3% discount rate case as a sensitivity analysis

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 INFRA-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, but standard 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
- Available crash-related injury data may need to be converted from KABCO 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 SO₂, VOCs, NO_x, and PM found in BCA guidance
 - Be careful about the measurement units being applied
- ◎ USDOT does not currently have recommended values for CO₂ emissions reduction
 - Should be discounted at same rate as other benefits and based on domestic damages

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
- ◎ **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

Hard-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**

Costs

- ◎ **Include all costs of implementing the project**
 - E.g., design, ROW acquisition, construction
 - Regardless of funding source
 - Include previously incurred 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
- ◎ Simple approach: assume linear depreciation
 - Be sure to properly apply discounting
 - Account for major maintenance and rehabilitation actions during remaining service life period

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:**

www.transportation.gov/buildamerica/INFRAgrants

◎ **Email:** INFRAgrants@dot.gov

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Questions?

