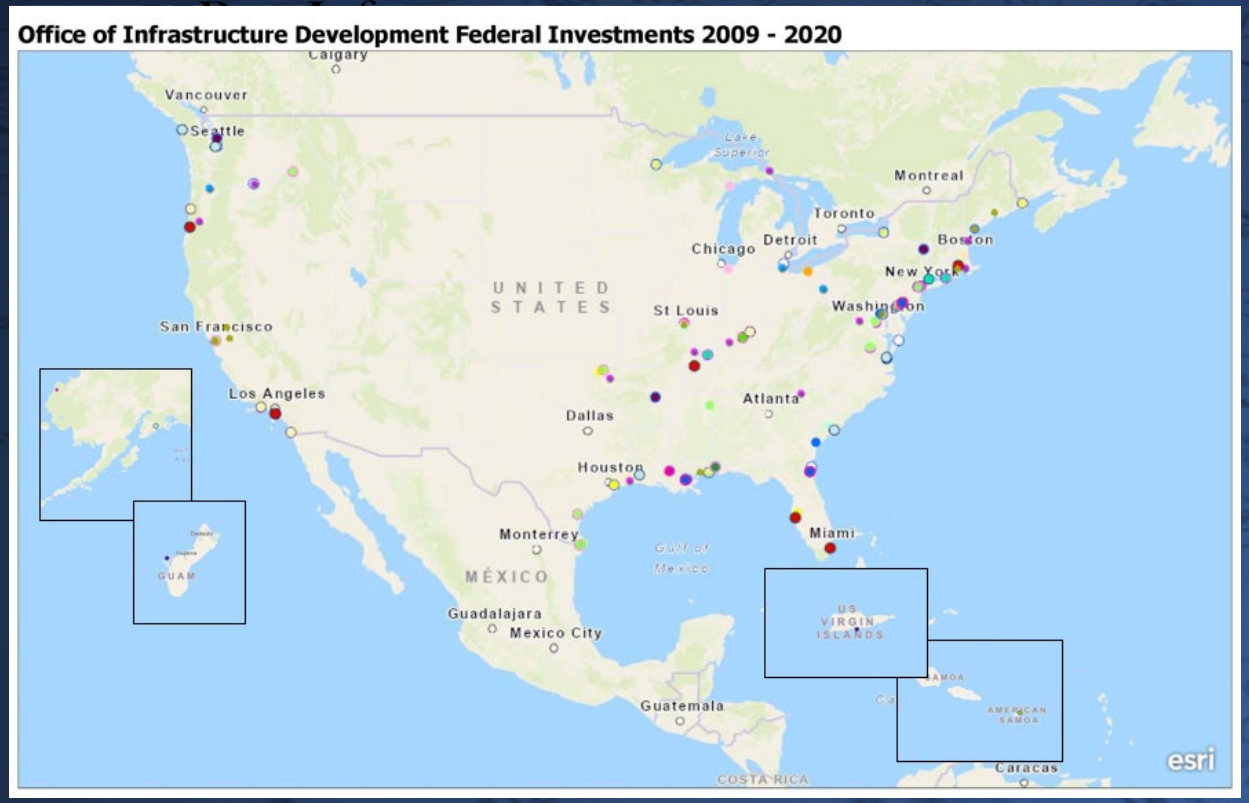
Maritime Administration
FY 2021 Port Infrastructure Development Program Grant Opportunity
"Preparing a Benefit-Cost Analysis for a Large Project" Webcast



Maritime Administration
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MARAD
U.S. MARITIME ADMINISTRATION

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

Preparing a Benefit-Cost Analysis for a Large PIDP Project

Office of the Assistant Secretary for Transportation Policy

Office of the Chief Economist

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

BCA and PIDP Large Projects

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

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

Economic Vitality

- 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)

PIDP Cost Effectiveness Requirements

- Large Projects
  - 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
- Does not apply to Small Projects at Small Ports

USDOT BCA Guidance

- Covers all USDOT discretionary grant programs
- Updated February 2021
- Available at https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance

What's New?

- Updated monetization values
- Additional guidance on valuing reductions in emissions (including CO_2)
- Additional guidance on benefits from agglomeration economies and state of good repair projects

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 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. 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

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
  - 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

Inflation and Discounting

- **Inflation Adjustments**
  - Recommend using a 2019 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)

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

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 DOT BCA Guidance

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

Emissions Reduction Benefits

- For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption
- Recommended year by year unit values for CO_2, SO_2, NO_x, 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**

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

Other Benefits

- Agglomeration Economies
- State of Good Repair
- 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

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
- 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

Port Infrastructure Development Resources

Port Infrastructure Development Program Grants Webpage:
https://www.maritime.dot.gov/PIDPgrants

Webinar information:
https://www.maritime.dot.gov/office-port-infrastructure-development/port-and-terminal-infrastructure-development/2020-port

Department of Transportation guidance on preparing a benefit-cost analysis:
https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance

Final Webcast

A webcast on preparing a package on economic vitality for small projects at small ports will be offered on Thursday, May 6, 2021 at 3:00 pm EDT

More Info: https://www.maritime.dot.gov/PIDPgrants

Questions? Email: PIDPGRANTS@DOT.GOV

Questions?