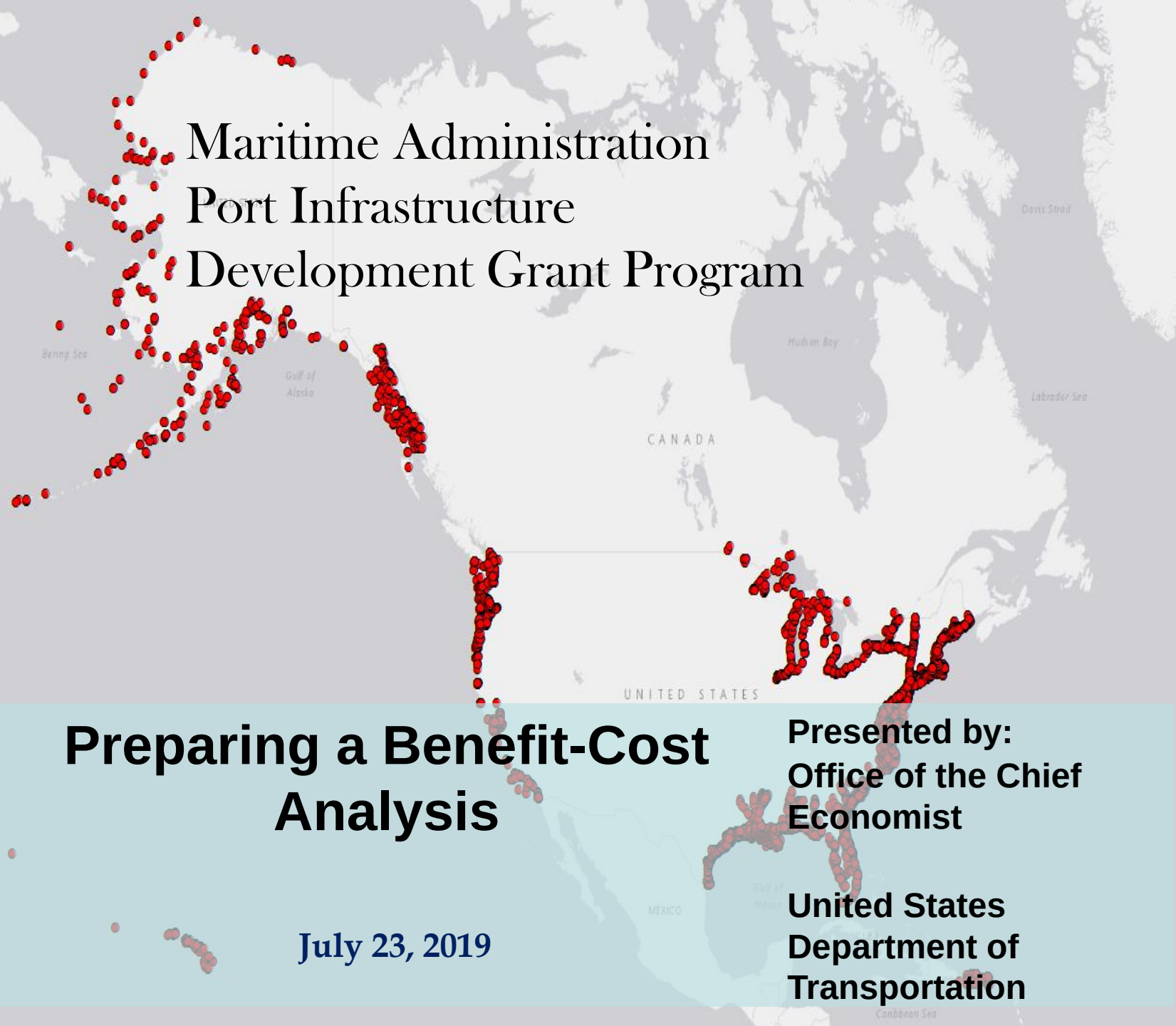

Maritime Administration
Port Infrastructure
Development Grant Program

Preparing a Benefit-Cost Analysis

July 23, 2019

Presented by:
Office of the Chief Economist

United States Department of Transportation

MARAD
U.S. MARITIME ADMINISTRATION

BCA and the PIDG Program

- All project sponsors should submit a benefit-cost analysis (BCA) as part of their PIDG 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

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

Transparent and Reproducible Analysis

MARAD

- **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 impacts of no build
  - 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 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

Inflation and Discounting

- **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**
  - E.g., 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 on non-vehicle time, long-distance travel, business travel
- **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**
  - 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**
  - Justify assumptions about expected reductions in crashes, injuries, and/or fatalities
  - Show clear linkage between project and improved outcomes
  - Use facility-specific data history where possible
- **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 CO_2, SO_2, VOCs, NOx, 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 "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**
  - 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**
  - 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 property 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.maritime.dot.gov/PIDPgrants

- Applications – Must be submitted on or before 8:00 PM E.D.T. on September 16, 2019

Question and Answer Session