ECONOMIC IMPACT ASSESSMENT PROJECT: DRAFT FRAMEWORK + DISCUSSION

National Capital Region
Transportation Planning Board

Regional Transportation Resilience Economic Analysis

- Conducting analysis to demonstrate the cost of inaction and provide support for the benefits of proactive resilience investment
- Five case studies quantifying the costs and benefits of resilience and adaptation
- Transportation assets (one each of: rail stops, bus stops, road segments, rail segments, bridges)
- Natural hazards (flooding and extreme heat)
- Develop a framework for risk-based economic impact analysis, and guidance for the evaluation of further assets and projects

Case Studies

- Bus Stop: Army Navy Drive & S. Joyce St stop in Arlington
- Rail Stop: Greenbelt MARC Station
- Bridge: Liverpool Point Road
- Railway: Silver line between Loudon Gateway and Washington Dulles
- Roadway: Anacostia Freeway

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Case Study: Bus Stop
Army Navy Drive & S. Joyce St stop in Arlington

Impacts of Extreme Heat on Bus Commuters

Inputs:

- Ridership
- Heat days
- Heat-related emergencies
- Cost of heat-related health emergencies

Solutions:

- No Action
- Low-Cost – bus shelter solution
- High-Cost – bus shelter plus vegetation solution

	A	B	C	D	E
1		Description	Value	Unit	Source
2	GENERAL VARIABLES				
3	General Variables	Discount Rate	3.1%	%	
4		Days per year	365	days	
5	Population	Population of Virginia, July 2024	8,811,195	people	U.S. Census
6		Daily on-boardings, Army-Navy Drive and S. Joyce Street WB/SB stop	72	people	
7	Health and Cost Assumptions				
8		Number of heat event days per summer	80	days	
9		Incremental heat-related emergency department visits per heat event day	87.1	incidents	Center for American Progress
10		Incremental heat-related hospitalizations per heat event day	20.84	incidents	
11		Daily heat-related emergency department visits, Army-Navy Dr and S. Joyce St stop	0.000707826	incidents	Calculation
12		Daily heat-related hospitalizations, Army-Navy Dr and S. Joyce St stop	0.000169358	incidents	
13		Emergency department visit cost	$750	per incident	Center for American Progress
14		Hospitalization cost	$14,900	per incident	
15		Daily cost of heat-related illness, Army-Navy Dr and S. Joyce St. stop	$3.05	per day	Calculation
16		Total summer cost of heat-related illness, Army-Navy Dr and S. Joyce St. stop	$244.34	per summer	
17		Increase in heat events, percent	3.61%	each year	Calculation
18	Infrastructure Parameters				
19		Useful life, bus shelter	20	years	Minneapolis/St. Paul Metro Transit
20		Advertising revenue per bus shelter	$11,500	per year	District of Columbia
21		Reduction in health impacts, bus shelter only	10%	per year	Assumption
22		Reduction in health impacts, bus shelter and vegetation	20%	per year	
23	PROJECT VARIABLES				
24	Project-Specific Variables	Start Year	2025	#	
25		Analysis period	20	Years	
26		Construction Phase	1	Years	Assumption

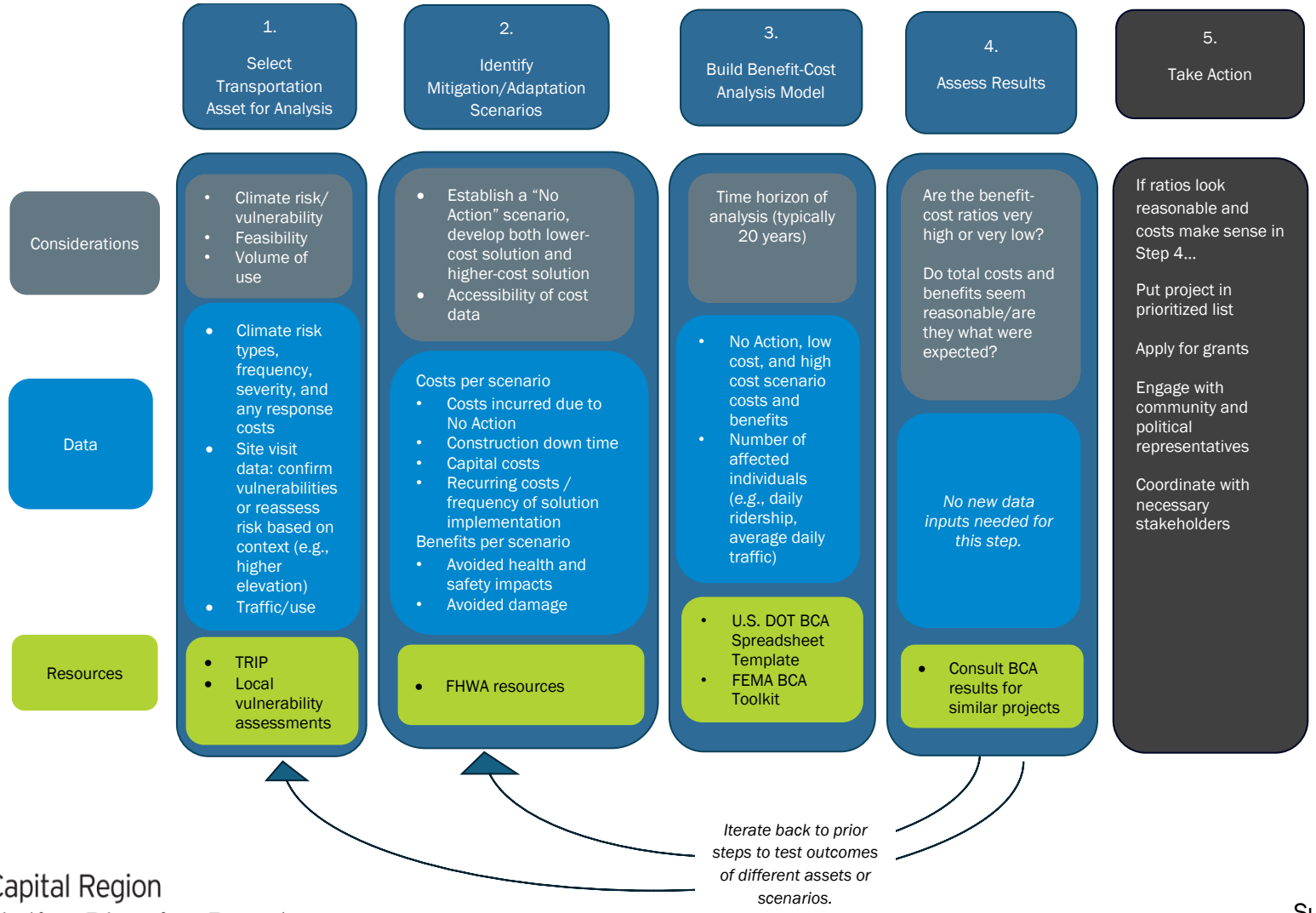
Screenshot of Bus Stop BCA Excel Model (Parameters tab)

Case Study: Bus Stop
Army Navy Drive & S. Joyce St stop in Arlington

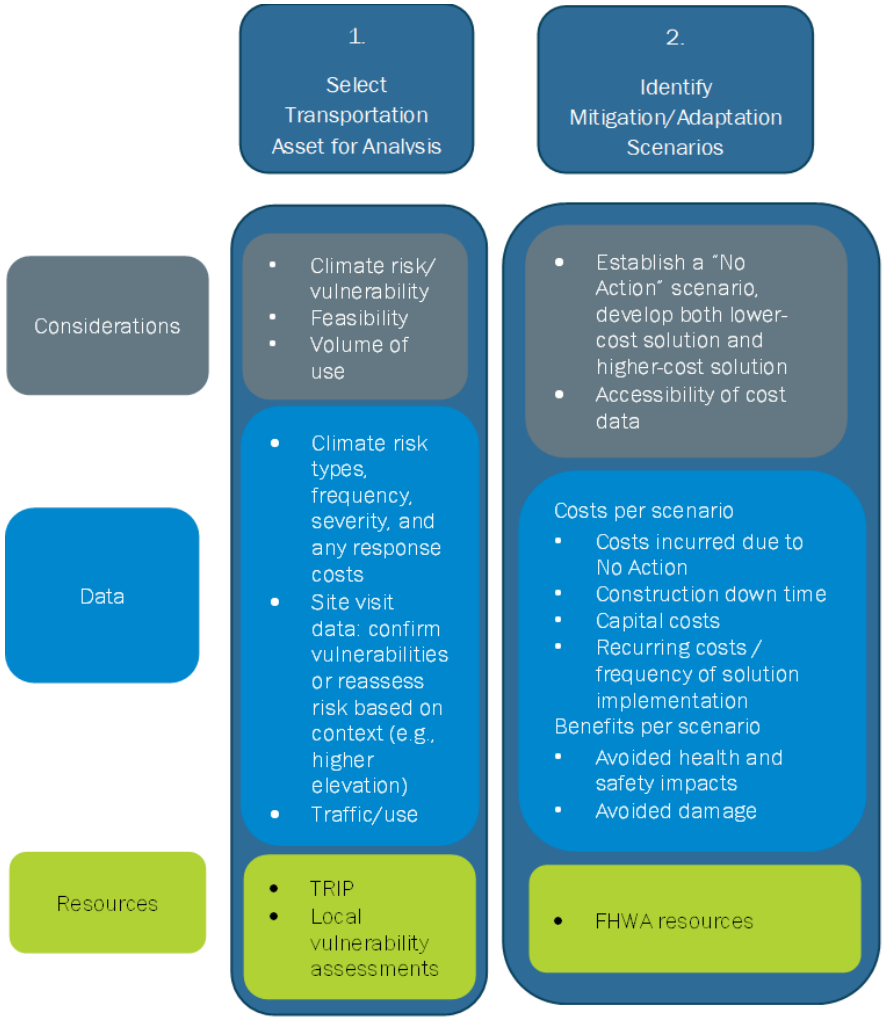
Key Takeaways

- Shelters and foliage solutions at bus stops can significantly lower ambient temperatures, resulting in decreased health costs.
- Over 20 years, no investment could result in nearly $7,000 in health impacts at a single location.
- Results suggest a 3:1 ROI for proactive investment.
- Similar action could be taken at a regional level to address health concerns in the National Capital Region.

Framework


1. Select Transportation Asset for Analysis
2. Identify Mitigation/Adaptation Scenarios
3. Build Benefit-Cost Analysis Model
4. Assess Results
5. Take Action
Considerations
Data
Resources
• Climate risk/ vulnerability
• Feasibility
• Volume of use
• Climate risk types, frequency, severity, and any response costs
• Site visit data: confirm vulnerabilities or reassess risk based on context (e.g., higher elevation)
• Traffic/use
• TRIP
• Local vulnerability assessments
• Establish a "No Action" scenario, develop both lower-cost solution and higher-cost solution
• Accessibility of cost data
Costs per scenario
• Costs incurred due to No Action
• Construction down time
• Capital costs
• Recurring costs / frequency of solution implementation
Benefits per scenario
• Avoided health and safety impacts
• Avoided damage
• FHWA resources
Time horizon of analysis (typically 20 years)
• No Action, low cost, and high cost scenario costs and benefits
• Number of affected individuals (e.g., daily ridership, average daily traffic)
• U.S. DOT BCA Spreadsheet Template
• FEMA BCA Toolkit
Are the benefit-cost ratios very high or very low?
Do total costs and benefits seem reasonable/are they what were expected?
No new data inputs needed for this step.
• Consult BCA results for similar projects
If ratios look reasonable and costs make sense in Step 4...
Put project in prioritized list
Apply for grants
Engage with community and political representatives
Coordinate with necessary stakeholders
Iterate back to prior steps to test outcomes of different assets or scenarios.

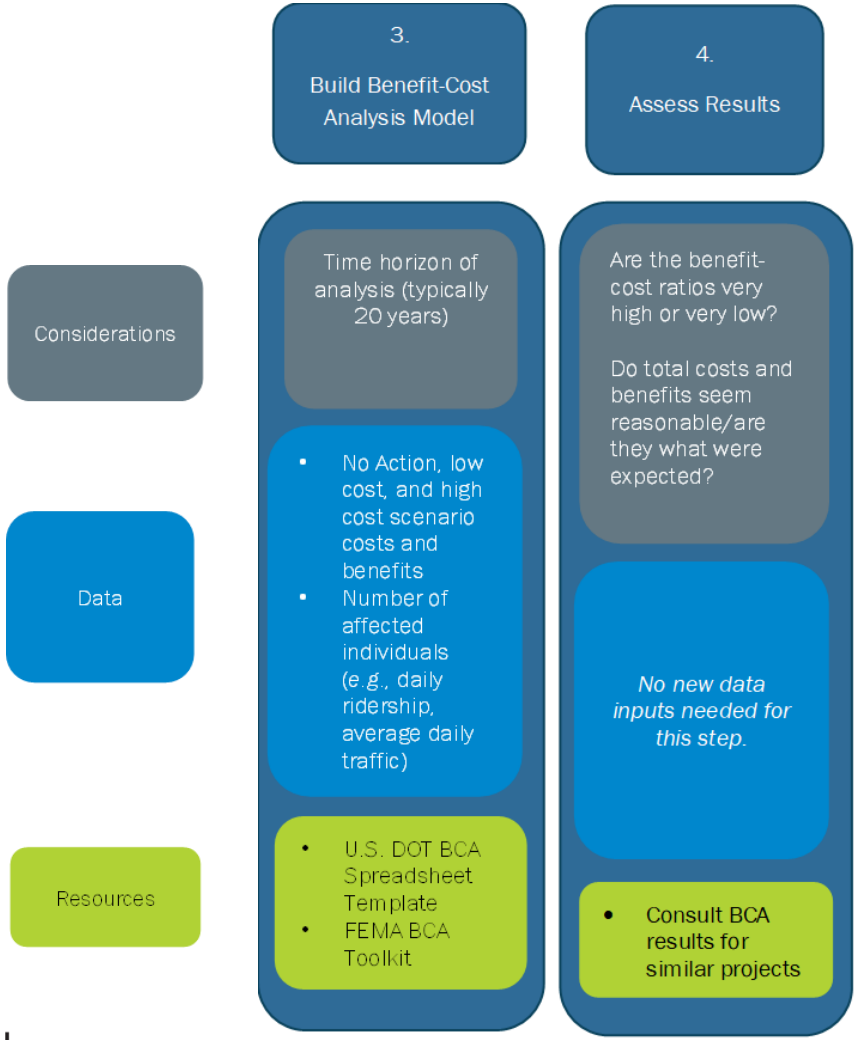
Framework: Steps 1 & 2



How did we accomplish this in our case studies?

- **Vulnerability:** climate risk scores from the TRIP
- **Feasibility:** Google Maps Street View (existing amenities)
- **Ridership:** gathered data from WMATA and Arlington Transit
- **Extreme heat impacts:** number of heat-related ER visits (Center for American Progress)
- **Solutions:** combination of shelters and vegetation (Transportation Alternatives, NYC)

Framework: Steps 3 & 4

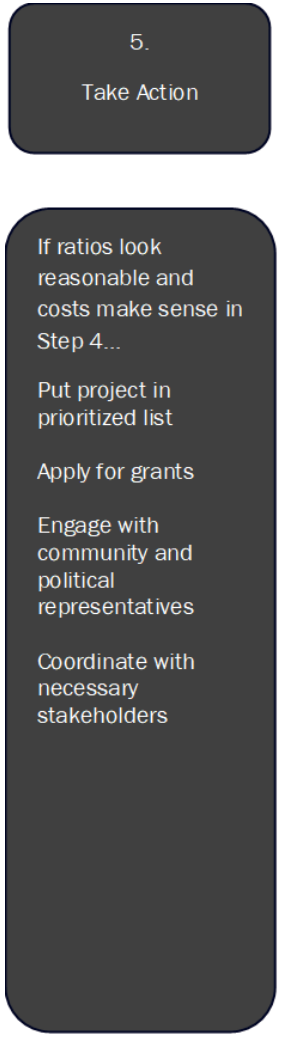


How did we accomplish this in our case studies?

- **Costs:**
  - Number of heat event days
  - Cost of heat-related hospital visits
  - Shelter installation costs
  - Operating and maintenance costs

- **Benefits:**
  - Avoided damages (avoided hospital visits)
  - Advertisement revenues

Framework: Step 5



- Make a simple, step-by-step process for assessing the high-level impacts of investments
- Show the benefits of proactive investment
- Demonstrate the benefits of doing ‘casual’ BCA

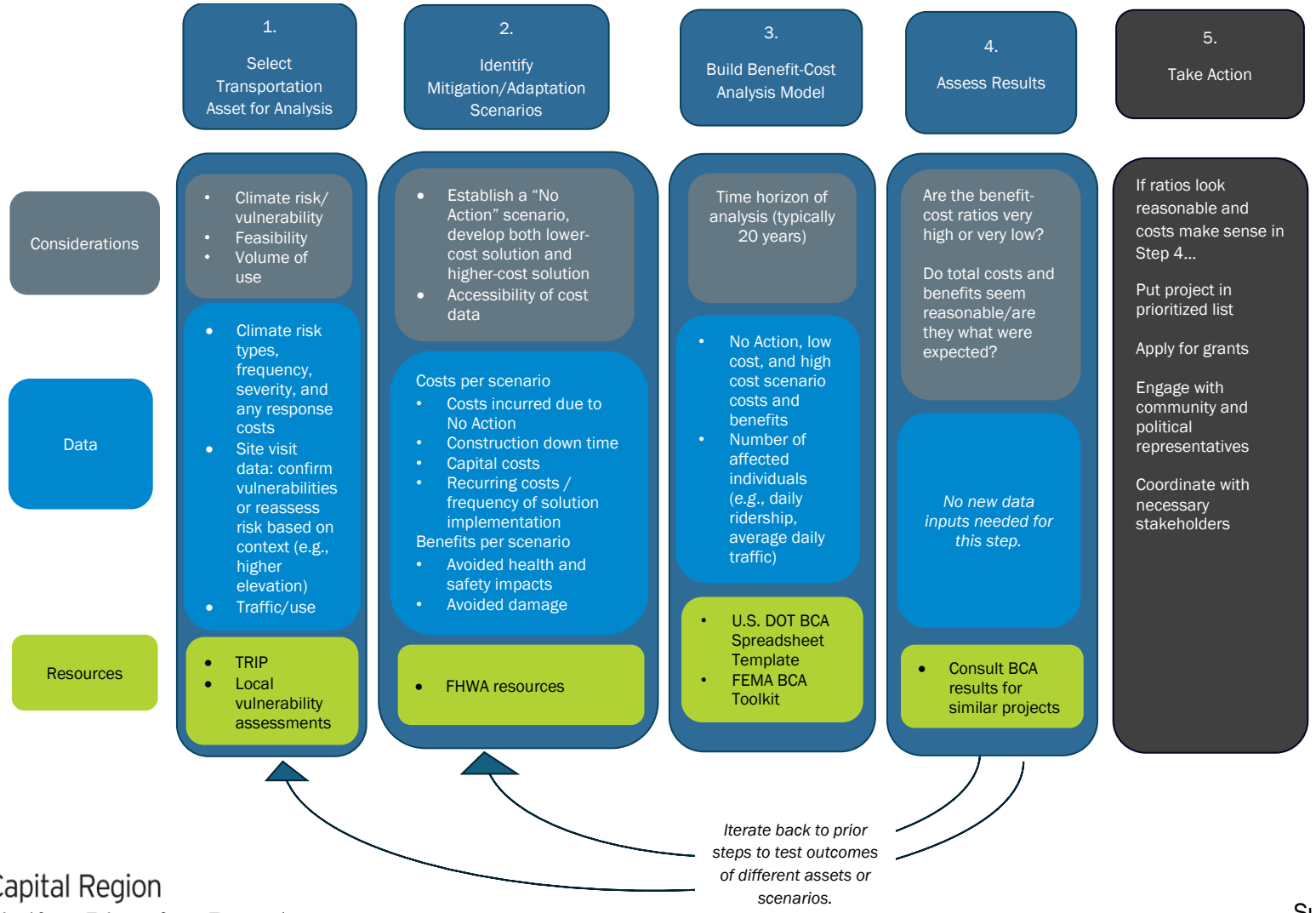
Questions and Comments on the Framework

Are there any components you feel are missing from the Framework?

How can we adjust to make the Framework easier to use or more beneficial for you?

Other questions or comments on the Framework?

Framework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