

Toolbox Training: SCAG Transit Climate Adaptation and Resiliency Toolbox

Matt Gleason & Grieg Asher, SCAG
Robert Kay & Beth Rodehorst, ICF

23 May 2019



Agenda

Timing	Agenda Item	Presenter
10:00 – 10:05	Welcome and Introductions	Robert Kay
10:05 – 10:15	Why did we create this Toolbox?	Matt Gleason
10:15 – 10:20	How did we create this Toolbox?	Robert Kay
10:20 – 10:25	Toolbox Overview	Robert Kay
10:25 – 10:45	When and how should I apply each of the Toolbox tools? Group 1: Getting Started	Beth Rodehorst
10:45 – 11:05	When and how should I apply each of the Toolbox tools? Group 2: Assessing Vulnerability and Consequences	Beth Rodehorst
11:05 – 11:15	When and how should I apply each of the Toolbox tools? Group 3: Identifying and Evaluating Adaptation Strategies	Beth Rodehorst
11:15 – 11:30	When and how should I apply each of the Toolbox tools? Group 4: Moving Toward Implementation	Beth Rodehorst
11:30 – 11:45	SCAG Adaptation Plan Project	Grieg Asher
11:45 – 12:00	Final questions and wrap up	

Why did we create this Toolbox?



ICF proprietary and confidential. Do not copy, distribute, or disclose.

Why did we create this toolbox?

Primary goal: reduce barriers to increasing climate resilience for transit agencies

Many agencies are small and many not have significant resources to dedicate to climate resiliency

By doing some of the legwork upfront, the toolbox can significantly reduce the time, money, and resources needed to assess vulnerability and get started on adaptation planning

Providing exposure datasets not only reduces the burden on individual transit agencies, but also ensures consistent data is used across the SCAG region

Transit agencies can benefit from recent lessons learned through similar assessments conducted elsewhere

How did we create this Toolbox?



ICF proprietary and confidential. Do not copy, distribute, or disclose.

How did we create this toolbox?

Project Team



Process

Collaborative process that blended best practices and technical analysis with stakeholder input

- Best practices
 - Emerging best practices in the adaptation field
- Technical analysis
 - Climate change projections
 - GIS mapping
- Stakeholder input
 - RTTAC meetings
 - Two project workshops
 - Workshop #1: Criticality and Vulnerability
 - Workshop #2: Adaptation

Toolbox Overview



ICF proprietary and confidential. Do not copy, distribute, or disclose.

Toolbox Overview

You can find the Toolbox at:

<http://www.scag.ca.gov/programs/Pages/Adaptation-and-Resilience-Planning.aspx>

HOME ABOUT BOARD PROGRAMS OPPORTUNITIES PARTICIPATE CALENDAR NEWS & MEDIA DATA & TOOLS Login Register

SCAG
INNOVATING FOR A BETTER TOMORROW

SEARCH Search this site... GO

HOME > PROGRAMS > TRANSPORTATION > TRANSIT > TRANSIT: ADAPTATION AND RESILIENCE PLANNING FOR PROVIDERS OF PUBLIC TRANSPORTATION

Transit: Adaptation and Resilience Planning for Providers of Public Transportation

The planet's climate is changing, and this is producing impacts on local transportation systems such as sea level rise, changes in temperature and precipitation, and increased flood risk. In order to maintain the resilience of the transportation system in light of these challenges, local agencies will have to analyze the potential impact of these challenges in their long range capital planning.

In FY 2017-19, SCAG engaged consultant assistance to prepare resources for providers of public transportation in the region to respond to expected challenges as a result of global climate change. This work, funded by a Caltrans Statewide and Urban Transportation Planning Grant, sought to assist transit providers with incorporating climate change adaptation into their existing processes.

Agendas & Minutes

Toolbox Overview

Toolbox Goals

Lower common barriers to climate resiliency planning to empower agencies with limited resources to prepare for climate change, including:

1. Identifying critical assets and routes
2. Integrating climate considerations into local and regional planning processes, and
3. Implementing adaptation practices to improve transit system resilience while complying with state and federal regulations

The Toolbox is...

- A collection of resources aimed at helping transit agencies assess vulnerabilities and conduct resilience planning

The Toolbox is NOT...

- A framework or a step by step guide for conducting vulnerability assessments or adaptation plans

Toolbox Overview

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

- 1
- 2
- 3

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

- 4
- 5
- 6

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

- 7
- 8

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

- 9
- 10
- 11

Toolbox Overview

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

1 2 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

9 10 11

9. Climate Resilience Planning Template
10. Contingency Plan Template
11. Transit Resiliency Funding Opportunities

When and how should I apply each of the Toolbox tools?



ICF proprietary and confidential. Do not copy, distribute, or disclose.

12

When and how should I apply each of the Toolbox tools?

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

1 2 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

9 10 11

9. Climate Resilience Planning Template
10. Contingency Plan Template
11. Transit Resiliency Funding Opportunities

When and how should I apply each of the Toolbox tools?

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

1 2 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



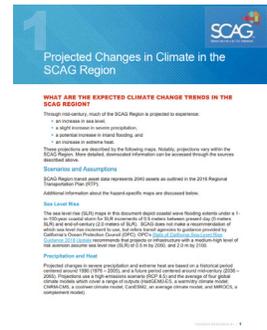
TOOLBOX RESOURCES

9 10 11

9. Climate Resilience Planning Template
10. Contingency Plan Template
11. Transit Resiliency Funding Opportunities

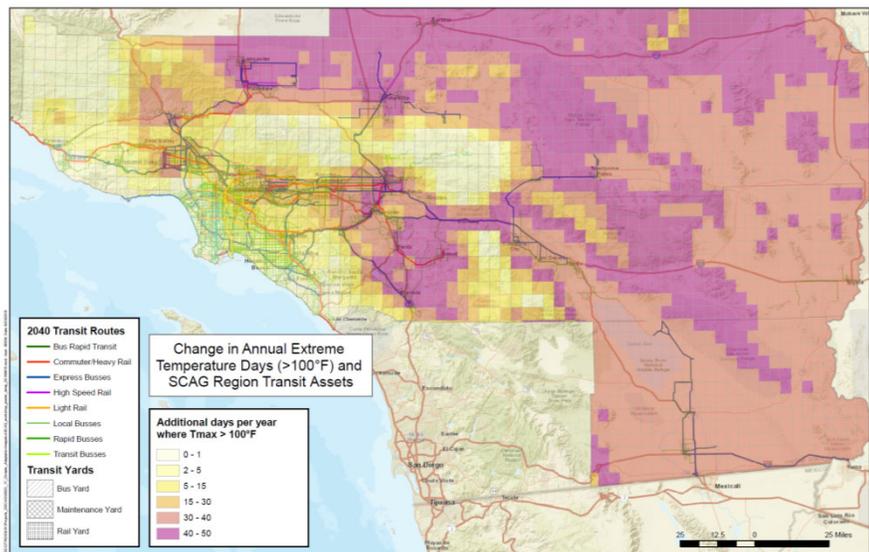
Tool 1: Projected Changes in Climate in the SCAG Region

- **Why was this resource developed?**
 - Retrieving climate data and mapping against assets can be a can require a lot of resources
 - We did the work for you!
 - The projections are consistent across the SCAG region and with the latest State-recommended guidance
- **What is the resource?**
 - A starting point for understanding exposure. It provides mid-century climate projections for three hazards for the SCAG region, and maps overlaying projections with transit assets
 - Extreme heat
 - Sea level rise
 - Extreme precipitation and inland flooding
- **When and how should I use it?**
 - Use it early on to understand how the climate is projected to change
 - Eventually, you may decide to do a more detailed exposure assessment. But for most people's purposes, this information should be sufficient.



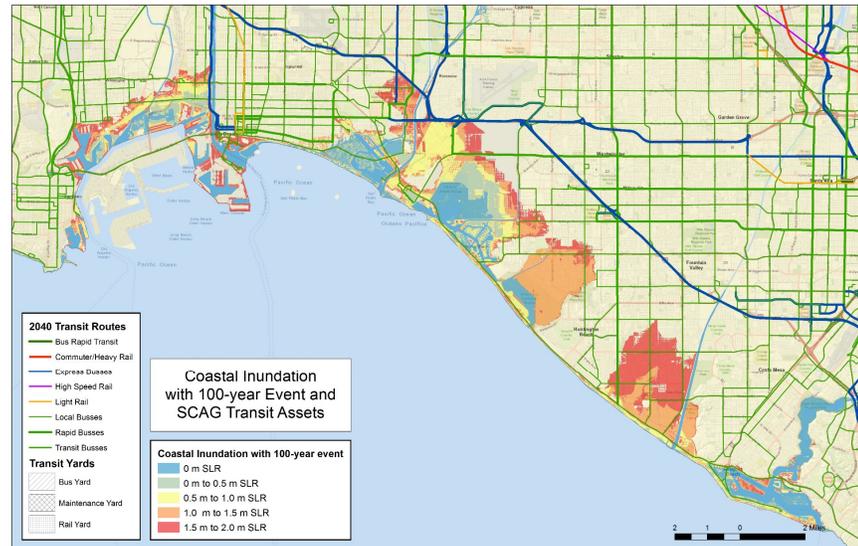
Tool 1: Projected Changes in Climate in the SCAG Region

Heat waves are expected to become hotter, last longer, occur more frequently, and be more widespread. Inland areas are projected to experience the greatest increases.



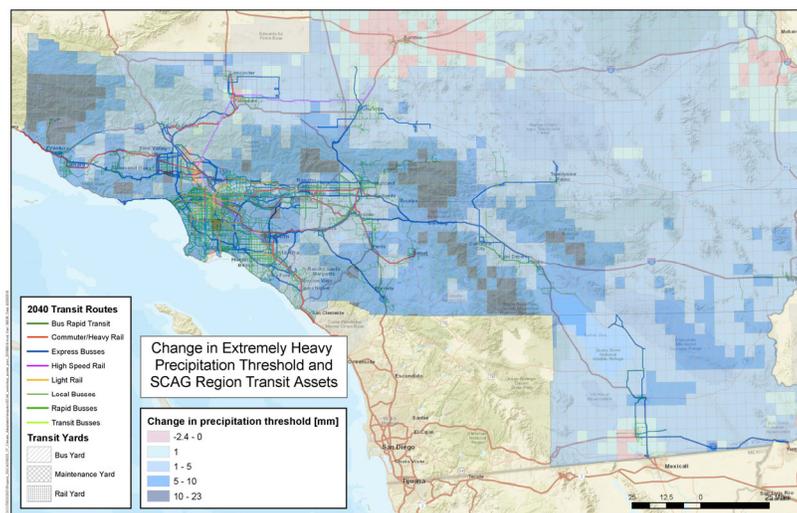
Tool 1: Projected Changes in Climate in the SCAG Region

Sea levels are projected to rise, leading to inundation in some coastal areas, namely Ventura, Playa Vista, Long Beach, and northern Orange County



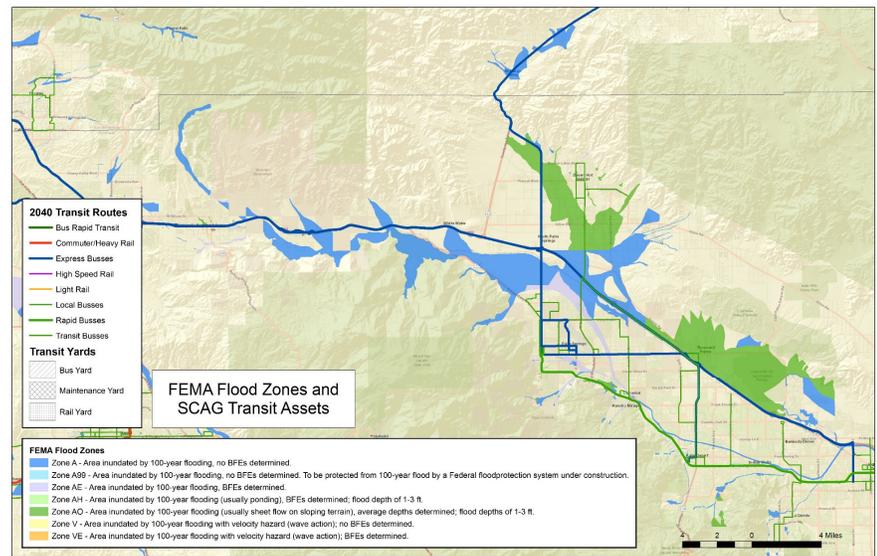
Tool 1: Projected Changes in Climate in the SCAG Region

The **threshold for extreme precipitation is expected to increase**, and dry to wet year swings (i.e., precipitation whiplash) are projected to become more intense. However, the average annual number of very heavy precipitation days is expected to stay **roughly the same**.



Tool 1: Projected Changes in Climate in the SCAG Region

Several areas have transit in floodplains within the SCAG region, including Long Beach, Coachella Valley, and western Imperial County. Flooding may be exacerbated by more intense extreme precipitation.



Tool 2: Assessing Vulnerability and Consequences: Getting Started

- Why was this resource developed?
 - There are a number of vulnerability assessment frameworks available, so we didn't want to create another one
 - We *did* want to provide some tips and best practices for getting started
- What it is the resource?
 - Outlines key considerations when embarking on a vulnerability assessment
 - Clearly articulate your vulnerability assessment goals
 - Refine your assessment focus early on
 - Use existing vulnerability assessment frameworks and methods
 - Obtain and interpret climate data appropriately
 - Resources for applying vulnerability assessment results
- When should I use it?
 - Before undertaking a vulnerability assessment, in order to appropriately prepare for and scope the assessment



Tool 3: Integrating Climate Change into Transit Agency Planning Processes



INTRODUCTION
The document provides a summary of transit agency planning processes and strategies for integrating climate change. The process flow is based on models from the SCAG...
1. Procurement/Contracting
2. Transit Asset Management
3. Short Range Transit Plan

- **Why was this resource developed?**
 - Given that transit agencies have limited resources, let's leverage what you're already doing to be more effective and cost-effective
- **What it is the resource?**
 - Outlines how to integrate climate adaptation into three common transit agency processes, including:
 - Procurement and Contracting
 - Transit Asset Management
 - Short Range Transit Plan
- **When should I use it?**
 - Once you understand your vulnerabilities and are ready to begin exploring adaptation

Tool 3: Integrating Climate Change into Transit Agency Planning Processes



Q&A on Tools for Getting Started



ICF proprietary and confidential. Do not copy, distribute, or disclose.

When and how should I apply each of the Toolbox tools?

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

1 2 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

9 10 11

9. Climate Resilience Planning Template
10. Contingency Plan Template
11. Transit Resiliency Funding Opportunities

Tool 4: How to Obtain Detailed Climate Projection Data

Why was this resource developed?

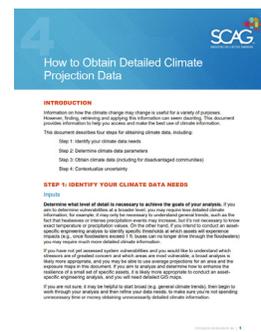
- High-level exposure data (provided in the first tool) is sufficient in many cases. However, certain assessments require more detailed data.
- There are many different options for retrieving data, so we broke it down to help you make decisions.

What it is the resource?

- This document outlines steps for obtaining climate data, including:
 - Step 1: Identify your climate data needs
 - Step 2: Determine climate data parameters
 - Step 3: Obtain climate data
 - Step 4: Contextualize uncertainty

When should I use it?

- When you want to develop climate projections beyond those provided in the first tool within this Toolbox



Tool 5: Assessing Criticality

Why was this resource developed?

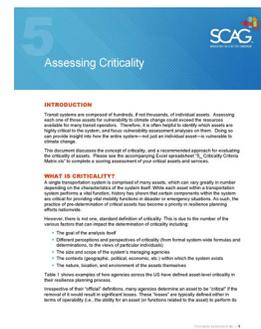
- Assessing the vulnerability of all assets within a transit system is not cost-efficient.
- It's often helpful to identify assets that are highly critical to the system, and focus vulnerability assessment analyses on those.

What it is the resource?

- Helps transit agency score the relative criticality of their assets using a guidance document and associated Excel tool.
- Steps include:
 - Defining goals and objectives of the analysis
 - Defining asset categories of interest
 - Applying evaluation criteria

When should I use it?

- Before or during your vulnerability assessment, when you want to identify critical assets to focus on



Tool 5: Assessing Criticality

Criticality Criteria Matrix

Asset Criticality

Bus Asset Category	Severity	Ridership	Connectivity	Service Criticality Score	Total Criticality Score
Administration buildings				0	0
Bases				0	0
Communications				0	0
Financial (payroll, procurement, revenue)				0	0
Fleet (non-revenue)				0	0
Fleet (revenue)				0	0
Fuel infrastructure & operations				0	0
Information technology				0	0
Materiel (stockroom)				0	0
Route (redundancy)				0	0
Staff (contracted staff)				0	0
Staff (direct operators)				0	0
Station/bus stop				0	0
Transit centers (incl. park & ride lots, bike centers, etc.)				0	0
Yards & shops				0	0

27

Tool 5: Assessing Criticality

Asset Evaluation Criteria

Severity: Given an available backup (if applicable), what kind of service can the system provide?

0	Near normal service
2	Impaired/compromised delivery of service
4	Localized shutdown
15	Total system shutdown (automatically considered to be highly critical)

Ridership: How many riders does the asset serve each day?

0	Does not apply
1	<100 riders
2	100 - 999 riders
3	1,000 - 9,999 riders
4	≥10,000 riders

Connectivity: How many transit lines does the asset provide connections to?

0	Does not apply
1	< 5 lines
2	5 - 9 lines
3	≥10 lines

30 Highest Possible Asset Criticality Score (Service Evaluation Criteria + Asset Evaluation Criteria)

28

Tool 6: Sensitivity Matrix

Transit Sensitivity Matrix

INTRODUCTION
When assessing transit system vulnerability, it is important to identify specific ways in which assets are sensitive to climate stressors. This document describes specific ways in which assets are sensitive to climate stressors. The information is intended to be used as a guide to help agencies understand and address their own vulnerabilities.

- **Why was this resource developed?**
 - When assessing transit system vulnerability, it's important to identify specific ways in which assets are sensitive to climate stressors.
 - Other transit agencies have already compiled a lot of information on sensitivities as part of their own projects, so we wanted other agencies to build upon, not recreate, their work.
- **What it is the resource?**
 - An Excel workbook that describes specific rail and bus asset sensitivities to temperature, precipitation and inland flooding, and sea level rise.
- **When should I use it?**
 - When conducting a vulnerability assessment, once you're interested in investigating specific sensitivities

Tool 6: Sensitivity Matrix

6	
BUSES	
Note: Parentheses indicate source, as listed in the References tab	
Asset Category	Important Impact-Asset Relationships by Climate Stressor
	Temperature Precipitation and Inland Flooding
Fleet	<ul style="list-style-type: none"> • Reduce asset lifespan (3, 8). • At higher temperatures, buses break down more frequently and require additional maintenance (8). Once temperatures reach 120 degrees F, many buses begin to shut down and stop running (8). • Extreme temperatures, particularly exceeding 100 degrees F stress the air conditioning systems (6). If they fail, the buses will be taken out of service and require maintenance (6). • Extreme heat stresses and causes damage to tires. The expansion and contraction of air in tires due to changing temperatures weaken the material (7). Increased cost of replacing tires damaged by more potholes and road damage (7). • Fueling in hot temperatures is less efficient, especially with gasoline (7). • Heat damage to asphalt could increase pothole and road damage, which can
Infrastructure (non-electrical)	<ul style="list-style-type: none"> • Heavy precipitation floods buses. Water often intrudes because they tend to be low clearance (3, 8). • Precipitation and flooding deposits debris in buses and bus lots (3). • Flooded bus storage can damage the fleet (3). • Drought can increase the amount of dust on vehicles and increase the need for washing, while at the same time creating potential limits on water use (3).
Infrastructure (electrical)	<ul style="list-style-type: none"> • When high heat is accompanied by drought conditions, asphalt and concrete pavement can crack, making it more vulnerable to water damage when it does rain (4). • Periods of excessive heat can compromise pavement integrity (e.g., softening asphalt and increasing rutting from traffic) (5). May require buses to reroute or perform maintenance on concrete bus pads to protect pavement (8). • Flooding at bus stations, parking lots, and bus stops (3). • Facilities are lost for routine inspections, and require additional maintenance (2). • Low-lying bridge and tunnel entrances for roads, rail, and rail transit will be more susceptible to flooding, and thousands of culverts could be undersized for flows (5). • Flooding at waterway crossings (where water has velocity) can be expected to cause pavement and embankment failure beginning when the water is high enough to flow over the roadway surface (4). • Storms increase risk of debris accumulation, sedimentation, erosion, scour, piping, and conduit structural damage (4).
	<ul style="list-style-type: none"> • Increased frequency or duration of heat events or incremental increases in the mean temperature can cause increased demand for air conditioning and stress the electric power systems during heat events (4). If AC units fail, they must either be fixed and delay the schedule or drivers must operate in the heat (7). • Blackouts increase as individuals get home and increase electricity use (7). • Increased frequency or duration of heavy rain events will cause low sensitivity; soil moisture effects electrical power system components, such as poles supporting power lines (4). • Drought conditions can increase the likelihood that trees will snap and break in storms, damaging power lines (4).

Q&A on Tools for Assessing Vulnerability and Consequences



ICF proprietary and confidential. Do not copy, distribute, or disclose.

31

Coffee Break



ICF proprietary and confidential. Do not copy, distribute, or disclose.

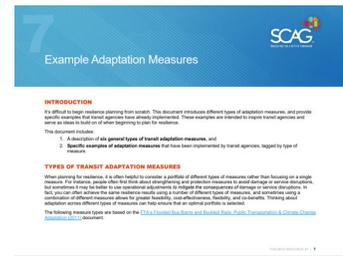
32

When and how should I apply each of the Toolbox tools?

<p>GETTING STARTED</p> <p>Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.</p> <p>TOOLBOX RESOURCES</p> <p>1 2 3</p>	<p>1. Projected Changes in Climate in the SCAG Region</p> <p>2. Assessing Vulnerability and Consequences: Getting Started</p> <p>3. Integrating Climate Change into Transit Planning Processes</p>
<p>ASSESSING VULNERABILITIES AND CONSEQUENCES</p> <p>Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change.</p> <p>TOOLBOX RESOURCES</p> <p>4 5 6</p>	<p>4. How to Obtain Detailed Climate Projection Data</p> <p>5. Assessing Criticality</p> <p>6. Sensitivity Matrix</p>
<p>IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES</p> <p>Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.</p> <p>TOOLBOX RESOURCES</p> <p>7 8</p>	<p>7. Example Adaptation Measures</p> <p>8. Tips for Selecting and Implementing Adaptation Measures</p>
<p>MOVING TOWARD IMPLEMENTATION</p> <p>Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.</p> <p>TOOLBOX RESOURCES</p> <p>9 10 11</p>	<p>9. Climate Resilience Planning Template</p> <p>10. Contingency Plan Template</p> <p>11. Transit Resiliency Funding Opportunities</p>

Tool 7: Example Adaptation Measures

- **Why was this resource developed?**
 - It's difficult to begin resilience planning from scratch. Having a list of specific examples that transit agencies have implemented can be helpful.
- **What it is the resource?**
 - A word document that includes:
 1. A description of six general types of transit adaptation measures
 2. Specific examples of adaptation measures that have been implemented by transit agencies, tagged by measure type
- **When should I use it?**
 - When developing an adaptation plan or just exploring adaptation measures



Tool 7: Example Adaptation Measures

EXAMPLE ADAPTATION MEASURES PLANNED OR IMPLEMENTED BY TRANSIT AGENCIES

• Plan & Prepare • Maintain and Manage • Strengthen & Protect • Enhance Redundancy • Recover • Retreat

Transit Agency Adaptation Measures	Adaptation Measure Type	Source
Kansas City Transit Authority (KCATA) <ul style="list-style-type: none"> Working on incorporating resilience into management plan for emergencies and to mitigate climate risks Focus on preparedness and service restoration Work w/ managers and front-line to identify assets, infrastructure, and services that are potentially vulnerable; work with a regional MPO to coordinate system planning across seven counties; use green infrastructure to mitigate flood risks 	● ● ● ● ● ●	1
Los Angeles County Metropolitan Transportation Authority (LA Metro) <ul style="list-style-type: none"> Integrated resilience into Environmental Management System (EMS) to consider resilience in agency decisions related to maintenance, operations, and capital project development Developed a Resiliency Indicator Framework to track infrastructure and operational resiliency over time Developing a comprehensive resiliency policy and updating infrastructure and facility design criteria and construction specifications to include resilience in capital project construction, operations, and maintenance 	● ● ● ● ● ●	1
Maryland Transit Administration (MTA) <ul style="list-style-type: none"> Focus on operations during extreme weather events Use operations & maintenance & emergency management procedures to protect infrastructure; developing an asset management system that incorporates climate and weather risk assessment; procedures that facilitate cessation and rapid recovery of services in response to winter weather threats 	● ● ● ● ● ●	1

Tool 8: Tips for Selecting and Implementing Adaptation Measures

Why was this resource developed?

- There's no hard-and-fast formula for determine which adaptation measures should be prioritized and implemented. Prioritization is based on various factors, and varies agency to agency.

What it is the resource?

- Provides a few tips for evaluating and implementing adaptation measures, including:
 - There are different types of costs of adaptation measures
 - There are different ways to achieve resilience
 - Some investments may be needed now, and some can wait (but shouldn't be forgotten!)
 - There are ways to manage uncertainty about the future climate
 - It's ok to start small
 - Effective communication can make the difference when seeking support for your resilience efforts

When should I use it?

- When developing an adaptation plan or beginning to decide which adaptation measures to prioritize and implement



Q&A on Tools for Identifying and Evaluating Adaptation Strategies



ICF proprietary and confidential. Do not copy, distribute, or disclose.

37

When and how should I apply each of the Toolbox tools?

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

1 2 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

9 10 11

9. Climate Resilience Planning Template
10. Contingency Plan Template
11. Transit Resiliency Funding Opportunities

Tool 9: Climate Resilience Planning Template

Why was this resource developed?

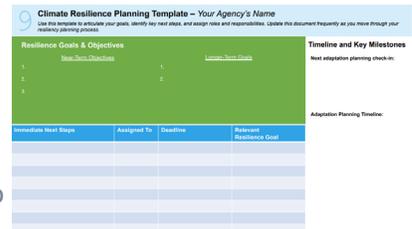
- We want adaptation plans to turn into meaningful action—not just a report that sits on a shelf
- Articulating responsibilities and near-term steps can help ensure momentum is continued

What is the resource?

- Template that helps transit agencies articulate:
 - Near- and long-term goals
 - Immediate next steps
 - Roles and responsibilities
 - Timeline for key adaptation milestones

When should I use it?

- When undertaking resilience planning



Tool 9: Climate Resilience Planning Template

Resilience Goals (clearly articulating goals can help provide focus around your resiliency efforts)

Near-Term Objectives

- Example:* Ensure all staff understand how climate change may affect the agency's assets and operations
- Example:* Have agency leadership acknowledge climate resiliency as an agency priority
- Example:* Develop a plan for adaptation planning

Longer-Term Goals

- Example:* Integrate climate resiliency into decision-making processes like procurement, short-range transit planning, and transit asset management
- Example:* Reduce service delays due to heavy rain events; reduce heat-related medical events by staff and customers

Immediate Next Steps	Assigned To	Deadline	Relevant Resilience Goal
<i>Example:</i> Engage senior leadership on adaptation	Maria	3 months prior to SRTP kick off	Near-term objectives 1, 2
<i>Example:</i> Develop workplan for completing a vulnerability assessment	John	Prior to next meeting of adaptation planning team	Long-term goal 1
<i>Example:</i> Conduct internal education/outreach on adaptation initiative	Anna	Throughout Q1	Near-term goal 1

Timeline and Key Milestones

Next adaptation planning check-in:

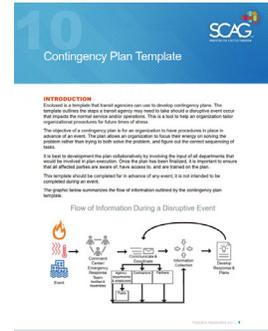
- Example:* January 15, 2019

Adaptation Planning Timeline:

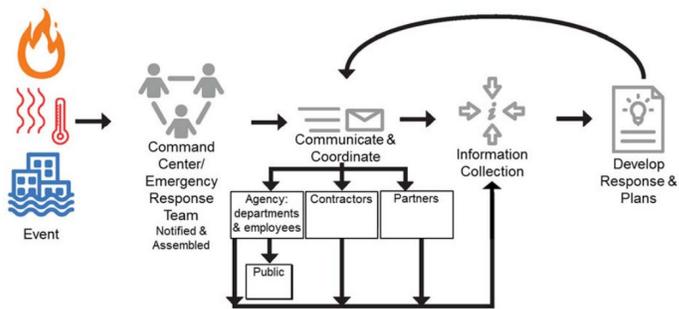
- Example:*
- Q1: Complete internal outreach and seek buy-in from executive leadership
 - Q2: Identify greatest vulnerabilities to transit system from climate change
 - Q3: Develop plan for incorporating climate change resiliency into upcoming SRTP
 - Q4: Work with colleagues throughout SRTP process to ensure climate resiliency is addressed

Tool 10: Contingency Plan Template

- **Why was this resource developed?**
 - Contingency plans can help agencies more effectively prepare for, cope with, and respond to disruptive events.
- **What it is the resource?**
 - Template that helps transit agencies develop contingency plans for disruptive events:
- **When should I use it?**
 - When planning for disruptive events



Flow of Information During a Disruptive Event



Tool 11: Transit Resiliency Funding Opportunities

- **Why was this resource developed?**
 - Funding is critical in advancing resilience efforts
- **What it is the resource?**
 - A document that discusses grant funding opportunities as of June 2018
- **When should I use it?**
 - When undertaking resilience planning



FUNDING OPPORTUNITIES SUMMARY
Table 1. Funding opportunities Summary

Grant Type	Grant Source	Grant Program	Grant Description	Grant Distribution & Requirements
Planning	Caltrans Transportation Planning Grant Program	Adaptation Planning (FY 2018-19: \$7 Million)	Funding directed for climate change adaptation planning on California's transportation infrastructure to reduce impacts from climate change and extreme weather events.	Grant minimum of \$100,000 Grant maximum of \$1,000,000 11.47% local match minimum
		Sustainable Communities (FY 2018-19: \$29.5 Million)	Funds local and regional multimodal transportation and land use planning projects that further the region's RTP SCS, contribute to the State's GHG reduction targets, and assist in achieving Caltrans' overarching objectives (e.g. safety).	Grant minimum of \$50,000 for disadvantaged communities and \$100,000 for all others Grant maximum of \$1,000,000 11.47% local match minimum

Q&A on Tools for Moving Toward Implementation



ICF proprietary and confidential. Do not copy, distribute, or disclose.

43

Thank you!

Questions?

Robert Kay
Robert.kay@icf.com

Beth Rodehorst
Beth.Rodehorst@icf.com



ICF proprietary and confidential. Do not copy, distribute, or disclose.

44

SCAG Regional Adaptation Plan Project



ICF proprietary and confidential. Do not copy, distribute, or disclose.

45

Project Purpose

- Empower transit agencies in the SCAG Region to:
 - identify critical assets and routes;
 - integrate climate considerations into local and regional planning processes; and
 - implement adaptation practices to improve transit system resilience while complying with state and federal regulations.
- Develop a toolbox of resources that will assist transit agencies in completing these activities with limited resources
- **Project to be completed in June 2018**



ICF proprietary and confidential. Do not copy, distribute, or disclose.

46

Why a Toolbox?

- Purpose is to build capacity of transit agencies of all sizes to
 - Evaluate their own vulnerabilities to climate change
 - Identify and implement appropriate adaptation measures
- By lowering common barriers to climate resiliency planning, agencies with limited resources can prepare for climate change

Toolbox Overview

GETTING STARTED

Learn about how your local climate is changing, define your resiliency goals, and learn about frameworks and transit processes that could guide your initiatives.



TOOLBOX RESOURCES

- 1
- 2
- 3

1. Projected Changes in Climate in the SCAG Region
2. Assessing Vulnerability and Consequences: Getting Started
3. Integrating Climate Change into Transit Planning Processes

Toolbox Overview

ASSESSING VULNERABILITIES AND CONSEQUENCES

Learn about resources to support vulnerability and impact assessments, including obtaining detailed climate projection data, identifying critical assets, and determining how assets are potentially affected by climate change



TOOLBOX RESOURCES

4 5 6

4. How to Obtain Detailed Climate Projection Data
5. Assessing Criticality
6. Sensitivity Matrix

Toolbox Overview

IDENTIFYING AND EVALUATING ADAPTATION STRATEGIES

Discover how other transit agencies are preparing for climate change, and read about best practices when evaluating and selection your adaptation actions.



TOOLBOX RESOURCES

7 8

7. Example Adaptation Measures
8. Tips for Selecting and Implementing Adaptation Measures

Toolbox Overview

MOVING TOWARD IMPLEMENTATION

Articulate time line, responsibilities, and next steps for action; conduct contingency planning, and identify funding sources.



TOOLBOX RESOURCES

9

10

11

- 9. Climate Resilience Planning Template
- 10. Contingency Plan Template
- 11. Transit Resiliency Funding Opportunities