

DATE: Revised June 29, 2023  
TO: Devin Middlebrook, Tahoe Regional Planning Agency (TRPA)  
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SUBJECT: Summary of Findings from Review of Key Plans and Reports, Tahoe Climate Resilience Dashboard Project, Attachment B

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## Project Background

The threats from greenhouse gas (GHG) emissions and climate change call for robust action. While this is a global challenge, the threats of climate change to the Lake Tahoe Region are significant: more frequent forest fires, loss of snowpack, increasing severe storms, flooding, loss of species biodiversity and increased invasives, and increased costs for infrastructure repairs and emergency services. The Tahoe Regional Planning Agency (TRPA), California Tahoe Conservancy (CTC) and many other federal, state, and local public, private, and non-profit organizations are working to reduce GHG emissions and make the region's urban and natural environments resilient to climate change.

The purpose of this project is to develop a Climate Resilience Dashboard that demonstrates the progress of regional partners on climate goals and communicates them to regulators, funders, stakeholders, residents, and visitors. The Climate Resilience Dashboard (the dashboard) will serve as a local reporting tool that tracks metrics relating to climate resilience in the Lake Tahoe Region. The metrics will help tell the story of climate resilience and engage the broader public in the conversation around climate action.

## Purpose of this memorandum

Multiple organizations are working to increase resiliency of the Lake Tahoe region to climate change. This memorandum provides the findings from reviewing key climate resilience documents and plans for the region. The regulatory requirements, plans, programs, projects, and other guiding documents provides foundational grounding and serves as guideposts for the Climate Resilience Dashboard.

### Documents Reviewed:

- Sustainability Action Plan and Sustainability Indicators Reporting Plan (TRPA, 2013)
- Tahoe-Truckee Electric Vehicle Readiness Plan (TRPA and Truckee-Donner Public Utility District, 2017)
- Regional Transportation Plan (TRPA, 2021)
- Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin (CTC, 2020)
- Tahoe Climate Adaptation Primer and Action Portfolio (CTC, 2021)
- Tahoe Climate Resilience Action Strategy (CTC, 2022)
- Lake Tahoe Greenhouse Gas Inventory Update (TRPA and partners, 2021)

- TRPA Threshold Standards and Regional Plan (2021) and TRPA Thresholds (2022)
- Local Government Climate Plans: City of South Lake Tahoe Climate Action Plan (2020) and the Placer County Sustainability Plan (2020)
- Envision Tahoe Prosperity Playbook: A Shared Action Plan for Economic Resilience, Investment, and Community Inclusion (Tahoe Prosperity Center, 2022) and Community Report for the Lake Tahoe Region (Tahoe Prosperity Center, 2022)
- Framework for Resilience: Tahoe-Central Sierra Initiative (TCSI), CTC, US Forest Service Department of Agriculture, The Nature Conservancy, National Forest Foundation, Alforests, Sagehen Creek Field Station University of California Berkeley, Sierra Nevada Conservancy, et al., (2020)

The review focused on:

- Identifying the best available information on climate conditions, the greenhouse gas inventory, and indicators and targets relevant to the Lake Tahoe Region.
- Identifying climate related goals that could be connected to different metrics.
- Summarizing climate related actions, strategies, targets, indicators, goals, and objectives.

Key findings from climate related planning and project implementation over the last decade are summarized below, and a more detailed review of key regional planning and climate resilience documents and their associated goals and findings are provided below in Exhibit 6.

## Summary of Tahoe Region Climate Planning and Implementation Over the Last Decade

The following section provides a high-level summary of regional climate plans and implementation projects completed over the last decade along with current knowledge on how climate conditions are changing, what is known about defining climate resilience, and major climate action related targets and mandates. This summary highlights information key to informing the update to the Tahoe Climate Resilience Dashboard.

### Climate Related Plans for the Tahoe Region

Over the last decade, Lake Tahoe Region communities have created various plans and initiatives to address sustainability and the changing climate. The TRPA Sustainability Action Plan (2013) and associated Indicators Reporting Plan was the first official plan outlining a menu of sustainability actions. Several of the 2013 Sustainability Plan actions were implemented in subsequent years, such as funding local incentive programs replacing older, pollution woodstoves and updating the Tahoe Regional Code to restrict idling. As of 2021, nearly 76 percent of the actions have been implemented.<sup>1</sup> The actions were implemented by TRPA, or local government partners, or other entities. Various actions were implemented at a local level since not all of them were specific to regional level implementation.

A companion to this plan, the Indicators Report (2013), provided a blueprint for the existing Sustainability Dashboard that will be updated through this project. The dashboard was intended to summarize regional sustainability efforts by TRPA and key partners. It presented information on the plans, programs, and other activities related to sustainability in Lake Tahoe Region.

#### Exhibit 1. Existing Sustainability Dashboard, Lake Tahoe Info

Source: TRPA, accessed at: <https://sustainability.laketahoeinfo.org/>



Since 2014, various Regional Plan updates and other plans, such as the Tahoe-Truckee Plug-in Electric Vehicle Readiness Plan and the City of South Lake Tahoe Climate Action Plan, include

<sup>1</sup> Climate Plan section on TRPA's climate resilience webpage: <https://www.trpa.gov/programs/climate-resilience/>

actions, goals, policy provisions, project work, and incentives encouraging sustainability and climate resiliency.<sup>2</sup> For example, updates to the Regional Transportation Plan (RTP) were made in 2017 and in 2021. The RTP updates further solidified TRPA’s commitment to promoting climate resilience by integrating time-bound targets (further described below).

Essentially these action plans and initiatives collectively suggest indicators and targets for the region and support the implementation of various actions to further advance mitigation and adaptation efforts and track the science surrounding the regional specific impacts of the Lake Tahoe Region. For example, the Tahoe-Truckee Plug-in Electric Vehicle Readiness Plan includes specific actions to support improved access to chargers and fast chargers in the region, shared information on incentives, and support the deployment of electric buses.

### Climate Related Projects in the Tahoe Region

TRPA coordinates the Environmental Improvement Program (EIP) for the region which advances the attainment of environmental threshold standards through partnerships and project work since 1997.<sup>3</sup> Local, state, and federal government agencies, private entities, scientists, the Washoe Tribe, and more have collaborated for decades to restore the environmental health of Lake Tahoe and serve as the foundation for regional climate adaptation coordination. This network of partners works together collectively to establish priorities, leverage funding, and find solutions to Lake Tahoe’s biggest environmental threats. Together, the partnership is implementing projects that not only improve the environment but also enhance recreation opportunities and revitalize communities.

The EIP Dashboard is generally viewed as an effective tool to communicate environmental information to a wide range of public, regulatory, and funding audiences. The EIP project tracker, a tool providing a wealth of relatable project level information, is organized in the following categories: watersheds and water quality; forest health; sustainable recreation and transportation; and science, stewardship, and accountability. The organization of the new and improved Tahoe Climate Resilience dashboard should complement the EIP project tracker to enable integration, where applicable. In addition, the EIP Action Priorities could inform what to focus on for several of the proposed dashboard indicators and several of the climate related EIP project examples could be integrated into the dashboard as examples of relatable project work.

The EIP project list tracker includes a “Climate Resilience” tag that helps to identify various projects identified as contributing to the Tahoe Climate Resilience Action Strategy. The 2021 EIP Progress Report highlights accomplishments and projects since 1997 and the cumulative investments in various sectors to accelerate the pace and scale of EIP partnership projects to balance climate change challenges. Key progress was made in 2021 recognizing the Caldor Fire cooperation in evacuating more than 30,000 people, supporting forest health funding, increasing the pace and scale of aquatic invasive species treatment, forming a new partnership

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<sup>2</sup> Additional detail on climate related planning and metrics is provided in the exhibit below. TRPA also provides a comprehensive list of Climate Action Planning since 2014: <https://www.trpa.gov/programs/climate-resilience/>

<sup>3</sup> EIP Project Tracker: <https://eip.laketahoeinfo.org/> provides detail on projects.

around destination stewardship addressing recreation and tourism, and expanding fire preparedness for seven additional neighborhoods. This “report card” update (2022) is described as a blueprint for climate resilience. Essentially, these projects demonstrate on-the-ground action supporting climate resilience. Consequently, the EIP project tool should be effectively integrated into the new Tahoe Climate Resilience Dashboard.

## Exhibit 2. Lake Tahoe Environmental Improvement Program, 2021 Accomplishments

Source: TRPA, August 2022



### Future Climate Related Work

TRPA is currently (2023) working to update regulations to promote more climate smart development and incentivize resilience.<sup>4</sup> This initiative recognizes the climate resilience dashboard update and the need to measure what matters.<sup>5</sup> This initiative surveyed 24 stakeholders from local government, nonprofits or community-based organizations, and private organizations to learn about policy updates. Results indicate a need for Tahoe to focus on reducing traffic congestion, promote water efficient landscaping and renewable energy, facilitate the transition to electric vehicles, promote zero waste for temporary events, and continue focusing on workforce housing. The resultant primary themes for the “Climate Smart Code” updates are focusing on building sustainable recreation and transportation systems, reducing wildfire risk, and building forest resilience, increasing watershed resilience and

<sup>4</sup> Climate Smart Code Section on TRPA’s climate resilience webpage: <https://www.trpa.gov/programs/climate-resilience/>

<sup>5</sup> Governing Board Meeting Presentation, October 26, 2022, Agenda Item VII.A Climate Resilience Strategic Initiative, accessed at: <https://www.trpa.gov/wp-content/uploads/Agenda-Item-No-VII-A-Climate-Resilience-Strategic-Initiative-Briefing.pdf>

biodiversity, upgrading infrastructure, and protecting vulnerable communities, and advancing science, stewardship, and accountability.<sup>6</sup>

## Defining Climate Resilience for the Lake Tahoe Region

Recognizing the narrative around climate resilience provides foundational information useful for shaping the focus of the new Climate Resilience Dashboard. TRPA's Regional Transportation Plan (RTP, 2021) and CTC's Tahoe Climate Resilience Strategy (2022) provides insights on how Climate Resilience is applied in the region.

TRPA's climate initiative in general focuses on harmonizing the goals of both states and local governments while maintaining the Region's reputation as a global leader in sustainability. The RTP (2021) recognizes climate resilience as a goal. The 2020 RTP (2021, pages 30-31) describes climate resiliency and how climate change: *impacts pose significant and growing risks to the safety, reliability, effectiveness, and sustainability of the Tahoe Basin and its transportation network. Many impacts are already occurring, and Lake Tahoe communities need to adapt to become more resilient to these changes. Higher temperatures, changes in seasonal precipitation, the intensity of rain events, and extreme weather can degrade roadways, damage culverts, and disrupt traffic. Preparing for climate change and extreme weather events is an important element of protecting the integrity of Tahoe's transportation system, the investment of taxpayer dollars, and the achievement of the plan's goals. Additionally, TRPA recognizes the broader need to address climate change in a holistic manner that connects to environmental justice.* The RTP (2021) recognizes that TRPA has been working with partners to develop a cohesive set of bi-state regional strategies that will result in climate mitigation, adaptation, and resiliency for the region by building on regional climate action to date and best science and planning practices.

Additionally, the Tahoe Climate Resilience Strategy (2022) published by CTC recognizes an integrated approach to building resilience that focuses on three main systems: the Lake Tahoe water system, the forested upland system, and the communities. They cite climate resilience priorities surrounding the need to expand public access to amenities; elevating the role of the natural lands in fighting climate change and advancing biodiversity conservation; restoring natural infrastructure; and safeguarding jobs, rural economies, and vulnerable communities and advancing equity.

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<sup>6</sup> Additional information provided in this presentation: <https://www.trpa.gov/wp-content/uploads/Agenda-Item-No-VII-A-Climate-Resilience-Strategic-Initiative-Briefing.pdf>

## Exhibit 3. Tahoe Climate Resilience Action Strategy Infographic and the Pillars of Resilience Infographic

Source: CTC, 2022; TSCI, 2020

### TAKING AN INTEGRATED APPROACH TO BUILDING RESILIENCE



**LAKE TAHOE**  
including its chemistry, hydrology, water quality, and native fish.



**FORESTED UPLANDS**  
including vegetation, wildlife, and groundwater.



**COMMUNITIES**  
including cultural landscapes, public health and safety, recreation, and water, power, communication, and transportation infrastructure.

Building resilience at Tahoe focuses on three main systems: **Lake Tahoe**, **Forested Uplands**, and **Communities**. Projects within each system yield multiple benefits and advance California and Nevada priorities, such as:

**Expanding** public access for people of all races, cultures, incomes, and abilities.

**Elevating** the role of natural lands in fighting climate change and advancing biodiversity conservation through land conservation.

**Restoring and using** natural infrastructure like wetlands, beaches, and forests to boost resilience to drought, flood, extreme heat, and changing visitor patterns.

**Safeguarding** jobs, rural economies, and vulnerable communities, and advancing equity.



## Key Resource Describing the Changing Climate: Tahoe's Climate Future Story Map

The California Tahoe Conservancy (CTC) created a [story map](#) that depicts how climate change is affecting Lake Tahoe, and how the region is adapting. This story map depicts future climate conditions and the associated impacts through vivid imagery, data, and user-friendly narrative. As shown below, the site offers an overview of climate change effects and associated adaptation efforts. This story map could be a useful resource to link to as a part of the Tahoe Climate Resilience Dashboard.

### Natural Resources

- **Water:** The need to model and design stormwater facilities to provide the greatest benefits under future climate scenarios; restore rivers and wetlands to reduce sediment flows into the Lake and respond to impacts due to warming temperatures making nearshore water more hospitable for aquatic invasive species.
- **Forest:** Longer, more frequent droughts and increased insect outbreaks will kill more trees. Increased tree die-off can further increase wildfire risk. This points to the need to adapt by reintroducing beneficial fire and restore the health of forest landscapes to increase their resilience to wildfire and reducing forest fuels on all public and private lands in neighborhoods and the wildland-urban interface.
- **Wetlands:** Shrinking meadows is an expected impact due to rising temperatures and decreased snowpack will likely dry out many meadows for prolonged periods, and eventually convert them to forest or shrubs. An adaptation measure is to restore mountain meadows to filter water, disperse flood flows, replenish groundwater, store carbon, and support unique plant and animal communities.
- **Wildlife:** Another impact associated with warming temperatures and changes in precipitation will reduce habitat and cause some native species to decline, or even become locally extinct. This calls for the monitoring of climate-threatened species.

### Community/Built Environment Infrastructure

- **Power Line Impacts:** The power lines will be at risk, particularly the high-voltage power transmission lines crossing lands with high risk of wildfire. They may ignite a fire if they contact surrounding vegetation, consequently vegetation should be removed around power lines while improving forest health.<sup>7</sup>
- **Shoreline Infrastructure Impacts:** Lower lake levels are associated with extended droughts limit boating access, affecting the recreation economy. High lake levels may flood lakefront properties. As a result, an adaptation effort being pursued is to retrofit shoreline infrastructure to function at all lake levels.

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<sup>7</sup> **Power Line Resilience Corridor Strategy** is an initiative led by utility companies to protect high risk communities by removing hazards near utility lines.



- **Transportation and Evacuation Impacts:** Extreme weather events, wildfire, and other hazards disrupt transportation, water, energy, and communication infrastructure. Road damages incur high annual costs that could be mitigated with adaptation efforts such as by retrofitting roads and utilities to withstand extreme weather and other climate change hazards. Climate change amplifies the risk of landslides, wildfire, flooding, and avalanches to the five highways carrying all traffic in and out of the Basin. An adaptation effort focused on disaster preparation involves state/regional agencies building community resilience, updating, and enforcing safety policies, and educating homeowners and visitors about wildfire danger and evacuation.
- **Public Health and Safety Impacts:** Increased wildfire events and smoke within and outside of the Basin will threaten public health and safety.

### Greenhouse Gas Emissions Inventories

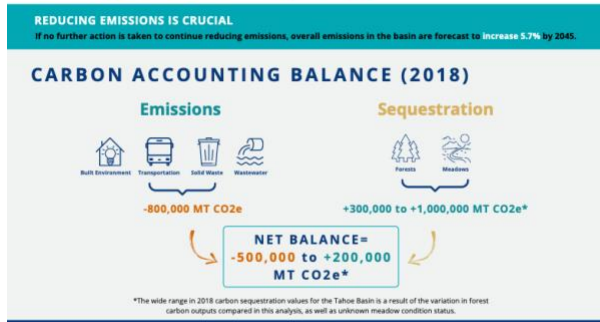
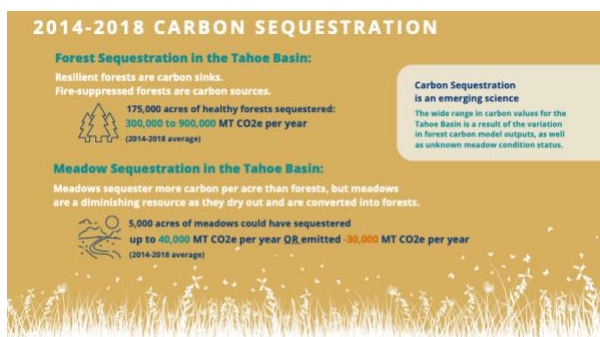
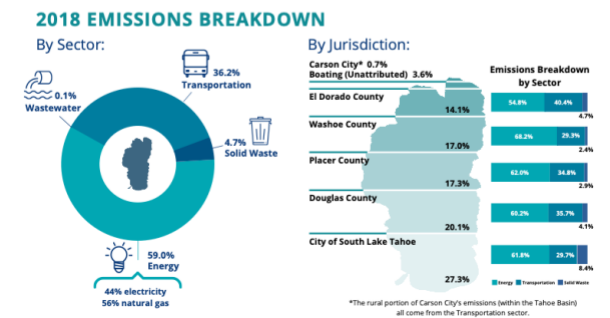
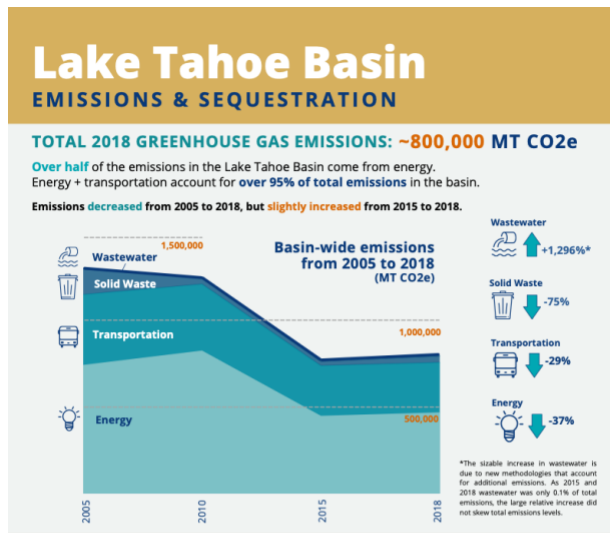
TRPA's webpage covering [Climate Resilience](#) provides a summary of the Greenhouse Gas (GHG) Emissions inventories which have measured an overall decline by almost 39 percent over the last few decades from 2005 to 2018 as shown in Exhibit 4. Total emissions were reduced from 1,297,446 metric tons of carbon dioxide equivalent (mtCO<sub>2</sub>e) to 795,793 mtCO<sub>2</sub>e with the energy sector producing more than half the emissions in the basin (59 percent), followed by transportation (37 percent). However, the 2018 inventory found a slight increase in emissions from 2015 to 2018. The 2018 GHG inventory modeled carbon sequestration potential in Tahoe's forests and meadows and found between 300,000 and 1,000,000 mtCO<sub>2</sub>e sequestered in 2018. This is compared to about 800,000 mtCO<sub>2</sub>e in emissions for 2018. Below, Exhibit 4 provides an infographic describing the recent inventory results.

There are various GHG reduction targets recognized in the Tahoe Region. The 2013 Tahoe Region Sustainability Action Plan (TRPA) first established a GHG reduction target of 15% by 2020 and 49% below the 2005 baseline by 2035 (more detail provided below). The State of California GHG reduction targets call for reducing GHG emissions to 40% below 1990 levels by 2030 (SB 32), and for carbon neutrality by 2045 (Executive Order B-55-18).

Overall, this recent inventory indicates that Lake Tahoe Region is on track to meet GHG emission reduction targets. The 39% reduction from 2005 to 2018 is greater than the targeted 15% reduction by 2020 and is on track to meet the 49% target for 2035. However, additional actions will be needed to meet the 2045 net zero target. Exhibit 5 illustrates the targets in a graph format to help explain future goals.

# Exhibit 4. Lake Tahoe Emissions and Sequestration Infographic

Source: TRPA, 2018



SIERRA  
www.sierra.org

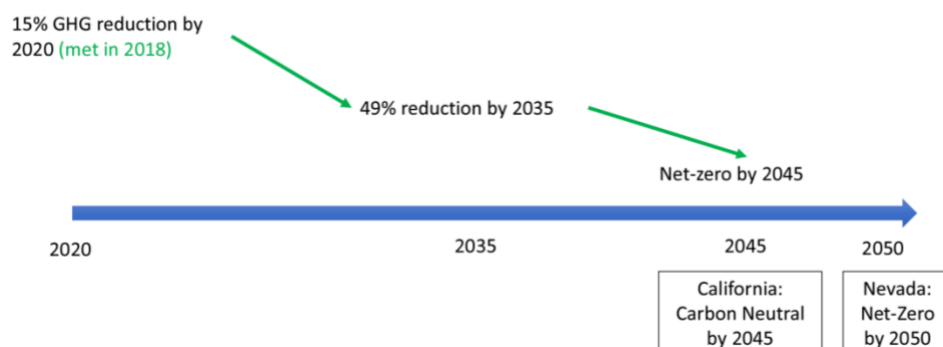
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## Exhibit 5. Graphic Describing TRPA's Greenhouse Gas Reduction Targets

Source: Governing Board Meeting Presentation for October 26, 2022, [www.trpa.gov/programs/climate-resilience/](http://www.trpa.gov/programs/climate-resilience/)

### Greenhouse Gas Reduction Targets



## Climate Mandates/Targets at the State, Regional, and Local Levels

Both the States of California and Nevada have provided legislative mandates or guidance on measuring and reducing GHG emissions and have set targets for GHG emission reduction.

### State Level Targets and Legislation

#### State of California

- The State of California has a goal to switch to 60% renewable electricity by 2030 with a goal of 100% carbon free electricity by 2045 (EO B055-18).<sup>8</sup> AB 3232 calls for 40% GHG emission reductions in buildings by 2030.
- Senate Bill (SB) 32 calls for reducing GHG emissions to 40% below 1990 levels by 2030, and Executive Order B-55-18 calls for carbon neutrality by 2045.
- SB 375, the Sustainable Communities and Climate Protection Act of 2008 requires that transportation related emission reduction targets be set: Tahoe is responsible for an 8% reduction by 2020 and an additional 5% by 2035.
- Executive Order B-16-12 mandates state agencies facilitate the rapid commercialization of zero-emission vehicles (ZEVs). The Executive Order sets a target for the number of 1.5 million ZEVs in California by 2025. Executive Order B-48-18 (Brown, 2018) directs state government to meet a series of milestones toward a long-term target of 1.5 million ZEVs on California's roadways by 2025 and 5 million by 2030.
- Assembly Bill (AB) 1482 Safeguarding California prioritizes climate adaptation across state agencies to safeguard California and requires a statewide adaptation plan that is updated every three years (Gordon 2015).

<sup>8</sup> Source: <https://www.trpa.gov/programs/climate-resilience/>

- SB 379 (2015) Requires all cities and counties to update safety elements of General Plans to include climate adaptation and resiliency strategies: <https://arccacalifornia.org/wp-content/uploads/2016/03/SB-379-Fact-Sheet-2.24.16.pdf>.
- AB 617 requires the California Air Resources Board (CARB) and local air districts to develop and implement additional emissions reporting, monitoring, and reduction plans to reduce air pollution exposure in disadvantaged communities.
- SB 1000 (2016) requires local governments to identify environmental justice communities and address environmental justice in general plans.
- AB 1384 requires state level adaptation planning with focus on vulnerable communities.
- AB 1445, the Regional Housing Needs Allocation (RHNA), requires Council of Governments to consider emergency evacuation route capacity, wildfire risk and other climate change impacts when developing methodology for distributing RHNA targets.
- AB 2238 requires California Environmental Protection Agency to develop statewide extreme heat ranking system by 2025 (ICARP or the Integrated Climate Adaptation and Resiliency Program is required to develop public communication plan for system).
- AB 1482 (Gordon, Chapter 603, Statutes of 2015) recognized climate smart land management of natural and working lands as a pillar of our state adaptation efforts.
- SB 27 (Skinner, Chapter 237, Statutes of 2021) required California Natural Resources Agency (CNRA) to develop the Natural and Working Lands Climate Smart Strategy, and to establish a California Carbon Sequestration and Climate Resiliency Project Registry. SB 27 also requires the California Air Resources Board (CARB) to establish carbon dioxide removal targets for 2030 and beyond as part of its Scoping Plan, considering the Natural and Working Lands Climate Smart Strategy, science-based data, cost-effectiveness, and technological feasibility in doing so.
- SB 1260 (Jackson, Chapter 624, Statutes of 2018) aimed to clear the path for more collaborative wildfire fuel reduction and prescribed burning projects to reduce the risk of catastrophic wildfire.
- AB 2470 (Grayson, Chapter 870, Statutes of 2018) established the Invasive Species Council of California to coordinate efforts to prevent invasive species introduction and advise efforts to control or eradicate such species.
- SB 852 authorizes a city, county or special district to form a climate resilience district for the purpose of raising and allocating funding for projects designed to address climate change mitigation, adaptation or resilience.
- Executive Order N-19-19 (Newsom, 2019) requires every aspect of state government redouble efforts to reduce GHG emissions and mitigate the impacts of climate change while building a sustainable, inclusive economy.
- Executive Order N-79-20 (Newsom, 2020) establishes a that 100% of in-state sales of new passenger cars and trucks will be zero-emission by 2035 and 100% of medium- and heavy-duty vehicles be zero-emission by 2045, among other emission reduction goals.

## State of Nevada

- Nevada aims to switch to 50% renewable electricity by 2030 with a goal of 100% carbon free electricity by 2050.<sup>9</sup>
- In Nevada, via Executive Order 2019, GHG emissions should be reduced by 2% below 2005 levels by 2025 and 45% below 2005 levels by 2030.

## Regional and Local Targets

- **TRPA RTP (2021):**
  - By 2045, TRPA's RTP (2021) forecasts a reduction of on-road transportation emissions by 13.7%.
  - Daily per capita VMT Target: 6.8% reduction from 2018 by 2045 (2018 per capita daily VMT is 12.48, goal is 11.63).
  - Non-Auto Mode Share Target: Improve average non-auto mode share calculated from the two most recent TRPA travel survey results; current performance on target at 24.5% (2018-20 average) up from 18% in 2014-16.
  - Transportation Access in Priority Communities Target: Increase access to each mode from priority communities to 100% by 2045 (on target).
  - Pavement Conditions Target: Maintain levels for "good" and "poor" pavement conditions: CA not on target but NV is on target.
- The 2013 Tahoe Region Sustainability Action Plan established a GHG emission reduction target of 15% by 2020 and 49% below the 2005 baseline by 2035.
- The City of South Lake Tahoe has a goal of 100% renewable electricity by 2030, at least a 50% reduction in GHG emissions by 2030, and an 80% reduction in emissions by 2040.

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<sup>9</sup> Source: <https://www.trpa.gov/programs/climate-resilience/>

## Existing Plans Related to Climate Resilience in the Lake Tahoe Region

### Exhibit 6. Key Plans and Documents: Descriptions, Climate Goals, Indicators & Metrics; and Notes

Source: Summarized by ECONorthwest. *Relevant goals are shown in bold italicized text below.*

Name, Date	Description	Climate Goals	Indicators & Metrics	Notes
<p><b>Sustainability Action Plan</b></p> <p>(2013, <a href="#">TRPA</a> consultant help from Environmental Incentives)</p>	<p>This document provides a sustainability action toolkit identifying various actions that could be taken. This plan identifies actual and potential actions being taken in a menu of options. This was one of the first steps to supporting sustainability at TRPA. This work was funded by the California Strategic Growth Council.</p>	<p>The plan provides guidance on indicators (action versus outcome indicators), and an overview of state, regional, and local efforts completed at that time. It included a baseline GHG inventory. Several of the actions recognized in the plan were taken such as an incentive program replacing older polluting woodstoves, idling restrictions, etc. To date, nearly 76 percent of the actions identified in the plan were implemented (RTP, 2021).</p>	<p>This plan includes a GHG inventory and reduction target with benchmarks set for 2020, 2035, and 2050 reducing at 15, 49, and 83% below the 2005-2010 baseline. Each local jurisdiction was encouraged to adopt a GHG emissions reduction target that supports achieving the Regional target. Various actions listed and rated for their co-benefits, impact towards GHG reduction potential, job generation potential, and private and public costs.</p>	<p>Many of these actions are more suited to local level jurisdiction action like energy star appliance rebates. Thus, these actions should be reconsidered. Target reduction strategies should be added to Area Plans. An updated GHG Emissions inventory was provided in 2018 (including carbon sequestration analysis). Rating framework of actions could be useful for a new set of metrics.</p>
<p><b>Sustainability Indicators Reporting Plan</b></p> <p>(2013-2014, <a href="#">TRPA</a> Consultant help from Environmental Incentives)</p>	<p>The Lake Tahoe Sustainability Indicators Reporting Plan guides the regular reporting of sustainability indicators for the Lake Tahoe Region. The report is intended to support consistent and regular reporting in Lake Tahoe. The primary long-term users are those responsible for regularly reporting and continually improving sustainability indicators.</p>	<p>There are not any goals outlined in this report; however, it provides a blueprint for the sustainability dashboard. This report discusses how the Dashboard can communicate sustainability progress through the lens of social, economic, and environmental indicators. The Dashboard is expected to present the status and trend of the indicators presented in this Reporting Plan – it does not look like this goal was carried through fully. Guiding principles are described on page 8.</p>	<p>Indicators are measurable variables used to represent the status and trend of each aspect, and what is being done to improve each aspect. Action indicators report on investments and accomplishments intended to improve region sustainability (e.g., policies, programs, and projects). Outcome indicators report progress in relation to the environmental, economic, and social goals. Aspects (similar to goals/objectives) are the environmental, economic and social topics most important to Tahoe sustainability.</p>	<p>Page 7 includes guidance on indicators that might be helpful. An aspect and indicator selection criteria are outlined (page 10 and in the appendix) outlining criteria such as relevance, utility, feasibility, reliability, etc.</p>

Name, Date	Description	Climate Goals	Indicators & Metrics	Notes
<p><a href="#">Tahoe Truckee Electric Vehicle Readiness Plan</a></p> <p>(TRPA and Truckee-Donner Public Utility District (PUD), 2017)</p>	<p>The Tahoe-Truckee Plug-in Electric Vehicle (PEV) Readiness Plan, including an action-oriented implementation plan and toolkits, was created in 2017. This plan includes a set of actions to support transportation electrification and support the replacement of traditional vehicles with zero emission vehicles through improved infrastructure, funding, and education. The plan lays out the path to make the region “PEV ready” by identifying the barriers to widespread deployment of charging infrastructure and outlining actions that will reduce and resolve these barriers.</p>	<p>The overall vision of the Plan is to establish the region as a leader in mass PEV deployment supported by robust PEV education and engagement; convenient network of charging infrastructure; streamlined charger installation; standardization of codes; and widespread use of renewable energy resources. The plan consists of an array of short-term, medium-term, and long-term actions. Key plan monitoring involves tracking PEV and charging infrastructure deployment and PEV readiness projects. Key monitoring metrics are the total number of charging stations, PEV adoption (vehicles, buses, bicycles, etc.) and GHG emissions effects. The plan aims to reduce petroleum consumption, GHG emissions, and noise; improve water quality/clarity; and increase energy independence and transportation choices. The RTP (2021) conveys the vision of adding a series of mobility hubs built at major intersections and town centers provide electric vehicle charging for an electric transit fleet and connect passengers with first and last mile trip options like shared mobility services and park-and-ride lots.</p>		<p>The RTP has a GHG emission goal related to PEV, zero emission vehicles, and transportation electrification. <b>The RTP shows the installation of DC fast charging hubs in nearly every town center. RTP (2021) Policy 1.5: Facilitate and promote the use of zero emission vehicle transit, fleet, and personal vehicles through implementation of the Tahoe-Truckee Plug-in Electric Vehicle Readiness Plan, education, incentives, funding, and permit streamlining.</b></p>
<p><a href="#">Regional Transportation Plan</a></p> <p>(2021, TRPA)</p>	<p>The Regional Transportation Plan (RTP) was updated recently in 2021. The RTP mission calls for TRPA to lead the cooperative effort to preserve, restore, and enhance the Lake Tahoe Region, while improving local communities and people’s interactions with our irreplaceable environment. <i>Vision: Tahoe’s transportation system is interconnected, inter-regional, and sustainable, connecting people and places in ways that reduce reliance on the private automobile.</i> The RTP proposed new trails and transit services, traffic signal improvements, adaptive corridor management that uses existing roadway to implement transit priority and/or reversible travel lanes, and parking management programs.</p>	<p><b>Key goals: 1) Protect and enhance the environment, promote energy conservation, and reduce GHG emissions by creating a transportation system that provides alternatives to driving. 2) Enhance and sustain the connectivity and accessibility of the Tahoe transportation system, across and between modes, communities, and neighboring regions, for people and goods. 4) Support the economic vitality of the Region to enable a diverse workforce, sustainable environment, and quality experience for both residents and visitors. 6) Provide for the preservation of the existing transportation system through maintenance activities that support climate resiliency, water quality, and safety. Planning for climate resiliency makes initial investments last and reduces large and costly rehabilitation projects.</b></p>	<p><b>RTP: Meet GHG reduction targets of 8% by 2020 and 5% by 2035, based on 2005 emission levels (as mandated by CARB).</b> The RTP programs/ projects are estimated to help meet these targets. <b>Key Targets, Ch. 5 Measuring and Managing for Success (p. 123+): Daily per capita VMT Target: 6.8% reduction from 2018 by 2045 (2018 per capita daily VMT is 12.48, goal is 11.63). Non-Auto Mode Share Target: Improve average non-auto mode share calculated from the two most recent TRPA travel survey results; current performance on target at 24.5% (2018-20 average) up from 18% in 2014-16. Transportation access in priority communities Target: Increase access to each mode from Priority communities to 100% by 2014 (on target). Pavement Conditions Target: Maintain levels for “good” and “poor” pavement conditions: CA not on target but NV is on target.</b></p>	<p>In 2018, TRPA adopted the Lake Tahoe Region Transit Monitoring Protocol to establish methods for collecting and analyzing public transit data. The RTP is updated every 5 years.</p> <p><i>Policy 1.1: Support mixed-use, transit-oriented development and community revitalization projects that encourage walking, bicycling, and easy access to existing and planned transit stops in town centers.</i></p> <p><i>Policy 3.4: Support emergency preparedness and response planning, including the development of regional evacuation plans.</i></p> <p><i>Policy 4.2: Enable growth of shared and on-demand shared ride mobility services (i.e., ride-, car-, and bike-sharing, e-hailing, etc.).</i></p>

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<p><a href="#">Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin</a> (2020, CTC)</p>	<p>The <a href="#">Tahoe Basin Vulnerability Assessment</a>, completed by CTC includes findings from the <a href="#">California's 4th Climate Assessment</a> to analyze specific regional climate change impacts. This vulnerability assessment assessed how patterns of temperature and precipitation are expected to change. The common scenarios and analyses provided are intended to help public agencies anticipate climate change implications, and better design and maintain their future projects that improve the quality of life, land, and waters in Tahoe. This assessment was written for a technical audience.</p>	<p>Key vulnerabilities are highlighted in the lake, upland, and community sub-systems.<sup>10</sup> <i>The greater the sensitivity and the less the adaptive capacity, the more vulnerable something is to climate change.</i></p>	<p><i>Vulnerability refers to the extent to which a natural or social system is susceptible to sustaining damage from climate change (IPCC). It is a function of 3 variables: Exposure: how much the resource will be exposed to climate changes (e.g., will temperature increase one degree or two?) Sensitivity: the degree to which a system will respond to a given change in climate, including beneficial and harmful effects, and Adaptive capacity: the degree to which adjustments in practices, processes, or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate, independent of management interventions.</i></p>	<p>Many great figures visually describing the changes and vulnerabilities.</p>
<p><a href="#">Tahoe Climate Adaptation Primer</a> (2021, CTC)</p>	<p>This primer focused on describing partner projects. This is a primer of major climate impacts (based on integrated vulnerability assessment) and existing adaptation partnerships (involving the states, TRPA, federal agencies, the Washoe Tribe, local jurisdictions, nonprofits, and businesses). The primer concludes with what lies ahead for Tahoe focusing on statewide planning, goals of a new regional mitigation, adaptation, and resilience initiative led by the TRPA, as well as local jurisdiction plans and initiatives.</p>	<p>This primer describes other plans (such as the 2014 Sustainability Action Plan) and calls for partners to identify and prioritize mitigation, adaptation, and resiliency actions that fill climate implementation gaps. The primer references the need for an updated dashboard to create a real-time climate scoreboard to track regional progress.</p>	<p>Great information on climate changes including average temperature, peak runoff, lake clarity, biological diversity, drought stress, wildfire risk, rising snowline, etc. No exact indicators/ targets or metrics recognized.</p>	<p>Helpful key messages and narrative around how the region is changing and how to define adaptation.</p>

<sup>10</sup> Lake: As a system that depends on the health and function of other physical and biological processes and resources (e.g., runoff, vegetation), Lake Tahoe has almost no ability to adapt to changes. Climate change will alter lake conditions and subsequently aspects of the Lake's native biodiversity. Alterations to the native biodiversity will impact how nutrients and particles delivered from the watershed are processed. More extreme hydrologic events, with increasing intensity of storms, rain-on-snow events and floods, along with more extended droughts, will lead to higher flow runoff events and corresponding impacts on erosion, pollutant transport, and damage to infrastructure. Upland: With more intense rainfall events over shorter periods, the total infiltration to groundwater storage will decrease compared with the same amount of annual precipitation spread over smaller events through the year leading to forest encroachment and loss of wetland habitat. Many native plant and animal species are likely to experience shifts in abundance and distribution, and some may not be able to persist in the Basin. Biodiversity of native plant species may decline due to reduced moisture across the range of forest types. As the soil moisture decreases during drought periods, vegetation will begin to change with increased tree mortality due to drought, climate-induced insects and pathogens, windthrow, and greater risk of wildfires. Riparian and meadow ecosystems will remain at risk of severe wildfire due to high densities of encroaching conifers. Without restoration, climate change is expected to continue converting meadows to upland forests. Communities: Roads, bike paths, and key infrastructure will be threatened by increased risk of wildfire, flooding, erosion, and landslides. Recreation use will be affected by reduced snowpack and more frequent extreme weather events. Public health and safety will be threatened by extreme heat events and smoke from wildfires. Traffic in Basin will increase as visitors seek cooler temperatures in Tahoe.



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<b>Tahoe Climate Adaptation Action Portfolio</b> (2021, <a href="#">CTC</a> )	CTC) and Tahoe Transportation District (TTD) partnered with Basin agencies, etc. to assess the vulnerability of the Lake, forests, and communities to climate change impacts ( <a href="http://tahoe.ca.gov/climate-change">tahoe.ca.gov/climate-change</a> ). This Climate Adaptation Action Portfolio (Portfolio) identified adaptation actions that are already being taken.	The Science and Engineering Team identified critical science, engineering, and economic research priorities for each sub-system that will help improve adaptation actions (sections for the lake sub-system, uplands, and communities). These are more related to research suggestions rather than metric related.	Similar to the above Primer document, this focused on tracking climate changes. Disaster preparedness actions underway are provided at the end of the report.	This only provides a little information on what actions should be taken. Rather, it focuses on describing activities already being taken by partner agencies.
<b>Tahoe Climate Resilience Action Strategy</b> (2022, <a href="#">CTC</a> )	This plan focused on actions advancing equity, creating jobs, and adaptation (resilience) and some mitigation actions. This is a short plan with goals and objectives. The actions are not all necessarily specific to TRPA since this was published by CTC.	5 goals related to the following: Building sustainable recreation and transportation systems; reducing wildfire risk and building forest resilience; increasing watershed resilience and biodiversity; upgrading infrastructure to protect vulnerable communities; and advance science stewardship and accountability.	No exact indicators/ targets or metrics recognized. Focused on investment and general goals like restore burned forests, expand vehicle charging and solar energy adoption.	Narrative regarding costs, funding needs, resilience, and projects. References a Lake Tahoe Forest Action Plan.

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<p>Lake Tahoe  <a href="#">Greenhouse Gas Inventory Update</a>            (2021, TRPA and partners)</p>	<p>This report provides the findings from an updated GHG inventory for the Region, (an update of the 2013 inventory). It provides detailed accounting of GHGs emitted by source, an estimate of energy use and emissions from aging buildings located in stream environment zones (wetlands), and carbon stored in natural ecosystems from 2014 to 2018. This report also provides a projection of GHG emissions from 2018 to 2045 based on a business-as-usual forecast of changes in energy use, transportation, solid waste management, and wastewater treatment. This inventory is an update to an inventory previously completed in 2013.</p>	<p>The states of California and of Nevada provided legislative mandates or guidance on measuring and reducing GHG emissions. <i>In California, AB 32 called for reduction of GHG emissions to 40% below 1990 levels by 2030, and Executive Order B-55-18, called for carbon neutrality by 2045. In Nevada, Senate Bill 254 (2019) required the state to create annual GHG emissions inventory reports and determine whether these policies are enough to achieve a goal of zero or near-zero GHG emissions by 2050, and by Executive Order 2019-22 calling for reducing GHG emissions by 2% below 2005 levels by 2025 and 44% below 2005 levels by 2030.</i></p> <p><i>The 2014 Sustainability Action Plan established a GHG emission reduction target of 15% by 2020 and 49% below the 2005 baseline by 2035. The City of South Lake Tahoe has a goal of 100% renewable electricity by 2032, at least a 50% reduction in GHG emissions by 2030, and an 80% reduction in emissions by 2040.</i></p> <p><i>Carbon sequestration recommendations: expand initiatives to stabilize forest carbon through forest health treatment; assess if increasing carbon stocks is appropriate for the ecological resilience of a landscape; determine if forest restoration activities that result in a net decrease in current carbon stocks across are acceptable if they improve overall forest resilience and function; identify constraints and opportunities for increasing meadow carbon stock; improve meadow carbon datasets and metrics; and expand meadow restoration initiatives to increase soil carbon storage in meadows.</i></p>		<p>The report included recommendations on a future GHG inventory such as to consider more detailed scenario planning to understand greatest opportunities to achieve GHG reductions, continue periodic re-inventories to measure progress, and develop a climate resiliency framework to track strategies.</p>

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<a href="#">Threshold Standards and Regional Plan</a> (TRPA, 2021)	<p>The Regional Plan guides development in the Region to achieve balance between the natural and built environment and it outlines TRPA's approach to meeting thresholds. This plan encourages environmentally friendly redevelopment of the aging built environment into compact, mixed-use development town centers. This Plan was last amended in 2021 and is structured to be updated every four years to adapt to shifting needs, circumstances, and threats. Mission: TRPA leads the cooperative effort to preserve, restore, and enhance the unique natural and human environment of the Lake Tahoe Region, while improving local communities, and people's interactions with our irreplaceable environment.</p>	<p>Key goals recognizing climate resilience or sustainability are outlined, particularly in the Transportation Element.<sup>11</sup> In other sections, there are various goals and indicators related to climate resilience. Goal AQ-1: Attain and maintain air quality in the region at levels that are healthy for humans and the ecosystem, achieve and maintain environmental thresholds and do not interfere with Residents' and visitors' visual experience. (Associated applicable policies are listed to the right.) Goal Veg-4 promote growth of late seral/old growth stands within the region and Goal Veg-6 is to reduce the risk for catastrophic wildfire supports climate resiliency. Goal S-1, Goal OS-1, and Goal SEZ-1 includes various policies that support carbon sequestration. Other goals to recognize include Goal PS-4 (protecting health) and Goal E-1 (promote energy conservation programs and development of alternative energy sources).</p>	<p>AQ-1.1 to 1.8 describe emission reduction policies such as AQ-1.3, encouraging the reduction of emissions from motor vehicles or for building efficiency (AQ-1.5). LU-4.1 Policy: [...] Centers are the areas where sustainable redevelopment is encouraged. The Vegetation section has helpful policies supporting healthy forest particularly Veg-1.1, 1.5, 1.7, 1.8, and 1.11 (such as Veg-1.1: Forest management practices shall be allowed when consistent with acceptable strategies for the maintenance and enhancement of forest health and diversity, prevention of wildfire, protection of water quality, and enhancement of wildlife habitats).</p>	<p>Goal DP-5 calls for TRPA to adaptively manage regional land use and the transportation system to achieve and maintain the transportation and Sustainable Communities Threshold Standard 1 (TSC1 described below).</p>

<sup>11</sup> Transportation Element Goal 1 Environment: *Protect and enhance the environment, promote energy conservation, and reduce greenhouse gas emissions.* Goal 5 Economic Vitality and Quality of Life: *Support the economic vitality of the Region to enable a diverse workforce, sustainable environment, and quality experience for both residents and visitors (5.3. also supports sustainable recreation and multimodal access to recreation sites).* Goal 6 System Preservation: *Provide for the preservation of the existing transportation system through maintenance activities that support climate resiliency, water quality, and safety.*

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<a href="#">TRPA Thresholds</a>  (TRPA, 2022, currently undergoing updates)	In 2022, through a threshold initiative update, a subset of the 10 threshold standard categories were identified including: Air Quality, Fisheries, Soil Conservation, Vegetation Preservation, Water Quality, and Wildlife. In addition, update guidance and goals (22) were provided on threshold standard development. TRPA first adopted the thresholds in 1982 and has since then updated them through an adaptive management or continuous improvement approach to reflect current scientific understanding and changing circumstances.	<i>They are in the process of updating the Thresholds, so we need to confirm. Key thresholds related to climate change: TSC1) Reduce Annual Daily Average VMT Per Capita by 6.8% from 12.48, the 2018 baseline, to 11.63 in 2045. Various Aquatic Invasive Species management standards and Water Quality including surface runoff could be linked to climate resilience. Various Soil Conservation and Vegetation could be applicable.</i>	<i>Various thresholds are identified describing water and air quality; soil conservation; transportation and sustainable communities (TSC); vegetation preservation; wildlife; fisheries; noise; recreation; and scenic resources. Recreation Policy Statements focus on preserving and enhancing the high quality recreational experience.</i>	Threshold updates are guided by 7 principles that could be considered for the dashboard metrics: protect ecosystem processes, structures, and functions; science-based; manage as a system; specific and measurable; informative; and feasible (p. 3-4, Regional Plan). The project team should attain more guidance on which thresholds would be most applicable with climate resilience.
<a href="#">City of South Lake Tahoe Climate Action Plan</a>  (2020, City of South Lake Tahoe)	This plan was developed following the City's pledge to become the first jurisdiction in the Sierra Nevada and the 26th in the nation to adopt a 100% Renewable Resolution, committing the City to a number of renewable energy targets and GHG emission reduction goals. The plan focuses on climate change mitigation actions. This plan was developed in partnership with the CivicSpark Fellows and the Sierra Nevada Alliance, Ascent Environmental, 12 partner agencies, and the community. The plan includes an inventory in the beginning section.	<i>Their overall goal is more ambitious than the state since it focuses on reducing GHG emissions to 50% below 2015 levels by 2030, 80% by 2040, and carbon neutrality by 2045 (CA).</i>	The plan has a series of strategies of 14 strategies which each include 6 transportation strategies, 1 land use strategy, 4 building energy strategies, 2 water and solid waste strategies, and 1 carbon sequestration and watershed health strategy. Action COT-1 is relevant to TRPA: Partner with TRPA to support transportation programs such as the Commute Tahoe program and the Linking Tahoe Plan.	<b>The strategies and actions should be reviewed to see if any could inform TRPA's metrics. A few actions with linkages with TRPA are</b> action EV-1, promoting and incentivizing Electric Vehicle chargers; actions TR-1 and TR-2, supporting improvement to transit services and promoting regional/local transit network for tourism; action WB-1 improving bicycle and pedestrian network and support use of e-bikes; and action LU-1 encouraging complete neighborhoods.

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<p><a href="#">Placer County Sustainability Plan (PCSP): A Greenhouse Gas Emission Reduction Plan and Adaptation Strategy</a></p> <p>(2020, Placer County)</p>	<p>The plan includes an inventory in the beginning section. The purposes of this plan are to provide a road map to achieve GHG reductions, demonstrate conformance to CA laws, implement the General Plan, and improve resiliency for climate-related hazards. The plan includes actions to address both mitigation and adaptation type actions. Various partners supported and PlaceWorks, Sierra Business Council, and Fehr &amp; Peers helped develop the plan.</p>	<p><i>Strategy GHG-1: Establish a carbon offset program that identifies, supports, and funds programs and projects that demonstrate sustained GHG emissions reductions and climate adaptation, primarily in the unincorporated county and the region. GHG reductions from these programs and projects shall be real, permanent, quantifiable, verifiable, and enforceable. Programs shall primarily serve the residents and businesses of Placer County.</i></p>	<p>The PSCP contains 67 strategies to reduce community-wide emissions, and 46 strategies to reduce government operations emissions. All strategies are organized into categories depending on the source of GHG emissions that they address such as energy, water and wastewater, transportation, solid waste, agriculture and forestry, and off-road equipment. The county likely will be updating this plan soon to prioritize actions and focus efforts.</p>	<p>Chapter 2, the vulnerability assessment, identifies populations including <i>children, homeless persons, households in poverty, outdoor workers, persons in mobile homes, persons with chronic health problems, persons without access to lifelines, senior citizens, senior citizens living alone, and undocumented persons.</i></p> <p><i>Conditions of concern: Extreme heat and senior citizens living alone are vulnerable to the most exposures due to decreased mobility, disconnection from the community, and the disabilities or illnesses that could make recovery from natural disasters more difficult. Households in poverty are also vulnerable to several hazards because of the additional financial burdens. Infrastructure at greatest risk are road, trails, bridges, communication facilities, electric transmission lines, and power plants.</i></p>
<p><a href="#">Envision Tahoe Prosperity Playbook: A Shared Action Plan for Economic Resilience, Investment, and Community Inclusion</a></p> <p>(Tahoe Prosperity Center, 2022)</p>	<p>The Envision Tahoe Prosperity Playbook describes how we can make this future real for the Tahoe-Truckee Region. This provides a playbook of data-informed strategies aimed at diversifying the region's economy, embracing tourism, and supporting next economy sectors well suited for this area.</p>	<p><i>There are no climate specific goals but associated goals. The playbook foundational strategies accelerate workforce housing and increasing mobility and three strategies to energize and diversify the business sector to build pathways to house-buying jobs. All include specific and actionable steps that can lead to execution and results.</i></p>	<p>Various actions based on data analysis findings could inform metric changes. Several helpful data analysis findings related to the economy and social systems should be evaluated such as the K-12 public and private school enrollment levels, average commute time, and affordable rent index.</p>	<p>Interesting data analysis findings regarding the changing climate are provided in the forward about economic diversification and long-term resilience.</p>

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<p><b>Framework for Resilience: Tahoe-Central Sierra Initiative (TCSI)</b> (CTC, 2020)</p>	<p>This plan provides a summary of the resilience pillars, elements, and metrics. This document was adapted from a report: Manley, P., K. Wilson, and N. Povak. 2020. Framework for Promoting Socio-ecological Resilience across Forested Landscapes in the Sierra Nevada,</p>	<p><i>The Framework includes Pillars (long-term, landscape-scale outcomes of restoring resilience), Elements (primary processes and functions that altogether make up a pillar), and Metrics (describing the characteristics of elements in quantitative and qualitative terms).</i></p>	<p><i>The metrics help assess, plan for, measure, and monitor progress towards desired outcomes and greater resilience. The metrics that a group uses may vary from region to region based on ecological and social differences (for example forest types, economy), available data, and user preferences. Key outcomes: forest resilience, carbon sequestration, fire dynamics, fire adapted communities, economic diversity, social and cultural well-being, wetland integrity, biodiversity conservation, water security, and air quality.</i></p>	<p>The plan provides a great deal of insights on outcomes and metrics. Need to check outcomes and metrics for insights useful to the Tahoe Climate Resilience Dashboard.</p>