

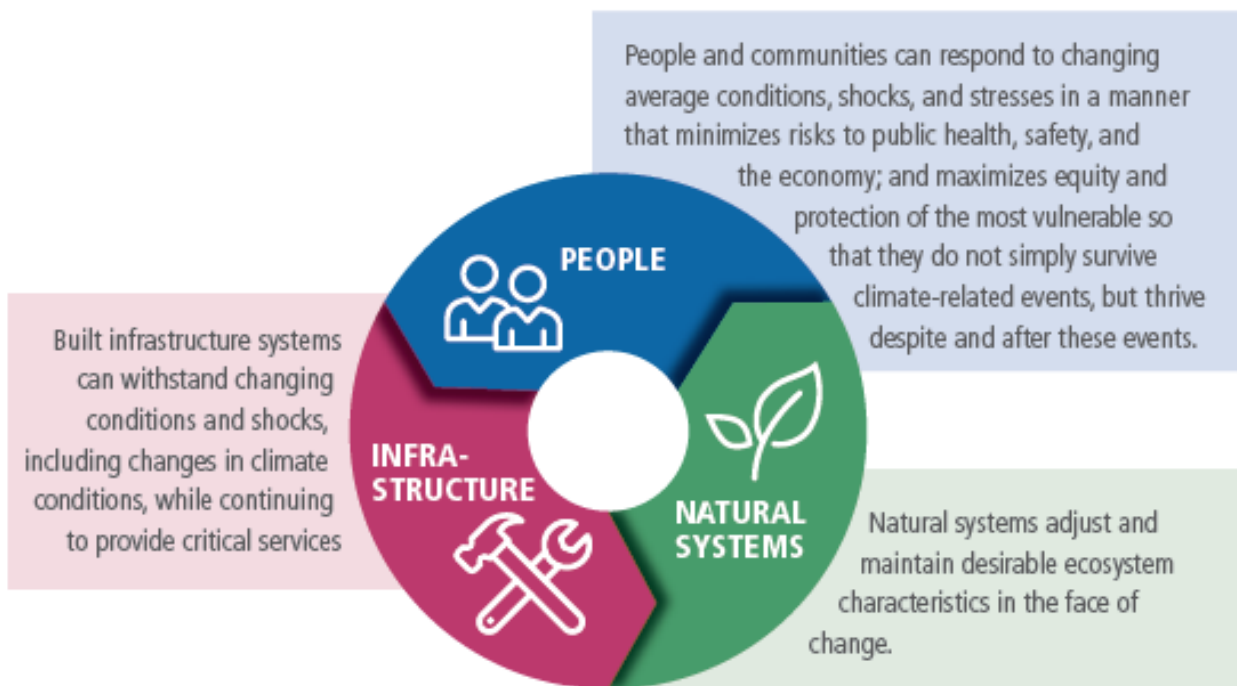
California's Fourth Climate Change Assessment – Excerpts

Chapter 3: Adaptation and Resilience in the Face of Climate Change – p. 68

California is undertaking an integrated approach to climate change that includes reducing GHG emissions and preparing for the impacts of a changing climate. California's efforts to prepare for climate impacts include taking actions that will reduce the acute and long-term effects of a changing climate and increase resilience of the state's people, economy, infrastructure, and natural systems. Recently, the State developed a definition of resilience, shown in Figure 18 ([Executive Order B-30-15 Guidance](#)).

This chapter presents the Fourth Assessment's analysis of the benefits of GHG emission reductions, and then focuses on recent policy developments and analyses prepared for the Fourth Assessment to inform the State's approach to preparing for climate impacts. Crosscutting resilience strategies are discussed first, including planning and planning support, governance and financing, and natural infrastructure. Then analyses and strategies for adaptation are presented for communities, infrastructure, and natural systems.

FIGURE 18 | RESILIENCE ACROSS COMMUNITIES, INFRASTRUCTURE, AND NATURAL SYSTEMS



Resilience is defined in terms of the State's people, infrastructure, and natural systems, as well as the interactions between and across them. Source: Executive Order B-30-15 Guidance

Adaptation planning and planning support – p. 72

Many of the strategies to build resilience in people and communities will be implemented by local government decision makers. Local governments have the primary authority over land use and development decisions, which have critical implications for exposure and vulnerability under a changing climate. This includes land use decisions, but also the development of strategies to respond to climate risks.

Legislation signed in 2015 (SB 379) requires that cities and counties consider climate risk in their General Plan (California Gov. Code § 65302). California state law requires each city and county to adopt a general plan “for the physical development of the county or city, and any land outside its boundaries which in the planning agency’s judgment bears relation to its planning” (California Gov. Code § 65300). The 2017 General Plan Guidelines released by the Governor’s Office of Planning and Research highlight the relationship between land use planning decisions and transportation patterns, electricity demand, and housing (Governor’s Office of Planning and Research, 2017).

Local Capacity Building – p. 72

Local governments control land use decisions within their boundaries and will be at the forefront of adapting to climate change. However, many do not have the resources to address the challenge. Researchers funded through the Fourth Assessment engaged local government stakeholders to develop a toolkit for local governments to identify opportunities to improve existing capabilities in order to pursue climate change adaptation initiatives more effectively and holistically (Kay et al., 2018). The toolkit is available online for use by local governments

Financing Adaptation – p. 74

The findings of recent studies, including from the Fourth Assessment, stress the financing needs of local governments to adapt to specific climate change impacts (Moser et al., 2018; Mann et al., 2017). Moser et al.’s (2018) study focuses on the financial needs to meet the multiple challenges of adaptation, provides an analysis of existing and proposed solutions, and cautions against potential solutions that would reinforce long-standing injustices and disparities. Their analysis also points out that financing challenges are about more than money; the challenges encompass institutional and governance considerations. Additional work is needed to identify how existing funding tools can support adaptation and resilience efforts, and to develop a more robust understanding of adaptation costs and benefits.

Energy – p. 78

State agencies and California electricity and natural gas utilities recognize the threat of climate change and are working together to build climate resilience. For example, the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) have created a high-level adaptation working group for information sharing across numerous state agencies. As part of the 2017 Integrated Energy Policy Report, electric and natural gas utilities are also engaged with CEC in discussions about potential climate impacts and adaptation options. Recent legislation further requires local governments, which

own multiple publicly-owned utilities, to prepare adaptation plans as part of their regular hazard mitigation plans (Chapter 10, IEPR, 2017).

The CPUC currently requires electric and natural gas investor-owned utilities to discuss climate adaptation as part of their Risk Assessment Mitigation Phase (RAMP) filings. Additionally, the CPUC recently issued an Order Instituting Rulemaking¹⁶ to consider strategies and guidance for climate adaptation for all investor-owned utilities, beginning with electric and natural gas utilities. The Rulemaking will consider: how to define climate adaptation for these utilities; data, tools, and resources necessary for utility planning and operations related to adaptation; impacts on disadvantaged communities; and frameworks for addressing climate adaptation issues both in CPUC proceedings and in utility planning and operations.

4th California Climate Change Assessment – Sacramento Valley Region

Summary of Key Findings – Energy, Water, Utilities and Transportation - p. 31

TABLE 1 CONT'D.

FOCUS AREA	RISKS	ADAPTATION STRATEGIES AND SOLUTIONS	STATUS/IMPLEMENTATION TIMELINE
4.3 ENERGY, WATER, UTILITIES AND TRANSPORTATION	<ul style="list-style-type: none"> Reduced thermo-electric power plant operating efficiency and generation capacity due to increasing air and water temperatures Reduced or disrupted hydropower generation from greater evaporative losses, altered runoff timing, decreased snow pack and increased storms intensity Uncertain impacts on solar and wind power outputs (i.e., from variable wind patterns) Decreased efficiency of electric transmission and distribution systems from higher temperatures 	<ul style="list-style-type: none"> Principles and best practices for adaptation (e.g., Council on Environmental Quality) Continuing development of comprehensive statewide strategies to adapt to climate change (e.g., California Natural Resources Agency, California Energy Commission, electric utilities, US Department of Energy, others) Cross-sectoral approaches to better facilitate adaptation at the local level (refer to the Cross-sector Interactions Section) Rapid decarbonization of buildings and transportation Planning to deploy distributed generation and energy storage for more local control of the energy supply 	Underway; Medium-term (11-30 years)
	<ul style="list-style-type: none"> Accelerated roadway deformation and track buckling resulting from extreme heat Increased expansion and contraction at critical bridge joints resulting from temperature fluctuations Traffic and signal disruptions from extreme weather Decreased driving visibility and health hazards due to wildfire 	<ul style="list-style-type: none"> State policies to integrate alternative fuel aspirations and driving trends (e.g., autonomous vehicles) into transportation plans and policies, and implementation of long-term maintenance plans Integration of energy-transport long-term planning at the local level upward Developing new finance tools for ensuring long-term maintenance and adaptation funds Incentivizing climate-smart infrastructure planning to prioritize mode shift to low carbon alternatives and active transportation 	Near-term (0-10 years); Medium-term (11-30 years)
	<ul style="list-style-type: none"> Reductions in groundwater in response to drought and increased water demands 	<ul style="list-style-type: none"> Implement water conservation strategies Assessment of additional water storage solutions Increased stormwater capture 	Underway; near-term (0-10 years); medium-term (11-30 years)
	<ul style="list-style-type: none"> Economic impacts that disproportionately affect particular sociodemographic groups depending on location 	<ul style="list-style-type: none"> Understanding broader social issues of climate change, especially for low-income and disadvantaged communities 	Near-term (0-10 years); medium-term (11-30 years)
	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	

Guiding Principles for Adaptation

Adopt Integrated Approaches: Adaptation should be incorporated into core policies, planning, practices, and programs whenever possible.

Prioritize the Most Vulnerable: Adaptation plans should prioritize helping people, places and infrastructure that are most vulnerable to climate impacts and be designed and implemented with meaningful involvement from all parts of society.

Use Best-Available Science: Adaptation should be grounded in the best-available scientific understanding of climate change risks, impacts, and vulnerabilities.

Build Strong Partnerships: Adaptation requires coordination across multiple sectors and scales and should build on the existing efforts and knowledge of a wide range of public and private stakeholders.

Apply Risk-Management Methods and Tools: Adaptation planning should incorporate risk-management methods and tools to help identify, assess, and prioritize options to reduce vulnerability to potential environmental, social, and economic implications of climate change.

Apply Ecosystem-based Approaches: Adaptation should, where relevant, take into account strategies to increase ecosystem resilience and protect critical ecosystem services on which humans depend to reduce vulnerability of human and natural systems to climate change.

Maximize Mutual Benefits: Adaptation should, where possible, use strategies that complement or directly support other related climate or environmental initiatives, such as efforts to improve disaster preparedness, promote sustainable resource management, and reduce greenhouse gas emissions including the development of cost-effective technologies.

Continuously Evaluate Performance: Adaptation plans should include measureable goals and performance metrics to continuously assess whether adaptive actions are achieving desired outcomes.