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California
Energy Commission
Research & Development

**California's Fourth Climate Change Assessment &
Adaptation Opportunities in the San Joaquin Valley**

Susan Wilhelm, PhD
Energy Research and Development Division

November 30, 2018
Sacramento, CA





California's Fourth Climate Change Assessment: An Interagency Effort

**California's Fourth Climate Change Assessment:
A product of CNRA, OPR, CEC**

Secretary Laird, Director Ken Alex, Chair Weisenmiller

Executive Management Team (CNRA, OPR, CEC)

Keali'i Bright, Louise Bedsworth, Drew Bohan, Pamela Doughman

Steering Committee: Climate Action Team Research Working Group

Staff Management Team

*Louise Bedsworth, Joseph Wraithwall, Nuin-Tara Key, Leah Fisher, Jamie Anderson,
Susan Wilhelm, Guido Franco, Pamela Doughman*

**Energy Sector
Research**

Susan Wilhelm,
CEC

**CNRA-funded
Research**

Jamie Anderson,
DWR

**External
Collaborators**

Joseph Wraithwall,
CNRA

**Statewide,
Regional, and
Topical Reports**

Guido Franco, CEC

Externally funded technical reports, strong coordination across agencies and between state and research teams enabled the Assessment to substantially broaden its scope and develop synthesis products geared toward practitioners and policy-makers.

California's Fourth Climate Change Assessment: A Multisector Effort

CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT

STATEWIDE REGIONAL TECHNICAL REPORTS TOOLS EVENTS

Projections, Data, & Tools
9 Documents

Energy
11 Documents

Water
10 Documents

Ocean & Coasts
5 Documents

Forests & Wildfire
3 Documents

Agriculture
3 Documents

Biodiversity & Habitat
2 Documents

Public Health
5 Documents

Governance
3 Documents

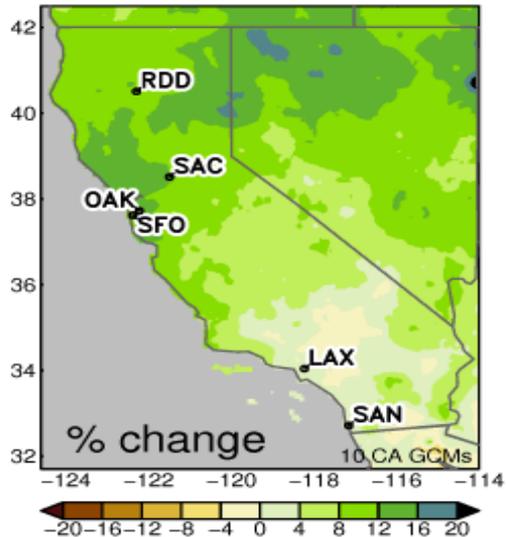
EPIC funds supported research to inform risks & resilience options for the electricity sector.

Climate Scenarios for California Suggest Severe Impacts to Water Resources

Wetter winters, drier springs expected by mid-century in California.

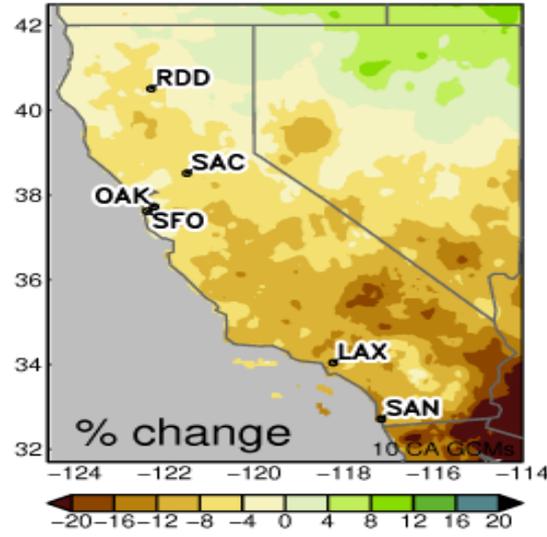
10 models

DJF avg precip change by 2040–2069 rcp45



10 models

AM avg precip change by 2040–2069 rcp45



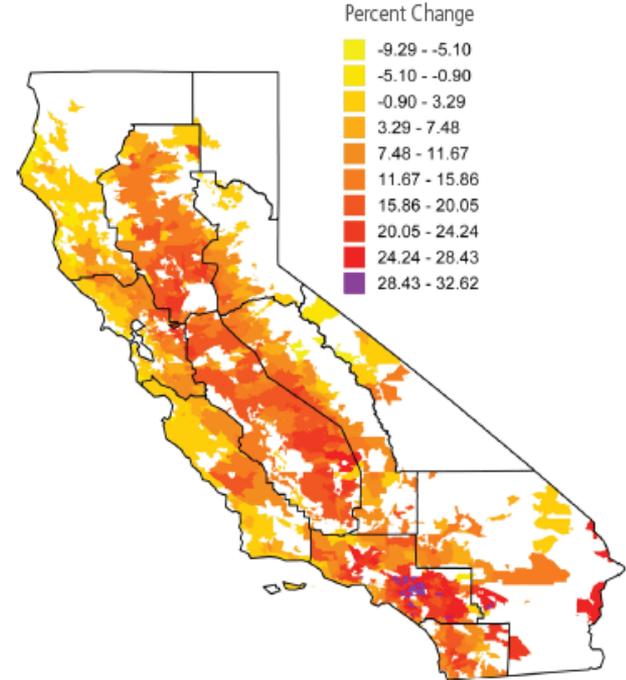
Source: Pierce, D. W., D. R. Cayan, J. F. Kalansky (2018). *Climate, Drought, and Sea Level Rise Scenarios for the Fourth California Climate Assessment*. Publication Number: CCCA4-CEC-2018-006.

Climate-Related Impacts to California's Energy System: Demand

Substantial changes in peak residential demand

- Total and peak residential electricity consumption projected to rise due to increased use and adoption of air conditioning.
- Demand increases especially in inland and Southern California.
- Increased residential electricity consumption approximately offset by decreased demand for natural gas (end-use basis).

Figure*: Projected end-of-century change in annual residential electricity consumption relative to 2000-2015 baseline.



* Data source: Auffhammer, Maximilian (2018). *Climate Adaptive Response Estimation: Short and Long Run Impacts of Climate Change on Residential Electricity and Natural Gas Consumption Using Big Data*. Publication Number: CCCA4-EXT-2018-005. Figure source: Bedsworth, L., D. Cayan, G. Franco, L. Fisher, S. Ziaja (2018). *Statewide Summary Report*. Publication Number: SUMCCCA4-2018-013.



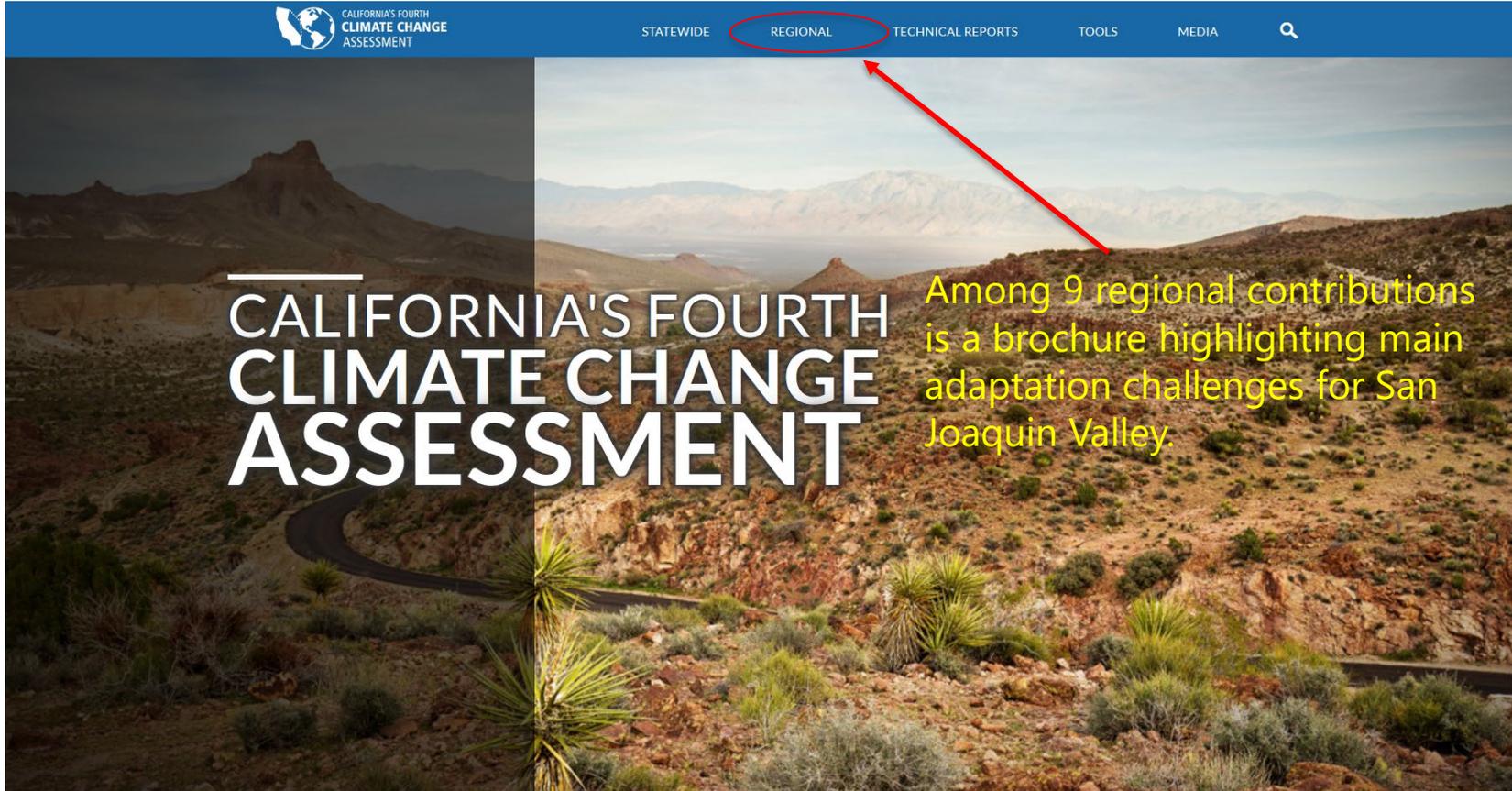
Research & Interactive Tools Illuminating Adaptation in San Joaquin Valley

A screenshot of the website for California's Fourth Climate Change Assessment. The page features a blue header with navigation links: "STATEWIDE", "REGIONAL", "TECHNICAL REPORTS", "TOOLS", and "MEDIA". A red circle highlights the "STATEWIDE" link, with a red arrow pointing from it to a text box on the right. The main content area has a background image of a desert landscape with a winding road. The text "CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT" is overlaid on the left side of the image.

CALIFORNIA'S FOURTH
CLIMATE CHANGE
ASSESSMENT

A **statewide integration report** as well as synthesis reports: on topics of importance to the state, including climate justice.

Research & Interactive Tools Illuminating Adaptation in San Joaquin Valley



The image shows a screenshot of the website for California's Fourth Climate Change Assessment. The top navigation bar is blue and contains the following items from left to right: a globe icon and the text "CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT", the word "STATEWIDE", the word "REGIONAL" (which is circled in red), the words "TECHNICAL REPORTS", the word "TOOLS", the word "MEDIA", and a magnifying glass icon. Below the navigation bar is a large landscape photograph of a desert valley with mountains in the background. Overlaid on the left side of the photograph is the text "CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT" in large white letters. On the right side of the photograph, there is a red arrow pointing from the "REGIONAL" menu item to a yellow text box that reads: "Among 9 regional contributions is a brochure highlighting main adaptation challenges for San Joaquin Valley".

CALIFORNIA'S FOURTH
CLIMATE CHANGE
ASSESSMENT

STATEWIDE REGIONAL TECHNICAL REPORTS TOOLS MEDIA

Among 9 regional contributions is a brochure highlighting main adaptation challenges for San Joaquin Valley



Key Findings of Importance to San Joaquin Valley

As discussed in the statewide report:

- **Water shortages, warmer temperatures, and development** of agricultural land will challenge agriculture production.
- **Agricultural communities are vulnerable** to drought-related impacts such as reduced employment associated with switching to crops that do better in water shortages and losses in the dairy sector.
- **Delta water exports** are projected to be reduced, and levees' **flood-related vulnerability** is exacerbated by sea level rise and subsidence.
- Estimates of damage from climate change in California are dominated by human mortality, coastal property damage, and droughts & mega-floods. **Increasing resilience of vulnerable populations** is critical.



How are EPIC Funds Helping to Address Resilience?

The Energy Commission's EPIC funds support research & development regarding:

- Viable, resilient paths for **deep reductions of greenhouse gas emissions**, with electrification playing a central role.
- Support of **Advanced Energy Communities** that use advanced technologies to enhance resilience/reliability, environmental performance, and security of energy systems in disadvantaged communities.
- Ensuring the transformation of California's energy system **benefits disadvantaged communities**.

These topics will be explored at a workshop in Fresno on December 4.

Research & Interactive Tools Illuminating Adaptation in San Joaquin Valley



CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT

STATEWIDE REGIONAL TECHNICAL REPORTS **TOOLS** MEDIA

cal-adapt
www.Cal-Adapt.org

Cal-Adapt is the State's portal for the climate projections produced for the Fourth Assessment, enabling data downloading and visualizations of climate scenarios at the local level and wildfire projections for the entire state.

°CHAT
www.Cal-Heat.org

Cal-Heat is a new tool funded by the Fourth Assessment to inform local public health officials' initiatives to protect the public during climate-exacerbated extreme heat events.

CoSMoS

COASTAL STORM MODELING SYSTEM (COSMOS)

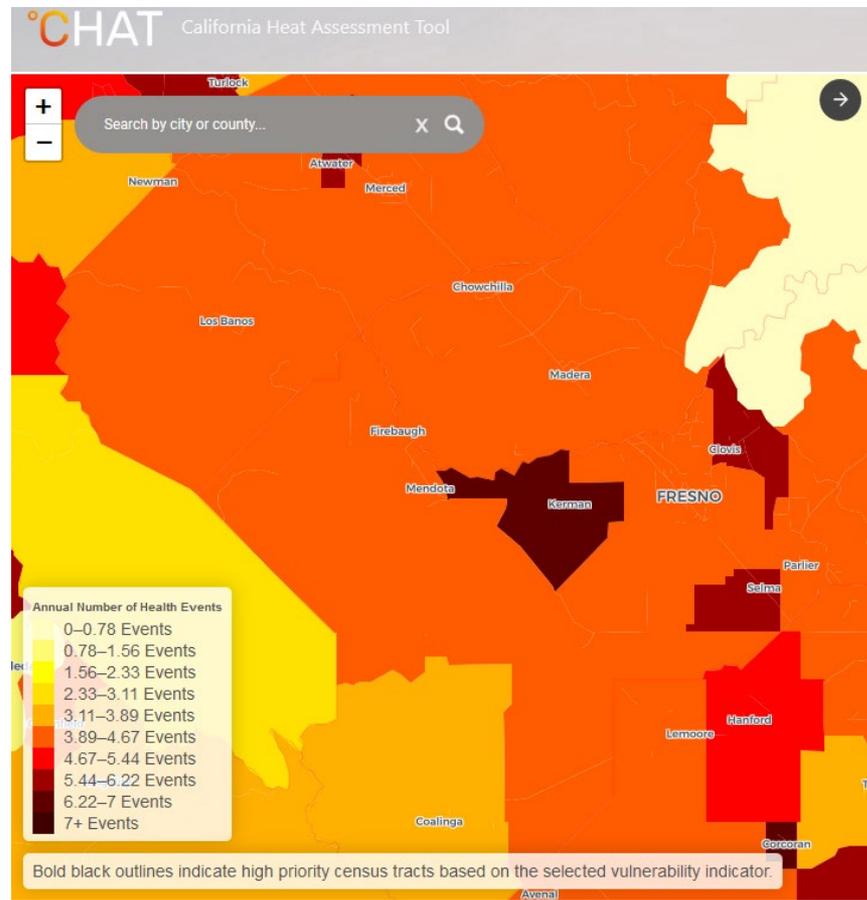
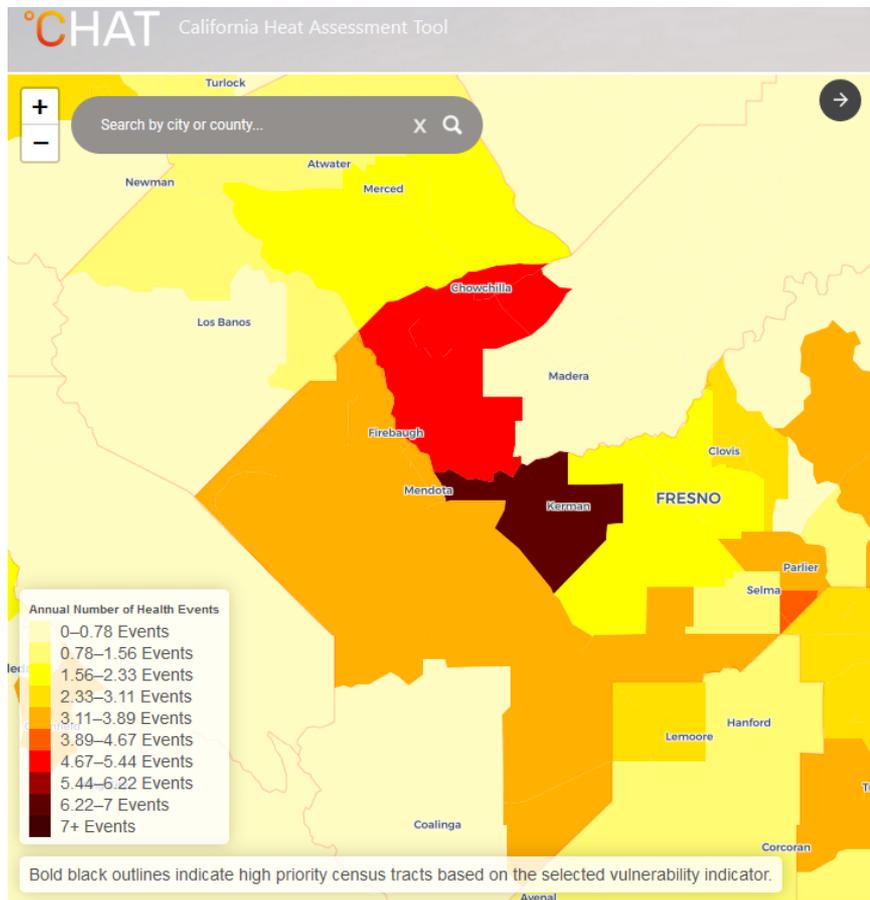
The CoSMoS model, partly funded by the Fourth Assessment, provides information about the complex interplay of coastal dynamics and climate change for California's coast.

View updated CoSMoS results on these websites:

- Hazard Exposure Reporting and Analytics (HERA)
<https://www.usgs.gov/apps/hera/>
- Our Coast Our Future Flood Map
www.OurCoastOurFuture.org



Heat Health Events Increasing in SJV





Public Health Implications of California's Climate Policy

As discussed in the statewide report:

- **Deep reductions in GHG emissions improve air quality** through reduced emissions of health-damaging pollutants such as particulate matter (PM), nitrous oxides (NO_x), and volatile organic compounds (VOC_x).
- California's **low-carbon energy future** would reduce air pollution mortality by about 55% by mid-century.
- These **public health benefits accrue at the local level**, bringing immediate air quality benefits to vulnerable populations.

From a public health perspective, California's low-carbon future appears to be no-regrets even if California goes it alone.



Upcoming Workshop in Fresno to Focus on San Joaquin Valley Climate Adaptation



DEC
04

San Joaquin Valley Regional Climate Symposium

by Local Government Commission (LGC)

Free

DATE AND TIME

Tue, December 4, 2018
10:00 AM - 2:00 PM PST

[Add to Calendar](#)

[Register](#)

LOCATION

Fresno Council of Governments
2035 Tulare Street
Suite 201 - Sequoia Room
Fresno, CA 93721

[View Map](#)



<http://www.climateassessment.ca.gov/events/>