

DOCKETED

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Cal-Adapt As a Platform for Collaboration

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Lead Commissioner Workshop on Customers of Climate
Science Research
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CALIFORNIA ENERGY COMMISSION



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Our helpful **Advisory Committee** (past and present)

Melissa Deas, former (2014) intern and Masters student of MIT's Urban Studies and Planning

Stockholm Environmental Institute (prototype)

Amy Luers, then of google.org and key to original vision plus securing funding





Presentation will address:

- Cal-Adapt as bridge between research and action
 - *Some examples of data and visualizations on Cal-Adapt*
- Use of Cal-Adapt to support climate resilience
 - *Investor-Owned Utilities*
 - *Others who have leveraged the publicly available platform*
- New and forthcoming features



Cal-Adapt: Bringing Research Results to a Broad Audience

- **Convey local climate risks** based on peer-reviewed science
- Climate change projections presented in **easy-to-understand format** with plain English descriptions *and* scientific rigor
- **Interactive maps and charts** provide a variety of approaches to explore different aspects of climate change
- **Access to primary climate change data** for further analysis
- Enable **development of custom tools** designed to manipulate climate change projections to support decision-making

Next: examples of visualization tools, and how utilities have used them



Visualization Tools: Temperature, Precipitation, SLR, Extreme Heat, Wildfire*, and Long Drought*

Cal-Adapt

[Climate Tools](#)

[Data](#)

[Resources](#)

[Blog](#)

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ANNUAL AVERAGES



Explore charts of projected annual averages of maximum temperature, minimum temperature and precipitation for your location.

Sources: [Pierce et al., 2014](#); [Livneh et al., 2015](#)

EXTREME HEAT



Explore charts of projected frequency and duration of extreme heat events for your location.

Sources: [Pierce et al., 2014](#); [Livneh et al., 2015](#)

SEA LEVEL RISE - CalFloD-3D



Explore maps of inundation location and depths for San Francisco Bay Area, Sacramento - San Joaquin Delta and the California coast during near 100 year storm events coupled with projected Sea Level Rise scenarios.

Source: [Radke et al., 2016](#)

SNOWPACK



View timelapse animation and monthly averages of projected Snow Water Equivalent, a common measurement for snowpack.

Source: [Pierce et al., 2014](#)

WILDFIRE



Coming soon

Source: [LeRoy Westerling, UC Merced](#)

LONG DROUGHT SCENARIOS (LOCA)



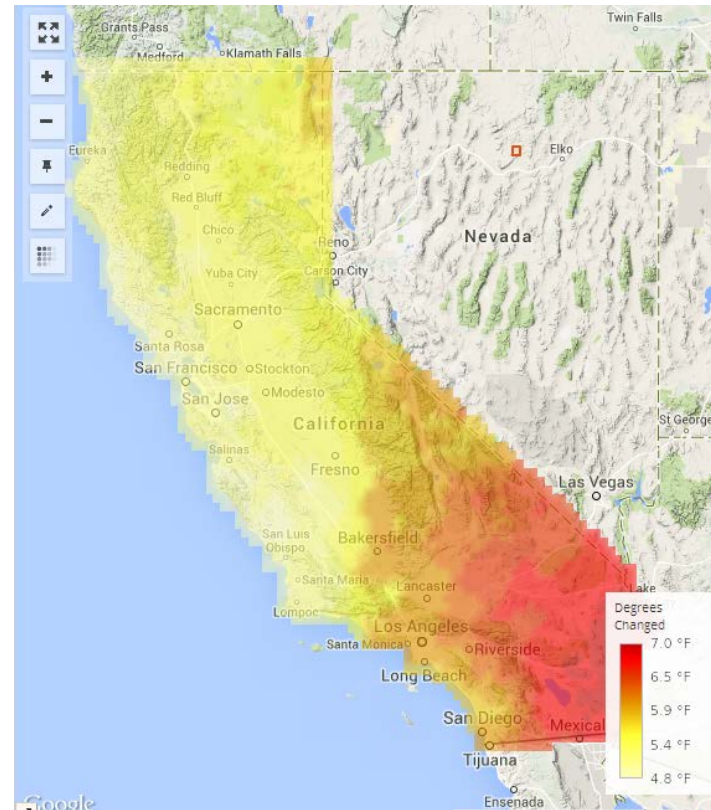
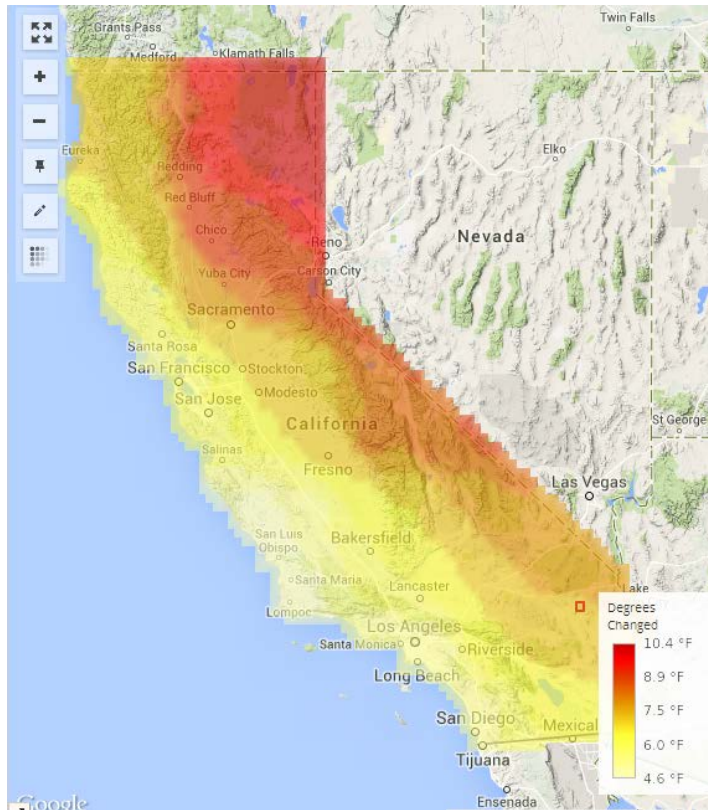
Coming soon

Source: [Pierce et al., 2014](#)

** ... Wildfire and long drought tools coming soon, along with tools such as stream flows.*



Degrees of Change: June vs. November

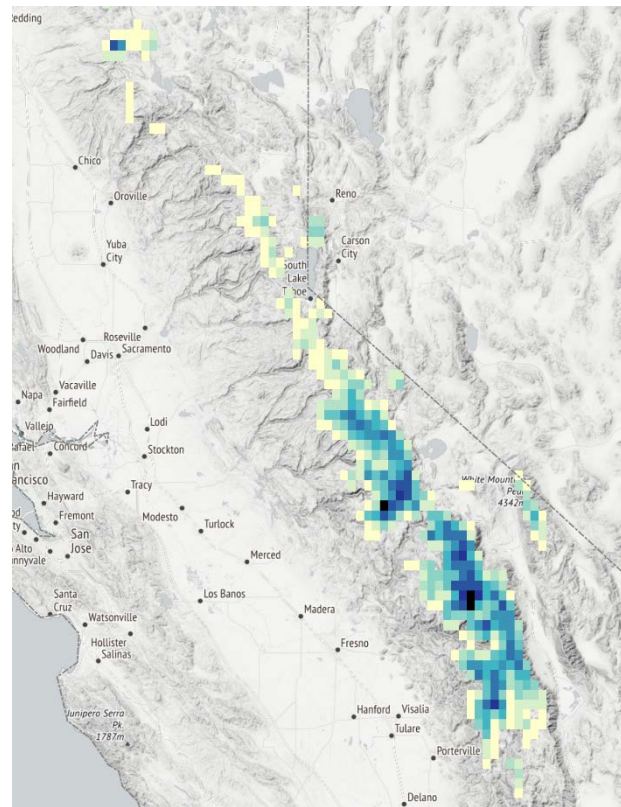
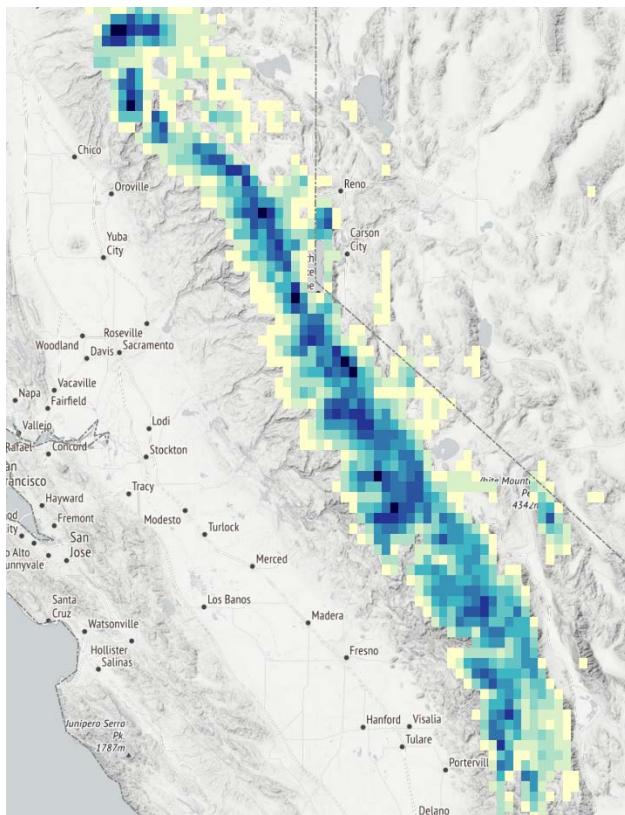


Degrees of change of projected high temperatures in June (left-hand side) vs. November (right-hand side) show under a high emissions scenario, 1961-1990 vs. 2070-2099.

Regional distribution of change is not uniform.



Projected Snow Water Equivalent: 1961-1990 vs. 2070-2099



Projected April snow water equivalent in 1961-1970 vs. 2090-2099 projected to decrease by about 75% (“average” model) under a high emissions scenario.

Massive implications for California’s water resources and energy sector.



CalFloD-3D Tool: Investigate Delta, Open Coast, and Bay Inundation due to Sea Level Rise + Extreme Storm

The same data set that enabled PG&E to gauge impacts of SLR on NG infrastructure in Delta (shown here) also publicly available for the entire coast and the Bay Area.

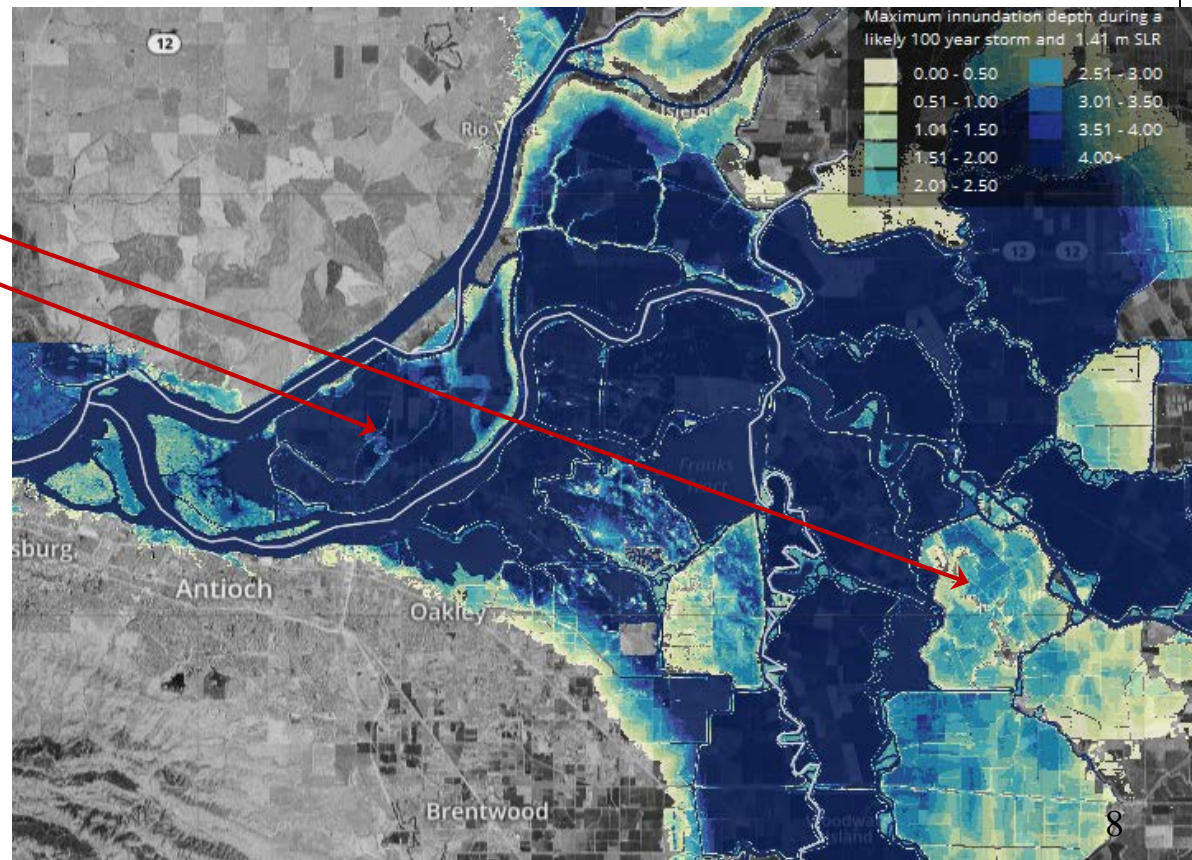
Tool being expanded to explore full range of Fourth Assessment SLR values

Infrastructure:

McDonald Island

Sherman Island

Shown here: 1.41 m
sea level rise +
extreme storm
event





Cal-Adapt: Supporting DOE Climate Resilience Partnership

Several California IOU's participated in this Partnership and used Cal-Adapt to support their vulnerability assessment:

- PG&E: used Cal-Adapt's extreme heat tool to explore intensity and duration of projected mid-century heat waves
- SoCalEdison: used Cal-Adapt in conjunction with spatial overlays of infrastructure and as a basis for exploring uncertainty.

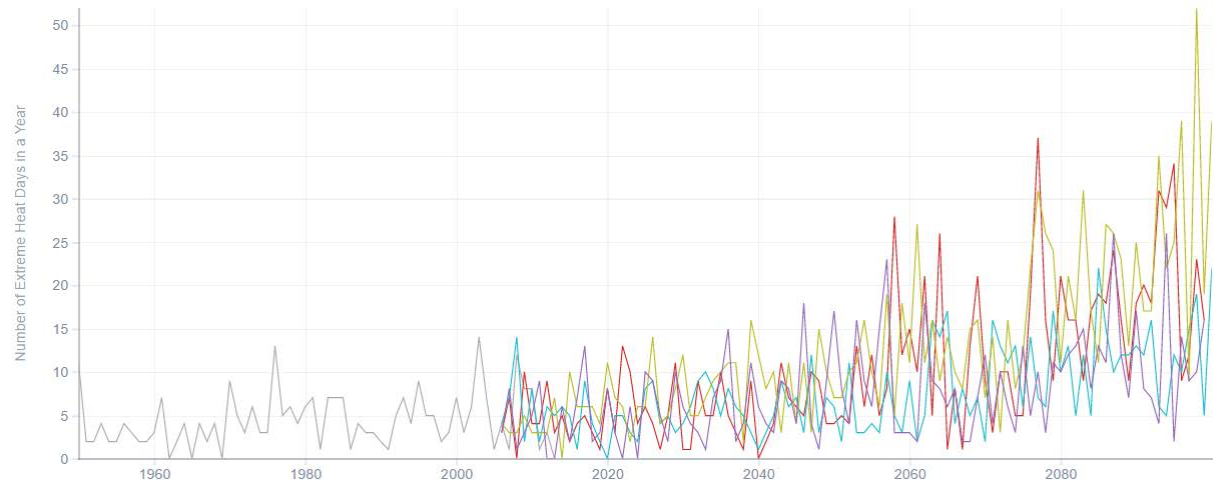


Figure: Increase in projected Annual extreme heat days in a Disadvantaged Community in Richmond under a high-emissions scenario (RCP8.5).













Cal-Adapt: Providing Scenarios Approved by State for Energy Sector Planning

CA IOUs requested set of common standards, timeframes, and scenarios that they can rely on for planning.

- These scenarios were articulated in the 2016 Integrated Energy Policy Report (IEPR) Update
- These scenarios are available via Cal-Adapt, which defaults to the four “priority” models chosen to represent a range of possible futures

Climate Models

 HadGEM2-ES*	<input checked="" type="checkbox"/> Show/Hide Warm/Dry	 CNRM-CM5*	<input checked="" type="checkbox"/> Show/Hide Cool/Wet
 CanESM2*	<input checked="" type="checkbox"/> Show/Hide Average	 MIROC5*	<input checked="" type="checkbox"/> Show/Hide Complement
 ACCESS1-0	<input type="checkbox"/> Show/Hide	 CCSM4	<input type="checkbox"/> Show/Hide
 CESM1-BGC	<input type="checkbox"/> Show/Hide	 CMCC-CMS	<input type="checkbox"/> Show/Hide
 GFDL-CM3	<input type="checkbox"/> Show/Hide	 HadGEM2-CC	<input type="checkbox"/> Show/Hide



Cal-Adapt: Supporting Public Health Efforts, Local Hazard Mitigation, and more

As a publicly available tool, Cal-Adapt has also been adopted (at no cost to ratepayers) by other resilience-related initiatives:

- California Dept. of Public Health, working to “Build Resistance Against Climate Effects (CalBRACE), has produced county-level reports of public health risks.
- Legislation (SB 379) passed in 2015 requires integration of climate into local hazard mitigation plans, and points to Cal-Adapt as a resource.
- Governor’s Office of Planning and Research has produced an Integrated Climate Adaptation and Resiliency Program (ICARP) that provides a clearinghouse of case studies, adaptation guidance, and additional resources. ICARP links directly to Cal-Adapt, complementing its peer-reviewed science and visualization tools.
- GovOps is leveraging Cal-Adapt’s Applications Programming Interface (API) to develop an automated tool that supports biennial Sustainability Roadmaps by “grabbing” and summarizing data for more than 1000 State facilities.



New Features

Cal-Adapt's Technical Advisory Committee has contributed to the identification of helpful features, including:

- Provision of utility service territory shape files, climate zones, and more as pre-loaded option for visualization and analysis
- Energy infrastructure visually represented in underlying map
- Linkage to State resources re: climate change (Integrated Climate Adaptation and Resiliency Program)
- Ability to overlay CalEnviroScreen (CES) scores, and choose census tracts using CES for guidance
- Ability to download data in multiple file formats

Publicly available at: <http://beta.cal-adapt.org/>



Forthcoming Features

Coming soon (Q2/3 2017):

- Enable user to use their own specific (possibly proprietary) shape file as a basis for analysis and visualizations
- Long drought scenario and visualizations
- Wildfire visualizations
- Stream flows and visualizations at select (ca. 58) locations in California
- Documentation summarizing key differences between data and visualizations on Cal-Adapt 1.0 vs. Cal-Adapt 2.0
- Development of “tools” to assist energy sector planning (e.g., cooling degree days (CDDs) and heating degree days (HDDs); demand forecast tool to provide climate projections for the meteorological stations used for demand forecast planning within Energy Commission)

Later this year

- Initial training for energy sector stakeholders, e.g., utility operators, GIS specialists, risk management teams
- Provision of solar irradiation projections
- Inclusion of Alex Hall’s (UCLA) dynamically downscaled climate projections



Thank you

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