

Making California policies strong with science: lessons learned from 30 years of connecting decisionmakers with science at the California Council on Science and Technology.

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Abstract

The California Council on Science and Technology (CCST) is a non-partisan, nonprofit, boundary organization with the mission of bringing science to decisionmakers. We focus on building and strengthening relationships with California’s decisionmakers—who need information to craft fact-based policy—and the scientists and experts who generate knowledge. We connect science and policy through a variety of programs, including 1) rapid-response expert briefings for the California capitol community on emerging issues, such as wildfires or disease outbreaks; 2) peer-reviewed, independent studies commissioned by State entities to provide decisionmakers with comprehensive analyses of the state of science on politically relevant, technically complex topics; and 3) a Science Fellowship program that for the past 10 years has placed PhD scientists and engineers as staff in State legislative offices for a year of public service. We will share specific examples from our programs that highlight best practices for facilitating the transfer of knowledge between scientists and decisionmakers and lessons learned from navigating the barriers that commonly arise when working at the boundary of science and policy.

Making California's policies stronger with science: Lessons learned from 30 years of connecting decision makers with science at the California Council on Science and Technology

The screenshot displays the California Council on Science and Technology (CCST) website. At the top, the CCST logo is on the left, and a navigation bar contains the title "Making California's policies stronger with science: Lessons learned from 30 years of connecting decision makers with science at the California Council on Science and Technology", the names "Amber Mace, PhD; Sarah Brady, PhD", and the website "www.ccst.us". A circular profile picture of a woman is on the right. Below the header, there are several content blocks:

- California needs independent science:** Includes an image of the California State Capitol and text stating "California decision makers face issues every day that are: Technically complex, Important to multiple stakeholders." with an "OPEN" button.
- Complex issues require in-depth assessment:** Includes an image of report covers and text stating "Engineers asked to consider the following: Does California need underground gas storage to provide for energy reliability through 2050? Waterways go... How do you design a curriculum?" with an "OPEN" button.
- Urgent issues require a rapid response:** Includes an image of a meeting and text stating "What about issues that can't wait? Requiring: A much shorter timeframe for consideration and response, An urgent need for relevant expertise" with an "OPEN" button.
- Sending in Scientists: CCST Science Fellows:** Includes an image of a group of people and text stating "Many issues are suitable for CCST studies, but: Timely decisions often get made without the benefit of a thorough investigation, Trustworthy staff are needed with strong..." with an "OPEN" button.
- Partnerships are key:** Includes an image of logos for various partners and text stating "California's vast intellectual resources are not organized under any single coordinating body: Decision makers need access to all of California's expertise, Scientists need their work to inform decisions" with an "OPEN" button.
- Science Services:** A central section with a vertical label and images of reports, workshops, and expert briefings, with buttons for "Peer Reviewed Reports", "Workshops", "Connecting with Experts", and "Expert Briefings".
- Engaged alumni create a lasting legacy:** Includes an image of a group of people and text stating "In order to think, long term programs require: Continued innovation, Responsible stewardship" with an "OPEN" button.

Amber Mace, PhD; Sarah Brady, PhD

California Council on Science and Technology (CCST)
www.ccst.us



PRESENTED AT:

A banner for the AGU 100 Fall Meeting. On the left is a photograph of the San Francisco skyline at sunset. On the right, the text reads: "AGU 100 | FALL MEETING", "ADVANCING EARTH AND SPACE SCIENCE", "San Francisco, CA | 9-13 December 2019".

CALIFORNIA NEEDS INDEPENDENT SCIENCE



California decision makers face issues *every day* that are:

- Technically complex
- Important to multiple stakeholders

They require *nonpartisan, independent* voices to help sort out the science from the noise.

SOLUTION: CCST brings independent science from a wide range of perspectives and institutions.

California showed its commitment to harnessing the expertise of independent science when its Legislature called for the creation of the California Council on Science and Technology (CCST) in 1988 to serve as a nonpartisan, not-for-profit, independent science advising body to the State of California on matters of science and technology (S&T).

CCST's core mission is to engage experts from across the State's research and education institutions, private sector, and non-profit organizations to ensure that California policy is informed by sound scientific understanding from multiple perspectives.

For 30 years, CCST has built trusted relationships with California's decision makers through our hard work delivering nonpartisan, science-based advice and perspectives. CCST works with leaders and staff at all stages of California's state policy life cycle, from the bill idea stage and beyond, in both Legislative and Executive Branch offices.

CCST brings value to the State of California by giving California decision makers broad access to S&T advice from multiple perspectives to inform policy.

CCST has a track record of providing effective advice to the State by leveraging the talent of leading academics and practitioners and translating knowledge into action for the appropriate audiences and in the appropriate contexts.

COMPLEX ISSUES REQUIRE IN-DEPTH ASSESSMENT



Imagine you're asked to consider the following:

- "Does California need underground gas storage to provide for energy reliability through 2020?"
- Makerspaces—How do you design a curriculum for community colleges around something that is intended to be creative and unstructured?

State decision makers are asked to make critical decisions on a number of issues that require a technical understanding. Some policies coming out of California end up setting the bar for the rest of the country. Decisions should be informed by the best available science to address as much uncertainty as possible.

SOLUTION:

CCST's in-depth, rigorous, peer reviewed reports take the time to get the science right. CCST augments the ability of decision makers to understand these issues by undertaking thorough, technical studies with executive summaries and recommendations targeted toward decision makers.

Our Studies

CCST studies are viewed as valuable and credible because of the organization's reputation for providing independent, objective, and nonpartisan advice with high standards of scientific and technical quality. Checks and balances are applied at every step in the study process to protect the integrity of the studies and to maintain public confidence in them.

CCST enlists the state's foremost scientists, engineers, health professionals, and other experts to address the scientific and technical aspects of society's most pressing problems.

Recent Studies:

Biomethane Heating Values

Source of Request: SB 840 (2016), AB 1900 (2012, Gatto)

In pursuit of renewable fuels objectives, AB 1900 required the California Public Utilities Commission (CPUC) to adopt standards for biomethane that specify the concentrations of constituents of concern that are reasonably necessary to protect public health and ensure pipeline integrity and safety. At the request of the State, CCST completed a study analyzing minimum heating value and maximum

siloxane concentration — two specifications that affect the injection of biomethane into common carrier natural gas pipelines in California.

Underground Natural Gas Storage

Source of Request: SB 826 (Leno, 2016); California Public Utilities Commission (CPUC)

In response to Governor Brown’s January 2016 state of emergency proclamation regarding the Aliso Canyon gas leak, SB 826 (Leno, 2016) requested that the California Council on Science and Technology (CCST) provide the State with up-to-date information on all currently operating underground natural gas storage fields in California. CCST was instructed to provide an independent technical assessment answering three key questions.

Makerspaces: California Community Colleges Project

Source of Request: California Community Colleges Chancellor’s Office (CCCCO)

The “Maker Movement” stands to benefit STEM workforce training and the innovation economy in California. Working with the CCCCCO, CCST produced “Promoting Engagement of the California Community Colleges with the Maker Movement” — a roadmap report for the \$17M “CCC Maker” initiative establishing a network of makerspace training hubs via community colleges across the state.

URGENT ISSUES REQUIRE A RAPID RESPONSE



What about issues that can't wait? Requiring:

- A much shorter timeframe for consideration and response
- An *urgent need* for relevant expertise

SOLUTION:

As an important complement to our in-depth studies, CCST Expert Briefings allow us the flexibility and responsiveness to address the urgent issues facing the state. CCST Expert Briefings create a two-way dialogue between scientists and the state, providing a stepping stone to further conversation and engagement.

Wildfires in California

[VIDEO] <https://www.youtube.com/embed/omhrZw5XDbc?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0>
Recently, as California has faced devastating wildfires, Legislators were moving quickly to determine policies and procedures, needing solid information fast. CCST convened four wildfire briefings attended by over 200 Capitol staff covering the topics of emerging technologies for wildfire response, forest management practices to reduce wildfires, environmental impacts of wildfires, and the uses of woody biomass from wildfire mitigation efforts.

Example One Pager:

CCST EXPERT BRIEFING SERIES
Emerging Technologies for Real-Time Response to Wildfires



Images: NASA Earth Observatory - smoke from 2018 Camp Fire, 102 and Whiskey Fires

BACKGROUND

- Wildfires are a common and natural occurrence in many of California's ecosystems.
- In recent years, the severity and frequency of wildfires in California has increased as a result of a combination of many factors including prolonged drought, historic fire management practices, and a massive tree die-off following a bark beetle infestation.
- The 2018 California wildfire season was the most destructive on record.

EMERGENCY RESPONSE TO WILDFIRES
Emergency response to large, rapidly spreading wildfires that threaten life and/or infrastructure involves coordination of multiple entities at the local, state, and federal level each operating with different missions and jurisdictions.

For example, firefighters are tasked with containing a fire, law enforcement is tasked with overseeing evacuations, and California Highway Patrol is tasked with maintaining roadways for safe travel.

When three major wildfires, the Camp Fire, 102 and Whiskey fires ignited in November 2018 the state-level emergency response included nearly 30,000 firefighters and hundreds of other responders from a number of entities (green box). In order to efficiently and effectively respond to wildfires,

emergency responders need access to reliable and timely information on the fire's location and future forecast and the ability to quickly share this information. Researchers and first responders are working together to develop and implement technologies for swift emergency response to wildfires.

SELECT EXPERTS
The following experts can assist on Wildfire Technologies.

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EXAMPLES: How Technology Can Help with Real-Time Wildfire Response

Emergency responders need access to reliable and timely information in order to (1) locate a fire, (2) forecast its spread, and (3) share the information quickly with other responders.

1. KNOW WHERE THE FIRE IS
Locate fires soon after they start to allow:
- Faster mobilization of local and statewide resources.

Example Technologies:

- Temperature/humidity sensors to detect presence of fire, infrared cameras to detect hot spots.
- UC Berkeley's FIRE system uses fire tower cameras, satellites, and drone with sensors for early detection of fires.
- Figure: NASA satellite image of fire and smoke from the Camp Fire shows utility of satellites and other airborne platforms (drones, planes, etc.) for aerial tracking and monitoring of fires.

Source: NASA Earth Observatory

2. KNOW WHERE THE FIRE IS GOING
Forecast the spread of a fire to allow:
- Better direction of resources and evacuations based on current conditions.

Example Technologies:

- UC San Diego's WFFIRE Lab uses sensors, satellites, and weather to forecast fire spread - for application to datasets.
- Figure: Orange County Fire District uses temperature and humidity sensors to locate wildfires along with current weather and maps of the local roads, topography, vegetation, and evacuation zones (pathways) to inform evacuations.

Source: Modified from Dave Winkelman

3. SHARE THE KNOWLEDGE
Share information quickly in a common format to allow:
- Coordination among many independent and interdependent entities.
- Access to the same information in an easily digestible form (compatible, visual, etc.).

Example Technologies:

- Figure: WFFIRE's FireMap platform provides a visually intuitive map of area's Blue-Cell fire showing the current position (left) and forecast (right).

Source: Modified from Capital at 2017

CCST
California Center for Science & Technology

CCST is a nonprofit, nongovernmental organization established in 1988 via ACR 185.

Learn more: www.ccst.us | Follow us: [Facebook](https://www.facebook.com/ccst.us) | [Instagram](https://www.instagram.com/ccst.us) | [LinkedIn](https://www.linkedin.com/company/ccst-us) | [YouTube](https://www.youtube.com/channel/UCqCgUg)

Recent Expert Briefings:

- Beneficial uses of woody biomass from wildfire mitigation (<http://ccst.us/wp-content/uploads/CCST-Wildfire-Biomass-One-Pager.pdf>)
- Evidence-based forest management strategies for improved wildfire resilience (http://ccst.us/wp-content/uploads/WildfireForestManagement_OnePager.pdf)
- Environmental impacts of wildfires in California (<http://ccst.us/wp-content/uploads/CCST-One-Pager-Wildfire-Environmental-Impacts-4-4-2019.pdf>)
- Emerging technologies for real-time response to wildfires (http://ccst.us/wp-content/uploads/WildfiresTechnology_OnePager_STW2019-2.pdf)
- Pathways to carbon neutrality (<http://ccst.us/wp-content/uploads/CCST-OnePager-Pathways-to-Carbon-Neutrality-2018-12-17-2.pdf>)
- Biomethane in common carrier pipelines (<http://ccst.us/wp-content/uploads/CCST-OnePager-Biomethane-20180607-2.pdf>)

For each of our expert briefings, we create a “one-pager” document summarizing the key questions and providing the contact information for each of the experts. The briefings are recorded and posted on our website: www.ccst.us/expert-briefings (<http://www.ccst.us/expert-briefings>)

SENDING IN SCIENTISTS: CCST SCIENCE FELLOWS



Many issues are suitable for CCST studies, but:

- Timely decisions often get made without the benefit of a thorough investigation
- Trustworthy staff are tasked with doing background research and finding facts

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SOLUTION: To assist decision makers directly in these efforts, each year the CCST Science & Technology Policy Fellows (CCST Science Fellows) program recruits a corps of PhD scientists and engineers. These CCST Science Fellows spend one year in Sacramento, directly serving decision makers either in the State Legislature or in a State Agency.

Applications are currently open for the 2020-2021 class of fellows. (<https://ccst.us/now-open-applications-for-ccsts-science-technology-policy-fellowship-in-sacramento-2/>)

[VIDEO] <https://www.youtube.com/embed/qPgrzyIoC3A?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0>
Working as staff within the State Senate, State Assembly, or in a State Agency, these scientific minds get a front-row seat learning about the craft and process of public policy in the State of California. CCST Science Fellows work alongside decision makers to evaluate complex scientific issues and interpret data, while tackling the responsibilities of full-time staffers.

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These talented individuals gain valuable experience and training in public policy. In turn, state decision makers are given access to science-savvy staff members, helping them to craft fact-based policies.

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The CCST Science Fellows program is a win-win for California. By embedding PhD scientists directly within state government, we inform policy discussions with scientific perspectives and expertise. The program welcomed its 11th class in November 2019, and now serves as a national model for a number of other states. Applications are currently open for the 2020-2021 class of fellows. (<https://ccst.us/now-open-applications-for-ccsts-science-technology-policy-fellowship-in-sacramento-2/>)



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PARTNERSHIPS ARE KEY



California's vast intellectual resources are not organized under any single coordinating body:

- Decision makers need access to all of California's expertise
- Scientists want their work to inform decisions in State government

SOLUTION:

To harness the *collective expertise* of California's extensive network of higher education and national laboratory systems, and to help fulfill our mission, CCST maintains formal partnerships with 11 Partner Institutions — bringing multiple perspectives from the renowned institutions and experts in California.

CCST provides its Partner Institutions with unique opportunities for cross-institutional collaboration and high-level visibility within the State's Executive and Legislative offices.



CCST brings value to its Partner Institutions by helping them fulfill their collective mission of service to society through the transmission of scientific knowledge to the public.

Harnessing the collective power and expertise of these systems together requires deliberate and focused effort and creates multiple benefits. The connections made via various **CCST science services** (e.g. workshops, briefings, reports) allow California to leverage the tremendous S&T expertise within and beyond its borders, while helping Partner Institutions to continue to meet their service goals for the betterment of society.

ENGAGED ALUMNI CREATE A LASTING LEGACY



In order to thrive, long-term programs require:

- Continued innovation
- Responsible stewardship
- High engagement

The CCST Science Fellows program benefits from a highly-engaged alumni network that supports incoming fellows and cements a lasting legacy for the program.

CCST now has **11 years** of experience placing PhDs directly into State offices, where CCST Science fellows have worked on over 1,000 bills, briefings, and hearings.



There are now **98 alumni** of the program, many serving in positions in legislative offices and agencies — and many of whom remain engaged with CCST, including critical work with training every year. In total, we now have had 113 CCST Science Fellows accepted to work directly with decision makers as trusted staff.

Every year, CCST Science Fellows alumni contribute a significant amount to the training program of the incoming fellows, and many become mentors for the new class of fellows throughout the year. Their involvement leads to better prepared and better connected fellows overall.

Sorry but time is up!

ABSTRACT

The California Council on Science and Technology (CCST) is a nonpartisan, nonprofit, boundary organization with the mission of bringing science to decision makers. We focus on building and strengthening relationships with California's decision makers—who need information to craft fact-based policy—and the scientists and experts who generate knowledge. We connect science and policy through a variety of programs, including 1) rapid-response expert briefings for the California capitol community on emerging issues, such as wildfires or disease outbreaks; 2) peer-reviewed, independent studies commissioned by State entities to provide decision makers with comprehensive analyses of the state of science on politically relevant, technically complex topics; and 3) a Science Fellowship program that for the past 10 years has placed PhD scientists and engineers as staff in State legislative offices for a year of public service. We will share specific examples from our programs that highlight best practices for facilitating the transfer of knowledge between scientists and decision makers and lessons learned from navigating the barriers that commonly arise when working at the boundary of science and policy.

SWITCH TEMPLATE

