



Climate Safe Infrastructure Working Group

Meeting 4

University of California-Davis

Institute of Transportation Studies, 1605 Tilia Street, Suite 100

Davis, California 95616

Wednesday, April 11, 2018

10am – 4pm

Welcome & Introductions

The Climate-Safe Infrastructure Working Group

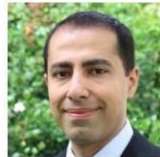
Co-Facilitators



Juliette Finzi Hart
USGS



Susi Moser
Susanne Moser
Research & Consulting



Amir Aghakouchak
UC-Irvine



Bruce Swanger
Cal-Trans



Chester Widom
DGS, State Architect



Cis Liban
L.A. Metro



Dan Cayan
UC-San Diego, SIO



David Groves
RAND



Nancy Ander
DGS, Off. of Sustain.



Deb Niemeier
UC-Davis



James Deane
High-Speed Rail Auth.



John Andrew
DWR



Kristin Heinemeier
Realized Energy



Kyle Meng
UC-Santa Barbara



Martha Brook
CEC



Noah Diffenbaugh
Stanford



Gurdeep Bhattal
Cal-Trans



Robert Lempert
RAND

Project Team



Keali'i Bright
Natural Resources
Agency



Elea Becker Lowe
Natural Resources
Agency



Joey Wall
Natural Resources
Agency



Guido Franco
California Energy
Commission

... and YOU

AB 2800 (Quirk): Purpose

Examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering, including oversight, investment, design, and construction.



AB 2800 (Quirk): Scope of Assessment and Recommendations

The working group shall consider and investigate, at a minimum, the following issues:

- (1) The current informational and institutional barriers to integrating projected climate change impacts into state infrastructure design.
- (2) The critical information that engineers responsible for infrastructure design and construction need to address climate change impacts.
- (3) How to select an appropriate engineering design for a range of future climate scenarios as related to infrastructure planning and investment.

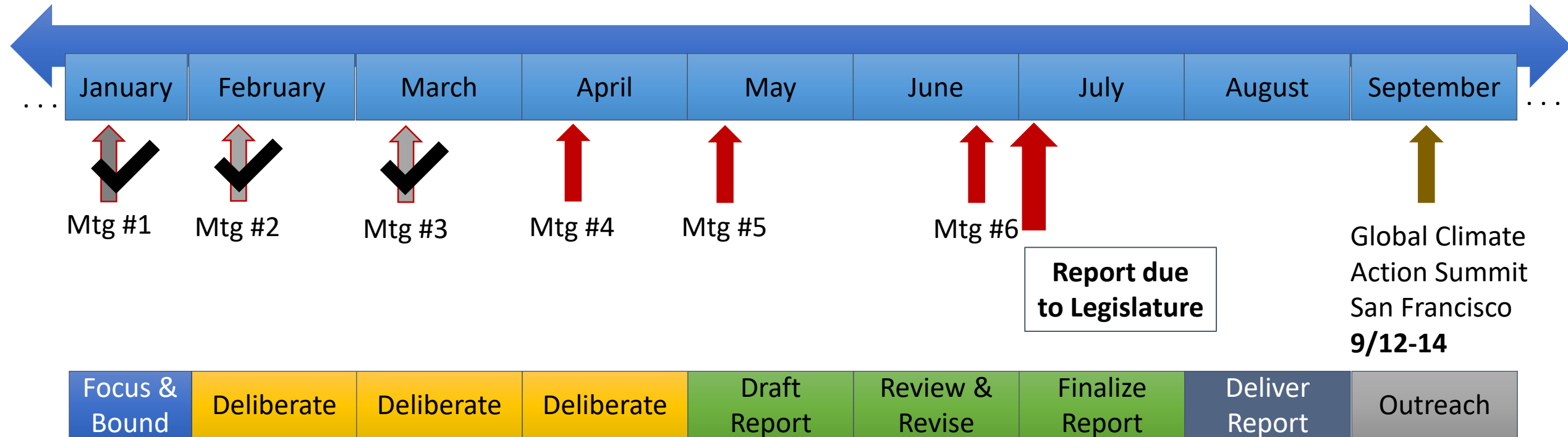
AB 2800 (Quirk): Additional Scope of Recommendations

(A) Integrating scientific knowledge of projected climate change impacts into state infrastructure design.

(B) Addressing critical information gaps identified by the working group.

(C) A platform or process to facilitate communication between climate scientists and infrastructure engineers.

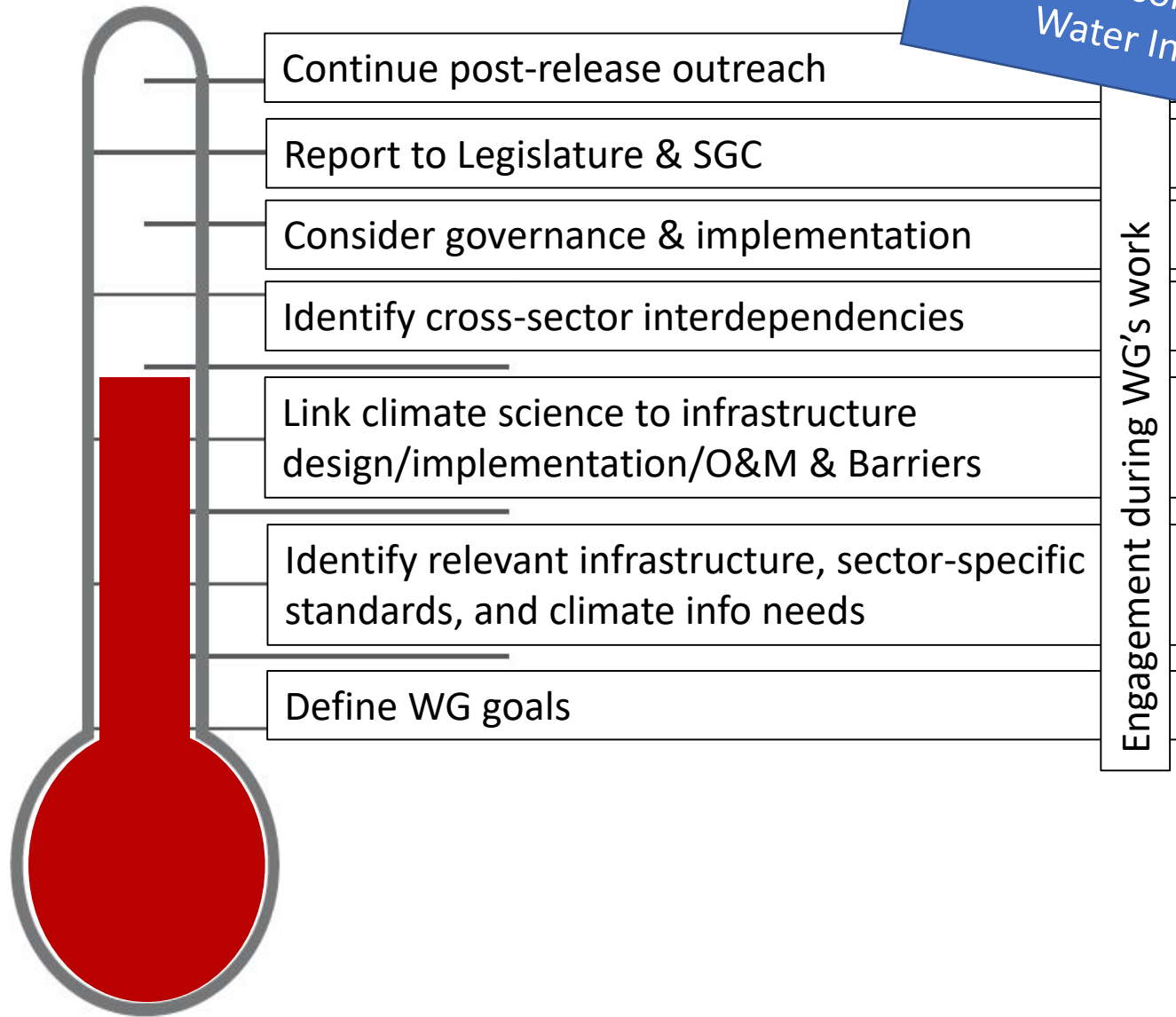
Project Timeline



Meeting Dates, Locations, Topics & Tasks

Mtg	Dates	Locations	Topics and Tasks
1	1/18	Sacramento	Determine project goals; WG structure and process
2	2/12	Los Angeles	Identify relevant infrastructure, sector-specific infrastructure standards, climate-sensitivity, information needs
3	3/13	San Francisco	Linking forward-looking climate science and impacts information with standards, codes, certifications throughout infrastructure life cycle, identify barriers to information use and potential ways to overcome them
4	4/11	Sacramento	Considering more than climate changes (land use, demographics, economy, mitigation, disasters) and cross-sector interdependencies in infrastructure design
5	5/9	San Diego	Governance of setting/changing design standards; non-standard strategies to ensure climate-safe infrastructure; deliberation of draft report; agree on refinement needs
6	6/20	Sacramento	Agree on final report revisions; delivery and outreach/promotion; project debrief

Measuring Progress



Water Resources Adaptation
to Climate Change Workgroup
of the Advisory Committee on
Water Information

3rd CAF

AAAS 2019?



The Arc of Our Work to Date

- Goal setting
- Rules of engagement

- Identify, prioritize climate-sensitive infrastructure;
- Agree on definitions
- Prioritize relevant standards, codes, guidelines;
- Identify information needs

- Connect engineers' information needs with climate science;
- Identify barriers to information use, solutions
- Work through concrete examples

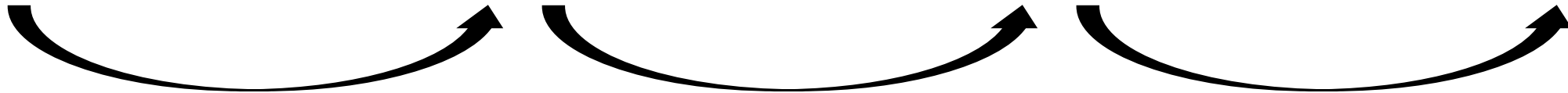
- **Consider comprehensive approaches to climate-safe infrastructure that integrate...**
 - Land use change
 - GHG mitigation
 - Disaster preparedness
 - Interdependencies

Meeting 1

Meeting 2

Meeting 3

Meeting 4



Agenda Overview

Time	Agenda Item
10:00-10:30am	Welcome, Intros, Stocktaking of Insights to Date, Meeting #4 Goals
10:30-11:00am	J. Thorne: Integrating Land Use Change and Ecological Data in Planning and Implementation
11:00-11:30am	K. Meng: Integrating Social, Demographic and Economic Data in Infrastructure Planning
11:30-12:00pm	Integrating Disaster Preparedness and Long-Term Planning
12:00-1:00pm	Lunch
1:00-2:00pm	S. Moser & J. Hart: Integrating Across Infrastructure Sectors
2:00-2:30pm	L. Bedsworth: Going Beyond Existing State Infrastructure Guidance
2:30-3:45pm	Co-Development of the Report Outline
3:45-4:00pm	Wrap-up: Review, Next Steps
4:00	Adjourn

Tasks for Meeting #4:

- **Task 1:** Take stock of the information and Insights gathered to date vis-à-vis project needs and goals
- **Task 2:** Fill gaps identified previously by CSIWG members and through the stock-take
- **Task 3:** Revisit and refine substantive goals of project
- **Task 4:** Co-develop outline of project report to legislature and Strategic Growth Council



Elements of the Final Product

A Set of Project Findings

- The **infrastructure considered** in the work of the WG
- **Opportunities for state to affect how and where infrastructure is built**
- **Opportunities for integrating science into infrastructure design**
- **Critical information needs of infrastructure engineers** to address CC impacts.
- **Critical information gaps**
- **Informational and institutional barriers** to integrating projected climate change impacts into state infrastructure design
- **Ways to select an appropriate engineering design** for a range of future climate scenarios as related to infrastructure planning and investment.

A Set of Recommendations

- **Policy recommendations** of how to encourage forward-looking infrastructure planning and design
- **Procedural recommendations** to affect climate-safe infrastructure development process (from planning, design, approval, construction to monitoring)
- **Principles** to guide infrastructure development, maintenance, repair to build equitable, climate-resilient infrastructure
- **Available tools and information sources** to use
- **Recommendations on how to lower/overcome barriers** to information use
- **Research recommendations** to fill information gaps
- **Recommendations on capacity building/professional development**

The infrastructure considered in the work of the WG

- Work so far...
 - Defined resilience, infrastructure, climate-safe
 - Decided infrastructure requires a systems focus
 - Completed template for identifying all relevant infrastructure & associated standards
 - Work still to do...
 - All CSIWG members refine/approve definitions
 - Mtg. 4 will focus on cross-sectoral discussions
 - Have all homework
 - Need input on telecommunication
- **Principles to guide infrastructure development, maintenance, repair to build equitable, climate-resilient infrastructure**

Opportunities for integrating science and future-CC info into infrastructure design

- Work so far...
 - Main focus so far!
 - Identified relevant standards and current exposure
 - Identified relevant standards and future-climate exposure
 - Reviewed opportunities of CC integration across design cycle
- Work still to do...
 - Need telecommunication information
 - Mtg 4 – focus on integrating other forward-looking science (e.g. impacts science & other drivers of change)
 - Clarify decision-making processes

- **Available tools and information sources** to use
- **Research recommendations** to fill information gaps
- **Policy recommendations** of how to encourage forward-looking infrastructure planning and design
- **Procedural recommendations** to affect climate-safe infrastructure development process
- **Principles** to guide infrastructure development, maintenance, repair

Critical Information Gaps

- Work so far...
 - Identification of information needs, comparison to what is possible
 - Continuing discussion on “which number to use”
 - Reconciliation of uncertainty/costs /trade-offs in decision-making
- Work still to do...
 - Short of getting to “one number” – what process can we use? > deeper exploration of adaptive design
 - Mtg. 4 – discuss economics behind adaptation/engineering design

- **Research recommendations to fill information gaps**
- **Recommendations on capacity building/professional development**

Ways to select an appropriate engineering design

- Work so far...
 - Mtg 3 - developed case studies for transportation and energy/buildings
 - Mtg 3 – looked at full design cycle and opportunities for selecting engineering design
 - Identified more approaches to explore:
 - Performance based standards
 - Adaptive design and management
 - Voluntary measures
 - Work still to do...
 - Need to develop case studies for water and telecommunication
 - Need to look at LC design for water and telecommunication
 - Mtg. 5 – focus on these other approaches... ?
- **Policy recommendations** of how to encourage forward-looking infrastructure planning and design
 - **Procedural recommendations** to affect climate-safe infrastructure development process
 - **Principles** to guide infrastructure development, maintenance, repair
 - **Recommendations on capacity building/professional development**

Opportunities for state to affect how and where infrastructure is built

- Work so far...
 - Declared that there are many ways to go above/beyond minimum standards, but relatively vague on specifics
 - CSIWG comments on need for policy change
 - Work still to do...
 - Mtg 4 - Discussion on how AB2800 can support and advance state goals
 - Webinar 5 focus on national/international standard setting
 - Mtg. 5 - focus on governance
 - What policy recommendations do we want to propose? If at all?
-
- **Policy recommendations** of how to encourage forward-looking infrastructure planning and design
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 - **Recommendations on how to lower/overcome barriers** to information use

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James (Jim) Thorne, Ph.D.
UC-Davis

Integrating Land Use Change and Ecological Data in Planning and Implementation

Opportunity for Public Comment



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Integrating Social, Demographic & Economic Data in Infrastructure Planning & Design



Kyle Meng, Ph.D.
UC-Santa Barbara
CSIWG Member

Opportunity for Public Comment



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Integrating Disaster Management & Long-Term Infrastructure Planning

Speaker: Nicole-Meyer-Morse, Ph.D.
California Office of Emergency Services

Opportunity for Public Comment



Lunch



12:00-1:00pm

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Integrating Across Interdependent Infrastructure Sectors

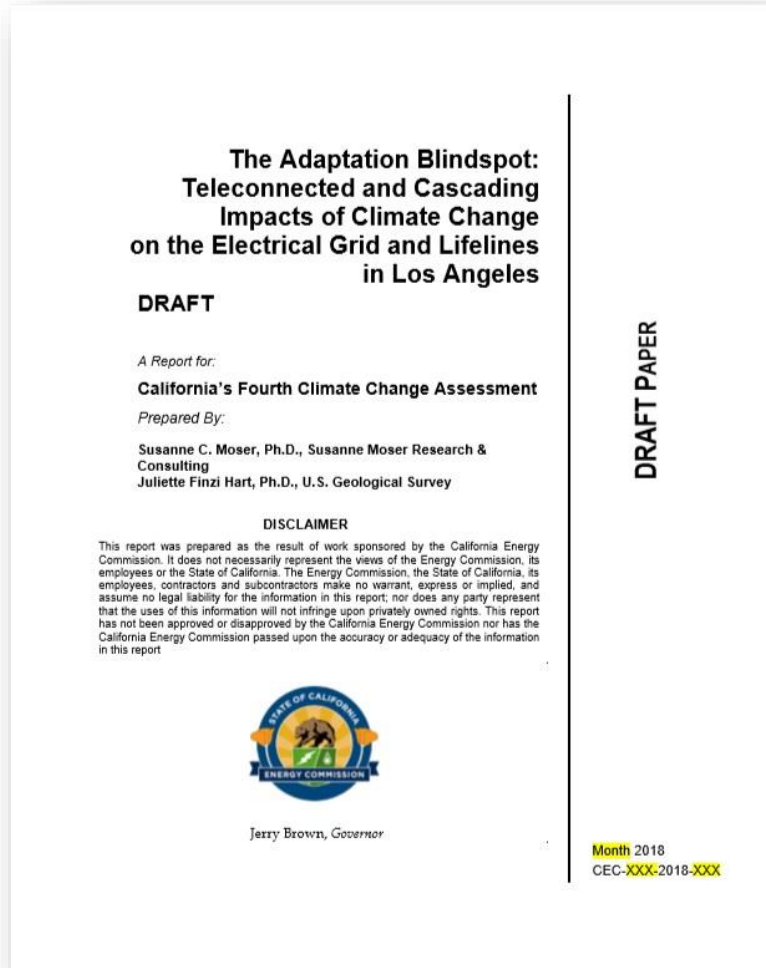


Juliette Finzi Hart
USGS



Susi Moser
Susanne Moser
Research & Consulting

A Contribution to California's Fourth Climate Change Assessment



Topic: Teleconnected/long-distance and cascading climate change impacts on electric grid and interconnected/interdependent lifelines

- Water/Wastewater
- Transportation
- Communication
- Fuel
- Emergency management
- Public health & health services
- (Food)

Focus: L.A. region

(Currently in peer-review)

How Can the State Help Solve These Problems?

(Policy, Guidelines, Standards etc.)

Challenge #1: Building Back Better After Disaster

- After disasters, need to “get back up and running” as quickly as possible
- Recovery funding conditions require “building back to exact pre-disaster condition” unless local codes allow it > missed opportunity for climate adaptation
- To “build back better” may also involve lengthy permitting process > social and economically unacceptable delay in return to functionality
- How to enable adaptation after disaster?



How Can the State Help Solve These Problems?

(Policy, Guidelines, Standards etc.)

Challenge #2: Detrimental Post-Disaster Waivers



- Waivers in emergency situations can speed up recovery (see use of waivers in preparing for L.A. Olympics; EPA waivers after Harvey and Irma in Florida)
- But frequently waivers have significant negative impacts on the environment (e.g., toxics) or on people (e.g., environmental justice)
- How can waivers be made “environment –safe”, “people –safe” and climate-safe”?

How Can the State Help Solve These Problems?

(Policy, Guidelines, Standards etc.)



Challenge #3: Common Sequences of Extreme Events

- Lifeline managers expect (and build their infrastructure) to have to withstand one kind of extreme, but in California they often come in typical sequences (each of which is expected to worsen with climate change)
- Place-based multi-hazard assessments exist, but don't usually consider climate change
- Concatenated events constitute a climate science frontier
- How can infrastructure be designed and (re)built to withstand complex risks

How Can the State Help Solve These Problems?

(Policy, Guidelines, Standards etc.)

Challenge #4: Interconnections and Interdependencies

- No lifeline can properly function for any length of time without services from other lifelines
- There is no overarching authority guiding or overseeing the development, long-term planning or day-to-day operations of the integrated system
 - Land-use choices can undermine water delivery and emergency management functionality
 - Sectoral changes in communication affect the capacity of emergency preparedness etc.
- What are examples of one sector wishing to adapt to climate change and another's standards, procedures etc. presented a barrier? How were these overcome?



How Can the State Help Solve These Problems?

(Policy, Guidelines, Standards etc.)



Challenge #5: Lack of Communication

- Finding #1: All sectors are dependent on functional communication infrastructure
- Finding #2: Across lifeline sectors, communication is generally poor
- Finding #3: The communication sector is notoriously difficult to engage
- Observation: The communication sector is not represented in the CSIWG, yet communication infrastructure is essential
- How to fill the “communication gaps” in each of these senses?

Rotating Break-Out Groups



Challenge #3: Common Sequences of Extreme Events



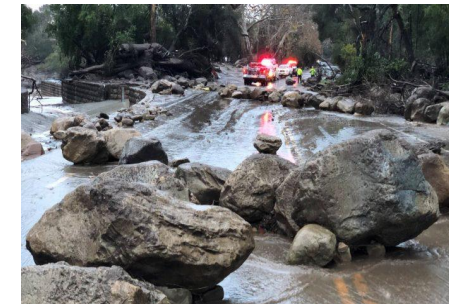
Challenge #2: Detrimental Post-Disaster Waivers



Challenge #5: Lack of Communication



Challenge #4: Interconnections and Interdependencies



Challenge #1: Building Back Better After Disaster

Opportunity for Public Comment



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Going Beyond Existing State Infrastructure Guidance



Louise Bedsworth, Ph.D.
Governor's Office
Office of Planning and Research

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Co-Development of the Report Outline: A Starting Point for Deliberation

Section 1: Introduction

- Charge
- Purpose
- Objectives
- Process

Section 2: Climate Change and Infrastructure – the Challenge

- Climate is changing: Potential threats, challenges and opportunities
- Infrastructure status: Challenge & opportunities

Section 3: Changing Infrastructure Standards

- Integration challenge of climate science & infrastructure planning
- Which, why, how

Section 4: Non-Standard-Based Approaches to Achieving Climate Safety

- Systemic, flexible, adaptive approaches
- Cross-sector alignment
- Integration of other forward-looking info
- Using opportunities for building back better

Section 5: Informational, Institutional and Other Barriers

Section 6: Recommendations to the Assembly & SGC

Appendices



Co-Development of the Report Outline

- Based on agreed outline:
 - Initial section annotation by each WG member
 - Further development in break-out groups by report sections
 - Report back and discussion



Opportunity for Public Comment



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Review of the Day

Stock-
Take of
Insights
Gained So
Far

Integrating
Land Use –
Integrating
Mitigation &
Adaptation

Integrating
Social,
Demographic
and Economic
Data

Integrating
Disaster
Preparedness
and Long-
term
Planning

Integrating
Across Inter-
dependent
Infrastructure
Sectors

Going
Beyond
Existing
Guidance

Report
Outline

**NEXT
STEPS**



Advertisement: Our Webinar Series

Inaugural Webinar: Setting the Standards and Context: Federal to Local Roles



Mike Sanio | Director of Sustainability
American Society of Civil Engineers

Kathryn Wright | Senior Associate
Meister Consultants Group/Cadmus Group

Peter Adams | Senior Policy Advisor
NYC Mayor's Office of Recovery and Resiliency

Introduction

Today's Webinar: Forward-Looking Climate Science for Use in Infrastructure Engineering: Possibilities and Limits



Dan Cayan, Ph.D. | Researcher | Climate-Safe
Infrastructure Working Group Member
Scripps Institution of Oceanography

Patrick Barnard, Ph.D. | Research Geologist
USGS Pacific Coastal & Marine Science Center

Nicolas Luco, Ph.D. | Research Structural
Engineer | USGS Geologic Hazards Team

Morgan Page, Ph.D. | Geophysicist
USGS Earthquake Science Center

Climate science

Mobilizing the Future: Infrastructure Challenges and Opportunities in the Transportation Sector



Gurdeep Bhattal
CalTrans



James Deane
High-Speed Rail Authority



Cris Liban
LA Metro

Transportation

Rushing toward the Future: Infrastructure Challenges and Opportunities in the WATER Sector



Kate White, Ph.D., P.E.
Lead, Climate Preparedness
and Resilience Community
of Practice
US Army Corps of Engineers



Amir Aghakouchak, Ph.D., P.E.
UC-Irvine



Andrew Schwarz, P.E.
Dept. of Water Resources

Water

Green Infrastructure: Design and Integration for Climate-Safe Communities



Maya Hayden, Ph.D.
Point Blue



Jeff Odefey
American Rivers



Tina Hodges
US Department of Transportation
Federal Highway Administration

Green Infrastructure

Governing Infrastructure: How Regulations, Standards, Codes and Guidelines Are Set and Changed



Ira Feldman
GHGMI Adaptation Leader
Adaptation Coordinator, ISO
President & Senior Counsel,
Greentrack Strategies
Founder, Climate Adaptation Scholars™



J. Alfredo Gomez
US Government Accountability
Office



Stephen A. Cauffman
National Institute of Standards
and Technology

Governance

Next Webinar: April 18

Energizing the Future: Infrastructure Challenges and Opportunities in the ENERGY Sector



Nancy Ander
CA Dept. of General Services



Kristin Heinemeier, Ph.D.
Realized Energy



Guido Franco, Ph.D.
California Energy Commission

Next Steps

We Will

- Continue webinar series
- Prepare meeting summary notes
- Prepare Meeting #5 (San Diego)
- Send annotated draft to WG
- [to be added over the course of the CSIWG meeting]
-
-

You Will

- Send in travel receipts
- Make travel arrangements for May meeting (San Diego)
- Attend and contribute to Webinar series
- Complete writing assignments within 2 weeks
- [to be added over the course of the CSIWG meeting]
-

Be in touch!

- To sign up to the Climate-Safe Infrastructure listserv...
- To stay up to date on CSIWG developments...
- To ask questions or send comments...

Email: Elea Becker-Lowe at Elea.Beckerlowe@resources.ca.gov or at climatesafeinfrastructure@resources.ca.gov

... and she will direct the inquiry accordingly.



Meeting #3 of the Climate-Safe Infrastructure Working Group • Davis • April 11, 2018

*Toward
Climate-
Safe
Infrastructure*



Thank you!