Welcome to the *Climate-Safe Infrastructure* Webinar Series

Supporting AB2800 and the Work of California’s Climate-Safe Infrastructure Working Group

June 6, 2018 | 12-1pm
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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.
The Climate-Safe Infrastructure Working Group

Co-Facilitators

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Project Team

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AB 2800 (Quirk): Scope of Assessment and Recommendations

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

(1) informational and institutional barriers to integrating climate change into infrastructure design.

(2) critical information needs of engineers.

(3) selection of appropriate engineering designs for different climate scenarios.
Purpose
• Hear from others elsewhere with relevant experience and expertise.
• Hear from CSIWG members.
• Educate and engage with interested stakeholders on climate change and infrastructure issues.

Sample of Webinar Topics
• What climate science can offer
• Various sectoral perspectives
• Processes of changing engineering standards and guidelines
• Holistic infrastructure planning and management
• Financing climate-safe infrastructure
• And others...
A Couple of Housekeeping Items

• Please type your questions for presenters into the chat box

• We will try to answer as many as possible after the presentations

• Answers to remaining questions will be posted on the website

• Thank you to USC Sea Grant!
Enabling Scientists and Engineers Working Together Effectively

Richard Moss
Columbia University

Susanne Moser
Susanne Moser Research & Consulting

Alex Wilson
Resilient Design Institute & BuildingGreen, Inc.
Accelerating Innovation of Applied Climate Science for Risk Reduction: A Role for the Sustained National Climate Assessment?

Richard H Moss
Visiting Senior Research Scientist, Earth Institute, Columbia University
for
California Climate-Safe Infrastructure Working Group
June 6, 2018
• Short background discussion of “assessment”
  • What is meant by the “sustained” assessment process?

• Advancing sustained assessment
  • Independent Advisory Committee
  • Climate assessment consortium

• Request for feedback
  • Possible working group participation in ‘communities of practice’?
  • Incentives for participation?
What are Assessments?

• ... synthesize and disseminate knowledge
  • Not ‘climate services’, but provide a foundation for them

• ... evaluate the state of knowledge available at a point in time relevant to decisions
  • Public policy to resource management and investment

• ... often are report focused but spawn other useful products
“Sustained Assessment”: An Evolving Process

• Concept: “sustained” interactions are required to build “salience, credibility, and legitimacy”

• Explored in 2013 Special Special Report on 4 “critical elements”:
  • Enduring collaborative partnerships
  • Scientific foundations
  • Programmatic infrastructure
  • Resource base and clear priorities

• Focuses on partnerships with the federal government (PREP, Resilience Dialogues, etc.)

Preparing the Nation for Change: https://tinyurl.com/ya6d2nls
Ongoing Activities to Advance the Sustained Assessment Process

• Federal government (with thanks to USGCRP/Agency staff!):
  • NCA4 report process is continuing (expected release late 2018)
  • Additional activities including Sustained Assessment Working Group, Resilience Toolkit, sustained assessment specialists, scenarios, and others

• Civil society efforts – two inter-connected components:
  • Independent Advisory Committee on Applied Climate Assessment (IAC) is developing ideas on expanded approach to sustained assessment
    • Support of NY State, Columbia University, and AMS
    • ~20 members from academia, state/local/tribal government, NGOs, and private sector
    • Will deliver recommendations (~9/18) and disband (~12/18)
  • Climate Assessment Consortium forming for long-term implementation
How the Sustained NCA Process Could Evolve

Current
• Emphasizes “state of science”
• Organized by “sector” and “region”
• Federal predominance
• Emphasizes reports

Future
• Adds “state of practice” in implementing solutions
• Includes “implementation challenges”, e.g., updating codes, financial risk, spatial planning, engineering and architectural design
• Shared partnership with state/local and civil society interests
• More diverse products, engagement, and capacity building
IAC Report Outline

1. Introduction
2. Practitioner perspectives and needs for climate action
   • Reflect on what “users” are trying to do and what they need from the SNCA to support action
3. Assessing applied climate and adaptation science
   • Distinguish “state of science” and “state of practice” assessments (process, organization, and content)
   • Explore challenges including how to produce useful insight across individual “case studies”
4. Innovating methods: under-utilized opportunities and under-served practitioner needs
   • Topics such as cost-benefit tools, integrated geospatial/socioeconomic data, indicators, citizen science, artificial intelligence/big data, …
5. Assessment network functions, design, and governance
   • How non-federal and federal NCA stakeholders can work more effectively together to distill, curate, and disseminate knowledge that is useful to action. QC? Priority setting? …?
6. Next steps/recommendations
Civil Society, a Climate Assessment Consortium, and the Federal Science Program

- GCRA of 1990 and USGCRP
- Data and other inputs
- Reports, multimedia, other resources
- Knowledge curation and exchange
- Engagement and participation

SNCA Processes and Products  Climate Assessment Consortium

- Engagement and participation
- Context of decision- and policy-making
- Trusted, ‘honest brokers’
- Maintain and enhance sustained process

SNCA Contributors

State/Local/Tribal Govt  NGOs  Universities  Private Sector  Foundations  Scientific Societies  Regional Science Cntrs  Professional Societies  Fellows & Sustained Assessment Specialists

- Communities of practice
- Evaluation and “best practices”
- Knowledge for climate services and ‘tailoring’
- Technical inputs
Communities of Practice – “Infrastructure” as Example?

• Much progress in critical elements of “sustained assessment” is in co-production developed in civil society, state/local levels
  • E.g., ASCE and other professional societies; AGU/TEX; AB2800; USDN indicators and resilience hubs; ASAP; AMS attribution studies; ...

• We are exploring possible benefits of using the NCA process to form ‘communities of practice’ drawn from these groups, relevant climate scientists, adaptation professionals/climate service providers, and users
  • Example areas: climate-ready infrastructures (specific types); managing coastal change; incorporate climate into financial risk; facility siting (approach to aggregating challenges is itself an issue for further exploration)
  • Topics to explore: adequacy of framing, ‘fit’ of climate and related information, approaches for ‘translation’ to decision/implementation metrics, monitoring, ...
• What are your thoughts about the sustained NCA process?
• Is it possible and productive to aggregate individual instances of recurring adaptation challenges (e.g., design of specific infrastructures, updated codes and standards) to conduct comparative assessments and develop ‘good practice’ insights?
  • Typology of use?
  • What can we learn?
  • Pitfalls to avoid?
• Would it be of interest to the AB2800 WG (and/or groups you have engaged with) to participate in well-framed communities of practice?
  • How could you contribute?
  • What would you hope to gain? What would incentivize your participation?
• Note: opportunity to review draft IAC report (July/August timeframe) and participate in assessment consortium process (see email address next slide)
Thank you!

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TOWARD MORE EFFECTIVE ENGAGEMENT OF SCIENTISTS AND ENGINEERS

The Role of Formal and Informal Education

Susi Moser, Ph.D.
Susanne Moser Research & Consulting
Why Engineering Will Be Vital in a Changing Climate

Smithsonian Secretary G. Wayne Clough offers personal insights on the realities of climate change and the best ways for society to adapt.

Climate Change: A Call to Action for Engineering & Design Professionals

By: Adam Efird

Climate change. It’s happening. Those of us in the engineering, design, and infrastructure industry have never before been presented with such a grand opportunity to affect economies and society like we are now. The scientific community has been telling us for some time now that the way we behave must change immediately if we are to prevent climate change from becoming catastrophic. It’s time for the infrastructure industry to fully embrace the crucial role we can play in moving society from discussion to action. It’s time for us to demonstrate leadership.
Engineering Education Is Changing

- From a focus on technical problems and technical competencies
- To a focus on sustainability problems requiring an integrated, adaptive and participatory approach.
  - Recognition of sustainability and climate change challenges
  - Shift toward systems thinking emphasis
  - Necessity to develop and teach new methods, tools and competencies
  - Consideration of epistemology to deal with different kinds of knowledge and high levels of uncertainties

- Engineering Education Research (EER) established as a field of inquiry since 2000s
- European EER finds it easier to educate about complex systems and train “the whole person”, while North American EER is more empirical than theoretical and upholds disciplinary boundaries more strongly

Sources: Borrego and Bernhard (2013), JEE; Halbe et al. (2015), Journal of Cleaner Production
A NASEM Workshop Series on Engineering Education and Climate Change

(2010-2014)
Two Key Gaps in Engineering Curricula

- Climate change remains largely absent in engineering curricula (except renewables engineering)

- Few, if any materials, fully engage the integration of climate, society and engineering

Needs/ways to promote:
- New case studies
- Specialized courses & training
- Courses into which climate change is fully integrated
- Degrees
- Modules
- Exhibits
- Extracurricular activities/service learning
- Prizes
- Institutes, Forums etc.

Sources: https://www.nap.edu/catalog/18957/the-climate-change-educational-partnership-climate-change-engineered-systems-and
The Earlier We Start... The Broader We Think...
NAS Report Recommendations

- Focus on youth, adults and professionals
- Identify and create integrated learning resources around key infrastructure vulnerabilities
- Design resources using latest insights into effective learning/teaching methods (active, engaged pedagogy)
- Establish networks of professional and online educational networks to expand educational opportunities
- Cross-cutting: Develop partnerships (professional societies, education experts, private sector, professionals, schools, colleges and universities) to accomplish the above

Building Engineering Competencies for a Changing World

■ “Hard” engineering skills
  – an ability to apply knowledge of mathematics, science, and engineering
  – an ability to design and conduct experiments, as well as to analyze and interpret data;
  – an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
  – an ability to identify, formulate, and solve engineering problems; and
  – an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

■ “Professional” skills
  – an ability to communicate effectively;
  – an ability to function on multidisciplinary teams;
  – an understanding of professional and ethical responsibility;
  – the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
  – a recognition of the need for, and an ability to engage in life-long learning; and
  – a knowledge of contemporary issues.

Sources: Schuman et al. (2013), JEE; American Society for Engineering Education’s (ASEE) (1994) Engineering Education for a Changing World
Will Educating Engineers Be Enough?

- Societal decisions about climate change will involve a wide range of experts, decision-makers in various sectors and different publics.
- Climate scientists are not usually trained in effective engagement, human concerns, ecology, governance.
- Social scientists are not usually trained in engagement with publics or with physical / natural / engineering scientists.
- Practitioners do not usually get trained in effective public engagement, not fluid in multiple sciences/disciplines.
- None (engineers, scientists and practitioners) are sufficiently trained in matters of finance, law etc.
In Conclusion: California’s Role

- The first step is taken: recognition of what is at stake
- Incentivize a rapid and substantial expansion of end-to-end, multidisciplinary climate change research, education and application programs.
- **Set expectations** through professional standards, qualification requirements, qualifications of those receiving state $$ etc.
  - *Build technical competencies in all sciences (incl. social sciences) and among decision makers.*
  - *Build professional competencies (as described above) in all the sciences.*
- **Expand and institutionalize the state’s decision support capabilities**, including a professional development pipeline of well-trained professionals.
- **Provide leadership, model in every sector, and set expectations for serious engagement of the public** in the development and debate of comprehensive climate risk management strategies with well-informed, rigorous debate of trade-offs.
Thank you!

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Achieving Engagement with Resilient Design

California Climate-Safe Infrastructure Working Group

Webinar - June 6, 2018

Alex Wilson, President
Resilient Design Institute
Founder, BuildingGreen

Santa Rosa wildfire, October 10, 2017 - Photo: California Highway Dept.
Evolution of a resilience focus
Resilience as a motivator

Flooding in New Orleans from Hurricane Katrina, 2005. Photo: FEMA

Charrette on Gulf Coast reconstruction in the fall of 2005. Photo: Alex Wilson
Resilience as a motivator

- We’re not making rapid enough progress in solving climate change
- Life-safety can be a greater motivator than “doing the right thing”
- Potential to appeal across the political divide
- Achieving passive survivability in buildings requires high levels of energy efficiency and passive design
- These buildings can be close to carbon-neutral—adaptation and mitigation
- Resilient Design Institute founded in 2012

8 • Provide for passive survivability

Homes, schools, public buildings, and neighborhoods should be designed and built or rebuilt to serve as livable refuges in the event of crisis or breakdown of energy, water, and sewer systems.
Putting resilient design into practice – Spaulding

Spaulding Rehab Hospital
on Boston Harbor in Charlestown, MA
Photos: Perkins+Will
Putting resilient design into practice – Spaulding
Putting resilient design into practice – Spaulding

Operable window (above) and exterior shading (right)
Photos: Alex Wilson

Operable windows at Spaulding Rehab - Photo: Perkins+Will
Drift Temperatures During Power Outages – Summer

Temperature Modeling: Atelier Ten, New York City in “Baby It’s Cold Inside,” Urban Green Council
Drift Temperatures During Power Outages – Summer

Temperature Modeling: Atelier Ten, New York City in “Baby It’s Cold Inside,” Urban Green Council
Effecting change: the Ecovation Hub in New England

• Tri-state region centered in Brattleboro, Vermont faced with the economic challenge of losing a major employer

• Vermont Yankee Nuclear Power Plant, which closed in 2014, employed 600 workers, with a median wage of $105,000 per year

• A local initiative, the Ecovation Hub, has been working to spur economic growth within the “clean economy”

• Mapping local and regional assets, identifying business opportunities, creating business plan templates, attracting young people to the area
Effecting change: Vermont Climate Economy Initiative

- Along with the threat of climate change are opportunities
- The Vermont Council on Rural Development is working to advance a climate economy in Vermont

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Enabling Scientists and Engineers Working Together Effectively

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• The **Climate-Safe Infrastructure** Webinar Series continues at least through July 2018

• Upcoming webinars:
  • Tools Supporting Climate-Safe Infrastructure Design – June 8
  • Monitoring Performance – Working Toward Success – June 11
  • Financing the Future, Part 3 – late June
  • Talking Climate Change with Engineers – July 10 or 12
  • Track webinars and progress of CSIWG at: [http://resources.ca.gov/climate/climate-safe-infrastructure-working-group/](http://resources.ca.gov/climate/climate-safe-infrastructure-working-group/)

• Questions: Joey Wall - [Joseph.Wall@resources.ca.gov](mailto:Joseph.Wall@resources.ca.gov)