**Climate-Safe Infrastructure Working Group**

**Meeting #4**

**April 11, 2018, Davis**

**Meeting Summary**

**Introduction**

This meeting summary provides succinct highlights of the meeting discussions, decisions made and progress on the Working Group’s efforts, as opposed to detailed meeting minutes. The meeting agenda and meeting presentation as well as the presentations of invited speakers provide additional information on the contents of the meeting.

This meeting was the fourth gathering of the Climate-Safe Infrastructure Working Group (CSIWG or WG for short). Its primary goals or tasks were fourfold, namely to:

* **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

The key outcomes around each of the meeting goals are summarized. A review of the overall progress of the Working Group along its self-defined goals are summarized first.

**Progress on Project Goals**

In Meeting 1, the CSIWG determined goals and sub-objectives they wish to achieve over the course of the project. We note them here with progress made since that first meeting.

|  |  |
| --- | --- |
| **Project Goal Areas (Developed in Meeting #1)** | |
|  | **TRACKING PROGRESS** |
| **GOALS** | **Post-MEETING #4 - April 2018** |
| **Orient toward longer-term outcomes (Vision, indications of success over time)** | |
| **Intended Long-term Outcome (therefore work toward recommendations that…)** | Brainstormed long-term outcomes of the work of the CSIWG (as indicators of success over time) |
| State agencies lead by example (…show clearly what the state can do immediately and over the medium- and longer-term). | WG members, several representing state agencies, continued to discuss the scope of the infrastructure they wish to focus on as well as on related standards, codes, guidelines they use to plan and design infrastructure; they also identified barriers to using forward-looking climate science and brainstormed ways to overcome them. This is a first step toward recommendations to state agencies. |
| Serve as example for the rest of the country (…illustrate what barriers there are and how they could be overcome; provide examples of progress wherever possible). | The AB2800 process involves a webinar which is attended occasionally by non-CA-based interested stakeholders. Interactions with non-CA-based infrastructure experts indicates that they are closely observing the process to glean lessons. Facilitators made a presentation to a federally convened water-focused adaptation working group to share AB2800/CSIWG process and experiences, which was extremely well received. |
| Resiliency is embodied in codes (… address the entire infrastructure planning, design, financing, implementation, monitoring and reassessment cycle, and use codes/standards and non-standard strategies to affect resilience). | WG identified relevant codes, standards and guidelines to ascertain whether they can accommodate resiliency goals; the WG also continues to work toward a common understanding of resiliency, climate-safety, and the infrastructure systems to focus on. |
| Widely accepted climate change standards (… set up a sustained process for engaging, training engineers; and make uptake of new standards and guidelines more likely). | During WG proceedings and in the webinar series, experiences, tools, best practices and guides are collected on an ongoing basis. |
| Codes and standards are correctly implemented and used (… focus on the development and use of forward-looking science in infrastructure building as well as on implementation). | In Mtg #3, a panel of SF Bay Area practitioners discussed how they make decisions in light of uncertain climate futures. Insights gained help understand incentives and barriers to account for climate change in infrastructure planning. In Mtg #4, input from CalOES and OPR helped refine the understanding of challenges of using forward-looking climate science and the WG brainstormed potential solutions. |
| Sustainable, resilient and safe buildings in a real-world social context (… reflect an understanding of the systems being designed/redesigned as social-economic-ecological-technical systems). | The WG reaffirmed its focus on infrastructure systems, rather than on isolated physical or technological structures. |
| **Produce a set of outputs by July 1** | |
| Complete a report (core elements and text) that: | Mtg#4 involved a dedicated session to co-develop a report outline and annotate this outline with key issues to cover; the work of drafting the report commences post-Mtg#4. |
| … includes concrete recommendations for updating design codes. | WG continued its discussion of inclusion of climate change in all stages of the infrastructure design and upgrade process through an interactive exercise in Meeting #3. Based on progress made to date, and a homework assignment between Mtg#4 and #5, the WG will spend focused time on recommendations at its next meeting. |
| … provides useable, tangible tools, techniques, guidance for people to operationalize recommendations. | Meeting discussions, panel contributions and webinars continue to surface useful tools and data platforms. This issue will be discussed in detail at an upcoming meeting. |
| … offers technical and policy guidelines. | The importance of policy recommendations was reemphasized as part of the discussions in Mtg#3 and Mtg#4. |
| ... provides a path for how to implement the measures recommended. | WG members have emphasized the need for an implementation chapter in the draft report outline. |
| … offers recommendations that are robust, credible and actionable. | Based on progress to date recommendations will be discussed in a dedicated session at Mtg#5. |
| … is written for people who may be skeptical about integrating climate change science into engineering practice. |  |
| **Provide clear policy guidance for near-term and longer-term decisions** | |
| Ensure that the Report includes overarching policy recommendations which: | Reiterated the importance of policy recommendations |
| … emphasize the importance of policy guidance. | Discussions to date indicate the WG understands the need for policy recommendations. |
| … address the near-term opportunities of $billions of infrastructure-spending in CA. | Draft report outline makes space to list and discuss these opportunities. |
| … convey that engineers have a responsibility to create safe buildings and communities. | Progress was made on a shared understanding of resilience and climate safety. The importance of liability, which is linked to standards, has also been noted. In addition, WG members discuss the importance of reframing their work as “leaving a positive legacy.” |
| … seriously consider environmental justice. | WG members continue to emphasize the importance of recognizing negative legacies of past infrastructure decisions and the uneven benefits accrued by different communities. |
| .. model how to inform decisions by science and robust evidence. | The continuing webinar series, Mtg#2 discussions on inclusion of forward-looking climate science needs, the Mtg#3 panel on the actual use of forward-looking science in practical decision-making, as well as Mtg#4 discussion on key challenges arising from interconnected infrastructure is helping the WG to better understand opportunities, barriers and limits. |
| **Address key issues for science & the science-practice interface** | |
| Ensure that the Report: | Building on items identified in Mtg#1 and refined since, the WG is continually gathering report input. |
| … Identifies vulnerable/critical infrastructure. | Homework sent to WG members after Meeting #1 is being completed for each sector. |
| … Identifies critical information needs of engineers. | WG focused in Mtg#2 and #3 on needs for forward-looking climate science, as well as other forward-looking information (e.g., social, economic, demographic, land-use change) in Mtg#4, and how it is being used. |
| … looks at variety of time scales over which decisions are made. | WG members recognize that time scales (design life, infrastructure life span, life cycles, planning horizons, frequency with which codes/standards get updated) vary by type of infrastructure and level of governance. |
| … Defines priorities for future research / understanding and information gaps. | WG members are continuing to identify research needs; work is ongoing. |
| … Identifies ways to integrate changing science into durable designs. | WG completed exercise looking at ways of including consideration of climate change throughout the design life cycle. Focus on adaptive design options will be given in a future webinar and future WG meetings. |
| … Describes a process for selecting engineering designs for a range of climate scenarios. | WG completed exercise looking at ways of including consideration of climate change throughout the design life cycle. |
| … Identifies barriers to integrating science into standards and design. | Homework completion ongoing to collect this information; case studies presented in Mtg #3 and as well as activities in Mtg#4 further advanced understanding of barriers, as did the panel discussions and external input from invited experts. |
| … Provides guidance and examples for how to connect cutting-edge, forward-looking science to practice. | Examples are integrated into the WG’s deliberations through the webinar series, case studies discussed in Mtg#3; and tools and data sources introduced in Mtg#4 additional case examples provided through panelists’ contributions |
| … Addresses the need for ongoing monitoring of projects so as to collect evidence on how new guidelines are working. | WG members have reiterated the importance of benchmarking and ongoing monitoring to validate data and to assess performance. |
| **Focus on engagement during and after the life of the Working Group** | |
| Reach out to public throughout CSIWG's process. | Organizing of webinar series is ongoing; formal public comment opportunities during each meeting; public was invited to actively participate in discussions with WG members in each WG meeting to date; project team is building growing listserv of interested stakeholders; CSIWG members invited to send names to add and spread the word about the CSIWG. |
| Seek input from and reach out to people implementing resiliency/sustainability measures in practice. | Speakers invited to ongoing webinar series offer illustrative examples. Recruitment of external speakers to future webinars is ongoing. WG and other stakeholders have sent suggestions for future webinar speakers. |
| Focus on owners/investors of state infrastructure but assume a much broader audience (non-state-owned infrastructure, engineers and decision-makers everywhere in CA and beyond). | Focus is subject to ongoing WG deliberations; overall agreement to focus on state-owned, state-regulated, and state-financed infrastructure, but to assume a broader audience. Desire for state to lead by example, serve as model, and incentivize others. |
| Ensure that report is not just for the State legislature and Strategic Growth Council but speaks directly to engineers so they can begin implementing what is being recommended for practice. | Intention is for report to include a list of tools and platforms, and to discuss gaps and additional needs. |
| Initiate or recommend the creation of a platform and sustained, adaptive process (beyond the life of this WG) to facilitate ongoing/future science-engineering communication/interaction. | Intention is for report to include list of tools and platforms; deliberations of recommendations only begun. |
| **Embody a set of principles and values throughout the Working Group’s work** | |
| Reflect what we want CA government to be. | Meetings are open to the public and widely advertised; provided multiple opportunities for public input and direct engagement at each meeting between WG members and attending public. Group process transparent to all. Meeting materials shared publicly well in advance of each meeting. Post-meeting summary notes and other related materials also shared on CNRA website. WG deliberations are multi-disciplinary and provide direct opportunities for exchange between scientists, practitioners and public. |
| Ensure we take social, behavioral, economic dimensions into account in recommendations (not just physical science and engineering approaches). | CSIWG membership and project team membership embodies this range of expertise. Mtg#4 in particular emphasized integration of forward-looking science besides climate science, i.e., land use, demographic, and socio-economic information. |
| Contribute experience and learn from all others, (e.g., status of climate science, how real-world infrastructure decisions gets made). | Members expressed their appreciation for the diversity of expertise around the table. Diversity of expertise and perspective shared in WG meetings and webinars. Local example of changing building codes/designs was presented in Mtg#2. Practitioner panelists included in Mtg#3. State agency input (CalOES, OPR) surfaced additional real-world opportunities and challenges. |
| Form new relationships. | Relationship building process continuing. Frank discussions among WG members indicate growing trust. Each meeting offers multiple opportunities for inform exchange as well as in-depth break-out group and whole-group discussions. |
| Work toward solutions for social systems. | WG members continue to emphasize the importance of defining infrastructure systemically. |
| Work toward real results with everyone. | WG members continue to emphasize real-world context in which decisions need to be made. |
| Meet public responsibility to meet design life expectations of expensive infrastructure. | Expressed intent of the WG, reflected in definition of climate-safety and resilience. |

**Stock-take of information and insights gathered to date vis-à-vis project needs and goals**

The Facilitation Team had previously summarized project goals regarding the final product into a set of project findings and project recommendations. At the beginning of this meeting, what had been accomplished and what still remained to be done was presented (and is summarized below).

List of categories of project findings and related categories of recommendations:

1. 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 focus on cross-sectoral discussions (completed)
     + Complete template of all relevant infrastructure & associated standards
     + Need input on telecommunication
   * Will inform…
     + **Principles** to guide infrastructure development, maintenance, repair to build equitable, climate-resilient infrastructure
2. **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 (completed)
     + Webinar 5 focus on national/ international standard setting
     + Mtg. 5 - focus on governance
     + What policy recommendations do we want to propose? If at all?
     + Clarify the scale at which policy recommendations are primarily focused
     + Clearly articulate the scope of infrastructure the report focuses on (state involvement, new/existing, systems vs. structures)
   * Will inform…
     + **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 to build equitable, climate-resilient infrastructure
     + **Recommendations on how to lower/overcome barriers** to information use
3. **Opportunities for integrating science into infrastructure design**
   * Work so far…
     + Main focus to date!
     + 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) (completed)
     + Clarify decision-making processes
     + Extract lessons learned from webinars
   * Will inform…
     + **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
4. **Critical information needs of infrastructure engineers** to address CC impacts **and 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
     + SF panel addressed this to some extent
     + For new buildings straightforward – build with scenarios in mind with room for adaptions in the future – and develop financing plan around that
   * Work still to do…
     + Short of getting to “one number” – what process can we use? > deeper exploration of adaptive design
     + Focus more on how to reconcile between cost and uncertainty
     + Mtg. 4 – discussion on economics behind adaptation/engineering design (completed)
     + Consider both the design/construction and operation/maintenance related needs
   * Will inform…
     + **Research recommendations** to fill information gaps
     + **Recommendations on capacity building/professional development**
5. **Informational and institutional barriers** to integrating projected climate change impacts into state infrastructure design

* Work so far…
  + Mtg 3 (Panel) identified several barriers
  + Homework assignment identified barriers
  + Group discussions in Mtg. 2 and 3 identified various barriers
  + Water webinar focused on some of the barriers of Federal level infrastructure planning
  + Brief discussions thus far on liability and impact on “adaptive” engineering design
  + 4/10/18 governance webinar discussed federal/international standard development.
* Work still to do
  + Mtg 4 focus on various barriers identified through the teleconnections project and WG members will brainstorm potential solutions (completed)
  + Continue discussions on how CA can go “above and beyond” national and international standards
  + Institutional barriers will be important component of Mtg. 5
  + Need more discussion to identify recommendations on how to overcome barriers
  + Extract barriers and lessons from infrastructure webinar series
  + Consider both the design/construction and operation/maintenance related needs
* Will inform…
  + **Recommendations on how to lower/overcome barriers** to information use
  + **Recommendations on capacity building/professional development**
  + **Policy recommendations**
  + **Procedural recommendations**

1. **Considerations of a platform or other ways** to facilitate science-engineering interactions

* Work so far…
  + Ongoing/opportunistic collection of tools and platforms
  + Initial discussion on a common platform to access data/science
  + Some tools mentioned in webinars
* Work still to do
  + Systematically extract tools and platforms from webinars
  + Explore in depth what platforms are available; what their benefits and limitations are, what is most useful in a platform, and whether more is needed.
  + Will inform…
  + **Available tools, information sources and platforms** to use
  + **Research recommendations** to fill gaps

1. **Ways to select an appropriate engineering design** for a range of future climate scenarios as related to infrastructure planning and investment.
   * Work so far…
     + Ongoing discussion on what to do if no “single number” can be provided… how do we develop methods for working around this.
     + Mtg. 3 – developed case studies for transportation and energy/buildings
     + Mtg. 3 – looked at full design cycle and opportunities for selecting engineering design
     + Identified approaches to explore more:
       - 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
     + Focus on these other approaches, particularly more on adaptive designs
     + Extract lessons from webinar series
   * Will inform…
     + **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**

The WG decided to **be inclusive but still focused by writing about and to state-owned, state-regulated and state-funded infrastructure**; it recommended to stay focused on this state-influenced infrastructure, but write the report in a way that also speaks to others; distinguish recommendations for those involved in state-owned/funded/regulated infrastructure (stronger) from those for other infrastructure; promote **state as a leader and model that others will and should follow**.

The focus of this meeting was to fill in and deepen discussion into several of these items.

**Fill gaps identified previously by CSIWG members and through the stock-take**

The WG had the opportunity to interact with various experts, invited to fill previously-identified gaps. We discuss each in turn. Their presentations during the meeting are posted on the Working Group’s website. [we’re getting permissions to post them]

1. Jim Thorne (UC Davis) – Presentation on **land use and ecological data and tools** that can be used in infrastructure planning and decision-making

* Presentation posted online
* Key points from the presentation and discussion
  + Presented on three research efforts (see ppt for details)
    - UPlan – urban growth model. Used in 6 CA counties for developing urban growth and transportation models; land use scenarios can be incorporated into forward-looking infrastructure planning.
    - Ecological risk maps (developed with and for natural resource managers) can be used to identify climate-adapted species assemblages, appropriate reforestation and habitat protection.
    - RAMP: Greenprinting helps bring regional natural resource analysis into advanced transportation mitigation planning (for more info on RAMP (Regional Advance Mitigation Planning) program in the water sector, see: <https://rampcalifornia.water.ca.gov/>; for RAMP in transportation see [**Caltrans Statewide Advance Mitigation Initiative (SAMI)**](https://rampcalifornia.water.ca.gov/web/guest/library/-/document_library/view/822436)**).**
* All data and tools are publicly available, either directly from J. Thorne or from the agencies that use them (DFW, CalTrans, DWR)

1. Kyle Meng (UC Santa Barbara, CSIWG member) – Presentation on insights from **economics** **and demography** for infrastructure planning and decision-making

* Presentation posted online
* Key points from the presentation and discussion
* Focus on three key issues of how to bring socioeconomic information and insights from economics into infrastructure planning

1. Role of changing demographics
2. Incentivizing innovation through standards
3. How to design climate-adaptive policies

* On 1: Role of changing demographics
  + Long-run demographic changes may be driven by economic factors
  + Alternatively, demographics may also be driven by climatic changes
  + Some of these processes are well understood; others imperfectly well, but still need to be considered in making projections about high-infrastructure need areas
  + Currently not much research that looks at demographic changes due to climate change in combination with economic factors
* On 2: Incentivizing innovation through standards
  + Economic theory suggests it is better to set a performance target/standard, but not to regulate the means for how to get there
* On 3: How to design climate-adaptive policies
  + This is always a matter of balancing trade-offs
  + A trade-off between lower cost now vs. losing the “option value” for tomorrow OR trade-off between higher cost now but greater option value in the future
  + It can be expensive to buy option value
  + Can analyze this through a CBA, but there are limits to this if climate risks can’t be quantified (i.e. in the face of significant uncertainty)
  + Need to look for robust solutions, i.e., ones that hold up under a variety of assumptions
* The presentation lead to significant discussion about best decision-making approaches, the importance of making policy recommendations, of educating decision-makers and the public about why certain investments are important to make, and about the search for an appropriate mix of prescribing targets, pathways, and finding adaptive approaches to meet or maintain performance targets.
* The discussion also lead CSIWG members and representatives of the public to revisit the intent of the legislation (AB2800), which was about how to save lives in light of increasing climate changes and disruptions.

1. Nicole Meyer-Morse and Millie Levin (Cal Office of Emergency Services) – Presentation on **opportunities and barriers to “building back better” after disaster**

* Presentation posted online
* Key points from the presentation and discussion
  + Disasters are key opportunity for adapting to climate change in the course of recovery, but there are significant institutional barriers to using recovery and rebuilding to “build back better”; hence invitation to OES to join us to explore the opportunity and challenges and see how standard-setting can help.
  + Codes and standards can affect disaster funding and associated redevelopment of communities after a federally declared disaster.
  + Five federal disaster declarations in CA in 2017 – highly unusual but recognition at OES that this is likely the new normal
  + Federal Assistance comes in three forms:
    - Public Assistance (most of the money goes to this program)
    - Individual Assistance
    - Hazard Mitigation Grant Program (CA uses this to build drought resiliency)
  + Majority of federal funding is under “public assistance”
    - Part of it goes to “permanent public assistance” i.e., rebuilding/recovery
    - Part of it goes to “emergency work” i.e., debris removal
  + Permanent Work involves rebuilding of
    - Roads & bridges
    - Water control facilities
    - Buildings & Equipment
    - Utilities
    - Parks, Rec and other
  + Public Assistance restores facilities to pre-disaster design and function unless local governments have codes and standards in place (prevailing practice, already being enforced) that allow them to build back better. Key is conformity with current applicable codes, specifications, and standards
  + If AB2800 can recommend/lead to local governments updating codes and standards that incorporate climate change… which locals can adopt… then after the disaster, they can use federal influx of money to build back better based on these standards/codes.
  + After Hurricane Maria, FEMA is beginning to rethink that requirement, but for now, these are the rules

1. Susi Moser and Juliette Hart – Presentation on **selected** **findings from Teleconnections project** **on interconnected and interdependent lifelines** (California Fourth Climate Change Assessment), currently in peer review and WG deliberation on potential solutions.

* The facilitation team presented five selected findings from their L.A-focused project and the working group discussed each in rotating break-out groups (World Café); presentation slides embedded in the facilitation materials for Mtg#4. The final report on the Teleconnections project will be published together with other reports that are part of California’s Fourth Climate Change Assessment.
* The five challenges discussed (with a sample of suggestions or potential solutions offered):
  + - * **Building Back Better After Disaster**
        + Requires improvements in disaster planning (beginning before disaster; having plans and protocols in place etc.)
        + Streamlining of permitting
        + Needs benchmarking, definition of goals (what is “better”?), and ongoing monitoring
        + Needs “carrots” to incentivize
      * **Detrimental Post-Disaster Waivers**
        + Needs regulatory guidance to make waivers climate-, environment- and people-safe
        + Waivers are often about speed, hence how can processes be accelerated (e.g., pre-certify, pre-selected/contractors for emergencies; elevate professional qualifications re: adaptation; aligning permits)
        + Waivers often also about politics
        + Need to have ways to mitigate waivers with requirements on what to do “instead”
        + In areas where climate disasters are expected, people should know to plan ahead; limit waivers to areas where disasters are unexpected
        + Need climate extremes exercises
      * **Common Sequences of Extreme Events**
        + Need multi-hazard framework for disaster planning, response and engineering
        + Climate region specific design criteria for multiple risks
        + Scenario analysis/event tree exercise to elucidate multiple events
        + Vulnerability assessment to complex risks
      * **Interconnections and Interdependencies**
        + Apply EOC model of coordination to other inter-sector situations
        + Example of sector integration: complete streets
        + Address zoning inflexibility
        + Develop regs/requirements to require multi-sector management plan
        + Is there a role for government or someone else to hold overarching authority?
      * **Lack of Communication**
        + Conduct periodic functional cross sector exercises
        + Build personal relationships/trust
* Deploy more back-up power sources/generators, particularly to communication infrastructure
  + - * + In disasters, deploy mobile EOCs
        + Require communication providers to share disaster contingency plans
        + Conduct more trainings and involve communication providers, local media

These and other findings will inform the WG’s work going forward, including report discussions of barriers, opportunities, and recommendations on closing informational gaps, capacity building, principles and policy.

**Revisit and refine substantive goals of project**

1. **Louise Bedsworth** (Governor’s Office of Planning and Research)

* Louise Bedsworth joined the WG for a briefing on the statewide planning and investment guide ([OPR 2017](http://opr.ca.gov/planning/icarp/resilient-ca.html)) and subsequent work at the state level, and to share her own thoughts on where and how the CSIWG could make a contribution with its report that seamlessly builds on work already completed or underway.
* Presentation slides are available online.
* Key issues raised in discussion
  + The guidebook resulted from the work of a 2016-17 technical advisory group
  + It helps state agencies which are now under executive mandate to plan for climate change in their long-term decisions and investments; it addresses
    - What to plan for, i.e. Changing climate conditions
      * Averages
      * Extremes
    - How to plan differently, i.e. with
      * Flexibility/adaptive pathways
      * Multi-attribute framework
      * Systems-thinking
  + Lays out vision, definitions and principles that the CSWG can build on
  + Since the release of the guidebook, much of the work has focused on how to implement this guidance
  + Hands on work with departments, e.g., as part of each department’s biannual Sustainability Roadmaps
  + That work revealed significant challenges in implementing the guidance, e.g.
    - Lack of understanding what climate data mean and what to do with them; often because they do not directly relate to the kinds of information facility managers work with
    - Need to make sure guidance is directed at the right people; budget and procurement staff do not necessarily deal with climate data, even if their work is touched by it;
    - Need for training in how to interpret and make use of data
    - Need to go beyond facilities management
    - People can relate more to extremes than to changes in average
    - Some people need different data than are available from Cal-Adapt
  + Request to CSIWG:
    - Can we provide more guidance to scientists on what type of information they should be producing, i.e. what are the information needs of engineers and architects?
    - Can we give better guidance to facility managers on how that information can be put to use?
    - What is needed to help with uptake of the climate information?
    - What can the state do to facilitate / meet the climate science needs of regions?

The discussion served as a useful orientation and motivation for the final discussion on the project report outline.

**Co-develop outline of project report**

The WG was presented with a draft outline to start with, but not be bound by in any way. The original draft outline presented to the WG was as follows:

**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**

The revised draft outline that emerged from WG deliberations is as follows:

**Executive Summary**

**Section 1: Introduction**

* Charge, Purpose, Objectives, Process

**Section 2: Climate Change and Infrastructure – the Challenge**

* CA Climate is changing: Potential threats, challenges and opportunities (scenarios)
* CA Infrastructure status: Challenge & opportunities
* [Barriers] Informational, Institutional and Other
* Definition of climate-safe infrastructure

**Section 3: Vision for Climate-Safe Infrastructure**

**Changing Infrastructure Standards**

* + Regulations (force of law, incorporate best practices and mandatory) --permitting
  + Standards - national, international concurrent efforts
  + Guidelines
    - Integration challenge of climate science & infrastructure planning
    - Which, why, how
    - Recommendations (throughout)

**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
    - Recommendations (throughout)

**Platform for Exchange between Climate Scientists and Engineers/**

**Architects**

**Coordination & Collaboration Across Scale** (International/ Fed/

State/local)

**Section 4: Summary of Recommendations to the Assembly & SGC**

**Section 5: Implementation of Recommendations beyond state infrastructure**

**Appendices/Glossary**

Call out boxes with sector-specific examples, case studies will be included across the report.

WG members re-assessed their ability to actively draft report sections. They also spent time providing annotations to the revised outline, which will be integrated into one document after the meeting.

The next meeting will focus on filling gaps on governance questions and on various segments of the report draft, being developed between Meetings #4 and #5.

The meeting adjourned at 4pm.