

# 5

## *Future Information Needs*

---

The Climate-Safe Infrastructure Working Group (CSIWG) identified information needs for planning and designing climate-safe infrastructure under a changing climate. This Appendix provides summaries of these identified needs. This compilation provides important initial information to the State as agencies prioritize future research funding and investment. However, this Appendix only provides a first glimpse. A first task of the proposed standing CSIWG should include the development of a more comprehensive catalogue of climate and social science research and information needs, and then to prioritize identified information needs.

### **Building Sector - Information Needed for Future Planning, Design and Decision-Making**

New & Existing Buildings, Parking Lots and Garages	<ul style="list-style-type: none"><li>• Temperature, precipitation, humidity, flooding, sea-level rise, ground water level, groundwater quality, hydrostatic pressure, ozone, VOCs, particulate matter</li><li>• Need future forecasts (not historical data) for design days, heating and cooling degree days, weather files and hourly climate data</li><li>• Need design day and hourly data for building energy system designs</li><li>• Need to understand predicted variability around temperatures, wind speed/direction, solar radiation to better design high-performance building envelopes and hybrid (passive and active) heating/cooling systems</li><li>• Need carbon design standard; need to design for future electrification</li></ul>
Energy Demand for Space Cooling	<ul style="list-style-type: none"><li>• Maximum and minimum daily temperatures</li></ul>
Energy Demand for Space Heating	<ul style="list-style-type: none"><li>• Maximum and minimum daily temperatures</li></ul>

## Transportation Sector - Information Needed for Future Planning, Design and Decision-Making

Culvert Design	<ul style="list-style-type: none"> <li>• How fast SLR will impact culvert and highways</li> <li>• Rates of coastal erosion</li> <li>• Change in return interval of storms</li> <li>• Temperature and precipitation increases over regions of state for various lifecycles of culverts</li> <li>• Identification of regions susceptible to wildfires</li> </ul>
Pavement Design	<ul style="list-style-type: none"> <li>• Review Caltrans map of Pavement Climate Regions and update map to reflect projected boundaries across the nine pavement regions</li> <li>• Projected precipitation data</li> <li>• Projected wildfire regions</li> <li>• Projected sea-level rise for protective measure design</li> </ul>
Bridge Design	<ul style="list-style-type: none"> <li>• Projected precipitation</li> <li>• Projected flows and velocities</li> <li>• Projected scour conditions, projected temperature increases for bridge expansion joint designs</li> <li>• Projected debris potential</li> <li>• Projected wildfire regions in contributing watersheds</li> <li>• Sea-level rise for coastal highways</li> </ul>
Signals and Signage Design	<ul style="list-style-type: none"> <li>• Projected temperatures</li> <li>• Projected precipitation</li> <li>• Projected wildfire regions</li> <li>• Sea-level rise</li> <li>• Storm surge</li> </ul>
Caltrans Buildings	<ul style="list-style-type: none"> <li>• Projected temperatures for various regions of the state for the service life of buildings (which could project to year 2100)</li> <li>• Projected precipitation for the service life of the buildings</li> <li>• Projected wildfire regions of the state</li> </ul>
Safety Rest Areas	<ul style="list-style-type: none"> <li>• Projected temperatures for various regions of the state for the service life of buildings (which could project to year 2100)</li> <li>• Projected precipitation for the service life of the buildings</li> <li>• Projected wildfire regions of the state</li> </ul>
Landscape Areas	<ul style="list-style-type: none"> <li>• Projected temperatures</li> <li>• Projected precipitation</li> <li>• Projected wildfire regions</li> <li>• Sea-level rise</li> <li>• Storm surge</li> </ul>
Roads and Bridges	<p>Rate of change for:</p> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Precipitation</li> <li>• Humidity</li> <li>• Sea level</li> <li>• Groundwater level</li> <li>• Hydrostatic pressure</li> <li>• Groundwater quality</li> <li>• Ozone</li> <li>• Volatile Organic Compounds (VOCs)</li> <li>• Particulate matter</li> </ul>

## Water Sector - Information Needed for Future Planning, Design and Decision-Making

Dams	<ul style="list-style-type: none"> <li>• Updated flood frequency distributions</li> <li>• Updated meteorological information (rainfall, snowpack, wind speed, temperature, dewpoint)</li> <li>• Updated stream gauge data</li> <li>• Impact of climate change on rainfall runoff, erosion, sediment and debris transport, potential for more frequent wildfires, and effects on utilities, facility access roads</li> </ul>
Pipelines/Tunnels	<ul style="list-style-type: none"> <li>• Updated meteorological information</li> <li>• Impact of climate change on rainfall runoff, erosion, sediment and debris transport</li> </ul>
Canals	<ul style="list-style-type: none"> <li>• Updated meteorological information</li> <li>• Impact of climate change on rainfall runoff, erosion, sediment and debris transport</li> </ul>
Levees	<ul style="list-style-type: none"> <li>• Updated flood frequency distributions</li> <li>• Updated meteorological information</li> <li>• Updated stream gage data</li> <li>• Impact of climate change on peak floodflows, erosion, debris deposition and durations of inundations</li> </ul>
Pumping/Generating Plants	<ul style="list-style-type: none"> <li>• Updated wind speeds</li> <li>• Updated water surface elevations</li> <li>• Understanding of expected debris at the intake</li> <li>• Updated seismicity</li> </ul>
Watersheds	<ul style="list-style-type: none"> <li>• Ecological, including forestry and wildfire, changes</li> </ul>

## Energy Sector Information Needed for Future Planning, Design and Decision Making

Electrical Transmission Lines	<ul style="list-style-type: none"> <li>• Expected maximum ambient temperatures (for the life of the conductor)</li> </ul>
Hydro Dams	<ul style="list-style-type: none"> <li>• Timing and spatial pattern of precipitation patterns</li> <li>• Changes in snowpack</li> </ul>
Power Plants	<ul style="list-style-type: none"> <li>• Changes in cooling water temperature and availability</li> <li>• Changes in surface temperatures</li> </ul>