Principles for Climate-Smart Infrastructure

Climate-smart infrastructure refers to infrastructure that is resilient to damage caused by extreme weather and climate change and that reduces heat-trapping emissions to the maximum extent possible.[1] It also seeks to address the inequities in our infrastructure systems and decision processes and to bolster the resilience of California's communities and economy.

The following principles can help foster climate-smart infrastructure decisions and guide the weighing of trade-offs among project alternatives. They are not exhaustive, but rather highlight key considerations to inform decisions. They are also interdependent and mutually reinforcing. Some are consistent with key principles and best practices for infrastructure resilience to a variety of hazards, while others are unique to climate impacts.

Apply Rigorous Climate Science
Infrastructure plans and decisions should be consistent with the best-available science about climate change and our understanding of how it will affect human, built, and natural systems.

- Integrate climate conditions projected to occur over a project's life span, and match the risk management approach with the magnitude and timing of projected change.
- Allow opportunities to update systems, strategies, and practices as science progresses.
- Design a project, plan, or system to be robust so it can perform well under a variety of climate-related conditions or can adapt to changing conditions, especially if uncertainty exists about how and when climate impacts will occur.

Prioritize Equitable Outcomes
Place particular focus on infrastructure decisions that increase the climate resilience of underserved populations, including low-income communities, communities of color, tribal communities, and other disadvantaged communities, as well as other vulnerable populations, including people with disabilities or existing health conditions, and the elderly.

- Prioritize infrastructure investments in underserved communities to begin addressing historic disinvestment, disproportionate climate-related vulnerabilities, and inadequate infrastructure, considering the unique needs of vulnerable populations within them.
- Engage underserved and vulnerable populations in meaningful ways to ensure infrastructure decisions address their needs and provide desired co-benefits.
- Ensure the benefits of building climate-smart infrastructure, such as employment opportunities and increased access to key services, are shared equitably and flow to disadvantaged and underserved communities. The costs of paying for this infrastructure should not fall disproportionately on middle- and low-income families, and solutions should strive to avoid and minimize harm, such as potential displacement that may result from infrastructure improvements.[2]

Spend Wisely and Strengthen Financial Management
Infrastructure plans and decisions should evaluate and incorporate climate-related costs and risks in a transparent manner to ensure public funds are spent wisely.

- Include climate-related impacts in the evaluation of a project's costs and risks, as well as the fiscal and nonmonetary benefits of and opportunities presented by climate-resilient infrastructure so trade-off assessments are more accurate.
- Disclose publicly the climate-related risks and resilience of projects over their entire life spans in a manner that is consistent, comparable, and objective across projects and that provides project-specific information.
- Create efficiencies by identifying opportunities to pool public resources (financial, human, etc.) where possible.[3]

Plan Proactively, Holistically, and Transparently
Infrastructure processes should build upon existing climate-related goals and encourage more transparent and integrated solutions across sectors, jurisdictions, and climate impacts.

- Develop projects to be consistent with climate mitigation goals, to the maximum extent possible, as well as climate adaptation plans and guidance.
- Consider the whole system and broader context for a project ("systems thinking"), including its interconnectedness with other infrastructure, sectors, jurisdictions, and the environment; possible exposure to multiple hazards and cascading failures; potential for green infrastructure solutions; and opportunities to realize multiple benefits in order to evaluate trade-offs more accurately and avoid maladaptive decisions.[4]
- Maximize transparency and accountability in the infrastructure decisionmaking process by implementing an inclusive and responsive process. Responsibility for implementation and accountability methods should be clear.

[1] How to design a project to be climate resilient and/or minimize heat-trapping emissions requires thoughtful consideration of potential trade-offs. Ideally, a project would accomplish both, but this is a complicated topic that deserves lengthier discussion than space here allows.

[2] We distinguish displacement due to neighborhood improvements that lead to unaffordability and gentrification from relocation initiated in response to climate risks such as sea level rise. Community involvement is necessary in planning either community improvements or community relocation.

[3] Infrastructure decisions can create administrative and strategic efficiencies. For example, a transportation agency could work closely with public works departments to time their efforts such that road repaving with more heat tolerant or permeable materials coincides with sewer system upgrades or installation of broadband or fiber underground (re:focus partners 2015a). Retrofits to enhance a building's climate resilience could co-occur with a mandated seismic retrofit. A water utility and public works departments could together identify vacant parcels to be used for green infrastructure projects.

[4] Maladaptive decisions are those that create, perpetuate, or exacerbate climate risk (Spanger-Siegfried et al. 2016). An example is using public funds to rebuild infrastructure in locations vulnerable to repetitive flooding without requiring they be built to a more protective standard. In August 2017, the Trump administration rolled back the recently updated federal flood risk management standard (FFRMS), which was aimed at ensuring that federal agencies use protective design standards to guard against flood risks when building in flood-prone areas. A revised FFRMS, when and if one is issued, must take future climate and other conditions into account in order to be truly protective and avoid maladaptive federal investments.

Source: Union of Concerned Scientists. Available online at www.ucsusa.org/climate-smart-infrastructure