



Title of Proposed Initiative Solar-reflective “cool” walls: benefits, technologies, and implementation

Investment Areas (Check one or more) – *For definitions, see First Triennial Investment Plan, page 12:*

- Applied Research and Development
 Technology Demonstration and Deployment
 Market Facilitation

Electricity System Value Chain (Check only one): See CPUC Decision 12-05-037, Ordering Paragraph 12.a. http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF.

- Grid operations/market design
 Generation
 Transmission
 Distribution
 Demand-side management

California Energy Commission

DOCKETED

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Issues and Barriers:

Cool (reflective) roofs are a proven building energy-efficiency measure with a well-developed infrastructure, including past Codes and Standards Enhancement (CASE) studies, current Title 24 requirements, a product rating system (Cool Roof Rating Council), and many available products. Berkeley Lab’s preliminary estimates indicate that cool (reflective) walls could provide comparable energy savings. However, while there are many potentially cool wall coating products available today, no CASE studies, code requirements, or product rating systems yet exist for cool walls.

Initiative Description and Purpose:

This initiative will evaluate the benefits of solar reflective walls, assess and advance available and potential cool wall technologies, and develop the infrastructure needed to appropriately promote their use. It would quantify how increasing wall albedo affects the cooling, heating, and lighting energy uses, how increasing wall albedo affects the urban environment; the performance (initial and aged albedos) of available and prototype cool wall technologies; and initiate the infrastructure need to promote the appropriate use of cool wall technologies.

Budget would be about \$1M to \$1.5M.

Stakeholders:

Potential stakeholders include California-based paint manufacturers; the Cool Roof Rating Council, which may wish to expand into wall product rating; U.S. EPA, U.S. DOE, and the California Air Resources Board.

Background and the State-of-the-Art:

- What research development and demonstration has been done or is currently being done to advance this technology or strategy (cite past research as applicable)?

Over the past 15 years, the California Energy Commission, the US EPA, and the US DOE have advanced the use of solar-reflective “cool” roofs to save energy, lower urban air temperatures, improve air quality, and delay global warming. In particular, Berkeley Lab has worked closely with the CEC, through multiple CASE studies and PIER research products, to quantify the benefits, develop the technology, and advance the appropriate use of cool roofs. However, cool walls have not been extensively evaluated.

- Describe any public and/or private successes and failures the technology or strategy has encountered in its path through the energy innovation pipeline: lab-scale testing, pilot-scale testing, pre-commercial demonstration, commercial scale deployment, market research, workforce development.

The development and deployment path for cool walls, while not yet traveled, would be analogous to that for cool roofs.

- Identify other related programs and initiatives that deal with the proposed technology or strategy, such as state and federal programs or funding initiatives (DOE, ARPA-E, etc.).

DOE's Building Technologies Office has previously co-sponsored CEC cool roof research, and might be interested to do so for cool walls.

**Justification:**

Describe how this technology or strategy will provide California IOU electric ratepayer benefits and provide any estimates of quantified annual savings/benefits in California, including:

- Name of sector and estimated size and energy use.
- Quantifiable performance improvements for the proposed technology/strategy.
- Maximum market potential, if successful.
- Number of direct jobs created in California.
- Why this research is appropriate for public funding.

Like cool roofs, cool walls can reduce cooling energy use in both nonresidential buildings and homes, saving energy and reducing peak power demand. A CASE study for the 2005 Title 24 standards found that on nonresidential buildings alone, substituting cool roofs for standard roofs in the course of new construction and regularly scheduled roof replacement could save about \$80M/year. Public funding of cool wall research could yield comparable benefits to California electric ratepayers.

Ratepayer Benefits (Check one or more):

- Promote greater reliability
- Potential energy and cost savings
- Increased safety
- Societal benefits
- Environmental benefits - specify
- GHG emissions mitigation/adaptation in the electricity sector at the lowest possible cost
- Low emission vehicles/transportation
- Waste reduction
- Economic development

Describe specific benefits (qualitative and quantitative) of the proposed initiative

Cool walls can save energy, lower urban air temperatures, improve air quality (slow the formation of smog), and delay global warming (though negative radiative forcing). The last feature mitigates the warming effects of GHG emission at essentially no cost, since cool walls may cost no more than standard walls.

Public Utilities Code Sections 740.1 and 8360:

Please describe how this technology or strategy addresses the principles articulated in California Public Utilities Code Sections 740.1 and 8360. The California Public Utilities Code is available online at www.leginfo.ca.gov/cgi-bin/calawquery?codesection=puc.

In accordance with section 740.1, this initiative offers a reasonable probability of providing benefits to ratepayers; is consistent with the objectives of EPIC; does not duplicate past or ongoing research; and supports environmental improvement, energy conservation, peak demand reduction, and building energy efficiency.