

# CALIFORNIA ENERGY COMMISSION

Maziar Shirakh, PE  
Buildings and Appliance Office  
**Project Manager**

G. William Pennington  
**Office Manager**  
Buildings and Appliance Office

Valerie T. Hall  
**Deputy Director**  
Efficiency and Renewable Energy

Melissa Jones  
**Executive Director**

## DISCLAIMER

This report was prepared by staff of the California Energy Commission. It does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors, and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the California Energy Commission nor has the California Energy Commission passed upon the accuracy or adequacy of the information in this report.

# Acknowledgments

The Building Energy Efficiency Standards (Standards) were first adopted and put into effect in 1978 and have been updated periodically in the intervening years. The Standards are a unique California asset and have benefitted from the conscientious involvement and enduring commitment to the public good of many persons and organizations along the way. The 2008 Standards development and adoption process continued that long-standing practice of maintaining the Standards with technical rigor, challenging but achievable design and construction practices, and public engagement and full consideration of the views of stakeholders.

The revisions in the 2008 Standards were conceptualized, evaluated and justified through the excellent work of Energy Commission staff and consultants working under contract to the Energy Commission, Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas and Electric Company, and Southern California Gas Company. At the Energy Commission, Maziar Shirakh, PE, served as the project manager and senior engineer. Bill Pennington, Manager of the Buildings and Appliances Office, provided overall guidance to the staff and consultants. Valerie Hall, Deputy Director of the Energy Efficiency and Renewable Division provided policy guidance to the Staff. William Staack and Dick Ratliff provided legal counsel to the staff. Other key technical staff contributors included Nelson Peña, Jeff Miller, PE, Gary Flamm, Bruce Maeda, Payam Bozorgchami, Tav Commins, Rob Hudler, and Alan Marshall. Additional staff input and assistance came from Chris Gekas, Suzie Chan, Martha Brook PE, Smita Gupta, Claudia Orlando, Chris Olvera, Beverly Duffy, and the Energy Commission's Web Team. Key consultants included Architectural Energy Corporation, Bruce Wilcox, Taylor Engineering, Proctor Engineering, Benya Lighting Design, Chitwood Energy Management, Davis Energy Group, EnerComp, and E3. The Heschong Mahone Group served as the PG&E's prime consultant.

*The Energy Commission dedicates the adoption of  
the **2008 Building Energy Efficiency Standards** to  
**Jon Leber, PE**, (November 13, 1947 - February 14, 2008)  
for his 30 years of dedication to excellence in the development and  
implementation of the most energy efficient building standards  
in the country and a model for others to follow.*

***He was the quintessential public servant.***

## ***Abstract***

This manual is designed to help building owners, architects, engineers, designers, energy consultants, builders, enforcement agencies, contractors and installers, and manufacturers comply with and enforce the 2008 Title 24 California Building Energy Efficiency Standards (Standards) for low-rise residential buildings. Written as both a reference and an instructional guide, this manual can be helpful for anyone that is directly or indirectly involved in the design and construction of energy efficient nonresidential buildings. This manual is intended to supplement several other documents that are available from the California Energy Commission (Energy Commission). These are the: (1) 2008 California Building Energy Efficiency Standards, which were adopted April 23, 2008 and become effective January 1, 2010; (2) Reference Appendices for the Standards; and (3) Residential Alternative Calculation Method Manual. This manual provides a summary of the principle changes in the 2008 Standards relative to the 2005 Standards. The technical chapters cover building envelope, mechanical / heating ventilation and air conditioning (HVAC) systems, water heating (including swimming pool system requirements), interior and for outdoor lighting permanently attached to the building. Mandatory measures, prescriptive requirements and compliance options are described within each technical area, subsystem or component. Other subjects that are covered include the compliance and enforcement process, including design and preparation of compliance documentation through field verification and diagnostic testing; computer performance approach; additions, alterations and repairs; New Solar Home Partnership (NSHP) requirements; and HERS (Home Energy Rating System) raters.

**Keywords:** title 24, energy, energy efficiency, low-rise residential buildings, building envelope, domestic water heating, HVAC, indoor outdoor lighting, performance approach, prescriptive approach, mandatory requirements, residential compliance manual, HERS rating, diagnostic testing, solar, residential cool roofs, residential additions alterations repairs, climate zones