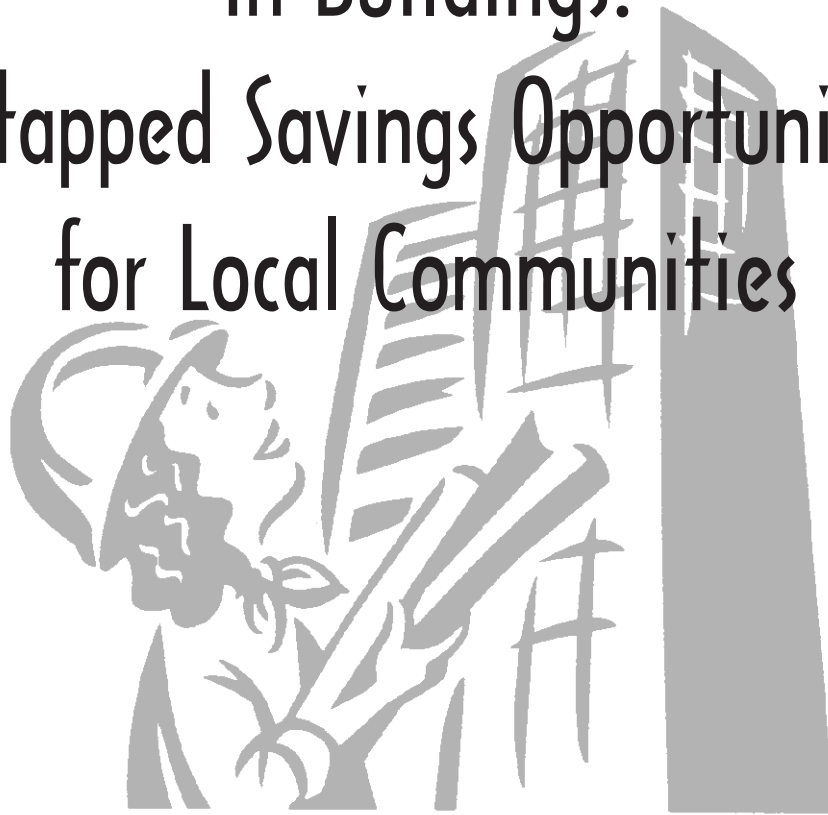


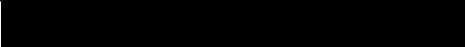
Improving Energy Efficiency  
in Buildings:  
Untapped Savings Opportunities  
for Local Communities



**December 1998**

*Produced by*

**Local Government Commission**



# Improving Energy Efficiency in Buildings: Untapped Savings Opportunities for Local Communities

---

December 1998

---

*Produced by*

**Local Government Commission**

*Principal Author*

**Steve Hoyt**

*Contributing Authors*

**Josh Meyer**

**Patrick Stoner**

*Editing & Design*

**Dave Davis**



## Acknowledgements



**Special thanks to  
the following people  
for their assistance,  
comments and  
suggestions in  
developing this  
resource guide:**

Local Government Commission  
1414 K St., Suite 250  
Sacramento, CA 95814-3929  
☎(916) 448-1198  
fax (916) 448-8246  
[www.lgc.org/energy](http://www.lgc.org/energy)

CeCe Barros  
Pacific Gas & Electric Company

Brian Bosse  
County of Santa Barbara  
Planning & Development Dept.

Leif Christiansen  
Local Government Commission

Ray Darby  
California Energy Commission

Danielle Dowers  
City and County of San Francisco  
Bureau of Energy Conservation

Beverly Duffy  
California Energy Commission

John Eash  
California Energy Commission

Robert Epler  
City of San Diego  
Environmental Services

Robert Fiock  
County of Siskiyou  
Building Department

Frank Galvery  
Southern California Gas Company

Eurlyne Geiszler  
California Energy Commission

Wayne Gungle  
City of Redding  
Building Department

Denise Jefferson  
California Building Officials, Inc.  
(CALBO)

Bill Knox  
California Energy Commission

Dan Lieberman  
City of San Jose  
Environmental Services Division

Mariann Long  
City of Anaheim  
Public Utilities Department

Michael Lubliner  
Washington State University  
Cooperative Extension  
Energy Program

Lynn Marshall  
California Energy Commission

Bill Pennington  
California Energy Commission

Ann Peterson  
California Energy Commission

Jeff Stein  
Eley Associates

Michelle Thomas  
Southern California Edison

Shawn Thompson  
City of Irvine  
Waste, Energy and Resource  
Planning

Emilia Tyminski  
Local Government Commission

## Table of Contents

Introduction . . . . .	1
Background . . . . .	2
Benefits at Home and the Workplace . . . . .	3
State Energy Efficiency Standards . . . . .	4
Energy Compliance Problems . . . . .	5
Features Common to Successful Local Programs (sidebar) . . . . .	6
New Compliance Tools – Diagnostic Equipment . . . . .	7
Energy Performance Contracting for Nonresidential Buildings . . . . .	8
Performance Contracts in the Residential Market: Residential Comfort and Energy Bill Guarantees . . . . .	9
Local Government Energy Efficiency Programs . . . . .	10
Local Government Green Building Programs . . . . .	13
Other Programs to Assist Local Governments . . . . .	14
Funding Opportunities for Local Governments (sidebar) . . . . .	15
Utility Programs . . . . .	16
Federal Government Programs . . . . .	17
Recommended Steps for Local Governments . . . . .	18
Resources . . . . .	19
Internet Resources . . . . .	20
Appendices . . . . .	21
A. Case Studies and Fact Sheets	
B. Energy Performance Contracting	
C. Local Government Energy Efficiency Programs	
D. Local Government Green Building Programs	
E. Green Building Articles and Resources	
F. Utility Programs	
G. Federal Programs	

## Introduction



California communities have survived the recent recession and are again beginning to thrive. Construction activity has increased. Retail business has improved. Local governments are seeking ways to bring a higher quality of life to their residents while developing community pride, service, unity and identity while protecting their environment, independence, and financial security.

Many cities and counties have found energy efficiency to be a powerful, cost-effective tool to help achieve these goals. Energy efficiency can strengthen and stimulate the local economy, improve local air quality, and improve the livability of neighborhoods.

Consuming 35% of the energy consumed in the United States, buildings present an enormous opportunity for reducing energy consumption and further realizing these objectives. This resource guide focuses on improving the energy and resource efficiency of new buildings through energy-efficient design methods, innovative programs, and quality construction practices.

Because the construction industry helps define a community, it is important for that industry to reflect community values. City councils, county boards of supervisors, and planning and building departments can work with builders to provide a clear new focus on enhancing their community by developing and implementing

specific programs that encourage energy-efficient neighborhoods and buildings.

The Local Government Commission has created *Improving Energy Efficiency in Buildings* to encourage local governments to take the lead in making their communities comfortable, energy-efficient, environmentally sound and economically secure places to live and work. The guide includes examples of successful local actions and provides an extensive list of resources to assist local leaders seeking to assure a higher quality of life in their communities.

## Background

State law requires all new and retrofitted buildings to meet the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

Commonly referred to as “Title 24,” these standards describe minimum requirements for new and retrofit construction with regard to a building’s energy features, devices and systems. However, the standards do not address construction quality nor do they require actual building energy performance verification.

This resource guide identifies common problems that weaken a building’s energy performance and describes innovative programs recently undertaken by California communities to improve the energy efficiency of new buildings. In addition, the guide highlights “green building” programs that look beyond energy efficiency to address the total resource use of a building.

Poorly constructed buildings have higher energy bills, reducing the amount of cash available for other expenditures. Poor construction techniques can also compromise indoor air quality and jeopardize fire safety. By wasting energy, under-performing buildings further damage air quality and increase atmospheric levels of carbon dioxide, which many scientists believe is one of the main causes of global warming.

These safety and environmental factors result in increased costs,

which hurt local economies in the long run.

California law requires all new buildings to comply with the energy efficiency standards set in Title 24, parts 1 and 6 of the California Code of Regulations. Local governments are responsible for the enforcement of these regulations and its involvement is crucial to the success or failure of new buildings meeting Title 24 requirements.

Furthermore, cities and counties

can follow the lead of pioneering local governments that have created programs encouraging the construction of buildings that deliver energy savings well above Title 24 targets. Architects, builders, energy service providers, and engineers have proven that cost-effective measures can be integrated into the design and construction process to reap energy savings of 50 percent or more above Title 24’s minimum energy efficiency standards.



## Benefits at Home and the Workplace

### ■ Benefits in the Residential Sector

Operating costs can be three times higher for an inefficient house or building. By improving compliance with Title 24 and creating programs that encourage builders to go beyond these standards in the residential sector, local governments can:

- Expand the purchasing power of residents through lower energy bills,
- Foster economic independence of lower income residents, who pay a much higher proportion of their income for energy costs,
- Strengthen the local economy through the recirculation of money previously leaving the community through unnecessary energy costs,
- Increase the eligibility level of home-buyers through federally subsidized energy efficiency loans,
- Increase home resale values through their lower operating costs,
- Improve occupant comfort,
- Reduce problems with indoor air quality and fire safety by reducing passageways for contaminants and fire, and
- Reduce power plant emissions and local natural gas combustion through reduced energy use.

Energy efficiency is a potent tool for strengthening local economies. The U.S. Department of Energy predicts that 70 to 80 cents of every energy dollar leaves the local community, and the American Council for an Energy Efficient Economy determined that \$2.32 of local economic activity is generated from every dollar spent locally on energy efficiency.

### ■ Benefits in the Professional and Commercial Sectors



Business and government can reap impressive financial returns from constructing energy-efficient buildings. These benefits include:

- Reduced energy and maintenance costs,
- Increased productivity,
- Improved profitability,
- Higher sales,
- Enhanced competitive position,
- Lower rates of absenteeism, and
- A reputation for environmental responsibility.

Energy-efficient buildings create more effective and comfortable work environments that produce cost savings that often go well beyond lower energy bills. By providing more effective lighting and a more efficiently insulated building, many errors caused by eye strain or temperature extremes can be eliminated. In *Greening the Building and the Bottom Line*, the Rocky Mountain Institute reports that a lighting retrofit of the main branch of the Reno, Nevada, post office not only reduced annual energy and maintenance costs by \$52,000, but also saved over \$400,000 in labor costs from a concurrent six-percent increase in worker output on mail sorting machines as well as a reduction in sorting errors.

The Rocky Mountain Institute also notes that when the West Bend Mutual Insurance Company moved its headquarters into a new, highly energy-efficient building in the early 1990s, productivity jumped by 16 percent. In an in-depth study conducted by the Rensselaer Polytechnic Institute, researchers determined that just one of the green design features alone increased productivity by 2.8 percent, reducing annual labor costs by \$364,000. (See the Appendices for the complete *Greening the Building and the Bottom Line* report).

## State Energy Efficiency Standards



**T**hrough the Warren-Alquist Act of 1974, the legislature established the California Energy Commission as the state's principal energy policy and planning organization. The development of energy efficiency standards for new buildings was among its original mandates.

The standards first took effect in 1978, promulgated in Title 24, parts 1 and 6 of the California Code of Regulations. Currently, the Energy Commission updates "Title 24" standards on a three-year cycle. The 1998 revisions are scheduled to become effective in the summer of 1999.

The Energy Commission is required by law to ensure that each energy efficiency standard is cost-effective. Most of the required features in Title 24 have a payback period of five years or less. This means that the incremental cost for more efficient construction and equipment are less than five years' worth of the resulting savings.

Californians have saved \$11.3 billion in electricity and natural gas costs, according to Energy Commission calculations, since the inception in 1978 of Title 24 standards and energy efficiency standards for appliances.

Title 24 distinguishes between residential and nonresidential buildings. Residential standards cover all low-rise residential buildings including multi-family buildings with three or fewer habitable stories. The nonresidential standards apply to all nonresidential buildings plus high-rise residential, hotel and motel occupancies.

Both sets of standards establish an energy budget for the building envelope (comprised of the foundation, floors, walls, roof, skylights and windows), space heating and cooling, and water heating.

**Residential standards cover all low-rise residential buildings including multi-family buildings with three or fewer habitable stories. The nonresidential standards apply to all nonresidential buildings plus high-rise residential, hotel and motel occupancies.**

Residential standards address lighting systems for kitchens and bathrooms, while nonresidential standards cover lighting systems for the entire building.

Mandatory water efficiency features, such as low flow showerheads and faucets, are included in both residential and nonresidential standards.

As weather conditions significantly affect energy use, the Energy Commission permits buildings to have different levels of energy consumption and requires different energy features depending on local climatic conditions. The Energy Commission has established sixteen climate zones to represent the varied and distinct heating and cooling needs that exist within the state.

## Energy Compliance Problems



### ■ Air Ducts

**T**he Energy Commission estimates that improper air duct installation is responsible for 20 to 40 percent of energy loss in newly constructed residential buildings. Air duct systems are commonly installed in inconspicuous, unconditioned spaces, such as garages, crawl spaces, or attics. As homeowners and builders are often unaware whether a duct system is properly installed, installers receive little feedback on the quality of their work.

Improperly installed air duct systems can result not only in a huge energy waste, but also present health hazards. Garages often contain auto exhaust, pesticides, herbicides, solvents and other toxic chemicals that can travel into the house through leaky air ducts — polluting indoor air and causing potential health hazards.

Innovative design methods can help to reduce energy loss prob-

lems associated with air ducts. By installing air ducts within conditioned space, any heated and cooled air that escapes through air leaks will be used by the conditioned space, reducing the energy loss without compromising air quality.

Though not yet adopted as common building practice, a study by the former Washington State Energy Office (now the Washington State University Cooperative Extension Energy Program) showed that installing ducts in the conditioned space does not cost more than installation in unconditioned space.

### ■ Insulation

**A**ccording to the California Institute for Energy Efficiency, more than one-third of new homes have less than minimum required levels of insulation and 20 percent have serious installation problems that significantly impact the insulation's performance.

Nonuniform construction of crawl spaces can cause a problem for

proper installation of floor insulation. The standard width of insulation rolls is 16 inches, yet when the space between floor beams is narrower, subcontractors often stuff the insulation into the space instead of cutting the insulation to fit correctly. When insulation is compressed, it reduces its R-value, a measurement of its insulation capability. Due to logistical problems, other spaces are often simply not insulated, such as behind the bathtub or shower.

### ■ Framing

**W**hile insulation value is the most important factor, the energy performance of a wall is also significantly affected by the framing method (*Residential Energy Conservation Evaluation*, Frankel et. al.). Generally speaking, the greater the amount of framing, the larger the potential for energy loss.

The Energy Commission advocates energy efficient design and construction methods that reduce the amount of framing, studs and headers, and increase the amount of insulation.

For example, advanced framing design methods, while structurally

sound, increase framing stud spacing from 16 to 24 inches, which increases the amount of area that can be insulated. Structural requirements may preclude such framing under certain conditions and should be evaluated by a professional engineer or architect.

Improper framing and wall installation can present health and fire safety concerns. Air penetrating through leaks in walls and framing can cause particles from fiberglass insulation to become airborne, causing potential respiratory problems. In the movement of a fire from one room to another, wall and ceiling air leaks can act as flues, accelerating the devastation. The potential for air leaks can be even greater in buildings with various ceiling heights.

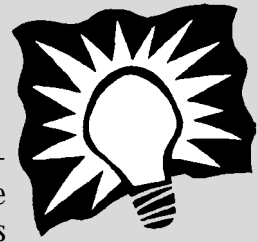
### ■ Windows

The U.S. Environmental Protection Agency estimates that in hot climates with high cooling needs, heat gain through windows is responsible for 50 percent of the cooling load. The thermal performance of windows have been significantly improved through new technologies, such as low-emissivity (low-e) coatings.

Unfortunately, builders have yet to fully utilize high performance windows. According to Dariush Arasteh at Lawrence Berkeley Laboratories, only one-third of new homes nationally are using low-e windows — even though they are cost-effective 80 percent of the time.

Selecting the correct type of

## Features Common to Successful Local Compliance Programs



Each year, the Energy Commission presents the Assuring Compliance with the Energy Standards (ACES) award to cities and counties with successful records of Title 24 enforcement. ACES recipients have indicated that their enforcement success resulted from the strong commitment of building department officials.

Many of the successful departments utilized workshops and training courses offered by the California Building Officials, Inc. Training Institute (CTI) and the Energy Commission. In the case of the City of Redding, the department designated one plan check engineer to attend CTI and Energy Commission trainings and to teach other department staff current codes and procedures. By assigning this responsibility to one person, the department focused and enhanced its limited resources.

Whether training occurred in-house or through the CTI state-sponsored workshops, successful building departments interviewed consistently pointed to ongoing training of their plan check engineers and field inspectors as central to the success of their departments' Title 24 compliance efforts. All of these building departments have found strategies for incorporating the energy plan and field inspection into other inspections with minimal impact to the amount of time required to perform a thorough job.

California Building Officials, Inc. (CALBO) is an association of building officials representing approximately 85 percent of California cities and counties. For more information on CALBO's trainings, call Denise Jefferson at ☎(916) 457-1103.

low-e window is also critical. In general, there are two types available, the original low-e windows for heating-dominated climates (like the Northeastern United States), and spectrally selective low-e windows which are appropriate for most of California. Spectrally selective low-e windows block both heat loss and solar heat gain.

Improperly installed windows are a

major source of air and water intrusion from unconditioned spaces. Besides energy loss, water seepage can cause mold and decay, which can result in extensive damage and also compromise indoor air quality.

## New Compliance Tools – Diagnostic Equipment



**B**efore the emergence of diagnostic tools, such as Duct Blasters™, blower doors, and flow hoods, many energy experts and most builders were unaware of the magnitude of the air leakage from improperly installed windows, wall framing, and air duct systems.

The Energy Commission advocates the use of diagnostic equipment in the construction process. This is sometimes referred to as performance testing. By identifying and correcting installation problems, builders can increase the energy performance of new buildings while limiting their exposure to construction defect litigation. Diagnostics also enhance quality control.

To encourage residential builders to use diagnostic equipment, the 1998 Title 24 standards will include energy efficiency credits for

builders who use performance testing to verify the quality of the heating, ventilating, and air conditioning (HVAC) systems.

Pacific Gas and Electric Company (PG&E), in cooperation with the Energy Commission, is providing training courses on proper air duct installation and diagnostics at its Stockton training center. Energy Commission staff report that the training is very popular.

For the past three years, the Building Industry Institute and the Energy Commission have worked together on a building energy code training program to train large production builders on improved compliance with Title 24 energy standards. Funded by the U.S. Department of Energy, the training educates builders on Title 24 codes and provides training on effective installation techniques.

Training sessions address installation

problems. Instructors educate contracting and purchasing personnel on the purchase and specification of energy conservation features, systems and devices.

An on-site session teaches field superintendents how to properly install these energy features. Consol, Inc. of Stockton, California, the projects' subcontractor, uses diagnostic equipment during the on-site training to identify installation defects in participating builders' homes. Three to six months later, instructors return to the site for inspection and follow-up training. Field superintendents and instructors jointly review the homes. During the follow-up sessions, instructors determine how successfully builders have incorporated the training into construction practice, and offer additional training.

In follow-up sessions, trainers found improvement in construction. There was also a decrease in the reporting of omitted energy features during each year of the program. More than 1,269 building personnel from 191 builder companies — representing 12 to 15 percent of all single-family home builders — have participated in the program so far.

For more information on this program, call Eurlayne Geiszler at the California Energy Commission at ☎(916) 654-4052.

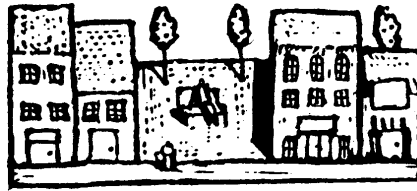
## Energy Performance Contracting - Nonresidential

While commonplace in building retrofit projects, energy performance contracting for new buildings has only recently been used to address design and logistic barriers to constructing energy-efficient buildings in the commercial sector. With energy performance contracts, a portion of the designer's and/or builder's compensation is tied to the energy performance of the building. In standard practice, competitive low-bid contracting encourages designers and builders to control the up-front costs of constructing a building without regard to its long-term operating costs.

Performance contracts are applicable to both plan/specification and design/build projects and can cover whole building or component performance. Much like the performance method of showing Title 24 compliance, a new building energy performance contract does not impose prescriptive requirements but rather gives the designer flexibility to achieve the performance goal.

Typically, before design development begins, a computer simulation model is used to compute an energy performance "target," such as cost-effective measures that go beyond required standards, that is based on the building program. The designer's proposed design can then be simulated and compared to the target building

The real test comes after the building is operational, when the actual energy use is compared to the adjusted target. The target model is adjusted for factors beyond the designer's or contractor's control, such as weather and occupancy patterns.



### ■ A Local Government Example: City of Oakland

The City of Oakland is one of the pioneers of new building energy performance contracting in the nonresidential sector. In 1994, Oakland began plans to build two new administrative buildings. The City wanted very energy-efficient, high-performance buildings that also created a productive work environment through providing optimum occupant comfort.

Recognizing that without proactive intervention the buildings would only minimally comply with California energy efficiency standards, the City sought the Energy Commission's assistance.

Through the Energy Commission's Energy Partnership Program, the City decided to pursue an energy performance contract. A local engineering and architectural research firm, Eley Associates, developed a performance target through computer simulation of the new buildings. The performance target is

based on a reasonable and cost-effective set of measures and is about 27 percent better than Title 24 standards.

A performance contract addendum was included in the design/build RFP. It requires the design/build contractor to demonstrate that the proposed design meets or exceeds the target and it spells out the financial incentive/penalty for exceeding or failing to reach the target in practice.

Construction was completed in 1998. The first year of occupancy is considered a "fine tuning" period of both the building systems (air conditioning, lighting, etc.) and the energy monitoring devices used to assess building performance. If, in the second year of operation, the building performs better than the adjusted target, the city will award the contractor a portion of the future stream of energy savings up to a maximum of \$250,000. If the building fails to reach the target, the contractor must then pay a penalty to the City based on a formula similar to that of the bonus award.

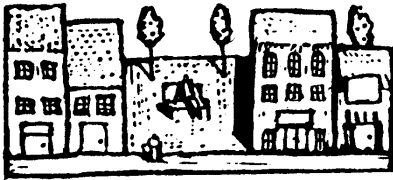
Through its "Performance By Design" program, PG&E awarded the City a \$193,000 rebate based on the simulated energy performance of the proposed design compared to a standard Title 24 building. As part of the energy performance contract, the City gave \$93,000 of the rebate to the contractor because the simulated performance of the proposed

design exceeded the performance target. This rebate is separate from the performance incentives and penalties described above, which are based on actual, not simulated, performance.

For more information on the Oakland buildings, call Scott Wentworth in the City of Oakland's Public Works Department at ☎(510) 615-5421.

Local governments interested in pursuing or encouraging performance contracting may be eligible to receive free assistance through the Performance Contracting Pilot Program currently offered by Eley Associates and the Rocky Mountain Institute.

For more information, call Eley Associates at ☎(415) 957-1977 or visit their web site at [www.eley.com](http://www.eley.com)



### ■ Performance Contracts in the Residential Market: Residential Comfort and Energy Bill Guarantees

While energy performance contracts in the nonresidential sector are still in their infancy, residential builders have offered energy performance guarantees for over 20 years.

A 1995 EPA report, *Assessment of Residential Comfort and Energy Bill Guarantee Programs*, identifies 28 guarantee programs in the United States. In California, Chitwood

Energy Management in Mount Shasta currently offers residential comfort and energy bill guarantee programs.

Residential comfort guarantees essentially assure that occupants will be comfortable with the heating and cooling system. According to the EPA report, these guarantees are commonly offered by utilities or manufacturers for houses having electric heat pumps.

The guarantee is used to calm home buyers' unfamiliar with electric heat-pumps. If the home buyer is not satisfied with the system, the guarantor usually offers added insulation, sealing of the HVAC ducts or, in rare cases, the replacement of the heating and cooling system to rectify the situation.

With bill guarantees, the builder or contractor guarantees that the homeowner's heating and/or cooling bill will not exceed a given dollar amount.

The Energy Commission believes that guarantee programs have the potential to deliver highly energy-efficient homes that exceed Title 24 requirements without regulatory intervention. Especially in extreme climates with significant heating or cooling loads, the Energy Commission sees bill and comfort guarantees as a potential tool for market transformation.

The Energy Commission is encouraging builders to provide bill or comfort guarantees to differentiate their product from their competitors. In the highly competitive residential housing market, other builders may then feel compelled to offer similar guarantees.

Recently, the Energy Commission worked with a desert community and Chitwood Energy Management (CEM) to guarantee maximum annual heating and cooling bills. The Energy Commission and CEM determined that the annual energy bills could be reduced in standard, new 1,400 square-foot homes from over \$2,400 to approximately \$500 by investing \$1 per square foot more than in standard construction practice.

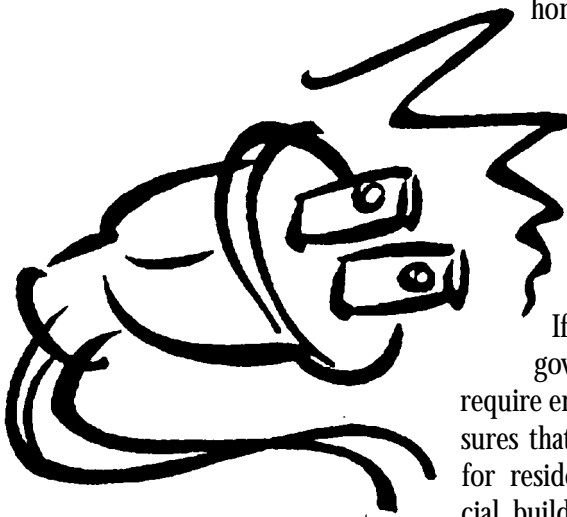
By using improved installation procedures and incorporating other energy efficiency features, a high level of efficiency would be obtained. The production team would use diagnostic tools to ensure quality and performance. (This project has been temporarily delayed.)

For more information, call John Eash at the California Energy Commission at ☎(916) 653-7181.

The Energy Commission supports the concept of a sustained marketing campaign to communicate to home buyers the added value of improved occupant comfort and safety, lower maintenance costs, higher durability, improved indoor air quality, and greater environmental sustainability that super energy-efficient homes deliver.

Once consumers are aware of the added value of high-performance homes, builders will have incentives to continue to offer these homes even after any specific program is completed.

## Local Government Energy Efficiency Programs



Several local governments in California have created voluntary, incentive-based programs to encourage construction of buildings that perform above Title 24's minimum energy efficiency standards. The City of San Diego Green Building Policy, which requires that all new and retrofitted municipal buildings perform 50 percent above Title 24 energy efficiency requirements, is the only current local jurisdiction program that requires buildings to exceed Title 24. (See the Green Building section of this report for more information). The City of Santa Monica is currently considering a program encouraging energy savings above Title 24 requirements.

Each of the major investor-owned electric utilities (PG&E, Edison and SDG&E) also has incentive programs for buildings that exceed Title 24. On a federal level, the Environmental Protection Agency's Energy Star Homes Program results in new

homes that perform 30 percent above the national model energy code, or roughly 20 to 25 percent above Title 24 requirements.

If a California local government chooses to require energy efficiency measures that go beyond Title 24 for residential and commercial buildings, California law requires that the jurisdiction prove the measures' cost-effectiveness.

Several local governments have developed voluntary, incentive-based programs that result in buildings that exceed Title 24 requirements.

\* **The City of Alameda's Title 24 Plus Rebate Program** offers commercial clients up to \$50,000 in rebates from the City's municipal utility for instituting energy efficiency design elements and construction practices. Builders can either choose from a prescriptive or performance approach, although the maximum rebate amount is higher for the performance method.

For more information, call Meredith Owens of the City of Alameda Bureau of Electricity at ☎(510) 748-3947.

\* **The City of Anaheim's municipal utility** offers 37 energy efficiency programs for residents, businesses, and low-income households through its **Anaheim Advantage** program. The City

partners with the Environmental Protection Agency's Energy Star Homes program. Anaheim Public Utilities also provides rebates for new commercial construction and expansion.

For more information, call Mariann Long of the City of Anaheim Public Utilities Department at ☎(714) 765-4251.

\* **The City of Los Angeles Department of Water and Power (LADWP)** is expressing its commitment to energy efficiency through its **Efficiency Solutions** programs. LADWP's HVAC Services program offers small to medium commercial and industrial customers financial incentives to install HVAC systems that exceed Title 24 standards. The City is currently contracting to make low-cost solar water heaters available to its customers. LADWP also offers a number of conservation retrofit programs targeted at residential and business customers. LADWP is currently working with the Energy Commission to achieve a high level of energy efficiency for two large new developments.

For more information, call Don Cunningham at LADWP at ☎(213) 367-4211.

\* **The City of Irvine** has programs for both new, single family residential, and new and remodeled commercial buildings. In April 1997, the City launched a voluntary program developed in cooperation with the Energy

Commission called **Irvine Quality Plus (IQ+)** to improve the energy efficiency of new homes.

IQ+ has a performance-based approach to energy efficiency. Although there are a few prescriptive measures (e.g., return air must be ducted), it is up to the builder and subcontractor to design and install a HVAC system that delivers the appropriate amount of air to the various rooms and does not leak more than 5 percent. (Diagnostic tests conducted on area homes prior to program inception showed between 10 percent and 80 percent leakage in HVAC systems.)

Independent inspectors, certified by the City of Irvine and hired by the participating builder, review the design, inspect the installation and test the performance of the HVAC system. If the home is in compliance, the builder then receives all the benefits offered by the City as well as the benefit of a more comfortable, energy-efficient home for buyers.

In the program's first year, a suddenly red-hot housing market muted builder interest in the program. Irvine approved over 662 certificates of occupancy and 986 permits for single-family homes in 1997. Only 58 homes had been certified under IQ+ by the beginning of 1998.

In May 1998, Irvine increased the program's visibility by hiring a marketing firm to promote it. Three more developments and another builder have since joined the program.

\* In partnership with Southern California Gas Company (The Gas Company), Irvine is also developing the **Energy Efficiency Building Program (EEB)**, an interactive on-line tool designed to assist commercial building owners, architects, engineers and maintenance staff to design, construct and maintain buildings for more energy efficiency. The EEB customizes design recommendations for over 40 types of buildings, such as hospitals, fast food restaurants, convention centers, hotels and auto dealerships.

The EEB is a detailed database broken down into four levels. The first level contains general, low-cost and no-cost recommendations by categories that apply to any commercial use: Building Envelope, HVAC Systems, Lighting and Office Equipment. At the second level, a determination is made regarding the appropriateness of various measures according to building type. The categories at this level are Architecture, Energy Management, HVAC, and Lighting. Once the measures are narrowed down, the third level gives detailed information including a brief description of the measure itself, cost-benefit analysis, and energy saving principles to help determine how the measure can be effectively applied for that type of use. The fourth level shows a listing of vendors to go to for that particular measure.

The database will be accessible through Irvine's web page; however, the database will be housed at The Gas Company web site to maintain technical control of the information and to ensure its accuracy. The tool's

main purpose is to disseminate accurate, focused information early in the design process. Each applicant to the Planning Department at Irvine will be required to use this database. A staff person will follow up to answer any questions and offer assistance.

As an on-line tool, the EEB could potentially be used by planning and building departments and commercial building designers throughout California. The program should be operational by March or April 1999.

For more information, call Shawn Thompson, PE, City of Irvine at ☎(949) 724-6358, or by email at [stombs1@ci.irvine.ca.us](mailto:stombs1@ci.irvine.ca.us)

\* **The City of San Jose's Innovative Design and Energy Analysis Service (IDEAS)** targets the nonresidential sector to achieve energy efficiency levels that exceed Title 24 in new commercial buildings. The City developed the IDEAS manual which includes complex matrices on different energy efficiency design features for different size and type buildings.

In 1993, San Jose developed solar access design guidelines and the Solar Access Design Manual, an excellent guide to passive solar design. The City is currently exploring the development of green building standards.

For more information, call Mary Tucker of the City of San Jose's Department of Environmental Services at ☎(408) 277-5533.

Additionally, San Jose's New Industrial Development/Study Work Group reviews site plans coming before the Planning Department. The Group's recommendations address the entire building system, including energy efficiency, solid waste management, water efficiency and recycling, and renewable energy opportunities. The recommendations are then forwarded to the Planning Department for consideration, and a copy is also provided to the developer.

For more information on the New Industrial Development/Study Work Group, call Dan Lieberman at the City of San Jose's Department of Environmental Services at ☎(408) 277-5533.

\* **The County of San Luis Obispo** recently developed the **Building Energy Efficient Structures** (BEES) program for new residential construction. Under the plan, the builder chooses at least three energy efficiency measures from a menu of options. In return, the County waives or reduces building fees and expedites plan check. The Planning and Building Department also conducts in-house workshops on passive solar design concepts, energy-efficient appliances, and other energy conservation and sustainable practices.

For more information, call John Euphrat of the County of San Luis Obispo Planning Department at ☎(805) 781-5600.

\* **The County of Santa Barbara's Innovative**

**Building Review Committee** (IBRC) is a voluntary, incentive-based program developed to encourage builders and architects to design and build structures that go 20 percent, 30 percent and 40 percent beyond Title 24 energy standards for residential and commercial buildings.

In 1994, Planning and Development staff included policy language to create the IBRC when the County was revising its Energy Conservation Element. The Board of Supervisors approved the policy in December 1994, specifically iterating that all policies must be voluntary and that no regulatory mandates or fees would be established. The IBRC began meeting shortly after Board approval, and currently meets twice a month. The original energy efficiency targets were 15 percent for residential and 25 percent for commercial above Title 24 requirements.

Sixteen local professionals, including architects, engineers, solar industry representatives, builders, utility representatives, and County plan check engineers, volunteer their time as IBRC members to provide free consultation and design assistance to participating builders and owners. Recommendations are made early in the design process when changes are the most cost effective. The Building Department offers an expedited plan check and reduced fee to participating owners, builders and designers.

In 1997, County staff sought funding to go beyond the original energy efficiency targets. In October 1997, the Urban Consortium's Energy

Task Force awarded Santa Barbara County a grant to develop these additional targets, and to track and measure the financial savings from three case studies. The County set the new energy efficiency targets at 20 percent, 30 percent, and 40 percent above Title 24 requirements with additionally required "energy points." Energy points come from an "Energy-Efficient Target Menu" of energy-efficient "green building" designs and techniques that are generally outside the purview of Title 24 standards. These include recycled building products, water conservation, and landscaping issues.

For more information, call Brian Bosse, County of Santa Barbara Planning and Development Department, Energy Division, at ☎(805) 568-2049, or by email at [bbosse@co.santa-barbara.ca.us](mailto:bbosse@co.santa-barbara.ca.us)

**V**oluntary, incentive-based, programs can help foster a collaborative atmosphere between local government officials and the building industry. To encourage builders and developers to utilize energy efficiency as a marketing tool, many programs stress the added market value that a highly energy efficient building provides. These programs offer an alternative to additional regulatory requirements.

The main challenge for such programs is obtaining participants. Builder participation rates for voluntary "Beyond Title 24" local government programs rarely rise above 10 percent of total buildings built, with 1 to 5 percent being the norm.

## Local Government Green Building Programs

Some local governments are looking beyond energy use issues linked to Title 24 and are addressing the total energy and resource use of buildings. Besides achieving a high level of energy efficiency, green buildings usually incorporate renewable energy systems and strive for low water consumption and waste output.

Green builders maximize the use of recycled, reused and low-embodied energy building materials. Nontoxic materials are also used to maintain high indoor and outdoor air quality. This whole systems approach often also attempts to encourage alternative modes of transportation and reduce automobile use.

The Cities of Austin, Texas, Boulder, Colorado, and San Diego, California, and the County of Santa Barbara currently maintain green building programs while the cities of San Francisco, San Jose, and Seattle, Washington are all currently considering or developing green building programs. San Francisco and Santa Monica already have Sustainable City policies, and the City of Oakland is currently developing its own sustainability plan.

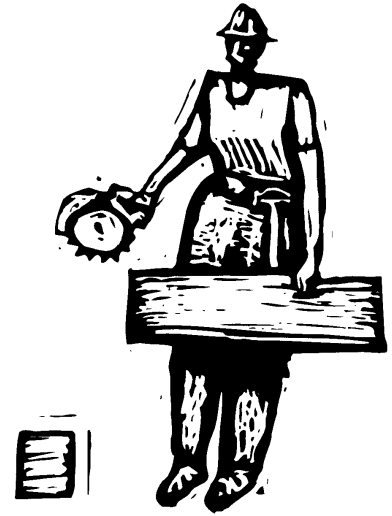
\* **The City of Boulder's Green Points program** is the only program in the nation to require green building practices. To obtain a building permit, the City requires all construction projects larger than 500 square feet to participate in the program.

Building permit applicants must accumulate a minimum number of green points. Applicants choose from a menu of green building options that address land use, framing, plumbing, electrical, insulation, HVAC, solar energy, and indoor air quality issues. Based on its environmental impact, each specific action is assigned a certain number of green points. For example, installing compact fluorescent bulbs gets 1-3 points and installing an evaporative cooling system garners four points, while using a solar water heater gains 10 points.

For more information, call the City of Boulder's Inspection Office at ☎(303) 441-3280.

\* **The City of San Diego** adopted green building policies for the construction and retrofit of its municipal buildings in November 1997. The policy requires new or retrofitted buildings to perform at 50 percent above minimum Title 24 energy efficiency standards. Plans must also address water conservation, indoor air quality, pollution and waste prevention, and public outreach and communication. The policy also encourages buildings that facilitate the use of bicycles and mass transit, while reducing the need for automobiles.

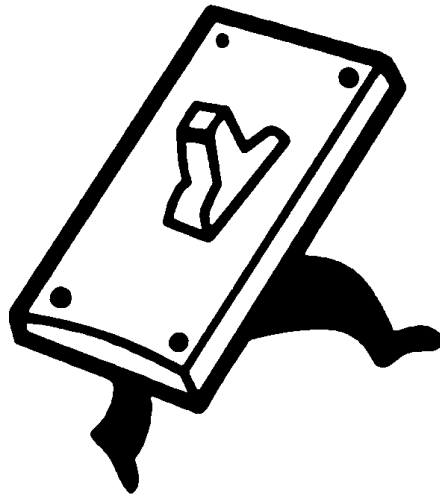
The City's Ridgehaven office building acted as a blueprint for the Green Building Policy. Though built in the mid-1980s, the building has been extensively retrofitted and now consumes 50 percent less energy than minimum Title 24 energy



standards. A neighboring building, built at the same time with identical blueprints but not renovated, uses three times more energy than the Ridgehaven building. The Ridgehaven building's efficiency upgrades had a payback period of three years and currently saves the City \$70,000 per year in energy costs.

For more information, call Robert Epler, City of San Diego Environmental Services, at ☎(619) 492-5025.

## Other Programs to Assist Local Governments



Comprised of representatives from virtually all sectors of the building industry, the **U.S. Green Building Council** (USGBC) has a number of tools to aid local governments interested in developing green building policies. The USGBC's Leadership in Energy and Environmental Design (LEED) building rating system provides a comprehensive set of criteria to evaluate the environmental sustainability of the entire building system. (The LEED rating system and criteria are included in the appendices).

The USGBC's State and Local Green Building Initiatives Committee provides interested member local governments and states with tools and resources to successfully institute green building programs. The committee is also developing a forum to facilitate communication between local and state entities pursuing sustainable building programs.

For more information, call the USGBC at ☎(415) 543-3001 or visit their web site at [www.usgbc.org](http://www.usgbc.org)

**The Local Energy Assistance Program** (LEAP) has devised an approach to planning and community development that local governments can use to create energy-efficient neighborhoods and buildings. Through the program, LEAP experts analyze development plans and recommend changes that lower the future community's energy use. The LEAP team identifies ways to lower development costs and/or increase the developer's profit. The developer is then asked to reinvest a portion of the increased revenue into building upgrades that exceed Title 24 requirements.

For example, narrowing streets and adding street trees in a proposed subdivision can lower summer neighborhood temperatures by as much as 10 degrees. Cooler ambient temperatures in turn reduce home cooling needs. Meanwhile, reducing the amount of pavement

saves the developer installation costs and may make room for a few more building lots.

The savings and profits can pay for building upgrades, such as window sun screens and high efficiency cooling and heating systems. As a result, residents get lower energy bills and a cooler neighborhood while the city or county has less street to maintain. In addition, the developer produces a more valuable subdivision that is less expensive to build.

Developed and implemented by the Local Government Commission and ADM Associates, Inc., LEAP provided free energy planning information and assistance to California cities and counties in 1998. The program is expected to continue in 1999.

For more information, call Josh Meyer of the Local Government Commission at ☎(916) 448-1198.

■ **A Local Government**

**Example: City of Escalon**

The City of Escalon's Farinelli Ranch Plan for 145 new homes is a good example of how simple design changes can save money for cities and counties, residents and developers. In Spring 1998, Escalon agreed to have the LEAP team analyze the preliminary site map for the project and develop a modified plan with a series of energy efficiency recommendations.

The LEAP redesign of the Farinelli Plan reduced street widths and added shade trees. This simple change will shade 85 percent of heat-generating street pavement under a cooling tree canopy that will be grown out within eight to ten years of the project's development. Annual energy use for cooling will be reduced by an average of 18 percent per home.

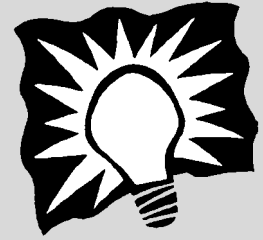
The plan also faced most of the homes north and south, the best building orientation for receiving natural lighting and heating from the winter sun and for preventing overheating in the summer.

Because of reduced street widths, the LEAP team was able to add a park to the development on land above an underground irrigation pipeline. This eliminated the need to reroute the line around the subdivision — saving the developer hundreds of thousands of dollars in replacement costs.

The developer will be asked to reinvest some of the savings into building upgrades, such as win-

## Funding Opportunities for Local Governments

Electric utility deregulation is providing opportunities for local governments to apply for funds to develop and operate energy efficiency programs. The California Board for Energy Efficiency (CBEE), an advisory board to the California Public Utilities Commission, is overseeing the process of distributing these energy efficiency funds.



For 1999, CBEE recommended that each investor owned utility (IOU), as interim administrator of the funds, include funding for programs for new construction under the heading, "Codes and Standards Support and Local Government Initiatives." Each IOU has done so in its filing for 1999 programs.

Local governments will be able to compete for this funding to operate market transforming energy efficiency programs. Check with your local IOU for more information. The process for obtaining funding in future years has yet to be determined.

dow sun screens, and high-efficiency water heaters and air conditioners.

The Escalon City Council approved the plan in December 1998. "Everyone wins, says J.D. Hightower, Escalon City Planner. Residents get better homes, lower energy bills, and cooler neighborhoods with plenty of green space. Narrower streets and a shorter pipeline means lower installation costs, so the developer gets a subdivision that's cheaper to build. And the City ends up with less street to maintain and a standard for future development that maintains the community's existing high quality of life." Construction should begin in 1999.

For more information, call J.D. Hightower at the City of Escalon at ☎(209) 838-4110 or Josh Meyer of

the Local Government Commission at ☎(916) 448-1198.

## Utility Programs

**U**tilities in California operate energy efficiency programs for new and existing buildings along with renewable energy and low income programs. The state's investor-owned utilities have designed energy efficiency programs for new homes that partner with builders. Similar to the EPA Energy Star Homes program (see page 17), builders agree to construct homes with specific energy efficiency features, while the utility usually provides training and marketing support.

Through its **Comfort Home** program, **Pacific Gas & Electric Company (PG&E)** has worked with over 3,500 builders in the construction of over 40,000 energy-efficient homes. These homes perform up to 25 percent better than Title 24 energy efficiency requirements. PG&E provides training on proper air duct installation to participating builders at its Stockton training center. PG&E recently strengthened its Comfort Home package by offering the U.S. EPA's Energy Star Homes program, which delivers even greater levels of energy efficiency and improved indoor air quality.

For more information, call CeCe Barros at ☎(415) 973-4757 or by e-mail at [CABE@pge.com](mailto:CABE@pge.com) or visit the web page at [www.pge.com/comfort](http://www.pge.com/comfort)

In 1998, **San Diego Gas & Electric's Contractor Wise**

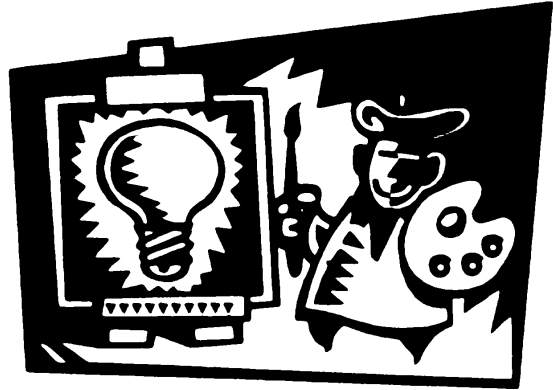
and **Energy Design** programs worked with builders and remodelers to improve the energy efficiency of new and remodeled homes. Energy Design offered participating builders free design review, marketing support and training on low-e windows, energy-efficient lighting and proper installation of HVAC systems. The Contractor Wise program strove to educate contractors in the home remodeling industry on the value of energy efficient products.

For more information, call Makissa Bevels at ☎(619) 654-1278.

By training builders and subcontractors in installing tight air ducts, high performance air conditioners and furnaces, choosing energy-efficient windows and other energy-efficient features, **Southern California Edison's ComfortWise** program provides homeowners with a house that will use 30 percent less energy than the national Model Energy Code (this translates to roughly 20-25 percent better than Title 24 standards). Edison is partnering with the Energy Star Homes program to leverage extra marketing and training resources for participating builders.

For more information, call Michelle Thomas at ☎(626) 302-8994, or visit Edison's web site at [www.comfortwise.com](http://www.comfortwise.com)

Through its **Energy Advantage** program, **Southern California**

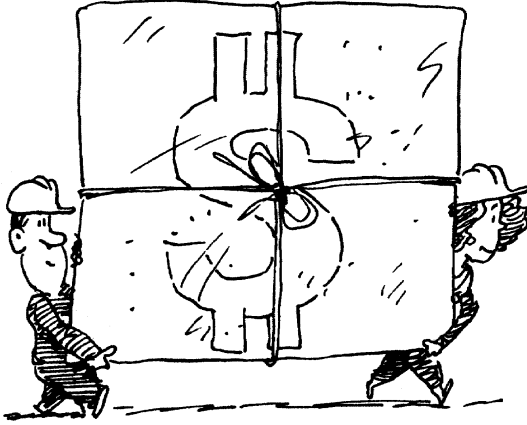


**Gas** partners with builders to achieve energy efficiency savings between 5 percent and 10 percent above Title 24 standards. In 1997, more than half of all new homes built in Southern California Gas territory were Energy Advantage homes. Energy Advantage requires builders to use water and space heating systems that exceed Title 24 requirements. Southern California Gas is currently expanding the program to provide training opportunities for builders on installing air duct systems and using low-e windows.

For more information on the Energy Advantage program, call Frank Galvery at ☎(909) 394-4223, or visit the web site at [www.socalgas.com/residential/energyhome/eah/program.html](http://www.socalgas.com/residential/energyhome/eah/program.html)

Southern California Gas has also partnered with the City of Irvine to create the **Energy Efficiency Buildings Program (EEB)**, a very comprehensive interactive design and planning tool for new commercial buildings. (See the section on local government energy efficiency programs for more on the EEB.)

## Federal Government Programs



**T**he U.S. Environmental Protection Agency's Energy Star Homes program is a voluntary, market-based program that promotes the value of energy-efficient homes. Participating builders agree to build homes that perform 30 percent above the national Model Energy Code, roughly 20 to 25 percent above Title 24 requirements. Third party inspectors perform diagnostic tests for quality assurance.

Instead of offering rebates or promoting payback periods, the Energy Star program emphasizes positive monthly cash flow through lower utility bills, and higher levels of comfort, lower HVAC operation noise levels, higher mortgage loan eligibility, and higher resale values for homeowners.

The EPA provides builders with marketing and promotional materials and resources. So far, 22 of

the 776 builders participating nationally are located in California.

Local governments can partner with the EPA Energy Star Homes program to help provide energy-efficient homes to their communities.

For more information, call Blaine Collison, Program Ally Coordinator, at ☎(202) 564-9139. See the Appendices for a list of participating Energy Star builders in California.

\* **The Federal Housing Administration's Energy Efficient Mortgages Program (EEM)** helps homebuyers or homeowners lower their energy bills by increasing their loan eligibility amounts to finance energy efficiency improvements. This Housing and Urban Development (HUD) program seeks to help achieve national energy efficiency goals, reduce pollution and improve the quality of affordable housing.

Energy efficiency improvements must pay for themselves through

reduced utility bills to qualify. Costs of eligible improvements that can be added to a mortgage range from \$4,000-\$8,000. In the last two years over 8,000 EEM loans were endorsed.

\* HUD also has an **Energy Efficient Homes Program (EEH)** which allows buyers of new homes to qualify for higher mortgages if the homes meet FHA energy efficiency standards. It encourages developers and builders to construct homes to higher standards than required by increasing the pool of qualified buyers.

For more information on either program, call the Federal Housing Administration, Single Family Home Mortgage Insurance Division at ☎(800) 933-9555, write to 451 7th St. SW, Room 9272, Washington, DC 20410, or visit the web site at [www.hud.org](http://www.hud.org)

## Recommended Steps for Local Governments

**C**onsider some of these ideas to enhance community construction quality, lifestyle and financial security in your community:

**1.** Provide information about the economic and comfort benefits of quality construction practices to builders, building officials and consumers.

**2.** Develop and implement guidelines and incentive programs that encourage optimal building orientation consistent with the State Subdivision Act, community goals, energy efficiency, and environmental benefits.

**3.** Develop and implement voluntary programs that provide incentives to builders who construct high-quality buildings and who use diagnostic tools to verify a high level of building energy performance.

**4.** Encourage local builders, utilities, subcontractors and/or others to provide comfort and utility bill guarantees for new and retrofitted buildings.

**5.** Partner with EPA's Energy Star Homes program.

**6.** Encourage local builders to use a whole building analysis with an integrated systems approach to energy efficiency.

**7.** Develop programs that encourage builders to provide: water-conserving plumbing fixtures and systems; construction waste recycling and management, green building systems and devices; high quality fenestration products and other community enhancing products and services.

**8.** Create incentive programs that include expedited plan check, reduced permit fees, rebated inspection fees, free marketing, public awards to recognize outstanding projects, or other creative incentives for designers, builders and others who construct highly energy-efficient buildings.

**9.** Encourage green building programs or projects that are consistent with guidelines issued by respected organizations such as the U. S. Green Building Council.

**10.** Encourage local jurisdiction officials (building and planning departments) to enthusiastically enforce Title 24, Part 6, the Energy Efficiency Standards for Residential and Nonresidential Buildings, and to



provide incentives such as expedited plan check, reduced or rebated permit and inspection fees for builders who conscientiously comply or exceed these standards.

**11.** Work with lending institutions to facilitate creative programs that enhance and make use of energy-efficient financing for participating builders who provide energy efficient solutions to retrofit problems.

**12.** Adopt green building and energy efficiency policies for the construction and retrofit of municipal facilities which can serve as examples for the private sector.

Resources

*Community Energy Workbook: A Guide to Building a Sustainable Economy*, Alice Hubbard and Clay Fong, Rocky Mountain Institute, 1995.\*

*Energy Aware Planning Guide*, California Energy Commission, January 1993.\*\*

*Energy Conservation Under the Sun: A Resource Book for Local Governments*, Local Government Commission, Fall 1998. Contact: Local Government Commission, 1414 K St., Suite 250, Sacramento, CA 95616. ☎(916) 448-1198.

*Energy Partnerships Program Update*, U.S. Department of Energy, December 1995.\*\*\*\*

*Energy Performance Contracting for New Buildings*, Charles Eley, Eley Associates.\*\*

*Energy Solutions for Cities and Counties*, U.S. Department of Energy, National Renewable Energy Laboratory, July 1995. Available on the web: [www.eren.doe.gov](http://www.eren.doe.gov)  
Mail: Sally Evans, NREL/DDS, 1617 Cole Blvd., Golden, CO, 80401-3393. ☎(303) 275-4363.  
fax: (303) 275-4053. e-mail: [evans@tcplink.nrel.gov](mailto:evans@tcplink.nrel.gov)

*Financing: Energy Efficiency in Buildings*, U.S. Department of Energy Rebuild America Guide Series.\*\*\*\*

*Greening the Building and the Bottom Line: Increasing Productivity Through Energy Efficient Design*. Rocky Mountain Institute.\* (\$12)

*Home Energy Briefs: Lighting, Windows, Water Heating, etc.*, Rocky Mountain Institute.\* (\$2 each or available in bulk)

*How to Finance Public Sector Energy Efficiency Projects*, California Energy Commission, #P400-97-001F, May 1997.\*\*

*How to Hire an Energy Auditor to Identify Energy Efficiency Projects*, California Energy Commission, #P400-97-001D, May 1997.\*\*

*Neighborhood Energy/Economic Development Project*, Urban Consortium Energy Task Force and the City/County of San Francisco, 1991. (\$15).

*New Building Energy Performance Contracting*, Charles Eley et al., Third National New Construction Programs for Demand Side Management Conference, 1995.\*\*\*

*Nonresidential Manual for Compliance with the Energy Efficiency Standards*, California Energy Commission,\*\* 1995. (1998 standards take effect July 1, 1999)

*Putting Renewable Energy to Work in Buildings*, Union of Concerned Scientists, 1993. (free).  
Contact: Union Of Concerned Scientists, ☎(617) 547-5552 x 241.  
Available on web: [www.ucusa.org](http://www.ucusa.org)

*Residential Manual for Compliance with the Energy Efficiency Standards*, California Energy Commission, 1995.\*\* (1998 standards take effect July 1, 1999)

*Sustainable Building Technical Manual: Green Building Design, Construction, and Operations*, Public Technology, Inc. 1996. \*\*\*\*\* (\$34 for government, \$68 to others)

*Sustainable Energy for Local Governments*, Urban Consortium Energy Task Force and the Cities of Portland, Oregon, and San Francisco, December 1992.\*\*\*\*\*

How to Get These Publications

\*  
Rocky Mountain Institute  
Publications Department:  
☎(970) 927-3851  
1739 Snowmass Creek Rd.  
Snowmass, CO 81654-9199  
e-mail: [orders@rmi.org](mailto:orders@rmi.org)  
For a full publications list,  
see its web site: [www.rmi.org](http://www.rmi.org)

\*\*  
California Energy Commission  
Publications Department:  
☎(916) 654-5200  
MS-13, P.O. Box 944295  
Sacramento, CA 95814

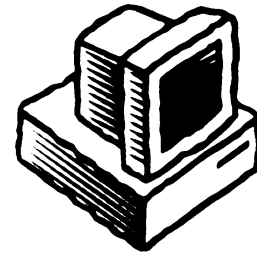
\*\*\*  
Eley Associates publications:  
☎(415) 957-1977  
142 Minna St., 2nd floor  
San Francisco, CA 94105

\*\*\*\*  
U.S. Department of Energy  
publications:  
U.S. DOE Office of Energy  
Efficiency and Renewable Energy  
☎(800) 363-3732  
web: [www.eren.doe.gov](http://www.eren.doe.gov)

\*\*\*\*\*  
Public Technology, Inc. and Urban  
Consortium publications:  
Public Technology Inc.  
☎(800) 784-8976  
fax (202) 626-2498  
1301 Pennsylvania Ave., N.W.  
Washington, D.C., 20004-1793  
web: [pti.nw.du.us](http://pti.nw.du.us)

*Sustainable Municipal Buildings*,  
Urban Consortium Energy Task  
Force and City and County of San  
Francisco, December 1996. \*\*\*\*\*  
(\$7.50)

## Internet Resources



Alliance to Save Energy:  
[www.ase.org](http://www.ase.org)

American Council for an Energy Efficient Economy (ACE3):  
[www.aceee.org](http://www.aceee.org)

Building Codes Assistance Project (BCAP):  
[solstice.crest.org/efficiency/bcap](http://solstice.crest.org/efficiency/bcap)

California Energy Commission:  
[www.energy.ca.gov](http://www.energy.ca.gov)

California Institute for Energy Efficiency (CIEE):  
[eande.lbl.gov/CIEE/ciee\\_homepage.html](http://eande.lbl.gov/CIEE/ciee_homepage.html)

Center of Excellence for Sustainable Development:  
[www.sustainable.doe.gov](http://www.sustainable.doe.gov)

Center for Renewable Energy and Sustainable Technology (CREST):  
[solstice.crest.org](http://solstice.crest.org)

City of Austin, Texas Green Building Program:  
[www.ci.austin.tx.us/greenbuilder.htm](http://www.ci.austin.tx.us/greenbuilder.htm)

City of Boulder, Colorado Green Points Building Program  
[environmentalaffairs.ci.boulder.co.us](http://environmentalaffairs.ci.boulder.co.us)

City and County of San Francisco Department of the Environment:  
[www.ci.sf.ca.us/environment](http://www.ci.sf.ca.us/environment)

City of Santa Monica Department of the Environment:  
[pen.ci.santa-monica.ca.us/environment](http://pen.ci.santa-monica.ca.us/environment)

Efficient Windows Collaborative:  
[www.efficientwindows.org](http://www.efficientwindows.org)

Energy Efficient Building Association (EEBA):  
[www.eeba.org](http://www.eeba.org)

Energy Outreach Center (EOC):  
[www.eoc.org](http://www.eoc.org)

Energy Solutions for Cities and Counties:  
[www.eren.doe.gov/cities\\_counties/](http://www.eren.doe.gov/cities_counties/)

EPA Energy Star Homes Program:  
[www.epa.gov/homes](http://www.epa.gov/homes)

EPA Energy Star Products and Programs:  
[www.epa.gov/appdstar/estar](http://www.epa.gov/appdstar/estar)

EPA Office of Sustainable Ecosystems and Communities (OSEC):  
[www.epa.gov/ecocommunity](http://www.epa.gov/ecocommunity)

Green Communities Assistance Kit:  
[epa.gov/region03/greenkit.index.html](http://epa.gov/region03/greenkit.index.html)

Green Lights Program, U.S. EPA:  
[www.epa.gov/greenlights.html](http://www.epa.gov/greenlights.html)

International Council for Local Environmental Initiatives (ICLEI):  
[www.iclei.org](http://www.iclei.org)

International Institute for Energy Conservation:  
[www.iiec.org](http://www.iiec.org)

Lawrence Berkeley Laboratory:  
[www.lbl.gov/HeatIsland](http://www.lbl.gov/HeatIsland)

Local Government Commission's Energy Information Clearinghouse:  
[www.lgc.org/energy](http://www.lgc.org/energy)

Los Angeles Department of Water and Power (LADWP):  
[www.ladwp.com/](http://www.ladwp.com/)

National Lighting Product Information (NLIP): [lighting.lrc.rpi.edu/NLPIP](http://lighting.lrc.rpi.edu/NLPIP)

National Renewable Energy Laboratory (NREL):  
[www.nrel.gov](http://www.nrel.gov)

Northwest Energy Efficiency Alliance:  
[www.nwallaince.org](http://www.nwallaince.org)

Pacific Gas and Electric Company (PG&E):  
[www.pge.com](http://www.pge.com)

Partnership for Advancing Technology in Housing:  
[www.pathnet.org](http://www.pathnet.org)

Planet Neighborhood:  
[www.weta.org/planet](http://www.weta.org/planet)

Renew America:  
[solstice.crest.org/sustainable/renew\\_america](http://solstice.crest.org/sustainable/renew_america)

Rocky Mountain Institute (RMI):  
[www.rmi.org](http://www.rmi.org)

Sacramento Municipal Utility District (SMUD):  
[www.smud.org](http://www.smud.org)

San Diego Gas & Electric (SDG&E):  
[www.sdge.com](http://www.sdge.com)

Smart Growth Network:  
[www.smartgrowth.org](http://www.smartgrowth.org)

Southern California Edison:  
[www.sce.com](http://www.sce.com)

Southern California Gas Company:  
[www.socalgas.com](http://www.socalgas.com)

Sustainable Sources:  
[www.greenbuilder.com](http://www.greenbuilder.com)

Total Efficiency Network (TEN):  
[www.energy.wsu.edu/ten/](http://www.energy.wsu.edu/ten/)

Tucson Institute for Sustainable Communities:  
[www.greenbuilder.com/institute/](http://www.greenbuilder.com/institute/)

Union of Concerned Scientists:  
[www.ucsusa.org](http://www.ucsusa.org)

U.S. DOE Energy Efficiency and Renewable Energy Network:  
[www.eren.doe.gov](http://www.eren.doe.gov)