

# The Newsletter



PROVIDING  
FINANCE AND  
TECHNOLOGY  
STRATEGIES FOR  
ENERGY-EFFICIENT  
DESIGN IN NEW  
CONSTRUCTION

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## New Patient Tower

The new Arcadia Methodist Hospital Patient Tower was designed with two important operating goals: to enhance the thermal comfort of the space, and simultaneously to reduce the overall energy consumption of the new facility. In a 24-hour facility, energy consumption can be a significant overhead expense if not properly controlled.

The Patient Tower is a 130,000-square-foot, five-story wing attached to an existing hospital structure. The first floor is primarily lobby, with upper floors containing patient rooms. The basement houses the mechanical and electrical equipment.

The design team, led by HKS Architects, Inc., with Neptune/Thomas/Davis Architects/Engineers and Hellman & Lober Consulting Mechanical Engineers, worked with Southern California Edison (SCE) and energy consultants from Robert Bein, William Frost & Associates to provide a cost-effective energy design for the project.

Throughout meetings during the schematic and design development phases for the new tower, the design team considered numerous energy-efficiency

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## Welcome to The Newsletter

The Newsletter is aimed at you—the person who influences the way new medical buildings are designed, built, and operated. Comfortable, productive, and energy-efficient buildings happen on purpose, not by accident. It takes individuals interested in building healthcare facilities that will improve the medical staff and patient environment to ask the right questions and demand the right solutions. That means you!

The purpose of this newsletter is to provide you with tangible strategies for constructing and operating buildings using energy-efficient designs. Over the next several months, you will receive issues on a quarterly basis. Each issue will cover different aspects of designing, building,

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Energydesignresources is funded by California utility customers and administered by Southern California Edison, under the auspices of the California Public Utilities Commission.

## savings by design

**S**AVINGS BY DESIGN is a new program to encourage high-performance design and construction for new buildings. The statewide energy-efficiency program is sponsored by Southern California Edison (SCE), Pacific Gas & Electric Company, and San Diego Gas & Electric, under the auspices of the Public Utilities Commission, and offers the following:

- Design assistance to provide information and analysis tailored to meet the needs of your project.
- Owner incentives to help offset increased costs of energy-efficient buildings.
- Design team incentives to reward designers who meet ambitious energy-efficiency targets.

WITH THE ENERGY MEASURES IMPLEMENTED, THE PATIENT TOWER WILL SAVE ALMOST \$77,000 PER YEAR IN UTILITY COSTS.



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strategies. Using computer simulation energy analysis results to guide their decisions, the team opted to implement a cost-effective package of integrated measures to optimize the lighting and mechanical systems. Those measures included high-efficiency lighting in all spaces, the use of an induced-draft cooling tower, variable-flow chilled water pumping, high-efficiency motors for pumps and fans, variable-frequency control of the first-floor air handling unit, and unequally sized, high-efficiency chillers. In addition, chiller controls were provided on the large chiller to allow “free cooling” during appropriate weather conditions, and a variable-frequency controller was installed on the smaller chiller to improve part load efficiency.

With the above package of energy measures included in the new Patient Tower design, the building will save a significant amount on energy consumption and operating cost as compared to the same building designed only to “standard” practice. When completed, the new tower exceeded California’s Title 24 energy standards by more than 16 percent, which is impressive considering that hospitals are not obligated to meet the standards.

The energy measures were evaluated using a computer-based building energy simulation program. The program, DOE-2, was developed by Lawrence Berkeley Laboratories with major funding from the Department of Energy. The design team used the simulation program to look at the interaction between the different energy-efficiency

measures being considered. For example, the simulation showed that the use of high-efficiency lighting resulted not only in lighting energy savings, but also in a reduction in the cooling load for the new building. This reduction in cooling load allowed the team to reduce the size needed for the chillers. Energy cost savings were then calculated using SCE utility rate schedules for a more accurate determination of operating savings achievable by including the efficiency strategies in the design.

The lighting system uses 32-watt, T8 fluorescent lamps with high-frequency electronic ballasts, resulting in a lighting power density of approximately 1.1 watts per square foot. Standard practice for this type of facility was determined to be about 1.6 watts per square foot. The new chillers utilize smaller compressors on a full-sized cooler and condenser. The refrigerant used is HCFC-123, and the energy usage, depending on the load, ranges from .545 to .583 kilowatts per ton for the chillers. Additionally, both chillers have three stages of compression available to maintain efficiency under part load conditions.

By evaluating and implementing energy measures during the initial stages of planning for the new Patient Tower, the design team has been able to lower the long-term energy consumption of the building without sacrificing the comfort level of patients and hospital staff. The results of their efforts were predicted to save the hospital administration about \$77,000 per year in utility costs.



**Savings By Design** seeks to improve the comfort, efficiency, and performance of buildings by creating a team approach to design. The purpose of the program is to provide the owner and the design team with the energy design tools and resources they need to improve building performance.

Financial incentives are available to owners when the efficiency of the new building exceeds the minimum **Savings By Design** threshold, generally 10 percent better than California Title 24 standards.

You should contact an SCE new construction representative at 800-338-8502 in the early planning stages of a new building to determine available assistance for your projects. You will be pleasantly surprised to learn about the financial and technical support available to you.

## Integrated Energy Design

“Integrated Energy Design” is a process used when designing a facility to cost-effectively improve the building environment while lowering the long-term operating costs of the building. It is different from a traditional design process whereby a building owner first hires an architect to design a project, who then brings in the necessary consultants to design subsystems that support the architect’s schematic design.

An “Integrated Energy Design” can be accomplished only when the building owner, architects, and all consultants act as a team, from the beginning of the project, to make decisions together with an understanding that the building operates as a whole rather than as the sum of its parts.

Healthcare administrators considering this process should develop a fundamental plan that includes the following elements:

- Aggressive, yet reachable, energy goals for the new building, established at the onset of design and revisited on a regular basis.
- An interdisciplinary team of architects, engineers, energy consultants, contractors, and facility personnel committed to working together to achieve the established energy design goals.
- Ongoing feedback from energy simulation and

life-cycle cost analyses to provide reliable energy-use data in order to make optimal design decisions.

Using this process, the building envelope can be designed to control the amount and quality of light and heat entering a facility—allowing minimal inputs from the lighting and heating, ventilation, and air-conditioning (HVAC) systems.

Lighting systems can be designed to use only the energy necessary to properly light the interior spaces and to be dimmed or turned off when not needed. The end result of careful design of these systems results in reduced capacity needs for space conditioning. Finally, additional energy savings can be achieved by modulating the mechanical system to respond to the actual loads and occupancy of the building.

The result of using an “Integrated Energy Design” process will be a new building that can save 15 to 30 percent—and sometimes greater—energy than a comparable building with a conventional design. Additional nonenergy benefits, such as more comfort in the building environment, can lead to increased productivity of the occupants, further increasing the value of your building. It is worth the extra effort.

## Simple Energy Design Strategies

Many design opportunities exist for constructing new medical facilities that are energy-efficient. Understanding some simple energy design strategies is instrumental to achieving a high-performance design.

In Southern California, high-performance lighting systems provide the biggest opportunity for energy savings. Not only is lighting directly responsible for about 40 percent of the annual electricity consumption, but the heat produced by lighting must be removed by energy-intensive air conditioners. Efficient choices in lighting include T8 lamps, dimmable electronic (high-frequency) ballasts, compact fluorescent lamps (CFL) in place of incandescents, and high-intensity discharge (HID) in place of high-wattage incandescent lamps, as well as thoughtful lighting design strategies that minimize the amount of fixtures required.

Upgrading heating, ventilation, and air-

conditioning (HVAC) equipment is the second major opportunity for energy savings. Air-conditioning and ventilation systems consume more than one-fourth of all the electricity in most buildings in Southern California. It is worthwhile to spend time on high-quality HVAC design, as it can yield greater efficiency as well as higher comfort levels. In a building environment, direct cost savings and increased medical staff and patient comfort can easily justify increased equipment efficiencies. Improved efficiency of individual system components, such as chillers, fans, pumps, and motors, can result in significantly lower energy costs. Buildings constructed in conjunction with Southern California Edison’s **Savings By Design** program, for example, will consume less energy than if they had been built to comply with Title 24 minimum requirements.

The Center for Health Design is a nonprofit, nonmembership organization that is working to make people’s lives better by demonstrating that supportive building design can enhance health and well-being. The organization provides research and publishes information focused on hospitals, nursing homes, and other health-care facilities. Healthcare and design professionals from all over the world use them as a valuable resource. Contact The Center for Health Design at 925-299-3631 or [www.healthdesign.org](http://www.healthdesign.org).

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and operating medical facilities and will include:

- An introduction to the concept of integrated building design.
- Strategies for increasing the comfort and productivity of occupants.
- The benefits of using life-cycle costing criteria for making informed design decisions.
- What services to demand from the architects and engineers you hire.
- How to close the design/construction loop with building commissioning.

Take a moment to review *The Energy Design Resources Newsletter*. It may help you not only improve the building environment for the medical staff and patients, but also lower your operating costs.

We encourage you to give us feedback on what you read. Our hope is that you use this newsletter to share building and operating experiences with other healthcare administrators. Please send your comments or questions to us at [editor@energydesignresources.com](mailto:editor@energydesignresources.com).

## California Energy Commission (CEC), Energy Efficiency Division

The California Energy Commission regulates energy efficiency in commercial buildings. On this site you will find information about Title 24, Part 6: California Energy Efficiency Standards for Nonresidential Buildings. This code specifies minimum energy and equipment requirements for new buildings.

[www.energy.ca.gov/efficiency](http://www.energy.ca.gov/efficiency)

## Energy Crossroads

This energy resource collection is sponsored by the Lawrence Berkeley National Laboratory. It now lists more than 400 websites in more than a dozen categories, including energy-efficiency publications, green buildings, and major conservation programs and initiatives.

[www.eandl.lbl.gov/CBS/eXroads/EnergyXroads.html](http://www.eandl.lbl.gov/CBS/eXroads/EnergyXroads.html)

## The CEC Energy Efficiency Financing Program Can Help!


The California Energy Commission (CEC) Energy Efficiency Financing Program offers low-interest loans for energy efficiency projects for both public and nonprofit hospitals. Example projects are feasibility studies to identify cost-effective measures and loans to install energy-efficient lighting, boilers, chillers and motors, variable-frequency drives, equipment controls, and other energy-saving devices. Healthcare facilities with energy-efficient equipment will cost less to operate, offering continuous savings and leaving more money for other medical services.

The Energy Efficiency Financing Program can provide up to 100 percent financing for energy-efficiency projects. The projects must be technically and economically feasible and save energy. Loans from the program must be repaid from the energy savings within 11 years, including principal and interest. The current interest rate is 5.4 percent.

Please call the CEC at 916-654-4008 for additional information. Don't miss the opportunity for your hospital to take advantage of the Energy Efficiency Financing Program.

**We want to hear from you!**

Please feel free to contact us at [editor@energydesignresources.com](mailto:editor@energydesignresources.com) with your comments.

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