



# Fortifying Energy Efficiency in Buildings and Saving Billions

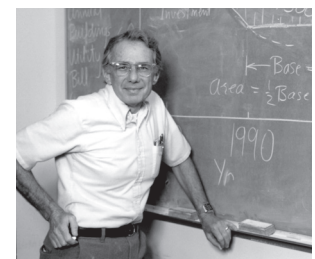
At 40 percent of energy usage in the United States, buildings — not transportation — are the nation's largest source of greenhouse gas emissions. As a consequence, Berkeley Lab scientists have made improving the energy efficiency of buildings one of their prime objectives.

The Lab's focus on energy efficiency is not new. During the 1973 energy crisis, our scientists, led by physicist Art Rosenfeld, developed new technologies and standards for windows, lighting and refrigeration that have since saved consumers a combined \$484 billion.

The so-called Rosenfeld Effect, has had a particular impact on California, where per capita energy consumption has remained relatively flat for 40 years. The nation's consumption, on the other hand, has risen 50 percent.

## A New Era in Buildings Research: FLEXLAB™

Completed in 2014, The Facility for Low-Energy Experiments in Buildings (FLEXLAB) is the first of its kind for developing and validating the performance of new energy-efficient building controls and technologies. Although many buildings are designed to be energy efficient, once they are up and running they can consume more energy than expected. FLEXLAB provides building stakeholders the expertise of our scientists and more than 9,000 square feet of floor space to test whole-building integrated design or the impact of reconfiguring windows, walls, floors, lighting, and HVAC systems. By measuring a building's energy use under real-world conditions, and on a significant scale, the facility offers a way to test-drive energy efficiency systems and make necessary changes in advance of building or retrofit projects.



Funded with \$15.9 million from the American Recovery and Reinvestment Act through the U.S. Department of Energy, FLEXLAB launches the latest chapter of Berkeley Lab's leadership in energy efficiency, working towards a cleaner energy future.

Visit [flexlab.lbl.gov](http://flexlab.lbl.gov) for more information.

# At Berkeley Lab, we've:



## Turned windows into energy savers.

Americans save billions of dollars in energy bills each year thanks to a Lab-developed window coating that prevents heat from entering in the summer and escaping in the winter. More than half of all windows sold each year have this coating.



## Pitted cool roofs against global warming.

The Lab leads the way in analyzing and implementing cool roofing materials, which reflect sunlight, lower surface temperature, and slash cooling costs. Think globally: If all the world's roofs and pavement used cool materials, the reduction in carbon dioxide emissions would be equivalent to taking the world's 600 million cars off the road for 18 years.



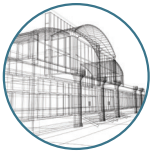
## Given fluorescent lights their big break.

Chances are you're reading this using energy-efficient fluorescent lighting, and chances are those lights use electronic ballasts, which control the current flowing through the light. Berkeley Lab developed the ballast in the 1970s with the lighting industry. A 2001 study found that electronic ballasts sold through 2005 would provide \$15 billion in energy savings.



## Made appliances pull their weight.

U.S. consumers save \$7 billion each year thanks to Lab scientists who helped to develop the federal government's energy efficiency standards for appliances. And those Energy Star labels you see on appliances? The Lab helped to implement those too.



## Given buildings an energy makeover.

The Lab wrote the book, or program rather, when it comes to wringing every penny out of a building's energy use. Software developed at Berkeley Lab is used worldwide to audit a structure's energy consumption. If you've set foot in the San Francisco International Airport, Sears Tower, or the Nestlé Headquarters in Switzerland, you've experienced energy savings thanks to Berkeley Lab.



## Helped bring energy efficiency to China.

Since 1988, Lab scientists have worked to make the world's second largest energy consumer after the United States as energy efficient as possible. The energy labels and appliance standards, developed with considerable support from Berkeley Lab, will reduce carbon emissions in China by about 9.1 billion tons between 2009 and 2030. The Lab has also helped improve energy efficiency in residential and commercial buildings, and industries such as cement manufacturing — proving that a booming economy and energy efficiency can go hand-in-hand.



## Developed the Home Energy Saver.

We designed the first energy auditing program on the Web that allows anyone to conduct an energy audit of their house or apartment and obtain energy-efficiency recommendations for saving money on energy bills.

## Indoor Air Quality

For decades, teams of Berkeley Lab scientists have investigated the ways that indoor air quality affects human health — from cognitive ability to personal comfort. Lab scientists were among the first to sound the alarm about sick buildings, including the health risks posed by radon, and also to offer solutions to make buildings healthier. They continue to identify and monitor other sources of indoor pollution — from cooking by-products to third-hand smoke, and to substantiate the health virtues and cost savings of energy-efficient ventilation, particularly in schools. Berkeley Lab experts have changed — and continue to change — the national thinking about what constitutes healthy building design and use.

For more details and the latest news, visit [www.lbl.gov](http://www.lbl.gov).

