



  
**ENVIRONMENT**  
**CALIFORNIA**  
 RESEARCH & POLICY CENTER

**GREENING THE BOTTOM LINE**  
 California Companies Save Money by  
 Reducing Global Warming Pollution



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# **Greening The Bottom Line**

## **California Companies Save Money by Reducing Global Warming Pollution**

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**Environment California Research & Policy Center**

**August 2006**

# Acknowledgements

Environment California Research & Policy Center sincerely thanks the many individuals, companies and institutions who generously provided information for this report, including: George Denise at Cushman & Wakefield; Judi Palmer at A&R Partners; Adobe Systems Incorporated; Catharine Dickey and Pamela Stevens at Westfield Corporation; Pat Ricchiuti, owner of P-R Farms; PowerLight, Inc.; Alison Richards-Evensen at SANDAG's RideLink Program; Judy Pike, Catherine Minervini and Kimbrey Matsoukas at Bentley Prince Street; Theresa Parsley and Gary Hopkins at Cal/EPA; Thomas Properties Management; Neal Pearson at Children's Hospital Central California; Barbara Christensen at San Mateo County Community College District; Mike Magee and Steve Fiebing at Naval Base Coronado; Stephen Coppinger at California Portland Cement Company; Nicole Gittleson at Clarum Homes; Ken Davis at Los Angeles Unified School District; Cheryl Lopez at Dahlia Heights Elementary School; and California's *Flex Your Power* program. Additional thanks to Christopher Busch at the Union of Concerned Scientists for reviewing a draft of this report. Tim Telleen-Lawton of the Frontier Group provided research assistance, and Tony Dutzik of the Frontier Group provided editorial assistance.

The generous financial support of the Wallace Global Foundation, the Energy Foundation and the Max and Anna Levinson Foundation made this report possible.

The authors alone bear responsibility for any factual errors. The recommendations in this report are those of Environment California Research & Policy Center and do not necessarily represent the views of our funders, those who provided information, or those who provided editorial input.

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# Executive Summary

Cutting global warming pollution can be good for California businesses and our economy.

Pioneering businesses across the Golden State are beginning to do their share to cut global warming pollution by being smarter about how they use energy and switching to clean, renewable energy sources. At the same time, they are finding that these strategies improve their competitiveness and help the bottom line—cutting energy costs, reducing exposure to volatile fossil fuel and electricity prices, and attracting environmentally aware customers.

This report highlights 12 such businesses or institutions and demonstrates the kinds of gains that can be had across California from an organized, statewide effort to reduce the state's global warming pollution. Altogether, the companies profiled below have reduced their global warming emissions by more than 100 million pounds per year—while reducing their annual operating costs by more than \$13 million.

## **Adobe Systems Incorporated, San Jose**

Adobe has implemented 45 energy efficiency and conservation projects at its headquarters in San Jose, from installing more efficient lighting to reprogramming the central heating and cooling systems.

- *Economic Benefits:* Invested \$1.1 million; reduced operating costs by just over \$1 million per year.
- *Global Warming Benefits:* Cut carbon dioxide emissions by 16 percent (more than 11 million pounds) while increasing the number of employees.

## **Westfield Corporation, locations statewide**

Westfield Corporation upgraded lighting systems at its seven San Diego-area shopping centers with more efficient technology, reducing electricity use by 19 percent. Westfield is nearing completion of a similar upgrade at 23 shopping centers nationwide.

- *Economic Benefits:* Expects to reduce energy

costs by \$2.6 million per year nationwide, paying off investment in less than 24 months.

- *Global Warming Benefits:* Nationwide, will reduce global warming pollution on the order of 40 million pounds per year.

## **P-R Farms, Clovis**

In 2005, P-R Farms installed one of California's largest privately-owned solar photovoltaic systems on the roof of its packing house, where employees pack, store and ship over 1 million boxes of fruit per year.

- *Economic Benefits:* Cost \$3.2 million after rebates and credits; reduced monthly electricity bills by up to 80 percent; will reach full payback in 10 years.
- *Global Warming Benefits:* Prevents 1.6 million pounds of carbon dioxide emissions annually.

## **San Diego Association of Governments (SANDAG)**

SANDAG's RideLink program assists employers and commuters with alternative transportation to and from work—helping QUALCOMM win a 2nd place ranking in EPA's Best Workplaces for Commuters Program.

- *Economic Benefits:* In fiscal 2006, RideLink estimates that it prevented nearly 2 million commuting trips, saving more than \$50 million in fuel costs, reduced travel delays and other benefits.
- *Global Warming Benefits:* The reduced vehicle travel avoided 125 million pounds of carbon dioxide pollution.

## **Bentley Prince Street, City of Industry**

Bentley Prince Street, California's largest commercial carpet manufacturer, reduced the amount of energy and resources used in carpet production, improved lighting efficiency, installed solar panels, purchased renewable energy credits and pursued a number of other projects to improve sustainability.

- *Economic Benefits:* Reduced the cost of manufacturing a unit of carpet by 48 percent since 1994, saving \$3.8 million in 2005.





- *Global Warming Benefits:* Reduced its global warming pollution by 75 percent (33 million pounds of carbon dioxide per year) in the last decade.

### **California Environmental Protection Agency, Sacramento**

The California Environmental Protection Agency (Cal/EPA) built a new headquarters building in Sacramento using a suite of energy-smart features, including an efficient lighting system, an efficient heating and cooling system, rooftop solar panels and daytime janitorial services.

- *Economic Benefits:* Cal/EPA staff estimate that the green features added no more than \$2 million (or approximately 1 percent) to the cost of the building, and save over \$1 million per year in reduced energy and operating costs.
- *Global Warming Benefits:* The building purchases 100 percent renewable energy from the Sacramento Municipal Utility District and has zero electricity-related global warming emissions.

### **Children's Hospital Central California, Madera County**

As part of a pilot Energy Star program with the U.S. Environmental Protection Agency (EPA), Children's Hospital Central California upgraded lighting and mechanical efficiency, saving over 4.5 million kilowatt-hours (kWh) per year.

- *Economic Benefits:* The measures save more than \$400,000 per year on energy costs; many projects paid for themselves in less than 1-2 years.
- *Global Warming Benefits:* Cut carbon dioxide emissions by more than 5 million pounds annually.

### **San Mateo Community College District, San Mateo**

San Mateo County Community College District made energy efficiency improvements

and installed cogeneration units that generate electricity for on-site use and use leftover energy to heat dozens of buildings on two campuses, cutting energy use by 56 percent.

- *Economic Benefits:* Avoided \$1 million in energy costs in 2005.
- *Global Warming Benefits:* Reduced carbon dioxide pollution by 6.4 million pounds per year.

### **Naval Base Coronado, San Diego**

Naval Base Coronado replaced over 1,000 light-bulbs on its airstrips and heli-pads with Light Emitting Diodes (LEDs)—brighter than the old bulbs while using 90 percent less energy. Additionally, the base replaced over 200 clothes washers with more efficient models and installed a large solar photovoltaic system on a covered parking lot.

- *Economic Benefits:* Reduced operating costs by over \$500,000 per year; individual projects have a projected return on investment up to 26 percent.
- *Global Warming Benefits:* Cut carbon dioxide emissions by more than 4 million pounds per year.

### **California Portland Cement Company, Mojave and Colton**

California Portland Cement Company worked with the EPA's Energy Star program to improve the efficiency of its manufacturing process. As a result, the company cut annual electricity consumption at one plant by 10 percent in 2005.

- *Economic Benefits:* Saving nearly \$3 million on electricity bills annually.
- *Global Warming Benefits:* Reduced global warming pollution by over 27 million pounds per year.

### **Clarum Homes, Watsonville**

In 2005, Clarum Homes finished construction of the country's largest community of zero-energy homes and apartments, Vista Montaña. Due to positive response from buyers, Clarum now builds zero-energy homes exclusively.

- *Economic Benefits:* Efficient features and solar panels save Vista Montaña homeowners an average of 67 percent on their electricity bills, or over \$1,200 per year—giving Clarum a unique marketing tool.
- *Global Warming Benefits:* Vista Montaña prevents roughly 2 million pounds of carbon dioxide emissions annually.

### Los Angeles Unified School District

Los Angeles Unified School District is prioritizing energy efficiency in a massive school construction and repair project, upgrading lighting, heating and cooling systems in hundreds of schools.

- *Economic Benefits:* In 2005, the district installed measures reducing energy costs by over \$950,000.
- *Global Warming Benefits:* These measures reduced global warming pollution by over 7 million pounds per year.

These case studies demonstrate that reducing global warming pollution at California businesses and institutions can be good for the environment—and profitable too.

When companies think seriously about their energy use and global warming impacts, they find opportunities to use less energy, use it more efficiently, and generate it from renew-

able sources. At the same time, these opportunities can help companies achieve greater financial success.

### Policy Recommendations

Just as the companies profiled here are leading California toward solutions to global warming, California should lead the country in reducing global warming pollution.

California should establish policies that encourage all businesses to invest in cost-effective ways to reduce global warming pollution. Toward that goal, the state should:

- Establish mandatory limits on global warming pollution from the state's largest sources and reduce statewide emissions 25 percent by 2020 and 80 percent by 2050.
- Defend the state's new global warming emission standards for cars and light trucks from legal attack by the auto manufacturers.
- Enhance funding for energy efficiency and distributed generation, promote smart growth and transportation alternatives, and require the state's electric utilities to generate 20 percent of their electricity with renewable energy sources by 2010 and 33 percent by 2020.
- Work with other states and the federal government to encourage implementation of similar policies. ■

# Introduction

Wal-Mart is the largest retail company in the world. The company is also the largest private consumer of electricity and operates one of the largest fleets of heavy-duty trucks in the United States. While rising to this position, the company built a reputation for ruthless competitiveness in the retail market.

Thus it was surprising to many when, in October 2005, Wal-Mart CEO Lee Scott pledged to dramatically cut the company's global warming pollution—setting a goal of reducing carbon dioxide emissions 20 percent by 2012. To achieve this goal, Wal-Mart plans to reduce energy use in stores by 30 percent; to double the efficiency of its truck fleet in a decade; and to purchase 100 percent renewable electricity.<sup>1</sup>

“We know that being an efficient and profitable business and being a good steward of the environment are goals that can work together,” testified Andrew Ruben, Wal-Mart's vice president for corporate strategy, in a hearing before Congress in July 2006.<sup>2</sup> “We believe that greenhouse gases can be cost-effectively reduced throughout the economy.”

Wal-Mart is learning what many California businesses and institutions already know: that helping to solve the problem of global warming is also an economic opportunity.

This report tells the story of 12 pioneering businesses and institutions in the Golden State that have taken the time to think carefully about how they use and produce energy.

In so doing, these companies have significantly reduced their global warming pollution, helped move California closer to energy independence and a stronger economy, all while helping their bottom-line.

California businesses, and the state of California as a whole, can take advantage of this same economic and environmental opportunity. By adopting policies limiting global warming pollution, California can enable businesses and organizations to follow the examples described in this report. Achieving this goal will leave California cleaner, safer, more economically secure and more prosperous in the years to come.

California can make a real difference on the issue of global warming, given its sheer size and its economic and political clout. As the 12th largest source of global warming pollution in the world, California has the opportunity to take substantial steps, meaningful on a global scale. As one of the largest economic engines in the world, actions in California have exponential impacts throughout America and beyond. And, with a history of developing effective solutions to environmental problems, California can use its political strength to lead the country in the right direction.

The stories that follow highlight the types of strategies that California businesses are already employing, demonstrating that reducing global warming pollution can be good for California businesses and our environment at the same time. ■

# Adobe Systems Incorporated



- Cut carbon dioxide emissions by 16 percent while expanding company headquarters
- Reduced energy costs by \$1 million per year



*The West Tower of Adobe Systems, Inc. Headquarters in San Jose is the first existing building certified as meeting the Platinum standards of the U.S. Green Building Council. (The West Tower is on the left.) (Photo Credit: Proehl Studios® April 2006)*

Adobe Systems Incorporated develops design and communication software for print, video, film and digital media. The company is famous for its Portable Document Format (.pdf) files—which by one estimate make up nearly 10 percent of the content of the World Wide Web (including the online version of this report).<sup>3</sup>

Adobe now has an additional claim to fame: the West Tower of its headquarters complex in downtown San Jose is the first commercial office building to receive the Leadership in Energy and Environmental Design (LEED®) Platinum certification for an existing building from the U.S. Green Building Council—the highest level of recognition now available. Adobe also was one of three companies rec-

ognized by California's *Flex Your Power* program for best overall achievement in 2005.

Adobe received the awards in part because of the company's significant efforts to improve energy efficiency. Over the past six years, Adobe has reduced per-employee electricity use at its headquarters by 35 percent and natural gas use by 41 percent.

As a result, Adobe has cut overall carbon dioxide emissions from its headquarters by 16 percent, despite increasing the number of employees working there by nearly one-third. Overall, carbon dioxide emissions are down by more than 11 million pounds per year.

Adobe began improving energy efficiency in

response to the California energy crisis that began in 2000. By the time then-Governor Gray Davis appealed to businesses to reduce their electricity use by 10 percent, Adobe had already hit that target. Motivated by the potential for significant cost savings, the company decided to go for another 10 percent.

Adobe hired property management company Cushman & Wakefield, known for identifying and taking advantage of cost-effective steps to improve building performance. George Denise of Cushman & Wakefield, building manager for Adobe's headquarters in San Jose, started with the low-hanging fruit—conceptually simple projects that paid for themselves very quickly and in some cases almost immediately. For example:

- Turning off lights and fans in the parking garages when they weren't needed yielded savings \$43,000 per year at essentially no cost.
- Reprogramming the central air conditioner and water heater to operate more efficiently and according to the actual needs of the building yielded over \$50,000 a year in energy savings at a one-time cost of \$1,000.

Once the easier projects demonstrated success, Adobe pursued more labor-intensive steps with larger up-front costs, but balanced by significant long-term savings. Many of these steps paid for themselves in little more than a year. For example:

- Replacing the lighting system in the garage with more efficient fluorescent lamp technology required an up-front investment of \$157,000, but yielded annual savings of \$138,000. PG&E supported the project with a \$40,000 rebate.
- Replacing the motors that drive the building's air fans with more efficient variable-speed technology cost \$126,000. The improved motors save \$46,000 per year in energy costs and earned a \$51,000 rebate.
- The installation of a real-time monitoring system for the building's electricity use

helped Mr. Denise and his staff to identify opportunities for more savings. The monitor enabled staff to track energy use in different parts of the building, discover inefficiencies and fix them. In just the last three months (April-June, 2006), the monitor helped point out measures worth another \$46,000 per year.

Altogether, Adobe has completed 45 separate energy efficiency projects. The company invested a total of \$1.1 million in the projects, yielding total savings of just over \$1 million per year. The projects will pay for themselves many times over—improving Adobe's bottom line.

The projects were supported by \$353,000 in rebates through PG&E and California's efficiency incentive programs. The rebates recognize the fact that, by reducing its own energy use, Adobe helps to reduce the cost of electricity for the region as a whole. But even without the rebates, the efficiency measures would be excellent investments, yielding strong returns in a short time.

Adobe is now in the process of implementing 15 more energy saving projects and evaluating a possible 10 to 20 more. Mr. Denise believes that the opportunities to improve efficiency will continue. For example, he is replacing the lighting in the building on a schedule of every four years—enough time to continually cycle in new and more efficient lighting technology.

Adobe's buildings are relatively new. The West Tower was built in 1996, and the other towers were built in 1998. Older buildings are likely to have even greater efficiency opportunities.

"According to the EPA, the average building can reduce energy use by 30 percent, easily," said Mr. Denise. "We've certainly found that to be the case here. There are a lot of opportunities if you just look for them." ■



# Westfield Corporation



- Reduced electricity use by 19 percent with a major lighting retrofit at 7 San Diego-area shopping centers
- Cut California's global warming pollution by more than 5 million pounds per year



*Amtech Lighting performed the lighting upgrade at the Westfield North County shopping center in Escondido. Together with partner General Electric, Amtech is performing similar upgrades at 23 Westfield locations nationwide.*  
(Photo Credit: Amtech Lighting)

Westfield Corporation is the U.S. unit of the Westfield Group, the world's largest retail property company.<sup>4</sup> Westfield Group owns and manages over 100 shopping centers across the globe, including 25 in California. Millions of Californians have visited a Westfield center to purchase clothing, find a new cell phone, see a movie, or buy a gift.

Visitors to one of the seven Westfield malls in San Diego might not notice that Westfield installed new, efficient lighting systems. But for company managers looking closely at utility bills, the savings from the new lighting were clear as day.

"We started looking closely at our utility usage and costs," said Pam Stevens, Senior Director of National Operations for Westfield. "We found that there were new technologies that could help us reduce our energy use, saving money."

In 2005, Westfield began a major lighting retrofit at its shopping centers near San Diego. The lighting at these facilities was nearing the end of its useful life, and the company had identified the retrofit as a major opportunity to reduce energy consumption and cut energy costs while maintaining levels of customer service.



At University Town Center in San Diego, for example, Westfield replaced lighting systems inside the mall's common areas, inside the parking garages and in the outdoor parking lots. The company reduced the energy required by the lamp socket (or ballast) and also installed energy-efficient bulbs. The company also upgraded exterior lighting around the building.

Altogether, the seven shopping centers now use 19 percent less electricity, reducing consumption by 5.6 million kWh per year.

The lighting systems have the added benefit of reducing California's global warming pollution. By using less energy to light its shopping centers, Westfield prevents 5.6 million pounds of carbon dioxide emissions each year.<sup>5</sup>

Some of the tenants of Westfield shopping centers (who control the lighting within the spaces they rent) have followed Westfield's example. For instance, one major national retailer is working to improve the efficiency of the lighting in its retail space at Westfield North County. The company hired the same lighting contractor that Westfield used in the larger shopping center and plans to follow suit at other locations.

Armed with this experience, Westfield is now taking its energy efficiency efforts further. Westfield has completed lighting upgrades in 18 of 23 targeted shopping centers nationwide. After rebates, the company is spending \$4.6 million on the program, reducing energy costs by \$2.6 million per year. The project is expected to pay for itself in less than two years.

"If we had not implemented the efficiency program, then we would be spending a lot more money on energy," said Ms. Stevens. "It's also a hedge against potential future utility rate increases."

At the same time, the efficiency program will reduce global warming emissions nation-wide by an estimated 40 million pounds per year.<sup>6</sup>

The company is also rolling out additional efficiency measures at existing centers, and also as it expands its centers. Some of these measures include:

- Installing motion sensors to make sure lighting is used only when needed in janitorial closets and other utility spaces at Westfield Topanga, Westfield San Francisco Centre and other malls;
- Increasing the efficiency of large motors in central air conditioning equipment, using variable frequency drives (which allow motors to operate more efficiently at a wider range of speeds, like the transmission in a car) at Westfield Old Orchard, Westfield North Bridge, Westfield Countryside, Westfield Topanga, Westfield Century City and others; and
- Installing energy management systems with automated controls to optimize use of lighting and air conditioning equipment.

Westfield is also investigating the option of solar photovoltaic panels as a way to generate its own electricity on-site.

- At the West Covina and Santa Anita shopping centers (located just northeast of Los Angeles), Westfield installed solar power modules on exterior lighting fixtures and in the outdoor parking lots.
- At the Westfield Galleria at Roseville, Santa Anita and Valencia Town Center locations, Westfield is piloting projects to install solar photovoltaic systems on the order of 350 kW (large enough to reduce global warming pollution by nearly half a million pounds per year.)

"We're trying to find steps that are achievable and that we can roll out everywhere," said Ms. Stevens. "If you do 20 or 30 little things at every mall, they add up." ■

# P-R Farms



- Installed one of California's largest privately-owned solar photovoltaic systems
- Reduced peak summer electric bills by \$26,000 (75 percent)
- Cut global warming pollution by 1.6 million pounds per year



*Pat Ricchiuti, owner of P-R Farms, completed installation of this massive solar array in July 2005. The system consists of 7,730 panels, covering 98,100 square feet. It reduces California's global warming pollution by over 1 million pounds per year. (Photo Credit: PowerLight)*

Pat Ricchiuti, owner of P-R Farms in Clovis and the president of the Fresno County Farm Bureau, has always depended on the sun to bring out the best flavor in his peaches, plums, apricots, nectarines, oranges and apples.

Now, he also depends on the sun to save him money on his monthly electric bill.

In July 2005, Mr. Ricchiuti completed one of California's largest privately-owned solar photovoltaic (PV) systems, situated on the roof of his 150,000-square foot packing house in the middle of agriculturally rich San Joaquin Valley. The 928 kW system, installed

by PowerLight, helps provide energy for the processing and cold storage of over a million boxes of fruit every year.

The solar array has a variety of benefits for P-R Farms. The system can provide up to 50 percent of the energy needs of the packing facility and cold room when operating at full capacity. If at any point the array produces more energy than can be used on the farm, it simply feeds into the regional electricity grid. Credit from the excess energy can be used up to a year later, allowing Mr. Ricchiuti to profit from sunshine year-round, even at night and outside of the peak fruit season.

With the solar array, Mr. Ricchiuti has seen drastic cuts in his energy bills. Before the installation of the system, it was not unusual for the farmer to pay more than \$250,000 per year for electricity to run the packing house and cold storage facility. In the peak of the summer, monthly bills could range as high as \$35,000. After the solar panels became active in July 2005, his monthly electric bill dropped to just over \$9,000. In some months, electricity costs for cold storage and packing are now more than 80 percent less than before.

“These are significant savings,” said Mr. Ricchiuti.

Mr. Ricchiuti’s system does more than save him money—it reduces the need for energy companies to install infrastructure like power lines and power plants. In recognition of the benefits that solar energy provides to society as a whole by producing power during long and hot summer days, when demand for power is highest, utility companies and the state and federal government offer rebates and tax incentives for solar energy. In the case of P-R farms, these incentives covered half of the total cost.

After rebates, Mr. Ricchiuti invested \$3.2 million in his solar array. Mr. Ricchiuti expects the investment to be fully paid off in a total of 10 years—after which the energy produced by the solar panels will be pure profit. With a lifetime of up to 30 years, the solar panels are a smart long-term investment.

“I see this as a way to become more competitive,” said Mr. Ricchiuti. “It makes economic sense.”

The solar panels also produce energy with zero global warming pollution. The panels reduce the need to draw power from California’s power grid, avoiding carbon dioxide emissions from power plants running on natural gas or coal. Every year, the solar array effectively reduces California’s global warming pollution by 1.6 million pounds of carbon dioxide.<sup>7</sup> Over their 30-year expected lifespan, the solar panels could prevent as much as 48 million pounds of carbon dioxide emissions.<sup>8</sup>

“I wanted, in some way, to help clean up the environment and give agriculture a good name,” explained Mr. Ricchiuti. “We’re just doing our share.” ■

# RideLink, San Diego Association of Governments



- RideLink promotes transportation alternatives for getting to and from work, preventing nearly 2 million trips in fiscal 2006
- Saved participants \$5 million in fuel costs and delivered more than \$50 million in benefits for the region, including reduced travel delays
- Cut global warming pollution by 125 million pounds of carbon dioxide



The RideLink program provides commuting services to both employers and commuters themselves. Pictured here are two of the more than 500 vans in the RideLink vanpool service.

(Photo Credit: SANDAG)

The San Diego Association of Governments (SANDAG), consisting of 18 cities and the county of San Diego, serves as a regional forum for decision-making. SANDAG crafts plans to manage growth, open space and traffic for the benefit of all residents and businesses in the region.

SANDAG understands that a functional transportation system is critical for the regional economy, and for quality of life in the San

Diego region. To reduce traffic congestion, clean the air, reduce the need for new freeways, and make it easier to get from place to place, SANDAG operates a commuting program called RideLink.

RideLink works with both employers and employees to provide transportation alternatives for getting to and from work. RideLink helps employers, free of charge, to develop commuter programs. RideLink also assists



commuters themselves with ride-matching services, a guaranteed ride home program, bike lockers, the San Diego Regional Vanpool program, and the SchoolPool service.

RideLink worked with QUALCOMM, Inc., one of the largest telecommunications companies in San Diego, to develop a commute-trip reduction program widely recognized as one of the best in the nation. In 2005, the U.S. Environmental Protection Agency ranked QUALCOMM's program number two on the list of *Fortune 500 Best Workplaces for Commuters*.<sup>9</sup>

RideLink staff met with managers at QUALCOMM to assess the company's transportation needs, surveyed employees to understand their needs, then worked with QUALCOMM to develop the commuting program. Now that the program is up and running, RideLink provides ongoing assistance with the implementation and marketing of the program.

QUALCOMM's program includes the following benefits, offered to all of its thousands of employees:

- Transit subsidies (a 25 percent subsidy plus pre-tax payroll deduction for mass transit expenses up to \$100);
- Membership in a car-sharing organization;
- Shuttle services between company locations;
- Bike lockers, racks and showers;
- Motorcycle parking;
- Flexible work hours;
- Telework options;
- A commuter resource page and carpool matching tool on company intranet; and
- Chargers for electric vehicles.

"We have helped more than 100 employers to create effective commuting options programs,"

said Allison Richards-Evensen, marketing manager for RideLink. More than 75,000 employees in the region are eligible for commuting benefits.

In addition, with the support of monthly subsidies provided by third-party vendors, RideLink operates more than 513 vanpools which carry more than 4,400 passengers to work. In the 2006 fiscal year, staff handled calls from nearly 7,000 commuters seeking travel assistance.

Ms. Richards-Evensen estimates that in the last year, RideLink commuter assistance programs prevented nearly 2 million trips, reducing travel on regional roadways by more than 105 million vehicle miles. Participants in the program saved \$5.7 million on fuel. For the region as a whole, the program delivered more than \$50 million in benefits, including reduced travel delays.

The program has a significant impact on global warming pollution as well. The program saved over 5 million gallons of gasoline, equivalent to 97 million pounds of tailpipe carbon dioxide emissions.<sup>10</sup> Including emissions associated with the upstream processing and delivery of gasoline, the program prevented 125 million pounds of global warming pollution.<sup>11</sup>

These benefits do not include the effect of RideLink's employer consulting services. Employers who craft their own commuting programs are magnifying these benefits for their employees and the region as a whole.

Ms. Richards-Evensen believes that the menu of transportation choices the RideLink program makes available are critical for success.

"Choices make the decision to change habits a little easier," she said. ■

# Bentley Prince Street



- Reduced energy costs per unit of carpet manufactured by 48 percent
- Increased efficiency and reduced waste, saving \$3.8 million in 2005
- Net greenhouse gas emission reductions of 75 percent since 1996



*Bentley Prince Street manufactures carpet (shown here) at a facility in the City of Industry. The company has earned numerous awards in recognition of its efforts toward sustainable commerce. The California Climate Action Registry has named the company a Climate Action Leader™ and the winner of the 2006 Climate Action Champion Award. Governor Schwarzenegger recognized the company with the 2005 Governor's Environmental and Economic Leadership Award. The company is a five-time winner of California's Waste Reduction Awards Program and a 2005 winner of the National Pollution Prevention Roundtable's Most Valuable Pollution Prevention Award. (Photo Credit: Bentley Prince Street)*

Bentley Prince Street is California's largest commercial carpet manufacturer. Based in the City of Industry, just east of Los Angeles, the company produces 7 million square yards of carpet each year in its 400,000-square foot carpet mill.

Bentley Prince Street, a subsidiary of Interface, Inc., is unique in the carpet industry for its commitment to sustainable commerce. In 1994, Ray Anderson, the founder and chairman of Interface, Inc., had an epiphany while reading a book by green business guru Paul Hawken, *Ecology of Commerce*. Inspired by the book, he steered all of the Interface companies toward efficient and sustainable practices, which are now integrated into every aspect of their business.

Bentley Prince Street has found that efficiency and sustainability are effective strategies to improve business performance. In the last decade, the company has dramatically reduced its global warming emissions, resource use and waste—saving tens of millions of dollars in the process.

The company pursued a variety of strategies to achieve these results, including manufacturing process improvements and increased renewable energy use.

## **Manufacturing Improvements**

Bentley Prince Street coordinates product development with manufacturing, enabling control over all of the stages of production, from design



to delivery. This control enabled the flexibility to root out waste in the manufacturing process and eliminate it.

For example, the company essentially eliminated two types of manufacturing methods that required significant energy and resource input, in favor of a process known within the industry as the “piece-dye” method. This method involves preparing white carpet, then adding patterns and colors on a made-to-order basis. The process has two advantages. First, it is more energy efficient. Second, it requires fewer resources. The process gives the company the flexibility to produce carpet with just a two-week lead time—even when using a custom design. As a result, the company can respond more nimbly to customer demand, reducing waste.

### **Efficiency Improvements**

Bentley Prince Street identified opportunities to reduce energy use in electrical and mechanical equipment at the factory.

For example, every seven years, the company evaluates its lighting efficiency and upgrades its lighting systems. The company has installed solar tubes in its offices and in its distribution center. These devices capture sunlight and pipe it into the building from the outdoors, providing indoor daylight with no electricity use. The company also uses low-energy light fixtures. Altogether, the company estimates that the lighting upgrades have saved \$250,000 since 1994.

The company has also initiated a maintenance program for its steam traps, which are important to get the most useful work out of the steam during the manufacturing process. Keeping them in good working order reduced gas and water usage and yielded cost savings. The company also revised its manufacturing schedule to avoid working during periods of high electricity demand, thus saving money during the periods when electricity is most expensive.

To improve the efficiency of its transportation and save money on fuel, the company only ships carpet in fully-loaded trucks. The company also launched a “Buy California” campaign to encourage California businesses to purchase from local suppliers, reducing transportation impacts.

### **Waste Reduction**

Bentley Prince Street worked to reduce the amount of solid waste it was sending to landfills and the amount of water used in the manufacturing process. The company set up an official waste reduction program, carefully tracking the amount of solid waste it produced. The company set up teams to recover materials for reuse and named departmental recycling champions. The company worked to save water by crafting a way to capture and reuse rinse water during the dyeing process.

### **Renewable Energy**

Bentley Prince Street has also pursued the use of on-site renewable energy generation to reduce its dependence on fossil fuels. In 1999, the company installed a 100kW solar photovoltaic system—at the time, the largest privately funded solar array in California.

At 1999 electricity rates, the payback period of the solar panels would have been a substantial 30 years. However, with the higher utility rates prevalent since the electricity crisis of 2001, the payback period has been reduced by more than half. The panels will likely reach the payback point during their useful life—meaning that while they may not yield a huge profit for the company, the panels are not harming business; and they have the benefit of acting as a hedge against further utility rate increases.

For electricity needs beyond the production of the solar panels, the company purchases Green-e certified renewable energy credits. The purchases fund the development of wind energy and biomass energy projects in other states,

effectively offsetting the emissions created by on-site use of electricity from California's electricity grid. These purchases enable the Bentley Prince Street facility to achieve 100 percent renewable electricity.

### **Meaningful Results—for the Environment and the Bottom Line**

These steps have had a clear and measurable impact.

In 1994, manufacturing a square meter of carpet required 50,650 BTU of energy. By 2004, that number had been cut to 26,570 BTU. This translated into substantial cost savings—48 percent less per unit of product manufactured.

From 1994 to 2005, overall energy use at the facility dropped by 56 percent, water use dropped by 68 percent, and the quantity of



*Bentley Prince Street installed these solar panels on top of its manufacturing facility in 1999. At the time, the panels were the largest privately funded solar array in California. (Photo Credit: Bentley Prince Street)*

waste sent to landfills dropped by 94 percent.<sup>12</sup> In 2005, the measures saved \$3.8 million.<sup>13</sup>

Collectively, the company estimates that its waste reduction projects have saved over \$43 million over time.

“Reducing waste has saved us so much money over the years, that it has enabled us to invest in new and innovative projects, like our solar panels and renewable energy credits.” said Judy Pike, Director of Sustainability for Bentley Prince Street.

Bentley Prince Street's actions have also dramatically reduced its global warming impact. From 1996 to 2005, the company cut direct carbon dioxide emissions by 50 percent (over 20 million pounds per year). Purchases of renewable energy credits provided an added benefit, offsetting the equivalent of 13 million pounds of carbon dioxide per year. Altogether, company emissions are down 75 percent.

The company has taken a leading role in finding solutions to global warming. Bentley Prince Street was the first charter partner in the California Climate Action Registry (CCAR). In 2005, Judy Pike attended the United Nations Climate Change conference in Montreal as a member delegate from the CCAR, and participated in numerous presentations there to share best practices.

At the same time, the business is enjoying success. After a slow-down in the market in the late 1990's, business has steadily increased, growing 5 percent between 2002 and 2005. The company credits its sustainability program for earning enhanced brand recognition and increased credibility as a well-respected leader in sustainable commerce.

“We think our business model is working very well,” said Ms. Pike. “Sustainability also means making a profit. We have 600 employees, plus all of their families, and they all depend on our business to succeed.” ■

# California Environmental Protection Agency

- Energy-efficient and sustainable design in new headquarters building saves over \$1 million per year in operating costs
- On course to further reduce energy use and global warming pollution 25 percent by 2010



*The Cal/EPA headquarters building at the corner of 10th and I streets in downtown Sacramento features energy efficient design, saving more than \$1 million per year in reduced energy and operating costs. (Photo Credit: Thomas Properties Management)*

In 2001, the California Environmental Protection Agency (Cal/EPA) moved into a brand new headquarters building in downtown Sacramento at the corner of 10th and I streets. The agency employs 3,000 people in the 25-story building—each working to restore and protect California’s environment, public health and economic vitality.

From the start, Cal/EPA designed the building with energy efficiency and sustainability in mind.

“As the state’s environmental agency, we felt that we needed to hold ourselves to our own

standards, or higher,” said Theresa Parsley, Assistant Secretary for Facilities Programs at Cal/EPA.

The building showcases a variety of innovative energy-saving features, including:

- Building design that maximizes the use of daylight;
- High-efficiency overhead lighting systems, engineered to use a maximum of 1 Watt per square foot;
- Wiring for overhead lighting that allows some bulbs to be turned off when they are not needed;
- Task lights at employee workspaces to

- supplement overhead light when necessary;
- Motion sensors wired to most lights in the building, turning them off automatically when no one is present;
- Efficient dual-pane glass in exterior windows helping to maintain the optimal indoor temperature;
- Variable frequency drives on building air fans and pumps, able to run efficiently at low speeds;
- A computerized electricity management system to control the building environment and keep track of electricity use room by room (useful for identifying opportunities to reduce energy use); and
- A rooftop-mounted solar photovoltaic system, consisting of 736 panels with a 29 kW capacity, supplying 55,000 kWh per year.

When issuing requests for bids for the facility, Cal/EPA made a point of requesting proposals for energy efficient and sustainable features. The agency was then able to compare the costs and the savings of different configurations for the building.

“In many cases there was no additional upfront cost for the ‘green’ approach,” said Ms. Parsley. “In some cases—including the lighting system, recycled carpet and recycled ceiling tiles—going green was no more expensive than the standard approach.”

The building cost \$172 million to build, including bond financing costs. Ms. Parsley estimates that the energy efficient and sustainable features of the building cost no more than \$2 million more than a standard approach (and probably less than that). In comparison, the efficient features of the building save more than \$1 million per year in reduced energy and operating costs. Because of the efficient features of the building, its electricity costs are 40 percent lower than the typical building in downtown Sacramento.<sup>14</sup>

At the same time, the building produces very little overall global warming pollution. In

addition to the electricity generated on-site from the solar panels, Cal/EPA purchases 100 percent renewable energy from the Sacramento Municipal Utility District, funding supplemental wind and biomass projects in the region.

Despite the already high efficiency of the building when Cal/EPA moved in, agency managers set a goal of reducing the building’s global warming pollution by 25 percent below 2000 levels by 2010.

Since moving in, building engineers have been able to find and install additional cost-effective measures to reduce energy use. Engineers have:

- Refined the programming of the air circulation systems, saving \$36,000 and 300,000 kWh annually;
- Programmed the energy management system to reduce airflow to the public hearing rooms and the auditorium when they are unoccupied, saving \$3 an hour;
- Installed Globalight™ lighting control panels, which regulate and stabilize the power supplied to the building’s fluorescent lighting systems. The control panels have reduced the power consumption of the lights by 20 percent and cut overall daytime electricity demand by 70 kW, saving in the range of tens of thousands of dollars per year;
- Reprogrammed the hot water boilers to more closely match the heating needs of the building, saving 400,000 cubic feet of natural gas and \$4,000 per year;
- Reduced the need to run one of the building’s compressors by modifying a chiller to help heat the building in the winter, saving \$7,000 and 58,000 kWh annually; and
- Upgraded a small chiller with a variable frequency drive, enabling it to operate more efficiently at lower speeds, saving \$22,000 per year and 180,000 kWh.

There are more upgrades in store for the future. A few electric motors in the building



still use direct drives, and thus waste energy when operating at low speeds. Upgrading the domestic water pump system with a variable frequency drive will save \$15,000 to \$20,000 per year. Relocating the thermostats to provide better readings of the actual heating and cooling needs of the open-office areas of the building will save \$5,400 per year. Upgrading the lights in the building stairwells with reflectors, thus reducing the number of lamps required, will cut their energy use by more than half, saving \$7,360 per year.

“We consider this building to be a living laboratory,” said Ms. Parsley. “We are using the tools it offers to figure out better ways to do things.”

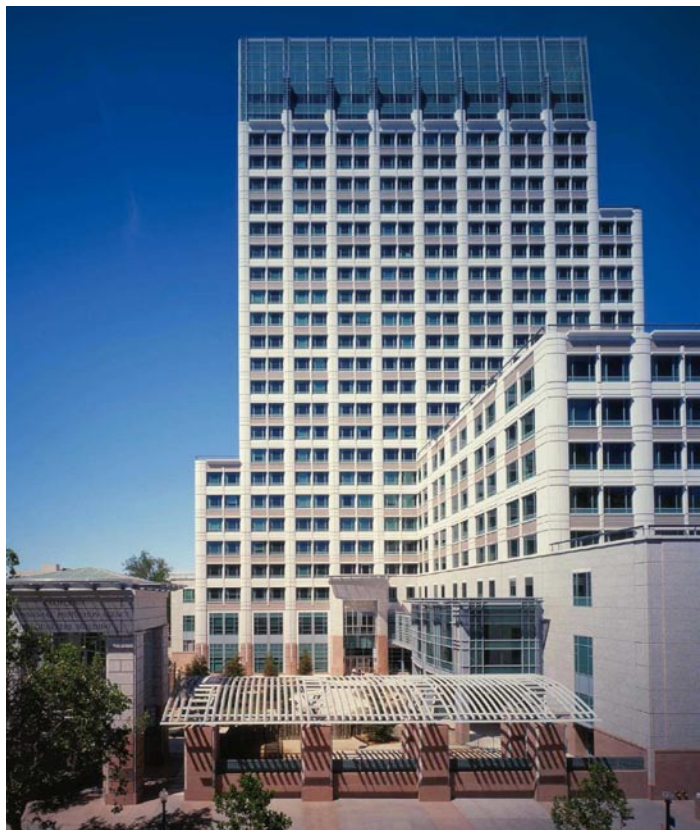
The building was designed with the flexibility to implement new ideas for saving energy. For example, Cal/EPA tested a new air conditioning approach to help prevent blackouts during the heat wave that hit California in mid-July 2006. The agency was able to cycle the air conditioning on and off every 30 minutes, alternating between odd and even floors, because each floor has an independent mechanical room. The step reduced electricity demand by 500 kW.

Another innovative approach to saving energy was suggested by the building’s janitorial service, Metro Maintenance. During the 2001 energy crisis, then-Governor Gray Davis asked all state departments to reduce their energy consumption by 8 percent. To help with this goal, Metro Maintenance proposed altering the cleaning schedule to daytime hours.

Cal/EPA agreed to the change, and the janitors began working from 11 AM to 8 PM (and continue to do so today). While the building is occupied, the janitorial staff perform quiet activities. After hours, the staff do any heavy-duty cleaning. The staff clean the building as a group, working floor by floor—lighting only one floor of the building at a time.

The new schedule was instituted on the day of the governor’s deadline for energy use reduction. The next day, building managers found that the new cleaning schedule alone achieved the governor’s 8 percent energy reduction target. Daytime cleaning saves \$100,000 per year in electricity costs and \$90,000 per year in labor costs.<sup>15</sup> The new schedule has the added benefit of improving communication between building tenants and cleaning staff, reducing the number of cleaning-related maintenance calls by 70 percent.

“We’ve tried to be bold enough to implement new ideas,” said Ms. Parsley, “while being responsible enough not to waste the public’s money.” ■



*The Cal/EPA Headquarters building in downtown Sacramento.  
(Photo Credit: Cal/EPA)*

# Children's Hospital Central California



- Reduced energy costs by more than \$400,000 per year with efficiency measures
- Cut carbon dioxide pollution by more than 5 million pounds per year



*Children's Hospital Central California in Madera County outside of Fresno reduced its energy use, each year saving more than \$400,000 and reducing global warming pollution by more than 4 million pounds. The Hospital is working to earn an Energy Star designation. (Photo Credit: Children's Hospital Central California)*

In 1998, Children's Hospital Central California moved to a new facility in Madera County, just outside of Fresno. The new facility is the 13th-largest freestanding pediatric hospital in the United States, and will expand from 255 to 297 beds by the end of 2006. The hospital's mission is to provide high-quality, comprehensive health care services to children, regardless of their ability to pay.

In order to provide service for any child who needs it, the hospital has to make sure that the financial side of its business adds up and its operating costs remain in check. As a part of that effort, the hospital has consistently improved the efficiency of its energy use over the last four years, saving money and enabling the doctors and nurses to stay focused on their core mission of patient care.

In 2002, Neal Pearson, the engineering manager for Children's, was recruited by the U.S. Environmental Protection Agency to enroll the hospital in a pilot Energy Star program. Because the hospital is relatively new, Mr.

Pearson expected that it would rank well in an audit of efficient energy use. He was surprised when the score came back: 25 out of a possible 100.

"It woke me up to the possibility of improving the operating efficiency of the building," Mr. Pearson said.

Pearson began investigating ways to reduce energy use and save money at the hospital's 50-acre campus. With the approval of hospital administration, he implemented a series of steps to "pick the low-hanging fruit"—the easiest cost-effective measures to save energy.

Among the first steps, hospital staff replaced incandescent lighting with more efficient fluorescent lamps and programmed the heating and cooling systems to only operate when needed. A year later, the hospital's Energy Star score had increased to 50.

With this initial experience, the hospital developed a comprehensive Energy



Management Plan. “Now the administration is picking the higher fruit,” said Mr. Pearson.

In 2003, the hospital implemented a series of energy-saving measures with larger up-front costs. Among these projects:

- The hospital replaced fixed-drives on 14 air handling systems with more efficient variable-speed drives, able to ease into operation much like the gears in a car. Purchasing and installing the new drives cost \$367,510, and yielded annual energy savings of \$271,998. Even before an expected rebate from PG&E, the project paid for itself in just over a year, reducing energy use by over 4.5 million kWh annually.
- The hospital decided to replace a set of electric steamers used to prepare food in the hospital kitchen. Electric appliances had been installed even though a pipe carrying steam from an in-house boiler ran near the kitchen. The hospital switched to in-house steam, eliminating the need to use electricity for heat.
- The hospital installed an energy management system to improve the precision of control over the building’s environment. In addition, the system helped Mr. Pearson diagnose an ongoing problem with the building’s chiller plant that had stumped a handful of professional engineering firms. With the correct diagnosis—a relatively simple matter of inadequate water flow—the hospital was able to improve the performance of the chiller plant enough that it was able to shut off one of three chillers completely.
- In addition, the hospital optimized its heating, ventilation and air conditioning systems; initiated a program to maintain a set of steam traps; continued upgrading lighting fixtures to more efficient models, and replaced a set of mechanical equipment controls with more precise and efficient digital versions.

These projects were all completed by June 2004. In the following year, the hospital paid \$392,164 less on its energy bills. The

measures reduced electricity and natural gas consumption by the equivalent of 17.9 billion BTU of energy.

At the same time, reduced energy consumption at the hospital led to reduced global warming pollution. The efficiency measures directly reduced carbon dioxide pollution from on-site use of natural gas, and indirectly reduced pollution from power plants that supply California with electricity. Altogether, the measures reduced the hospital’s global warming pollution by more than 5 million pounds of carbon dioxide per year.<sup>16</sup>

Children’s Hospital has set a goal of achieving an Energy Star designation—awarded to facilities with scores higher than 75 out of 100. The hospital currently has a score of 67.

To reach the goal, the hospital is carrying out a number of additional projects, including a second phase of the lighting upgrade. Mr. Pearson expects this phase to yield annual savings of \$30,374 and reduce electricity use by another 337,491 kWh per year—cutting carbon dioxide pollution by an additional 260,000 pounds per year.

“Energy Star shows us that there are other facilities that have done it, and we can do it too,” Mr. Pearson said. “I’m sure we’ll get there.” ■



*CHCC Plant Services staff member Edmond Logan installs a new, more efficient lighting system. (Photo Credit: Children’s Hospital Central California)*

# San Mateo County Community College District



- Cut energy use by 56 percent with efficiency measures and cogeneration (on-site production of heat and electricity)
- Saving \$1 million per year



*The campus at College of San Mateo, one of three colleges in the San Mateo County Community College District. The district installed cogeneration units at two of these campuses and undertook a variety of efficiency improvements, reducing overall energy use by 56 percent (Photo Credit: College of San Mateo)*

San Mateo County Community College District consists of Cañada College in Redwood City, College of San Mateo, and Skyline College in San Bruno. About 40,000 students attend the colleges, completing the first two years of a bachelor's degree before transferring to a four-year university or completing one of 90 vocational degree and technical certificate programs.

The district, funded in part through the California state budget, must use money effectively to provide a high quality education for its students. Reducing expenses is one tactic district managers have used to free up more money for its core mission, education.

The campus buildings were built over 35 years ago. By 2001, many of the building's mechanical and electrical systems had aged beyond their useful lifetimes. District managers realized that the old systems were wasting energy as well—and that cost money.

In 2002, the district began upgrading old systems and implementing a suite of energy efficiency measures designed to rein in energy expenses.<sup>17</sup> The district:

- Upgraded lighting systems with more efficient technology—providing higher quality indoor lighting and a better learning environment for students while also reducing energy use;

- Repaired and upgraded mechanical systems, including installing efficient variable speed drives on motors in the water and heating/cooling systems; and
- Installed a digital control system to accurately maintain optimal building environments.

The district also installed two co-generation units, which generate both electricity and heat for use on two of the three campuses. The co-generation units are capable of meeting over half of the district's peak electricity needs. At the same time, the units transfer excess heat from electricity generation into the central heating system—reducing the use of natural gas for heat.

Altogether, these measures added up to a 56 percent reduction in overall energy use on campus. The district is saving more than 7.2 million kWh of electricity annually. Its energy costs are down by more than \$1 million per year.

“Because of this work, we have freed more than \$1 million a year that can be used for other

critical needs on campus,” said Ron Galatolo, Chancellor of the District. “In addition, the energy efficiency projects have vastly improved our academic environment.”

The district has helped to reduce global warming pollution as well, avoiding over 6 million pounds of carbon dioxide emissions annually.

The community college district is continuing its commitment to energy efficiency in the new buildings on campus. In 2005, the district began construction of a new science building at College of San Mateo that exceeds California's building efficiency codes by 42 percent. It includes efficient heating, ventilation and air conditioning systems, occupancy and daylight sensors for lighting control, high-efficiency windows, and a cool roof to prevent sunlight from heating the building on hot days. Cañada College's new Library and Student Resource Center incorporates similar features to exceed California standards by 30 percent. ■



# Naval Base Coronado



- Reduced energy costs by more than \$500,000 per year through efficiency measures and the addition of the world's largest covered-parking lot solar photovoltaic array
- Cut carbon dioxide pollution by more than 4 million pounds per year



*The solar photovoltaic array at Naval Air Station North Island, the world's largest covered parking solar installation.*  
(Photo Credit: Naval Base Coronado)

Naval Base Coronado consists of seven facilities spread across the San Diego region, spanning from airfields at San Clemente Island to mountain training grounds in Cleveland National Forest. The base is the largest employer in San Diego County, with 36,000 military and civilian employees—accounting for 30 percent of the Navy's regional workforce.

Naval Base Coronado is also one of the largest energy users in the San Diego region. To minimize the amount of taxpayer dollars spent on energy, the base has implemented a series of innovative energy efficiency and renewable energy projects in the last five years.

The Naval Base Coronado Public Works Team found a major opportunity to improve energy

efficiency in the incandescent lights used to light the airfields and heliports at the base. The incandescent lights used a lot of energy and burned out frequently, requiring replacement. The Public Works Team found that Light Emitting Diodes (LEDs) could provide more light for a longer period of time, using much less energy.

In 2003, Navy staff replaced 1,237 incandescent lights with LEDs. The LEDs dramatically improved nighttime visibility for aircraft, and used up to 90 percent less energy than the incandescent lamps. The lamps can also operate for more than 100,000 hours without needing replacement. As a result, the base was able to eliminate the expense of purchasing over 5,000 replacement bulbs every year.<sup>18</sup>

The project required a \$328,000 investment, and annually saves \$22,850 in energy costs and \$52,500 in material costs. The project will fully pay for itself in 3.8 years and deliver a 26 percent return on the original investment.

In fiscal 2005, Naval Base Coronado made additional energy efficiency upgrades, including replacing old clothes washing machines with 263 new Energy Star® certified efficient appliances. Altogether, the effort reduced annual energy and material bills by about \$357,000, saving 2.5 million kWh per year.

At the same time, these energy efficiency measures are reducing global warming pollution emissions by over 2 million pounds of carbon dioxide per year.<sup>19</sup>

In addition to energy efficiency, the base is also pursuing innovative renewable energy projects. In October 2002, Naval Base Coronado installed the world's largest covered-parking lot solar photovoltaic system at Naval Air Station North Island. Over 81,000 square feet of solar panels were mounted on a carport structure, creating a covered parking lot for hundreds of cars. The system is capable of delivering 750 kW of power at full operation—3 percent of peak demand at the base.

The solar panels required an investment of \$7.66 million, before incentives. Because the solar panels benefit society as a whole, the project received incentives from San Diego Gas & Electric via a state of California rebate program and the federal government, totaling more than \$5 million. The incentives recognize the value of solar panels in reducing the need for energy companies to install infrastructure like power plants and power lines by producing power during hot summer days, when it is needed most. The panels reduce energy costs on the base by \$122,409 per year and will achieve payback in 18.5 years, with a projected 5.4 percent return on the original investment.

The experience gained by the solar industry in manufacturing and installing this power plant—along with the many other solar installations in California in the last several years—has helped make solar energy cheaper. For example, in a little less than three years after the North Island solar panels were installed, P-R Farms installed a solar array that was 25 percent larger for 16 percent less money. (See Page 16.)

The panels on the naval base produce 1.24 million kilowatt-hours (kWh) per year, equivalent to reducing carbon dioxide pollution by 1.5 million pounds annually.<sup>20</sup>

“Implementing cost-effective energy conservation projects demonstrates leadership, saves taxpayer dollars, and helps to reduce impacts on the environment,” said Mike Magee, Base Energy Manager for Naval Base Coronado. ■



*An example of the LED lighting installed along airport taxiways and helipads by the Naval Base Coronado Public Works Team. The LED fixtures give off more light than conventional bulbs, and use 90 percent less energy. (Photo Credit: Naval Base Coronado)*

# California Portland Cement Company



- Improved efficiency of manufacturing process, saving nearly \$3 million worth of electricity every year
- Reduced global warming pollution by over 27 million pounds per year



*New air piping at California Portland Cement Company's cement factory helps to reduce the energy use of the compressed air system. (Photo Credit: California Portland Cement Company<sup>25</sup>)*

California Portland Cement is one of the top 10 cement manufacturers in the U.S. The company produces cement, concrete and related building materials at plants located in Colton and Mojave, California and in Rillito, Arizona. The company supplies markets throughout the southwestern U.S.

California Portland Cement Company first began working with the U.S. Environmental Protection Agency's Energy Star program in 1996. Over the years, the company realized that improved energy use was a wise investment and could yield great cost savings.

"As an Energy Star partner, we value superior energy performance," said Jim Repman, CEO of California Portland Cement, in a company press release. "It's good for our bottom line and good for the environment."<sup>21</sup>

In 2003, California Portland Cement worked with Energy Star officials to develop a company-wide energy management program. The company involved staff at all levels, from senior management to on-the-ground plant engineers. The company made a point of involving staff directly involved with the manufacturing process, the main use of energy at the plants.



The company addressed energy use in all aspects of the manufacturing process. For example, after an audit of the grinding process, engineers realized that there was room for improvement in the operating efficiency of the grinding mill. The company purchased a new grinding mill that did the same amount of work using 40 percent less energy. The company also took steps to reduce heat losses and optimize the chemistry of the manufacturing process.

California Portland Cement identified and implemented a variety of additional steps to conserve energy and to use energy more efficiently at its plants.<sup>22</sup> For example, engineers realized that leaks in compressed air piping were wasting energy. They determined that a single half-inch diameter hole in an air pipe wasted more than \$32,000 per year. The company invested in new air piping to minimize such leaks. Additionally, engineers identified opportunities to improve the performance of the air compressor and other parts of the compressed air handling system.

To improve the performance of its electrical and lighting systems, the company turned to high-efficiency lighting, variable speed drives for motors and audits to make sure the motors

were of the proper size for their intended use.

The company improved the performance of its mechanical systems as well. For example, engineers replaced belts that transfer power from a motor to machinery with cog-style belts, improving the efficiency of energy transfer by 3 to 5 percent. Additional reforms addressed plant operations and employee awareness and training. Finally, the company required its suppliers to meet minimum efficiency standards for motors and other parts.

California Portland Cement Company achieved significant results under the new energy management program. During 2004, the company reduced its overall energy usage by about 3 percent, cutting carbon dioxide emissions by 27 million pounds.<sup>23</sup> In 2005, the company reduced its annual electricity consumption at one of its plants by 10 percent, or roughly 31 million kilowatt-hours (kWh), and overall energy use by 48 billion BTU. Reduced electricity consumption is saving the company nearly \$3 million annually.

“We have found that participating in Energy Star just makes good business sense,” said Mr. Repman, in a company press release.<sup>24</sup> ■

# Clarum Homes



- Built Vista Montaña, currently the nation's largest zero-energy home community
- Efficient features and solar panels save homeowners on the order of \$1,200 per year on electricity
- Prevents roughly 2 million pounds of global warming pollution per year



*Clarum Homes built the largest community of zero-energy homes in the country, Vista Montaña, in Watsonville, just outside Santa Cruz. The community consists of 177 single family homes, 80 townhomes and 132 apartment units—all with energy efficient features and rooftop solar photovoltaic panels. (Photo Credit: Clarum Homes)*

Clarum Homes, based in Palo Alto, builds single-family homes, townhomes and multi-unit residential buildings. In the last decade, Clarum has emerged as one of California's leading manufacturers of energy-efficient and environmentally-friendly residential communities.

John Suppes, founder and president of Clarum Homes, first started learning about green building, energy efficiency and sustainable design in the late 1990s. These ideas began to filter into Clarum home designs, first with

rooftop-mounted solar panels and then with a variety of energy efficient features.

Energy consultant ConSol, Inc. played an important role in the evolution of Clarum Homes. ConSol is one of four companies selected by the U.S. Department of Energy as partners in its Building America program, a partnership designed to introduce innovative energy- and material-saving technologies into the building industry. One of the program's goals is to create homes that produce as much energy as they use, or "zero energy homes."

Working with ConSol, in 2002 Clarum introduced a zero-energy home prototype, called the Enviro-Home. Clarum and its partners designed this home to use between 60 and 90 percent less energy than a conventional home.

Energy-saving features in an Enviro-Home include:

- Fluorescent lighting;
  - Enhanced insulation, including a foam-wrapped building envelope;
  - Energy-efficient windows;
  - A tankless water heater;
  - A high-efficiency furnace and a programmable thermostat;
  - A cool roof covering that reflects heat away from home and reduces cooling needs;
  - Tight seals on ducts, windows and doors; and
  - Efficient Energy Star-rated electric appliances.
- Each home also includes an integrated solar photovoltaic system, ranging in size from 1.2 to 2.4 kilowatts (kW).

“Feedback from homebuyers has been very positive,” said Mr. Suppes. “So we decided to continue building nothing other than zero-energy homes.”

Clarus deployed the Enviro-Home concept into mass production with the Vista Montaña development in Watsonville, just outside of Santa Cruz. The development, fully completed in 2005, is currently the largest zero-energy home community in the United States, consisting of 177 single family homes, 80 townhomes and 132 apartment units—all equipped with Enviro-Home features.

Owners of a Clarum-built home pay much less on their utility bills. A survey of homeowners in Vista Montaña revealed that electricity

bills in the community were two-thirds less, on average, than those of comparable homes in the area.<sup>26</sup> The average savings per home were over \$1,200 per year on electricity alone. The company says that reductions in natural gas bills are similar.

Homeowners benefit from reduced energy consumption and at the same time from the energy produced by the solar panels. If the panels produce more energy than the house needs, the energy is sold back to the energy utility as required by California’s net metering law. Solar energy is most available during times of peak energy demand, when energy is also at its most expensive. The credit earned can put a big dent in the cost of electricity used at night.

“With skyrocketing energy costs and continued concerns over energy shortages, efficient and sustainable design makes sense,” said Mr. Suppes.

The zero-energy home features also help to reduce global warming pollution. If Vista Montaña had used standard building techniques, it would emit on the order of 2 million pounds more carbon dioxide per year.<sup>27</sup>

If all new homes in California were built to these standards, it would have a dramatic impact on the state’s global warming emissions. Every year, California adds enough housing for roughly 170,000 families.<sup>28</sup> If all of these units matched the performance of the Clarum Enviro-Home, it would prevent on the order of 1 billion pounds of carbon dioxide pollution per year.

“Being part of the solution is important to us,” said Mr. Suppes. “We’re trying to promote this type of construction so that more builders will follow suit.” ■

# Los Angeles Unified School District



- Saving over \$950,000 per year due to lighting and heating/cooling efficiency improvements made in 2005
- Reducing global warming pollution by over 7 million pounds per year



Los Angeles Unified School District is building new schools, like High Tech High School in the San Fernando Valley (pictured here), to be energy and environmentally efficient from the start. In 2001, the Board of Education adopted a resolution directing all new schools to meet standards designed by the Collaborative for High Performance Schools. In addition, the district is retrofitting existing schools, like Dahlia Heights Elementary, with more efficient lighting and mechanical equipment.. (Photo Credit: Collaborative for High Performance Schools)

The Los Angeles Unified School District is the second-largest school district in the country, with more than 1,000 facilities and an enrollment of over 725,000 students. The district serves the City of Los Angeles and all or part of 28 other cities, as well as some unincorporated parts of Los Angeles County.

The district recently began the largest school construction and repair effort in its history. Altogether, the district is investing \$19.2 billion in its facilities, working to reduce class sizes and improve the quality of education it offers to students in the region—creating an

environment that is conducive to the learning process, energy efficient and environmentally sustainable.<sup>30</sup>

Energy efficiency has a prominent role in these new construction and repair projects. The district is designing new school buildings to be energy and environmentally efficient from the start. The Board of Education adopted the Collaborative for High Performance Schools (CHPS) standards for all new construction projects—similar to the Leadership in Energy and Environmental Design (LEED) standards developed by the U.S. Green Building



Council. In older schools, the district is investing in energy efficient lighting, installing efficient heating ventilation and air conditioning equipment, and upgrading other systems to use less energy.

In 2005, the district cut its electricity use by 6 percent (roughly 5 million kWh) by installing over 100,000 energy efficient lights and exit signs equipped with efficient light emitting diodes (LEDs). Facilities staff also replaced outdated heating and cooling systems in selected schools with high efficiency mechanical equipment, saving more than 219,000 therms of natural gas per year. These upgrades reduced global warming pollution by over 7 million pounds per year.<sup>31</sup>

“We have a Board of Education and a Facilities Services Division that supports sustainability, energy efficiency and environmental stewardship,” said Ken Davis, Energy and Utilities Manager for the District.

District leaders are also supportive of the dollar savings that energy efficiency projects provide. The lighting upgrades save the district over \$700,000 each year; and the natural gas savings (at current commercial rates) total exceeds \$250,000 annually. The district can devote this money to hiring more teachers, to ensure every student has the opportunity to obtain a quality education.

Mr. Davis noted that some schools within the district have integrated the efficiency process into the very fabric of the school, involving students and teaching them about energy.

Dahlia Heights Elementary School, near Occidental College in Los Angeles, is a good example. In the 2004-2005 school year, Cheryl Lopez, a special education teacher for 2nd and 3rd grade, created a year-long energy curriculum for special education students together with a regular 2nd grade class. The students collaborated on learning about how energy was used at the school and at home—even

looking at school electricity and water bills. The students learned about energy conservation, focusing on 10 different ways to save energy, including compact fluorescent light-bulbs. Finally, the students surveyed ways the school was wasting energy and made a video about their findings, including easy steps to take to reduce energy use. At the end of the school year, the students presented their video to the entire school. The video focused on simple steps, like closing doors while the air conditioning was on, or turning off lights—but it was a powerful way to build awareness in the students.

“The students became little experts on energy,” said Ms. Lopez. “They were thrilled about being able to do something to help the school. Some of the kids still come back to tell me what they’re doing at home. They’ll take the experience with them for the rest of their lives.”

Meanwhile, largely out of view, facilities staff were upgrading the lighting and mechanical systems in Dahlia Heights to use less energy—helping the district as a whole.

In 2006, Ms. Lopez is tackling recycling. With a grant from the City of Los Angeles, her class has set up a recycling station for the cafeteria, reducing waste by over 75 percent—and even netting a \$100 profit to date on recycled cans and aluminum foil.

And at the same time, the district is implementing additional upgrades that will nearly double the energy and cost savings results from 2005, according to Mr. Davis. By operating more efficiently, the district will be able to invest the extra operating money into its students—ultimately strengthening the social and economic health of the L.A. region.

“We have to think about operating efficiently to make it work,” said Mr. Davis. “It takes leadership and awareness from the top all the way down to the guy that turns the wrench.” ■



# Conclusion and Recommendations

These case studies demonstrate that reducing global warming pollution can be profitable for California businesses and institutions.

When companies and institutions think seriously about their energy use, they find opportunities to use less energy, use it more efficiently, and generate it from renewable sources. At the same time, these opportunities can lead to greater financial success by cutting energy costs, reducing exposure to volatile fossil fuel and electricity prices, and attracting environmentally aware customers.

The pioneering businesses and institutions profiled here have all taken action to reduce their global warming pollution—at the same time helping to clean the air, increase energy independence and strengthen California's economy. These actions have been good for the bottom-line.

If all California businesses statewide pursued these same opportunities to reduce global warming pollution, it would have a major impact—both by reducing the state's impact on the global climate and by setting an example for the rest of America and the world to follow. As the world's sixth-largest economy and the 12th largest source of global warming pollution, action in California has worldwide significance.

By adopting policies limiting global warming pollution, California can grow cleaner, safer, more secure and more prosperous in the years to come.

## Policy Recommendations

Just as the companies profiled here are leading California toward solutions to global warming, California should lead the country in reducing global warming pollution.

California should establish policies that encourage all businesses to look closely for cost-effective ways to reduce global warming

pollution. The state should:

### **Limit Global Warming Pollution**

- California should establish mandatory limits on global warming pollution that reduce statewide emissions by 25 percent by 2020 and 80 percent by 2050.

These reductions are needed to stabilize global warming gases in the atmosphere at a level that minimizes the worst impacts of global warming. For example, a report released by the California Environmental Protection Agency predicts that California temperatures could rise by up to 10.5 degrees Fahrenheit by the end of the century, with five times as many extreme heat days in Los Angeles and Sacramento.<sup>32</sup> The increased heat could make the state's snowpack—the major source of fresh drinking water—nearly disappear. In addition, the increased heat would increase the potential for wildfires and cause sea levels to rise, possibly flooding the Sacramento-San Joaquin River Delta.<sup>33</sup>

If emissions of global warming pollution are significantly reduced, the number of extremely hot days in California might increase by only half of the report's forecast.<sup>34</sup>

### **Reduce Dependence on Fossil Fuels**

- California should enforce its new global warming emission standards for automobiles and light trucks, designed to reduce emissions from these sources 30 percent by 2016. State leaders should continue to defend this policy from auto industry lawsuits and work with the federal government to ensure that it is implemented.
- California should enhance funding and remove barriers for large-scale energy efficiency improvements and for distributed generation, including incentive funds, grants, no-interest loans and expanded net metering policies.
- The state should generate more energy

from renewable sources, requiring the state's electric utilities to generate 20 percent of their energy with renewables by 2010 and 33 percent by 2020.

- The state should promote smart growth and transportation alternatives, to reduce dependence on the automobile. The state should also require businesses to implement plans to reduce the number of miles traveled by employees commuting to work alone in their cars.

***Work with Other States and the Federal Government to Promote Implementation of Similar Policies***

- Acting alone, California can make a real and lasting contribution toward solving global warming. However, the impact California could have by leading the rest of the country, and the world, toward the same solutions holds even greater potential benefits. California should encourage other states across the country to follow its lead wherever possible. Additionally, state leaders should work with Congress and the executive branch to advance solutions to global warming at the federal level. ■

# Notes

- <sup>1</sup> Andrew Ruben, Vice President for Corporate Strategy and Sustainability, Wal-Mart Stores, Inc., *Congressional Testimony, U.S. House of Representatives, Committee on House Government Reform*, 20 July 2006.
- <sup>2</sup> Ibid.
- <sup>3</sup> Adobe Systems Incorporated, *Adobe Fast Facts*, June 2006.
- <sup>4</sup> Largest retail property company as measured by equity market capitalization.
- <sup>5</sup> Estimated based on the 2002 emissions intensity for the electric power sector in California. According to the 2002 inventory of global warming emissions from California, consumption of 209,600 GWh of electricity in California was responsible for 95.2 million metric tons of carbon dioxide equivalent (including CO<sub>2</sub> and other gases adjusted by global warming potential). At this rate, every MWh of consumption causes 1,002 pounds of carbon dioxide equivalent emissions; Gerry Bemis and Jennifer Allen, California Energy Commission, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update*, June 2005.
- <sup>6</sup> Estimated based on Westfield's projected savings and the average carbon intensity of U.S. electricity generation. Westfield estimates that the lighting upgrades will save 30 million kWh per year. In 2004, for every kWh of electricity generated, on average the U.S. emitted 1.357 lbs of carbon dioxide: Energy Information Administration, U.S. Department of Energy, *United States Electricity Profile*, DOE/EIA-0629, June 2006. The actual figure could be higher or lower depending on the exact sources of electricity in the regions where the stores are located.
- <sup>7</sup> Assuming the panels operate at 20 percent capacity over a year (roughly the average for California). At this level, the panels would produce 1.6 million kWh per year. Emissions estimate based on the 2002 emissions intensity for the electric power sector in California (See Note 5).
- <sup>8</sup> Assuming that the California energy grid will remain as carbon intensive as it was in 2002.
- <sup>9</sup> SANDAG, *EPA Names Qualcomm Commuter Program Second Best in Nation*, (Press Release), 19 October 2005.
- <sup>10</sup> Assuming an average vehicle fuel economy of 21 miles per gallon: U.S. Environmental Protection Agency, *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2006*, EPA420-S-06-003, July 2006; Global warming emission reductions from those fuel savings were calculated using carbon dioxide coefficients for tailpipe emissions (approximately 19.3 pounds of carbon dioxide per gallon, based on EIA, *Documentation for Emissions of Greenhouse Gases in the United States 2003*).
- <sup>11</sup> Upstream emissions resulting from the production and distribution of gasoline are approximately 5.7 pounds of carbon dioxide per gallon, based on well-to-tank results from General Motors Corporation, Argonne National Laboratory, et al., *Well-to-Wheel Energy Use and Greenhouse Gas Emissions of Advanced Fuel/Vehicle Systems—North American Analysis, Volume I*, June 2001.
- <sup>12</sup> Energy use dropped from 376 billion BTU to 167 billion BTU; and water used dropped from 234 million gallons to 76 million gallons.
- <sup>13</sup> Based on 2005 rates for electricity, gas and water.
- <sup>14</sup> Thomas Properties Group, *Thomas Properties Group Turns Green into Gold*, (Press Release), 19 January 2004.
- <sup>15</sup> "Going GREEN," *Sacramento Business Journal* 19 March 2004.
- <sup>16</sup> Estimated using the 2002 carbon intensity of a MWh of electricity consumption in California

(See Note 5), and translating the BTU figure into kWh equivalent (0.00029 kWh/BTU). The savings is dominated by the fan replacement, alone responsible for more than 4 million lbs per year of avoided carbon dioxide emissions.

<sup>17</sup> San Mateo County Community College District, *Narrative Supporting the Flex Your Power Award Application*, 16 September 2005.

<sup>18</sup> Navy Region Southwest, Regional Energy Program Office, *Energy Case Study: LED Aviation Lights, Naval Base Coronado*, obtained from Mike Magee, Base Energy Manager, Naval Base Coronado on 20 July 2006.

<sup>19</sup> Estimated using the 2002 carbon intensity of a MWh of electricity consumption in California (See Note 5); and the savings from the measures, approximately 2.7 million kWh per year.

<sup>20</sup> As estimated by the Navy: Navy Region Southwest, Regional Energy Program Office, *Energy Case Study: 750 kW Photovoltaic System, Naval Base Coronado*, obtained from Mike Magee, Base Energy Manager, Naval Base Coronado on 20 July 2006.

<sup>21</sup> As quoted in: California Portland Cement Company, *EPA Names California Portland Cement Company Energy Star® Partner of the Year*, (Press Release), 21 March 2005.

<sup>22</sup> Steve Copping, Chief Electrical Engineer, California Portland Cement Company, *Energy Management at California Portland Cement*, Presented at the California Energy Commission, 2005 Energy Report Committee, Climate Change Workshop, Sacramento, CA, 12 July 2005.

<sup>23</sup> Ibid.

<sup>24</sup> See Note 21.

<sup>25</sup> See Note 22.

<sup>26</sup> Bernadette Del Chiaro, Environment California Research & Policy Center, *Rave Reviews for Solar Homes: A Survey of Homeowners in California*, March 2006.

<sup>27</sup> Estimated based on an assumed reduction in electricity and natural gas use of 67 percent, compared to a typical household with an assumed monthly average household electricity consumption of 550 kWh per month and natural gas consumption of 40.5 therms per month, leading to 864 pounds of carbon dioxide per household. Further assumed that the apartment building units, because of smaller size and efficiency advantages, use 50 percent of the energy of an average household; and the townhomes use 75 percent.

<sup>28</sup> California Building Industry Association, *New Home Market to Ease Back*, (Press Release), 21 July 2006.

<sup>29</sup> Assumed average conventional housing unit global warming impact of 800 pounds per month and increased energy performance of 67 percent.

<sup>30</sup> Los Angeles Unified School District, Facilities Services Division, *Building the Learning Community*, downloaded from [www.laschools.org](http://www.laschools.org) on 31 July 2006.

<sup>31</sup> Assuming an average emissions rate of 1002 lbs of CO<sub>2</sub> per MWh consumed from the California electricity grid (See Note 5) and 14.47 million metric tons carbon equivalent per quad BTU of natural gas consumption; U.S. Department of Energy, Energy Information Administration, *Documentation for Emissions of Greenhouse Gases in the United States 2003*, May 2005.

<sup>32</sup> California Climate Change Center, *Our Changing Climate: Assessing the Risks to California*, July 2006; Jane Kay, "If You Thought Last Week Was Hot... Higher Temperatures, Rising Ocean, Loss of Snowpack Forecast for State," *San Francisco Chronicle*, 1 August 2006.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid.