

Greening the Bottom Line 2012

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 **Anheuser-Busch InBev Fairfield Sonoma County** • 6 million lbs pollution reduced annually **Family YMCA** • \$1.6 million saved over 20 years Santa Rosa • 200,000 lbs pollution reduced annually • \$250,000 saved over 15 years **Clif Bar Emeryville** • 8.7 million lbs pollution reduced annually \$145,000 saved annually **Golden Valley Unified School District** San Mateo Community Madera **College District** • 2.3 million lbs pollution reduced San Mateo County • \$250,000 saved within five years • 1.6 million lbs pollution reduced since 2007 • \$275,000 saved annually **Century Plaza Towers** Los Angeles • 4 million lbs pollution **Gills Onions** reduced annually \$900,000 saved annually **Oxnard** • 4 million lbs pollution **Constellation Place** reduced annually Los Angeles • \$800,000 saved annually • 1.2 million lbs pollution reduced annually \$100,000 saved annually **Marine Corps Base and Marine Corps Air Station Camp Pendleton** San Diego County **Marine Corps Air** • 9.5 million lbs pollution **Station Miramar** reduced annually \$900,000 saved annually San Diego • 250 million lbs pollution reduced annually • \$800,000 saved annually

Executive Summary

educing global warming pollution is critical to protecting California's environment, but doing so can also deliver big rewards for our state's economy.

All across California, businesses, farms, government agencies, schools and nonprofits are demonstrating that action to reduce heat-trapping emissions can improve competitiveness and strengthen the bottom line. Energy efficiency measures and clean energy projects reduce waste, cut energy costs, limit exposure to fossil fuel price spikes, and attract environmentally aware customers.

This report highlights ten organizations that have made investments in clean energy solutions, together reducing their emissions of global warming pollution by the equivalent of over 280 million pounds of carbon dioxide per year while saving more than \$4 million annually.1

The steps these organizations have taken to reduce their operating costs and reduce global warming pollution are quickly becoming the norm in the Golden State. California should continue to adopt and

strengthen sensible policies that encourage clean energy and energy efficiency innovations, such as the Million Solar Roofs Initiative and the Electric Program Investment Charge. This will ensure that all of California's communities will be able to make inroads into a clean, sustainable energy future.

Gills Onions – Oxnard

Gills Onions, a family-owned onion grower in Oxnard, installed a biogas energy system to turn its own crop waste into electricity. Using onion peels, the system generates 60 percent of the annual energy needs of the onion processing plant. The system has also greatly reduced truck trips formerly needed to haul away onion waste.

- Gills Onions reduced emissions of carbon dioxide pollution by over 4 million pounds per year, helping California to fight global warming.
- In 2010, Gills Onions saved \$800,000 through energy savings and reduced labor and transportation costs.

Golden Valley Unified School District – Madera

Golden Valley Unified School District is using renewable energy to help combat the state budget crunch. It purchased a 1.1-megawatt solar photovoltaic (PV) system that supplies 80 percent of the district's total annual electricity consumption.

- The solar array prevents 2.3 million pounds of carbon dioxide pollution each year.
- The school district expects to achieve up to \$250,000 in cumulative energy savings by 2017 and up to \$9 million in cumulative energy savings after 25 years of operation.

Anheuser-Busch InBev – Fairfield

Anheuser Busch installed a large, utility-scale 1.5-megawatt wind turbine at its Fairfield Brewery in 2011, adding to a 1.2-megawatt solar array and a biogas energy system fueled by brewing waste products. On a net annual basis, the turbine produces about 20 percent of the electricity needed at the plant.

- The wind turbine reduces carbon dioxide pollution by 6 million pounds per year.
- The wind turbine alone will reduce energy costs by \$1.6 million to \$2.5 million over a 20 year period.

Sonoma County Family YMCA – Santa Rosa

The Sonoma County Family YMCA installed a 273-kilowatt solar PV array in its parking lot. The solar array produces 80 percent of the facility's electricity needs and also doubles as a shade structure for vehicles. The YMCA has also installed energy-efficient lighting and an efficient pool heater.

- The solar system will offset 219,000 pounds of carbon dioxide emissions and reduce over 3,000 pounds of other unhealthy pollutants each year.
- At the same time, the solar system will save up to \$250,000 in energy costs over a 15-year period.

San Mateo Community College **District – San Mateo County**

The San Mateo Community College District, which consists of College of San Mateo, Cañada College in Redwood City and Skyline College in San Bruno, has built five LEED Gold certified buildings as part of a capital improvement plan. These buildings incorporate energy-efficient lighting, cool roofs, and digital temperature control systems to reduce energy consumption by as much as 34 percent compared to similar buildings constructed to code.

- Energy efficiency improvements have eliminated 1.6 million pounds of carbon dioxide pollution since 2007.
- The new buildings reduced annual electricity costs by \$275,000.

Marine Corps Air Station Miramar – San Diego

The Marine Corps considers energy independence to be a top priority, and it has pursued renewable energy projects to reduce its reliance on fossil fuels from the commercial power grid. The Marine Corps Air Station at Miramar is halfway towards a goal of producing all of its electricity from on-site sources by 2017, with the bulk of this energy coming from a 3.2-megawatt landfill methane gas plant.

- MCAS Miramar is eliminating the equivalent of over 250 million pounds of carbon dioxide pollution each year.
- The base reduced its energy bills by an estimated \$820,738 in 2012.

Marine Corps Base and Marine **Corps Air Station Camp Pendleton** San Diego County

Camp Pendleton has installed more than 2 megawatts of solar PV capacity throughout the base, including a 1.4-megawatt array constructed on top of a sealed-off landfill. The Air Station has also installed an innovative skylight system in several of its hangars and buildings, maximizing natural lighting and reducing energy usage.

- Camp Pendleton's renewable energy systems have reduced carbon dioxide pollution by over 8 million pounds through the first ten months of FY 2012, and the skylight systems eliminate nearly 1.4 million pounds of carbon dioxide annually.
- Camp Pendleton has also saved \$844,754 in energy costs through the first ten months of FY 2012, while the skylights save \$103,000 in energy costs each year.

Clif Bar – Emeryville

At its headquarters building in Emeryville, Clif Bar has installed a 531-kilowatt "smart" solar array and solar water heating system. The company also uses recycled packaging materials to ship its products.

Clif Bar's solar array and use of recycled packaging reduce carbon dioxide pollution by more than 8.7 million pounds per year.

The solar array reduces energy costs by \$145,000 each year—savings that are expected to grow between 5-7 percent annually.

Century Plaza Towers – Los Angeles

The Century Plaza Towers became a LEED Gold rated building in 2011, a rare standard among high-rise office buildings. To achieve this distinction, CBRE Group invested in a variety of state-of-the-art energy efficiency improvements, hightech transportation solutions, and other sustainability initiatives including a highly efficient heating and cooling system, lighting improvements, and special window coating to help keep interior areas of the building cool. Its most significant measure, however, is a ParkHelp System in its parking garage that guides drivers to vacant parking spaces, reducing traffic congestion and achieving significant fuel savings.

- The various measures reduce global warming pollution by an estimated 4 million pounds annually.
- Building owner, CBRE Group, expects to save more than \$900,000 annually thanks to their investment in energy efficiency.

Constellation Place – Los Angeles

Constellation Place, a 35-story high-rise office building, implemented a variety of energy efficiency measures and was the first high-rise office building in Los Angeles to achieve a LEED Silver designation in 2008 and LEED Gold certification in 2010. Its chief sustainability achievement is an almost 1 megawatt (MW) solar PV system that is one the largest urban arrays in the city of Los Angeles.

• The roof-mounted 1 MW solar

- photovoltaic systems reduces global warming pollution by an estimated 1.2 million pounds each year.
- The solar electric systems alone are saving Constellation Place an estimated \$100,000 annually.

Policy Recommendations

By promoting strategies that reduce global warming pollution, California can position itself to become cleaner and more prosperous. California can also help businesses and consumers save money while creating jobs. Toward this end, California should:

• Limit global warming pollution by implementing AB 32.

- Auction 100 percent of emission allowances through the AB 32 cap-and-trade program and use revenues from auctions to support clean energy programs, energy efficiency, and clean transportation.
- Promote large-scale energy efficiency improvements and distributed generation with financial incentives and expanded net metering policies.
- Generate at least 33 percent of its electricity from renewable sources by 2020 and increase the requirement going forward.
- Work cooperatively with other states and the federal government to encourage and adopt similar global warming solutions.

Introduction

lobal warming is the most important environmental challenge of the 21st century. It is also a challenge that quintessential American businesses like Coca-Cola have decided to address.

"The consensus on climate science is increasingly unequivocal," says Coca-Cola's climate protection position statement. "We have a role to play in ensuring we use the best possible mix of energy sources, improve the energy efficiency of

"The consensus on climate science is increasingly unequivocal."

Coca-Cola's climate protection position statement

our manufacturing processes, and reduce the potential climate impact of the products we sell."2

For Coca-Cola, global warming is not merely an

inconvenience, but rather represents a problem that cuts to the core of its business model. For instance, global warming is likely to have negative ramifications for global agricultural production, potentially increasing the cost of Coca-Cola's ingredients.3

This is why Coca-Cola has committed itself to being part of the solution to global warming. For example, the company reduced its greenhouse gas emissions from global manufacturing by 286.6 million pounds in 2010, a two percent decrease from the previous year. Coca-Cola has also installed 400,000 hydrofluorocarbon (HFC)-free cooling systems throughout the globe as of August 2011, reducing pollution of harmful HFCs. By ultimately phasing out all HFC-producing equipment, Coca-Cola will reduce its global warming pollution by the equivalent of over 115 billion pounds of carbon dioxide.4

Coca-Cola has also used energy efficiency to achieve cost savings. For example, all of Coca-Cola's new glass-door coolers and 95 percent of its new vending machines and fountain machines use at least 40 percent less energy than older models. By embracing energy efficient business practices, Coca-Cola reduced energy costs by \$163 million in 2010, representing a major gain for the bottom line.5

Coca-Cola's experience shows that it is pos-

sible for businesses and other institutions to make tremendous strides to reduce global warming pollution. Moreover, it is also possible to do so in a way that provides a boon to California's economy.

This report highlights ten different institutions that have invested in energy efficiency solutions and clean renewable energy projects. As a result, these institutions—which run the gamut from businesses, government agencies, schools, farms, and nonprofits—have reduced global warming pollution and helped the environment, all while strengthening their own bottom lines.

California and its businesses have access to a wealth of opportunities to achieve economic and environmental breakthroughs. For example, California has some of the strongest distributed solar power resources in the United States, with statewide capacity at over 1 gigawatt and increasing.⁶ It is also enhancing energy efficiency standards in buildings. Rajendra Pachauri, the chairman of the United Nations Intergovernmental Panel on Climate Change, has argued that building efficiency represents the "largest potential for the reduction of emissions" in California. In May 2012, the California Energy Commission responded, adopting rules that will boost the energy efficiency of new buildings by as much as 30 percent.8

California not only has the muscle to get the job done, but also has the potential to establish itself as a global green economic leader. It is one of the world's ten largest economies,9 and as might be expected, it is also the 12th largest emitter of greenhouse gases.¹⁰ Achieving deep cuts in carbon dioxide and other pollution sources will not be easy, but as these stories will show, California has the economic strength to get the job done. Sustaining a cooperative effort where all Californians find ways to contribute—including businesses and job creators—will enshrine California as a model for the rest of the world.

Good policymaking will be crucial to the success of these efforts. By strengthening legislation and policies that reduce global warming pollution, such as AB 32, the Million Solar Roofs Initiative, and the Electric Program Investment Charge, California can incentivize more businesses and other entities to take advantage of these opportunities. Widespread adoption of "green" energy practices is a surefire way to promote economic growth, protect the environment, and improve our collective quality of life.

The time for action on global warming is at hand. These stories will demonstrate how Californians have already made investments to reduce their greenhouse gas emissions while achieving profitable returns. Their success should inspire others to follow in turn.

Gills Onions Oxnard, California



Gills Onions operates an Advanced Energy Recovery System that converts onion waste into energy, saving the company \$800,000 and eliminating 4 million pounds of global warming pollution each year. Credit: Gills Onions

- **Cut global warming pollution** by over 4 million pounds per year.
- Produces all of its onion processing plant's baseload electricity needs using energy from onion peels and scraps, saving \$800,000 in 2010.

ills Onions, located in Oxnard, CA, is one of the world's largest familyowned onion farms and onion processing facilities. Since its founding in 1983, Gills Onions has distinguished itself as an environmental leader in the agricultural sector.

Gills Onions' processing facility produces a significant amount of onion waste in the form of peels, tops, and tails—up to 1.5 million pounds of waste in any given week, or enough material to fill 75 dump trucks or tankers.11 Prior to 2009, Gills Onions disposed of this onion waste by spreading it over onion fields for use as a fertilizer, a practice that is standard in the industry. However, this method required intensive labor and handling and had significant environmental drawbacks.12

Gills Onions decided to repurpose its onion waste in a sustainable way. In July 2009, the company installed an Advanced Energy Recovery System. The system transforms waste onion peels into biogas. Then, the biogas fuels a pair of 300 kilowatt hydrogen fuel cells, which generate clean, local electricity. Any remaining solid onion waste ends up as cattle feed.¹³

The system produces all of the plant's baseload electricity needs—equivalent to approximately 60% of its electricity usage in a typical year.14 This saves the company about \$700,000 annually in avoided electricity costs. By preventing truck trips to haul onion waste off site, the biomass energy system also saves the company another \$400,000 in avoided waste disposal expenses.15 The annual operating cost of the system is just \$300,000, resulting in \$800,000 in savings in 2010.16 Gills Onions expects the savings to fully cover the cost of the system within 6 years, generating a strong return on its investment.¹⁷

To help finance the \$10.8 million project, Gills Onions took advantage of several state and federal clean energy incentives. These included a \$2.7 million grant from Sempra Energy as part of California's Self Generation Incentive Program, as well as \$3.2 million from the American Recovery and Reinvestment Act.¹⁸ In addition, Gills benefited from a \$499,000 Research, Development and Demonstration grant from the California Energy Commission to conduct research to evaluate the biogas produced at Gills Onions and to demonstrate gas cleaning and conditioning of the high sulfur contaminated biogas so that it can be used in the fuel cell power plant.¹⁹

"We believe the driving force behind sustainability starts with a good business case," said Nikki Rodoni, director of sustainability at Gills Onions. "We set out to discover the economic savings that also translate into environmental benefits."

These environmental benefits stem from both clean energy generation and waste diversion. Electricity from the two fuel cells prevents 112,000 cubic feet of natural gas combustion each day. The reduced truck traffic saves 40,000 gallons of diesel fuel annually.²⁰ The system also reduces over 4 million pounds of carbon dioxide pollution associated with grid electricity usage each year.²¹ In addition, Gills benefited from another California Energy Commission grant in the amount of \$400,000 to demonstrate the use of a membrane filtration system to clean and reuse wastewater produced from Gills Onions. This reclaimed wastewater will be used in the evaporative cooling towers at the processing plant. This could reduce fresh city water demand by 45,000 gallons per day, decrease the volume of wastewater disposed, and ultimately further reduce energy associated with water conveyance and treatment."22

In 2012, Gills Onions began operating

the world's largest vanadium flow battery system. The system allows Gills Onions to store energy produced by its onion-powered fuel cells for long periods of time. During parts of the day when electricity rates are lowest, the battery system stores energy, and when expensive peak rates come into effect, the battery discharges power. This arrangement maximizes the cost savings of the system.

"It is an opportunity to help stay ahead of regulation and appeal to the growing segment of environmentally-conscious buyers," Ms. Rodoni added.

Gills Onions has also taken steps to make their transportation operations more efficient. In 2009, Gills Onions partnered with the University of California, Santa Barbara's Bren School of Environmental Science and Management to calculate vehicle usage, energy consumption, and emissions of their vehicle fleet. Together, they concluded that vehicles were responsible for over 38 percent of the company's energy consumption.²³ Furthermore, they found that Gills Onions relied almost entirely on diesel to meet its fuel demands.

Gills Onions responded with several measures to reduce transportation emissions. For example, the company replaced its fleet of trucks with more efficient Freightliners and equipped them with lighter wide-base tires. As a result, the company reduced transportation energy usage by 20 percent and eliminated 40,000 gallons of diesel fuel consumption per year. It also prevented at least 266,750 pounds of carbon dioxide pollution annually and ensured that the company will be in compliance with California's 2017 vehicle smog regulations.²⁴

"We understand that adopting sustainable practices is not only the right thing to do, but also makes our business more efficient," said Ms. Rodoni.

Golden Valley Unified School District

Madera, California





These solar panels at Webster Elementary School are part of a 1.1 megawatt solar PV project installed by Golden Valley Unified School District. Credit: Cupertino Electric, Inc.

- **Obtaining 80 percent of district** electricity needs from on-site solar power, reducing carbon dioxide emissions by 2.3 million pounds per year.
- Projected to achieve cumulative energy cost savings of \$250,000 within five years, with even greater energy savings in subsequent years.

ike all public school districts in California, the Golden Valley Unified School District (GVUSD), located east of the Central Valley town of Madera, California, has had to contend with a challenging fiscal climate created by the state's ongoing budget crisis. This was made possible without upfront expenditures through several affordable funding mechanisms.

Rising energy costs have a significant impact on school district budgets. According to ENERGY STAR, the federal government's energy efficiency program, America's K-12 school districts spend nearly \$6 billion on energy costs each year—or more money than is spent on textbooks and computers combined.25 This poses a significant drain on school finances.

GVUSD has adopted a strategy to reduce energy costs through renewable energy solutions, thereby preserving precious dollars for its schools. In June 2012, the district oversaw the finishing touches on several brand new solar power systems installed at four schools and its headquarters building. TerraVerde Renewable Partners, a California renewable energy company based in Larkspur, was responsible for advising the district on the project.

Cupertino Electric, the main contractor on the project, installed nearly 4,000 solar photovoltaic panels on district property, with a combined capacity of more than 1.1 megawatts. Eighty percent of the panels are mounted at ground level on unused property, while twenty percent of the panels are elevated and double as shade structures for parking lots and outdoor play areas. GVUSD expects to produce approximately 1.7 million kilowatt-hours (kWh) of electricity annually, accounting for over 80 percent of its total electricity consumption on a net annual basis. In fact,

seven of the district's ten utility meters will be offset exclusively through solar power, offsetting 98% of the District's electricity bills at those meters.²⁶

GVUSD decided to purchase the solar installation outright, rather than rely on a leasing agreement. This was possible without upfront expenditures, as the district took advantage of several affordable funding mechanisms. The California Energy Commission approved a low interest loan to cover approximately half the cost, payable over 15 years. The rest was covered by sales of Certificates of Participation (COPs), a form of lease financing often used by California school districts. COPs are tax-exempt obligations and are typically repaid from the district's general fund, from developer fees, or in the case of solar power, from energy cost savings and incentives generated by the project. The district will have the option of making early payments on both the loan and COPs if surplus funding allows.²⁷

Dr. Rick Brown, President of TerraVerde, said that the arrangement would produce immediate savings. "The prime motivation for the district is to reduce electricity costs over the long-term," he said.²⁸

The district will save money in two ways. First, the amount of money the district spends on monthly repayments and solar maintenance costs will be less than what the district had previously paid Pacific Gas and Electric for an equivalent amount of grid-based electricity. And second, while the price of energy is likely to increase in the future, the district's solar electricity costs will remain almost the same as they are today, thanks to fixed monthly repayment rates.

"Our annual cost of electricity will be no greater than what we paid in the last year before we converted to solar," said Andy Alvarado, GVUSD Superintendent.²⁹

The cost savings for the district are considerable, and they will be noticeable within the first year of operation. By 2017, the district will have achieved net cumulative savings of more than a quarter million dollars. And over twenty-five years, the district has the potential to accumulate nine million dollars in total savings.

There are also substantial revenue opportunities for the district. The district will have access to a performance-based incentive program offered by PG&E via the California Solar Initiative. The district will have five years of eligibility for the program, during which it will receive a monthly rebate based on the amount of solar electricity it generates. Dr. Brown also added that the district should be able to sell renewable energy credits valued at approximately \$700,000 over the next 25 years.³⁰

The solar installation will also have tremendous benefits for the environment on top of their value as an educational resource. The project will eliminate 2.3 million pounds of carbon dioxide pollution on an annual basis.³¹

The project will also help put a dent in the Central Valley's notoriously poor air quality.³² The district's solar electricity usage will prevent the emission of more than 2,300

pounds of unhealthy chemical pollutants like sulfur dioxide, oxides of nitrogen, particulate matter, and volatile compounds each year.³³

"Our Board was committed to leaving a legacy...for succeeding genera"Our Board was committed to leaving a legacy... for succeeding generations of students, parents, staff and our community."

Andy Alvarado, Superintendent

tions of students, parents, staff and our community," Superintendent Alvarado concluded.

Anheuser-Busch Brewery

Fairfield, California



Anheuser-Busch InBev constructed a 1.5-megawatt wind turbine at its Fairfield brewery, meeting 20 percent of its annual on-site electricity needs. Credit: Foundation Windpower

- Installed an on-site 1.5-megawatt wind turbine.
- **Reducing 6 million pounds** of carbon dioxide pollution annually and saving at least \$1.6 million over twenty years with wind energy.

he brewing industry is a major part of California's economy. According to statistics from the Brewers' Almanac, which is published annually by the Beer Institute, California leads the nation in the number of breweries that are based in the state. The industry also claims to directly or indirectly support nearly a quarter million jobs in California.34

One of the largest breweries in the state is the Anheuser-Busch InBev facility in Fairfield. The 700,000 square-foot brewery produces 4.4 million barrels of beer annually.35 It is also a familiar sight for motorists who travel on Interstate 80 between Sacramento and the San Francisco Bay Area, thanks to the prominent "Budweiser" sign emblazoned on the side of the building.

In November 2011, the view from the freeway became even more memorable. The brewery installed a wind turbine on its property that towers over 300 feet in height.

The \$4 million General Electric turbine takes advantage of the area's substantial wind potential, which is fed by the presence of nearby waterways like the Suisin Bay. In fact, the Fairfield brewery is less than twenty miles from one of Northern California's largest wind farms, located in the Montezuma Hills near Rio Vista.

The wind turbine itself has a capacity of 1.5 megawatts, and on an annual basis, the brewery expects to generate approximately 3.5 million kilowatt-hours (kWh) of electricity—enough to power nearly 400

homes. The brewery has estimated that the turbine will meet up to 20 percent of its yearly electricity needs,³⁶ or enough energy to produce 25,000 cases of beer per day, on average.³⁷

The environmental benefits are also substantial. Because wind energy is clean and produces no emissions, the turbine is expected to help prevent the The brewery has estimated that the turbine will meet up to 20 percent of its yearly electricity needs, or enough to produce 25,000 cases of beer per day, on average.

emission of more than 6 million pounds of carbon dioxide pollution each year.³⁸

Although Anheuser-Busch owns the land where the turbine is sited, the company did not purchase the wind turbine. Instead, Anheuser-Busch signed a power purchasing agreement with Foundation Energy, a renewable energy company based in San Francisco. The power purchasing agreement allows Anheuser-Busch to reap the advantages of the wind turbine with minimal upfront cost. Under this arrangement, Foundation Energy owns and operates the turbine on leased land, and then sells the electricity back to the brewery to achieve a return on its investment.

Foundation Energy estimates that customers such as Anheuser-Busch can cumulatively save between \$1.6 million and \$2.5 million over the lifetime of their agreements, which extend for a minimum of

twenty years.³⁹ These savings are achieved because the power purchaser (in this case, the brewery) is locked into paying a stable rate that remains the same regardless of projected increases in utility electricity prices.

Anheuser-Busch and Foundation Energy also took advantage of financial incentives to make the project a reality, which came in the form of state rebates designed to bring California closer to its goal of producing 33 percent of its power from renewable sources by 2020.⁴⁰

In addition to its wind turbine, the Fairfield brewery has also developed other alternative energy projects with great success. For example, it has worked with SunEdison to install approximately 6500 solar panels on 6.5 acres of its property;⁴¹ the solar panels have a capacity of 1.2 megawatts and satisfied 3 percent of the brewery's electricity demand in 2009.⁴² In optimal weather conditions—namely, with the sun shining and the wind gusting—the brewery can generate up to half of its electricity needs from their on-site wind and solar energy projects.⁴³

Furthermore, the brewery has replaced 15 percent of its natural gas use through a bio-energy recovery system (BERS). The BERS system converts nutrients in brewing wastewater into a renewable methane biogas that can be used for energy. Anheuser-Busch utilizes such systems at facilities all over the country, making it the nation's largest BERS operator.⁴⁴

Sonoma County Family YMCA

Santa Rosa, California



The Sonoma County Family YMCA installed carportmounted solar PV system in its parking lot. The YMCA expects to save up to \$250,000 over a 15-year period. Credit: SolarCity

- Constructed a 273 kilowatt solar PV carport system, reducing carbon dioxide emissions by more than 200,000 pounds annually
- Achieving energy savings of \$250,000 over a 15-year period

onprofit organizations often provide valuable services to California's residents and can greatly improve the quality of life in their communities. In Santa Rosa, one such organization—the YMCA—has taken advantage of solar power to reduce its energy costs, contribute to cleaner air, and better promote its core values of youth development, healthy living, and social responsibility. In 2009, the Sonoma County Family YMCA, led by CEO David Brown, consulted with TerraVerde Renewable Partners and contracted with SolarCity to plan and develop a solar project for its Santa Rosa campus.

The solar installation consists of 1,162 photovoltaic solar panels with a combined capacity of 273 kilowatts. According to Mr. Brown, the solar panels are currently supplying 80 percent of the YMCA's power needs on a net annual basis.45

The installation was constructed in the YMCA's parking lot, with solar panels mounted on top of a carport structure. This was an ideal design solution that accommodated the YMCA's small property size, and as Mr. Brown pointed out, the carport also has added advantages.

"Not only does it provide alternative electricity generated through our solar panels, it also provides shade for the cars that park there during the hot summer," he said.

To fund the project, the YMCA entered into a power-purchasing agreement with SolarCity, allowing it to obtain long-term savings without up-front expenditures. YMCA members did not bear the capital cost of the solar panels. Instead, SolarCity owns the solar panels and operates them for the YMCA, which will purchase the electricity it obtains from the panels at fixed rates over a 15-year period.

Over the life of the agreement, Mr. Brown expects the YMCA to save approximately \$250,000 on electricity costs—savings that can be used to benefit Sonoma County residents. Because the YMCA chose to have SolarCity finance the project, most of the cost savings will be accrued in the later years of the contract, when grid-based electricity is projected to become more expensive. The YMCA's electricity costs will remain stable in the interim.

SolarCity took advantage of several incentives to help the YMCA achieve these cost savings. They secured cash rebates from Pacific Gas and Electric through the California Solar Initiative. SolarCity also received a renewable energy investment tax credit from the federal government. And most importantly, California's net metering policy allows SolarCity to receive a credit for excess power that the solar panels deliver to the grid. All of these programs help SolarCity pay for the upfront costs of this solar PV system.

The solar panels also help the environment by reducing greenhouse gas emissions and other pollutants. According to the YMCA, the solar panels are expected to offset 219,000 pounds of carbon dioxide emissions annually. Over a 15-year period, the YMCA will also eliminate 2,000 pounds of nitrogen oxides, 500 pounds of sulfur dioxide, and 600 pounds of particulate matter.⁴⁶

In addition to the solar panels, the YMCA has incorporated other sustainable building features in its facility. These include energy efficient lighting, efficient toilets and showers that conserve water, and a more efficient pool heater. Mr. Brown estimated that the upgrades have reduced energy costs by about twenty percent, even as the facility

has expanded in recent years to better serve the community.⁴⁷

"Our prime motivation is to be good stewards of the Y," said Mr. Brown. "Being a community organization,

"We need to
be a leader in
preserving our
natural resources
and demonstrating.
that things can
be done without
a reduction in
service."

CEO David Brown

we need to be a leader in in preserving our natural resources and demonstrating to our membership that things can be done without a reduction in service or reduction in performance."

San Mateo County Community College District

San Mateo County, California



The Health and Wellness Center at College of San Mateo is one of five ultra-efficient LEED Gold buildings built by the San Mateo County Community College District. Credit: San Mateo County Community College District.

- **Constructed five LEED Gold** certified buildings as part of capital improvement plan.
- Saving \$275,000 in annual energy costs and reduced carbon dioxide pollution by over 1.6 million pounds since 2007 by increasing energy efficiency.

an Mateo County Community College District is comprised of three community colleges in the San Francisco Bay Area: College of San Mateo, Cañada College in Redwood City and Skyline College in San Bruno. These three schools offer courses in subjects like business administration, nursing, and computer science that cater to both transfer students headed to four-year universities as well as students in vocational and certification programs. They have a combined enrollment of approximately 40,000 students.

In 2002, the District launched a comprehensive effort to upgrade its aging infrastructure, implementing a suite of energy efficiency measures designed to rein in energy expenses. In 2006, Environment California highlighted the District's initial progress on this front.⁴⁸ The district installed advanced lighting systems and upgraded temperature controls. The District also installed two cogeneration units, which generate both electricity and useful heat. Together, these and other efficiency measures contributed to a 56 percent district-wide reduction in energy use and a 6 million pound annual reduction in greenhouse gas emissions.

Since then, the District has continued to improve its overall energy efficiency through its modernization initiative. The second phase of the capital improvement plan, known as CIP2, authorized the construction of five LEED Gold rated buildings on District campuses.⁴⁹ This fell in line with the directive of the Board of Trustees, which pushed for the new facilities to meet "green building" design guidelines and standards as a way of increasing sustainability, promoting environmental stewardship, and maximizing energy efficiency.⁵⁰

College of San Mateo (CSM) constructed the largest of the five buildings. One, the Health and Wellness Building, is an 88,000 gross square foot venue that is home to programs in cosmetology, nursing and dental assisting, as well as a fitness and aquatic center. During construction of the building, 32 million pounds of waste, or nearly 97 percent of waste produced by the project, was recycled or otherwise diverted from area landfills. The building itself consumes about 34 percent less energy and 46 percent less water than similarly sized structures built strictly to code.⁵¹ And in 2011, Sustainable San Mateo County, a nonprofit sustainability education group, recognized green design of the Health and Wellness building with a Green Building Award. The county government's RecycleWorks waste reduction program and the San Mateo County Chapter of the American Institute of Architects also recognized CSM through the award process.

The second building CSM constructed, the 143,000 GSF College Center, was also built to LEED Gold Standards. Forty percent of the building's construction materials came from recycled content, and 11 percent of construction materials were procured from local sources.⁵² The U.S. Green Building Council lauded the College Center as "a pioneering example of sustainable design that demonstrates the college district's leadership in transforming the building industry."⁵³

Furthermore, CSM achieved sustainability gains through renovating academic and faculty office buildings, installing cool roofs, and implementing digital controls for energy systems. CSM constructed a central chiller plant to distribute energy efficient cooling to each of the campus' main facilities. The majority of campus parking lot light fixtures were also replaced with energy efficient LED lighting.⁵⁴

The two other colleges in the District have also made strides to modernize and "green" their facilities. At Cañada College, the District constructed a 15,000 GSF LEED Gold Facilities Maintenance Center. The College also renovated the Student Center, a primary academic building, and the Science Complex. As with CSM, these facilities were connected to a central chilled water plant and were equipped with digital energy controls and cool roofs. 55

Skyline College constructed a pair of LEED Gold buildings—the Multicultural, Cosmetology, and Administration Building, which is approximately 73,000 GSF, and the Facilities Maintenance Center, which is approximately 15,000 GSF. The College also supplemented new digital energy controls and cool roofs in the Science Building with upgraded energy efficient lighting.⁵⁶

The District's energy-efficient facility improvements have significantly reduced its energy consumption. Since 2007, the District has reduced electricity consumption by 1.7 million kilowatt-hours (kWh) and reduced natural gas consumption by 55,000 therms.⁵⁷ As a result, the District avoided approximately 1,630,330 pounds of carbon dioxide pollution from these

energy sources over the same time period.⁵⁸

In addition to the environmental benefits offered by the projects, the District is reap"San Mateo
Community College
District is committed to
reducing operational
costs and improving
the environment."

Chancellor Ron Galatolo

ing substantial energy savings from its energy efficient facilities. Since 2007, the District has saved an estimated \$275,000 per year on energy costs, and these savings are expected to increase as energy prices rise over time. The District has also

benefitted from over \$750,000 in energy incentives from local utilities.⁵⁹

The District also plans to further expand its sustainability efforts in the future. As funding becomes available, the District will explore the potential to install renewable energy facilities, such as solar photovoltaic panels or micro wind turbines.60 Future renovations and new construction projects will also abide by the District's commitment to energy efficiency.

"San Mateo Community College District is committed to reducing operational costs and improving the environment by incorporating energy efficient and sustainable practices in its facilities, capital projects, and enterprises functions," said Ron Galatolo, Chancellor of the District.

Marine Corps Air Station Miramar

San Diego, California

- Obtaining approximately half of its electricity from on-site renewable sources, including solar PV and a landfill gas plant.
- Saving more than \$800,000 annually in energy costs and eliminating over 250 million pounds of carbon emissions each year through renewable energy and energy efficiency.



MCAS Miramar is generating nearly half of its power from this landfill gas plant, which converts methane into on-site energy. Credit: MCAS Miramar

arine Corps Air Station (MCAS) Miramar, located near San Diego, is home to over 15,000 service members and their families. It is best known as the headquarters of the 3rd Marine Aircraft Wing, the Marine Corps' main aviation presence on the West Coast. At Miramar, the Marine Corps is demonstrating that American ingenuity and technological might go beyond the design of advanced fighter jets to include innovations in clean energy from big to small. In fact, at bases throughout the state, the Marines are proving that clean energy solutions can be harnessed to enhance mission readiness and better serve and protect American interests—including California's environment.

MCAS Miramar is developing the capability to become completely independent from the commercial electricity grid by 2017.

This means that the base will be able to obtain all of its electricity from on-site energy sources. ⁶¹ The majority of this energy will be renewable—and in fact, Miramar is already obtaining about half of its electricity from on-site renewable sources. This exceeds service-wide targets that have been set by the Marine Corps, which is seeking to reduce energy intensity (energy used per square foot of facility space) 30 percent by 2015 and increase renewable energy consumption to 25 percent of all electricity consumed by 2025. ⁶²

Miramar's progress also exceeds benchmarks set by Executive Order 13514, which requires the Department of Defense to obtain 20 percent of its electricity from renewable sources by 2020.⁶³

Energy security and energy independence have become increasingly important

priorities for the United States military, particularly in regards to military bases and other installations. In 2010, the Department of Defense reported that over 500 such installations were reliant on the commercial power grid for electricity.⁶⁴ The DoD considers this to be highly problematic because disruptions to the power grid can disrupt critical operations at these installations, many of which are directly involved in supporting missions overseas.

In response, the Department of Defense has adopted a strategy to increase the production of on-site energy at military bases. Renewable energy is uniquely suited for this role. First, renewable energy sources like wind and solar can be deployed on a scale that is small enough to be entirely independent of the grid, yet large enough to meet a significant portion of bases' energy needs. And second, renewable energy is not prone to price fluctuations and supply shortages that plague the fossil fuel industry. As a result, military bases throughout California have begun deploying a number of renewable energy projects.

One way that Miramar is increasing its renewable energy usage is through solar power. San Diego ranks as California's top "solar city," with a higher solar capacity and more solar installations than any other municipality in the state.65 MCAS Miramar has taken full advantage of San Diego County's solar potential by installing approximately one megawatt of solar photovoltaic systems. These include 735 kilowatts of carport-mounted PV panels, 105 kilowatts of concentrated tracking PV (CPV), 85 kilowatts of rooftop PV panels, and 600 parking and walkway lights.66

The solar PV systems produce a total of 1.5 million kilowatt-hours (kWh) of electricity each year—creating savings of \$130,000 and eliminating 660,000 pounds of carbon dioxide pollution annually.⁶⁷ MCAS

Miramar plans to build on this success by investing in more solar PV systems in the next few years. Its goal is to install enough solar to produce 2.5 MWh of electricity and boost annual savings to an estimated \$300,000 each year.68

MCAS Miramar has also invested in solar water heating technology in four of its facilities. For example, Miramar recently constructed a training pool that is heated using solar power.⁶⁹ Miramar also replaced old boilers with more efficient boilers and added solar hot water systems in two hangars, and it is in the process of doing so in the laundry facilities of a Bachelor Enlisted Quarters. Combined, the projects will save 3 billion BTUs of energy, reduce energy costs by \$35,000, and eliminate 360,000 pounds of greenhouse gas pollution annually.70

In addition to the solar energy projects, MCAS Miramar is also rolling out a microgrid to distribute electricity from on-site sources, dynamic windows designed to insulate buildings from solar heat gain, and advanced HVAC and metering systems.

In June 2012, MCAS Miramar debuted its biggest renewable energy project yet—a new 3.2-megawatt landfill methane gas energy plant. The plant was constructed at the San Diego Miramar Landfill, which is located on leased Department of Navy property next to the Air Station. It is the first Department of Defense renewable energy project to take advantage of new rules allowing for long-term power-purchasing agreements,71 which allow the military to access new clean energy sources without the need for upfront capital expenditures. MCAS Miramar agreed to a 15-year power purchase agreement with Fortistar LLC, which was responsible for constructing the plant. Miramar will also have the opportunity to negotiate an extension to the contract.

The Miramar landfill plant shares many of the same benefits of more traditional renewable energy sources like wind and solar, especially when it comes to greenhouse gas reductions. The plant is expected to reduce emissions of methane—an extremely potent greenhouse gas—by the equivalent of more than 252 million pounds of carbon dioxide annually, according to Fortistar.⁷²

There are also additional advantages. For example, the plant is not subject to intermittency constraints, as it can operate virtually around the clock in all meteorological conditions. This means that it can produce much more energy on a kilowatthour basis, increasing its cost-effectiveness. The opening of the landfill plant also brings the Department of Defense closer to its goal of operating ten methane biogas facilities at landfill and/or water treatment plants by fiscal year 2020.⁷³

"The landfill project was a big step forward in being 100 percent off grid capable," said 1st Lt. Ryan Welsh, a public affairs

officer with Marine Corps Installations West.

MCAS Miramar's efforts to improve energy efficiency and increase renewable energy

"The landfill project was a big step forward in being 100 percent off grid capable."

1st Lt. Ryan Welsh

usage have clearly paid off. The base is currently obtaining approximately 48 percent of its energy needs from on-site renewable sources. According to a 2010 National Renewable Energy Laboratory report, the Marines will save an estimated \$820,738 in 2012 from their various clean energy investments, and eventually, getting to near zero net energy at the base will save the Marines an estimated \$26 million over 20 years.⁷⁴

Marine Corps Base Camp Pendleton and Marine Corps Air Station Camp Pendleton

San Diego County, California



MCAS Camp Pendleton has installed skylight systems in several of its hangars, lowering annual energy costs by \$103,000 and reducing global warming pollution by 1.52 million pounds. Credit: MCAS Camp Pendleton

- Used renewable energy systems, including solar PV and solar thermal arrays, to save \$844,754 in energy costs and eliminate over 8 million pounds of carbon dioxide in the first ten months of FY 2012.
- Installed innovative skylight systems in buildings, reducing lighting and energy costs by \$103,000 annually and reducing global warming pollution by 1.52 million pounds per year.

he Marine Corps' presence in San Diego County extends far beyond MCAS Miramar. Two of the busiest and most important Marine Corps installations in California are Marine Corps Base Camp Pendleton and Marine Corps Air Station Camp Pendleton, which are both located in the northern part of the county. The bases host a combined daytime population of over 75,000 military and civilian personnel. Like MCAS Miramar, both MCB Camp Pendleton and MCAS Camp Pendleton have taken steps to increase their sustainability through renewable energy and energy efficiency.

MCB Camp Pendleton has implemented numerous solar energy projects to meet a significant portion of the base's energy needs. Thanks to funding from the American Recovery and Reinvestment Act, the base operates the Marine Corps' largest solar photovoltaic array—a 6 acre, 1.4-megawatt system that was built on top of the base's Box Canyon Landfill.75 The Box Canyon array supplies approximately 10 percent of the base's total energy consumption,⁷⁶ producing nearly 2.3 million kilowatt-hours (kWh) of electricity in the first ten months of fiscal year 2012.79 This eliminated 3,068,143 pounds of carbon dioxide pollution and led to energy savings of \$321,753.

MCB Camp Pendleton has also installed seventeen additional solar PV arrays, with a total capacity of 640 kilowatts and an annual output of 1.15 million kWh. Other solar projects include five solar thermal arrays, 300 PV powered streetlights, and

15 PV powered bus shelters. Base-wide, solar and other forms of renewable energy reduced carbon dioxide emissions by 8,055,336 pounds and saved \$844,754 in energy costs in the first ten months of FY 2012. And the base is already moving forward with a new 346-kilowatt PV system that will be placed on two of the base's dining facilities, reducing future carbon emissions by an estimated 392,160 pounds annually.⁸⁰

MCAS Camp Pendleton has also introduced innovative energy efficiency measures to its buildings and structures. For example, the air station installed an advanced skylight system in seven hangars. The skylights, which range between thirty-two and thirty-six square feet in size, are designed to maximize daylighting and automatically dim and turn off artificial lights during the daytime. The skylights also feature domes that maximize sunlight in the early hours of the morning and late hours of the evening, as well as special diffusers that allow sunlight to radiate throughout the hangars. The floors and walls of the building were also coated in white to naturally increase the reflectivity of light.

The skylight systems are relatively simple to maintain and have reduced MCAS Camp Pendleton's electricity consumption by 850,000 kilowatt-hours (kWh) annually. These reductions lower MCAS Camp Pendleton's energy bills by \$103,000 each year while eliminating approximately 1.52 million pounds of greenhouse gas emissions.⁸¹ The systems have been so successful since their introduction that two

new hangars and a new warehouse are being designed to incorporate the same technology.

"It's the simplicity of this project that makes it so great. No moving parts, no maintenance, no negative impact on our Marines-and the energy savings continue."

"It's the simplicity of this project that makes it so great,"

Jim Perkins, Resource Efficiency Manager at MCAS Camp Pendleton

said Jim Perkins, Resource Efficiency Manager at MCAS Camp Pendleton. "No moving parts, no maintenance, no negative impact on our Marines—and the energy savings continue."

Clif Bar & Company

Emeryville, California



Clif Bar & Company headquarters in Emeryville, which is certified as LEED Platinum, has one of the largest "smart solar" arrays in North America. Credit: Clif Bar

- Installed a "smart" solar array that produces 70 percent of its headquarters' power and reduces energy costs by \$145,000 or more each year.
- Eliminated 8.7 million pounds of carbon pollution annually through the use of solar power and recycled packaging materials.

lif Bar & Company, headquartered in Emeryville, is a privately owned business that is highly regarded for its selection of organic energy bars and other organic foods and drinks. Since 2002, Clif Bar has purchased more than 250 million pounds of organic ingredients, and today, they account for 70 percent of Clif Bar's food ingredients.82 For Clif Bar, sustainability is as inseparable from its identity as its use of organic ingredients—and that includes supporting efforts to combat global warming.

"We don't think you can have an authentic sustainability program if you're not addressing your contribution to climate change," said Elysa Hammond, Director of Environmental Stewardship at Clif Bar. "It's the mother of all environmental issues."

Clif Bar embraces a variety of sensible, sustainable practices to reduce global warming pollution. For example, Clif Bar uses recycled paperboard to create the boxes that are used to package and distribute its products. This is beneficial because recycled packaging is much less energy intensive to manufacture compared with using virgin paperboard. In Clif Bar's case, this results in a reduction of more than 7.8 million pounds of carbon dioxide emissions annually—the equivalent of taking more than 700 cars off the road for a year.83

Clif Bar has also made great use of renewable energy and energy efficiency measures at its Emeryville headquarters building, which opened in 2010. Clif Bar's most significant project is a 531-kilowatt rooftop "smart" solar array, which uses advanced monitors to increase the power output of individual solar panels by 6-8 percent compared to standard panels.⁸⁴ The solar system was installed by Sun Light and Power, with Tigo Energy supplying Tigo Maximizer smart technology for the panels. The solar system supplies approximately 70 percent of the headquarters' power needs, and solar thermal arrays are used to heat 70 percent of the building's hot water.

Clif Bar's use of solar power has generated both cost savings and carbon dioxide reductions. Virtually all of Clif Bar's power bill—estimated at \$145,000 annually—is offset by solar electricity, even though only 70 percent of its electricity needs are met by the solar panels.85 This is because of net metering, which allows Clif Bar to sell solar energy to Pacific Gas and Electric during peak periods when energy demand (and prices) is highest. Since electricity costs more during these peak periods, the credits that Clif Bar receives can be used to purchase cheaper electricity from the grid during off-peak periods. This effectively reduces Clif Bar's electricity bill to nearly zero.

The savings are projected to increase even further in the future, according to Gary Gerber, CEO of Sun Light and Power.

"Assuming that rates will continue to climb, and based on historical averages, we would expect those savings to escalate by about 5 percent to 7 percent annually," he said. 86

In the first eighteen months of operation, which began in January 2011, the solar panels produced 918,416 kilowatt-hours (kWh) of energy. This was enough to reduce over one million pounds of carbon dioxide emissions. ⁸⁷ And because the solar panels were brought online gradually, rather than simultaneously, the true annual carbon reductions should work out to about 934,000 pounds per year.

Clif Bar received a number of financial incentives for the solar panels. For example, the California Solar Initiative offers a ninecent per kilowatt-hour performance based incentive that can be redeemed for up to five years; Mr. Gerber has calculated that the rebate will amount to approximately \$70,000 annually. Additionally, the project earned \$835,000 from federal investment tax credits. 88

The headquarters building also has other sustainable features. For example, the building contains four glass atria that allow natural sunlight to illuminate work areas. Other design elements include the use of recycled construction materials and furniture, as well as low-flow faucets and showers that reduce water consumption. ⁸⁹ The inclusion of these innovations prompted the U.S. Green Building Council to certify the building as LEED Platinum, the highest rating available.



Clif Bar's aggressive stance on climate change has elicited positive attention from outside observers. Climate Counts,

"In our mind, the investments we've made are simply the right thing to do."

> Elysa Hammond, Director of **Environmental** Stewardship

a nonprofit that encourages large companies to reduce their climate change impact, has named Clif Bar an "Industry Innovator." Clif Bar has also received more than 15 other green awards at the local, state and national levels. Clif Bar also provides benefits to its employees to help them reduce their personal carbon footprints.90

"The journey toward sustainability is part of our DNA, our identity as a company passionate about food and the outdoors," said Ms. Hammond. "In our mind, the investments we've made are simply the right thing to do."

Century Plaza Towers

Los Angeles, California



- Extensive energy efficiency improvements including lighting retrofits, window coating, and high-tech energy efficient parking garage system.
- Cutting global warming pollution by more than 4 million pounds and saving more than \$900,000 annually.

The Century Plaza Towers, a Westside landmark, are now one of just 13 buildings in Los Angeles awarded the rare LEED Gold certification by the U.S. Green Building Council, making them of the greenest buildings in Los Angeles. Credit: Peter Valli, PCV Photographic Services

entury City is a prominent high-rise district located within the Westside of Los Angeles. Among its many skyscrapers are several of the most energy-efficient buildings in the city, including the Century Plaza Towers.

The Century Plaza Towers, constructed in 1975, are a pair of landmark 44-story commercial buildings that hold a combined 2.3 million square feet of office space. The Towers are managed by CB Richard Ellis Group, Inc. (CBRE), the world's largest commercial real estate services firm in terms of revenue in 2011. For CBRE Group, embracing sustainability is simply good economics—and the Century Plaza Towers help exemplify this.

"The owners of the Century Plaza Towers have been an early adopter and a real estate leader in the transition to a low carbon economy," said Bradley Cox, Senior Managing Director of Trammell Crow Company, a wholly owned, independently operated subsidiary of CBRE, Inc., the management and leasing company for Century Plaza Towers.⁹¹

The Century Plaza Towers became Energy Star certified buildings in 2008, and in 2011, they received a LEED Gold rating in the category of existing buildings from the U.S. Green Building Council.⁹² To achieve these distinctions, CBRE Group invested in a variety of state-of-the-art energy efficiency improvements, high-tech transportation solutions, and other sustainability initiatives.

In 2010, Century Plaza Towers unveiled a new, high-efficiency central plant. The plant is equipped with efficient chillers, boilers, and cooling towers, reducing the amount of energy consumed by the building. The central plant also eliminates the emission of volatile organic compounds and oxides of nitrogen (NOx), both of which contribute to smog in Los Angeles. In total, this represents a net environmental impact reduction of 30%.93

Century Plaza Towers also embarked on a significant lighting retrofit project to help reduce energy consumption. The \$1.3 million project, which involved recycling and replacing approximately 60,000 lights, took advantage of \$898,000 in rebates to achieve a payback period of just seven months. The project reduced energy consumption by 3.8 million kilowatt hours annually, eliminating 1.8 million pounds of carbon dioxide pollution each year.94 The building managers estimate they will save \$732,108 annually.95

Additionally, Century Plaza Towers installed a special film on the buildings' windows that reflects solar radiation to help cool interior areas. The re35NEARL film, which is manufactured by 3M, shields the buildings by rejecting approximately 61% of natural heat gain. The result is a 30% reduction in electricity consumption, which is achieved by reducing the usage of heating, ventilation, and air conditioning (HVAC) systems. The \$1.2 million project received \$115,000 in rebates and had a payback period of 4.5 months. 96 The special film is expected to cut building costs by \$249,173 annually.97

Century Plaza Towers has also embraced transportation systems that are designed to reduce commuters' environmental footprints. In 2011, Century Plaza Towers installed fifteen electric vehicle charging stations at a cost of \$102,000, allowing commuters and visitors to recharge their vehicles on-site.98

Its most significant measure, however, was the purchase of a \$2.6 million ParkHelp System in its parking garage. The system uses electronic controls and lights to guide drivers to vacant parking spaces, reducing traffic congestion in the garage and allowing drivers to spend

less time parking their vehicles. As a result, the system eliminates more than 3.3 million pounds of CO2 per year-equivalent to 13.8% of commuters' vehicle emissions—and achieves annual fuel savings of approximately 173,000 gallons of gasoline.99

"...the Century Plaza Towers' goal is to advance the public discourse on the pressing need to incorporate environmental and social appropriateness into our daily business dealings" Bradley Cox,

Senior Managing Director of Trammell Crow Company

"By investing in energy efficiency as a validation of their commitment to reduce greenhouse emissions, the Century Plaza Towers' goal is to advance the public discourse on the pressing need to incorporate environmental and social appropriateness into our daily business dealings," said Mr. Cox. 100

Constellation Place

Los Angeles, California



- Installed one of the city's largest solar arrays on two parking structures, totaling nearly 1 MW of pollution-free energy capacity. Also invested in two on-site fuel cells, as well as extensive energy efficiency improvements.
- Reducing global warming pollution by more than 1.2 million pounds annually and saving approximately \$100,000 per year from the solar system alone.

Constellation Place hosts one of the largest solar photovoltaic systems in Los Angeles atop two parking structure roofs. Credit: Courtesy of Constellation Place

entury Plaza Towers is not the only Century City development to go green. Constellation Place, a 35-story high-rise office building owned by Constellation Place, LLC, 101 implemented a variety of energy efficiency measures and was the first high-rise office building in Los Angeles to achieve a LEED Silver designation in 2008 and LEED Gold certification in 2010. Its most high profile sustainability achievement is an almost 1 megawatt (MW) solar PV system that is one the largest urban arrays in the city of Los Angeles.

Constellation Place, LLC brought in SPG Solar to tackle the challenge of harnessing the sun's energy in a high-density urban environment. Ultimately the solar project was developed and constructed in two phases.

The first phase of the project was completed in 2008. It consists of 1,408 solar PV panels mounted on top of Constellation Place's parking structure. The solar panels generate 570,095 kilowatt-hours of clean electricity annually—enough to satisfy 4% (or 12% of the connected meter) of Constellation Place's energy demands and save the company over \$50,000 per year—while eliminating over 610,000 pounds of CO2 emissions each year.¹⁰²

Los Angeles Mayor Antonio Villaraigosa, a proponent of solar power, praised Constellation Place's move to produce renewable energy, which was incentivized in part by a Los Angeles Department of Water and Power solar rebate. "Los Angeles is setting the standard for a green, sustainable economy," he said.¹⁰³

The second phase of the project, which was rolled out in 2010, involved placing another roof-mounted system on top of the adjacent Century Park West Garage. This system accounts for 80 percent of the parking structure's electricity needs, eliminating 16.5 million pounds of carbon dioxide emissions over a 25-year period while reducing electricity costs by more than \$60,000 annually.104

Combined, the systems have a capacity of slightly less than one megawatt—a remarkable achievement considering the urban location.105

"We're very proud to have completed our second photovoltaic installation in Century City with SPG Solar, which represents a substantial commitment to energy conservation," said Sarah Shaw, General Manager of Constellation Place.106

In addition to the solar panel system, Constellation Place has also invested in several

"We're very proud to have completed our second photovoltaic installation in Century City with SPG Solar, which represents a substantial commitment to energy conservation."

Sarah Shaw, General Manager of Constellation Place

other initiatives to reduce their energy consumption including two 200-kilowatt energy fuel cells and various energy efficiency measures, such as lighting retrofits and a highly efficient Central Plant that provides heating and cooling for the building.

Altogether, the efficiency measures, along with the solar panels and the fuel cells, are saving Constellation Place hundreds of thousands of dollars annually and reducing global warming pollution by 1.2 million pounds each year.¹⁰⁷

Conclusion and Recommendations

These ten case studies demonstrate that reducing global warming pollution can go hand in hand with strengthening the bottom line for California businesses and institutions.

These groups put innovative ideas about sustainable energy use into motion. They have taken advantage of opportunities to use less energy, use it more efficiently, and generate it from renewable sources. At the same time, these opportunities created economic returns by cutting energy costs, reducing exposure to volatile fossil fuel and electricity price spikes, and attracting customers who value the environment.

The benefits of sustainable energy usage can extend beyond the subjects of these case studies. All of California stands to gain from renewable energy and energy efficiency measures. This is because they can reduce global warming pollution, contribute to cleaner air, increase energy independence, and create jobs for California's economy.

If all state businesses and organizations pursued similar opportunities to reduce global warming pollution, it would have a major impact—both by reducing the state's carbon footprint and by serving as models for the rest of America and the world to follow. As one of the world's ten largest economies⁹¹ and as the 12th largest source of carbon dioxide pollution,⁹² action in California has ramifications far beyond state lines.

By adopting policies limiting global warming pollution, California can grow cleaner, safer, more secure and more prosperous in the years to come. Further, by adopting policies and programs that spur investments in clean energy solutions, California can help businesses and consumers save money while creating jobs.

Policy Recommendations

Just as the companies and institutions profiled here are leading California toward adopting 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

• In 2006, California became the first state to adopt an economy-wide cap on global warming pollution. AB 32, the Global Warming Solutions Act of 2006, sets a mandatory limit of reducing emissions to 1990 levels by 2020.

Even deeper reductions are now believed to be needed to stabilize global warming gases in the atmosphere at a level that minimizes the worst impacts of global warming. A report released by the California Environmental Protection Agency predicts that average California temperatures could rise by up to 8.6 degrees Fahrenheit by the end of the century, with five times as many extreme heat days in cities like Sacramento. 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, overwhelming levees in the Sacramento-San Joaquin River Delta and causing extensive flooding across the state.93

AB 32 sets out to achieve its global warming pollution reduction goal through a variety of direct measures, including the Renewable Portfolio Standard, clean cars programs, and the Low Carbon Fuel Standard. Dozens of programs like these should be aggressively pursued and implemented by state and local governments.

Implement Cap-and-Trade Through 100% Auction

In addition to the direct pollution reduction measures discussed above, AB 32 also set in motion the nation's first-ever economy-wide cap-and-trade program that aims to put a price on the right to pollute and create a market for the sale and purchase of global warming pollution allowances.

This policy promises to be one of the most important tools used to achieve the dramatic reductions in global warming emissions. But its success depends on the robust, effective implementation of the cap-and-trade system. By auctioning global warming pollution allowances, California can reduce the cost of achieving emission reductions, both now and in the future, and ensure the basic fairness of the program.

To achieve those benefits, California should ensure the following recommendations are adopted and implemented:

- Auction 100 percent of emission allowances.
- Use the revenues from auctions to support clean energy technological development, including research and development funding and early market support for clean technologies; invest in energy efficiency to reduce energy and transportation costs to consumers; invest in low-carbon transportation infrastructure such as public transit to provide driving alternatives to more people; and provide direct consumer rebates to alleviate any increases in energy costs that result from the program.

Implementing AB 32 in full—and ultimately moving to lower the cap on pollution even further—is the most critical step in strengthening California's leadership in solving global warming. All of the pieces of AB 32, including its direct measures and the cap-and-trade program, should be implemented on schedule and to the high standards required by the law.

Further Reduce Dependence on Fossil Fuels

- California should enhance funding and continue to remove barriers for large-scale energy efficiency improvements and for distributed generation, including California's Million Solar Roofs Initiative, the Electric Program Investment Charge, and expanded feed-in-tariff and net metering policies.
- The state should generate more energy from renewable sources, enforcing the state's 33% by 2020 renewable portfolio standard, and ultimately pushing beyond this minimum goal.
- The state should continue to implement SB 375, the Sustainable Communities and Climate Protection

Act, and promote smart growth and transportation alternatives, to reduce dependence on the automobile. The state should also spur 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 similar 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

1 Aggregate annual greenhouse gas reductions and aggregate annual dollar savings were obtained by calculating the sum of the case studies' annual figures.

The aggregate annual dollar savings figure is somewhat imprecise because Anheuser-Busch, Golden Valley Unified School District, and Sonoma County Family YMCA are saving money over multiple years through long term financing agreements. To obtain an average annual dollar savings figure for these entities, we divided the total cumulative dollar savings achieved over the length of the agreement by the number of years in the agreement. Because dollar savings achieved through typical financing agreements tend to be greatest near the end of their duration—with only modest savings near the beginning—the stated aggregate figure is likely to exceed the real dollar savings at the present time.

For MCB Camp Pendleton's renewable energy systems, data was only available for the first ten months of fiscal year 2012. We obtained annual greenhouse gas reductions and dollar savings by calculating a ten-month average and applying it to the remaining two months of FY 2012 (August 2012 and September 2012); this figure represents an estimate and does not account for month-by-month variation in energy production.

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