

LOW CARBON LEADER: CALIFORNIA JUNE 2005



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FOREWORD

Climate change is an economic issue. Major economic activities of our industrialized society are at the root cause of human induced climate change, and its impacts in turn have economic effects. Yet, the degree that we allow our response to the threat of climate change to be economically damaging or economically productive is in our hands. The case studies presented here display the actions California – the state, its businesses and its public sector – are taking to create a productive and thriving low carbon economy, actions that demonstrate a positive economic response to climate change.

California is both utilizing and developing the technologies we will need worldwide to transition away from high carbon economic outputs. Examples here reveal how California businesses and government are utilizing energy efficiency, cogeneration, diverse fuels, renewable energy and other clean technologies to reduce their operating costs and increase economic output. Also demonstrated here is the leadership that the state and its businesses have taken to develop and grow the clean technology and renewable energy economic sector.

As a leadership coalition with positive business case stories to tell about greenhouse gas emissions reduction, The Climate Group has documented multiple examples from around the world where corporations, states and other institutions are cutting out waste, using energy efficiently, bringing down their emissions and saving money. This publication adds to the growing documentation of climate protection as economic opportunity.

These 16 cases are just a snapshot of how California's vast intellectual and economic resources are being used to reduce emissions and create new opportunities. Many more cases could have been included, such as how California's investor owned utilities, PG&E, Southern California Edison, and San Diego Gas and Electric, are all expected to meet the state's goal of 20% electricity from renewable sources by 2010, or how one California company, Green Star Products, has become the largest producer of biodiesel in the US with 35 million gallons per year capacity, or how the state's Public Interest Energy Research grants have brought more than 33 clean energy products to the marketplace. And finally, the 44 private and public sector members of California's Climate Action Registry, all of whom are inventorying greenhouse gas emissions and working on reduction strategies, could also have been featured.

California's response is a model of the abundant economic opportunities available in reducing greenhouse gas emissions and transitioning to a low carbon future. The state's universities and other institutions are working on the technologies that will shape the low carbon future and its entrepreneurs are bringing them to market. Such leadership can have big paybacks. A recent survey of US venture capitalist firms labeled California as most attractive region for clean technology/clean energy investment.

Every economic threat also represents an inspiring challenge to those who are bold and creative enough to rise up to it. Investment in the technologies and products and the new energy infrastructure that will shape the low carbon future offers a huge opportunity to businesses large and small around the world. California demonstrates that the right leadership and incentives can harness the talent and skills that exist to find solutions that beat climate change and increase prosperity for all.

NANCY SKINNER, US DIRECTOR, THE CLIMATE GROUP

STEVE HOWARD, CEO, THE CLIMATE GROUP



00: CALIFORNIA STATE GOVERNMENT

POPULATION: 35 MILLION
BUDGET: \$1.3 TRILLION

California is the largest state in the United States. Yet, in terms of carbon intensity California is atypical. Whereas national annual per capita greenhouse gas emissions average 20 metric tons, Californians' per capita emissions average 12 metric tons. The reason: since the early 1970s California has been a leader in promoting efficiency, cleaner technologies and renewable energy.

California acknowledged early the threat of climate change, passing legislation in 1988 to assess impacts and identify mitigation strategies. Since that initial law, California became the first government to regulate greenhouse gas emissions from vehicles; set a Renewable Portfolio Standard requiring 20% of electricity to be sourced from renewables by 2010; established the first state-sponsored climate change research program; and opened the California Climate Action Registry to facilitate public and private sector reporting of greenhouse gas emissions.

The effect of the state's 30-year history of energy efficient building codes and numerous financial and other incentives to reduce electricity use is pronounced. Per capita electricity use has remained practically unchanged since the mid 1970s compared to a growth in national per capita electricity use of about 1.5% per year.

Among California's programs are a 'public goods charge' that provides funding for renewable power and energy efficiency, such as rebates for customer-owned solar and wind systems and the Public Interest Energy Research program which distributes up to \$62 million annually in grants for clean energy development. A 'kilowatt-hour bounty' rewards 20% reduction in electricity consumption with a 20% payment, and a multi-tier rate structure charges higher rates for consumption over a baseline. In 2002, the state's building code efficiency standards were strengthened, estimated to further cut electricity use by 200MW per year.

Transportation remains California's biggest challenge. In 2000, transport accounted for 51% of CO₂ emissions whereas electricity production accounted for only 25%. In response, the California legislature adopted the world's first ever law to reduce greenhouse gas emissions from cars and light trucks. The regulation requires a 22% reduction in CO₂ emissions and other pollutants by 2012, and by 30% by 2016.

RANK OF CALIFORNIA AMONG 50 STATES IN TOTAL ENERGY CONSUMPTION: 2

RANK OF CALIFORNIA AMONG 50 STATES IN PER CAPITA ENERGY CONSUMPTION: 48

COST-SAVINGS GENERATED FROM ENERGY EFFICIENCY SO FAR: \$20 BILLION

RESULTING INCREASE IN STATE PER CAPITA GDP: \$875 TO \$1,300

ADDITIONAL COST-SAVINGS EXPECTED BY 2011: \$57 BILLION

Demonstrating further leadership, Governor Schwarzenegger has directed state agencies to recommend a statewide greenhouse gas emissions reduction target and to develop a 'blueprint' outlining a transition to hydrogen fuels and advanced vehicle technologies.

	TARGETS	REDUCTIONS/ACHIEVEMENTS	BENEFITS
01	HEWLETT-PACKARD	<ul style="list-style-type: none"> – 60GWh of energy savings implemented by 2004 – Increased high-end server energy efficiency by 35% – New 'Blade' PC ten times more energy efficient than typical desktop PC 	<ul style="list-style-type: none"> – Reduced overall energy use 6.1% in 2003 – Reduced electricity consumption and gas use 25% and 11% respectively, between 2002 and 2003
02	THE WALT DISNEY COMPANY	<ul style="list-style-type: none"> – Reduced electricity use at Walt Disney World resort 46 million kWh – Reduced energy use at company-wide facilities on average 5-20% 	<ul style="list-style-type: none"> – Annual savings of \$2.3 million through Building Tune-Up program – Employee commuter program at Disneyland Resort saved company \$2 million by reducing parking facilities
03	GAP INC.	<ul style="list-style-type: none"> – Increased energy efficiency of stores in North America 25% per square foot between 2000 and 2003 	<ul style="list-style-type: none"> – Saving \$1.6 million annually through energy efficiency and operational improvements
04	BP	<ul style="list-style-type: none"> – Met greenhouse gas reduction target in 2001, nine years ahead of schedule – First multinational corporation to launch internal emissions trading scheme 	<ul style="list-style-type: none"> – Saved \$650 million over three years from estimated outlay of \$20 million – Solar panel sales grew 78% between 2001 and 2004
05	EASTMAN KODAK	<ul style="list-style-type: none"> – Reduced energy use 19% indexed to production volume as of 2003, based on 1997 levels – Reduced CO₂ emissions 17% from power production as of 2003, on 1997 baseline 	<ul style="list-style-type: none"> – Saved approximately \$10 million in energy costs
06	LOS ANGELES COMMUNITY COLLEGE DISTRICT	<ul style="list-style-type: none"> – Annual reduction in electricity purchases of 30% at Pierce College – 0.75MW of renewable energy already installed on campuses 	<ul style="list-style-type: none"> – Annual energy cost savings of \$260,000 at Pierce College – Received \$1.3 million in utility rebates as of 2005, \$5.5 million expected in future
07	QUALCOMM	<ul style="list-style-type: none"> – Reduced electricity demand 12 million kWh per year – Between 1993 and 2002, reduced CO₂ emissions 4,000 tons per year – Upgrading existing 2.4MW on-site cogeneration system to 7.2MW 	<ul style="list-style-type: none"> – Saving \$1.4 million annually through reduced energy costs
08	CALPINE CORPORATION	<ul style="list-style-type: none"> – Current Calpine fossil power plants emit about 52% less CO₂ per MWh when compared to industry fossil average 	<ul style="list-style-type: none"> – Not documented
09	CLIF BAR	<ul style="list-style-type: none"> – Offset 15 million tons CO₂ between 2003-2005 with wind farm investments – Helped build first Native American-owned wind farm in partnership with Native Energy's 'Windbuilders' program. 	<ul style="list-style-type: none"> – Not documented
10	CITY OF SAN DIEGO	<ul style="list-style-type: none"> – By 2004 reduced greenhouse gas emissions about 4 million tons, more than halfway towards target – Efficiency improvements to City operations 1994-2001 cut 144 million kWh – Generating 18MW of power from solar PV on city facilities 	<ul style="list-style-type: none"> – Cost savings of \$15 million on city utility bills
11	JOHNSON & JOHNSON	<ul style="list-style-type: none"> – Company-wide emissions reduced 3% from 1990 to 2004 while revenue increased 317% – Second largest non-utility solar photovoltaic (PV) installations in US – 18% of purchased electricity generated from renewables 	<ul style="list-style-type: none"> – \$30 million saved annually through energy efficiency measures
12	CISCO SYSTEMS	<ul style="list-style-type: none"> – Cut electricity use at headquarters 49.5 million kWh per year through energy efficient building design, concurrent CO₂ emissions reduction of 25,000 tons – Saved 12.4 million kWh/year through additional energy efficiency measures 	<ul style="list-style-type: none"> – Headquarters efficiency improvements provided \$5.7 million in utility rebates and cut \$4.5 million/year in operating costs – Additional energy efficiency measures saving \$1.25 million/year
13	CITY OF SAN FRANCISCO	<ul style="list-style-type: none"> – Reduced electricity demand 22 million kWh per year through energy efficiency improvements – Installed largest city-owned solar power system in the US – Voters approved \$100 million solar bond in 2001 	<ul style="list-style-type: none"> – Annual cost saving of \$2.2 million through city-facility energy efficiency measures
14	FETZER VINEYARDS	<ul style="list-style-type: none"> – Purchasing 93% of electricity from renewable sources – Headquarters building design reduced energy demand 25,900kWh per year – Reduced natural gas 10% and saved 500,000kWh from efficiency measures, 1999-2003 	<ul style="list-style-type: none"> – Recycling program avoided \$120,000 in landfill fees since 1990 – Energy efficiency measures saved \$60,000 from 1999-2003
15	INTEL	<ul style="list-style-type: none"> – Reduced PFC emissions 46% between 2001 and 2004 – Decreased energy use indexed to production 8% from 2002 to 2004 – Developed technology that reduces energy use of PCs by up to 71% 	<ul style="list-style-type: none"> – Annual costs savings of more than \$10 million from energy efficiency projects

EXCHANGE RATE
 US\$1.00 = £0.53
 US\$1.00 = Euro 0.78
 on 10 May 2005



01: HEWLETT-PACKARD

HP REDUCES TRANSPORT ENERGY CONSUMPTION BY DENSELY PACKING PRODUCTS ON EACH SHIPPING PALLET, THEREBY REDUCING THE TOTAL NUMBER OF TRIPS REQUIRED.

01: HEWLETT-PACKARD

EMPLOYEES: 151,000
REVENUE: \$80 BILLION

Global computer manufacturing giant Hewlett-Packard (HP) is one of the largest information technology companies in the world, with 430 sites in 178 countries and more than a billion customers. In 1992 HP launched its Design for Environment (DfE) Program focused on three areas: energy efficiency in both the manufacture and use of HP products, designing for reuse and recyclability, and selecting materials for low environmental impact.

HP was an early member of the World Economic Forum's Global Greenhouse Gas register, publicly reporting its third-party verified greenhouse gas emissions in 2003. Between 2002 and 2003 HP estimates that greenhouse gases were reduced by 5.6% over its entire facility space.

PFCs are gases used in the semi-conductor industry for cleaning and etching. Between 1995 and 2002, HP's PFC emissions doubled due to increased production and product changes. HP hoped to substitute gases with a lower global warming potential, but alternatives did not achieve requirements. An emission abatement approach using new equipment was employed which cut PFC emissions 26% between 2002 and 2003. Companywide HP intends to reduce PFC emissions 10% below 1995 levels by 2005.

Electricity and natural gas use account for about 87% of HP's operational greenhouse gas emissions. In early 2004 HP set a target to implement 50GWh of energy efficiency projects. As of November 2004, more than 60GWh of annual energy savings were achieved. Projects included installing lighting control systems and lighting upgrades, air conditioning changes, and the purchase of renewable electricity.

A 'Conserve and Preserve' program introduced in April 2004 promotes energy awareness among employees. Monitors are set up to shut off after 20 minutes of inactivity, and HP substituted printers and copiers with multi-function products that are more energy efficient.

"OUR PARTICIPATION IN THE WORLD ECONOMIC FORUM'S GLOBAL GREENHOUSE GAS REGISTER ALLOWS US TO OPENLY DEMONSTRATE THE PROGRESS OF OUR CLIMATE CHANGE PROGRAMS"

DAVID LEAR, VICE PRESIDENT OF CORPORATE, SOCIAL AND ENVIRONMENTAL RESPONSIBILITY, HP

More than 1,000 of HP's computers, printers, and other products are US EPA Energy Star® qualified. HP has increased the number of transactions that its servers can process per unit of energy consumed by more than 150% since 1998, and HP's 'Blade' PC is ten times more energy efficient than a typical desktop PC.

In 2004, HP introduced a Supplier Code of Conduct to high priority suppliers that represent 98% of purchasing expenditures. The code states that suppliers must have environmental policies covering energy efficiency, hazardous materials, information and labeling, manufacturing, packaging and product recycling and reuse .

02: THE WALT DISNEY COMPANY

EMPLOYEES: 129,000
REVENUE: \$30.7 BILLION

Through its ethic of 'Environmentalism', the Walt Disney Company is seeking to blend business growth with environmental stewardship.

Walt Disney World Resort has participated in the US EPA's Energy Star Buildings Program since 1996, upgrading more than 17 million square feet of facilities, and saving more than 46 million kWh of electricity. Through the US EPA's Building Tune-Up program Disney has worked to optimize performance and energy efficiency in all company buildings providing average energy savings of 5-20% per facility, and resulting in \$2.3 million in annual cost savings across the company.

Disney offers a flexible combination of commuting options for its employees. These include comprehensive commuter services to 30,000 Southern California Disney employees, including, but not limited to, tax-free subsidies for bus and rail, a subsidized vanpool program with more than 60 vans, a cash incentive program for bicyclers, walkers and carools, as well as a pre-tax benefit to offset transit and vanpool costs for Disney commuters nationwide. Participating in the program has saved Disney over \$2 million, through reduced need for parking facilities.

When waste in landfills decomposes, methane – a powerful greenhouse gas – is emitted. Disney has extensive companywide recycling programs that have diverted more than 728,000 tons of waste since 1991. Disney's 'Recycle IT' on-line computer equipment exchange encourages internal reuse of equipment. The company works with local community groups to redistribute items such as electronics, furniture, and office supplies. In 2003 alone, Disney was able to divert more than 574 tons of reusable items from landfills. Posting of information to the company's internal website has eliminated numerous printed reports, including a daily news summary that previously consumed 30.5 tons of paper annually.

03: GAP INC.

EMPLOYEES: 150,000
REVENUE: \$16.3 BILLION

To maximize cost savings and energy efficiency opportunities, Gap Inc. has developed an Energy Management Program to improve the design, building standards, and operations of its sites and stores. As a result, in 2003 Gap's North American stores were roughly 25% more energy efficient per square foot than those opened in 2000.

Gap's corporate offices in San Bruno, California, have energy saving features such as a grass roof (for insulation), an under-floor ventilation system, and extensive use of natural light and computer activated lighting. Energy use in about 40% of Gap stores is monitored through a computerized energy management system that enables the company to monitor energy performance and identify opportunities to further reduce energy consumption.

Gap is committed to further maximizing energy efficiency. To help achieve this goal in 2003 Gap joined the US EPA's Climate Leaders program. This voluntary partnership between industry and government encourages companies to reduce their greenhouse gas emissions.

04: EASTMAN KODAK

EMPLOYEES: 64,000

REVENUE: \$13.5 BILLION

Eastman Kodak Company is a world leader in traditional and digital photography, and on-line imaging services. The company has major manufacturing facilities in eleven nations including the US, UK, France, Canada, Brazil, Mexico, China and India. Headquartered in Rochester, New York, Kodak also has a number of company facilities and subsidiaries in California.

Kodak's view is that greenhouse gas emissions reflect a waste, and that non-renewable resources need to be conserved as part of overall business efficiency. The company began tracking its CO₂ emissions in the 1990s and in 1997, set environmental goals for its sites worldwide. These goals included a 15% reduction in energy use (indexed to production volume) and a 20% reduction in CO₂ emissions from power production, both by 2003.

Emphasizing energy conservation and process improvements, by 2003 the company had achieved a 19% reduction in energy use, indexed to production. It also reduced CO₂ emissions from power production by 17%. A second set of five year goals were then adopted, for the period 2004 to 2008.

Kodak deploys 'Energy Focus Teams,' small cross-functional teams that assess energy waste and recommend changes during intense, week-long reviews. The benefits of the Energy Focus Teams have surpassed expectations; between 1999 and 2003 Kodak's initiatives to reduce energy use have resulted in overall savings of \$10 million.

Thus far 70% of Kodak's CO₂ reductions have been achieved through energy conservation and process improvements, and 30% through fuel switching from coal to gas. For its 2004 goals, Kodak has linked manager's salaries with environmental metrics, and publishes energy use data monthly. In the future, it will also focus on waste reduction and continued improvements in product design. Most of Kodak's products already carry the US EPA's Energy Star designation.

In 2004, Kodak joined the California Climate Action Registry, believing that the Registry's third-party verification requirement provides a good basis for 'early action credit' should the US establish greenhouse gas regulations over time. In 2005, the US EPA awarded Eastman Kodak Company with an Energy Star Award for Sustained Excellence in Energy Management.

05: BP

EMPLOYEES: 102,900

REVENUE: \$285 BILLION

BP, an oil and gas company operating in over 100 countries, is California's primary gasoline supplier, with a 20% market share. It is the largest oil and gas producer in the US, and one of the largest gasoline retailers with 42,000 US based employees and operations in almost every state. Californians know BP best through its 1,200 ARCO stations and the ARCO 'ampm' convenience store brand.

“BP IS COMMITTED TO PROVIDING ENERGY SOURCES THAT HELP REDUCE EMISSIONS WHILE CONTINUING TO PROVIDE THE FUELS THAT WILL ENSURE FUTURE MOBILITY FOR EVERYONE”

JR THOMAS, SENIOR VICE PRESIDENT, WEST COAST RETAIL OPERATIONS, BP

BP made a commitment to address climate change in 1997 setting the company apart from its peers. In 1998, BP announced a target for 2010 that greenhouse gas emissions from its own operations would be 10% lower than 1990 levels. BP achieved that target at the end of 2001, nine years ahead of schedule. To achieve the reductions BP invested \$20 million to increase operational efficiency, applied technological innovations and improved overall energy management. The company's actions resulted in a gain of around \$650 million in net present value over just three years.

Within California BP is implementing a number of initiatives that contribute to energy efficiency and clean energy promotion. To encourage renewable energy development, BP signed up to California's Renewable Technology Program, which uses financial incentives for the production, sale and use of qualifying technologies. The Solar Neighbours Program™ is a scheme in which BP donates a solar system to a low income household in California each time a celebrity purchases a BP solar system for their home. A new Solar Homes Solution™ program allows Californians to get a complete system of financing, permitting and installation.

BP's introduction of cleaner burning diesel into the market place in California has also resulted in emission reductions. In Los Angeles the use of this fuel in 2001 removed the equivalent emissions of more than 7,000 cars daily.

BP has contributed significantly to the R&D and delivery of Governor Schwarzenegger's pledge to develop a hydrogen economy in California. Working in partnership with Ford Motor Company, BP has committed to build a network of hydrogen fueling stations in areas including Sacramento. In October 2004, in collaboration with Praxair, South Coast Air Quality Management District, and DaimlerChrysler, BP opened the world's first retail-designed hydrogen refueling station at Los Angeles International Airport (LAX).



06: LOS ANGELES COMMUNITY COLLEGE DISTRICT
THE SOLAR SYSTEM AT PIERCE COLLEGE FEATURES 1,274 PHOTOVOLTAIC PANELS ON AN INNOVATIVE CARPORT STRUCTURE ENABLING THE COLLEGE TO GENERATE MUCH OF ITS OWN ELECTRICITY NEEDS, WHILE ALSO PROVIDING SHADE TO PARKED VEHICLES.

06: LOS ANGELES COMMUNITY COLLEGE DISTRICT

EMPLOYEES: 18,000

BUDGET: \$500 MILLION

Los Angeles Community College District (LACCD) is the largest community college district in California, educating some 130,000 students on nine campuses in the greater Los Angeles area. In 2002, LACCD's Board of Trustees voted to incorporate sustainable design principles into all new buildings. A Central Energy Team is coordinating energy efficiency measures aimed at keeping energy use stable while LACCD grows.

Using the LEED guidelines of the US Green Building Council, the District will construct 44 new environmentally-friendly facilities over the next decade, making it the largest public sector LEED building project in the nation. This will increase LACCD's building area by nearly 60%, and involves the remodeling of some 15-20 older buildings.

LACCD's Board also committed informally to a 15-25% renewable energy standard, including a promise to generate 10% of this energy, or about 4.5MW, on-site. New solar installations are expected to prevent some 137 million tons of CO₂ from being emitted into the atmosphere, and wind turbines are planned for one campus.

“LACCD HAS MADE RENEWABLE POWER AND SUSTAINABLE BUILDING PRACTICES A PRIORITY”

DR PETER LANDSBERGER, CHANCELLOR, LACCD

LACCD's LEED-certified buildings will exceed California Title 24 energy efficiency standards by 20%. They will be equipped with energy-efficient features such as green roofs, operable windows with sensing devices that automatically turn off air conditioning systems when opened, ultra-low wattage lighting, and energy-saving mechanical equipment. LACCD also plans educational components for the new buildings and a sustainability curriculum.

In 2003, LACCD's Pierce College unveiled a new on-site solar electric system and a cogeneration system. These new systems are expected to reduce Pierce College's electricity purchases by 30% and save some \$260,000 each year.

By 2005, LACCD had received some \$1.3 million in rebates from various utility energy programs. The District expects to receive some \$5.5 million annually through similar rebate programs in the future.

LACCD joined the California Climate Registry in March 2005. The District plans to use registry protocols to conduct greenhouse gas emissions inventories in the coming years.

SECTORS CLEAN ENERGY

BIOMASS
BIO/ALT FUELS
ENERGY EFFICIENCY
FUEL CELLS
GEOTHERMAL
SOLAR
WASTE RECYCLING/PROCESSING
WATER TREATMENT/CONSERVATION
WIND

CALIFORNIA'S LOW CARBON ECONOMY

With an estimated GDP of \$2 trillion, California ranks as the world's sixth largest economy. Its economy is also the largest of all America's individual states. While it consumes more energy than every other state except one, it ranks 48th out of 50 in the amount of energy it consumes per person. It is one of the most energy efficient economies in the world today and enjoys unique economic advantages.

Recently amended, California's Renewable Portfolio Standard (RPS) calls for 20% of the state's electricity to be met from renewable sources by 2010. This and other energy efficiency regulations have set benchmarks for the country and have already helped to save more than \$20 billion in electricity and natural gas expenditures statewide. By 2011, California expects to enjoy further cost-savings from energy efficiency estimated at an additional \$57 billion.

Equally important is California's renewable resource and clean energy sector, which is emerging as a new economic driver within a leading global high-tech sector. California attracts \$50 billion in federal R&D funding. More than 80,000 scientists and engineers work within California's knowledge-based economy. Since 1999 they have secured an estimated 18,000 patents, one out of every five issued in the United States. This scientific prowess coupled with the state's progressive energy policies have produced a thriving renewables and clean energy sector that is expected to lead the way to the low carbon economy of the future.

Already, California is home to three globally competitive wind power companies; three of the world's biggest geothermal power companies; two of the world's largest solar PV plants in the world; and the world's premier R&D consortium for fuel cell vehicles. The hundreds of California companies in the renewables sector already employ more than 170,000 people. By meeting the goals of the RPS by 2017, the state would generate more than 200,000 person-years of employment and fuel job growth with payroll benefits worth \$8 billion.

Small businesses that specialize in alternative energy create work for a broader range of workers. For example, electricity generated by solar PV employs roofers, electricians, and sheet metal workers who up to now played virtually no role in power generation. This kind of broad-based job growth, together with income generation and growth opportunities, are fueling increased investment. One regional study conducted in San Diego estimated that a \$3.6 billion investment in distributed energy installations would net an economic benefit of nearly \$18 billion and thousands of new jobs over the next 30 years.

Internationally, California is also well-positioned to take advantage of an exploding worldwide market. Wind power is expected to grow to be a \$60 billion industry by 2020; geothermal power, a \$35 billion industry; solar PV, \$30 billion; fuel cells, \$75 billion. Over the next two decades, these new sectors will offer unprecedented opportunity for the more than 175 companies in California that are already exporting renewable energy products and services overseas, and others are sure to follow.

WORLDWIDE MARKET OPPORTUNITY FOR WIND, SOLAR, GEOTHERMAL AND FUEL CELL ENERGY BY 2020: \$200 BILLION

RANK OF CALIFORNIA TO RESPOND TO OPPORTUNITY AMONG 50 US STATES: 1

AMOUNT VENTURE CAPITAL INVESTED IN CLEAN TECHNOLOGY IN CALIFORNIA IN 2003: \$339 MILLION

PERCENTAGE THIS REPRESENTS OF NORTH AMERICAN TOTAL: 29%

NUMBER OF CLEAN ENERGY PRODUCTS BROUGHT TO MARKETPLACE BY STATE FUNDED RESEARCH GRANTS (2000-03): 33

AMOUNT ALLOCATED BY STATE'S TWO LARGEST PENSION FUNDS FOR INVESTING IN CLEAN TECHNOLOGY COMPANIES: \$450 MILLION

ESTIMATED NUMBER OF JOBS IN CALIFORNIA THAT \$500 MILLION INVESTMENT WILL CREATE: 10,000

NUMBER OF PEOPLE WORKING IN CALIFORNIA RENEWABLES SECTOR: 170,000

NUMBER OF PEOPLE WORKING IN US COAL INDUSTRY: 83,000

JOB GROWTH FORECAST FOR RENEWABLE SECTOR BY 2017: 200,000 PERSON-YEARS

ADDITIONAL PAYROLL BENEFITS FROM RENEWABLE SECTOR BY 2017: \$8 BILLION

VALUE OF CALIFORNIA EXPORT SALES OF ENERGY EFFICIENCY, RENEWABLE ENERGY AND CLEAN ENERGY TECHNOLOGIES STIMULATED BY STATE ENERGY TECHNOLOGY EXPORT PROGRAM: \$500 MILLION

07: QUALCOMM INC.

EMPLOYEES: 8,000

REVENUE: \$4.9 BILLION

Headquartered in San Diego, California, QUALCOMM is a global leader in digital wireless technologies, with operations in 10 US states and 15 countries. Since 1992, the company has completed 350 energy efficiency and energy management improvement projects that have saved an estimated 12 million kWh of electricity and 525 thousand BTU's per year.

“QUALCOMM IS COMMITTED TO BEING A POSITIVE FORCE IN THE PROTECTION AND ENHANCEMENT OF THE LOCAL AND GLOBAL ENVIRONMENT, WHICH INCLUDES ADDRESSING GLOBAL CLIMATE CHANGE”

**JIM CALLAGHAN,
VICE PRESIDENT, REAL ESTATE
AND FACILITIES, QUALCOMM**

Among the energy efficiency projects undertaken are variable frequency drive (VFD) motor upgrades, high efficiency motor replacement, lighting retrofits, energy efficient HVAC control systems, and improved energy efficiency design and construction of its facilities. QUALCOMM also manages a cogeneration system, which combines electrical generation and thermal climate control to increase efficiency and reduce greenhouse gas emissions. This cogeneration system is currently being upgraded from a 2.4MW system to 7.2MW. These projects have helped achieve annual cost savings of approximately \$1.2 million.

QUALCOMM saved an additional 1.8 million kWh and \$220,000 annually from data center efficiency upgrades. Within its fleet Qualcomm is beginning to utilize hybrid vehicles; two are in use now and more will be procured via normal replacement schedules.

An internal energy website and homepage alert messages are used to keep employees informed of energy emergency situations and of energy savings and renewable energy opportunities in their own homes. The company voluntarily reduces demand during grid energy alerts and was recognized by San Diego Gas & Electric for these efforts in 2004.

QUALCOMM personnel are actively engaged in a wide range of regional and community efforts, including the California Climate Action registry, of which it was a charter member. QUALCOMM is also involved with the City of San Diego's Sustainable Energy group and San Diego's Chamber of Commerce Energy group.

Qualcomm's future energy plans include a 500kW solar PV installation, 425,000 square feet of LEED certified office buildings, and adding a new 4.8MW cogeneration facility.



08: CALPINE CORPORATION

WHEN CALPINE COMPLETED THE 545MW SUTTER ENERGY CENTER IN 2001, IT ESTABLISHED A NEW BENCHMARK, AS THE CLEANEST MAJOR NATURAL GAS POWER PLANT OPERATING IN THE UNITED STATES.

08: CALPINE CORPORATION

EMPLOYEES: 3,500

REVENUE: \$8.9 BILLION

San Jose based Calpine Corporation is the largest independent power producer in the US, and the nation's 8th largest power producer. Generating enough energy to power 23 million homes, it's the country's largest renewable power producer and operates an extremely efficient fleet of power plants. Worldwide, Calpine is also the leader in renewable geothermal power.

Founded in 1984, Calpine's involvement in clean energy production began in 1989, with purchase of a 5% interest in a geothermal facility in northern California. Calpine's portfolio today includes 102 power plants in operation or construction in 23 states, three Canadian provinces, the UK and Mexico. These plants, all natural gas-fired or geothermal facilities, produce 31,000MW of electricity, with some 750MW from geothermal.

Within California, Calpine operates 4,000MW of natural gas and geothermal fueled sources. Calpine's gas turbine combined cycle power plants emit about 52% less CO₂ per unit of electricity compared to the industry average, and produce electricity at lower costs, demonstrating that environmental and economic improvements can be achieved together.

In May of 2004, Calpine CEO Peter Cartwright pledged to combat global warming by limiting future investments to low carbon power generation. Calpine's Board of Directors agreed to invest only in new baseload power plants with CO₂ emission rates equal to or lower than those from modern, combined-cycle natural-gas fired plants. The goal for future plants is to lower emissions to about 850 lbs CO₂ per MWh, as compared to Calpine's current average of 900 lbs CO₂ per MWh. The current industry average for US fossil fuel plants is 1,900 lbs CO₂ per MWh.

“IT MAY BE DECADES BEFORE WE KNOW WITH COMPLETE CERTAINTY THE FULL RAMIFICATIONS OF GLOBAL WARMING... OUR BOARD OF DIRECTORS' DECISION MERGES A SOUND BUSINESS STRATEGY WITH ESSENTIAL NATIONAL AND GLOBAL ENVIRONMENTAL GOALS”
**PETER CARTWRIGHT,
CEO, CALPINE**

In 2005, Calpine total production will save 50 million tons of CO₂ emissions by displacing higher emitting generation sources. Calpine's R&D activities include utilizing CO₂ sequestration to enhance natural gas production through injection of CO₂ into natural gas wells.

Calpine's Climate Change Policy 'supports programs at the federal, regional and state levels that include appropriate reductions in CO₂ emissions and provide flexible, market-based solutions that will reward the transition from more carbon-intensive generation to efficient, low carbon-intensive generation and renewable power.' In 2004 Scientific American named Calpine CEO Peter Cartwright Business Leader of the Year for his work promoting low carbon technologies.

09: CLIF BAR

EMPLOYEES: 140

REVENUE: \$106 MILLION

Based in Berkeley, California, Clif Bar Inc. is a leading maker of energy and nutrition foods. Well-known products include the Luna® and Clif® Bars. The company is committed to sustainability from the field to final product. To offset the CO₂ generated by the company's manufacturing, offices, travel, trucking and commutes, in 2002 Clif Bar partnered with Native Energy to purchase wind energy credits. In 2003 the partnership offset 4 million tons of CO₂; this rose to 5.5 million tons per year in 2004 and 2005. Clif Bar also created a Cool Commute Program in partnership with American Forests to plant trees to offset carbon emissions generated by its employees' commutes. Trees are planted through the Wildfire ReLeaf program, a reforestation effort targeting areas burned by wildfire in Southern California.

An active supporter of federal climate change legislation like the McCain-Lieberman Climate Stewardship Act, Clif Bar has promoted the Act at athletic events throughout the US and via the company's products and website. In 2004, Clif Bar launched a Climate Neutral Biodiesel Mobile Marketing Tour where a retrofitted city bus run on 100% biodiesel fuel drove from Florida to Boston, educating the public about global warming.

Clif Bar's Berkeley headquarters has extensive recycling programs and currently recycles or composts more than 80% of its office waste, and the company uses recycled paper for all in-house and out-sourced printing. Clif Bar was also the first major energy bar company to become certified organic, with 70% organic ingredients. Clif Bar recognized that organic farming is a powerful tool in the fight against global warming. Organic farming uses 50% less fossil fuels than conventional agriculture and stores up significant amounts of carbon in the soil over time.



10: SAN DIEGO
 THE CITY OF SAN DIEGO POWERS A FLEET OF 100 REFUSE TRUCKS WITH LIQUIFIED NATURAL GAS PRODUCED FROM METHANE CAPTURED FROM THE CITY'S LANDFILL.

10: SAN DIEGO

POPULATION: 1.25 MILLION
 BUDGET: \$2.3 BILLION

The City of San Diego's Climate Action Plan began with inventorying greenhouse gas emissions from city operations and the community. Based on 1990 levels 42% of emissions came from transportation, 38% from energy use and 20% from landfilled waste. City staff calculated that meeting their reduction target of 15% below 1990 levels by 2010 will require cutting about 6.5 million tons of greenhouse gases.

“ENVIRONMENTAL PROTECTION AND COST EFFICIENCIES ARE NOT MUTUALLY EXCLUSIVE – WITH WHAT WE’VE DONE TO REDUCE GREENHOUSE GAS EMISSIONS, WE’VE ALSO REDUCED COST”

LINDA GIANELLI PRATT, MANAGER, CITY OF SAN DIEGO SUSTAINABLE COMMUNITY PROGRAM

San Diego developed its plan as part of ICLEI's Cities for Climate Protection campaign. Implementing the plan, San Diego has improved energy efficiency in city buildings and facilities, installed solar photovoltaics (PV) and other renewable energy generation, implemented waste reduction and landfill gas recovery and begun a partnership with local businesses.

The 22 businesses in San Diego's partnership have each developed emission reduction policies, established energy management teams, and set performance goals. San Diego's Green Schools Program educates young people on the importance of taking action to address climate change through classroom presentations, hands-on experience conducting a school energy audit, and participation in community service projects.

An award-winning compost program and citywide curbside recycling and greenwaste collection divert waste. These and a landfill gas recovery system together cut close to 800,000 tons. To address emissions from the city's refuse fleet, landfill methane is converted into liquified natural gas (LNG) to fuel over 100 refuse collection trucks. Global Positioning System (GPS) navigation technology is used to optimize refuse truck routes. These measures are cutting nearly 3,000 tons of CO₂ each year.

San Diego's renewable energy efforts include using methane off-gassed from the sewage at the wastewater treatment plant to fuel the plant's generator. The treated wastewater powers a 1.35MW hydroelectric plant, and the combined systems make the plant energy self-sufficient. Solar PV on city facilities are currently producing 18MW of renewable energy generation.

11: JOHNSON & JOHNSON

EMPLOYEES: 109,100
 REVENUE: \$47.3 BILLION

Since 1886 Johnson & Johnson (J&J) has been a world-leading manufacturer of consumer health care products, medical devices, and pharmaceuticals. With operations in 54 countries, J&J's products are available in more than 175 countries. California is home to eight of J&J's companies including Neutrogena, BabyCenter, ALZA and J&J Pharmaceutical Research and Development.

J&J has a long history of environmental stewardship, beginning in 1943 when the company's founder General Robert Wood Johnson wrote the J&J Credo. Though J&J is not an energy intensive organization, the company has had a corporate energy program since 1973.

Energy efficiency became a renewed priority in the 1990s due to increased concern over environmental issues and climate change. During this time J&J engaged in a series of major partnerships including joining US EPA's Green Lights and Energy Star programs and WWF's Climate Savers Program.

Many of the J&J companies based in California have taken advantage of the state's progressive renewable energy policies. Funded partially by the City of Los Angeles Department of Water and Power, J&J's Neutrogena facility has installed a 546kW solar photovoltaic (PV) system, which reduces facility operating costs and reliance on grid-supplied power by almost half. According to the World Resources Institute, J&J is now the second largest non-utility user of solar PV in the US, having installed similar systems at numerous facilities in California, New Jersey and Pennsylvania.

In 2004 six California based J&J companies jointly purchased renewable energy certificates from producers generating biomass and wind power. This transaction covered approximately 29.7 million kWh of electricity and offset more than 25,000 metric tons of CO₂, equivalent to removing approximately 5,000 cars from the road.

“THROUGH INVESTMENTS THAT DIRECTLY REDUCE CO₂ EMISSIONS, JOHNSON & JOHNSON IS ALREADY REAPING THE BENEFITS OF POSITIVE CASH FLOWS IN THE SHORT TERM AND REDUCED BUSINESS RISK IN THE LONG TERM”

CHRIS HUNTER, CORPORATE ENERGY MANAGER, JOHNSON & JOHNSON

J&J's pharmaceutical subsidiary ALZA recently implemented an innovative contract with the city of Mountain View to purchase methane gas from a municipal landfill. The gas will be used to fuel three generators, providing the ALZA campus with 3MW of power and offsetting more than 7,000 tons of CO₂ annually.



12: CISCO SYSTEMS
CISCO'S USE OF INNOVATIVE TECHNOLOGY TO CONSERVE ENERGY AT ITS FACILITIES ENABLES THE COMPANY'S SAN JOSE HEADQUARTERS CAMPUS TO MEET AND OFTEN EXCEED CALIFORNIA'S BUILDING ENERGY EFFICIENCY STANDARDS.

12: CISCO SYSTEMS

EMPLOYEES: 35,000
REVENUE: \$22 BILLION

Cisco Systems is a worldwide leader in networking for the internet, developing hardware, software, and service offerings to create internet solutions.

“OUR MESSAGE TO EMPLOYEES IS THAT IT IS GOOD BUSINESS TO USE ENERGY EFFICIENTLY”

SHEIKH NAYEEM, FACILITIES ENGINEER, CISCO SYSTEMS

The company has a corporate commitment to increasing energy efficiency, and recently designed and built its San Jose, CA, headquarters to exceed California's building energy standards by 15 to 20%. The energy savings features qualified Cisco for \$5.7 million in rebates from its energy supplier Pacific Gas & Electric (PG&E), conserved enough energy to power some 5,500 homes, and saved the company \$4.5 million per year in operating costs.

Cisco has also implemented a range of energy efficiency measures: retrofits of company facilities; optimizing cafeteria food storage systems; upgrading to VFD motors; eliminating unnecessary lighting and optimizing lighting use. These additional measures have reduced the company's energy use by about 12.4 million kWh/year, and yielded some \$1.25 million in annual savings.

Cisco has completed an initial audit of greenhouse gas emissions on its US operations where the company's largest buildings and employee population are located. The audit covers both natural gas and purchased electricity for 2000 and 2001. Cisco is also working on a greenhouse gas emissions reduction plan that will include energy, waste reduction, water conservation, material selection, and employee trip-reduction components. Cisco engineers have identified an additional 10-12 million kWh of energy efficiency savings opportunities that they hope to implement in the next two years.

Cisco currently offers a number of incentives for its employees to reduce their emissions. It was ranked third among Fortune 500 companies in the US EPA's 'Best Workplaces for Commuters' program, with 77% of employees taking advantage of incentives to choose alternatives to single-occupancy car commutes. The array of commuter services that Cisco offers includes a shuttle service between its offices and transit stations; transit passes and subsidies; and promotion of commuting options such as carpools and vanpools.



13: CITY OF SAN FRANCISCO
WITH MORE THAN 700 CLEAN AIR VEHICLES IN ITS TRANSPORTATION FLEET, SAN FRANCISCO IS AN ESTABLISHED LEADER IN LOW EMISSION VEHICLES.

13: CITY OF SAN FRANCISCO

POPULATION: 777,000
BUDGET: \$5 BILLION

In 1998, The City of San Francisco joined ICLEI's Cities for Climate Protection campaign. Since then San Francisco adopted a greenhouse gas target, inventoried city-wide emissions, and approved an ambitious Climate Action Plan. The target is to reduce city-wide greenhouse gas emissions 20% below 1990 levels by 2012. The Climate Action Plan focuses on improvements in transportation, energy efficiency, renewable energy and solid waste.

“OUR ACTIONS CAN BE AN EXAMPLE TO OTHERS – IT IS UP TO MUNICIPAL GOVERNMENTS TO TAKE OWNERSHIP OF THIS CRITICAL ISSUE”

GAVIN NEWSOM, MAYOR, CITY OF SAN FRANCISCO

In 2001, San Francisco voters approved a \$100 million bond initiative to fund solar and other renewable power sources for public buildings. In 2004, San Francisco's Public Utilities Commission (SFPUC) completed the largest city-owned solar power system in the US, which rests atop Moscone Center, San Francisco's premier conference facility. Every year the 765kW solar PV system along with energy efficiency measures installed at the Center saves 4 million kWh of electricity and \$305,000 in energy costs. By the end of 2006 more than ten new solar systems will be installed at city owned schools, libraries and health clinics. Local businesses and homes also receive solar system installations through a partnership between the SFPUC and San Francisco's Department of the Environment.

San Francisco's energy efficiency programs include a 'Peak Energy Program' to reduce electricity demand by 16MW by 2004, and 55MW by 2008. A Green Building Ordinance requires LEED 'silver' certification in City construction projects over 5,000 square feet. The installation of efficient LED traffic signals is expected to cut 7.7 million kWh and save the city an additional \$1.2 million per year in electricity costs.

With a history of extensive waste reduction, recycling and reuse programs, in early 2003 the San Francisco Board of Supervisors adopted a goal of diverting 75% of waste from city landfills by 2010, and achieving zero waste by 2020. By 2004 the City had already achieved a waste diversion rate of 63%.

San Francisco is also an established leader in low emission vehicles with more than 700 clean air vehicles currently in its fleet (compressed natural gas, hybrid, electric, biofuel and propane). More than half of the Municipal Railway (Muni) fleet is comprised of zero emission vehicles, and Muni's 'Zero Emissions 2020' plan calls for Muni to establish an all-electric drive fleet by 2020.



14: FETZER VINEYARDS
FETZER VINEYARDS IS LARGEST GROWER OF ORGANIC GRAPES IN CALIFORNIA, AND ASPIRES TO USE ONLY ORGANIC GRAPES BY 2010. ORGANIC FARMING USES 50% LESS FOSSIL FUELS THAN CONVENTIONAL AGRICULTURE AND STORES SIGNIFICANT AMOUNTS OF CARBON IN THE SOIL OVER TIME.

14: FETZER VINEYARDS

EMPLOYEES: 350
PRODUCTION: 3.7 MILLION CASES OF WINE/YEAR

Established in 1968, Fetzer Vineyards is the sixth largest premium wine producer in the US and Mendocino County's largest producer of quality wines. Its sustainability program is guided by its 'triple bottom line' vision, whereby every business decision must meet economic, environmental and equity improvement criteria. Fetzer's action on greenhouse gas emission reduction is a corollary of this commitment.

In 1996, the company unveiled a 10,000 square foot administration building designed to use 31% less energy than standard practice. It uses rammed earth, recycled wood and paint, non-off-gassing carpet glues, day-lighting, and energy efficient cooling, heating and lighting systems. Solar photovoltaic tiles on the building's roof produce 56,500kWh of electricity, about 75% of the building's electricity needs, saving the company \$6,700 in electricity costs. Fetzer purchases 93% of its operational electricity needs (about 5.4 million kWh/year) from renewable sources supplied by Three Phases Energy.

Fetzer has applied a variety of strategies to minimize energy use in its operations. Refrigeration upgrades and the installation of timers have saved at least 225,000kWh/year in electricity use and reduced natural gas use by 10%; and 36 holding tanks have been insulated, saving 32% in electricity per tank. All of Fetzer's tractors and 50% of its big-rig trucks run on biodiesel fuel. The company also owns five electric SUVs, 12 'Think' cars, and numerous electric carts.

Fetzer has aggressively attacked waste. Recycling programs cut landfill disposal by 95% since 1990, bringing down solid waste greenhouse gas emissions by 92% and saving Fetzer \$120,000 in dump fees.

“REDUCING ENERGY USAGE REDUCES IMPACT ON THE ENVIRONMENT AND USES LESS NATURAL RESOURCES – USING LESS ENERGY ALSO SAVES MONEY AND CAN CREATE A BETTER WORK ENVIRONMENT FOR OUR EMPLOYEES”

PATRICIA VOSS, PRESIDENT, FETZER VINEYARDS

The company is well known for its commitment to organic agriculture, 1,800 acres are currently organically farmed and 17% of its total crush originates from organic grapes. Fetzer Vineyards is largest grower of organic grapes in California, and aspires to use only organic grapes by 2010.

In 2004 Fetzer joined the EPA Climate Leaders Program committing to review and report its greenhouse gas emissions each year.

15: INTEL

EMPLOYEES: 85,000
REVENUE: \$34 BILLION

Intel was founded in the Silicon Valley in 1968. The Santa Clara site is home to Intel's worldwide corporate headquarters.

In 1999, along with the other members of the World Semiconductor Council (WSC), Intel set a goal of reducing PFC emissions to 10% below 1995 levels by 2010. To reduce PFC emissions Intel is designing environmental improvements into the manufacturing process for the latest generation of computer chips by using a combination of chemical substitution, process optimization and abatement.

Intel has also made major contributions to reducing end-user emissions through improving the energy efficiency of its products. The company helped to develop the US EPA's Energy Star Program for computers, and Intel's Instantly Available PC (IAPC) technology allows PCs to run more efficiently while reducing their energy use by up to 71%.

To address its internal emissions, Intel has spent \$2-3 million per year on energy conservation projects at its facilities, resulting in annual cost savings of \$10 million. The majority of these projects have focussed on facility improvements, for example improving efficiency of systems that maintain building temperature.

With a long term view to participating in the carbon offset market, Intel is a member of the Climate, Community and Biodiversity Alliance (CCBA) a group that is developing standards to evaluate and score the impacts of land-based offset projects. The company has engaged in fuel switching and the purchase of renewable energy at some locations – initiatives it hopes to expand on.

GLOSSARY

ICLEI
 International Council for Local Environmental Initiatives

US EPA
 United States Environmental Protection Agency

PFCs
 Perfluorocompounds are a family of gases used by the semi-conductor industry as solvents. The climate change potential of PFCs is 6,500 to 23,900 times greater per molecule than that of CO₂

LEED
 The LEED (Leadership in Energy and Environmental Design) Green Building Rating System® is a voluntary standard for developing high-performance, sustainable buildings, developed by the members of the US Green Building Council

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