
2010 CALIFORNIA
GREEN
INNOVATION
INDEX
NEXT 10

NEXT 10 IS AN INDEPENDENT NONPARTISAN ORGANIZATION THAT EDUCATES, ENGAGES AND EMPOWERS CALIFORNIANS TO IMPROVE THE STATE'S FUTURE.

NEXT 10 WAS FOUNDED IN 2003 BY BUSINESSMAN AND PHILANTHROPIST F. NOEL PERRY. NEXT 10 IS FOCUSED ON INNOVATION AND THE INTERSECTION BETWEEN THE ECONOMY, THE ENVIRONMENT, AND QUALITY OF LIFE ISSUES FOR ALL CALIFORNIANS. WE PROVIDE CRITICAL DATA TO HELP INFORM THE STATE'S EFFORTS TO GROW THE ECONOMY AND REDUCE GLOBAL WARMING EMISSIONS.

SINCE 2008, NEXT 10 HAS PUBLISHED THE *CALIFORNIA GREEN INNOVATION INDEX*. THE *INDEX* TRACKS CALIFORNIA'S PROGRESS IN REDUCING GREENHOUSE GAS (GHG) EMISSIONS, IMPLEMENTING INNOVATIVE PUBLIC POLICY, GENERATING TECHNOLOGICAL AND BUSINESS INNOVATION, AND GROWING BUSINESSES AND JOBS THAT ENABLE THE TRANSFORMATION TO A MORE RESOURCE-EFFICIENT ECONOMY.

FOR MORE INFORMATION ABOUT THE *CALIFORNIA GREEN INNOVATION INDEX*, PLEASE VISIT US ONLINE AT WWW.NEXT10.ORG.

CALIFO

POPULATION

2008 **38.3** MILLION

1990 – 2008 **1.4%**
AVERAGE ANNUAL GROWTH RATE

WWW.NEXT10.ORG

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RATIO OF GHG EMISSIONS
(METRIC TONS) TO GDP ($10,000)

CARBON ECONOMY

1990 **4.6**

2008 **3.1**

2020 **2.0**

MEETING AB 32 TARGETS

GROSS DOMESTIC PRODUCT

(INFLATION ADJUSTED DOLLARS FOR FIRST HALF 2009)

2008 **$1.8** TRILLION

2.3% AVERAGE ANNUAL GROWTH 2000 – 2008

2008 **$47,700**
PER CAPITA GDP

Gross Domestic Product (GDP) is a way of measuring the size of an economy, and is calculated by summing the value added from all industries in the economy. This measure can be used for a country as well as a state, in which case it can also be expressed as gross state product (GSP).

RNTA

Gross GHG emissions includes fossil fuel carbon dioxide (CO_2), with electric imports and international fuels (carbon dioxide only) and non-carbon GHG emissions (in CO_2 equivalents).

TOTAL GHG EMISSIONS

(MILLION METRIC TONS OF CO_2 EQUIVALENT)

1990 **433**

2008 **478**

0.5% AVERAGE ANNUAL GROWTH
1990–2008

PER CAPITA GHG EMISSIONS

2008 **12.5**
MILLION METRIC TONS

AB 32

CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006

Assembly Bill 32 was signed into California law in 2006, putting into place the first ever statewide cap on global warming pollution. AB 32 has put California at the forefront of climate change policy by requiring the state to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020.

AB 32 TARGETS

TOTAL GHG EMISSIONS

2020 **433**
MILLION METRIC TONS

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Population Data Source: California Department of Finance. Economy Data Sources: Bureau of Economic Analysis; California Department of Finance. Greenhouse Gas Emissions Data Sources: California Air Resources Board, "California Greenhouse Gas Inventory–by Sector and Activity"; California Department of Finance Carbon Economy Data Sources: California Air Resources Board, "California Greenhouse Gas Inventory - by Sector and Activity"; Moody's Economy.com

Dear Friends,

I started Next 10 in 2003 as a businessperson who saw California at a crossroads, facing a multi-billion dollar budget deficit and an energy crisis. Once again, today, we are experiencing daunting economic and environmental challenges. Over the years our research has explored the nexus of the economy and environment and the profound impact both have on our overall quality of life.

This third edition of the *California Green Innovation Index* tracks California's history of policy and technology innovation and resulting economic and environmental gains or losses. Based on this research, we can conclude that California's green economy is one of the few areas of the economy that is growing in the current downturn. The research we present in this *Index* demonstrates the important contribution green innovation and clean technology investment continue to make to our economy. Top findings include:

CALIFORNIA IS A GLOBAL LEADER IN GREEN INNOVATION

- California has attracted $11.6 billion in cleantech venture capital (VC) since 2006, accounting for 24 percent of total global investment.
- California is the top state in patent registrations in green technology, outpacing second-ranked New York by 150 patents between 2007 and 2009.
- In the first half of 2010, the state attracted 40 percent of global cleantech VC, exceeding the first half of 2009 by two-and-a-half times.

CALIFORNIA CONTINUES TO RAISE ITS ENERGY PRODUCTIVITY, FREEING UP DOLLARS FOR BUSINESSES AND HOUSEHOLDS TO SPEND IN THE ECONOMY, WHICH CREATES NEW JOBS

- California's businesses gain the competitive edge through efficiency gains: Between 2002 and 2007, electricity productivity of manufacturers improved by 13 percent in California and dropped by ten percent in the rest of the nation.
- As a result of efficiency improvements, each Californian used 20 percent less energy in 2008 than in 1970 while little progress has been made in the rest of the country.

CALIFORNIA'S ECONOMY IS REDUCING ITS DEPENDENCE ON CARBON AS TOTAL EMISSIONS LEVEL OFF AND PER CAPITA EMISSIONS DROP

- For every dollar of GDP generated in 2008, the state's economy required 32 percent less carbon than it did in 1990.

This year's *California Green Innovation Index* also includes a feature that examines California's overall business climate and a feature that delves into our growing green manufacturing sector. In completing this research we uncovered some surprising facts. Contrary to popular assertions, even among electricity-intensive industries, new business startups in California vastly outnumber losses through closures and exits. And, California is not experiencing an exodus of businesses to other states.

By revenue, energy represents the largest industry in the world. Energy technology (ET) is emerging as the next breakout technology revolution. And like information technology (IT), ET is an emerging trillion-dollar market. California's world-class talent, research centers and businesses, coupled with its innovative clean energy policies uniquely position us to invent and deploy technology and benefit as a market leader.

Here's to many more years of innovation of all kinds here in California.

Sincerely,

F. Noel Perry

F. Noel Perry
Founder, Next 10

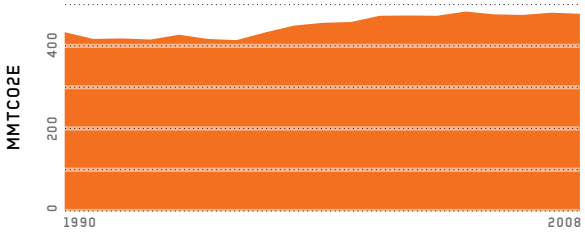
CONTENTS

INDEX AT A GLANCE

The *2010 California Green Innovation Index* presents a series of "dashboard" indicators that track changes over time and two in-depth features: *The Changing Business Climate* and *Manufacturing in the Core Green Economy.* The Index at a Glance highlights key areas detailed in this report.

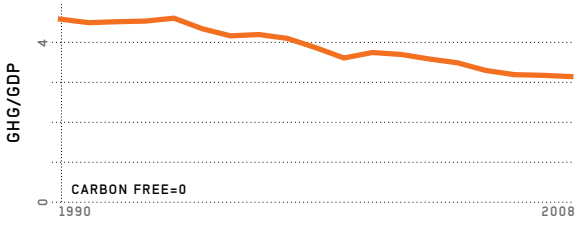
CALIFORNIA'S ECONOMY IS REDUCING ITS RELIANCE ON CARBON AS TOTAL EMISSIONS LEVEL OFF AND PER CAPITA EMISSIONS DROP.

GHG EMISSIONS _PAGE 12



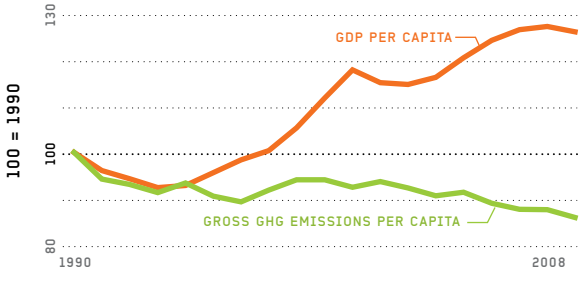
Gross annual greenhouse gas (GHG) emissions have climbed 15 percent since 1996 and have been leveling out since 2001.

CARBON ECONOMY _PAGE 14



For every dollar of GDP generated in 2008, California requires 32 percent less carbon than in 1990.

GDP & EMISSIONS _PAGE 13



Relative to 1990, gross domestic product (GDP) per capita grew 26 percent while GHG emissions per capita decreased by 14 percent.

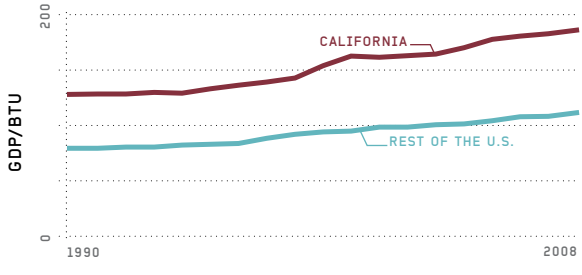
VMT & EMISSIONS _PAGE 30

PERCENT CHANGE 2007–2008	
VMT PER CAPITA	-3%
SURFACE TRANSPORTATION GHG EMISSIONS PER CAPITA	-6%

Both vehicle miles traveled (VMT) per capita and surface transportation emissions per capita have declined steadily, in part a result of the economic recession and spikes in fuel prices. From 2007 to 2008, VMT per capita dropped by three percent, while surface emissions fell by six percent.

AS A RESULT OF ENERGY EFFICIENCY POLICIES ENACTED SINCE THE 1970S, CALIFORNIA'S ENERGY PRODUCTIVITY CONTINUES TO RISE. THIS MEANS THAT DOLLARS BUSINESSES AND HOUSEHOLDS DO NOT SPEND ON ENERGY CAN BE REINVESTED IN THE ECONOMY THROUGH CAPITAL UPGRADES OR NEW EMPLOYEES. ACROSS ALL SECTORS, VAST OPPORTUNITIES EXIST FOR NEW EFFICIENCY GAINS.

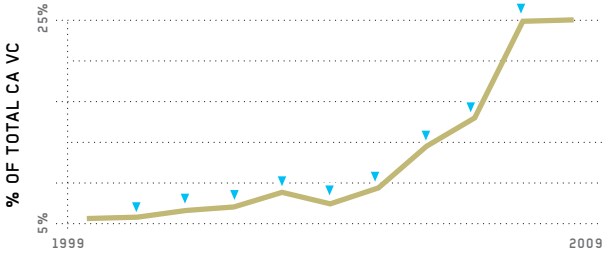
ENERGY PRODUCTIVITY _PAGE 18



Energy productivity, measured as the ratio of energy consumed (inputs) to GDP (economic output), is 68 percent higher in California than in the rest of the nation. California's energy productivity is also improving at a faster rate than the rest of the country.

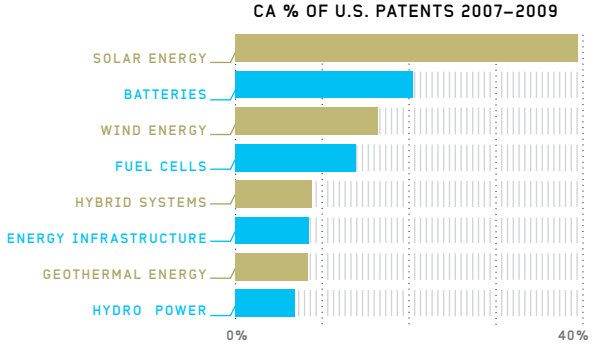
EVEN DURING THE CURRENT ECONOMIC DOWNTURN, INVESTMENT IS STRONG IN CLEAN TECHNOLOGY, AND NEW VALUE IS BEING CREATED THROUGH INNOVATION IN TECHNOLOGY AND PUBLIC POLICY.

CLEANTECH VC _PAGE 21



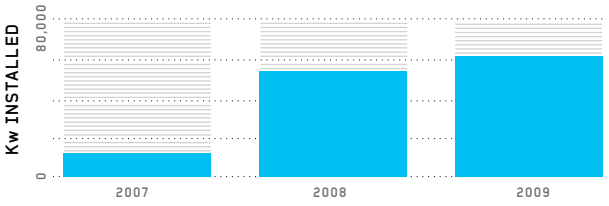
Cleantech accounts for a large and growing portion of total venture capital (VC) in the state. In 2009, 25 percent of total VC investment was from cleantech, up from 13 percent two years earlier. Cleantech investment in the first half of 2010 was two and a half times greater than the first half of 2009.

GREEN TECH PATENTS _PAGE 25



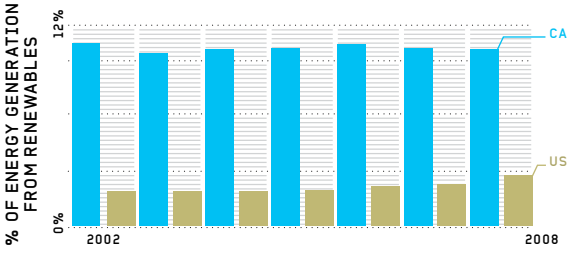
California accounted for 39 percent of all solar patents registered in the U.S. from 2007 to 2009, compared with 24 percent between 1995 and 1997.

SOLAR CAPACITY _PAGE 35



New solar capacity in California has grown by 14 percent since 2008 and by more than five-times since 2007. This growth is directly related to the California Solar Initiative offering rebates to consumers and the Renewables Portfolio Standard.

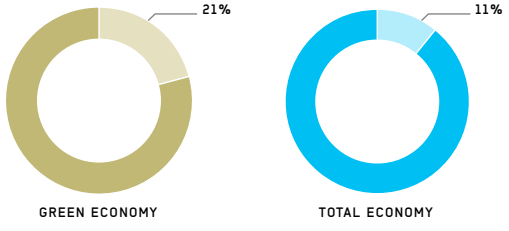
RENEWABLES _PAGE 35



Since 2002, renewable energy has represented roughly 11 percent of total energy generation in California. In the United States, renewables have increased from two to three percent. California's Renewables Portfolio Standard mandated that 20 percent of the state's electricity comes from renewable sources by 2010 and has been raised to 33 percent by 2020.

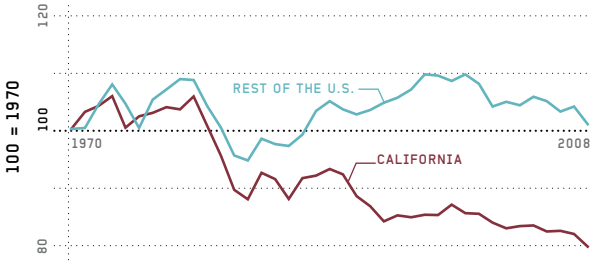
GREEN MANUFACTURING _PAGE 50

AS OF JANUARY 2008



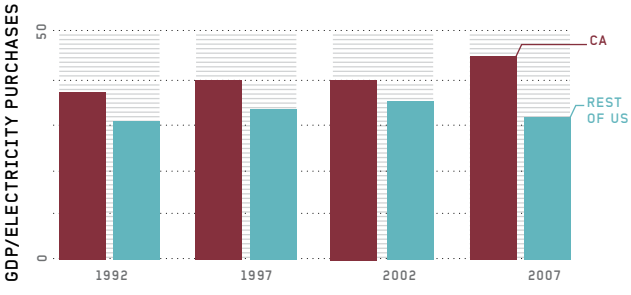
Nearly 21 percent of California's green employment is in manufacturing. Across all industries, manufacturing represents only 11 percent of employment.

ENERGY CONSUMPTION _PAGE 19



On a per capita basis, Californians have been consuming less energy over the long-term. Energy consumption per capita has dropped 20 percent since 1970 in California, while little progress has been made in the rest of the nation.

ELECTRICITY PRODUCTIVITY _PAGE 45



California's manufacturers have increased their electricity productivity by 13 percent since 2002, while productivity dropped by ten percent for manufacturers in the rest of the nation.

CALIFORNIA'S PAST AND FUTURE

California has a history of cutting edge cultural change and technological advance. To date, this history is repeating itself in the realm of green innovation. The state's pioneering spirit is fueled in part by its world-class research and development talent, precedent setting public policy, and forward-looking population.

HERITAGE OF TECHNOLOGICAL AND SOCIAL INNOVATION

The California experience demonstrates that reducing greenhouse gas (GHG) emissions can be achieved while also growing the economy. A debate that pits the environment against the growing economy is a false proposition. Economic prosperity has been achieved while protecting limited natural resources.

Innovation breaks down barriers and creates new value. In order to realize both, a reduction of GHG emissions and economic growth, California will need to build on its tradition of innovation. Through improving efficiencies, we can do more with less. By generating less waste and pollution, we can spend less on costly mitigation efforts. By thinking creatively, we can learn how to do things differently. By investing in technological advance, the deployment of new technology and practices, and in our talent base, California will remain a world leader in green innovation.

A virtuous cycle of green innovation develops through the actions of individual actors and the interactions between actors. Each actor has control over a certain scope of action. Each decision, whether a policy, purchase or production issue, will have an impact on the scope of action of another group of actors. As one action triggers another, momentum grows, and the innovation process is spurred. When actions are aligned around shared goals of growing the economy and reducing negative environmental impacts, then a virtuous cycle of green innovation develops.

Spurring California's green innovation demands the concerted efforts of multiple actors.

Government adopts policy innovations, which create an environment that encourages both private sector and individual innovation. At the same time, government policy is influenced by the emergence of new technologies, products, and business practices in the marketplace, which demonstrate what could be possible on a larger scale.

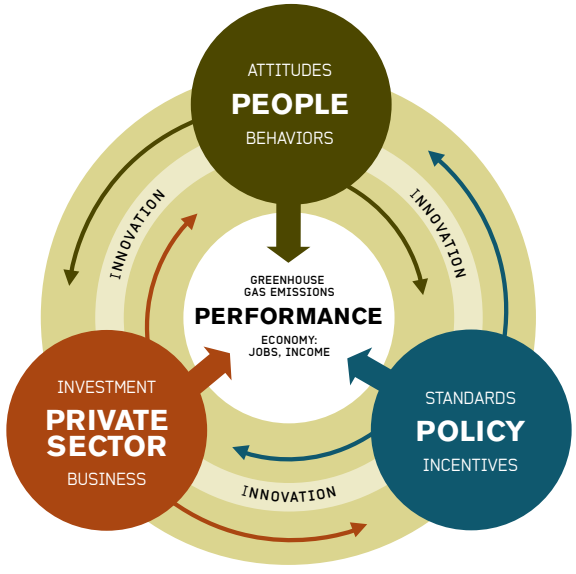
Elected officials also pursue policy innovations in response to growing concerns from the public—interests shaped by the media, consumer experience, and personal values as much as by government information and incentives.

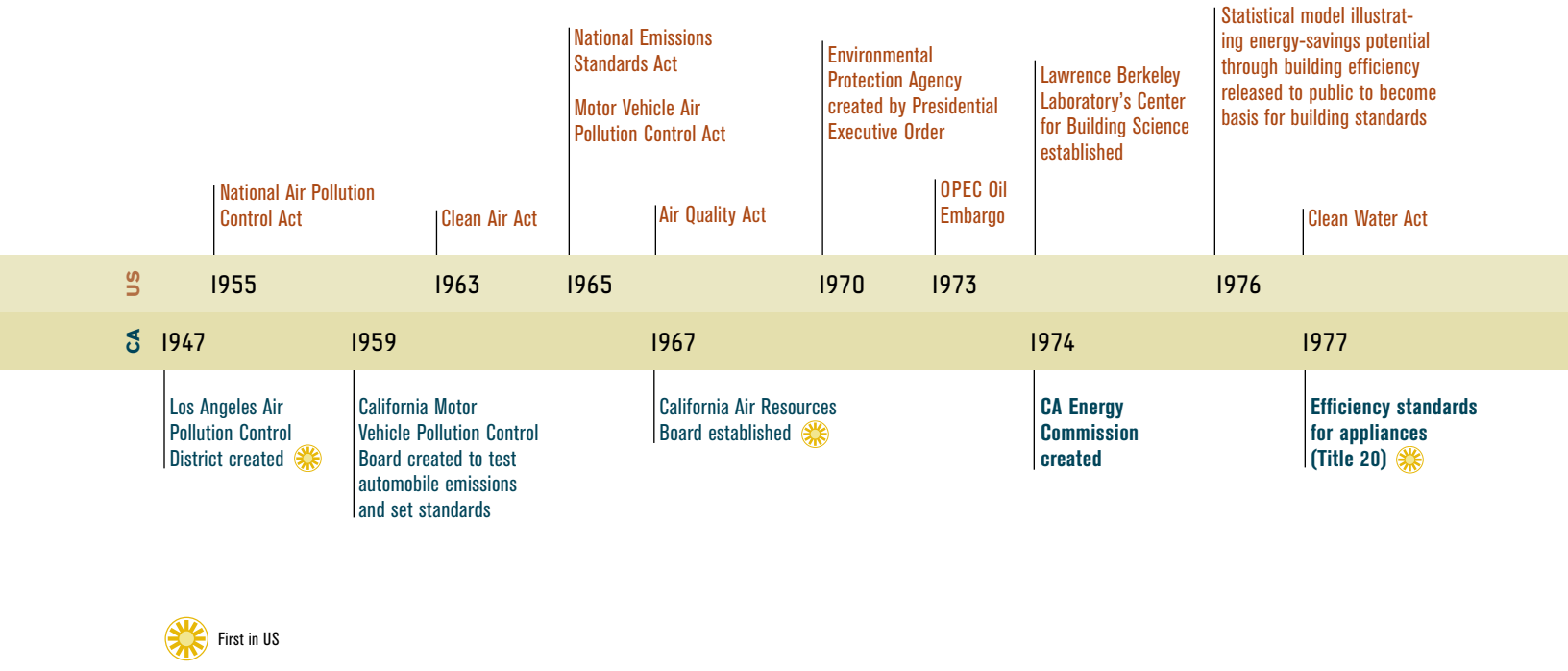
Private sector businesses respond to government mandates and incentives, but also to global market forces (like the price of oil). Businesses pursue innovations to meet emerging industry and consumer demand for new green products and practices. These innovations not only help the bottom line of California businesses, but also create jobs, help inform policy, and change individual behavior by offering tangible applications of green innovation.

The private sector also includes a diverse mix of non-profit groups that promote changes in government policy, business practices, and individual behaviors. This "independent sector" of organizations is an important catalyst for green innovation.

Individuals not only respond to government incentives and availability of new products, but also influence the direction of policy through the political process, and generate demand for new green products in the marketplace.

California has a heritage of trailblazing pioneers, creative problem-solvers, outdoor enthusiasts and world-class businesses that shake up the status quo. California's heritage is founded on forward-looking people who are open to trying new things. This is what innovation is about, and this is what will drive economic prosperity in the new context of global climate change and diminishing natural resources.

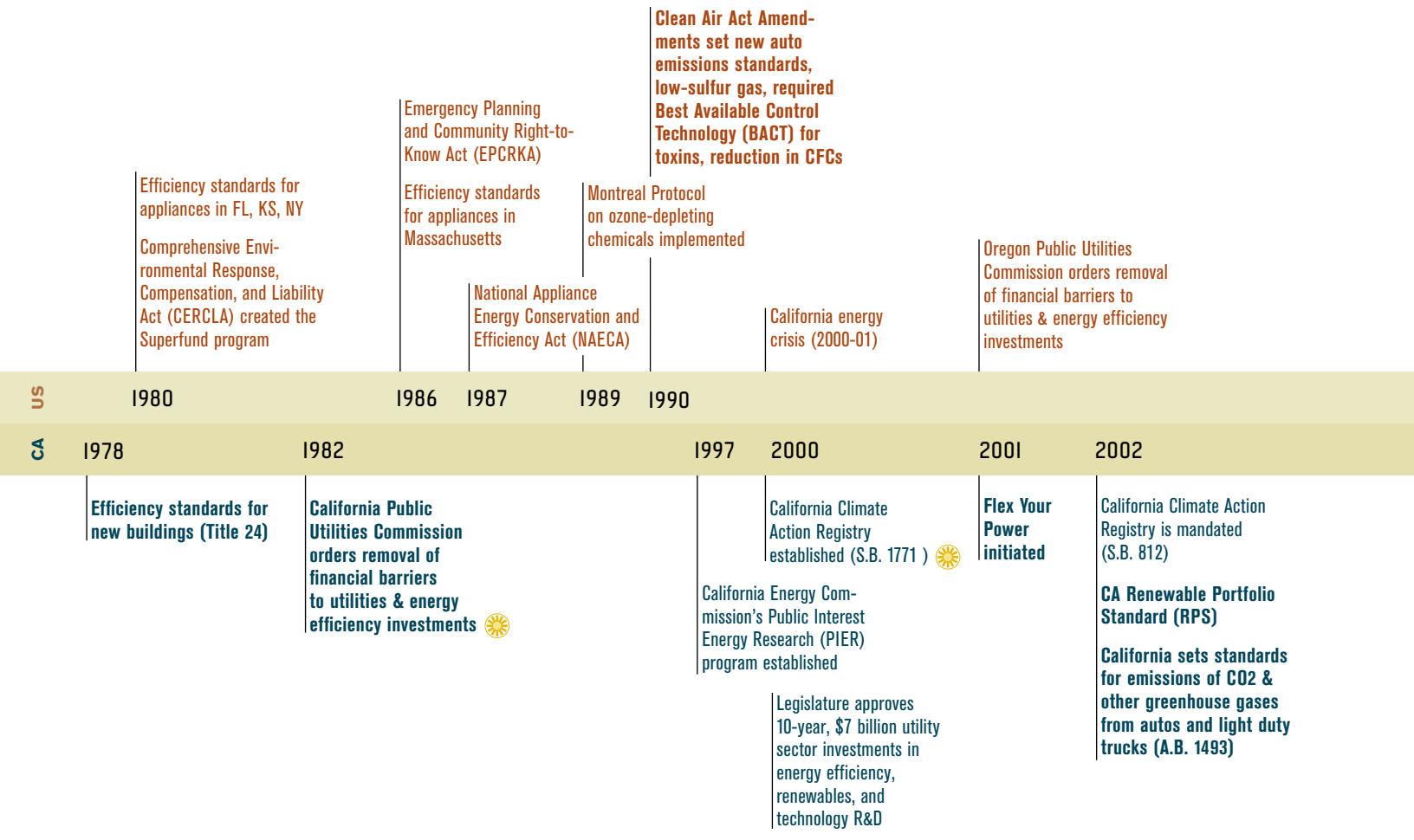




CALIFORNIA POLICY TIMELINE

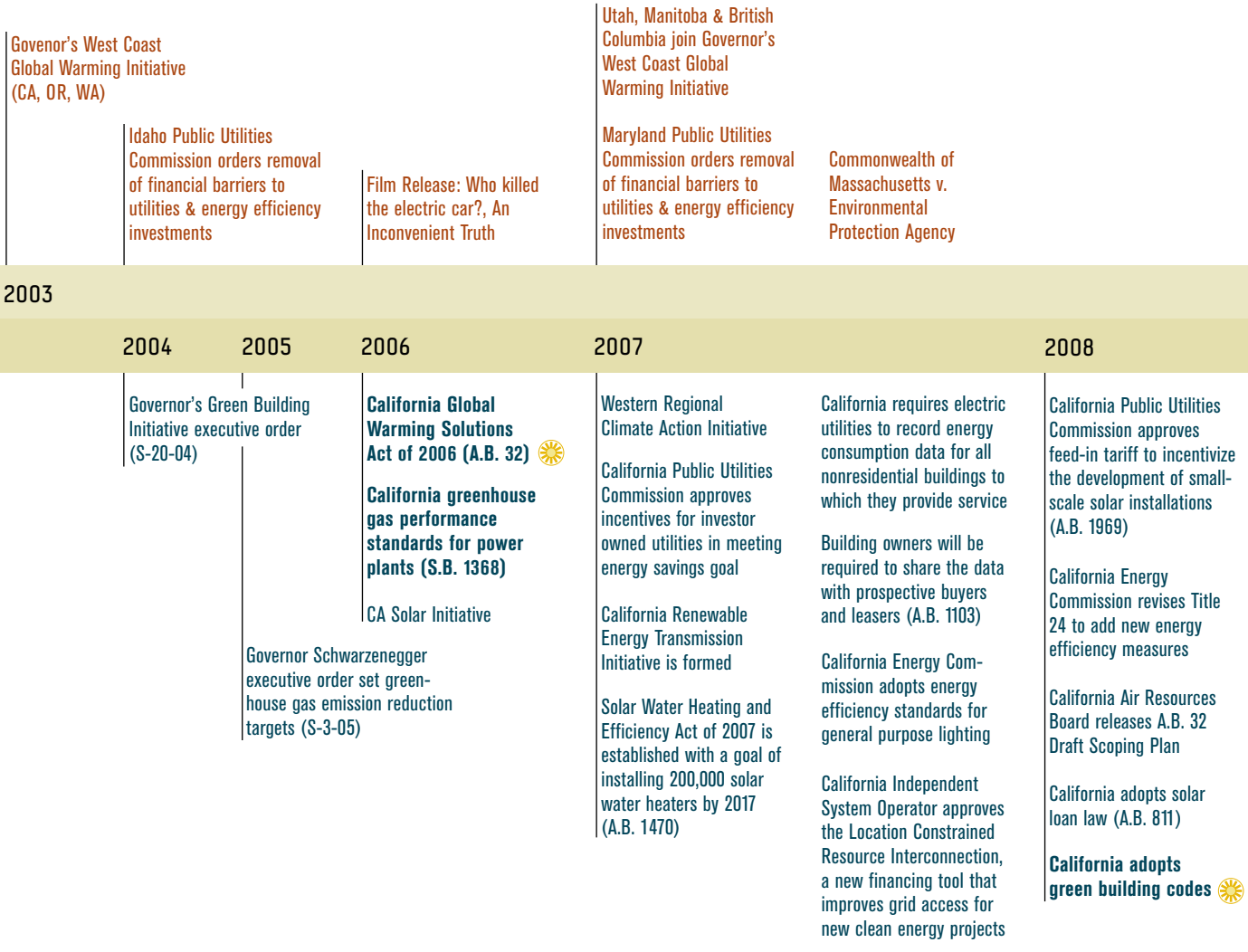
For over seventy years, California has been a national leader in policy innovation related to the environment. The state's first legislative landmark came in 1947 with the creation of the Los Angeles Air Pollution Control District. This bold step toward cleaner air in Los Angeles was not only the first green policy in California, but the first of its kind in the nation. Over the next few decades, California continued to pursue green legislation and was propelled to the forefront of the environmental policy movement by the energy crisis of the 1970s. To combat the higher energy costs caused by the OPEC Oil Embargo in 1973, the California Energy Commission (CEC) was established and implemented a series of energy policies aimed at increasing energy efficiency and lowering costs. The first major legislative policy to this effect in both California and the nation was the Energy Efficiency Standards for Residential and Nonresidential Buildings, which created groundbreaking energy standards for appliances and buildings.

More recently, the state has been faced by the challenges posed by the California Energy Crisis of 2000 and 2001 and climate change. In the early years of the decade, lawmakers were galvanized into action by energy shortages and the ensuing rolling blackouts. This renewed dedication has since snowballed with the increased understanding of the dangers of climate change, leading the State to pass scores of green policies aimed at securing California's future. Resulting policy innovations have embraced extensive energy efficiency campaigns, greenhouse gas emissions standards, renewable energy incentives, and technology research investments.



Recent policy innovations include the following:

- **Under a new energy efficiency law, Energy Efficiency: Equity, Jobs and Green Buildings (A.B. 758)**, buildings in California will become more energy efficient and less costly to operate. The CEC will establish a comprehensive plan to increase energy savings in residential and commercial buildings built before current building standards. A request for proposal was released on June 16, 2010 for a technical support contractor to assist with the development and implementation of the programs that will satisfy the bill requirements. Sixty-nine percent of homes to date in California were built before the first energy standards and will be a large part of the focus of the CEC's efforts to increase energy efficiencies and savings. According to a 2005 CEC report, consumers can save $4.5 billion through energy saving measures in electricity and natural gas.[1]
- **With the passage of a new sustainable energy bill, The California Solar Surplus Act of 2009 (A.B. 920)**, customers will soon be reimbursed for excess energy they produce from solar photovoltaic and small wind systems. As of January 1, 2011, energy companies will compensate customers for energy they send back into the power grid. Currently, there are 50,000 homes and businesses in California with solar photovoltaic systems that will



experience greater energy savings and help push California toward the 33 percent renewable energy goals of Governor Schwarzenegger. This new law demonstrates how the proliferation of clean technology provides economic returns while achieving lower emissions.

- **High reporting compliance under A.B. 32** (the California Global Warming Solutions Act of 2006) was reported by the California Air Resource Board. As of November, 591 of the 605 facilities that emit at least 25,000 metric tons of carbon dioxide per year have reported their GHG emissions for 2008. California's A.B. 32 put into place the first ever statewide cap on global warming pollution requiring the state to reduce its GHG emissions to 1990 levels by 2020.
- **Accreditation is now available for third party professionals to verify emissions** in an effort to begin tracking emissions reductions under a cap-and-trade regulatory system. This first-in-the-nation program is investing in the workforce development needed in order for people to gain the new skills now demanded by companies to meet the new regulatory requirements.
- **California's Renewable Portfolio Standard Program** was amended in September 2009 by an executive order from Governor Arnold Schwarzenegger, increasing the percentage of power generation from renewable energy sources from 20 percent to 33 percent by 2020. Governor Arnold Schwarzenegger had issued a non-binding order in November 2008.

US

Cap-and-Trade bill passes U.S. Senate Environment and Public Works Committee (S.B. 1733)

U.S. Department of Labor to award $500 million for green jobs initiatives

U.S. Department of Energy to provide $8 billion of loans for renewable energy projects

EPA will adopt more stringent tailpipe rules modeled after those of California's

EPA proposal to reduce emissions on large industrial projects

Clean technology tax incentives included in American Recovery and Reinvestment Act. U.S. now on pace to double renewable manufacturing capacity by 2012

U.S. Department of Energy implements guaranteed loan solicitation for renewable energy manufacturing projects

Advanced Research Projects Agency-Energy receives $400 million to fund cross-disciplenary energy research

U.S. Department of the Treasury and Department of Energy to award $550 million for clean energy grants

United Nations Climate Change Conference in Copenhagen, Denmark

U.S. Department of Energy announces $30 million for energy-efficient housing partnerships

CA

2008

Land use strategy requirements mandated to reduce GHG emissions (S.B. 375)

Green Collar Jobs Council established (A.B. 3018)

California Public Utilities Commission adopts the California Long-Term Energy Efficiency Strategic Plan for 2009 to 2020

California Air Resources Board adopts plan to reduce greenhouse gas emissions levels to 1990 level by 2020

2009

California Air Resources Board adopts regulation to reduce carbon intensity of transportation fuel 10 percent by 2020

California granted waiver from EPA for more stringent vehicle emission standards

California receives $49.6 million of stimulus dollars to improve energy efficiency, reducing carbon dioxide emissions by 22,541 tons and creating 500 jobs

California increases feed-in tariff caps (S.B. 32)

California utilities must reimburse customers for excess power generated from solar and wind power systems (A.B. 920)

California Energy Commission to establish regulation to increase building energy efficiency and lower operation costs (A.B. 758)

California Air Resources Board announces compliance rate of 97 percent in reporting of greenhouse as emissions by State's 600 largest facilities

California Air Resources Board accredits third party professionals to verify greenhouse gas emissions

The California Energy Commission set the world's most rigorous efficiency standards for televisions, cutting electricity needs for new flat-panel sets by about 50%

2010

California Air Resources Board finalizes regulation of Palvey Bill for greenhouse gas emissions for passenger vehicles

California launches California Green Corps using $10 million in stimulus funds, providing green sector jobs for at-risk young adults

Green Innovation Challenge Grant program to invest $20 million training workers for jobs in cleantech industries

GHG reduction targets set for S.B. 375 land-use strategies for 18 regions. Targets for 2020 and 2035 integrate land use, housing and transportation planning

Air Resources Board raises RPS from 20% to 33% by 2020

- **California was granted a waiver from the U.S. EPA in June 2009** to pursue stricter vehicle emissions standards, first outlined in a 2004 law that called for reductions of GHG emissions by cars and light trucks of 22 percent by 2012 and 30 percent by 2016. The U.S. Environmental Protection Agency and Department of Transportation adopted vehicle standards in April of 2010 modeled after California's regulations.
- **The California Green Corps, created by Governor Schwarzenegger**, launched a pilot program in March 2009 taking advantage of $10 million in federal economic stimulus funding from the U.S. Department of Labor in addition to $10 million from public-private partnerships. The program goal is to develop the green workforce in California and provide valuable job opportunities to at-risk young adults between the ages of 16 and 24. The California Clean Energy Workforce Training Program has emerged from the California Green Corps.
- **The California Energy Commission set the world's most rigorous efficiency standards for televisions in November 2009** (effective in 2010), cutting the electricity needs for new flat–panel sets by about 50 percent.

CALIFORNIA'S GREEN INNOVATION

TRACKING CALIFORNIA'S PROGRESS IN GREEN INNOVATION ILLUSTRATES HOW WELL THE STATE IS MAINTAINING ITS PACESETTER POSITION AND INDICATES NEW PATHS EMERGING IN AREAS OF GREEN INNOVATION. THE DASHBOARD INDICATORS THAT FOLLOW MEASURE PROGRESS IN ENVIRONMENTAL QUALITY, RESOURCE EFFICIENCY, AND TECHNOLOGICAL ADVANCEMENTS, AND ARE STATISTICALLY MEASURABLE OVER TIME. FOLLOWING THE DASHBOARD INDICATORS ARE TWO FEATURES THAT DELVE INTO DEEPER DETAIL: CALIFORNIA'S CHANGING BUSINESS CLIMATE AND MANUFACTURING IN THE GREEN ECONOMY.

DASHBOARD INDICATORS

CALIFORNIA'S ECONOMY IS REDUCING ITS RELIANCE ON CARBON AS TOTAL EMISSIONS LEVEL OFF AND PER CAPITA EMISSIONS DROP. AS A RESULT OF PIONEERING ENERGY EFFICIENCY POLICIES ENACTED SINCE THE 1970S, ENERGY PRODUCTIVITY CONTINUES TO RISE, WHICH MEANS THAT BUSINESSES AND HOUSEHOLDS GET MORE FOR THEIR ENERGY DOLLARS AND THEREFORE HAVE DOLLARS TO SPEND IN THE ECONOMY ON CAPITAL UPGRADES OR HIRING NEW EMPLOYEES. EVEN DURING THE CURRENT ECONOMIC DOWNTURN, VENTURE CAPITAL INVESTMENT IS STRONG IN CLEAN TECHNOLOGY, AND NEW VALUE IS BEING CREATED THROUGH THE ADOPTION OF NEW TECHNOLOGIES AND PUBLIC POLICY INNOVATION. THE DASHBOARD INDICATORS TRACK THE STATE'S PROGRESS IN THE AREAS OF THE CARBON ECONOMY, ENERGY EFFICIENCY, GREEN TECHNOLOGY INNOVATION, TRANSPORTATION, AND RENEWABLE ENERGY.

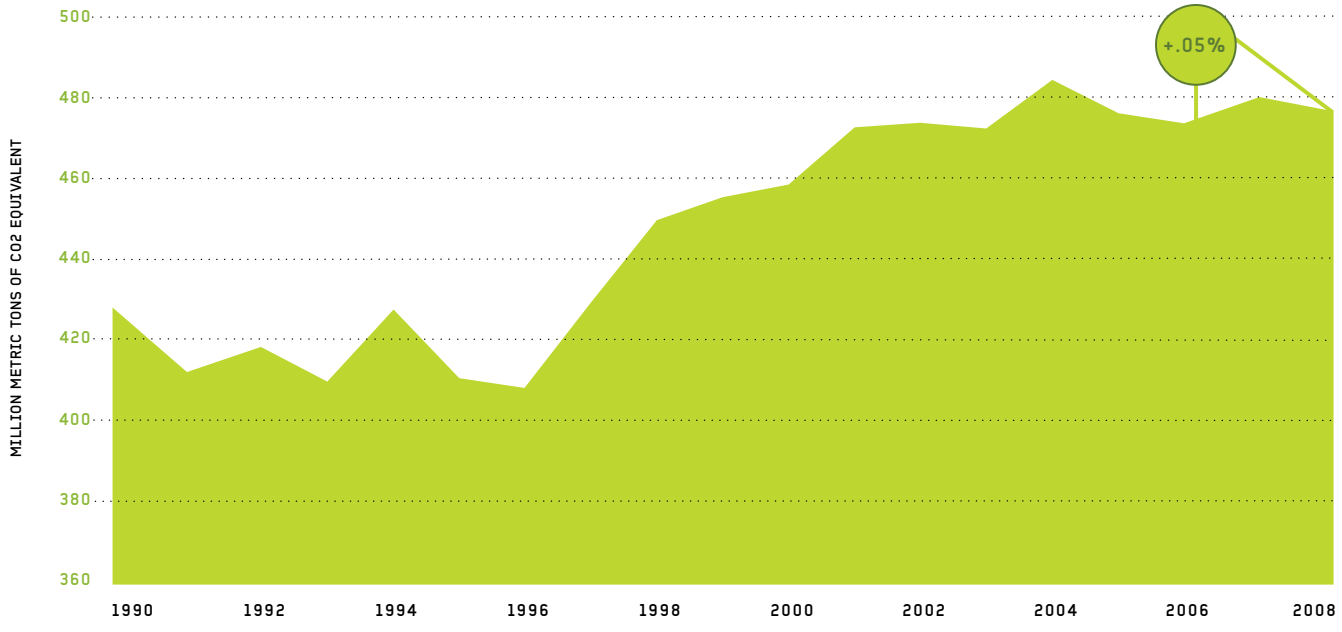
THE CARBON ECONOMY

California's economy is largely dependent on carbon-based energy. Carbon-based fuels drive our distribution networks of ocean shipping, air cargo, trains and trucks. And carbon-based fuels are the basis of our electricity generation. In order to meet the environmental goals laid out by the California Global Warming Solutions Act (A.B. 32) and other legislation, our economy must transition away from its dependence on carbon.

The indicators relating to the Carbon Economy track this necessary shift. They help illustrate the relationship between economic performance (i.e., gross domestic product) and the generation of GHGs, and how the relationship is changing. In some instances, California is compared to the rest of the U.S. (i.e., excluding California) and other large states.

Since 1996, California's gross annual GHG emissions have risen substantially, climbing by 15 percent. While the rate of growth has slowed in large part since 2001, total emissions must start dropping in order to reduce emissions to 1990 levels by 2020 as mandated by A.B. 32. Since 2006, emissions increased 0.5 percent. While rising 1.2 percent from 2006 to 2007 and slipping (-0.6%) again in 2008, this recent unevenness reflects multiple factors including the onset of the economic recession, fuel price hikes and a noticeable drop in on-road transportation.[2]

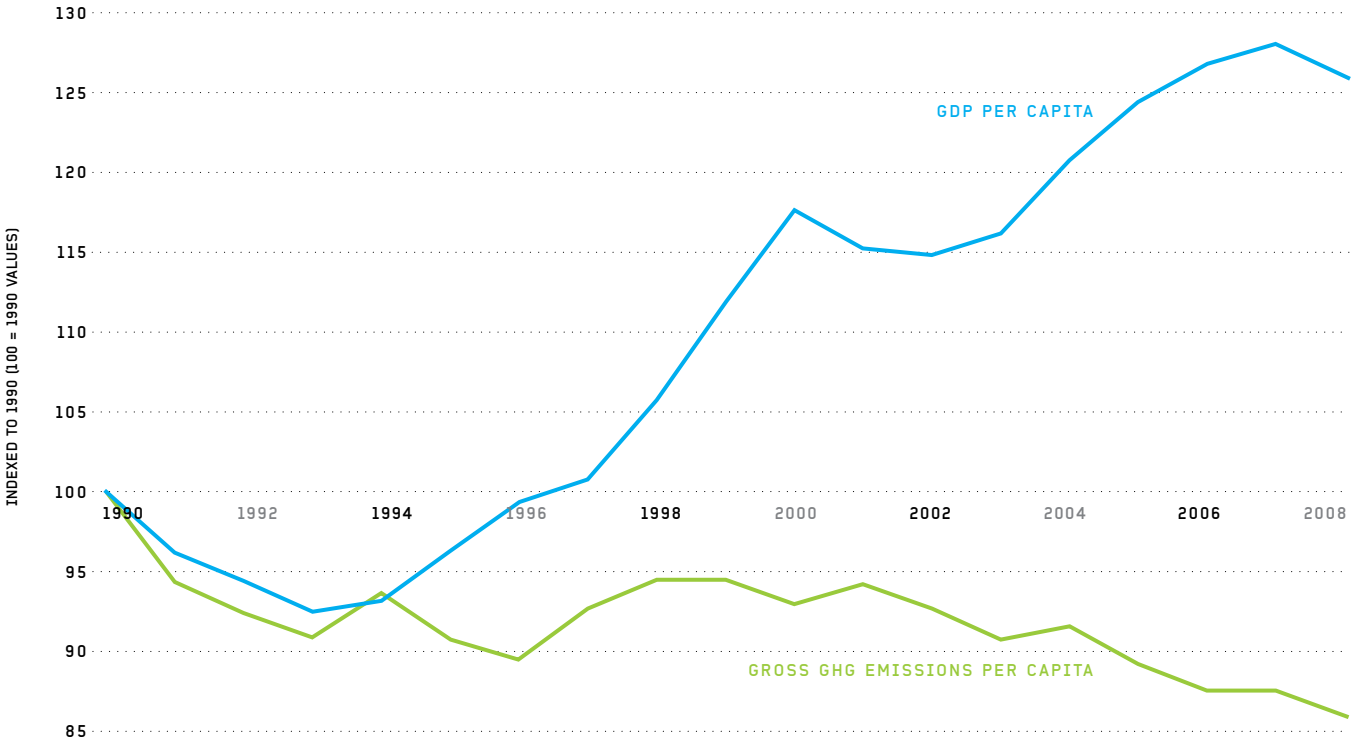
FIG 1. TOTAL CALIFORNIA GREENHOUSE GAS EMISSIONS
GROSS ANNUAL EMISSIONS



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Gross greenhouse gas emissions (GHG) includes fossil fuel CO2, with electric imports and international fuels (carbon dioxide equivalents) and noncarbon GHG emissions (in CO2 equivalents). Noncarbon GHG emissions are made up of Agriculture (CH4 and N2O), Soils, ODS substitutes, Semi-conductor manufacture (PFCs), Electric Utilities (SF6), Cement, Other Industrial Processes, Solid Waste Management, Landfill Gas, and Wastewater, Methane from oil and gas systems, Methane and N2O from Fossil Fuel Combustion. Data Source: California Air Resources Board, California Greenhouse Gas Inventory–by Sector and Activity. Analysis: Collaborative Economics

FIG 2. GHG EMISSIONS AND GROSS DOMESTIC PRODUCT

CALIFORNIA'S RELATIVE TRENDS SINCE 1990 / GROSS GHG EMISSIONS AND GDP DOLLARS PER CAPITA



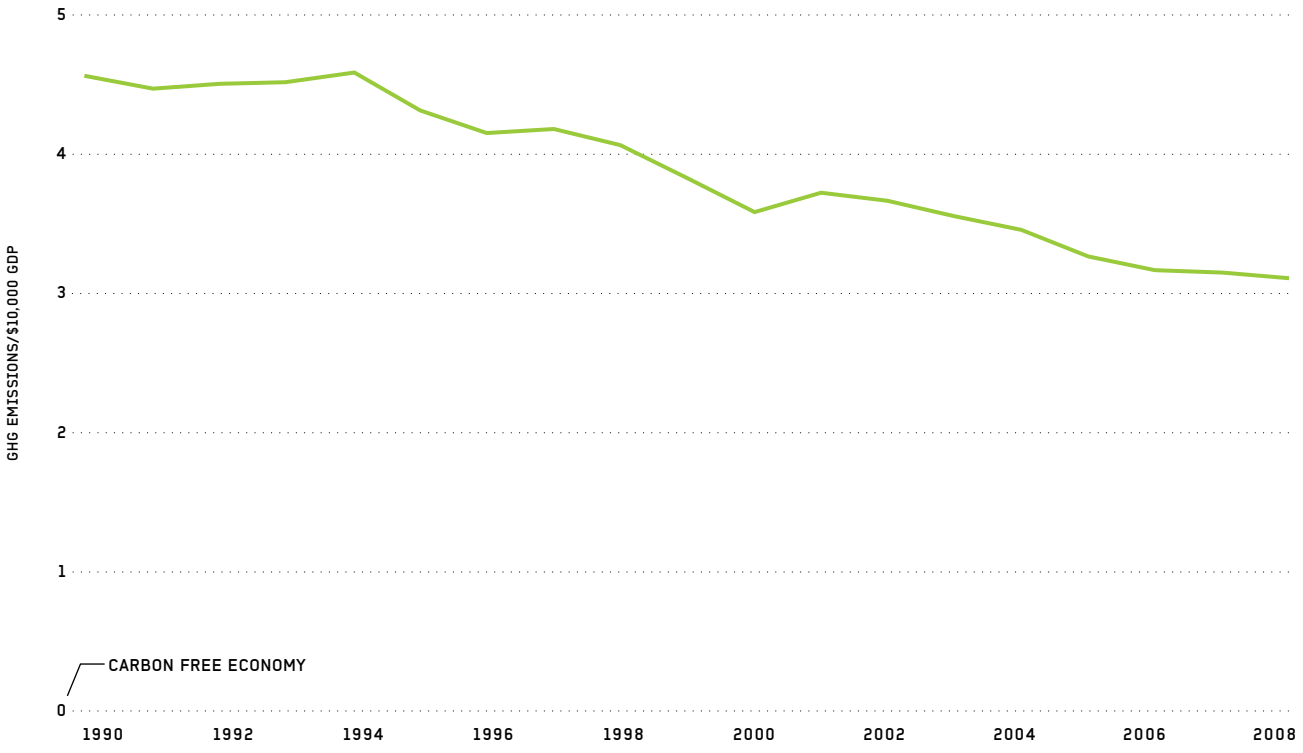
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory–by Sector and Activity; Bureau of Economic Analysis, U.S. Department of Commerce; California Department of Finance. Analysis: Collaborative Economics

The California experience demonstrates that reducing GHG emissions can be achieved while also growing the economy. California's efficiency standards for buildings and appliances implemented since the 1970s, coupled with multi-billion dollar utility investments in cost-effective energy efficiency, have contributed significantly to the drop in emissions per capita. Since 1990, Gross Domestic Product (GDP) per capita grew by 26 percent while emissions per capita dropped by 14 percent.

Although both GDP per capita and emissions per capita slowed from 2007 to 2008, the drop in emissions outpaced that of GDP. From 2007 to 2008, California's GDP per capita shrank by 0.9 percent, while emissions per capita dropped by two percent.

FIG 3. THE CARBON ECONOMY

GROSS EMISSIONS RELATIVE TO GROSS DOMESTIC PRODUCT / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory–by Sector and Activity; Bureau of Economic Analysis, U.S. Department of Commerce; California Department of Finance. Analysis: Collaborative Economics

The California economy's dependence on carbon-based energy continues to lessen. Reported as gross GHG emissions relative to GDP, the state's carbon economy has dropped from 4.5 to 3.1 metric tons of carbon dioxide for every $10,000 of GDP generated. This represents a drop of 32 percent since 1990 and of 1.1 percent between 2007 and 2008. Once the relationship reaches zero, the state's economy will be completely free of its carbon dependency.

Compared to other states, California ranks fifth lowest in carbon-based GHG emissions per capita, and tenth highest in GDP per capita. Since 1990, California has reduced its emissions per capita by 13 percent. In 2007, California's per capita emissions were 50 percent below the rest of the U.S. (Figure 4). In contrast with other large states, the state's emissions were 24 percent below Florida and a 62 percent lower than Texas. (Per capita emissions represented here are based on the U.S. Energy Information Administration and vary slightly from the more comprehensive data reported in the California Energy Commission's GHG Inventory.)

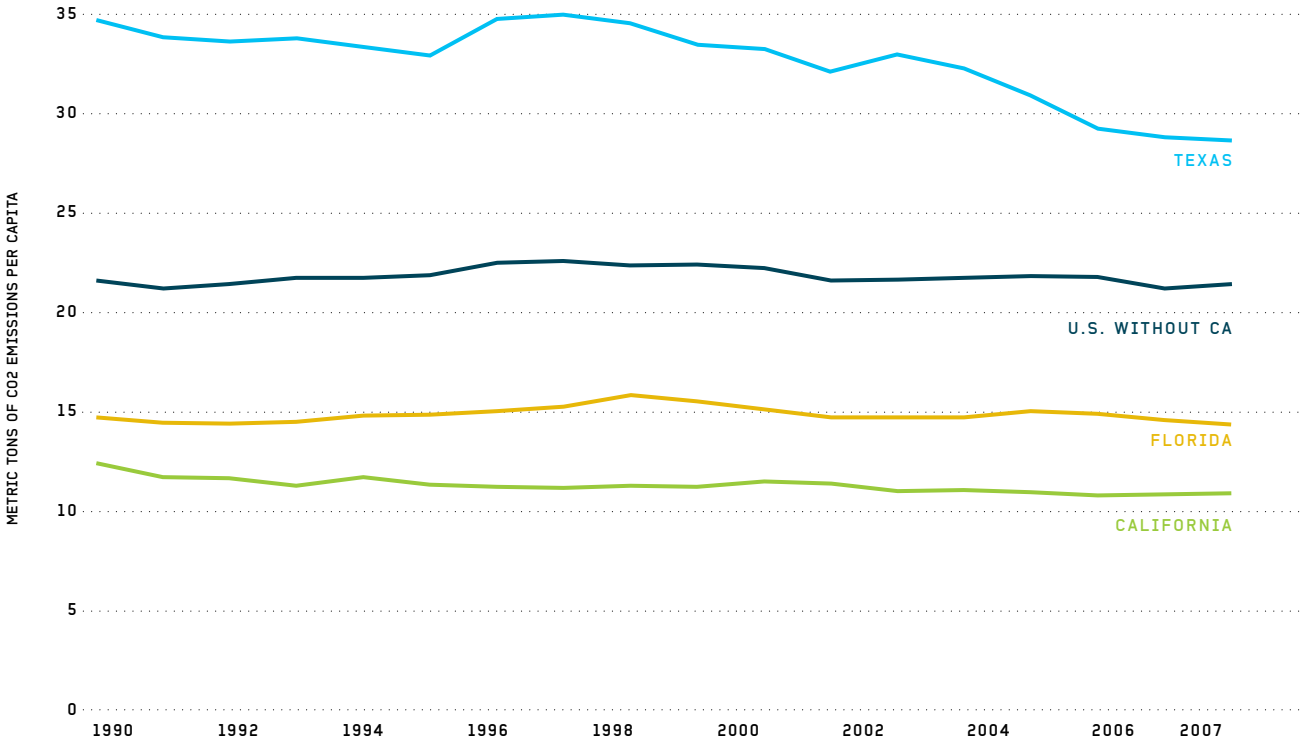
In terms of the carbon intensity of the economy, California ranks fifth lowest after Washington D.C. and three densely populated states, New York, Connecticut and Massachusetts. In comparison with other large states, Florida ranks 17th and Texas, 35th. The carbon intensity of California's economy has declined roughly 30 percent since 1990 (Figure 5).

EMISSIONS BY SECTOR

Transportation accounts for the largest source of GHG emissions in California (37%), followed by Electric Power (24%) and Industrial (21%). Together, these sources represent 82 percent of the state's emissions. The California Air Resources Board collects GHG emissions data by direct source of emissions rather than by end-user. Figure 7 depicts California's GHG emissions by detailed source.

FIG 4. GHG EMISSIONS IN CALIFORNIA AND OTHER STATES

CO2 EMISSIONS FROM FOSSIL FUEL COMBUSTION / METRIC TONS OF CO2 EQUIVALENT (MTCO2) PER CAPITA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy; Population Division, U.S. Census Bureau; California Department of Finance. Analysis: Collaborative Economics

2007 NATIONAL RANKING

	LOWEST GHG EMISSIONS PER CAPITA	HIGHEST GDP PER CAPITA	% OF TOTAL U.S. GDP
California	5	10	13%
Texas	39	19	8%
Florida	12	34	5%

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy; Bureau of Economic Analysis, U.S. Department of Commerce; Population Division, U.S. Census Bureau; California Department of Finance. Analysis: Collaborative Economics

PERCENT CHANGE / 2006-2007

	GHG EMISSIONS PER CAPITA	GDP PER CAPITA
California	+0.2%	+0.6%
Texas	-1.0%	+2.3%
Florida	-1.7%	-1.0%
U.S. without California	+0.8%	+1.0%

NATIONAL CARBON ECONOMY RANKING

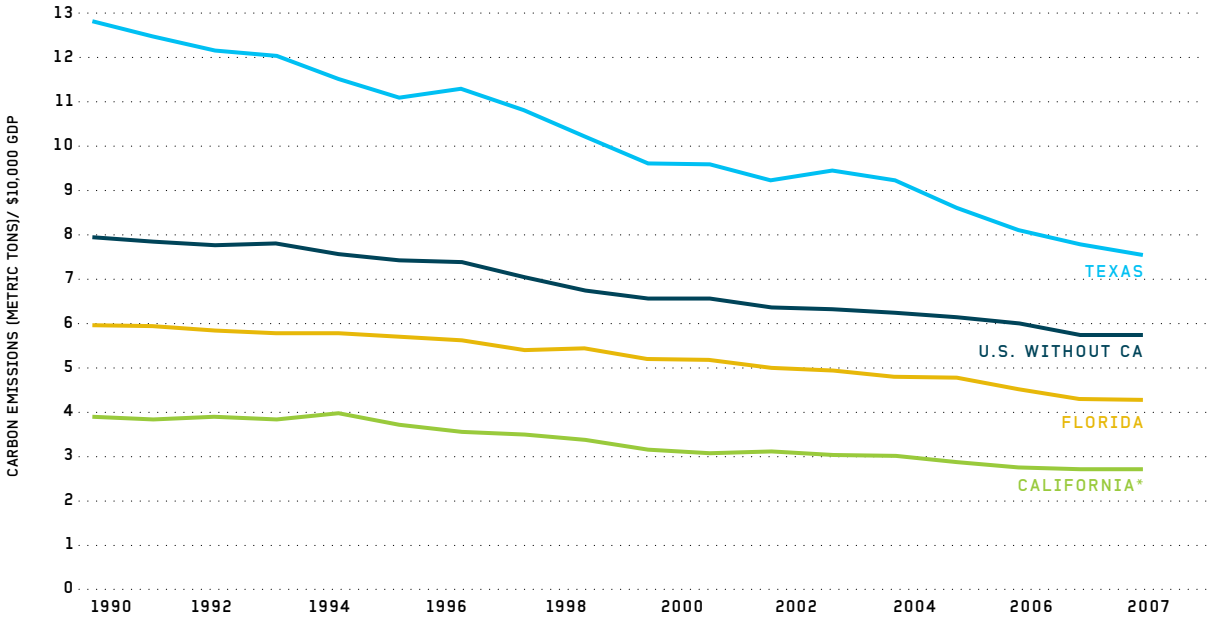
2007 LOWEST CARBON ECONOMY (EMISSIONS/GDP)

District of Columbia	1
New York	2
Connecticut	3
Massachusetts	4
California	5
Florida	17
Texas	35

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy Bureau of Economic Analysis, U.S. Department of Commerce Analysis: Collaborative Economics

FIG 5. THE CARBON ECONOMY IN CALIFORNIA AND OTHER STATES

CARBON EMISSIONS (METRIC TONS) PER 10,000 DOLLARS GDP



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. *GHG emissions data that allows for state-level comparison is from the Energy Information Administration and is limited to carbon emissions (fossil fuel combustion). Therefore, data represented here differs from analyses represented in other charts of total GHG emissions for California. Data Source: Energy Information Administration, U.S. Department of Energy; Bureau of Economic Analysis, U.S. Department of Commerce. Analysis: Collaborative Economics

Transportation 37%: Emissions from all transportation sources account for 37 percent of California's total GHG emissions. Emissions include the following sources: on-road passenger vehicles, on-road heavy duty trucks, ships & boats, locomotives, non-road transportation, and domestic (intra-state) aviation. If the emissions from petroleum refining (in the industrial sector) were included, it would be 44 percent. On-road passenger vehicles account for the vast majority (93%) of transportation emissions.

Electric Power 24%: In-state electric power generation (including natural gas and other fuels) accounts for 47 percent of electric power emissions, while the remaining 53 percent is from electric power imports. Electric power emissions encompass total emissions related to electricity generation.

Industrial 21%: Roughly 21 percent of California's emissions are from industrial activities. Emissions from industrial sources come from petroleum refining, oil & gas extraction/ supply, general fuel use, cogeneration heat output, cement plants, landfills, and other process emissions.

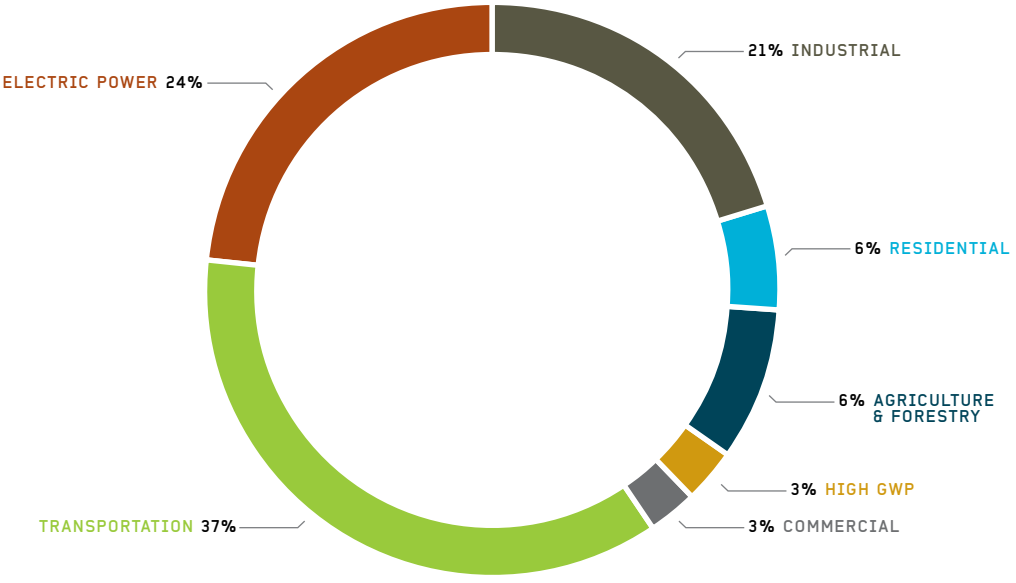
Residential 6%: GHG emissions from the residential sector account for six percent of total emissions in the state. GHG emissions in the residential sector are from fuel combustion from natural gas and other fuel use. Fuel is burned in order to heat houses and buildings, prepare food, and for hot water.[3]

Agriculture & Forestry 6%: Emissions from Agriculture & Forestry account for six percent of California's total emissions and are from livestock, soil preparation and fertilizer application, tractors, agricultural pumps & other fuel use, crop growth & harvesting, and wildfires.

Commercial 3%: Emissions from commercial fuel combustion and cogeneration heat output account for three percent of emissions statewide. The vast majority of emissions are from fuel combustion from natural gas and other fuel use. Similar to the residential sector, fuel is burned in order to heat buildings, prepare food, and for hot water.

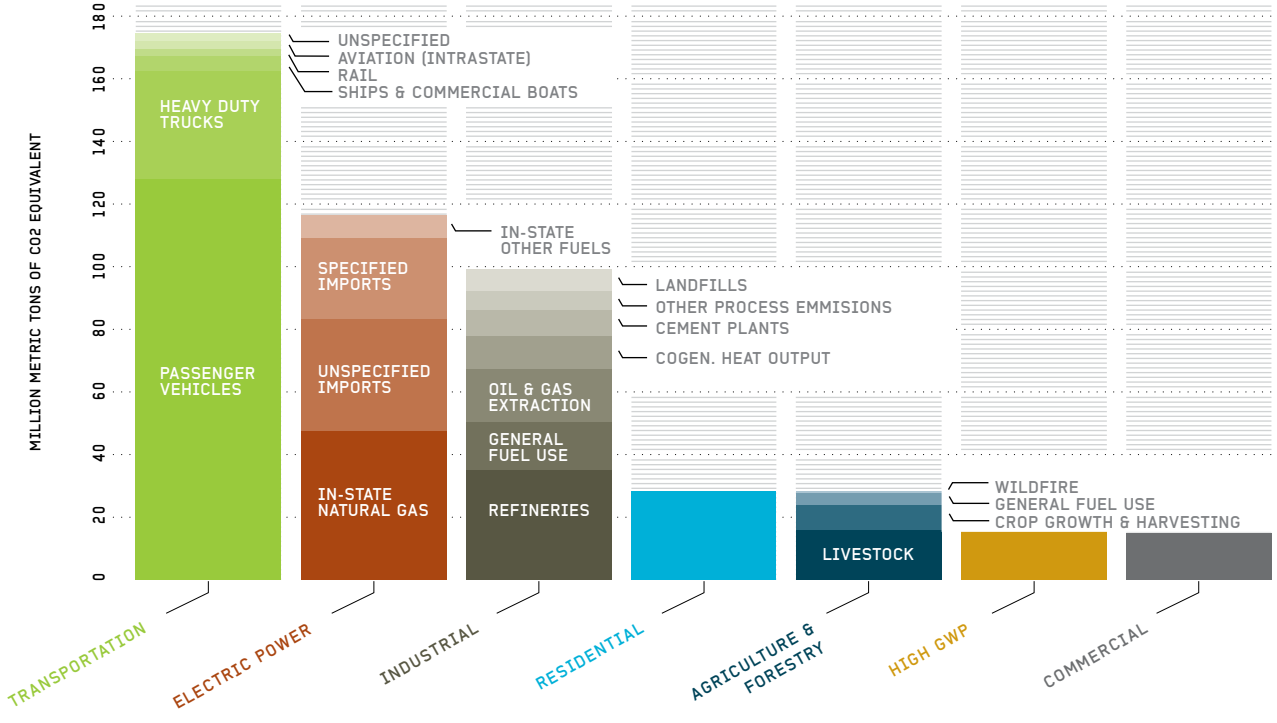
High Global Warming Potentials (GWP) 3%: High GWP makes up three percent of California's total GHG emissions. High GWP includes ozone depleting substance (ODS) substitutes, electricity grid losses, and semiconductor manufacturing.

FIG 6. GREENHOUSE GAS EMISSIONS BY SOURCE
CALIFORNIA 2008



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory–by Sector and Activity. Analysis: Collaborative Economics

FIG 7. GREENHOUSE GAS EMISSIONS BY DETAILED SOURCE
CALIFORNIA 2008



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board- California Greenhouse Gas Inventory–by Sector and Activity. Analysis: Collaborative Economics

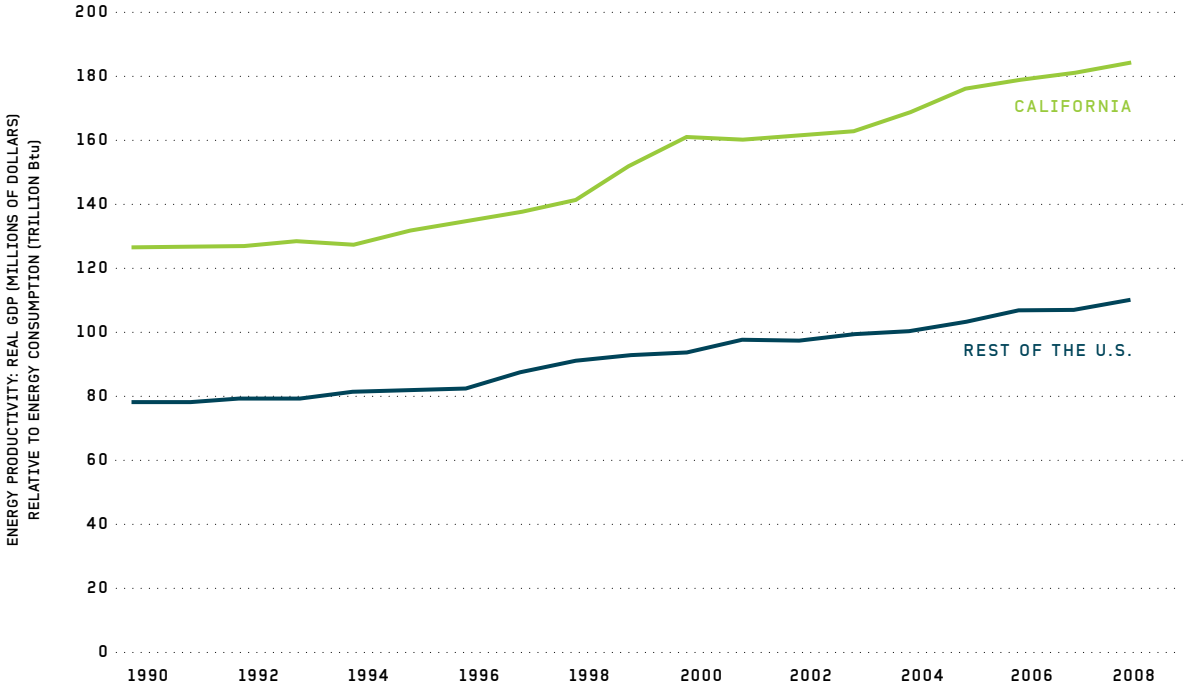
ENERGY EFFICIENCY

California's energy productivity is 68 percent higher than that of the rest of the nation, and it is improving at a faster rate (Figure 8). In 2008, California produced $2.28 of GDP for every 10,000 British Thermal Units (BTU) of energy consumed. In comparison, the rest of the United States produced $1.36 for every 10,000 BTU of energy consumed. This difference in energy productivity between California and the rest of the U.S. is about 93 cents per 10,000 BTU of energy consumed. In 1990, California's energy productivity was 63 percent higher than that of the rest of the country.

Over the last four decades, Californians have been consuming less energy per capita (Figure 9). Since 1970, California has reduced its energy consumption per capita by 20 percent, while U.S. consumption per capita has remained largely above 1970 levels. Most recently, consumption has dropped related to the economic downturn. Between 2007 and 2008 total energy consumption dropped by 1.3 percent in California and by 2.1 percent in the rest of the country, and per capita consumption fell by three percent in both.

Total electricity use in California has been increasing since 1990, and per capita consumption has remained within five percent of 1990 levels (Figure 10). From 1990 to 2009, total electricity consumption grew by 22 percent, and per capita consumption declined by six percent.

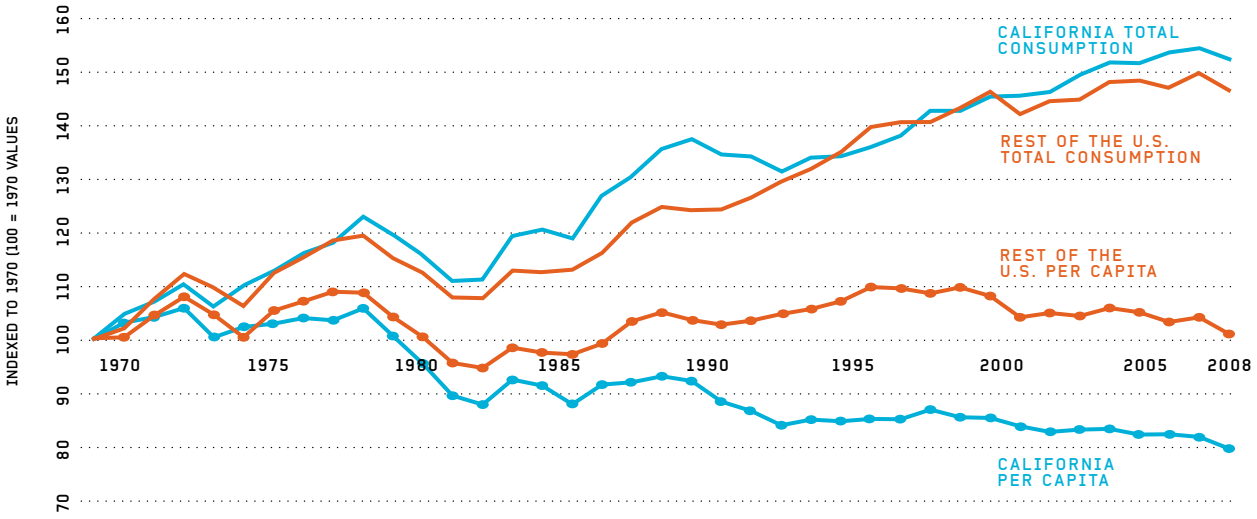
FIG 8. ENERGY PRODUCTIVITY
GDP RELATIVE TO TOTAL ENERGY CONSUMPTION / CALIFORNIA AND THE REST OF THE U.S.



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: U.S. Department of Energy, Energy Information Administration; U.S. Department of Commerce, Bureau of Economic Analysis. Analysis: Collaborative Economics

FIG 9. TOTAL ENERGY CONSUMPTION RELATIVE TO 1970

TOTAL CONSUMPTION AND PER CAPITA / CALIFORNIA AND THE REST OF THE U.S.



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy; Population Division, U.S. Census Bureau; California Department of Finance. Analysis: Collaborative Economics

PERCENT CHANGE IN ELECTRICITY CONSUMPTION

CALIFORNIA 1990-2009

TOTAL	+22%
PER CAPITA	-6%

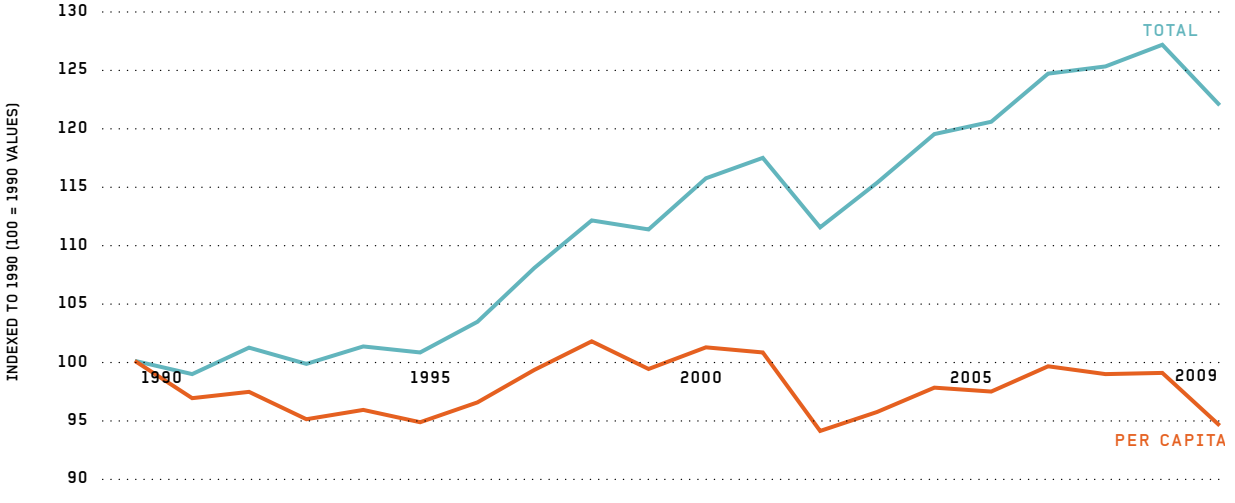
ENERGY CONSUMPTION PER CAPITA

(BRITISH THERMAL UNITS)

	2008	2009	PERCENT CHANGE
CALIFORNIA	225	219	-3%
REST OF THE U.S.	353	342	-3%

FIG 10. ELECTRICITY CONSUMPTION RELATIVE TO 1990

TOTAL AND PER CAPITA / CALIFORNIA

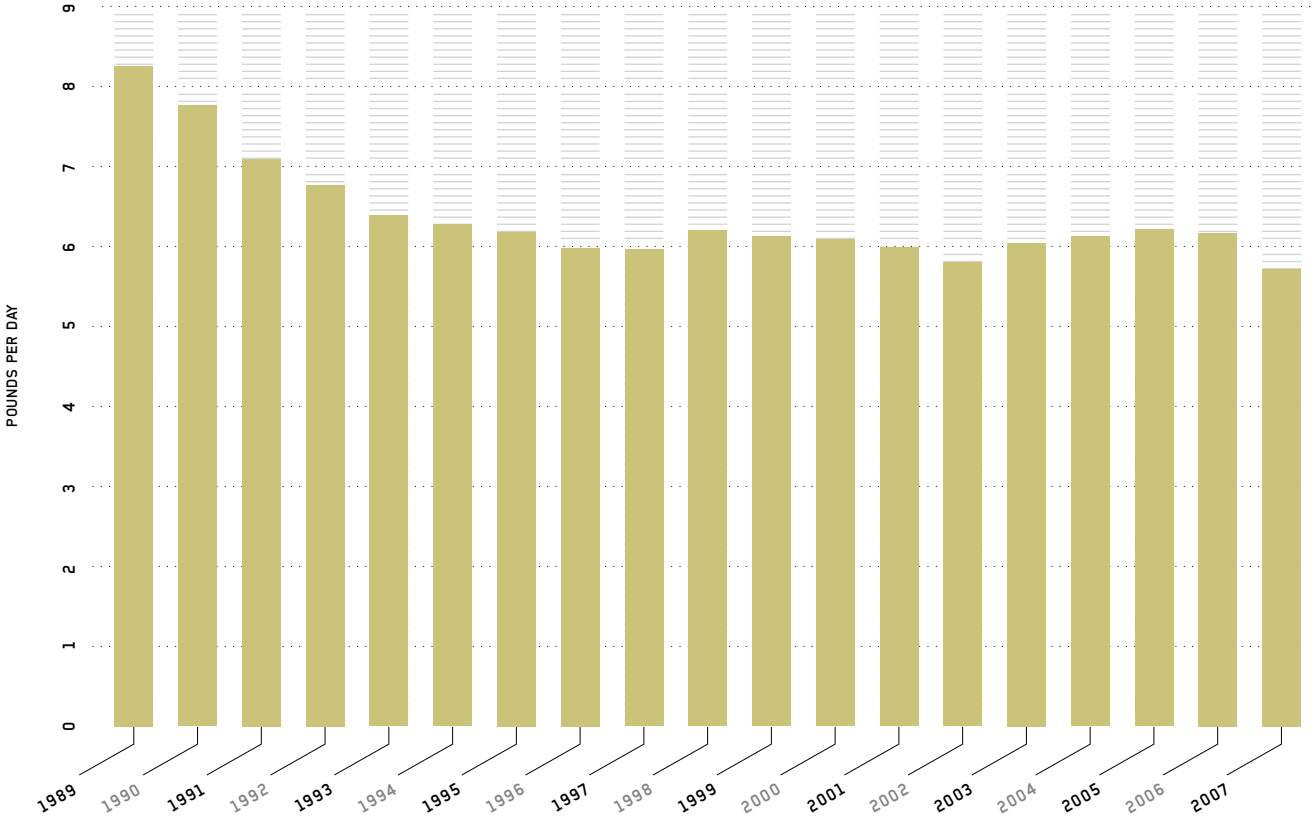


NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: U.S. Department of Energy, Energy Information Administration; Population Division, US. Census Bureau; California Department of Finance. Analysis: Collaborative Economics

Californians are generating less waste headed to landfills. Not only does this mean that landfills can be used longer before building new ones, but less waste in landfills also means less generation of methane gas emissions, an extremely persistent GHG.

In 2007, the average Californian disposed of 5.7 pounds of waste every day.[4] Daily waste disposal per capita in California decreased 31 percent since 2007. From 2006 to 2007, waste disposal per capita decreased seven percent. Much of this success can be explained by the state's strong recycling program, which has achieved a waste diversion rate of over 50 percent.[5]

FIG 11. CALIFORNIA WASTE DISPOSAL PER CAPITA
POUNDS PER DAY



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Intergated Waste Management Board and the State of California, Department of Finance. Analysis: Collaborative Economics

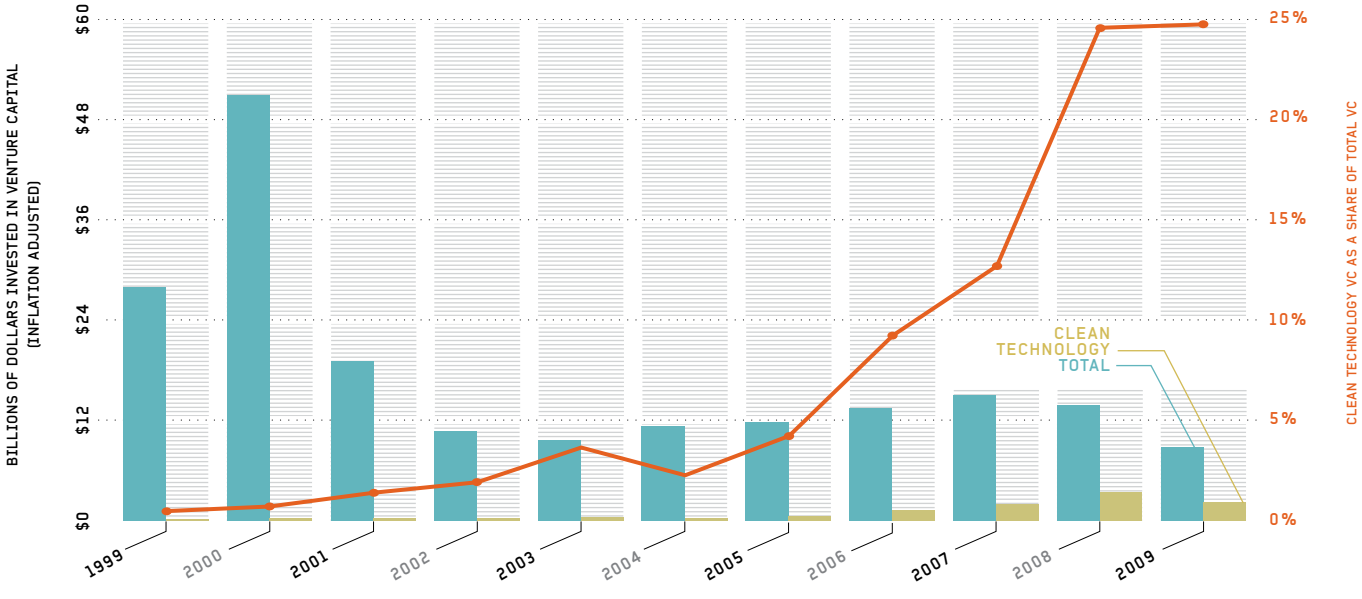
GREEN TECHNOLOGY INNOVATION

California remains a global leader in the growing and diverse fields of clean technology, and investment is up in the first half of 2010. The global financial crisis has dealt a severe blow to the venture capital industry since the end of 2008. Total venture capital (VC) investment in California dropped 36 percent from 2008 to 2009 (Figure 12). Globally, total investment levels reset back to 2003 levels, and the state was hit particularly hard. In contrast, global investment in cleantech reset only to 2007 levels. In California, 2009 investment in cleantech exceeded 2007 levels by 14 percent.

In the first two quarters of 2010, investment in cleantech jumped two and a half times over the first half of 2009. This suggests that investors are feeling confident about growing opportunities in these diverse technology fields. Although VC investment in clean technology also fell by 36 percent from 2008 to 2009, cleantech VC represents a growing share of total VC in California. In 2009, investment in cleantech accounted for 25 percent of total VC, compared with only 13 percent in 2007.

FIG 12. VENTURE CAPITAL

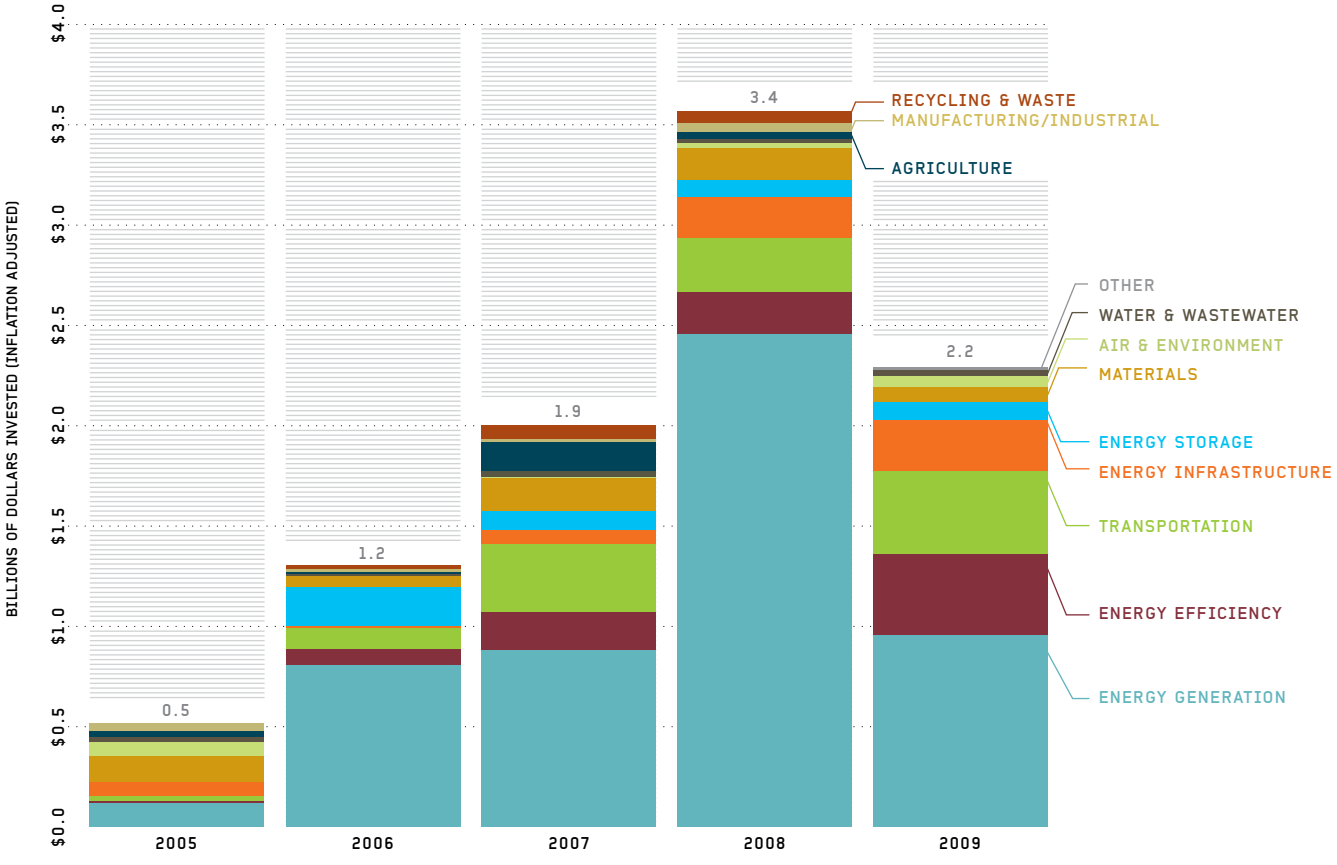
CLEAN TECHNOLOGY AND TOTAL INVESTMENT / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, Data: Thomson Reuters; Cleantech Group,™ LLC. Analysis: Collaborative Economics

FIG 13A. VENTURE CAPITAL INVESTMENT IN CLEAN TECHNOLOGY BY SEGMENT

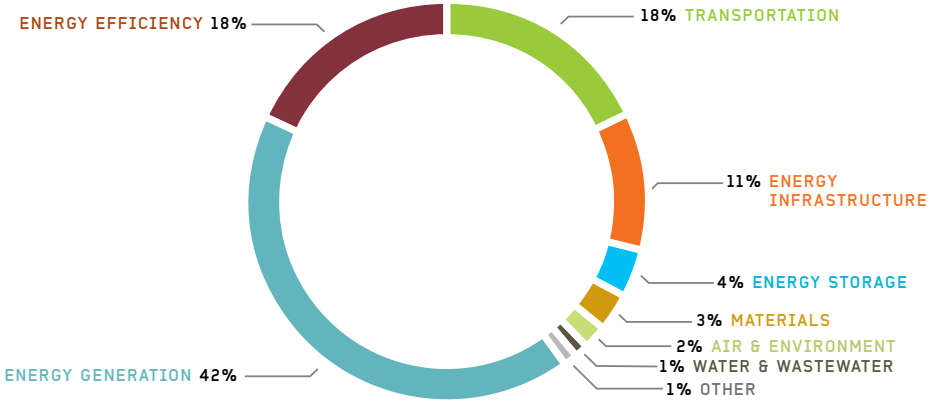
BILLIONS OF DOLLARS INVESTED / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Cleantech Group,™ LLC. Analysis: Collaborative Economics

FIG. 13B. CALIFORNIA VENTURE CAPITAL INVESTMENT IN CLEAN TECHNOLOGY

DISTRIBUTION BY CLEANTECH SEGMENT / 2009



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Cleantech Group,™ LLC. Analysis: Collaborative Economics

CLEANTECH VC INVESTMENT Q1 & Q2 CALIFORNIA

	% CHANGE 2009-2010
INVESTMENT $	+246%
NUMBER OF DEALS	+65%

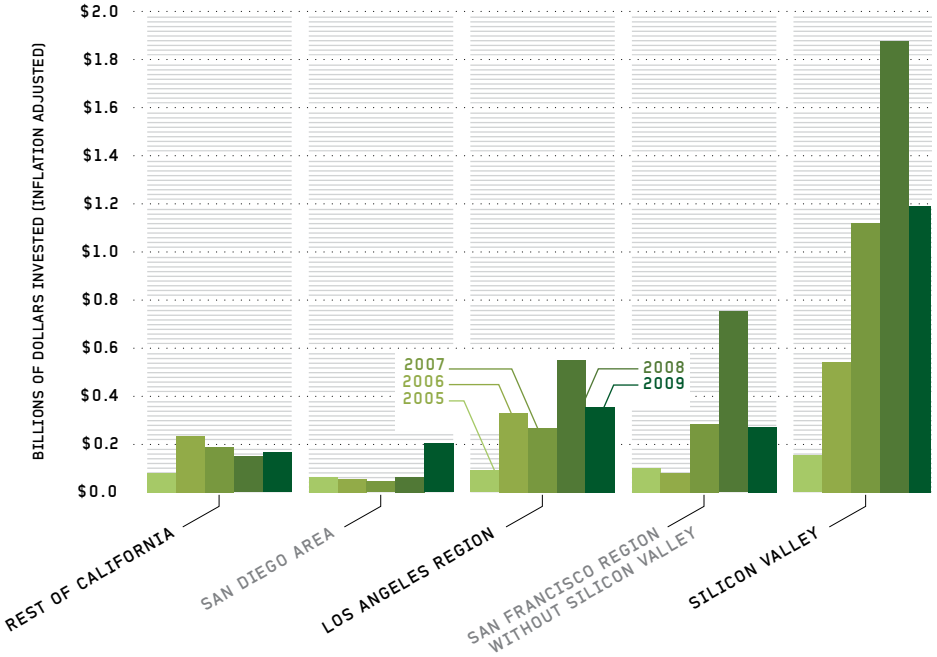
Note: Values are Inflation Adjusted

Energy generation, including solar, wind and geothermal, continues to attract the greatest amount of cleantech venture capital investment (Figure 13A). In 2009, energy generation received 42 percent of all venture capital investment in clean technology in California, while energy efficiency and transportation each received 18 percent of total investments in the state. Clean technology in transportation includes electric vehicles and light rails (Figure 13B). Of all areas, investment in energy efficiency, including smart grid technology, is growing fastest. Energy efficiency investment increased 101 percent over the previous year, while energy generation investment decreased 61 percent.

Attracting 54 percent of cleantech investment in the state, Silicon Valley continues to be the hot spot for cleantech (Figure 14). In 2009, Silicon Valley attracted $1.2 billion in investment. While VC investment dropped in nearly every region, investment more than tripled in the San Diego region in 2009.

In the context of the global financial crisis, project financing for cleantech installations has been squeezed. To help bridge this gap, the state was awarded $1.8 billion in public funds for cleantech projects under the American Reinvestment and Recovery Act (Figure 15).

FIG 14. VENTURE CAPITAL INVESTMENT IN CLEAN TECHNOLOGY BY REGION
BILLIONS OF DOLLARS INVESTED

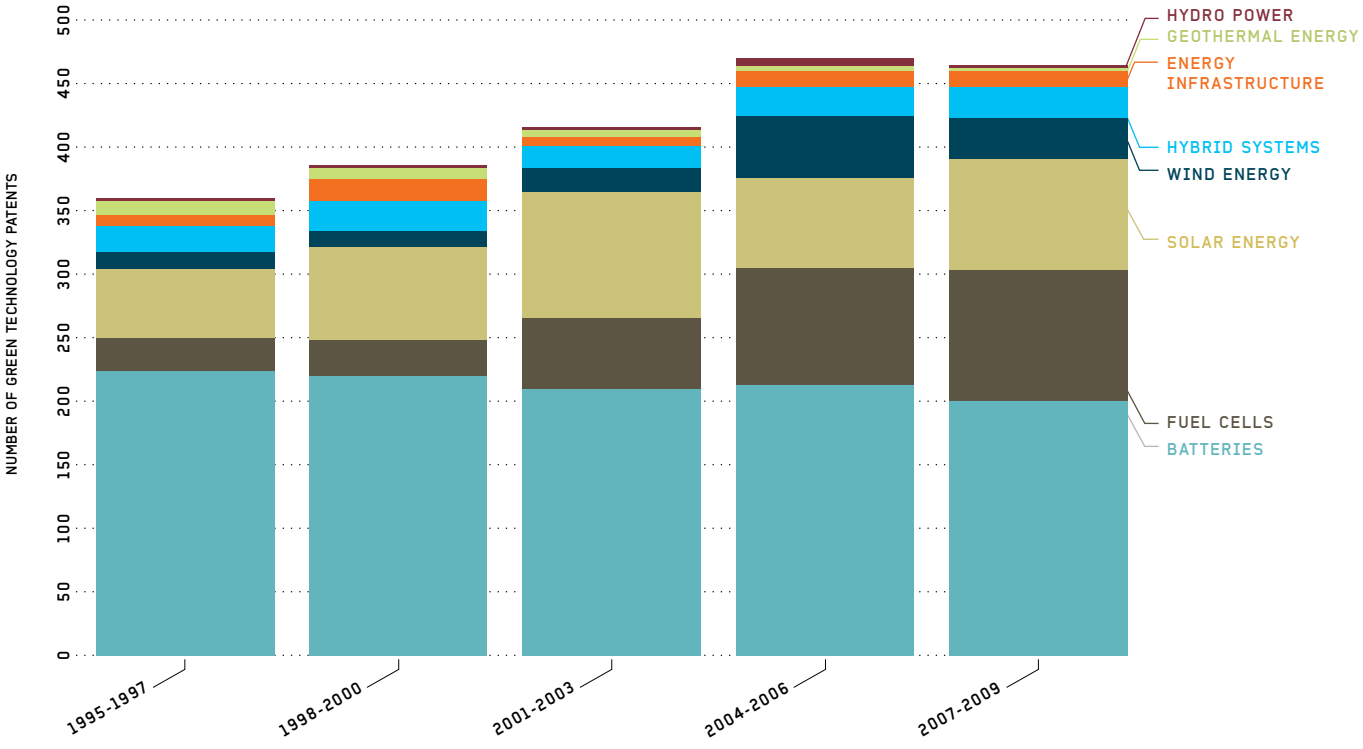


NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Cleantech Group,™ LLC . Analysis: Collaborative Economics

FIG 15. VENTURE CAPITAL AND PUBLIC INVESTMENT IN CLEAN TECHNOLOGY
CALIFORNIA, 2009

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Cleantech Group,™ LLC (www.cleantech.com); Independent Recovery Transparency and Accountability Board. Analysis: Collaborative Economics

FIG 16. GREEN TECHNOLOGY PATENTS
BY TECHNOLOGY / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: 1790 Analytics, Patents by Technology; USPTO Patent File. Analysis: Collaborative Economics

With more than 450 green technology patents registered between 2007 and 2009, California ranks first in the U.S. in total green technology patents. Specifically, the state is at the top in patents related to Advanced Batteries, Solar Energy, and Wind Energy.

Patent registrations related to clean energy technologies increased robustly in 2009 as a result of increased filings from foreign and domestic inventors with the U.S. Commerce Department's Patent and Trademark Office (USPTO). From 2008 to 2009, registrations from U.S. inventors rose 31 percent and from foreign inventors, 39 percent (Figure 17). Since 1998, patenting activity with the USPTO in green technology by foreign inventors has outpaced U.S. inventors.

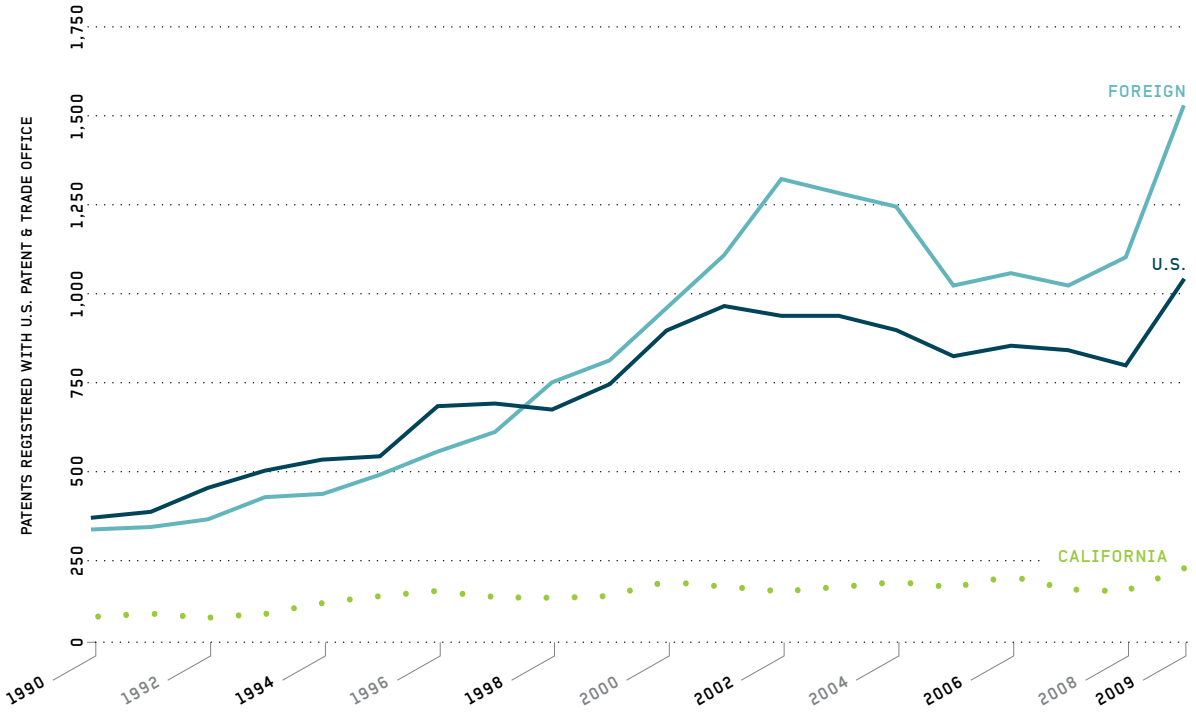
In an effort to speed the commercialization process of these important new technologies, the USPTO announced in December 2009 that it plans to launch a program to accelerate the review process of green technology patent applications.[6] Currently, green patent applications typically face a review time of 30 to 40 months. The new program will reduce the wait time by roughly one year, expediting the deployment of green technologies.

California accounts for a large and growing percentage of national green patent activity. California is the top state in patents registered in solar, wind and battery technology. From 2007 to 2009, California represented 39 percent of Solar Energy patents registered in the U.S., up from 24 percent in the period 1995 to 1997. California accounts for 20 percent of all Battery Technology patents registered in the U.S. between 2007 and 2009, and 16 percent of total Wind Energy patent registrations.

Since 1995, total green technology patent registrations grew by 29 percent. California has maintained a high level of activity in Battery Technology patents. Since 1995, registrations in Fuel Cell Technology have grown fastest.

FIG 17. GREEN TECHNOLOGY PATENT REGISTRATIONS

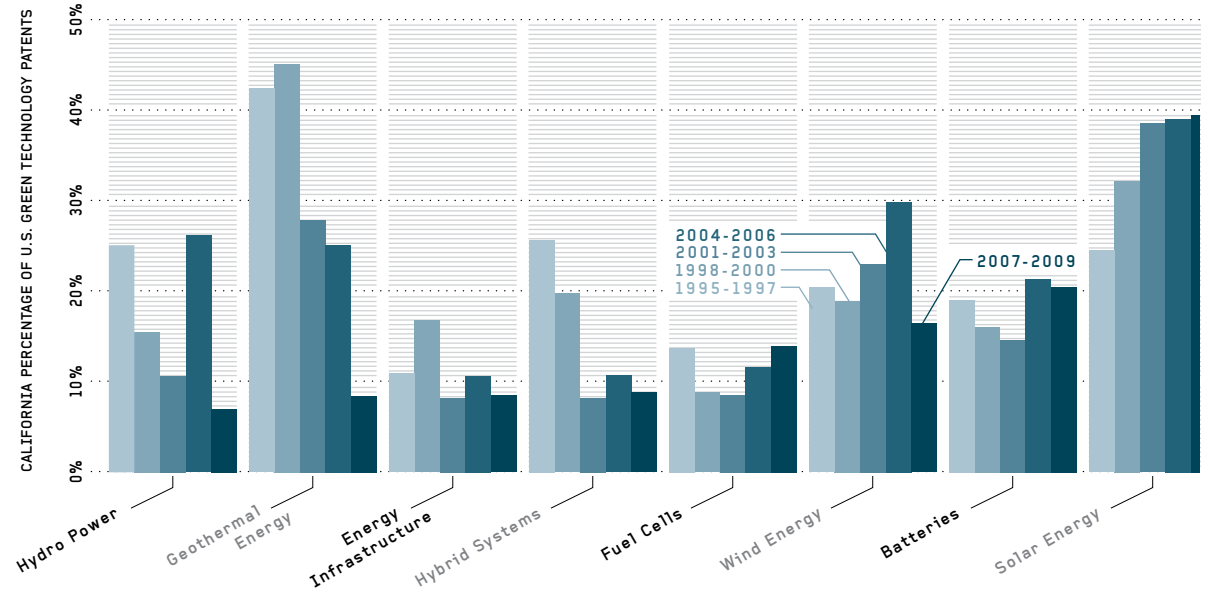
BY PRIMARY INVENTORS / CALIFORNIA, U.S., AND FOREIGN INVENTOR PATENT REGISTRATIONS



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: 1790 Analytics, Patents by Technology; USPTO Patent File. Analysis: Collaborative Economics

FIG 18. GREEN TECHNOLOGY PATENTS

CALIFORNIA PERCENTAGE OF U.S. GREEN TECHNOLOGY PATENTS



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: 1790 Analytics, Patents by Technology; USPTO Patent File. Analysis: Collaborative Economics

TOTAL GREEN TECH PATENTS

TOP RANKING STATES IN PATENTS REGISTERED

	NUMBER OF PATENTS	RANKING	
	2007-2009	2007-2009	1995-1997
California	458	1	1
New York	307	2	2
Michigan	295	3	7
Texas	135	4	6
Massachusetts	110	5	3
Connecticut	103	6	14
Illinois	98	7	4
Minnesota	82	8	13
Ohio	81	9	9
Pennsylvania	76	10	10

BATTERY TECHNOLOGY

TOP RANKING STATES IN PATENTS REGISTERED

	NUMBER OF PATENTS	RANKING	
	2007-2009	2007-2009	1995-1997
California	198	1	1
Texas	72	2	8
Michigan	68	3	9
Illinois	59	4	6
New York	53	5	2
Wisconsin	49	6	3
Massachusetts	44	7	5
Florida	38	8	4
Minnesota	38	8	11
Ohio	37	10	7

SOLAR TECHNOLOGY

TOP RANKING STATES IN PATENTS REGISTERED

	NUMBER OF PATENTS	RANKING	
	2007-2009	2007-2009	1995-1997
California	87	1	1
New York	16	2	3
Massachusetts	14	3	8
New Hampshire	12	4	32
New Mexico	11	5	16
Colorado	10	6	3
Michigan	8	7	6
Texas	7	8	2
New Jersey	6	9	10
Florida	5	10	5

WIND TECHNOLOGY

TOP RANKING STATES IN PATENTS REGISTERED

	NUMBER OF PATENTS	RANKING	
	2007-2009	2007-2009	1995-1997
California	32	1	1
New York	29	2	14
Massachusetts	10	3	2
Texas	9	4	2
Arizona	8	5	27
Illinois	8	5	7
Nevada	8	5	7
Ohio	8	5	27
Virginia	8	5	14
Michigan	7	10	14

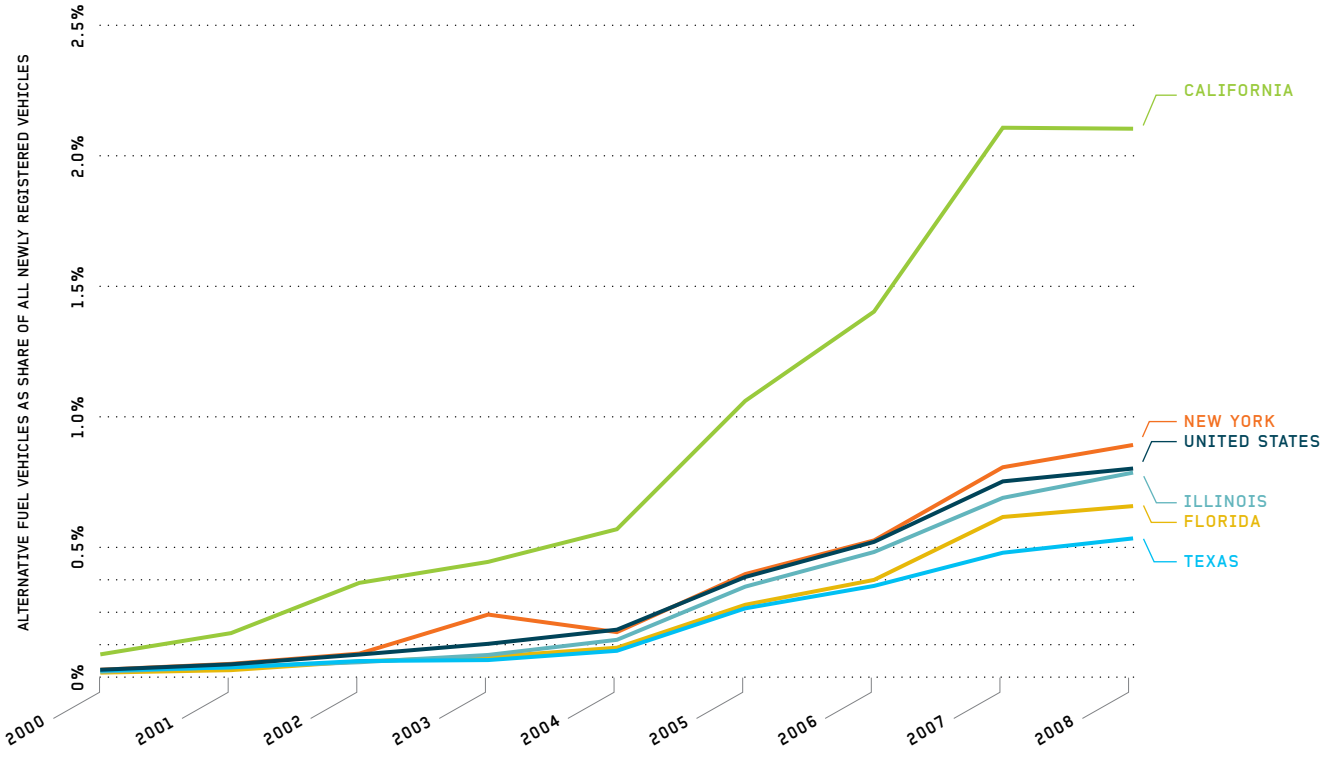
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: 1790 Analytics, Patents by Technology; USPTO Patent File. Analysis: Collaborative Economics

TRANSPORTATION

In transportation, Californians are adopting new behaviors and becoming early adopters of new technology. Emissions from surface transportation have declined in recent years as a result of many factors including the economic recession beginning in 2007 and spikes in gasoline prices.[7]

Although California accounted for nine percent of all newly registered vehicles in the United States in 2008, 24 percent of alternative fuel vehicles in the nation were registered in California. As a share of total newly registered vehicles, alternative fuel vehicles in California account for more than double the share in other leading states.

FIG 19. ALTERNATIVE FUEL VEHICLES
AS SHARE OF TOTAL NEWLY REGISTERED VEHICLES / CALIFORNIA AND OTHER TOP ALTERNATIVE FUEL VEHICLE STATES



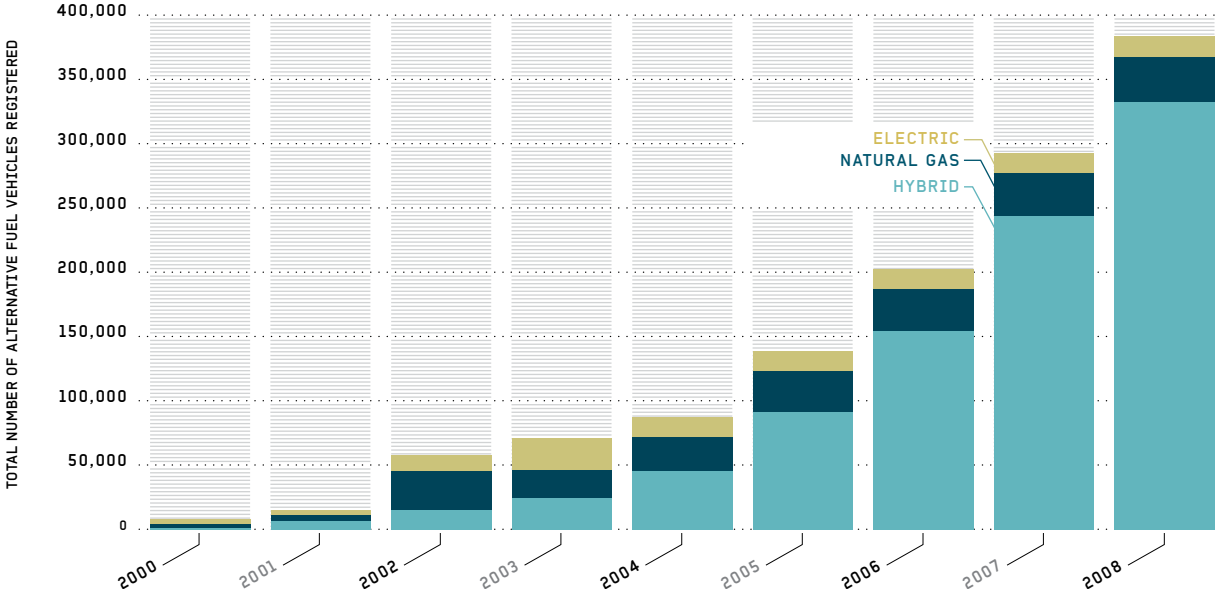
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Includes hybrid and electric vehicles as well as vehicles running on natural gas. Data Source: R.L. Polk & Co. Analysis: Collaborative Economics

Over the long-term, the total number of alternative fuel vehicles registered is growing rapidly and was nearly 50 times higher in 2008 than in 2002 (Figure 20). From 2007 to 2008, total vehicle registrations dropped by 0.2 percent, but registrations of alternative fuel vehicles grew by 31 percent. Holding steady since 2007, alternative fuel vehicle registrations account for 2.1 percent of total newly registered vehicles.

Alternative fuel consumption as a percentage of total transportation fuel consumption has steadily increased in California, climbing from 0.46 percent in 2003 to 0.69 percent in 2007 (Figure 21). By comparison, consumption of alternative fuels nationwide has largely remained static at 0.15 percent in 2003 and 2007 (Figure 21).

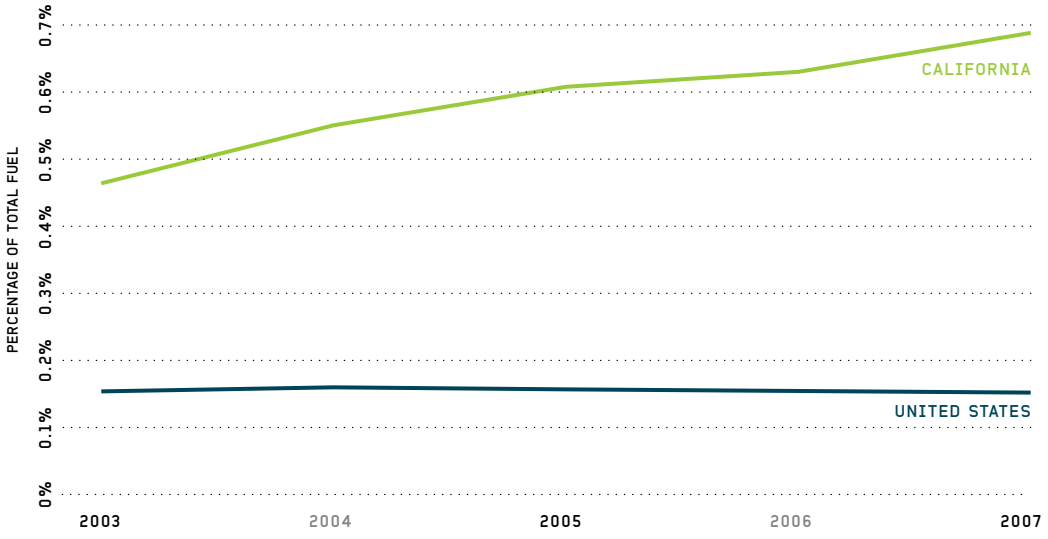
The use of alternative fuels is up in California while the consumption of conventional gasoline is down. Between 2006 and 2007, alternative fuel use jumped nine percent and the use of conventional fuel dropped 0.4 percent. In view of longer term consumption trends, conventional fuels increased four percent and alternative fuels, 55 percent (Figure 22). Meanwhile, conventional fuel use in the U.S. decreased one percent from 2006 to 2007, while alternative fuel use increased one percent. Longer view consumption trends show an increase of four percent in conventional fuel use and of three percent in alternative fuel use.

FIG 20. TOTAL NUMBER OF ALTERNATIVE FUEL VEHICLES REGISTERED
CALIFORNIA



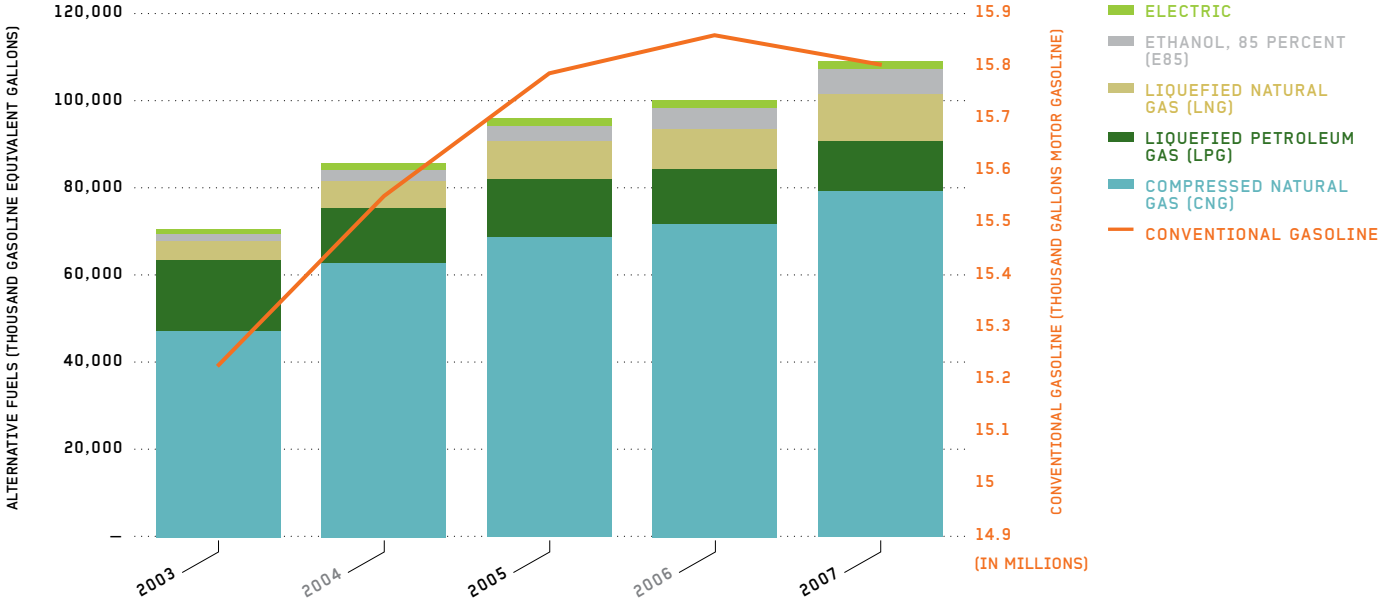
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Energy Commission. Analysis: Collaborative Economics

FIG 21. ALTERNATIVE FUEL CONSUMPTION AS A PERCENTAGE OF TOTAL TRANSPORTATION FUEL CONSUMPTION



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Alternative Fuels Data–EIA Coal, Nuclear, and Renewables Division "Alternatives to Traditional Transportation Fuels, 2007," Table C4. Motor Gasoline Data–State Energy Data System, Series MGACP "Motor gasoline consumed by the transportation sector." Analysis: Collaborative Economics

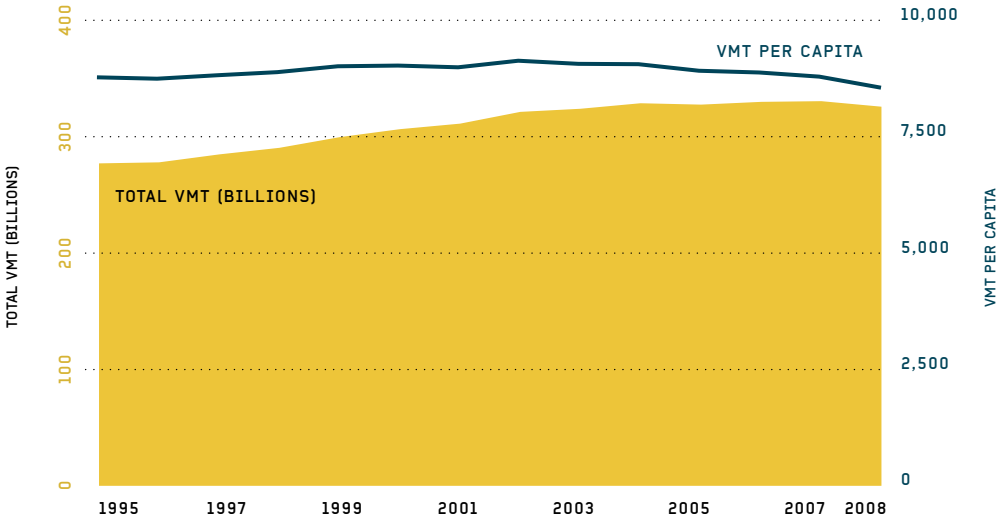
FIG 22. CONSUMPTION OF GASOLINE AND ALTERNATIVE FUELS CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Alternative Fuels Data–EIA Coal, Nuclear, and Renewables Division "Alternatives to Traditional Transportation Fuels, 2007," Table C4. Motor Gasoline Data–State Energy Data System, Series MGACP "Motor gasoline consumed by the transportation sector." Analysis: Collaborative Economics

FIG 23. TRENDS IN VEHICLE MILES TRAVELED

TOTAL AND PER CAPITA / CALIFORNIA

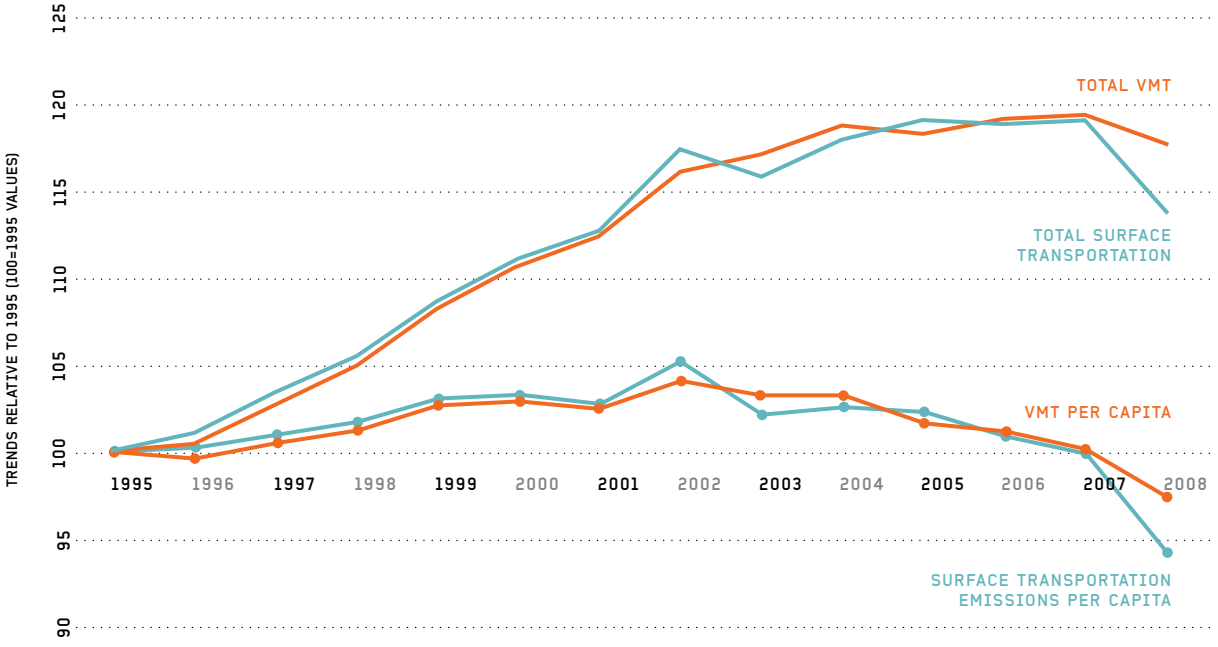


CALIFORNIA VMT PERCENT CHANGE	
2007-2008	
TOTAL	-1.4%
PER CAPITA	-2.8%

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Includes VMT on state highway systems and other public roads.
Data Source: California Department of Transportation; California Department of Finance. Analysis: Collaborative Economics

FIG 24. TRENDS IN VEHICLE MILES TRAVELED AND GHG EMISSIONS FROM SURFACE TRANSPORTATION

TOTAL AND PER CAPITA TRENDS RELATIVE TO 1995 / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory–by Sector and Activity; California Department of Transportation; California Department of Finance. Analysis: Collaborative Economics

Californians are driving less. From 2007 to 2008, total vehicle miles traveled (VMT) dropped by 1.4 percent—the largest drop since 1995. Per capita VMT also fell by 2.8 percent. Over the long-term, there has been a downward trend in VMT per capita. Since the peak in 2001, VMT has declined by nearly five percent.

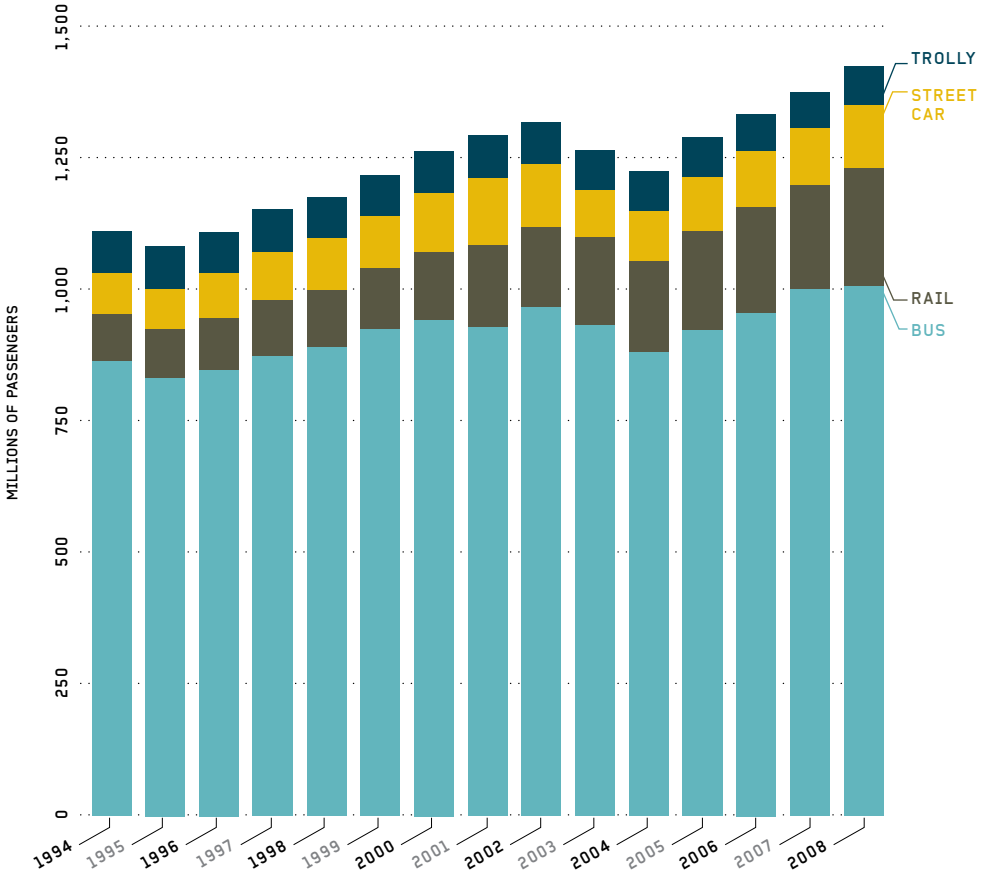
After holding steady since 2005, GHG emissions from surface transportation dropped four percent between 2007 and 2008.

Public transit ridership in California is on the rise across all types of transit, yet transit availability is shrinking. In 2008, the number of total annual passengers was 16 percent higher than in 2004.

Ridership is growing in all types of transit, yet the number of transit routes is falling. While the total number of passengers increased four percent since 2007, public transit availability declined over this period. From 2007 to 2008, total revenue miles decreased by 15 percent. The highest growth in ridership was in rail transit, with an increase of 13 percent since 2007.

FIG 25. PUBLIC TRANSIT USE

TOTAL ANNUAL PASSENGERS BY TRANSIT TYPE / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California State Controller's Office. Analysis: Collaborative Economics

GROWTH IN PUBLIC TRANSIT RIDERSHIP

2007-2008 CALIFORNIA

RAIL	+13%
STREET CAR	+11%
TROLLY	+8%
BUS	+1%
TOTAL	+4%

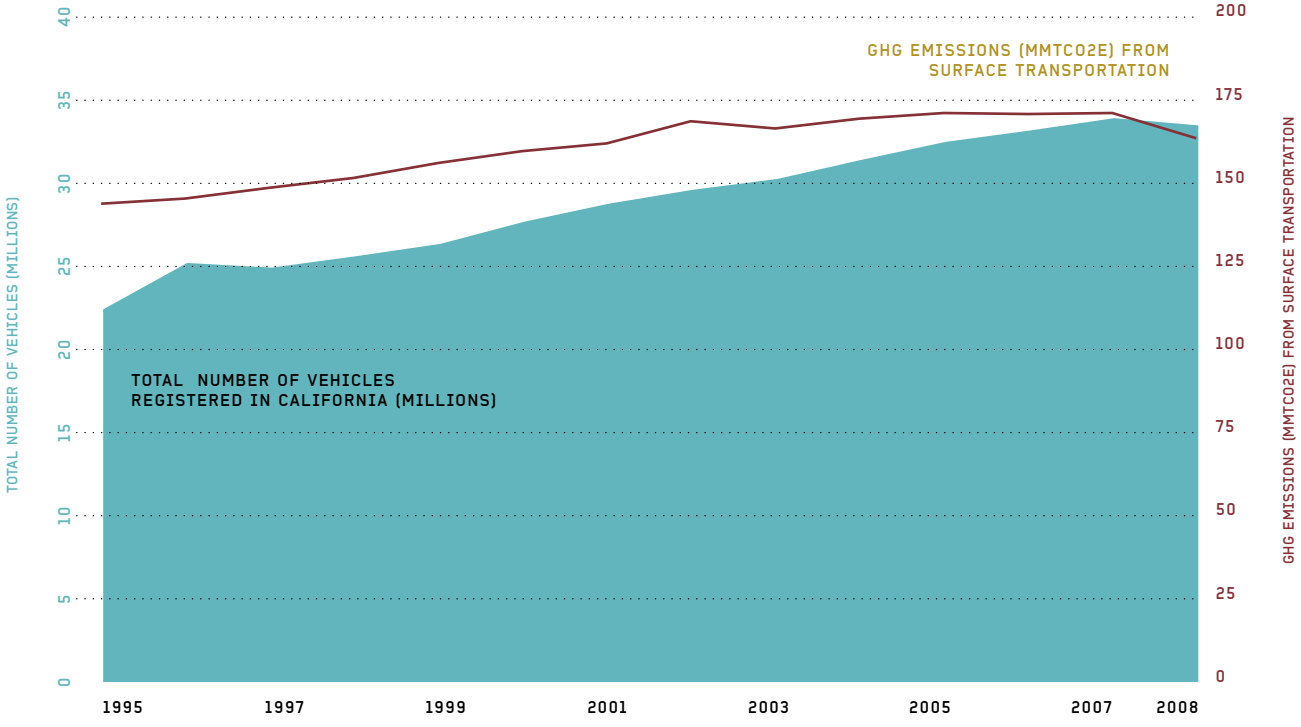
TRANSPORTATION / VEHICLE MILES TRAVELED, PUBLIC TRANSIT RIDERSHIP, NEW ALTERNATIVE FUEL VEHICLE REGISTRATIONS / 2008

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Transportation; California State Controller's Office; R.L. Polk & Co.; California Department of Finance
Analysis and Cartography: Collaborative Economics

With 65 rides per capita in 2008, the Bay Area boasts the highest public transit use, followed by the Los Angeles Area with 56 rides per capita. These regions also have the lowest levels of VMT per capita in the state. Both regions, along with Orange County, have concentrations higher than the state average in hybrid and natural gas vehicles. Regions with higher than state average concentrations in electric vehicles include the Sacramento Area, Orange County, Inland Empire, and San Diego as well as the more rural areas of Sacramento Valley, Central Coast, North Coast, and Sierra Region.

In changing their transportation habits, Californians are making a difference in reducing GHG emissions. They are driving less, using more alternatives to driving alone and shifting to lower-emission vehicles and fuels. The total number of vehicles in the state dropped by 1.3 percent from 2007 to 2008. Together, these changes produced a four percent reduction in CO2 emissions from California's total vehicle fleet between 2007 and 2008.

FIG 26. TOTAL VEHICLES AND GHG EMISSIONS
CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Total number of vehicles are for all vehicles registered in California including cars, trucks, buses, and motorcycles.
Data Source: California Air Resources Board, California Greenhouse Gas Inventory–By Sector and Activity; Federal Highway Administration, U.S. Department of Transportation.
Analysis: Collaborative Economics

RENEWABLE ENERGY

California's renewable energy resources are holding steady but not growing. Since 2002 total renewable energy generation increased by nine percent. Over this period, wind energy generation has more than doubled. California's Renewables Portfolio Standard is a driver behind this growth related to investor-owned utilities.

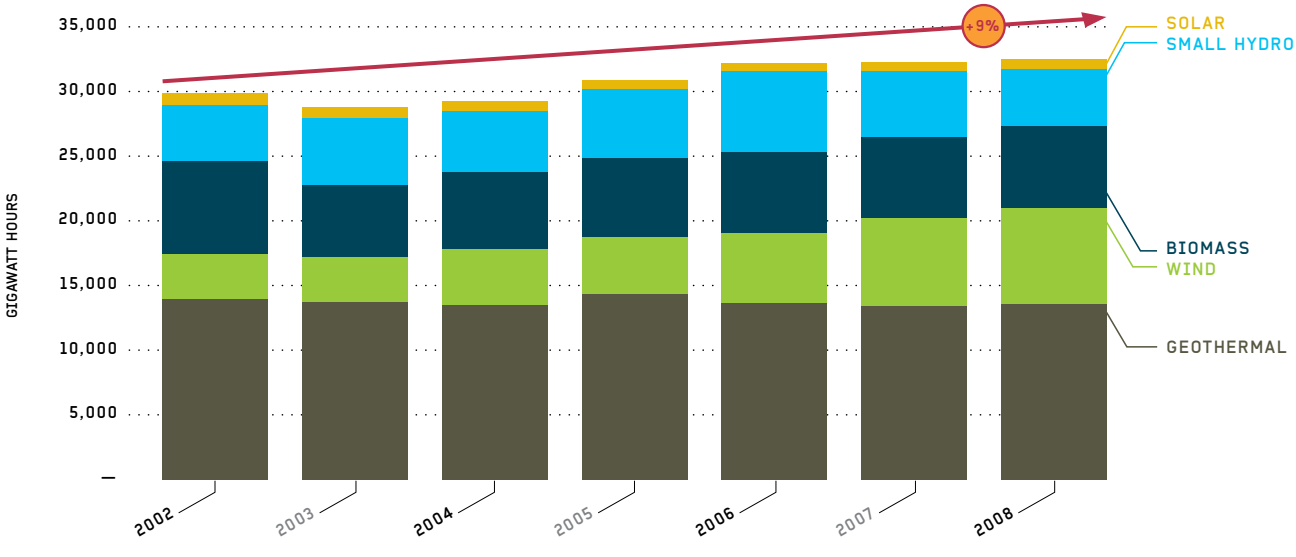
Although energy generation from renewable sources has risen, renewable energy generation as a percentage of total energy generation has remained steady. In 2008, 10.6 percent of California's total energy came from renewable sources. Nationwide, only three percent of total energy generation is from renewable sources but this represents a half percent increase from the previous year.

According to the Solar Electric Power Association, as of May 2010, five of the top ten solar energy producing utilities in the United States were located in California. In 2007, California ranked first in solar energy generation, representing over 90 percent of the total U.S. net solar electricity generation.

From 2008 to 2009, newly installed solar capacity increased by 14 percent throughout California after growing by four and a half times from 2007 to 2008 (Figure 29A). Overall, this growth is directly related to the policy innovation of the California Solar Initiative which helps reduce the upfront costs to customers through rebates. In addition, prices for photovoltaic modules are the lowest they have been since 2003,[8] so the slower expansion in 2009 is likely due to limited opportunities for project financing.[9]

Solar capacity is expanding unevenly across sectors. Up 42 percent from the prior year, the residential sector accounted for the bulk of the growth in 2009 (Figure 29B). Accounting for only six percent of capacity, installations in the government sector expanded nearly threefold.

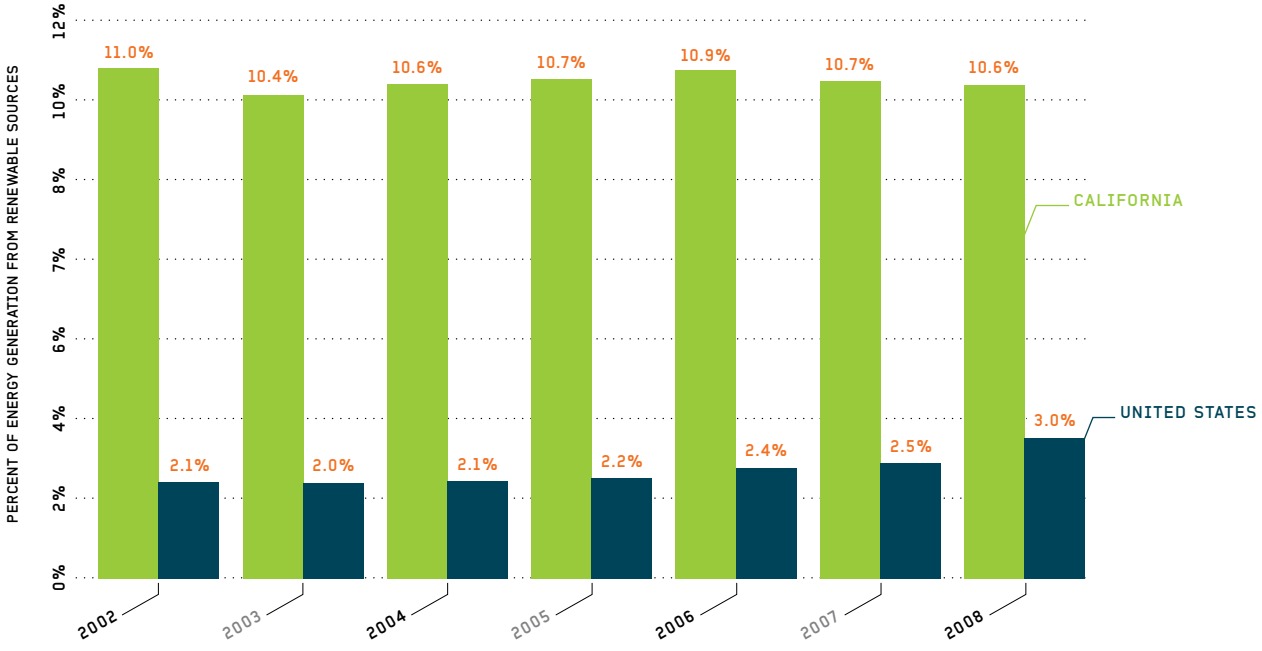
FIG 27. CALIFORNIA RENEWABLE ENERGY GENERATION
GIGAWATT HOURS BY SOURCE



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Energy Commission. Analysis: Collaborative Economics

FIG 28. PERCENT OF TOTAL ENERGY GENERATION FROM RENEWABLE SOURCES

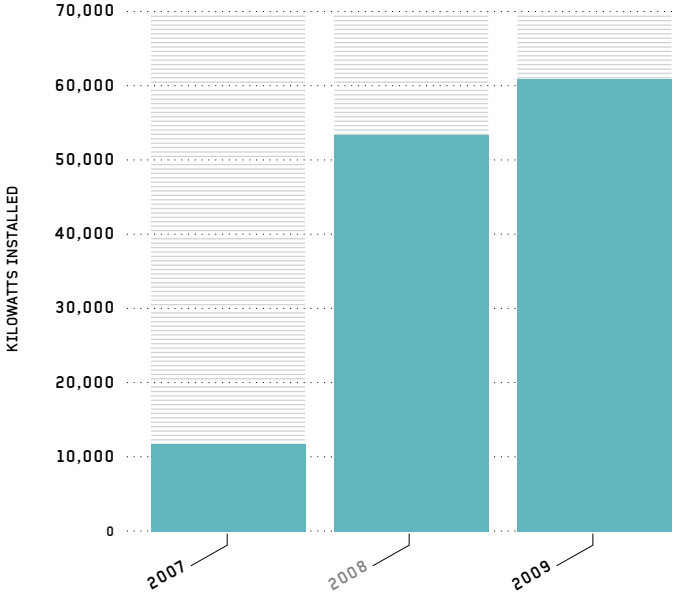
CALIFORNIA AND UNITED STATES



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Energy Commission; Energy Information Administration, U.S. Department of Energy. Analysis: Collaborative Economics

FIG 29A. NEW SOLAR INSTALLATIONS

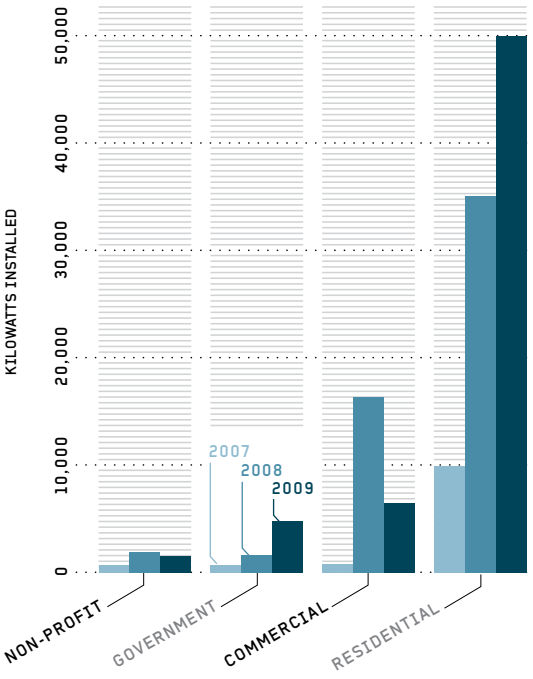
CAPACITY (KW) INSTALLED THROUGH THE CALIFORNIA SOLAR INITIATIVE / CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Public Utilities Commission, California Solar Initiative. Analysis: Collaborative Economics

FIG 29B. NEW SOLAR INSTALLATIONS BY SECTOR

CAPACITY (KW) INSTALLED THROUGH THE CALIFORNIA SOLAR INITIATIVE



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: California Public Utilities Commission, California Solar Initiative.
Analysis: Collaborative Economics

Solar capacity is expanding at different rates across the state. Some regions with relatively high electricity consumption rates could benefit from greater solar capacity (in addition to energy efficiency improvements). The San Joaquin Valley stands out as such a region, and this is associated with multiple factors such as the high use of air conditioning. In contrast, the Central Coast and San Diego are regions with relatively low electricity consumption per capita and high solar capacity per capita. The highest levels of solar capacity per capita in 2009 were reported in the Bay Area, Sierra Region, Sacramento Valley, and Central Coast. The most efficient regions, Orange County and the San Diego Region reported the lowest electricity consumption per capita in 2008.

SOLAR DECATHLON TESTS ENERGY-EFFICIENT BUILDING STRATEGIES

For three weeks in October 2009, 20 teams of college students gathered for the Solar Decathlon to build a "solar village" at the National Mall in Washington D.C. Held by the U.S. Department of Energy every couple years since its founding in 2002, the Solar Decathlon is an international competition to develop and showcase new ideas in solar energy, energy efficiency and home design. Each team designs, builds and operates an energy-efficient house, which is then judged based on ten objective and subjective categories relating to efficiency, functionality and aesthetics. Team California, made up of Santa Clara University and California College of the Arts students, placed third among the 20 teams.

"Solyndra Breaks Ground on New 500 Megawatt Solar Plant." Web. May 17, 2010. http://www.solyndra.com/News/Press-Release-090409

ELECTRICITY CONSUMPTION AND SOLAR INSTALLATIONS / ELECTRICITY CONSUMPTION 2008 (GWh PER CAPITA) AND INSTALLED SOLAR CAPACITY 2009 (kW PER 10,000 PEOPLE)

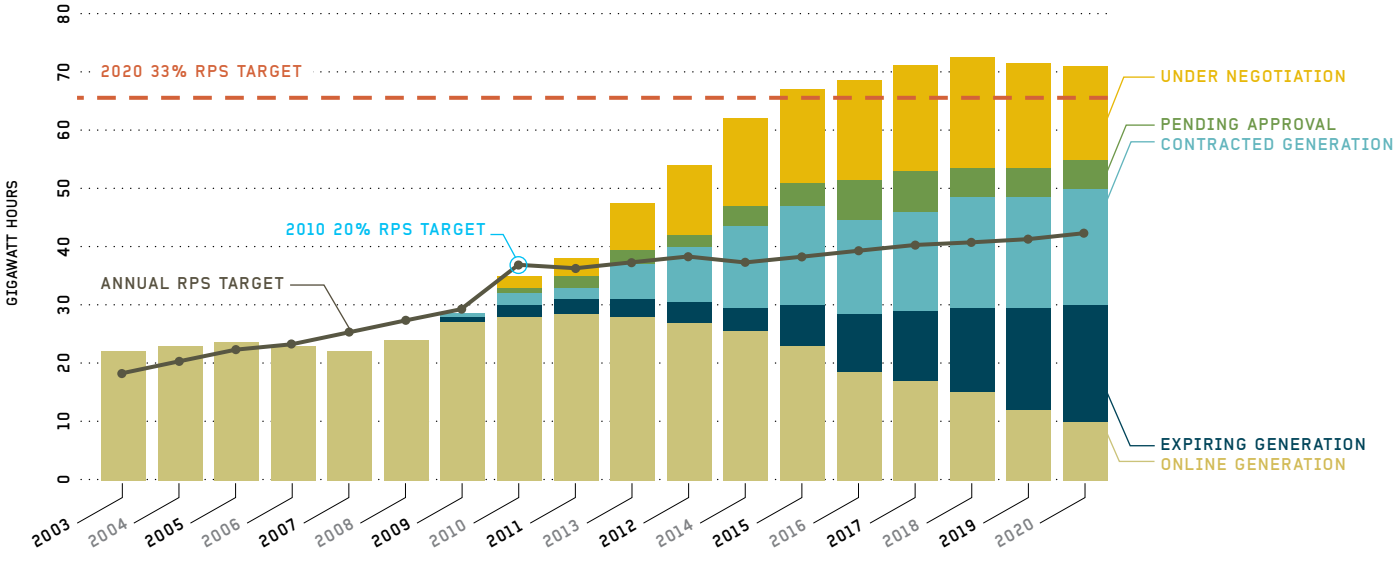
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: California Public Utilities Commission, California Solar Initiative; California Department of Finance; California Energy Commission
Analysis and Cartography: Collaborative Economics

California's Renewables Portfolio Standard (RPS) was established in 2002, requiring investor-owned utilities (IOUs), electric service providers (ESPs) and community choice aggregators (CCAs) to increase electricity procurement from renewable sources by an additional one percent each year, with a target of 20 percent of total electricity procured from renewable sources by 2010. In November 2008, Governor Schwarzenegger signed an Executive Order to accelerate the RPS target to 33 percent by 2020.

The RPS target is based on the California Energy Commission's forecast of retail electricity sales. While many contracts and short-listed bids offer options for developers and IOUs to expand a project's generation, the forecast is based on minimum energy deliveries. Although a percentage of contract failure is not assumed in the forecast, the dates that projects are expected to go online are adjusted to take into account delays that arise from the permitting, siting, transmission, and financing processes. In 2008, RPS-eligible resources comprised 13 percent of total IOU electric retail sales.

FIG 30. INVESTOR-OWNED UTILITY ACTUAL AND FORECASTED RENEWABLES PORTFOLIO STANDARD GENERATION

CALIFORNIA



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Data is historic through 2008. Forecast data is used for 2009 to 2020. In November 2008, Governor Schwarzenegger signed an Executive Order to accelerate the RPS target to 33% by 2020. Data Source and Analysis: California Public Utilities Commission, Portfolio Standard Quarterly Report, Quarter 4 2009.

THE CHANGING BUSINESS CLIMATE

THE CHANGING BUSINESS CLIMATE: IMPACTS & NEW OPPORTUNITIES

There are many myths and questions concerning California's business climate and how new public policy related to climate change is impacting the state's economic engine. Business climate describes how well a place supports economic growth and business development. Factors that contribute to business climate include taxes and regulations, government incentives, permitting and licensing, real estate costs, and energy costs, but also infrastructure, access to a skilled workforce, quality of life, and access to capital.

With rising energy costs, shifting consumer demands, and the development of policies to address climate change, the business climate is changing. New opportunities are emerging in the form of productivity gains, new markets, technological advancements, and increased competitiveness. Business leaders around the world already recognize this and are enjoying the benefits of significant cost-savings and new revenue streams.

Changing global markets and public policy are driving California businesses to develop new practices to reduce costs and improve their competitive edge. As such, growing numbers of companies are working with their suppliers to set defined criteria for sustainability in their products and processes.

Despite this growing body of evidence, certain myths persist concerning the factors that undermine business growth in general and California business growth specifically due to the state's unique energy and energy efficiency policies. For example, it is not commonly known or understood that California's average electricity bills are actually LOWER than the average electricity bills in most other states. It is true that California's electricity rates are among the highest in the nation. However, average electricity bills are lower than in most other states because of California's high efficiency standards for buildings and appliances, and utility-financed energy efficiency programs. In addition, California's electricity bills have increased less since 1990 than most states.

This feature addresses current myths by examining the facts concerning the state's business climate. The analysis presented here refutes these myths and reveals the following four Facts:

_FACT 1: Electricity bills are lower in California.

_FACT 2: California manufacturers spend a smaller percentage of total operating costs on electricity.

_FACT 3: California's electricity productivity in manufacturing is outpacing the rest of the nation.

_FACT 4: More businesses are starting up in California than closing or leaving.

_FACT 1:

ELECTRICITY BILLS ARE LOWER IN CALIFORNIA

Gains in energy efficiency have resulted in lower average monthly bills even though rates may be higher. For the economy as a whole, these efficiency gains translate into higher energy productivity and economic competitiveness.

_FACT 2:

CALIFORNIA MANUFACTURERS SPEND A SMALLER PERCENTAGE OF TOTAL OPERATING COSTS ON ELECTRICITY

Compared to other states, electricity bills are lowest in California, and electricity costs as a portion of total business costs vary by industry. In manufacturing, an electricity-intensive sector, electricity costs in California have dropped faster than in the rest of the nation.

_FACT 3:

CALIFORNIA'S ELECTRICITY PRODUCTIVITY IN MANUFACTURING IS OUTPACING THE REST OF THE NATION

Improving energy efficiency can boost competitiveness and enable new investment in jobs and capital.

_FACT 4:

MORE BUSINESSES ARE STARTING UP IN CALIFORNIA THAN CLOSING OR LEAVING

Even in electricity-intensive sectors, new businesses continue to open at a faster rate than business closings in the state.

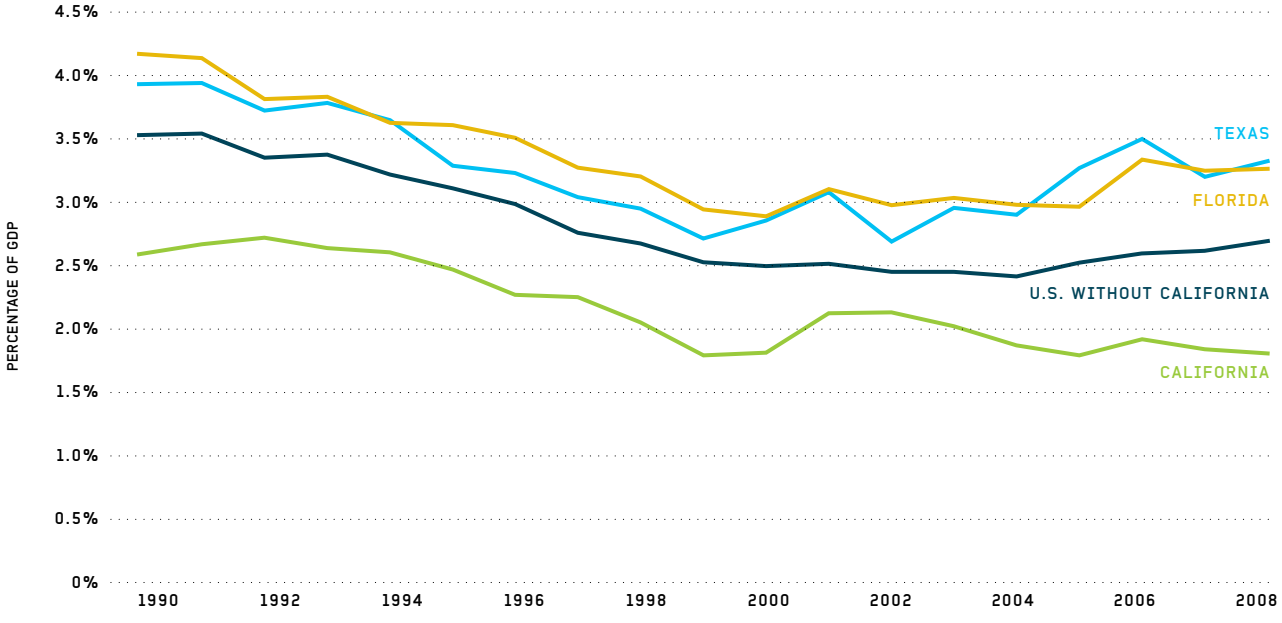
FACT 1: ELECTRICITY BILLS ARE LOWER IN CALIFORNIA

How much of a state's economic output goes toward paying for electricity costs offers an indication for the economy's energy productivity. Money not spent on energy costs, whether by a household, business or public entity, can be invested in capital upgrades that boost productivity or invested in the creation of new jobs.

In 2008, California's statewide electricity bill equated to roughly 1.8 percent of the total state economy. The statewide electricity bills of Texas and Florida each equate to 3.3 percent of their state economy, above the U.S. (without California) average of 2.7 percent. This means that Californians had $29 billion more in 2008 to spend on other uses—money that would have gone towards energy costs if California operated at the same level of efficiency as Texas. Compared with the rest of the nation, California ranked fourth for the lowest electricity bill as a fraction of GDP just below Utah, Washington, D.C., and Colorado.

FIG 31. STATEWIDE ELECTRICITY BILL AS A FRACTION OF GDP

CALIFORNIA AND THE REST OF THE U.S.



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy; Bureau of Economic Analysis, U.S. Department of Commerce. Analysis: Collaborative Economics

FIG 32. AVERAGE MONTHLY ELECTRICITY BILLS / RESIDENTIAL SECTOR

CALIFORNIA AND THE REST OF THE U.S. 1990 AND 2007

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Energy Information Administration, U.S. Department of Energy. Analysis: Collaborative Economics

While electricity rates are higher in California, because of the state's high efficiency standards for buildings and appliances and utility energy efficiency programs, average electricity bills are actually lower than in most other states. In addition, California's electricity bills have increased less since 1990 than most states.

California maintains average monthly residential electricity bills that are lower than 33 states, even while rates are higher than 43 states. Residential electricity bills in California are 14 percent lower than the rest of the nation. Since 1990, average monthly residential electricity bills have remained steady.

ELECTRICITY PRICES AND BILLS (INFLATION ADJUSTED) BY SECTOR

CALIFORNIA AND THE REST OF THE U.S.

		PRICE (CENTS PER kwh)	AVERAGE MONTHLY BILL		
		2007	1990	2007	% CHANGE 1990-2007
Residential	California	$0.15	$86	$86	-0.2%
	Rest of the U.S.	$0.11	$98	$98	0.4%
Industrial	California	$0.10	$14,603	$5,496	-62%
	Rest of the U.S.	$0.07	$14,925	$13,971	-6%
Commercial	California	$0.13	$740	$761	3%
	Rest of the U.S.	$0.10	$573	$634	11%

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Price statistics for the U.S. without California are the national average price. Data Source: Energy Information Administration, U.S. Department of Energy. Analysis: Collaborative Economics

California has the sixteenth-lowest industrial electricity bill in the nation, even though industrial electricity rates are the ninth-highest. From 1990 to 2007, California's industrial electricity bills dropped by 62 percent. Representatives of the California Energy Commission caution that this seeming dramatic drop reflects a definitional change for industrial consumers following the energy disruption in 2000 and 2001, and that the real drop was closer to four to ten percent.[10] Over this period, industrial electricity bills in the rest of the nation decreased by only six percent.

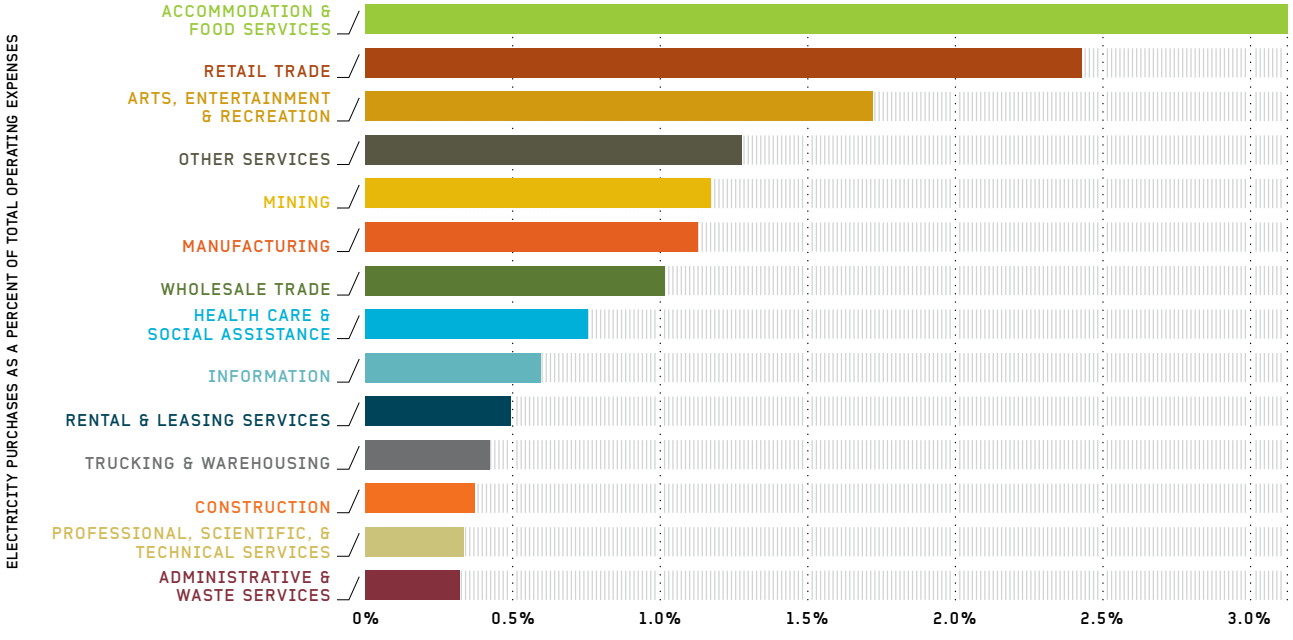
Since 1990, commercial electricity bills have increased three percent in California. Over the same period of time, commercial electricity bills for the rest of the country grew 11 percent. Even though commercial electricity bills are increasing at a much slower rate in California than in the rest of the nation, there is great potential for achieving significant improvements in energy efficiency in commercial buildings in California. In many cases, improvements will yield almost immediate returns on investment.[11]

FACT 2: CALIFORNIA MANUFACTURERS SPEND A SMALLER PERCENTAGE OF TOTAL OPERATING COSTS ON ELECTRICITY

Electricity costs as a percentage of total expenses vary by industry. Operations typically rely on multiple energy sources, such as natural gas, in addition to electricity. This analysis focuses on electricity expenses, because state-level data from the U.S. Economic Census on business operating expenses is consistent across sectors for electricity purchases but not for other energy expenses.

Nationwide, businesses in Accommodation & Food Service spend by far the largest percentage of their expenses on electricity with roughly three dollars of every hundred spent going toward electricity purchases. In contrast, Administrative & Waste Services and Professional, Scientific, and Technical Services had the lowest share of total operation costs spent on electricity purchases at three-tenths of a percent in 2007

FIG 33. ELECTRICITY PURCHASES AS A PERCENT OF TOTAL OPERATING EXPENSES BY INDUSTRY
UNITED STATES, 2007

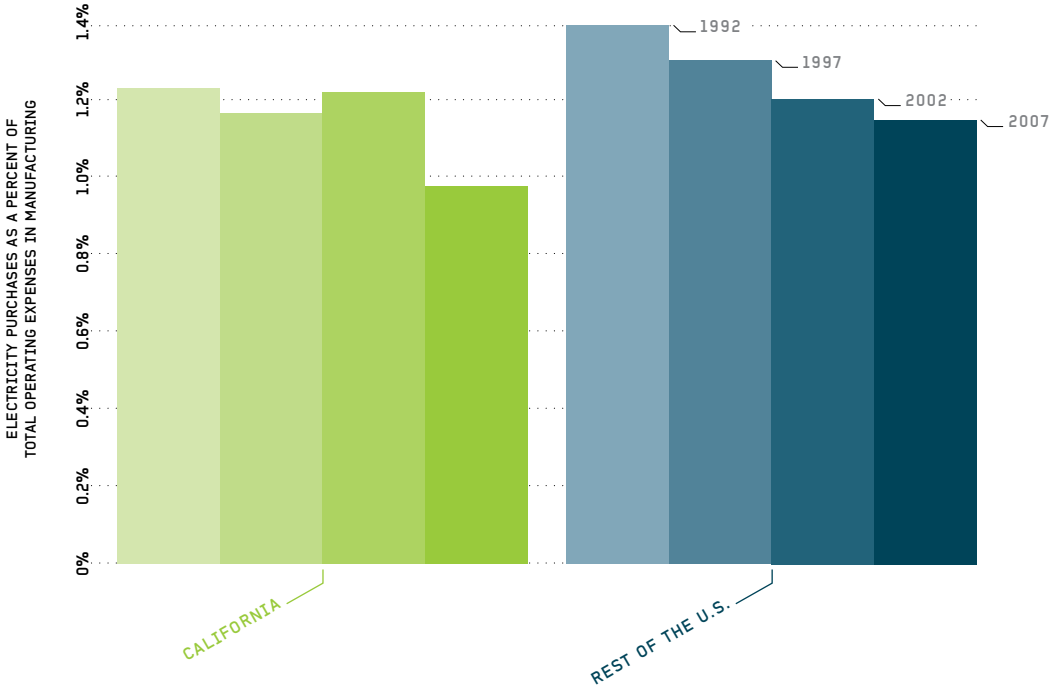


NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Professional, Scientific, & Technical Services excludes office of notaries. Data Source: U.S. Census Bureau, 1992, 1997, 2002 Economic Census & Service Annual Survey 2002 and 2007; U.S. Department of Commerce, Bureau of Economic Analysis. Analysis: Collaborative Economics

In 2007, California's electricity purchases as a share of operating expenses were 15 percent below that of the rest of the country and fell 21 percent from 1992 to 2007. For the U.S. (without California), the drop was 18 percent between 1992 and 2007.

In Manufacturing industries nationwide (not including California), electricity costs make up roughly 1.1 percent of expenses, compared with approximately one percent in California. In monetary terms, this means that California's manufacturers saved nearly $740 million in 2007. This savings allows for spending on other operating expenses—money that would have gone to electricity expenses if California's electricity purchases as a percentage of total operating expenses were as high as in the rest of the nation. Among other industries, manufacturing includes petroleum refineries and cement manufacturing.

FIG 34. ELECTRICITY PURCHASES AS A PERCENT OF TOTAL OPERATING EXPENSES IN MANUFACTURING
CALIFORNIA AND THE REST OF THE U.S.



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Manufacturing excludes publishing firms for 1992 data because of differences in SIC and NAICS classifications. Data Source: U.S. Census Bureau, 1992, 1997, 2002, 2007 Economic Census; U.S. Department of Commerce, Bureau of Economic Analysis. Analysis: Collaborative Economics

FACT 3: CALIFORNIA'S ELECTRICITY PRODUCTIVITY IN MANUFACTURING IS OUTPACING THE REST OF THE NATION

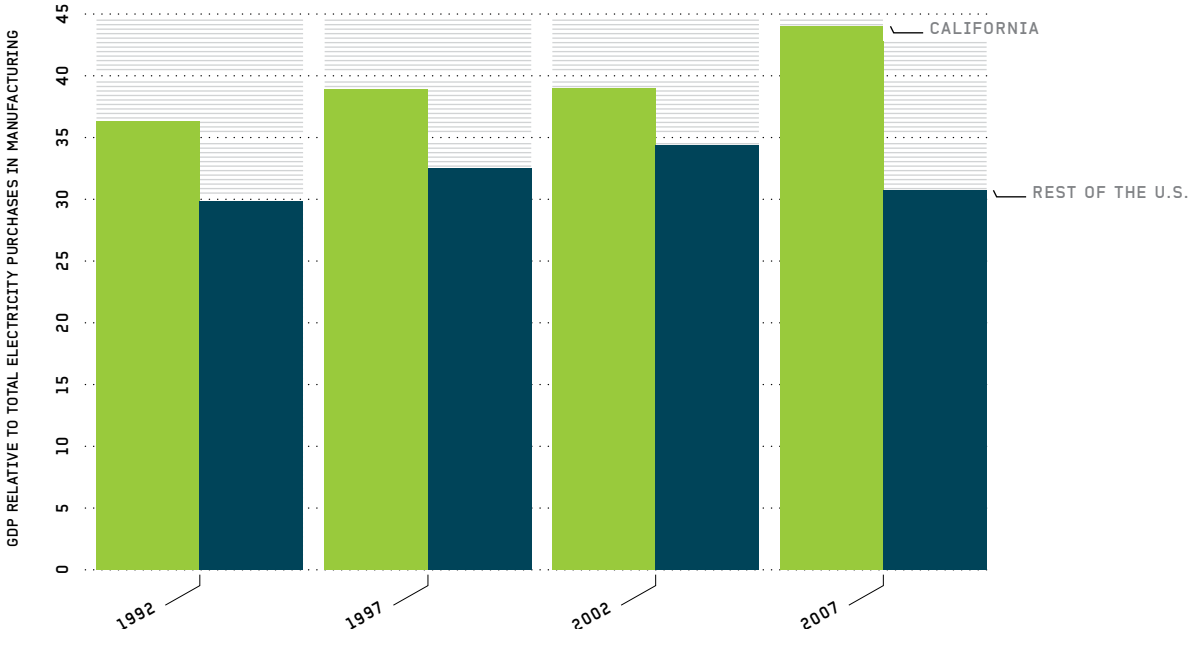
Improving efficiencies in the consumption of energy and all natural resources will boost the competitive edge of a company as well as an economy. In addition to new savings on resources not consumed, a company increases its resilience to external shocks (such as volatile fuel costs) thereby improving its competitive edge over other less resilient companies. The same is the case for a state or regional economy.

California's manufacturers benefit from higher efficiencies in their use of electricity than manufacturers in the rest of the nation. Since 2002, California's electricity productivity in manufacturing grew by 13 percent, while dropping by ten percent in the rest of the nation. This means California's manufacturers are generating more value while spending less on electricity.

In 2007, California's manufacturers generated nearly $44 of GDP for every dollar spent on electricity—$13 more than the rest of the United States (figures in 2007 dollars). Over the long-term, energy productivity is rising at a faster rate in California than in the rest of the country. From 1992 to 2007, GDP relative to total electricity expenditures in manufacturing increased 21 percent in California and three percent across the rest of the United States.

FIG 35. ELECTRICITY PRODUCTIVITY IN MANUFACTURING

GDP FROM MANUFACTURING RELATIVE TO TOTAL ELECTRICITY PURCHASES / CALIFORNIA AND THE REST OF THE UNITED STATES



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Note: Manufacturing excludes publishing firms for 1992 data due to differences in SIC and NAICS classifications. Data Source: U.S. Census Bureau, Economic Census 1992, 1997, 2002, 2007 and U.S. Department of Commerce, Bureau of Economic Analysis. Analysis: Collaborative Economics

FACT 4: MORE BUSINESSES ARE STARTING UP IN CALIFORNIA THAN CLOSING OR LEAVING

Business climate describes how well a location supports economic growth and business development. Factors that contribute to business climate include taxes and regulation, government incentives, permitting and licensing, real estate costs, energy costs, infrastructure, access to a skilled workforce, quality of life, and access to capital. Contrary to popular assertions about an unaccommodating business climate, California is not experiencing an exodus of businesses to other states.[12] Even among electricity-intensive industries, new business startups outnumber losses through closures and exits.

There is a certain level of "churn" that takes place in the stock of businesses in any given location as new business open, some close, and others either leave or enter the location. The vitality of a region's business climate can be observed in part by examining the extent to which business startups outnumber closings and exits.

California's stock of business establishments totaled two million in 2008. In a typical year in California, the number of new business openings (start-ups and new branches) outnumber closings and vastly outnumber exits. On average, each year between the years 1995 and 2008, 177,000 new businesses opened their doors and 1,000 businesses moved operations to California. Closings took place for about

FIG 36. AVERAGE ANNUAL CHANGE / 1995–2008
CALIFORNIA BUSINESS ESTABLISHMENTS

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: National Establishment Time Series Database (NETS). Analysis: Collaborative Economics

TOTAL BUSINESS ESTABLISHMENTS IN CALIFORNIA
1995: 1.2 MILLION / 2008: 2 MILLION

	AVERAGE ANNUAL CHANGE 1995-2008	
Electricity-Intensive Industries	New Openings: +82,000 Moving to CA: +450 Closings: -60,000 Moving from CA: -700	AVERAGE ANNUAL NET CHANGE: **+21,750** ADDED BUSINESS ESTABLISHMENTS
All Industries	New Openings: +177,000 Moving to CA: +1,000 Closings: -118,000 Moving from CA: -1,500	AVERAGE ANNUAL NET CHANGE: **+58,500** ADDED BUSINESS ESTABLISHMENTS

NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: National Establishment Time Series Database (NETS). Analysis: Collaborative Economics

118,000 establishments, and roughly 1,500 left the state. On average, California reports a net gain of roughly 58,500 new business establishments each year.

What about the businesses categorized within industries that are particularly electricity intensive? Based on this analysis, even these businesses are not displaying disproportionate patterns of business failures or out-migration. Electricity-intensive industries are defined as those industries which report electricity purchases, as a percentage of total operating costs, above the median for the nation, 0.72 percent of total operating expenses. The electricity-intensive industries represented in this analysis include:

- Accommodation & Food Services
- Mining
- Retail Trade
- Arts, Entertainment & Recreation
- Other Services
- Manufacturing
- Wholesale Trade

WHAT IS BUSINESS CHURN?

Business churn describes the change in the number of business establishments due to different causes over a period of time. An establishment can be a business with a single location, or it can be a single unit of a multi-establishment firm. Between 1995 and 2008, the total number of business establishments in California increased from 1.2 million to 2 million. Although most of this change can be explained by new businesses opening their doors, there were also many businesses closing their doors over this period. To a far lesser degree, there were also businesses moving between California and other states.

Tracking business churn provides valuable information about what underlies the net numbers. Also known as business dynamics, this type of analysis requires time-series information on individual businesses which is available with the National Establishment Time-Series Database (NETS), prepared by Walls & Associates using Dun & Bradstreet establishment data. Business churn analysis has been reported widely in regional and statewide analyses in California. Some examples include:

- ***2010 Index of Silicon Valley.*** Joint Venture: Silicon Valley Network and the Silicon Valley Community Foundation. <http://www.jointventure.org/images/stories/pdf/2010%20Index-final.pdf>
- ***2009 Solano County Index of Economic and Community Progress.*** Solano Economic Development Corporation. <http://www.co.solano.ca.us/SubApp/SolanoIndex/Reports/SolanoIndex2009.pdf>

The Public Policy Institute of California has a long history of carrying out business churn analysis including:

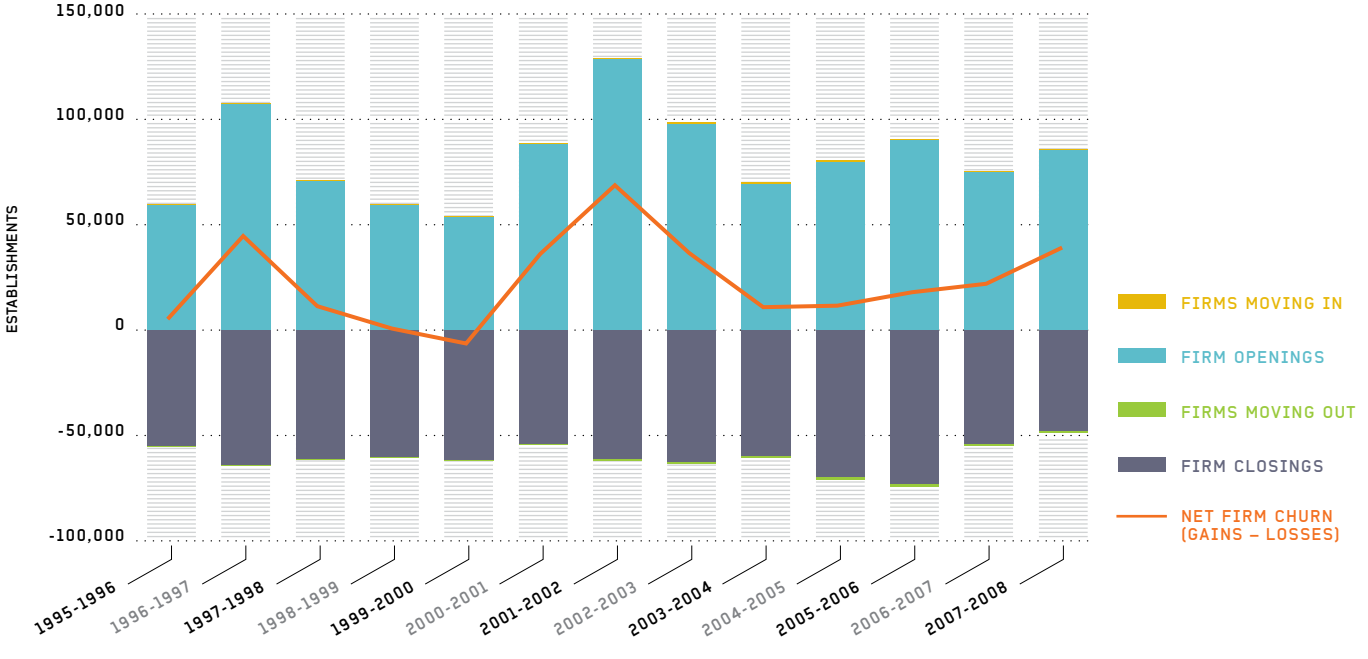
- Jed Kolko. "Business Relocation and Homegrown Jobs, 1992-2006." Public Policy Institute of California. Sept 2010. <http://www.ppic.org/content/pubs/report/R_910JKR.pdf>
- Jed Kolko & David Neumark. "Business Location Decisions and Employment Dynamics in California." Public Policy Institute of California. Nov. 2007. <http://www.ppic.org/main/home.asp>.
- David Neumark, Junfu Zhang & Jed Kolko. "Interstate Business Relocation: An Industry-Level Analysis." Public Policy Institute of California. 19 June 2006. <http://www.ppic.org/main/home.asp>.
- Junfu Zhang & Nikesh Patel. The Dynamics of California's Biotechnology Industry. San Francisco: Public Policy Institute of California, 2005.
- Junfu Zhang. High-Tech Start-Ups and Industry Dynamics in Silicon Valley. San Francisco: Public Policy Institute of California, 2003.

For electricity-intensive industries in California, new business openings significantly outnumber closings and exits similarly to the economy as a whole. In a typical year, 82,000 new businesses in electricity-intensive industries opened their doors. Over the period from 1995 to 2008, annual closings averaged 60,000 and a mere 700 establishments left the state. On average, California witnesses a net gain of 21,750 business establishments per year in electricity-intensive industries.

The chart below illustrates the year-to-year change of business churn. With the exception of 1998 and 1999, business openings have outnumbered business failures and exits. Furthermore, between 2004 and 2007, electricity-intensive industries were reporting steady net growth (represented by the line in the chart) in establishments in California.

In conclusion, opportunities for increased competitiveness and greater savings have emerged for California's businesses as they respond to the impacts of the changing business climate. Through gains in efficiency, California's electricity bill as a fraction of GDP is among the lowest in the nation, resulting in increased productivity and cost savings. Compared with the rest of the nation, California's manufacturers spend a smaller percentage of operating costs on electricity and saving $740 million in 2007. Additionally, California's electricity productivity in manufacturing is outpacing the rest of the nation. As a result, California's manufacturers are generating more value while spending less on electricity. Despite common assertions that California's business climate is not conducive to business development, the state generates far more new businesses than the number of businesses that exit the state. This is also the case for electricity-intensive businesses which have opened 82,000 new establishments on average per year while a number equating to less than one percent of that actually leave the state.

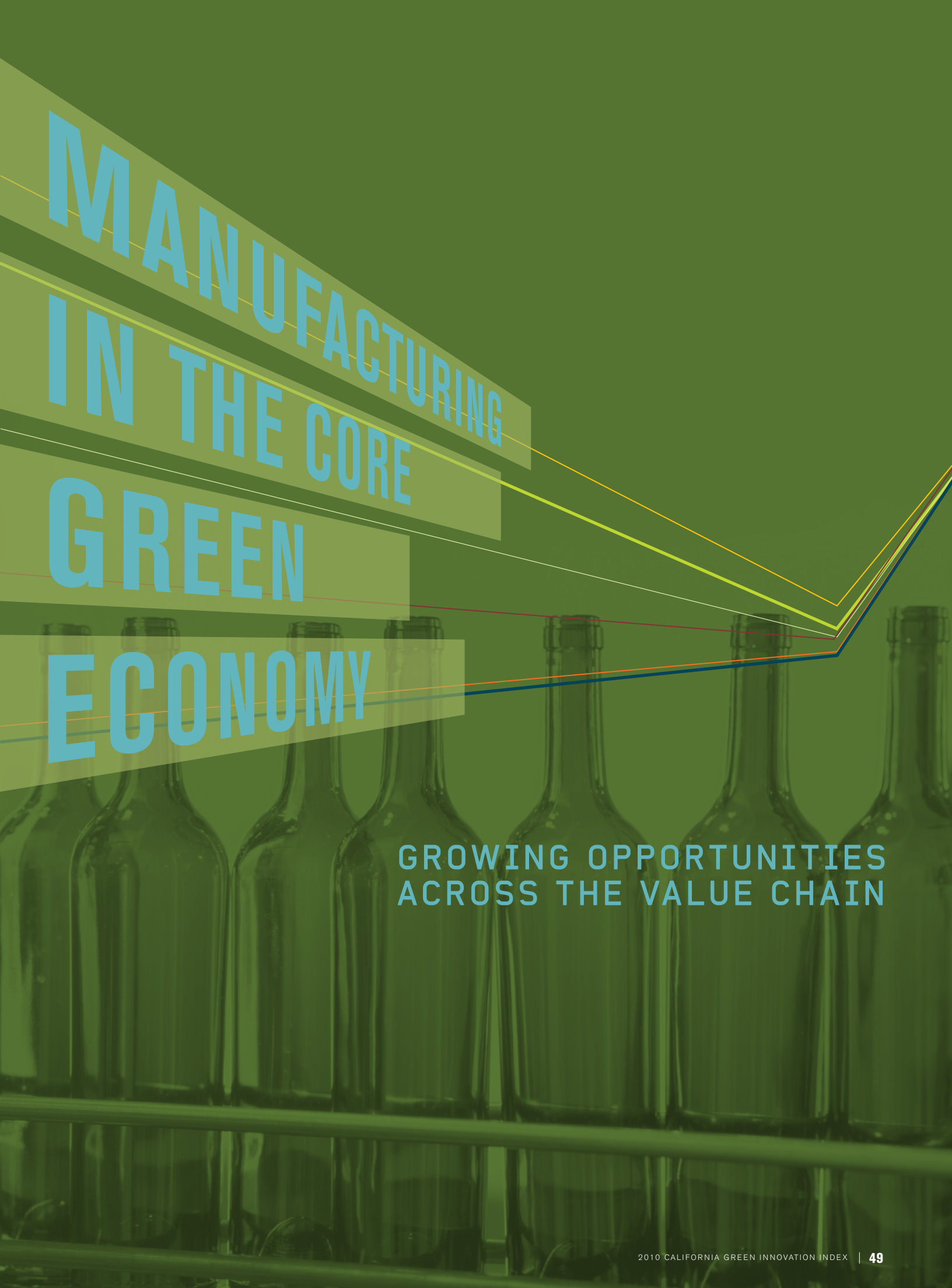
FIG 37. CALIFORNIA ELECTRICITY INTENSIVE INDUSTRIES
ESTABLISHMENT CHURN



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: National Establishment Time Series Database (NETS). Analysis: Collaborative Economics

MANUFACTURING IN THE CORE GREEN ECONOMY

GROWING OPPORTUNITIES ACROSS THE VALUE CHAIN

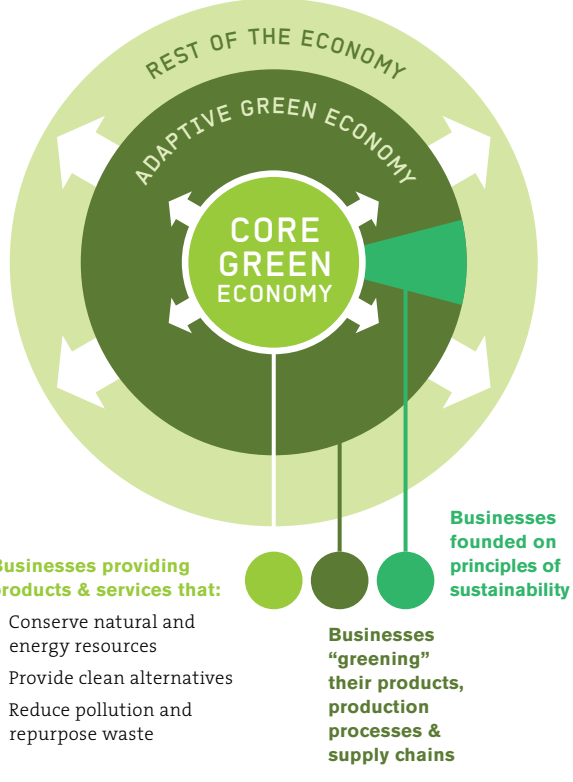


California's green economy is growing, and manufacturing represents a significant portion of the state's diverse green businesses which span the value chain. From the point of conception to delivery to the consumer and maintenance over the lifetime of the product, there are many distinct activities involved.

California's Core Green Economy consists of businesses that provide the products and services that leverage clean energy sources, conserve energy and all natural resources, reduce pollution, and repurpose waste. These companies represent the core, because they provide the means for all other businesses as well as households and public entities to transition to a cleaner and more resource efficient economy.

In other sectors of the economy, companies are adapting to more sustainable practices. These companies make up the adaptive green economy, and also include companies founded on principles of sustainability. These companies are using the products and services of the Core Green Economy in order to improve the resource efficiency of their own operations. The rest of the economy continues to operate business as usual. (For more information on the diversity and distribution of California's growing green economy, see Next 10's Many Shades of Green report, 2009 and 2010 forthcoming).

The Core Green Economy includes fifteen Green segments (see page 51). Within each Green segment, that is, the field of application of products and services, businesses can be viewed by their primary functions along the production value chain. These roles include research and development, manufacturing, suppliers, installers, sales, service providers and public education services. Each of the aforementioned roles is represented in California's Core Green Economy. This presence indicates the existence of: 1.) wide-ranging job opportunities across the skills spectrum and 2.) strong potential for continued green business growth which builds on a diverse business base rich with interrelated competencies.



GREEN MANUFACTURING EMPLOYMENT BY SEGMENT, 2008	
Manufacturing & Industrial	83%
Energy Storage	64%
Transportation	48%
Energy Efficiency	44%
Advanced Materials	42%
Water & Wastewater	41%
Energy Infrastructure	37%
Energy Generation	30%
Green Building	19%
Agriculture	18%
Air & Environment	6%
Recycling & Waste	2%
Business Services	0%
Finance & Investment	0%
Research & Advocacy	0%
Total	21%

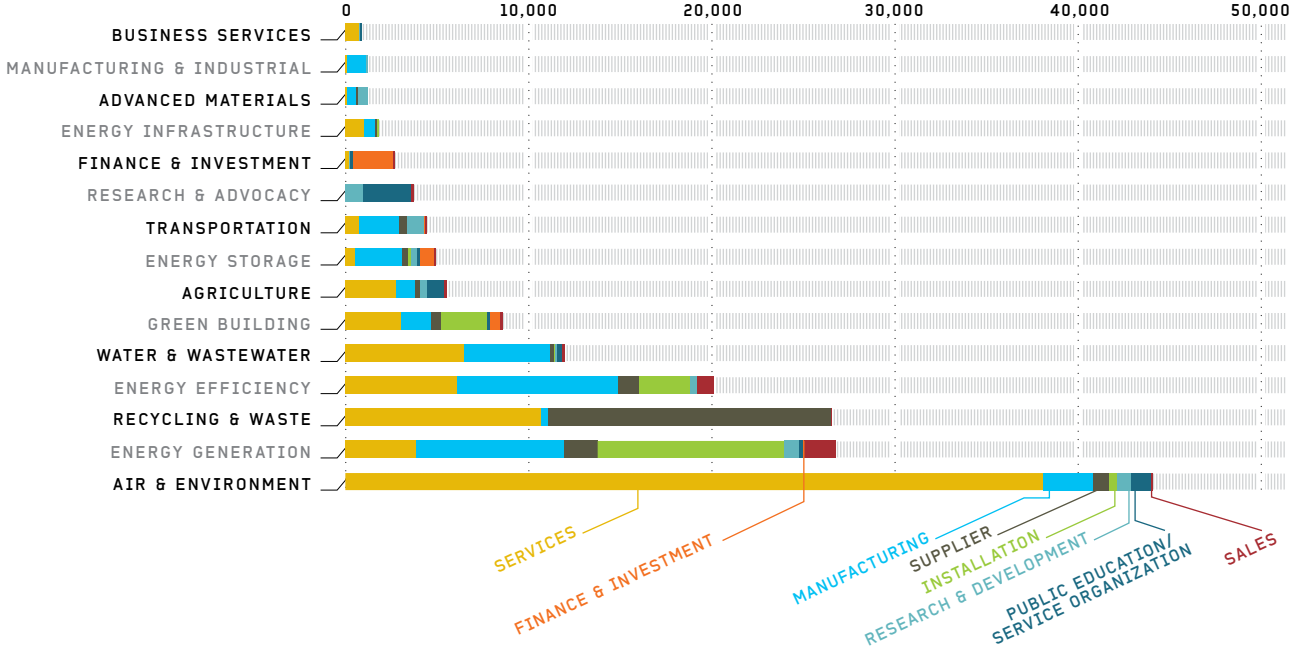
California's Core Green Economy consists largely of high-value services and manufacturing. Employment in businesses that primarily offer services account for 45 percent of all jobs in California's Core Green Economy. Manufacturing represents 21 percent of all green employment; by contrast, in the state economy as a whole, manufacturing accounts for 11 percent of total employment.

By green segment, Services and Manufacturing account for the largest employment shares, but the mix of value chain roles varies widely (chart below). Half of all employment in Air & Environment is in Services, largely in Environmental Consulting. Employment in Manufacturing is mainly split across Energy Efficiency and Energy Generation. Within each of these green segments, Manufacturing makes up 44 percent of jobs in Energy Efficiency and 30 percent of jobs in Energy Generation.

Looking at other roles in the value chain, jobs in Installation are primarily in Energy Generation, Energy Efficiency, and Green Building. In fact, Installation represents 38 percent of all jobs in Energy Generation and 30 percent in Green Building. Green jobs in the supplier category are mainly in Recycling & Waste.

The green segment of Manufacturing & Industrial Support consists of businesses that provide products and services that help manufacturers of any industry produce more efficiently, and 83 percent of employment in this segment is in a manufacturing facility. Sixty-four percent of employment in Energy Storage is in manufacturing. Other green segments with strong manufacturing employment include Transportation (48%), Energy Efficiency (44%), Advanced Materials (42%), and Water & Wastewater (41%).

FIG 38. CORE GREEN ECONOMY JOBS BY ESTABLISHMENT TYPE
CALIFORNIA 2008



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Green Establishment Database. Analysis: Collaborative Economics

THE GREEN MANUFACTURING EXPANSION

California is experiencing a significant expansion in green manufacturing employment while manufacturing employment in general has been contracting for decades. Expansion in green manufacturing varies by green segment and is taking place across the state. Various regions are establishing dominance in specific segments of green production as industries are developed from only a few employees to hundreds or thousands in the short time frame of 1995 to 2008.

Manufacturing employment in California's Core Green Economy expanded by 19 percent between 1995 and 2008 while total manufacturing employment in the state dropped nine percent. Even in the most recent period, green manufacturing held steady with a one percent increase while overall, manufacturing employment dropped four percent.

The growth in green manufacturing employment varies by industry. Manufacturing employment in Advanced Materials in California expanded significantly from less than ten jobs in 1995 to nearly 500 in 2008. Similarly, manufacturing employment in Energy Infrastructure nearly tripled from approximately 170 to 650 jobs statewide. In the same time period, manufacturing employment in Transportation more than doubled from approximately 990 to 2070 jobs.

This growth in green manufacturing is taking place in nearly every region of the state. Between 1995 and 2008, the Bay Area gained more than 3,400 green manufacturing jobs, a growth rate of 55 percent. Other regions displaying

MANUFACTURING EMPLOYMENT IN CALIFORNIA

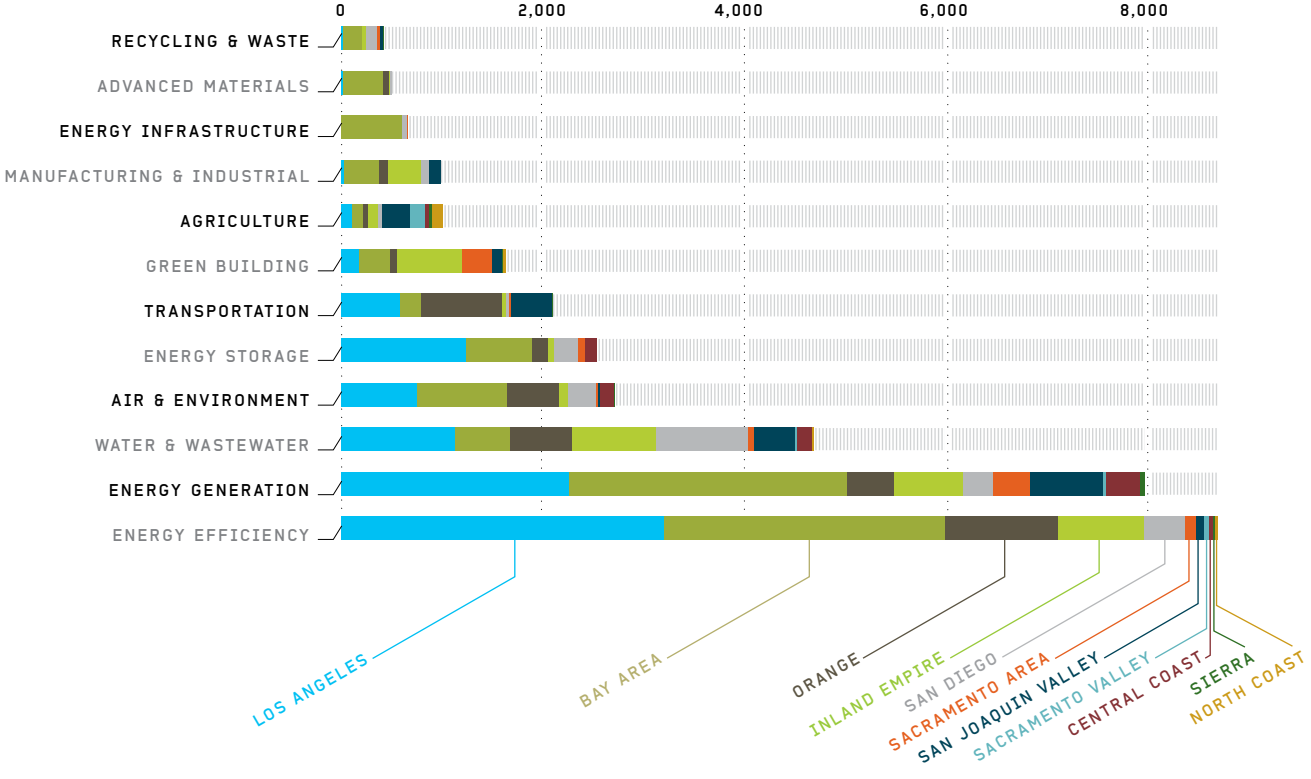
	EMPLOYMENT				PERCENT CHANGE			
	GREEN ECONOMY		TOTAL ECONOMY		GREEN ECONOMY		TOTAL ECONOMY	
	1995	2008	1995	2008	1995-2008	2007-2008	1995-2008	2007-2008
Bay Area	6,185	9,607	581,639	511,750	55%	8%	-12%	-5%
Central Coast	1,453	811	45,097	38,217	-44%	0%	-15%	-11%
Inland Empire	3,500	3,630	122,518	165,776	4%	2%	35%	0%
Los Angeles	9,373	9,370	837,519	661,969	0%	-2%	-21%	-4%
North Coast	203	175	13,596	10,170	-14%	2%	-25%	3%
Orange	2,532	3,895	272,139	283,727	54%	-7%	4%	-1%
Sacramento Area	882	971	61,483	54,186	10%	8%	-12%	-14%
Sacramento Valley	140	245	13,895	12,988	75%	12%	-7%	-1%
San Diego	2,201	2,389	167,750	177,239	9%	2%	6%	-4%
San Joaquin Valley	1,537	2,128	127,907	122,717	38%	-4%	-4%	-1%
Sierra	78	110	8,978	9,232	41%	0%	3%	-3%
Total	28,084	33,331	2,252,521	2,047,971	19%	1%	-9%	-4%

significant growth in green manufacturing jobs include Orange County (1,363 jobs, 54% growth) and the San Joaquin Valley (591 jobs, 38% growth). In these three regions, job growth in manufacturing in the green economy far outpaced that in the total economy. In Orange County, general manufacturing employment across the economy expanded four percent, while manufacturing contracted 12 percent in the Bay Area and four percent in San Joaquin.

Reflecting the nature of the product and service mix of the different segments of the Core Green Economy, green manufacturing employment is concentrated in the segments of Energy Efficiency, Energy Generation, and Water & Wastewater. The bulk of the state's green manufacturing employment is in the metro centers of Los Angeles and the Bay Area. However, other regions are developing areas of specialization as clusters of activity form. For example, the San Diego region represents seven percent of the state's green manufacturing employment but 19 percent of the state's manufacturing jobs in Water & Wastewater.

The Bay Area is a clear leader in green manufacturing employment in the green segments of Energy Infrastructure (91% of total green manufacturing jobs in California), Advanced Materials (80%), and Recycling & Waste (46%). The Los Angeles region is a leader in green manufacturing employment in Energy Storage (49%), while the Inland Empire is a leader in Green Building (39%).

FIG 39. GREEN MANUFACTURING EMPLOYMENT BY SEGMENT / 2008

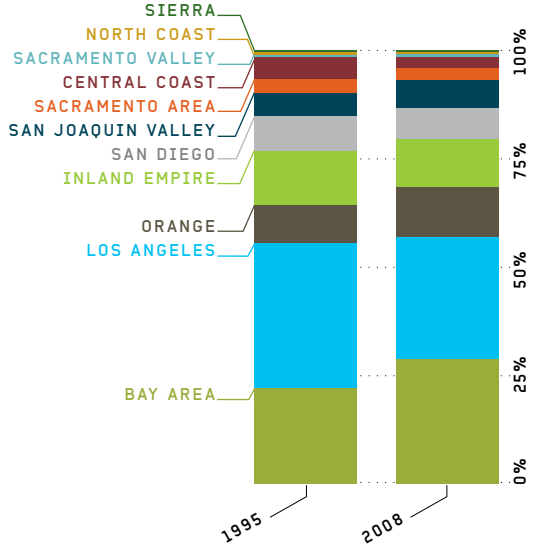


NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: Green Establishment Database. Analysis: Collaborative Economics

California's green manufacturing employment is distributed across the state and more so than traditional manufacturing. As the state's traditional manufacturing base, the Los Angeles region holds more manufacturing jobs than any other region with 32 percent of total manufacturing jobs in 2008. In green manufacturing, Los Angeles and the Bay Area host the largest employment, each with nearly 10,000.

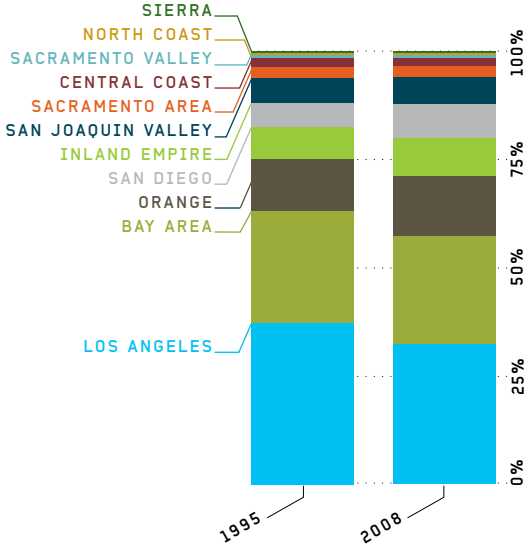
From 1995 to 2008, green manufacturing job growth varied regionally and by green segment. The Bay Area experienced the largest increase in jobs with a 55 percent increase, a gain of more than 3,400 manufacturing jobs. Notable changes in specific green segments include an increase in jobs in Manufacturing & Industrial Support (894%), Green Building (430%) and about a job gain of about 1,770 in Energy Efficiency. Also adding a significant number of green manufacturing jobs was the Orange County with approximately 1,360 jobs, an increase of 54 percent. The largest green segment job gains in Orange County during the same time period were in Transportation (approximately 770 additional jobs). Orange County's workforce more than tripled in Transportation, Manufacturing & Industrial Support, Green Building, and Energy Storage. The San Joaquin region grew 38 percent, adding around 590 green manufacturing jobs. The largest growth in jobs occurred in Transportation, with an increase of 260, where jobs approximately tripled.

FIG 40. GREEN MANUFACTURING EMPLOYMENT REGIONAL DISTRIBUTION



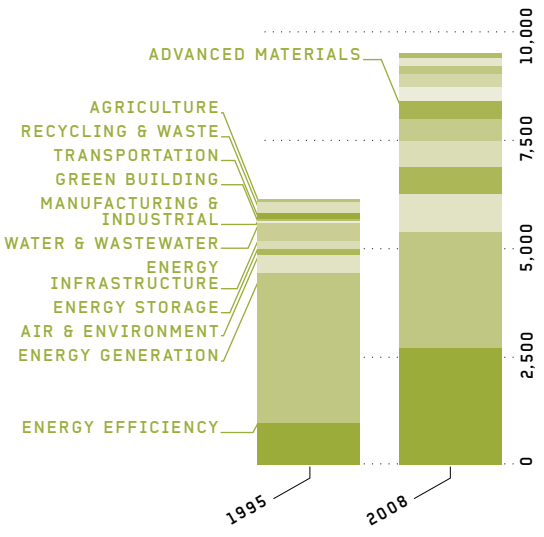
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 41. TOTAL MANUFACTURING EMPLOYMENT REGIONAL DISTRIBUTION



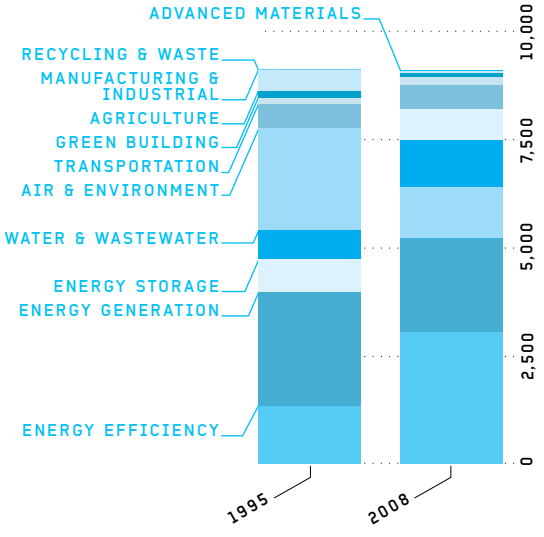
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 42. GREEN MANUFACTURING EMPLOYMENT BAY AREA



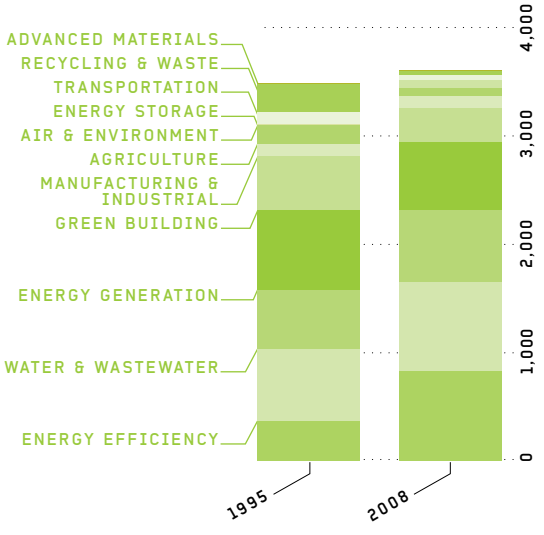
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 43. GREEN MANUFACTURING EMPLOYMENT LOS ANGELES REGION



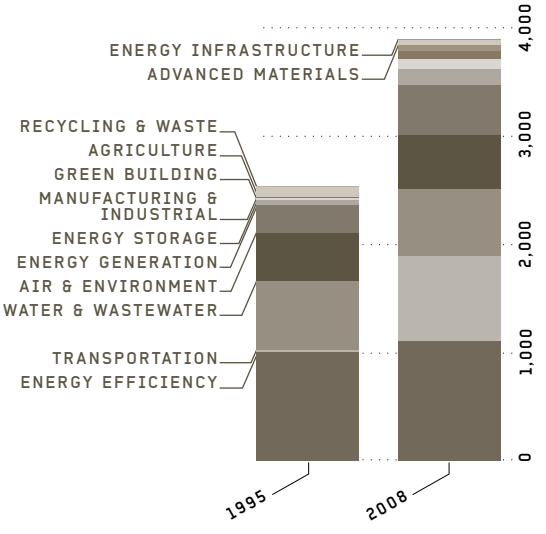
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 44. GREEN MANUFACTURING EMPLOYMENT INLAND EMPIRE



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 45. GREEN MANUFACTURING EMPLOYMENT ORANGE



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

Nearly all regions experienced growth in green manufacturing employment from 1995 to 2008, and those that witnessed net losses also saw growth in specific segments. Net losses were primarily due to falling production in Air & Environment and were experienced in the Central Coast (down 44%), the North Coast (down 14%), and Los Angeles (down less than 1%). Despite a slight overall contraction in green manufacturing jobs in the Los Angeles region, their Energy Efficiency segment grew by 126 percent, adding about 1,750 jobs. The Central Coast also experienced strong growth in Energy Efficiency. Manufacturing jobs grew 300 percent in Green Building in the North Coast.

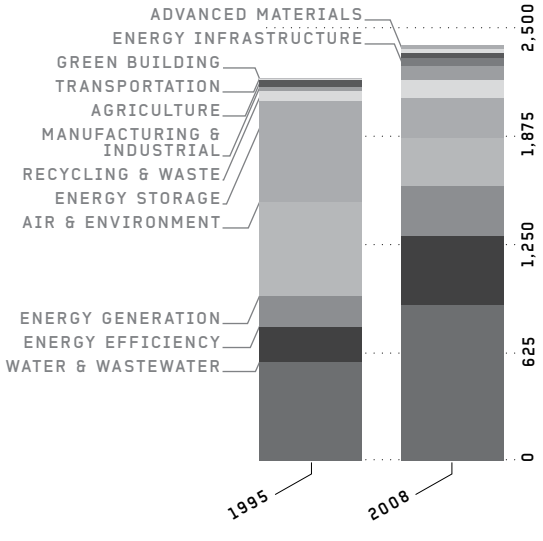
PHILIPS LUMILEDS

Philips Lumileds is a San Jose based global leader in high-volume power LED manufacturing. The company began as a division of Hewlett-Packard and was fully acquired by Philips in 2005, after Philips acquired the interest of Agilent Technologies. Lumileds maintains both manufacturing and R&D operations in San Jose. Philips Lumileds LED lights are superior to traditional incandescent lighting options in that they provide reduced heat generation and a longer lifespan, resulting in a smaller carbon footprint. LED innovation is applied to various sectors of lighting needs including automotive lighting, computer displays, signaling and signage, and general lighting.

"Company Overview." Web. May 17, 2010. http://www.philipslumileds.com/corporate/

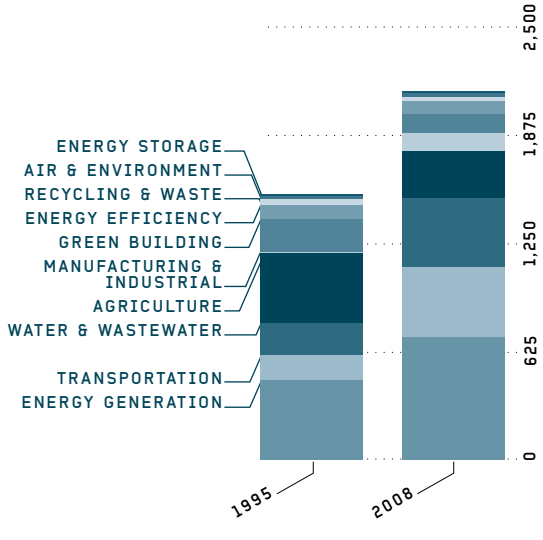
"LED Manufacturing." Web. May 17, 2010. http://www.philipslumileds.com/technology/manufacturing.cfm

FIG 46. GREEN MANUFACTURING EMPLOYMENT SAN DIEGO REGION



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 47. GREEN MANUFACTURING EMPLOYMENT SAN JOAQUIN VALLEY



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

HYDRANAUTICS

Hydranautics is a manufacturer of membrane separation products used in the water and wastewater treatment industry. Since 1987, the company has operated as a subsidiary of the Nitto Denko Corporation, a leader in the manufacturing of high-tech products using Polymer Synthesis Technology. Hydranautics is headquartered in Oceanside, California, where it also operates a 160,000 square foot manufacturing facility on 14 acres.

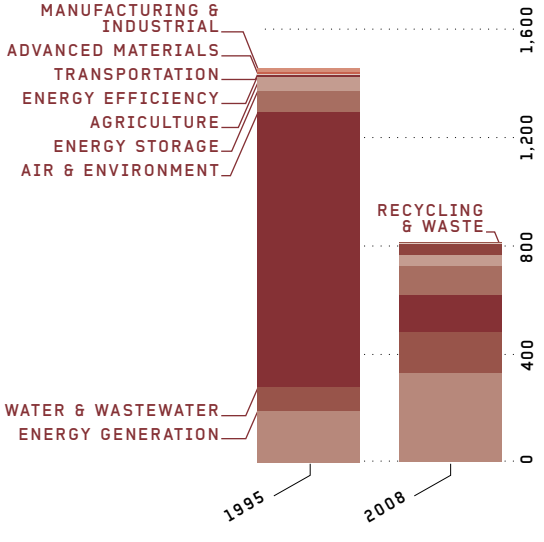
Membrane products manufactured at Hydranautics have applications in the following uses: potable water, industrial process water, wastewater treatment, surface water treatment, seawater desalination, electric rinse water, agricultural irrigation and pharmaceuticals.

"About Us." Web. May 17, 2010. http://www.membranes.com/index.php?pagename=history

The largest green manufacturing employment gains in the Inland Empire and Sierra regions were in Energy Efficiency. For the remaining regions, Green Building contributed the most to job growth in the Sacramento Area. Agriculture Support represented 87 percent of the total green manufacturing job increase in the Sacramento Valley from 1995 to 2008, and Waste & Wastewater added about 330 jobs in the Sierra region during the same time.

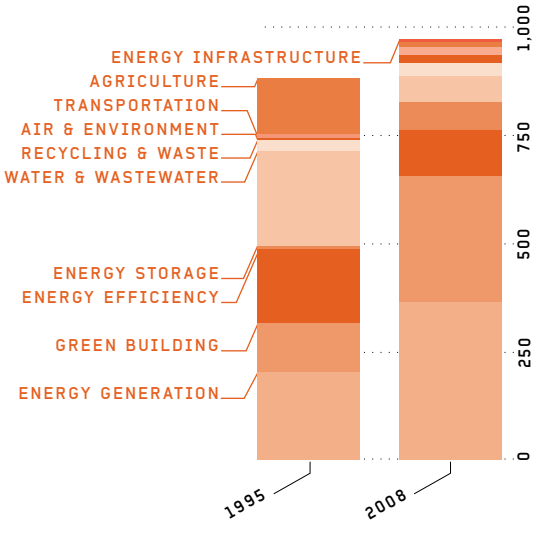
In conclusion, manufacturing in California's green economy is growing and distributed across the state. The diversity of business activities across the state offers a good base for business growth as well as growing occupational opportunities even outside of the state's metropolitan centers.

FIG 48. GREEN MANUFACTURING EMPLOYMENT CENTRAL COAST



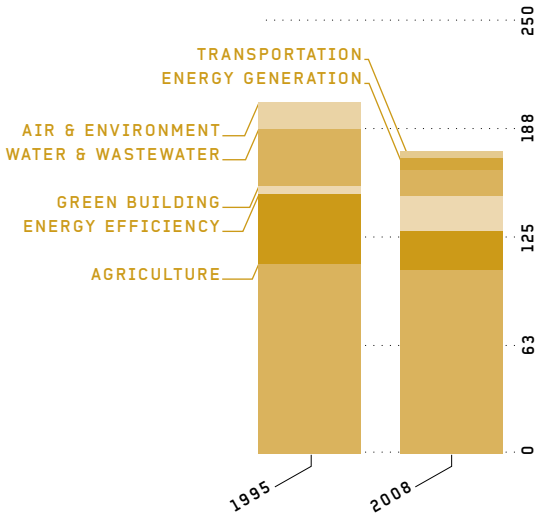
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 49. GREEN MANUFACTURING EMPLOYMENT SACRAMENTO AREA



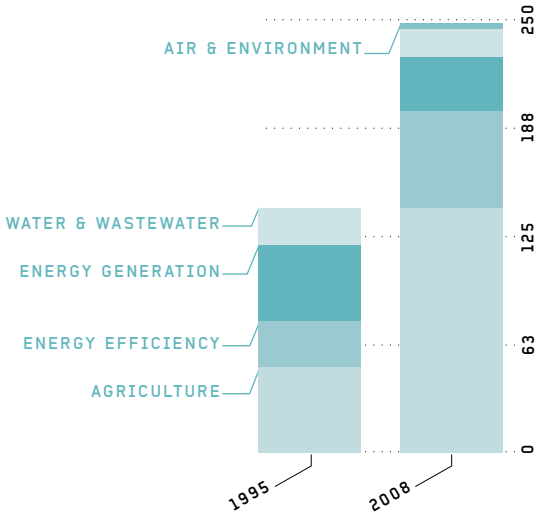
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 50. GREEN MANUFACTURING EMPLOYMENT NORTH COAST



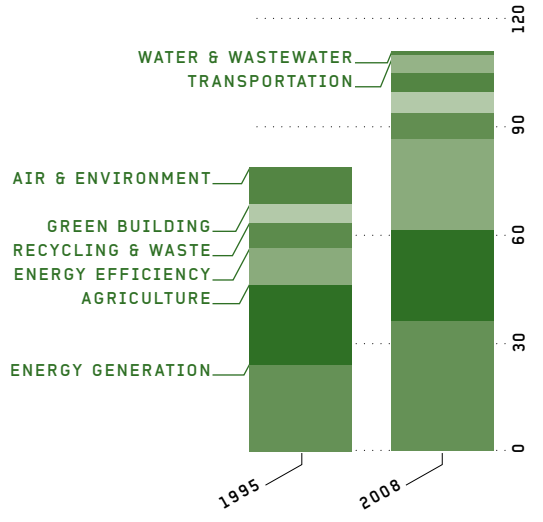
NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 51. GREEN MANUFACTURING EMPLOYMENT SACRAMENTO VALLEY



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

FIG 52. GREEN MANUFACTURING EMPLOYMENT SIERRA REGION



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX.
Data Source: Green Establishment Database
Analysis: Collaborative Economics

SOLYNDRA, INC.

Solyndra Incorporated is a designer and manufacturer of photovoltaic systems for the commercial and rooftop markets as well as hardware for system installations. Systems provide simple mounting and installation, resulting in low per watt installation costs.

Solyndra's proprietary cylindrical thin-film modules are currently manufactured in a 300,000 square-foot complex in Fremont, California. In September of 2009, the company commenced construction of a second fabrication plant located near its current facility.

"Solyndra Breaks Ground on New 500 Megawatt Solar Plant." Web. May 17, 2010. http://www.solyndra.com/News/Press-Release-090409

THE FIFTEEN SEGMENTS OF THE CORE GREEN ECONOMY

GREEN SEGMENT	DESCRIPTION	
Energy Generation	• Renewable energy generation (all forms of solar, wind, geothermal, biomass, hydro, marine & tidal, hydrogen, co-generation) • Research & Testing in renewable energy	• Renewable energy consulting services • Associated equipment, controls, and other management software and services
Energy Efficiency	• Energy conservation consulting and engineering • Building efficiency products and services • Energy efficiency research	• Alternative energy appliances (solar heating, lighting, etc.) • Energy efficiency meters & measuring devices
Transportation	•Alternative fuels (biodiesel, hydrogen, feedstock-neutral ethanol infrastructure)	• Motor vehicles & equipment (electric, hybrid, and natural gas vehicles, diesel technology)
Energy Storage	• Advanced batteries (e.g. Li-Ion, NiMH) • Battery components & accessories	• Fuel cells
Air & Environment	• Environmental consulting (environmental engineering, sustainable business consulting)	• Emissions monitoring & control • Environmental remediation
Recycling & Waste	• Consulting services • Recycling (paper, metal, plastics, rubber, bottles, automotive, electronic waste and scrap)	• Recycling machinery manufacturing • Waste treatment
Water & Wastewater	• Water conservation (control systems, meters & measuring devices) • Development and manufacturing of pump technology	• Research and testing • Consulting services • Water treatment & purification products/services
Agriculture Support	• Sustainable land management and business consulting services	• Sustainable supplies and materials • Sustainable aquaculture
Research & Advocacy	• Organizations and research institutes focused on advancing science and public education in the areas of: renewable energy and alternative fuels and transportation.	
Business Services	• Environmental law legal services • Green business portals	• Green staffing services • Green marketing and public relations
Finance & Investment	• Emission trading and offsets • Venture capital and private equity investment	• Project financing (e.g. solar installations, biomass facilities, etc.)
Advanced Materials	• Bioplastics	• New materials for improving energy efficiency
Green Building	• Design & construction • Building materials	• Site management • Green real estate & development
Manufacturing & Industrial Support	• Advanced packaging • Process management and consulting	• Industrial surface cleaning
Energy Infrastructure	• Consulting and management services	• Cable & equipment

ENDNOTES

[1] California Energy Commission. "Options for Energy Efficiency in Existing Buildings." December 2005

[2] California Air Resources Board. "Trends in California Greenhouse Gas Emissions for 2000 to 2008 – by Category as Defined in the Scoping Plan." May 28, 2010. As for other factors behind the variability in the recent years, the peak in 2004 is due primarily to the low snowpack that year. Because of the limited capacity for hydroelectric generation, more power was generated by natural gas or coal plants. At the end of 2005, a coal plant located in Nevada and serving Southern California was shut down, and replacement power came from an in-state natural gas plant.

[3] California Air Resources Board. "Staff Report: California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit." November 16, 2007

[4] The California Integrated Waste Management Board began using a simpler, quicker and more precise per capita disposal measurement system as of 2007 in accordance with Chapter 343, States of 2008 (Wiggins, SB 1016). The new disposal indicator uses the population of a jurisdiction and the quantity of disposal as reported by disposal facilities to calculate the per capita disposal rate.

[5] *2008 California Green Innovation Index*, pg 14-15.

[6] "USPTO to fast track patent applications covering 'green' technologies." IP Spotlight. December 8, 2009. http://ipspotlight.com/2009/12/08/uspto-to-fast-track-patent-applications-covering-green-technologies/

[7] California Air Resources Board. "Trends in California Greenhouse Gas Emissions for 2000 to 2008— by Category as Defined in the Scoping Plan." May 28, 2010

[8] Global prices for photovoltaic modules began to rise from 2003 to 2006 with increasing demand driven by the implementation of feed-in tariffs in Germany and Spain. Rising prices were also attributed to market imbalences for polysilicon between 2004 and 2008. "Higher prices were sustained until the third quarter of 2008 when the global recession reduced demand, polysilicon supply constraints eased, and module supply increased. For the first time since 2003, average module prices declined to $3.65/W, down from approximately $4/W in 2007 (in real 2008$)." See page 72 in: U.S. DOE Energy Efficiency and Renewable Energy. "2008 Solar Technologies Market Report." January 2010.

[9] California Public Utilities Commission. "CPUC California Solar Initiative: 2009 Impact Evaluation Final Report." June 2010

[10] According to the U.S. Energy Information Administration (EIA), the 62 percent drop is due primarily to the doubling of industrial customers between the years of 2000 and 2001 without a corresponding doubling in consumption. The EIA was unclear about the sudden growth in industrial consumers; however, representatives from the California Energy Commission (CEC) suggest that in connection with the deregulation that disrupted the state's energy markets between 2000 and 2001, there was a definitional change for industrial customers and that the drop in average monthly bills is closer to 4-10 percent than the 62 percent drop reported by the EIA.

[11] For more information, see Next 10's *Untapped Potential of Commercial Buildings: Energy Use and Emissions,* July 2010. (http://next10.org/next10/publications/untapped_potential.html)

[12] The finding that migration of "Energy Intensive" and "Other" industries is relatively insignificant compared to firm openings and closings parallels the work of Jed Kolko, David Neumark, Junfu Zhang, and Brandon Wall at the Public Policy Institute of California (PPIC). The 2005 "Are Businesses Fleeing the State? Interstate Business Relocation and Employment Change in California" by Neumark, Zhang, and Wall found that establishment loss peaked at -0.05 percent between 1992 and 2002, while Kolko and Neumark's 2007 *Business Location Decisions and Employment Dynamics in California* found that job losses due to business relocation averaged approximately -0.06 percent between 1992 and 2004. These numbers are similar to the findings that net migration of establishments between 1995 and 2008 averaged -0.03 percent for both Energy Intensive and Other industries while net migration of jobs averaged -0.05%.

APPENDIX

DASHBOARD INDICATORS

THE CARBON ECONOMY

Total California Greenhouse Gas Emissions Greenhouse gas emissions data are from the California Air Resources Board's *California Greenhouse Gas Inventory—by Sector and Activity.* The Greenhouse Gas (GHG) Inventory provides estimates of the amount of GHGs emitted to the atmosphere by human activities within California. The inventory includes estimates for carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), which are often referred to as the "six Kyoto gases", and nitrogen trifluoride (NF3).

The current (May 2010) GHG inventory covers years 2000 to 2008. The emissions estimates are statewide estimates that rely primarily on state, regional or national data sources, rather than individual facility-specific emissions. As estimates are refined to include additional years and improved estimation methods, new editions of the inventory are released. GHG emissions for the years 1990 through 1999 are from the archived 1990-2004 GHG inventory published in November 2007, which provided the basis for developing the 1990 statewide emissions level and 2020 emissions limit required by A.B. 32.

GHG Emissions and Gross Domestic Product *See the appendix entry for Total California Greenhouse Gas Emissions.* GDP data are real GDP by state (millions of chained 2000 dollars), from the U.S. Department of Commerce, Bureau of Economic Analysis. The California Department of Finance's "Revised County Population Estimates, 1970-2008, December 2008" was used to calculate per capita figures.

The Carbon Economy *See the appendix entry for Total California Greenhouse Gas Emissions.* GDP data are real GDP by state (millions of chained 2000 dollars), from the U.S. Department of Commerce, Bureau of Economic Analysis.

GHG Emissions in California and Other States Emissions data are from "CO2 Emissions from Fossil Fuel Combustion—Million Metric Tons CO2 (MMTCO2)," calculated by the Environmental Protection Agency based on Energy Information Administration, U.S. Department of Energy data. EPA developed state-level CO2 estimates using (1) fuel consumption data from the DOE/EIA State Energy Data 2007 Consumption tables and (2) emission factors from the U.S. Emissions Inventory 1990 – 2007. EPA's data may differ slightly from state-authored inventories because of methodological differences, including scope of coverage, underlying data, emission factors and assumptions. The California Department of Finance's "Revised County Population Estimates, 1970-2008, December 2008" was used to calculate per capita figures for California. Population estimates from the U.S. Population Division, U.S. Census Bureau were used to compute per capita figures for other states and the rest of the U.S.

The Carbon Economy in California and Other States Emissions data are from "CO2 Emissions from Fossil Fuel Combustion—Million Metric Tons CO2 (MMTCO2)," calculated by the Environmental Protection Agency based on Energy Information Administration, U.S. Department of Energy data. EPA developed state-level CO2 estimates using (1) fuel consumption data from the DOE/EIA State Energy Data 2007 Consumption tables and (2) emission factors from the U.S. Emissions Inventory 1990-2007. EPA's data may differ slightly from state-authored inventories because of methodological differences, including scope of coverage, underlying data, emission factors and assumptions. The California Department of Finance's "Revised County Population Estimates, 1970-2008, December 2008" was used to calculate per capita figures for California. Population estimates from the U.S. Population Division, U.S. Census Bureau were used to compute per capita figures for other states and the rest of the U.S. Gross Domestic Product data come from the Bureau of Economic Analysis, U.S. Department of Commerce, "Real GDP by State (millions of chained 2000 dollars)."

GHG Emissions by Source *See the appendix entry for Total California Greenhouse Gas Emissions.*

GHG Emissions by Detailed Source *See the appendix entry for Total California Greenhouse Gas Emissions.*

ENERGY EFFICIENCY

Energy Productivity Energy consumption data are from the U.S. Department of Energy, Energy Information Administration's State Energy Data System, *Consumption,*

Physical Units, 1960-2007 and *Table F20: Total Energy Consumption, Price, and Expenditure Estimates by Sector, 2008.* Total energy consumption includes all of the following sources: petroleum, natural gas, electricity retail sales, nuclear, coal and coal coke, wood, waste, ethanol, hydroelectric, geothermal, solar, and wind energy. GDP data are real GDP by state (millions of chained 2000 dollars), from the U.S. Department of Commerce, Bureau of Economic Analysis. To calculate savings between California and the rest of the U.S., GDP data was adjusted into first half 2009 dollars, using the U.S. city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics.

Total Energy Consumption Relative to 1970 Energy consumption data are from the U.S. Department of Energy, Energy Information Administration's State Energy Data System, *Consumption, Physical Units, 1960 – 2007* and *Table F20: Total Energy Consumption, Price, and Expenditure Estimates by Sector, 2008.* Total energy consumption includes all of the following sources: petroleum, natural gas, electricity retail sales, nuclear, coal and coal coke, wood, waste, ethanol, hydroelectric, geothermal, solar, and wind energy. To compute per-capita values, "Revised County Population Estimates, 1970 – 2008, December 2008" from the California Department of Finance for California and annual population estimates from the U.S. Census Bureau's Population Division were used for the Rest of the United States.

Electricity Consumption Relative to 1990 Electricity consumption data are from the U.S. Department of Energy, Energy Information Administration, *Current and Historical Monthly Retail Sales, Revenues and Average Revenue per Kilowatthour by State and by Sector (Form EIA-826).* Consumption does not include self-generation, just the amount of electricity sold to end users. The California Department of Finance's "Revised County Population Estimates, 1970 – 2009, December 2009" was used to calculate per capita figures.

California Waste Disposal per Capita Data are provided by the California Integrated Waste Management Board and the State of California, Department of Finance. California statewide disposal figures are reported as annual figures and daily estimates are calculated according to a 365 day calendar. Pursuant with Chapter 993, Statutes of 2002 (Chavez, AB 2308), disposal figures exclude waste processed at three inert mine—reclamation facilities in Southern California from 2001 to 2005. Beginning in 2006, disposal excludes waste sent to two of these facilities—representing roughly two percent of diversion. Starting in 2007, the California Integrated Waste Management Board adopted a new per capita disposal measurement system (Chapter 343, Statutes of 2008 [Wiggins, S.B. 1016]) to make the process of goal measurement as established by the Integrated Waste Management Act of 1989 (A.B. 939) simpler, more timely, and more accurate. SB 1016 builds on AB 939 compliance requirements by implementing a simplified measure of jurisdictions' performance. SB 1016 accomplishes this by changing to a disposal-based indicator—the per capita disposal rate—which uses only two factors: a jurisdiction's population (or in some cases employment) and its disposal as reported by disposal facilities.

GREEN TECHNOLOGY INNOVATION

Venture Capital Investment in Clean Technology and Total Investment Clean technology venture capital investment data is provided by Cleantech Group,™ LLC (www.cleantech.com) and includes disclosed investment deals. Data for total annual venture capital investment is provided by PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, Data: Thomson Reuters. Data is adjusted into first-half 2009 dollars, using the U.S. city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics.

VC Investment in Clean Technology by Segment & VC Investment in Clean Technology by Segment Data are provided by Cleantech Group,™ LLC (www.cleantech.com) and includes disclosed Cleantech investment deal totals. Data is adjusted into first-half 2009 dollars, using the U.S. city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics. The San Diego region is comprised of San Diego County; the Los Angeles region includes Los Angeles and Orange Counties; the San Francisco region contains the ten county Bay Area region; and Silicon Valley is comprised of San Mateo County, Santa Clara County, Scotts Valley, Freemont, Newark and Union City.

Venture Capital and Public Investment in Clean Technology Data is from the Cleantech Group,™ LLC and the Independent Recovery Transparency and Accountability Board. Public investment data measures energy funds that have been formally committed to a program in California by the federal government.

Green Technology Patents 1790 Analytics developed and performed the search of detailed U.S. Patent data from the U.S. Patent & Trade Office based on search criteria defined by Collaborative Economics for the eight technology areas: solar, wind, hydro and geothermal energy generation, energy storage, fuel cells, hybrid systems and energy infrastructure.

TRANSPORTATION

Alternative Fuel Vehicles Alternative fuel vehicle data are provided by R.L. Polk & Co. and includes newly registered vehicles for new and used vehicles.

Total Number of Alternative Fuel Vehicles Registered Data are from the California Energy Commission, compiled using vehicle registration data from the California Department of Motor Vehicles. Alternative fuel vehicles include hybrid and electric vehicles as well as vehicles running on natural gas.

Alternative Fuel Consumption as a Percentage of Total Transportation Alternative Fuel Consumption data is provided by the Coal, Nuclear and Renewables Division of the Energy Information Administration (EIA) in Table C4, "Estimated Consumption of Alternative Fuels by State and Fuel Type." Motor Gasoline data is collected from the EIA State Energy Data System (SEDS); the SEDS series used in this indicator is identified as MGACP, "Motor gasoline consumed by the transportation sector." As SEDS petroleum data is provided in 'Thousand barrels', this data was converted to gallons using 42 gallons per barrel.

Consumption of Gasoline and Alternative Fuels *See the appendix entry for Alternative Fuel Consumption as a Percentage of Total Transportation.*

California Vehicle Miles of Travel Vehicle Miles Traveled (VMT) is defined as total distance traveled by all vehicles during selected time period in geographic segment. VMT estimates for 1995 – 2007 are from the California Department of Transportation's "2008 California Motor Vehicle Stock, Travel, and Fuel Forecast." VMT data for 2008 is from the California Department of Transportation's, Highway Performance Monitoring System's "2008 California Public Road Data."Data includes annual statewide total VMT on State highways and non-state highways. In order to calculate VMT, Caltrans multiplies the road section length (length in miles along the centerline of the roadway) by Average Annual Daily Traffic (AADT). AADT are actual traffic counts that the city, county, or state have taken and reported to the California Department of Transportation. To compute per-capita values, "Revised County Population Estimates, 1970 – 2008, December 2008" from the California Department of Finance were used.

Trends in VMT and GHG Emissions from Surface Transportation VMT data are from the California Department of Transportation (see the appendix entry for California Vehicle Miles of Travel. GHG emissions data are from the California Air Resources Board's California Greenhouse Gas Inventory—by Sector and Activity. Surface Transportation emissions sources include passenger vehicles and heavy duty trucks.

Public Transit Use and Availability in California, by Transit Type Total number of passengers and total vehicle miles data are from the California State Controller's Office, "Transit Operators and Non-Transit Claimants Annual Report," Fiscal Years 1997 – 2008. The data in this annual report are based on unaudited reports submitted by various transit operators.

Transportation Map See the appendix entries for California Vehicle Miles of Travel; Public Transit Use and Availability in California, by Transit Type; and Alternative Fuel Vehicles.

Total Vehicles and GHG Emissions GHG emissions data are from the California Air Resources Board's California Greenhouse Gas Inventory—by Sector and Activity. Surface Transportation includes passenger vehicles and heavy duty trucks. Vehicle registration data are from the Federal Highway Administration, U.S. Department of Transportation, "Highway Statistics" 2000 – 2008, Table MV-1. Total number of vehicles are for all vehicles registered in California including cars, trucks, busses, and motorcycles.

RENEWABLE ENERGY

California Renewable Energy Generation California data is from the California Energy Commission, "Net System Power

Reports" 2002-2008, Table 2: 2008 Total System Power in Gigawatt Hours. Total system power is the sum of all in-state generation and net electricity imports by fuel type. Each year, the total-system-power mix changes, in part, because hydroelectric generation can significantly vary from year to year and other resources will make up the difference.

Percent of Total Energy Generation from Renewable Sources, by Type California data is from the California Energy Commission, "Net System Power Reports" 2002-2008, Table 2: 2008 Total System Power in Gigawatt Hours. Total system power is the sum of all in-state generation and net electricity imports by fuel type. Each year, the total-system-power mix changes, in part, because hydroelectric generation can significantly vary from year to year and other resources will make up the difference. U.S. Total energy generation data is from the Energy Information Administration, U.S. Department of Energy, "Table 1.1. Net Generation by Energy Source: Total (All Sectors), 1995 through June 2009." U.S. Renewable energy generation data is from the Energy Information Administration, U.S. Department of Energy "Table 3 Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 2004 – 2008" and "Table 1.11. Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 2002-2007." The State of California's definition of renewable energy does not include large-scale hydroelectric power. Since the Energy Information Administration does not differentiate between small and large-scale hydro, data represented here for the U.S. does not include any hydro. In 2007, all hydro represented 6% of total U.S. energy generation. According to the Bureau of Reclamation, U.S. Department of the Interior (Hydroelectric Powerplants Fiscal Year 2006 Generation) in 2006 small hydro accounted for 2% of total hydroelectric power generation.

New Solar Installations The California Solar Initiative (CSI) is part of the Go Solar California campaign, an unprecedented $3.3 billion ratepayer-funded effort that aims to install 3,000 MW of new grid-connected solar over the next decade and to transform the market for solar energy. CSI is overseen by the California Public Utilities Commission and provides incentives for solar system installations to customers of the state's three investor-owned utilities (IOUs): Pacific Gas & Electric, San Diego Gas & Electric (SDG&E) and Southern California Edison. The program tracks the solar capacity added, and the data selected for this indicator includes all completed projects from January 2007 through December 30, 2009.

Electricity Consumption Map *See the appendix entry for New Solar Installations.* Electricity consumption data are from the California Energy Commission's Energy Consumption Data Management System. Data represent retail sales of electricity to end-use customers. The California Department of Finance's "Revised County Population Estimates, 1970 – 2008, December 2008" was used to calculate per capita figures.

IOU Actual and Forecasted RPS Generation Data is from the California Public Utilities Commission "Renewables Portfolio Standard Quarterly Report," Third Quarter 2009.

FEATURE: THE CHANGING BUSINESS CLIMATE: IMPACTS & NEW OPPORTUNITIES

Statewide Electricity Bill as a Fraction of GDP Data used to calculate electricity bills are from *1990 – 2007 Number of Retail Customers by State by Sector (EIA-861), 1990 - 2007 Retail Sales of Electricity by State by Sector by Type of Provider (EIA-861), 1990 – 2007 Average Price by State by Type of Provider (EIA-861),* published by the Energy Information Administration, U.S. Department of Energy. Electricity Sales data for 2008 is from the EIA's "Table 5.4.B. Retail Sales of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through December 2008 and 2007." Electricity price data for 2008 is from EIA's "Table 5.6.B. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through December 2008 and 2007." Gross Domestic Product data come from the Bureau of Economic Analysis, U.S. Department of Commerce, "Real GDP by State (millions of chained 2000 dollars)." Electricity bills as a fraction of GDP were adjusted into first half 2009 dollars, using the U.S. city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics.

Average Monthly Electricity Bills: Residential, Commercial, & Industrial Data used to calculate electricity bills are from *1990 – 2007 Number of Retail Customers by State by*

Sector (EIA-861), 1990 – 2007 Retail Sales of Electricity by State by Sector by Type of Provider (EIA-861), 1990 – 2007 Average Price by State by Type of Provider (EIA-861), published by the Energy Information Administration, U.S. Department of Energy. Electricity bills were adjusted into first half 2009 dollars, using the U.S. city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics.

Electricity Purchases as a Percentage of Total Operating Expenses by Industry Data are provided by the U.S. Census Bureau, 1992, 1997, 2002 Economic Census, U.S. Census Bureau 2002 Service Annual Survey, and the U.S. Commerce Department, Bureau of Economic Analysis. Select Operating Expenses for California, Florida, New York, Texas, and the United States (1992, 1997) combines total compensation, total cost of materials, total capital expenditures, depreciation charges during year, and total rental payments because total operating expense data was not available on the state level. Total Operating Expenses for the United States (2002) were estimated directly by the U.S. Census Bureau. Manufacturing does not include publishing firms for 1992 data because of differences in SIC and NAICS classifications. This represents roughly a three percent difference in number of establishments counted in the Manufacturing industry. Private libraries are included in the Information industry estimates only when establishments have payrolls. Industry groupings are based on two-digit NAICS codes, except for the following: Trucking & Warehousing (48-49) excludes couriers & messengers, scheduled passenger transportation, rail transportation, oil pipelines, the post office, and other transportation services; Finance (52) consists only of securities & commodity contracts intermediations and brokerages; Professional, Scientific, & Technical Services (54) excludes office of notaries, landscape architectural services, & veterinary services; Administrative & Waste Services (56) excludes landscaping services; and Other Services excludes pet care services, religious organizations, and labor unions and similar labor organizations. U.S. Census Bureau does not provide data for agriculture, utilities, management of companies and enterprises, educational services, and public administration.

Electricity Purchases as a Percentage of Total Operating Expenses by Industry, Electricity Purchases as a Percentage of Total Operating Expenses in Manufacturing, Electricity Productivity in Manufacturing Data are provided by the U.S. Census Bureau, 1992, 1997, 2002, 2007 Economic Census & 2002 and 2007 Service Annual Survey. GDP data is from the U.S. Commerce Department, Bureau of Economic Analysis. Total Operating Expenses (1992, 1997, and 2007) combines total compensation, total cost of materials, total capital expenditures, depreciation charges during year, and total rental payments. Total Operating Expenses for the United States (2002) were estimated directly by the U.S. Census Bureau. Manufacturing does not include publishing firms for 1992 data because of differences in SIC and NAICS classifications. This represents roughly a three percent difference in number of establishments counted in the Manufacturing industry. Private libraries are included in the Information industry estimates only when establishments have payrolls. Industry groupings are based on two-digit NAICS codes, except for the following: Trucking & Warehousing (48-49) only includes subsectors Truck Transportation (484) and Warehousing and Storage (493); Professional, Scientific, & Technical Services (54) excludes office of notaries. Other Services excludes pet care services, religious organizations, and labor unions and similar labor organizations. U.S. Census Bureau does not provide data for agriculture, utilities, management of companies and enterprises, educational services, and public administration.

Business Establishment Churn Business churn describes the gross change in the number of business establishments due to openings, closings and migration. An establishment can be a business with a single location, or it can be a single unit of a multi-establishment firm. Over any time period, underlying any net change in business establishments are the total numbers of business openings, closings and migration. Also known as business dynamics, this type of analysis requires time-series information on individual businesses which is available with the National Establishment Time-Series Database (NETS), prepared by Walls & Associates using Dun & Bradstreet establishment data. Business churn analysis has been reported widely in regional and statewide analyses in California by Collaborative Economics and the Public Policy Institute of California.

The definition of "energy-intensive" and "other" industries is based upon the data presented in the "Electricity Purchases as a Percent of Total Operating Expenses by Industry" indicator. Energy-intensive industries are defined as industries where electricity purchases as a percent of total operating expenses is above the median (0.72%) represented in this dataset; energy intensive industries are Wholesale Trade, Manufacturing, Other Services, Arts, Entertainment & Recreation, Retail Trade, Mining, and Accommodation & Food Services. Given that state-level data is available only for Manufacturing, the electricity purchase and operating expense trends identified by industry at the national level was extended to California. Additionally, electricity purchases and operating expense data is not available for all industries; Utilities, Agriculture, Public Administration, Management Services, and Educational Services are excluded from this analysis while Trucking/ Logistics, Real Estate, and Finance are partially represented. Based upon this definition, the NAICS codes for "energy-intensive" and "other" industries was translated to SIC and the NETS Database was sourced establishment counts.

FEATURE: MANUFACTURING IN THE CORE GREEN ECONOMY

Green Business Establishments and Employment by Green Segment and by Establishment Type The accounting of green business establishments and jobs is based on multiple data sources for the classification of green businesses (such as New Energy Finance, Cleantech Group, LLC and others) and leveraged also a sophisticated internet search process. The National Establishments Time-Series (NETS) database based on Dun & Bradstreet establishment data was sourced to extract business information such as jobs. The operational definition of green is based primarily on the definition of cleantech defined by the Cleantech Network. This sample offers a conservative estimate of the industry in California. See Next 10's *Many Shades of Green* (2009, 2010 forthcoming) for a detailed analysis of the diversity and distribution of California's growing green economy.

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California Integrated Waste Management Board

California Public Utilities Commission

California Solar Initiative

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Energy Information Administration

Federal Highway Administration

Independent Recovery Transparency and Accountability Board

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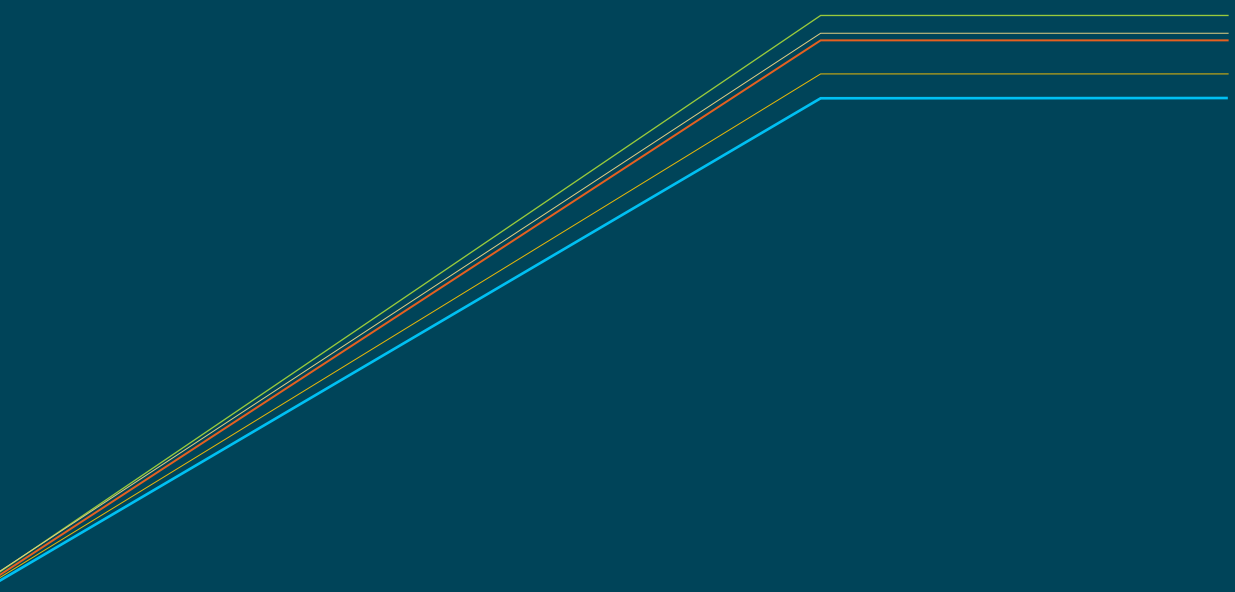

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