



## Clean Energy and Climate Change Summary of Analyses for California (2009 to present)

### 2016 California Green Innovation Index, International Edition

By Next 10 – June 2016

Findings for California include:

- Solar generation and zero emission vehicle adoption rates have increased dramatically in California – 1,378 percent in just 5 years for solar generation and 244 percent in two years for ZEV registrations – signaling major market disruption as clean energy technology hotspots take root across California.
- The state's top region for commercial and residential solar power is Riverside-San Bernardino-Ontario, while Fresno is number one for industrial solar power.
- As of 2014, renewable energy sources served 25 percent of California's retail electricity sales, and generated 20.1 percent of California's total electricity up from 12 percent in 2009.
- Internationally, California maintains its ranking as 4<sup>th</sup> in the world for the share of electricity generated from renewable sources.



### Advanced Energy Jobs in California 2016

By Advanced Energy Economy – April 2016



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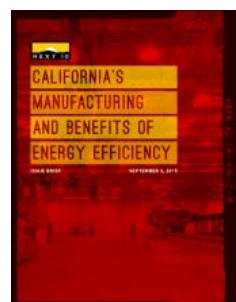
At just over 500,000 workers, advanced energy employs three times as many Californians as the motion picture, TV, and radio industry; more than agriculture, forestry, and fishing; and approaching construction. With 1 in every 5 advanced energy workers nationwide, California has the largest advanced energy industry by employment of any state in the country.

Employment in California's advanced energy industry grew 18% last year, six times the rate of statewide employment growth. Employers engaged in advanced energy business also expect to increase their workforce by 8% this year.

### California's Manufacturing and Benefits of Energy Efficiency

By Next 10 – September 2015

The report finds that California generates \$59 in GDP for every dollar spent on electricity, compared to \$38 for the rest of the nation, leading every other state except Connecticut. At the same time California continues to generate the most manufacturing output, jobs and exports of any state in the U.S. Energy policies designed to promote efficiency and reduce energy bills are contributing to the state's manufacturing success. Further, Californians on average spend less on total electricity bills than the rest of the nation, due the state's strong track record in energy



efficiency.

## [Achieving California's Greenhouse Gas Goals: A Focus on Transportation](#)

By Next 10 – August 2015

Current policies are technologically feasible but limited incentives, unfunded mandates, and other factors may create barriers to implementation. Specific recommendations to address these barriers in order to achieve greenhouse gas emissions reduction goals beyond 2020 include:



- Increasing certainty around emission reductions, fuel costs and overall travel costs by assessing policy price signals and their impact on consumer behavior.
- Supplying resources to support the implementation of the state's smart growth law, SB 375, and creating enforcement mechanisms.
- Designing policies with long-term reduction goals in mind.
- Seeking regulatory harmonization with other states that have adopted low carbon fuel standards and other carbon mitigation programs.

## [2015 California Green Innovation Index, International Edition](#)

By Next 10 – May 2015

Findings for California include

- Ranks among top 10 nations worldwide in total renewable energy generation, share of electricity from renewable sources, highest energy productivity and lowest carbon intensity (emissions per GDP).
- World's second least carbon-intensive economy. For every dollar of goods and services, California emits less carbon than any nation except France.
- #5 in the world in energy productivity (GDP relative to total energy consumption).
- For every unit of energy, the state produced \$268 billion GDP, compared to U.S. \$164 billion GDP.
- Attracted half (\$5.7 billion) of clean tech global venture capital investment (2014)—second only to the U.S. as a whole. 153 percent increase in investment between 2013 and 2014.
- Cut electricity use per capita by four percent and total energy use per capita by 19.5 percent (1990—2012).
- Cut GHG emissions per capita 25 percent (1990-2012) and increased GDP per capita 37 percent—the U.S. (with California) cut emissions per capita 17 percent and increased GDP per capita 37 percent.



## [California Climate Policy to 2050: Pathways for Sustained Prosperity](#)

By Next 10 – April 2015

- The policy scenario reflecting the most ambitious 2030 emissions cap produces the greatest overall positive economic impact, generating about one million more jobs and nearly 6 percent more GSP (\$338 billion) by 2050. This policy pathway includes a cap and trade program, a 50 percent renewable energy portfolio by 2030, carbon mitigation credits, a moderate electric vehicle adoption rate, and trend improvements in energy efficiency.
- The state can achieve its 2050 carbon emission reductions goals—even under the least ambitious cap and trade program analyzed—with a carbon mitigation credit program offering some out-of-state mitigation credits that are verifiable, additional, and tradable.



## [E2 Advanced Biofuels Market Report 2014](#)

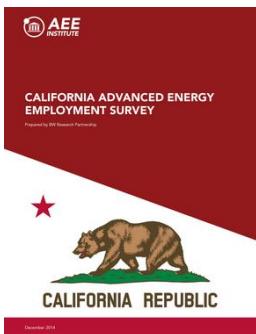
By Environmental Entrepreneurs – January 2015



- Capacity in 2014 is approximately 800 million gallons gasoline equivalent.
- Capacity in 2017 may reach over 1.7 billion gallons gasoline equivalent 165 facilities planned, under construction, or operating from 180 companies.
- Nearly \$4 billion in private investment into active advanced biofuel producers and value-chain companies since 2007 and \$200 million in new private investments since E2's last report.
- Over \$848 million in grants to advanced biofuel producers since 2007.



[E2 ADVANCED BIOFUEL MARKET REPORT 2014](#)



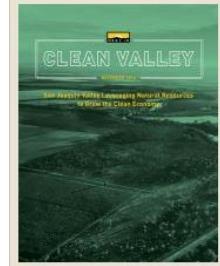
## [California Advanced Energy Employment Survey](#)

By Advanced Energy Economy Institute – December 2014

- California is the nation's most populous state and the nation's leader in policies to promote secure, clean, affordable energy. It should be no surprise that California has a large and growing advanced energy economy as a result.
- This first-time survey finds that the Golden State is home to more than 40,000 businesses serving advanced energy markets, spanning the entire value chain and including a wide range of energy technologies that address both supply and demand.
- Advanced energy employment in the state is currently 431,800, an increase of 5% over last year. Employers are optimistic about the future as well, with about half of all firms expecting to add employees during the coming year, for more than 70,000 new jobs – a 17% projected increase.

## 2014 California Clean Tech Reports

By Next 10 – November 2014



Next 10 released a series of five studies touting the progress of the California clean tech economy:

- [San Joaquin Valley](#)
- [Los Angeles and Orange County](#)
- [San Diego and Imperial County](#)
- [Sacramento](#)
- [Bay Area](#)

## [Clean Energy Works For Us: Second Quarter 2014 Report](#)

By Environmental Entrepreneurs (E2)



- More than 12,500 clean energy and clean transportation jobs and clean transportation were announced in 29 states in the second quarter of 2014. This is more than twice the number of jobs announced in the first quarter of the year.
- When transportation fuels are included under California's landmark clean energy and climate law, AB 32, beginning in January 2015, E2 expects to see more job announcements in the clean vehicles sector.
- California is a top state for clean energy jobs with more than 2,512 CA clean energy/transportation jobs announced in the second quarter.

## 2014 California Green Innovation Index

By Next 10 – May 2014

- California's overall renewable generation grew 56 percent between 2002 and 2012 and the state reached a new high in its renewable electricity share in 2012, producing 15.4 percent of total electricity generation, about three times the percentage of the U.S. as a whole.
- California's state electricity bill share of GDP was 0.47 percentage points less than Texas in 2012, which can be attributed to the state's nation-leading energy efficiency profile.
- California is among the most efficient, least carbon-intensive economies in the world, with per capita greenhouse gas emissions dropping by 17 percent since 1990.
- Between 2011 and 2012, registrations of zero emission vehicles (ZEVs) increased 62 percent between 2011 and 2012 to a total of about 34,500.
- California's overall clean economy continues to create new jobs and business opportunities across diverse sectors, ranging from water efficiency and recycling to energy and battery technologies. Between January 2002 and January 2012, employment in the state's Core Clean Economy jumped 20 percent to reach nearly 196,000. During the same time period, jobs in the larger overall state economy grew by two percent.



## California's Low Carbon Fuel Standard: Compliance Outlook & Economic Impacts

By CalETC and other partners

[April 2014 – Phase 2 – June 2013 – Phase 1](#)



The objective of this two-part study from ICF International was to examine the economic impacts of Low Carbon Fuel Standard (LCFS) compliance, and the co-benefits. Highlights:

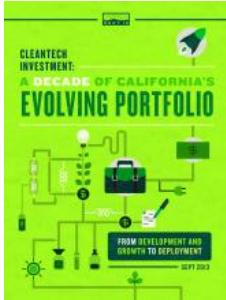
- By spurring greater use of clean alternative fuels and vehicles, the LCFS will result in \$1.4 – \$4.8 billion in societal benefits by 2020 from reduced air pollution and increased energy security
- The LCFS could create as many as 9,100 new jobs for California. This number could be higher, particularly if the state attracts more clean fuel production facilities and technology providers
- The LCFS is likely to lower the average price of transportation fuels and bring greater stability to fuel prices in response to fluctuating crude oil prices, as the number of competitors selling in the wholesale fuel market increases as well as the diversity of fuel types
- The LCFS is driving investment in low carbon biodiesel, ethanol, renewable diesel, biogas, and electricity

## Clean Energy Works For Us: 2013 Year-In-Review and Q4 Report

By Environmental Entrepreneurs (E2) – March 2014



- More than 78,600 clean energy and clean transportation jobs were announced in 2013.
- California topped the list of states for the second consecutive year, with more than 15,000 jobs announced at more than 40 projects.
- Sectors with strong growth included advanced biofuels, solar, and public transportation.



## Cleantech Investment: A Decade of California's Evolving Portfolio

By Next 10 – September 2013

This report summarizes that the clean technology (cleantech) sector is a vital part of the economy, generating new jobs and businesses while making California's transition toward a cleaner and more efficient economy possible.

## Clean Energy Jobs Quarterly Report: Q4 2012 and the year in review

By Environmental Entrepreneurs (E2) – March 2013

This report documents the growth of the clean energy sector. Based on new hiring by companies, cities, and organizations, the report shows that clean energy and clean transportation are helping drive innovation and job creation in America.



## 2013 California Green Innovation Index

By Next 10 and Collaborative Economics – March 2013

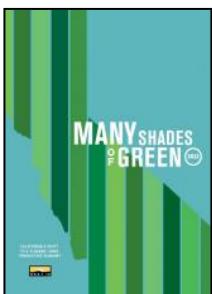
Next 10's California Green innovation index tracks the state's progress in reducing GHG emissions, generating technological and business innovation, and growing businesses and jobs that enable the transition to a more resource efficient economy as California adopts innovative energy and emissions policies.

## The West Coast Clean Economy: Opportunities for Investment & Accelerated Job Creation

By The Pacific Coast Collaborative – March 2012

This report was commissioned by the Pacific Coast Collaborative jurisdictions of California, Oregon, Washington and British Columbia. The report analyzes the economic growth and job creation potential within the region associated with the emerging clean economy. Key report highlights include:

- The clean economy is the single most important global opportunity on the medium-term horizon, with revenues expected to reach \$2.3 trillion by 2020.
- It is estimated that up to 1.03 million net new jobs can be created between 2010 and 2020.
- The high growth clean economy segments include: clean energy supply, clean transportation, energy efficiency and green building, environmental protection and resource management, and knowledge and support.



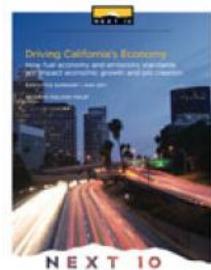
## Many Shades of Green: California's Shift to a Cleaner, More Productive Economy

By Next 10 – February 2012

The report examined data on green companies, job type, location, and growth across green industry sectors and regions throughout California.

## Driving California's Economy: How Fuel Economy and Emissions Standards Will Impact Economic Growth and Job Creation

By Next 10 -January 2012



- A cleaner, more efficient passenger vehicle fleet creates significant consumer savings that, when reinvested into local economies, offer a potent catalyst for economic growth.
- Increasing fuel economy and reducing emissions from passenger vehicles creates jobs across the economy, far beyond what are thought of as “green” sector and “green collar” jobs.
- When compared to California’s economic performance with no fuel economy or emissions standards, improving fuel economy 4-6 percent per year starting in 2017 would have the following impacts on California by 2025: 1) the addition of 38,000 to 236,000 jobs; 2) an increase in GSP of .82 percent to 1.31 percent; 3) a reduction of 8 percent to 19 percent of state GHG emissions

## Powering Innovation: California is Leading the Shift to Electric Vehicles from R&D to Early Adoption

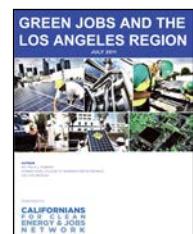
By Next 10 – December 2011



This report highlights research tracking key indicators that assess opportunities and obstacles for California in the EV sector. California captured 69 percent of global EV investment in 2011, ranks first in nation in EV patents, and EV jobs increase during downturn.

## Green Jobs and the Los Angeles Region

By Dr. Philip J. Romero, California State University, Los Angeles, Presented by Californians for Clean Energy & Jobs Network – July 2011



## Sizing the Clean Economy: A National and Regional Green Jobs Assessment

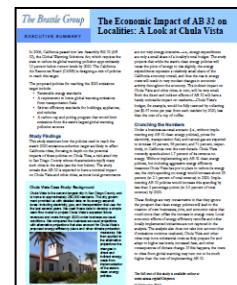
By the Metropolitan Policy Program, Brookings Institute – July 2011



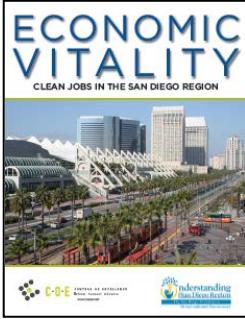
In this report, the Brookings Institute examines the nation’s major metropolitan areas and all 50 states and District of Columbia. The report explores the size, growth, and geography of 39 green economy segments. The report examined several regions in California, including Bakersfield, Fresno, Los Angeles, Modesto, Oxnard, San Francisco, Sacramento, San Diego, Sacramento, and Stockton.

## The Economic Impact of AB 32 on Localities: A Look at Chula Vista

By The Union of Concerned Scientists – December 2010



Looking at Chula Vista, a mid-sized city in San Diego County, the study examined how the policies used to reach the state’s 2020 emissions-reduction target are likely to affect California cities. The study revealed that AB 32 policies would have a minimal economic impact on Chula Vista and likewise, other cities, since most local governments are not very energy-intensive, spending a small share of the locality’s budget on energy expenditures. The direct and indirect effects of AB 32 will have a barely noticeable impact on Chula Vista’s budget, and would be fully restored by collecting just \$1.97 more per year from each resident by 2020, less than the cost of a cup of coffee.



## [Economic Vitality: Clean Jobs in the San Diego Region](#)

By The San Diego Foundation – December 2010

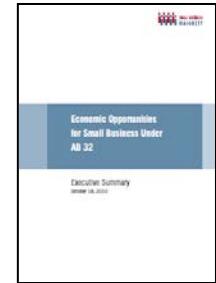
The San Diego region has become one of the fastest growing in California for clean jobs, attracting \$445 million in venture capital in the last five years alone. Other factors that have contributed this growth include state and local leadership in policies that create more opportunities for business development, local demand for installing renewable energy, and innovation in energy efficiency technologies. The study found that one in ten jobs are linked to industries that are helping the region become more energy independent, developing clean and efficient technologies, reducing pollution, and keeping energy costs low.

## Economic Opportunities for Small Business Under AB 32

By Small Business Majority – October 2010

[Summary](#) – [Full Report](#)

This report found that AB 32 provides opportunities for small businesses to gain a financial edge in the burgeoning clean energy sector, and lays the foundation for significant growth in many industries connected to it.



## [The Economic Opportunity from Clean Energy Jobs in California's San Joaquin Valley](#)

By Dr. Shawn Kantor, University of California, Merced, presented by the California Business Alliance for a Green Economy – October 2010



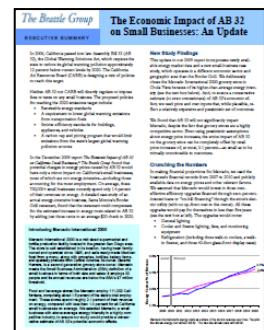
The report finds that clean energy projects slated for the San Joaquin Valley could bring more than 100,000 jobs and fundamentally change economic development and job creation in the region. With the state looking to the San Joaquin Valley to help satisfy its renewable energy needs, the Valley is well positioned for economic growth, attracting jobs in the cleantech and clean energy sectors.

## The Economic Impact of AB 32 on Small Business: An Update

By The Brattle Group – October 2010

[Summary](#) – [Full Report](#)

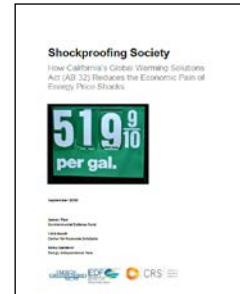
Brattle Group economists updated their 2009 report: *The Economic Impact of AB 32 on California Small Businesses*, which looked at how AB 32 is likely to impact small businesses across the state. The Mercado International 2000 grocery store in Chula Vista served as the case study for the 2010 update. The report reaffirmed its previous finding that AB 32 will not significantly impact small businesses. Despite how Mercado International is in the highly competitive grocery store sector, the impact of AB 32 could be completely offset by retail price increases of, at most, 0.1 percent—so small as to be virtually unnoticeable to customers.



## Shockproofing Society: How California's Global Warming Solutions Act (AB 32) Reduces the Economic Pain of Energy Price Shocks

By Energy Independence Now, Environmental Defense Fund, & Center for Resource Solutions – September 2010

This first-of-its-kind study examined the nation's previous crude oil price shocks and how California's clean energy and clean air standards would shield households from future price shocks. If an oil price shock occurred in 2020, California consumers and businesses would save between \$4.8 and \$9.6 billion, depending on the size of the price shock. The average household would save up to \$670 in 2020 if oil and natural gas prices doubled and stayed there for a year. The savings would come from reduced demand for imported oil and natural gas through a suite of AB 32 standards, such as more efficient cars, greater alternative fuel and energy options, and more efficient buildings.



## California's Green Economy

By The California Employment Development Department, Labor Market Information Division – April 2010



The California Employment Development Department (EDD) survey found that more than 300,000 people spend the majority of their time and another 171,000 workers spend part of their time on producing green products or providing green services. California is leading the nation in the percentage of the labor force working at green jobs.

## The Economic Impact of AB 32 on California Small Businesses

By The Brattle Group – December 2009

This first-of-its kind economic analysis examined how California's AB 32 policies will impact small businesses. Using the Border Grill restaurant in Los Angeles as a case study, economists at the Brattle Group concluded that the policies will increase the percent of revenue the Border Grill spends on energy by a mere 0.3 percent—increasing the share of revenues dedicated to energy costs from 1.4 percent to 1.7 percent in 2020. Moreover, this a conservative estimate because the report does not factor in the full range of cost savings that could come from energy efficiency investments. By 2020, the cost of a typical dinner would rise about 0.1 percent—or less than three cents for every \$20.

