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**San Diego helps drive California's explosive solar growth
Ranks near top of state for energy productivity**

California Green Innovation Index finds clean tech innovators in unexpected places as the state leads the nation in clean tech patents, investment and electric vehicles

SAN FRANCISCO—Solar energy generation and zero emission vehicle adoption rates have increased dramatically in California, signaling major market disruption as clean energy technology clusters take root across the state—and not just in traditional innovation hotspots. Widespread embrace of clean technology is one reason the eighth edition of Next 10's *California Green Innovation Index* (next10.org/2016-gii), released today, finds the state growing in its role as a leader in decoupling economic growth from carbon emissions on a per capita basis.

The *Index* ranks San Diego-Carlsbad second in California for both commercial and residential solar capacity, but halfway down the pack at number 13 for industrial solar energy.

Among the *California Green Innovation Index's* other San Diego-area findings:

- San Diego-Carlsbad ranks 2nd for total installed commercial solar capacity, with 15,169 kW, and 2nd for total installed residential solar capacity, with over 132,000 kW.
- San Diego-Carlsbad comes in third place in California for electricity productivity, a key measure of an economy's decoupling of economic output from its energy use.
- The area ranks fourth for green tech patents (filing 513 patents in 2015, a 27.6 percent increase over 2014), both in absolute terms and in patents per million residents.
- The region ranks fourth overall for clean vehicle rebates and also fourth in the state for GDP per capita, producing \$64,783 per capita of value for its locally produced goods and services in 2014.

This year's *Index* provides a snapshot of 26 metro areas, ranking them across a range of indicators, including commute times, recent GDP growth, energy productivity and clean tech patent filings. Additional data from across the state include:

- San Francisco-Oakland-Hayward ranks first for electricity productivity, while Merced and Madera rank last.



- Riverside-San Bernardino-Ontario has emerged as the state's top region for commercial and residential solar power. Fresno ranks number one for industrial solar power.
- On a per capita basis, Hanford-Corcoran boasts the most commercial and industrial solar energy.
- On a per capita basis, Yuba City ranks #1 for residential solar energy, and Chico ranks #2.
- Riverside-San Bernardino-Ontario drivers suffer the longest commutes.
- Silicon Valley isn't just about computers. The San Jose-Sunnyvale-Santa Clara area tops the rankings in green technology patents and in electric car rebates per capita.

"As the 6th largest economy in the world and an innovator in climate and energy policy, California is forging a decoupling between economic growth and carbon emissions per capita," said F. Noel Perry, businessman and founder of the nonpartisan nonprofit group [Next 10](#). "California is not only the fourth-most energy productive economy in the world, the state also leads in key clean tech indicators, like clean tech patents and investment. Much of the rest of the nation is following our lead."

This year's *Index* tracks key economic and environmental indicators at the regional, state, national and international level.

"California is a global leader when it comes to expanding its economy without increasing per capita emissions—this trend represents a shift from old growth models," said Christopher Thornberg, founding partner of Beacon Economics, an independent research and consulting firm, which compiled the *Index* for Next 10.

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 4th in the world for the share of electricity generated from renewable sources. In 2014, California's total state greenhouse gas emissions fell .62 percent compared to 2013.

Other highlights of the *Index* include:

Solar

- Solar energy generation increased 1,378 percent between 2009-2014 (p.17).
 - Wind generation increased 155 percent during this period, while in-state biomass increased 10 percent.
- CA installed 3,266 megawatts (MW) of solar photovoltaic (PV) in 2015 alone, more than any other state in the U.S. (p.18), bringing the state's total to 13,243 MW.
- Grid-connected, utility-scale solar provided 15,592 GWh in 2015, up from only 1,000 GWh in 2011 (p.17).



- Total residential megawatts (installed capacity) increased 65 percent in 2015, while total megawatts interconnected in the industrial sector almost doubled, and the commercial sector saw a substantial 42 percent increase (p.18).

Energy Productivity/Electricity

- In 2014, California's average monthly residential electricity bill was 20 percent lower than the U.S. average due to higher levels of energy efficiency (p.14).
- California's total electric bill came to 1.7 percent of GDP in 2014, compared to 2.4 percent in 1990. In 2013, California produced \$2.93 of GDP for every 10,000 BTUs, while the rest of the nation produced \$1.64 of GDP for every 10,000 BTUs.
 - Put another way, given the same amount of energy, California had 1.8 times as much economic activity as the rest of the country.
- While U.S. energy productivity improved 5.6 percent between 2010 and 2013, California's energy productivity rose by 7.4 percent (p.12).

Clean Tech Patents/Investment

- In 2015, California patent registration topped the nation in all major clean technology categories, from biofuels to solar to green materials. The state registered more than five times the solar patents than the 2nd ranked state (New York), and generated over 25 percent (p.31) of all energy efficiency patents in the U.S.
- After a huge increase in 2014, the Golden State continued to pull in more clean tech investment than any other state, increasing 35 percent in 2015 to \$9.8 billion. This is a significant portion of the nation's total clean tech investment, which was up 5 percent in 2015 to \$14.5 billion.
- Overall, total clean tech investment increased in the state, but clean tech venture capital investment alone in California declined 8 percent from 2014 (much of the surge in 2014 was due to a \$3 billion investment for the ride sharing company Uber) (p.36).
- Clean transportation was the hottest sector for venture capital investment in California, bringing in \$3.4 billion in 2015. This was 90.5 percent of all clean transportation venture capital investment in the nation (p.36).

Clean Transportation

- Transportation remains the largest producer of California's greenhouse gas emissions, at 36.9 percent (p. 6).
- Despite a rising number of cars and trucks on California roads resulting in a 2.2 percent increase in total vehicle registrations between 2011 and 2014, greenhouse gas emissions from surface transportation actually decreased .8 percent in this period, as California's clean cars policies work to ensure that gasoline-powered vehicles are increasingly lower-emissions, and that alternative technologies are increasingly common (p. 28).
 - This reduction in surface emissions since 2011 means California drivers have avoided emitting the equivalent of 126 million gallons of gasoline, equal to taking 236,582 passenger vehicles off the road for one year.



- Zero emission vehicle (ZEV) registrations increased by 244 percent between 2012 and 2014, driven by a 115 percent increase in all-electric vehicles and a 550 percent increase in plug-in hybrid vehicles (p.28).
 - In 2012, 34,547 ZEVs were registered in California. That number nearly doubled to 60,206 in 2013, and nearly doubled again to 118,801 in 2014.

Agriculture Sector

- From 2000-2014 GHG emissions attributed to livestock manure management climbed 22.6 percent, while emissions from dairy anaerobic lagoons increased 34.3 percent.¹

International Rankings

- If California were a country, it would rank fourth in the world for energy productivity (2013), climbing from 5th place in 2012 (p.51).
- The world's least carbon intensive economies held their spots in 2013 while continuing to reduce their carbon intensity. France, California and Italy remained the three least carbon intensive economies in the world, and dropped .9, .9 and .21 MTCO₂e/\$10,000GDP respectively (p.51).
- California fell from the number eight spot in 2012 to the number nine spot in 2013 for total renewable electricity generation, as global renewable energy generation increased.

“California’s increasing energy productivity and renewable energy growth are not accidents,” Perry said. “They can be tied to policies, from the landmark AB 32 climate and clean energy law to last year’s SB 350, which increases the Renewable Portfolio Standard to 50 percent clean energy and calls for a 50 percent increase in building energy efficiency by 2030.”

Last year, California spearheaded the Under 2 MOU. This international memorandum of understanding, which U.N. Secretary-General Ban Ki-moon has said “could be a game changer,” gives states and regions a formal way to commit to cutting emissions and limiting the increase in global average temperature to below two degrees Celsius. So far, 128 jurisdictions from 28 countries and six continents have signed on. Together, they represent more than a quarter of the global economy.

“The Under 2 MOU is an example of California’s leadership on climate and clean energy,” Perry said. “This year’s *Green Innovation Index* connects the dots and shows how you can trace progress on clean energy and climate from innovations in California’s metro areas to policies to commitments made by governments around the world.”

About Next 10

¹ Note: The California Air Resources Board approved a plan to reduce methane emissions by 40 percent below 2013 levels by 2030. If approved, the legislature could allocate expenditures from the cap-and-trade program to meet these goals. The California Department of Food and Agriculture (CDFA) awarded \$12 million in 2014 and \$11.1 million in 2015 to dairy digester projects.



[Next 10](#) is an independent, nonpartisan organization that educates, engages and empowers Californians to improve the state's future. With a focus on the intersection of the economy, the environment, and quality of life, Next 10 employs research from leading experts on complex state issues and creates a portfolio of nonpartisan educational materials to foster a deeper understanding of the critical issues affecting our state.

About Beacon Economics

[Beacon Economics](#) is one of California's leading economic research and consulting firms, specializing in economic and revenue forecasting, economic impact analysis, economic policy analysis, and regional economic analysis. Known for delivering independent and rigorous research, the firm provides its clients with economic trend and data analysis that strengthens strategic decision-making about investment, revenue, and policy.