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**San Francisco tops Silicon Valley in clean tech innovation as state's
clean economy thrives**

*Ninth annual Green Innovation Index finds spike in transportation emissions
Challenging state's 2030 climate goals*

SAN FRANCISCO—The Bay Area has overtaken Silicon Valley as the state's leading producer of green tech patents in an annual ranking of California's clean economy. Released by the nonpartisan, nonprofit group Next 10 and prepared by Beacon Economics, the ninth annual [California Green Innovation Index](#) finds that with a 74 percent increase between 2015 and 2016, San Francisco-Oakland-Hayward has become the state's leading producer of green tech patents.

Data gathered over the nine years of the *Index* shows that California's climate policies have allowed for considerable economic growth, with California outpacing other states in GDP and employment gains following the Great Recession. However, the *Index* also notes that the rate of decline in California's carbon emissions has slowed, driven by a sharp increase in emissions from the transportation sector, in part due to the housing crisis pushing up commute times.

"California's clean economy is growing all across the state, with different regions finding different ways to grow the economy while cutting greenhouse gas emissions," said F. Noel Perry, businessman and founder of [Next 10](#). "However, developing cleaner transportation options presents both a great challenge and a great opportunity for the state moving forward."

In a ranking of 26 regions across California on a range of measures, the *Index* found that the Bay Area filed 359 more green tech patents than San Jose-Sunnyvale-Santa Clara, securing the top spot in that category after placing second in last year's *Index*. Green tech patents—which can cover everything from energy storage to advanced materials to renewable energy technologies — are an indicator of clean tech innovation, and Silicon Valley has been a consistent leader in this category.

Other San Francisco-Oakland-Hayward, Napa and Santa Rosa-Petaluma highlights include:

- San Francisco-Oakland-Hayward ranks first in public transit ridership per capita, beating out the Los Angeles area by a margin of over 50 percent.
 - But commute time for the region's drivers is long – the area ranks 23rd of 26, just below L.A., with commute times averaging 29.1 minutes.



- When adjusted for population, Santa Rosa-Petaluma ranks 3rd for clean vehicle rebates.
- Napa has the 9th shortest average commute time in California.

Other regional highlights include:

- The San Joaquin Valley has emerged as a solar powerhouse, with Fresno, Madera and Visalia-Porterville ranking 1st, 2nd and 3rd for total installed solar capacity in the industrial sector.
- San Diego-Carlsbad boasts the most residential solar installed, but when accounting for population, Yuba City still holds 1st place.
- Riverside-San Bernardino, last year's champion for residential and commercial solar, slipped to third place in both rankings.
- Santa Barbara-Santa Maria drivers enjoy the state's shortest commute times, while Riverside-San Bernardino-Ontario drivers suffer the longest.

Between 2006 — when California's landmark climate legislation was adopted — and 2015, California's GDP per capita grew by almost \$5,000 per person, nearly double the growth experienced by the U.S. as a whole. At the same time, per capita emissions in the state decreased by 12 percent. Job growth between 2006 and 2015 in California outpaced rates experienced prior to 2006, and outpaced total U.S. employment gains by 27 percent.

The *California Green Innovation Index* has tracked key economic and environmental indicators at the regional, state, national and international level since 2008. This year's edition finds that California's record is especially impressive when it comes to cutting emissions and energy use per dollar of GDP. The state has become the most energy-productive major economy in the world, moving up three spots from 2013 to 2014, while also reducing its carbon intensity by 4.5 percent.

However, enormous challenges lie ahead. On an absolute basis, California's total GHG emissions fell only slightly in 2015, down 0.34 percent from 2014. This compares to a 0.73 percent reduction in the previous year and sharper falls in years before. If current rates of decline continue through 2020, the state will need to reduce emissions at a rate of 4.97 percent each year in the decade between 2020 and 2030, and produce even steeper declines in the period from 2030 to 2050, if it is to meet current climate goals.

Part of the reason for this slower rate of decline is a recent spike in transportation emissions. In 2015, total transportation-related GHG emissions rose by 2.7 percent, largely due to an increase of 3.1 percent in emissions from on-road vehicles like cars, trucks and buses. This increase seems to be a result of a strong economy and lower gas prices resulting in more vehicles on the road, combined with a housing crisis that has led to longer commutes.

“Transportation sector emissions vastly outweigh other carbon-producing areas of California's economy, and the recent spike should alert policy-makers that despite



our best efforts, more must be done,” said Fowler. “Cheap gas prices and a strong economy are creating increased goods movement and prompting Californians to drive more. In addition, the housing affordability and availability crisis is forcing people to live increasingly farther away from work, driving up total vehicle miles traveled in the state by 2.7 billion in 2014, up 0.08% from the previous year. So it’s no surprise that greenhouse gas emissions from vehicles have been increasing, despite California having the nation’s most ambitious clean transportation policies.”

“Finding a way to reduce emissions by 5 percent each year in the coming decade will require innovation,” said Next 10’s Perry. “Fortunately, that’s something California has proven it knows how to do.”

Other highlights of this year’s *Green Innovation Index* include:

Renewable energy

- In 2015, California increased renewable electricity to 21.9 percent of total electricity generation, up 1.8 percent from the year before.
- As of Q1 2017, California leads the nation in installed solar capacity with 18,963 megawatts. From 2010 to 2015, California solar generation increased by over 1,738 percent. By the end of 2016, the state’s cumulative installed solar capacity was six times the total of the next-highest state (North Carolina).
- California’s renewable generation increased 8.3 percent in 2015, with solar jumping 40.3 percent and small hydro dropping 6.1 percent due to the drought. Wind generated 37 percent of the state’s renewable electricity, and for the first time, solar (27 percent) overtook geothermal (20 percent) as the second-largest source of renewable generation.

Clean jobs

- In 2016, 21.6 percent of California’s energy jobs were in solar and wind generation, surpassed only by Nevada (29.1 percent) and Hawaii (22.8 percent).
- California has 8.5 jobs in solar and wind generation for every 1 job in fossil fuel generation, whereas the U.S. average is 2.5 renewable jobs for every 1 job in fossil fuel generation.
- In 2016, California has just over 300,000 jobs in the energy efficiency sector - more than twice as many as the next leading state (Texas).
- California is the top state for employment in energy storage, comprising 28 percent of the national workforce in 2016.

Power sector

- California’s electric-power sector was responsible for 19.1 percent of the state’s greenhouse gas emissions in 2015, down 0.9 percent from 2014.



- In California, per capita electricity consumption decreased 2.3 percent from 2014 to 2015. In the rest of the U.S., it decreased 1.8 percent.
- The state needs to increase renewable generation by 24 percent between 2017 and 2020 in order to meet the next RPS goal. Effective grid management to incorporate this level of renewables remains a key challenge for the state.

Transportation

- By the end of 2016, about half of all zero-emission vehicles (ZEVs) ever sold in the U.S. were bought in California. In the first quarter of 2017, ZEVs accounted for nearly 5 percent of the state's auto sales.
- In 2015, there were 172,895 ZEVs registered in California, up 45.5 percent from 2014. Over the same time period, traditional gasoline vehicle registration increased 1.7 percent.
- The state's charging infrastructure lags badly. At the time of publication, California has only 0.05 public charging outlets per ZEV, placing it ahead of only New Jersey and Alaska for availability of infrastructure.

Clean technology innovation

- California continues to lead the U.S. in clean technology patent registrations. California registered 5,119 clean technology patents in 2016—more than 20 percent of total U.S. patent registrations, which totaled 23,958 across all states.
- California earned top rankings in every clean tech patent category in 2016, with 1,060 patents for green materials, 645 related to efficiency, 616 in the transportation sector, and 493 for solar energy.
- Across the nation, investment in clean technology companies continued to shrink in 2016. Total US investment in clean tech companies was \$2.5 billion, down 7.4 percent from 2015.
- In California, total investment in clean technology grew by 12 percent compared to 2015, totaling \$1.7 billion, representing more than two-thirds of total U.S. investment in clean tech.

About Next 10

[Next 10](#) is an independent, nonpartisan, nonprofit 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.