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San Diego claims top solar spot, sees dramatic reduction in national gas As state's clean economy thrives

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

SAN FRANCISCO—San Diego has emerged as the state's top region for residential solar energy 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 San Diego-Carlsbad outcompetes 25 other regions across California for the highest total amount of residential solar capacity installed in 2016.

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 clean economy measures, the *Index* found that, in addition to securing the top spot in the state for total installed solar capacity in the residential sector, San Diego-Carlsbad ranked well in efficiency measures, taking third place for electricity productivity and second place for natural gas productivity. In fact, the region saw a remarkable reduction in natural gas consumption per capita between 2014 and 2015, moving it from the 18^{th} spot last year to third place in this year's *Index*.

Other San Diego-Carlsbad highlights include:

- The region produced more green tech patents than most other areas of the state, securing the 4^{th} spot in that category.

- In terms of public transportation, although far behind state leaders the Bay Area and LA, San Diego-Carlsbad ranked 3rd for public transit ridership.
- The region ranked 4th for clean vehicle rebates.

Other regional highlights include:

- The San Joaquin Valley has also 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
- Riverside-San Bernardino, last year's champion for residential and commercial solar, slipped to third place in both rankings.
- San Francisco-Oakland-Hayward overtook San Jose-Sunnyvale-Santa Clara to become the #1 producer of green tech patents in the state.
- 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.*