



**EMBARGOED UNTIL 10pm PDT, August 21, 2017**

FOR IMMEDIATE RELEASE  
August 22, 2017

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**Ninth annual Green Innovation Index finds California clean economy thriving  
But emissions-reduction challenges loom**

*Transportation sector emissions spike, pose major challenge  
to state's 2030 climate goals*

SAN FRANCISCO—As California's economy continues to grow, the state's carbon footprint continues to shrink, albeit at a slower pace than in earlier years due in part to a spike in transportation emissions.

The ninth annual [California Green Innovation Index](#) — released by the nonpartisan nonprofit group Next 10 and prepared by Beacon Economics — finds that the state's ambitious climate policies have allowed for considerable economic growth, with California outpacing the growth of other states during the recovery period following the Great Recession.

Between 2006 — when the state's landmark climate legislation was adopted — and 2015, California's GDP per capita grew by almost \$5,000, 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.

While the state has made considerable progress decoupling economic growth from greenhouse gas (GHG) emissions, the rate of emissions decline appears to be slowing, due in part to a spike in transportation emissions. 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.

“California has experienced tremendous success implementing policies that incentivize innovation in business, technology and carbon reduction,” said F. Noel Perry, businessman and founder of [Next 10](#). “But the effects of these efforts seem to be reaching a plateau. Therefore, it is critical that the next generation of climate



policies be designed to deliver steeper reductions. With uncertainty at the federal level, California must maintain its success and leadership in equitably growing the clean energy economy.”

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 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.

“California policies have allowed the state to generate more economic growth while producing fewer emissions. In 2014, every \$10,000 of economic activity in California resulted in 55 percent fewer CO<sub>2</sub> emissions than \$10,000 of economic activity yielded in the rest of the nation,” said Adam Fowler, economist at Beacon Economics, an independent research and consulting firm that compiled the *Index* for Next 10.

However, enormous challenges lie ahead, as the *Index* shows a recent spike in transportation emissions. The transportation sector remains the biggest source of greenhouse gas emissions in the state, responsible for 38.5 percent of emissions and overshadowing all other areas of the economy. 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 percent 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.”

Commute times in California increased 2.8 percent between 2014 and 2015, while at the same time, the state experienced a 4.8 percent decrease in public transportation trips.

“The data in this year’s *Index* shows that developing cleaner transportation options presents both a great challenge and a great opportunity for the state moving forward,” said Next 10’s Perry. “Finding a way to reduce emissions by 5 percent each year in the coming decade will require innovation. Fortunately, that’s something California has proven it knows how to do.”



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

### ***Power sector***

- In 2016, energy-related carbon dioxide emissions in the U.S. were 12.5 percent below their 2006 levels. The decade-long nationwide slide in emissions from power production reflects the electric power sector shifting away from coal and toward less carbon-intensive fuels.
- Across the U.S., 2015 saw a record number of coal plants discontinue operations, accounting for nearly 14 gigawatts of capacity.
- Natural gas production and consumption hit an all-time high in the U.S., displacing more-polluting energy sources.
- 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 to 2020. Effective grid management to incorporate this level of renewables remains a key challenge for the state.

### ***Renewable energy***

- In 2015, California increased renewable electricity to 21.9 percent of total electricity generation, up 1.8 percent from the year before.
- In 2015, California's renewable generation increased 8.3 percent from the year before, 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.
- Unexpected regions have emerged as solar energy hotspots in recent years. Fresno retained the top spot for industrial solar, while Los Angeles-Long Beach-Anaheim jumped from 3rd to 1st in commercial installations. San Diego-Carlsbad moved to first in residential solar installations.
- 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 1738 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).
- For the U.S. as a whole, renewable generation increased 0.5 percent, to 7.3 percent of total generation in 2015.

### ***Transportation***

- As of 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 jobs***

- California has 8.5 jobs in solar and wind generation for every 1 job in fossil fuel generation.
- 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 is the top state for employment in energy storage, comprising 28 percent of the national workforce in 2016.

### ***Clean technology innovation***

- 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.
- 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 (just less than the next three states combined), 645 related to efficiency (more than the next five states combined), 616 in the transportation sector (more than the next two states combined), and 493 for solar energy (more than the top 10 states combined).

### ***International comparisons***

- China remained the largest greenhouse gas emitter in 2014, followed by the U.S. and the European Union.
- When treated as a country, California moved up two places in comparison to the 49 nations with greatest greenhouse gas emissions, surpassing France and Italy to become the 18<sup>th</sup> largest emitter.
- California maintained top rankings as one of the least carbon-intensive emitters (2<sup>nd</sup> to France) and one of the highest shares of electricity from renewable energy sources (6<sup>th</sup> highest).
- The Golden State moved up three spots to the number one ranking as the most energy productive economy in 2014.



**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.*