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**Decade of data charts global greenhouse gas emissions and economic trends  
in advance of Global Climate Action Summit**

*10<sup>th</sup> annual California Green Innovation Index compares clean economy progress  
in host state and in nations around the world*

SAN FRANCISCO — As leaders from around the world prepare to gather in San Francisco for the Global Climate Action Summit, a new report tracks the progress of host state California and nations across the globe in the race to decarbonize their economies.

The *Index* compares state and environmental indicators with the U.S. and the rest of the world, and finds that in the ten years since California passed its first climate law, emissions fell by 11 percent, even as its economy grew by almost 16 percent during one of the longest economic expansions in the state's history. The European Union (EU-28) was the only major economy to cut emissions more than California, but its real economic output grew by only 8.8 percent.

"This year's *Index* tells a comprehensive but complex story of the transition to a decarbonized economy," said F. Noel Perry, businessman and founder of Next 10. "On the one hand, California is a world leader in innovation and climate policy, which has resulted in strong economic growth and emissions reductions. On the other hand, transportation emissions in California continue to rise at a time when the federal government is attempting to curtail our ability to control those emissions. As subnational, national and international leaders gather in San Francisco, this *Index* provides important data and impetus for increased collaboration across state and national lines in the transition to a clean energy economy."

"Over the course of a decade, comprehensive, consistent policy in California created market certainty. That drove investment and advanced technology. California is third only to China and the U.S. as a whole in attracting clean technology investment," said Adam Fowler, director of research at Beacon Economics, the independent research and consulting firm that compiled the *Index* for Next 10. "But progress doesn't always follow a straight line. Both California and the U.S. have experienced dips in VC investment and a decline in patent generation in the past year, while some of our major economic competitors have seen increases. Command of clean technology markets may well determine economic success in the 21<sup>st</sup> century, so it's not a time to slow down."



The tenth annual *California Green Innovation Index* charts a decade of mixed results. Global emissions rose by 15 percent from 2005 to 2015, led by growing emissions from fast-growing economies like China and India.

One clear positive trend in climate action has been the global boom in clean energy generation and innovation. Renewable energy increased 339 percent globally between 2005 and 2015, led by a massive increase in solar electricity generation as technologies improved and equipment costs fell. Around the world, solar generation increased 6,327 per cent between 2005 and 2015. Wind power grew by 701 percent globally.

The 2018 *California Green Innovation Index* rankings show the European Union generating the most renewable energy, followed by the United States, China, Germany and Japan. Looking at carbon intensity — a measure of greenhouse gas emissions relative to GDP — France is the world's least carbon-intensive economy, followed by Argentina, California, the U.K. and Nigeria, respectively.

Overall, China remains the world's top emitter of greenhouse gasses, followed by the United States (including California), EU-28, Russia and India. California itself is in 18<sup>th</sup> place among major polluters.

**Top global findings from the 2018 Index include:**

- Total global emissions rose by 15 percent between 2005 and 2015, led by China, India and Iran.
- Globally, renewable energy generation increased 339 percent between 2005 and 2015, led primarily by a massive boom in solar electricity as technologies improved while costs fell.
  - Solar generation increased globally by 6,327 percent, while wind power increased 701 percent.
  - China's solar generation increased by a whopping 61,049 percent, followed by India (29,584 percent), EU-28 (7,235 percent), and the U.S. (4,424 percent).
  - Solar generation increased by 2,571 percent in California, and wind energy generation increased 442 percent.
    - But for the first time in *Index* history, California experienced a decline in solar generation growth, with the new net energy metering solar installations down 10.5 percent from 2016, signals that the industry may be maturing.
    - However, any slowdown is expected to be resolved in 2020 when a new mandate from the California Energy Commission requiring all new homes in California to have rooftop solar takes effect.
- In 2015, Germany had the highest share of electricity from renewable sources, followed by Spain and the United Kingdom. California had the 7<sup>th</sup>-highest share of electricity from renewable sources while the U.S. was 17<sup>th</sup>.

***Clean technology innovation***

- Globally, clean tech investment increased 121.2 percent between 2007 and 2017, with an annual investment of \$7.78 billion in 2017.



- California's global share has ranged from 46 percent to 18 percent depending on the year.
- China attracted the most clean technology venture capital funding in 2017, pulling in \$4.12 billion. The United States including California was in second place, at \$2.48 billion, and California came in third with \$1.42 billion. The European Union (EU-28) pulled in \$470 million, and Taiwan attracted \$300,000 million.
- In 2017, \$2.5 billion was invested in clean energy technology in the United States, with 57.2 percent (\$1.4 billion) going to California companies.
  - Transportation technologies received the largest share [\$610 million in US; \$459m in CA].
- The U.S. (including California) was a global leader in clean tech patents in 2017, producing 29 percent of global patents.
  - The EU-28 produced 20 percent of global patents, followed by Japan (13 percent), South Korea (6 percent), California (5.4 percent) and China (4 percent).
- Globally, the number of clean technology patents increased 243.8 percent between 2007 and 2017.
  - The number of patents produced in California increased 342 percent in this period.
- The number of clean tech patents registered in 2017 was 77,376, an 11.2 percent gain over 2016.
- From 2016-2017, the world saw an 11.2 percent gain in clean tech patents, while both the U.S. and CA saw a decline.
  - EU-28, which ranks second globally for most clean tech patents, saw a surge of over 40 percent from 2016-2017, while Japan and South Korea (spots 3 and 4, respectively) declined.
  - California leads the U.S. in clean tech patents [18.6 percent] followed by Texas [6.5 percent], New York [5.5 percent], Michigan [5.1 percent] and Massachusetts [4.2 percent].
- China had the largest international improvement in energy productivity between 2005 and 2015, with a 48.7 percent gain, followed by the U.K. at 36 percent and India at 35.9 percent.
  - California improved its energy productivity by 23.4 percent during this time.
- China also leads the world in electric vehicle (EV) adoption, accounting for 49 percent of total global EV sales in 2017—the most in the world, and nearly twice that of the next top EV adopter (Europe).
  - In the US, California leads states in terms of EV adoption with half of the U.S. zero-emission vehicles, or 8 percent of the global total of EVs by the end of 2017—the same as the rest of the U.S. combined.
  
- Saudi Arabia is the world's top emitter on a per capita basis, followed by Canada and the U.S., while Bangladesh, Nigeria, Pakistan, The Philippines and India have the lowest emissions per person respectively.
- California ranked 13<sup>th</sup>-highest in electricity consumption per capita, just after Belgium and before Germany. The U.S. had the 5<sup>th</sup>-highest electricity consumption per capita.

### **About Next 10**



[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. Through its Sustainable Growth and Development practice, Beacon partners with policymakers, communities, businesses, and elected officials to data-drive discourse and decision-making processes around sustainability, economic growth, and equity. Beacon leverages its quantitative and qualitative competences as well as its policy-related expertise to help clients translate their goals into measurable metrics for success.