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California will hit climate targets more than 100 years too late if current pace of emissions reductions holds

Eleventh annual California Green Innovation Index finds state climate goals in question without major policy and technology breakthroughs to dramatically accelerate emissions decline

Transportation sector, wildfires and landfill emissions prove challenging, threaten previous gains

San Francisco, CA — California will meet its 2030 climate targets more than three decades late, in 2061, and could be more than 100 years late in meeting its 2050 target if the average rate of emissions reductions from the past year hold steady, according to a new study tracking more than a decade of environmental and economic indicators in the Golden State.

The eleventh annual [California Green Innovation Index](#)—released by the nonpartisan nonprofit Next 10 and prepared by Beacon Economics—finds the state needs to reduce emissions by an average of 4.51 percent each year—marking a three-fold increase from the 1.15 percent reduction seen in 2017—to meet the requirements of SB 32, which raised the state’s emissions reduction goal to 40 percent below 1990 levels by 2030.

“California has made tremendous gains cutting pollution without detrimental economic impacts,” said F. Noel Perry, businessman and founder of Next 10. “The state’s per capita GDP has grown more than 41 percent while per capita greenhouse gas emissions have fallen by just over 25 percent since 1990. But this year’s *Index* serves as a wake-up call—we’re going to need major policy breakthroughs and deep structural changes if we’re going to deliver the much steeper emissions reductions required in the years ahead.”

The sobering findings follow widespread celebration after California hit its 2020 emissions reductions goals four years early. Since 2000, electricity has been the only economic sector that has seen continuous and significant improvements in reducing greenhouse gas (GHG) emissions. The industrial, residential, and transportation sectors have only seen small declines, while California’s large commercial sector is moving in the opposite direction—with emissions increasing more than 64 percent.

“Over the last 17 years, the industrial, residential and transportation sectors have cut their emissions by less than 5 percent,” said Adam Fowler, director of research at Beacon Economics, an



independent research and consulting firm. “Moving forward, the state must hit reduction targets of 4.5 percent *annually*—the days of a 20-year runway to achieve this level of reduction in these sectors are past.”

Electricity sector gains mask challenges from transportation, buildings, and industry

This year’s Index finds that 2017 marked the first time that a greater portion of California’s power mix came from renewable sources like wind and solar than it did from fossil fuels.

“Renewable energy in California has really matured. Solar and wind are increasingly cost-competitive with fossil fuels, and we are seeing a significant uptick in the investment and development of energy storage. The number of patents issued for energy storage increased 65.6 percent year-over-year in 2018,” said Perry, “We can already see the impact this is having, as some gas plants in California have been shuttered and plans scrapped for new plants in part due to cost-effective renewables and the availability of more storage opportunities.”

But the report authors note that, while California has the second-lowest rate of carbon emissions per capita in the nation, and a carbon intensity relative to GDP that is 54.3 percent lower than the rest of the U.S.—there are enormous challenges ahead.

Transportation emissions hit a record high in 2017—making up 41.1 percent of the state’s total GHG emissions—and of which on-road passenger vehicles accounted for 28 percent. The report finds car ownership rates and vehicle miles travelled also hit new highs in 2017, while consumer preferences have shifted markedly toward less-efficient vehicles. By the fourth quarter of 2018, light-duty pickup trucks, mini-vans, and SUVs made up 57.3 percent of new vehicle registrations, up from 39.3 percent five years ago.

“Electric vehicle adoption has increased significantly in recent years, and was up 37 percent in 2017,” noted Fowler. “But we’re also seeing a significant jump in consumer preference for less-efficient internal combustion engine (ICE) vehicles—even in just the past year in climate-conscious California. This signals that we may not see electric vehicles truly replacing ICE vehicles until we have more consumer choices and the infrastructure to support them.”

These trends are complicated by the federal administration’s rollback of national fuel economy and emission reduction standards which were intended to lower transportation pollution significantly in the coming decade, and the recent revocation of California’s waiver to set vehicle emissions standards—which has kicked off a legal battle that could last for years before resolution.

Top findings in the area of transportation include:

- The annual increase in transportation emissions has slowed down slightly compared to the previous three years.
- Vehicle miles travelled and GHG emissions from surface transportation per capita increased 0.5 percent and 0.1 percent, respectively, from 2016 to 2017.
- The fact that VMT has increased faster than GHG emissions from surface transportation indicates that the state’s fuel economy standards and policies are working to reduce



emissions to an extent, but the current upward trajectory of VMT and surface transportation GHG emissions cannot continue if the state is to meet its climate goals.

- In 2018, battery electric, plug-in hybrid, and hydrogen vehicles accounted for 1.5 percent of all registered on-road vehicles in California, up from 1.1 percent in 2017. At current pace, the share will reach 2 percent by the end of 2019.
- The vehicle ownership rate is increasing faster than ever, reaching 80.6 vehicles per 100 persons in 2018. ZEVs and hybrids accounted for about 4.0 vehicles per 100 persons.
- Vehicle miles travelled (VMT) per capita have been increasing gradually for years in California – but declining in some other populous states. Between 2008 and 2017, total VMT increased 5 percent in California, but declined in Pennsylvania (-6%) and New York (-8%). Texas saw the greatest increase over the period (+16%).

Wildfire emissions present unique challenge

The *Index* notes that the 2018 wildfires in California produced an estimated nine times more emissions than were reduced across the entire state’s economy the year prior—with wildfires contributing more than the commercial, residential or agriculture sectors did in 2017.

The 2018 wildfires burned more than 1.8 million acres of California land—a five-fold increase since 1972 and the largest-burned acreage recorded in a California fire season. The study notes that ten of the state’s most destructive fires have occurred since 2010, including 2018’s Camp Fire, the most deadly and destructive in state history.

“What we’re learning is that climate successes can be fragile—and one devastating fire can eclipse hard-won emissions reductions gains.” noted Perry. “Our lands serve as an important carbon sink and wildfires are an important part of the natural cycle. But learning to better manage wildfire risk—including powerlines which don’t cause most fires, but have caused our most-destructive fires—is critical.”

- California wildfires in 2018 emitted an estimated 45.5 million metric tons of CO₂ (MMTCO₂) emissions—a 24 percent increase from 2017, when California wildfires released an estimated total of 36.7 MMTCO₂.
- Not only are wildfires becoming more severe, the frequency of historically-destructive fires has also been increasing over the last decade. Ten of the state’s most destructive fires occurred since 2010, and 19 of them have occurred within the last 30 years.
- Between 2000 and 2017, the number one cause of wildfires was those categorized as “other”—which includes debris, escaped prescribed burn, miscellaneous causes, and unknown/unidentified—(34.2%), followed by lightning (31.1%), human-caused (23.7%), vehicles/structure (7%), and powerlines (4%).
- While powerlines may not cause the most fires, they tend to cause the most destructive fires in terms of the number of structures destroyed, as powerlines are located in more



populated areas of the state. California's most destructive fire to date—the Camp Fire in Butte County in November 2018—was caused by powerlines and destroyed 18,804 structures.

Landfill emissions rise; recycling rates decline

Landfill emissions are also emerging as a policy challenge—having risen every single year since 2004 in California, and shooting up 7.4 percent from 2016 to 2017.

“With a growing economy, Californians are consuming more, and waste is increasing remarkably. At the same time, the recycling rate in 2017 was 42 percent, even lower than it was in 2016,” noted Fowler. “At our current pace, we are nowhere near hitting the state’s target of a 75 percent recycling rate by 2020.”

- As the economy continues to grow, people consume more, and solid waste generation generally continues to increase. The state is not on track to meeting its goal of 75 percent recycling rate by 2020 and will only face further challenges in meeting that goal as a result of no longer being able to send recycling to markets abroad, such as China.
- In 2017, Californians exported or sent to landfills 37.8 million tons of waste, up 7.4 percent compared to 2016.
- As landfills are burdened with an increasing amount of waste, landfill emissions have gone up every single year since 2004. From 2007 to 2017, emissions from landfills have increased by 1.0 percent every year on average

According to Perry, “The 2019 *Index* is a call to action. The state has a great degree of control over its power mix, but there are several sectors that are harder to control—whether that be wildfires or sectors dependent on end-users’ consumption behaviors. Each choice we make about how to use our land, power our homes and buildings, and travel each day makes a difference. Transformative policies are needed, but success requires change from all of us.”

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

Carbon Economy

- California’s energy-related carbon dioxide emissions per capita were 9.2 MTCO_{2e} per person in 2016—the second-lowest among the 50 states, behind New York—and have remained relatively constant since 2011.
- California’s carbon intensity continues to improve. From 2012 to 2017, its carbon intensity declined at a rate of 4.53 percent per year—faster than the 10-year average of 3.18 percent from 2007 to 2017.
- In 2016, California’s carbon intensity relative to GDP was 54.3 percent lower than that of the rest of the U.S. Compared to the other populous states, California’s carbon intensity was 44.2 percent lower than Florida’s, 46.1 percent lower than Illinois’s, 54.1 percent lower than Pennsylvania’s, 58.2 percent lower than Ohio’s, and 66.2 percent lower than Texas’s in 2016.



Energy Efficiency

- California has a long history of leading on energy efficiency. Since 1990, the state has reduced its per capita energy consumption by 10.2 percent and kept its per capita electricity consumption essentially flat over the last 40 years, while per capita electricity consumption continued to rise across the rest of the country.
- Despite these gains over the long term, both total energy consumption and per capita energy consumption increased in California from 2015 to 2016, largely the result of increased energy usage in the transportation sector driven by low fuel prices.
- For the second year in a row, both total energy consumption and per capita energy consumption have increased in California. Consecutive increases in energy consumption and per capita energy consumption have not happened since 2002 and 1998, respectively.
- Electricity consumption reached new highs in the residential and agricultural sectors in 2017. Electricity consumption in the residential sector grew by 4.3 percent—driven in part by an increase in plug-in electronic devices and EVs—and by 2.9 percent in the agricultural sector from 2016 to 2017. Total electricity consumption in 2017 reached highs not seen since 2008 at the start of the Great Recession.
- California has among the lowest per capita electricity consumption among the selected large states, along with New York. Unlike New York, however, in which per capita consumption has held steady, it continues to decrease in California.

Renewable Energy

- Hydroelectric, solar, and wind generation are increasingly displacing natural gas. 2017 was the first time that the share of fossil fuel sources—coal, oil, and natural gas—fell below 40 percent of California’s power mix.
- California’s landmark 2010 energy storage procurement mandate (AB 2514) has helped to expand storage capacity in the state, with investor-owned utilities meeting the 2020 procurement target of 1,325 MW a few years early, but more will need come online in order to hit the 2024 target of 1,325 MW energy storage capacity installed.
- As the energy storage market grows and matures, the technology is becoming increasingly cost-competitive with natural gas. In Moss Landing, two lithium-ion batteries were approved this past fall to replace retiring gas generators. When they come online, the batteries will be the two largest in service in the world.
- While Community Choice Aggregators (CCAs) are quickly growing, the California Public Utilities Commission notes that CCAs would have to procure roughly twice the amount of clean energy they have procured to-date by 2022 and close to six times as much by 2030 in order to meet our clean energy and climate goals.



- As of the end of 2018, California accounted for 44 percent of all small-scale solar photovoltaic (PV) net generation in the U.S. Small scale-solar PV generation increased 23 percent from 2017 to 2018 in both California and the rest of U.S.

Clean Technology Innovation

- Energy Storage patents in California increased 65.6 percent year-over-year in 2018.
- Compared to 2017, the dollar amount invested in California increased 137.1 percent, reaching \$3.4 billion in venture capital (VC) funding.
- Venture capital investment in clean technologies totaled \$5.8 billion in the U.S. in 2018, of which 58 percent (\$3.4 billion) was invested in California.
- California is the clear leader in clean tech patent registration in all major clean technology categories. For every one patent registered in Texas, the state with the second-most patents registered in 2018, California had 3.5 patents.
- Venture capital investment in solar totaled just \$122.2 million in California in 2018, less than one-tenth of the \$1.43 billion investment the state saw in that sector in 2008. Only 22.6 percent of the deals made in the U.S. were in California in 2018, down slightly compared to 23.5 percent in 2017.
- The dip in the number of patents registered in 2018 (compared to 2017 and 2016) might signal a slowdown in clean tech patent applications, not just in the U.S., but globally.

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.