

California's 100 Percent Zero-Carbon Goal Hinges on Energy Storage

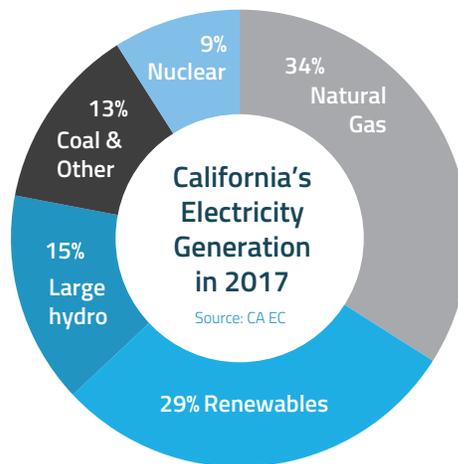
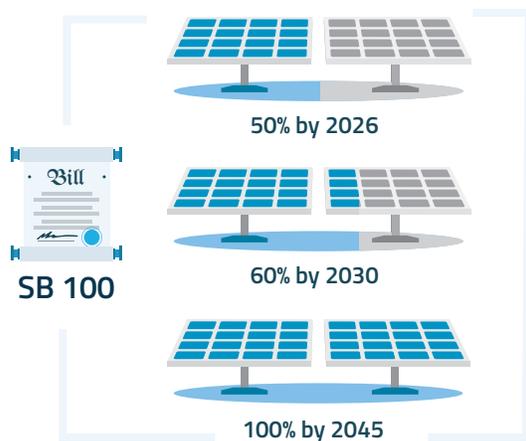
Building Standards, Investments in Electric Vehicle Infrastructure, and Market Reforms Among Key Policy Tools

Industry Insight

On September 10, California enacted legislation (SB 100) with a goal of procuring 100 percent of the state's electricity from renewable and zero-carbon resources by 2045. California's move is historic in that it represents the world's fifth-largest economy having established a renown in the international climate arena. The Golden State has accelerated the growth of its solar and wind industries but success likely depends on whether storage systems can supplant natural gas that provides about a third of the state's electricity. Earlier this year, California became the first U.S. state to mandate solar rooftop panels on new homes. To achieve its 2030 goal of five million zero emission vehicles, California recently enacted a law to assess charging infrastructure buildout. The new wave of clean energy and climate measures come as California wrangles the Trump administration's attempts to roll back the state's auto emission standards while also fighting record wildfires attributed to weather-related conditions.

California's Progress Towards Goals

California's Renewable Portfolio Standards (RPS) was first established in 2002 with the goal of 20 percent renewable energy by 2017. The goal was raised in 2006 (20 percent by 2010) and in 2008 (33 percent by 2020). Legislation enacted in 2015 set a target of 50 percent by 2030. California currently gets 24 percent of its electricity from hydropower and nuclear – which do not qualify for RPS – and 29 percent from renewables, almost triple the amount from 2007. The state's investor-owned utilities have remained on track to meet the requirements.



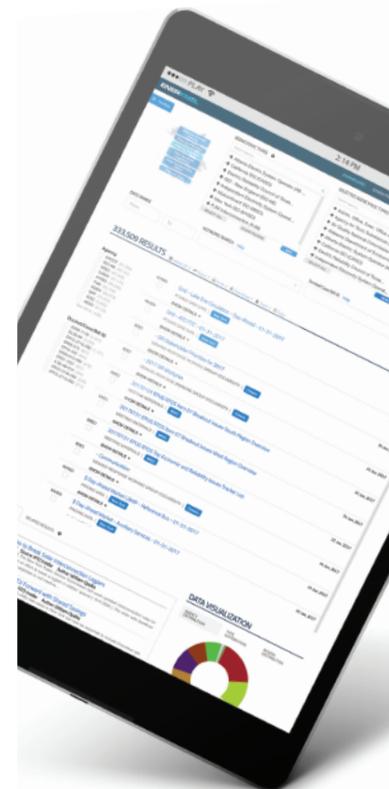
In 2013, the California Public Utilities Commission set a mandate for the investor-owned utilities to procure 1,325 MW of energy storage by 2020. Installations in the grid run by California Independent System Operator made up about 18 percent of existing U.S. large-scale battery storage power capacity last year, according to a May 21 report from the U.S. Energy Information Administration.

The growing need for flexible generation to smooth the variable output of renewables – combined with new building standards that mandate solar panels on new homes – will increase the dependence on storage. The law defines the goals, but does not detail the means of procurement, meaning there is leeway in how the state meets the requirement. Challenges stemming from the operational realities of a fully renewables-powered California could be averted with other zero-carbon possibilities.



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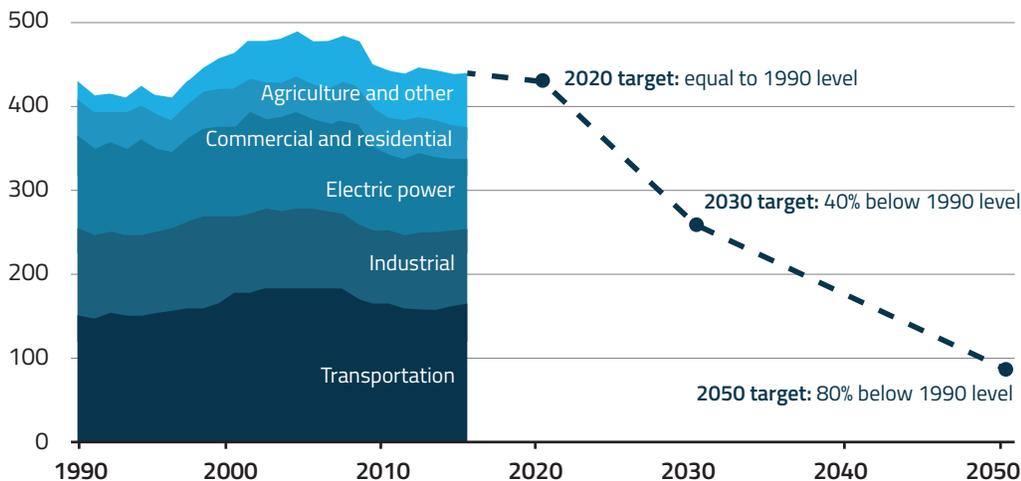
Emissions in California



In July, California Air Resources Board [announced](#) that **greenhouse gas emissions in California fell below 1990 levels for the first time since emissions peaked in 2004.**

Electricity generation had the largest decline among all the sectors with emissions dropping by 18 percent in 2016. Solar generation experienced a 33 percent growth while natural gas fell by more than 15 percent. **The board said that the price signal created by the emissions trading program rendered fossil fuel generation expensive, giving a boost to cleaner out-of-state power.** Hydroelectric power from outside the state grew by nearly 39 percent in 2016 thanks to heavy rainfall in the West Coast. The state has **a goal of curbing emissions by 40 percent by 2030 and 80 percent by 2050 relative to 1990 levels.**

California GHG emissions by sector and targets through 2050 (million tons CO₂ equivalent)

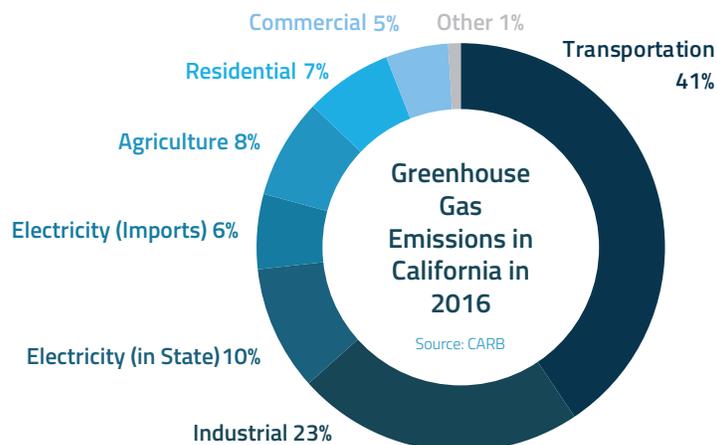


Source: EIA

Electric Vehicles and Path Forward



Zero-emission vehicles are critical to meet the state's goals **given that the transportation sector is the largest greenhouse gas emitting segment accounting for over 40 percent of California's emissions.** California's goal to have **five million zero-emission vehicles on the road ahead of the 2030 target date** will require the installation of over a **quarter-million chargers**, according to an Aug. 20 report by the California Energy Commission. At the end of 2017, nearly 14,000 public chargers, including, 1,500 fast chargers, served 350,000 plug-in electric vehicles.



Source: CARB

Recent Policies



California Enacts Law Banning Offshore Drilling in State Waters in a Counter to Trump's Expansion Plan

Sept. 8 - California Gov. Jerry Brown, a Democrat, [signed](#) legislation (**SB 834**) **banning the construction of pipelines and other oil and natural gas infrastructure within state waters**, hitting back against a proposal by the U.S. Interior Department to open more than 90 percent of the Outer Continental Shelf acreage to drilling. Gov. Brown also submitted the state's formal opposition to the agency's proposal to open new public land for drilling activities, saying that it contradicts the state's move to fight climate change and meet its objectives under the Paris climate accord.

California Grid Operator Board Clears Measures to Boost Energy Storage Role in Wholesale Markets

Sept. 5 - The California Independent System Operator Corporation board [approved](#) technical refinements that would **streamline the participation of energy storage and distributed energy resources in the wholesale market.** The measures include **enhanced bidding options** that would help better adapt to limitations of resources, such as demand response types that cannot respond instantly to real-time dispatch. Batteries would be allowed to absorb power when there is an oversupply and feed them back to the distribution system when needed. Interconnection improvements would provide connection options for new resources and allow for storage resources to continue to provide grid services.

Trade Group Seeks California Power Market Reforms as Growing Backstop Procurements Threaten Reliability

The Electric Power Supply Association [urged](#) the Federal Energy Regulatory Commission to find that the California Independent System Operator Corporation's resource **adequacy construct is fundamentally flawed** as it has forced the grid operator to rely on out-of-market mechanisms to obtain the capacity needed to maintain reliability and failed to support resource adequacy. The group sided with CXA La Paloma LLC which filed a complaint in June alleging that the "patchwork approach" has led to **insufficient revenues causing new and efficient generators to go bankrupt or exit the market.** The growing need for flexible generation to smooth the variable output of renewables – which will compound with new building standards that mandate solar panels on new homes – will increase the dependence on short-term out-of-market procurements. The association warned that failure to compensate independent generators will deter new entry, leading to higher prices for tighter supply and even shortages. To facilitate a durable market mechanism, the group asked the commission to order reforms to develop a three-year forward capacity market with mandatory auction participation and buyer-side mitigation rules. CXA La Paloma owns the 1,124-megawatt natural gas-fired La Paloma generating facility in California.

