

Green Energy is Gold for California and the USA

Daniel M. Kammen

I am a physicist, and an energy and sustainability science researcher, and live in California because of its penchant for not just setting -- but actually achieving big goals and bold visions that others consider too ambitious. What California proposes -- we then research, discuss, and accomplish. In fact, we continually exceed the goals that skeptics have said are unmeetable. This is why I believe that California should -- and ultimately will -- pass into law the "100 Percent Clean Energy Act" -- [Senate Bill 100](#) -- which would establish a bold goal of 100% clean, zero-carbon electricity by 2045.

To fully appreciate the multi-faceted benefits of SB 100 for California and the country, a bit of history is needed. Thanks to the law we passed in 2002—the Renewables Portfolio Standard (RPS)—the state has nearly tripled its use of renewable electricity. Today, renewables meet more than a quarter of the state’s electricity demand. Just last week, the [California Air Resources Board announced](#) that the state will meet its goal of reducing greenhouse gas emissions below 1990 levels in 2016 – a full four years ahead of its 2020 deadline. Our system of renewable electricity generation is a key driver of that success. In fact, the California Public Utilities Commission has estimated that California will likely [meet our 50% RPS goal well ahead of the 2030 deadline](#). California and New York State have emerged as national leaders in setting and meeting clean energy targets that have kept utility rates low, and funneled the majority of *all* US ‘cleantech’ investment through just these two states.

See the trend? California sets ambitious goals, and then exceeds them. Here’s more good news: California now has more people employed in the solar energy industry than in traditional utilities. I have been tracking job creation in the clean energy sector for fifteen years, where we find [two to four times more jobs](#) in solar, wind, sustainable biomass, efficiency and energy storage than in any fossil-fuel sector, and [true in California](#) as well. And the price of wind and solar has dropped faster than expected so that they are now [cost-competitive or cheaper than the cost of building new fossil-fuel-powered plants](#).

Next up is for California to establish the bold new goal to power our state with 100% clean, zero-carbon energy by 2045. SB 100 would mandate that 60% of our electricity demand be met with renewable sources, and allows flexibility for how the other 40% can be met via additional renewables, existing large hydropower, or other clean energy sources. In the world of clean energy research, we are focused on the innovations needed to reach ambitious goals like this. More synergies between clean energy and jobs for California exists here, too where the same wave of innovation we saw in solar energy -- where California played key research and deployment roles -- is now seeing the energy storage industry. California, with world-leading standards for utility deployment of batteries and flywheels, is both leading this charge, too, and stands to profit in revenue and in more jobs.

Big transformational goals are proven drivers of innovation, even as they may be controversial. A decade ago California passed SB 1, that set a target of 1 million solar roof-tops by 2020. The predictable response was that it was too ambitious, and more details were needed. Today, California has close to [700,000 solar rooftops](#), well on the way to the goal, each of which saves ratepayers on solar power that today is [often under 5 cents per kilowatt-hour](#), with residential rates more than *four times* that cost. Despite some legal and regulatory battles, solar saves utilities money, too on generation capacity coincident with peak demand, or that can be used to power electric vehicles, which in turn costs less than one-quarter of what it costs to drive a conventional internal combustion engine car.

Since 1999 I have served as a coordinating lead author for the Intergovernmental Panel on Climate Change (IPCC), where scientists have recognized that the electricity sector will need to be completely carbon-free by 2050 and that clean and renewable energy sources must become the dominant source of electricity powering buildings, industry and transportation if we are to succeed in keeping global temperature increases to below 2 degrees and avoiding the worst climate impacts that threaten California. As the world's fifth largest economy, California can pioneer this path and will gain economically as we develop new technologies and services that others will need as they too work towards global climate goals. Current political troubles aside, there is where the U. S. must ultimately go.

As we've seen repeatedly, and the world will see at the global Climate Action Summit that California will host in September, we have demonstrated the capacity and leadership needed to achieve big goals. SB 100 sets such a goal that is critical for a clean, healthy and profitable energy system. With the global clean energy market growing far faster than the fossil fuel sector, what California is doing is a good business decision for the state and the nation.

Daniel M Kammen is the founding director of the [Renewable and Appropriate Energy Laboratory](#) and a professor and chair in the Energy and Resources Group, and professor and director of the Center for Environmental Public Policy in the Goldman School at the University of California, Berkeley. Kammen has served as the Chief Technical Specialist for Renewable Energy and Energy Efficiency at the World Bank, and Science Envoy for the U. S. State Department.

Twitter: [@dan_kammen](#)

Laboratory: <http://rael.berkeley.edu>

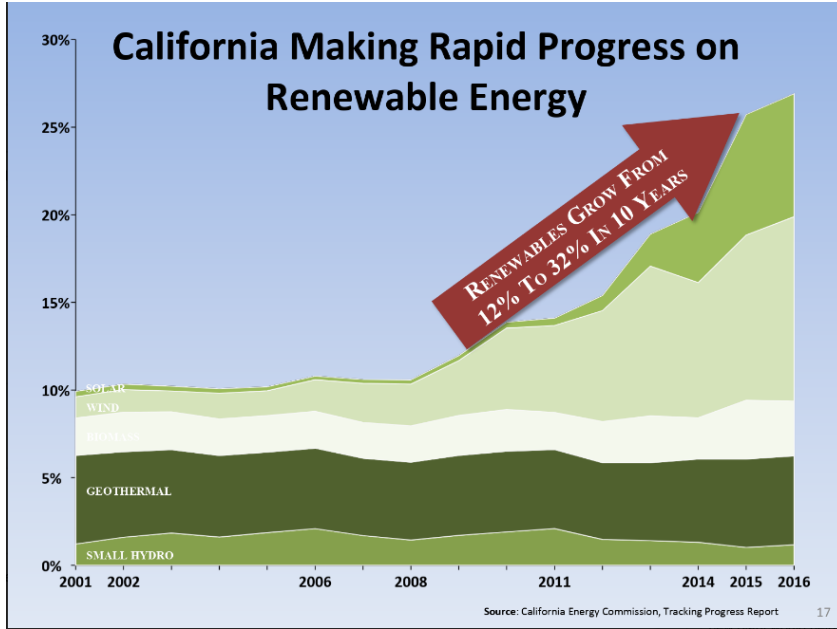


Figure 1: Almost a 3x increase in solar and wind energy in California, 2008 - 2018



Figure 2: Thirteen years after the California Legislature set a goal for 2020 of having 1 million solar rooftops in the state, there are close to 700,000 installed.