

## Green growth policies: California

### Abstract

*The U.S. state of California is not only very large—it would be the ninth largest economy in the world were it a sovereign nation—but one of the most energy efficient: California consumes the lowest amount of electricity per capita in the country; the state generates 15 percent of the country’s total renewable energy; and, it has consistently led the country in setting tighter and tighter CO<sub>2</sub> emissions standards. Through the “California effect” of imitation and legislation, the state has lifted up the environmental standards of the entire U.S. and even other countries that want to do business in this most populous and wealthy part of the U.S. What can other states and countries learn from California in the area of green growth? First, like Germany (see the Germany green growth brief), California started its drive towards green growth early: the state began pursuing environmental standards that exceeded federal minima in the 1940s and created the country’s first air pollution control districts in 1947. Early starters benefitted from less politicization and this then created its own political momentum that late starters may have to work harder to create when implementing greener policies. Second, direct and indirect regulations have made California’s energy prices the highest in the country. This has led to big efforts towards improvements in energy efficiency so that electricity bills as a portion of output are among the lowest in the country. Finally, the state is a hub of clean energy research and investment: the state hosts many of the world’s best research intensive universities and research centers; the state is the home of a highly skilled labor force, particularly in Silicon Valley; and, the state has played a role in helping venture capital find its way to energy efficient projects. California’s example shows how public intervention and private initiative can, at a sub-national level of government, push forward the agenda on green growth internationally.*

If the state of California was a country, it would be the ninth wealthiest in the world.<sup>1</sup> It would also be one of the greenest. Its commitment to sustainable growth is nothing new, and dates to early 1940s.<sup>2</sup> This focus on sustainable growth translated also into jobs: in 2008 employment in green establishments amounted to 163,616 (CCI 2010). This note tries to investigate how California became an American leader in green growth policies.

### America’s greenest

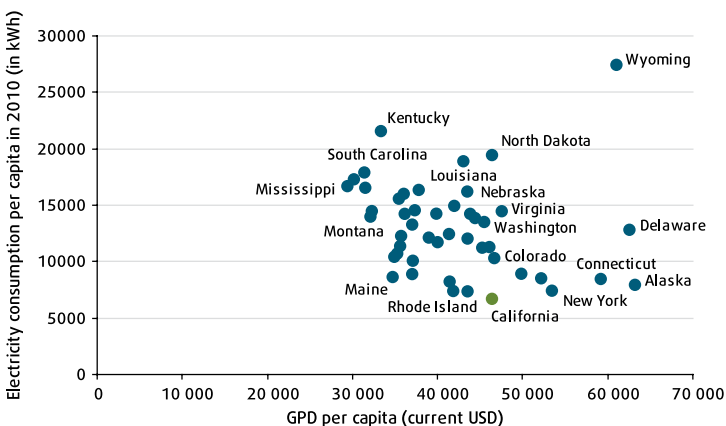
The U.S. states have a lot of independence when it comes to setting carbon emissions standards. California used this flexibility to set one of the highest standards in the world. Since the 1970s, electricity consumption per capita in California remained flat, in contrast to the U.S. national average.<sup>3</sup> Currently, those living in California consume the lowest amount of electricity per capita in the country: constituting half of the electricity consumption in state of Washington and one third of electricity consumption in Kentucky (Figure 1). And although part of this divergence stems from the state’s warm climate and cleaner industry profile, environmental policies also contributed to this success.<sup>4</sup> Around 12 percent of the state’s energy comes from renewable sources<sup>5</sup> and California accounts for almost 15 percent of US total renewable generation.<sup>6</sup>

### How to be green

There are several reasons behind California’s leadership in green growth.



**Figure 85: Electricity consumption per capita in 2010 (in kWh) and real GDP per capita in the US states<sup>7</sup>**



Source: US Bureau of Economic Analysis, California Energy Commission.

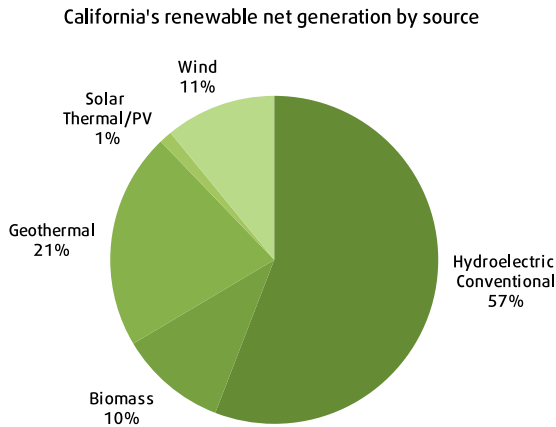
First, California's emphasis on sustainable development stems from rich history of environmental legislation. Due to severe air pollution in the Los Angeles Basin and high population growth, in 1947 the state of California created the first county-level Air Pollution Control Districts in the United States. In 1963, California set the first emissions controls for new vehicles in the US. Legislation protecting the environment gained momentum in the beginning of the 1970s. In 1974 the California Energy Commission (CEC) was established to consider applications for new power plants. Gradually, the commission mandate was expanded and it published the first state appliance performance standards in 1976 (Rosenfeld and Poskanzer 2009). The state focused on energy efficiency, such as building and appliance standards, which brought around \$56 billion in household energy savings between 1972 and 2006 (Mandell and Kelsey 2011). Among the panoply of energy efficiency measures, there were performance incentives in place for utilities that saved energy.<sup>8</sup> California's focus on efficiency was facilitated by the strong leadership of individuals such as Arthur H. Rosenfeld, former Commissioner of the California Energy Commission.<sup>9</sup> Efficiency gains have been a significant part of green growth strategy that translated into savings and prevented the construction of additional power plants.

Second, indirect and direct regulations in California made the energy prices higher. Currently, California has one of the most expensive residential electricity prices in the U.S. (15.60 cents/kWh vs. U.S. average of 12.17).<sup>10</sup> However, higher prices seem to have forced consumers to use energy more efficiently and made the electricity bills lower. In 2008, electricity bills as a percent of GDP in California were the fourth lowest in the U.S., after Utah, District of Columbia, and Colorado (Next 10, 2010).

Third, the state has been investing in green technologies. In 2007-2009, California registered the highest amount of green tech patents in the US.<sup>11</sup> In 2009, it accounted for more than 50 percent of clean energy technology venture capital investments and more than two thirds in the second quarter of 2010 (BACEI 2010). Although venture capital is usually not suitable for energy technology, due to long-term character of such investments, California started developing venture capital specialized in clean technology. Investments allowed for the development of renewable energy sources, from hydro to wind energy (figure 2). The innovation process is facilitated in the

state's wide base of cutting-edge companies. California is home to Silicon Valley, which thanks to network of innovative companies, skilled labor pool and financial capacity, is a leader in green innovation (CCI 2010).

**Figure 86: California's renewable net energy generation in 2010 by energy source**



Source: U.S. Energy Information Administration.

There are other factors at play. Rosenfeld and Poskanzer 2009 indicate that the combination of legislation with scientific knowledge facilitated by the state's leadership in energy efficiency. California has some of the best universities in the world and environmental research produced by these schools can and is used globally. National labs at Berkeley, Argonne, and Los Angeles worked with the legislators on energy efficiency issues. In 1971 Berkeley opened its first graduate program on energy, the Energy and Resources Group. The California Energy Commission cooperated with research labs, granting funds for academic research, and using the results for energy efficiency regulation (Hanemann 2007).

Finally, California has demonstrated a constant commitment to environmental policies. When legislation was first implemented in the 1940s, 1950s, and 1960s a controversy arose over whether California should be able to set higher environmental standards than those set out by national policies. Thanks to California's persistence, it was granted a special waiver (Hanemann 2007). Since then, California has been setting the standards higher and higher. By passing AB 32, the California Global Warming Solutions Act of 2006, the state committed to reduce GHG emissions to 1990 levels by 2020. As noted by Hanemann (2007), AB 32 is unique among green growth legislation because it is comprehensive and legally binding.<sup>12</sup> California is committed to sustainable growth because a clean environment and high quality of life are the states' assets that encourage people to move there. Additionally, having high-tech industry instead of more carbon-intensive industries gives California an important advantage.

### Going beyond states' borders

California's policymakers still face some limitations and concerns over energy supply. Mandell and Kelsey 2011 point out that long application processes for new plants hampers the expansion of energy supply. The authors also indicate flaws in the deregulation process, implemented in 1996, that gives an opportunity for traders to inflate energy prices.



Through more stringent regulations and strong leadership, California became the national leader in green growth policies that might serve as a model to other U.S. states and countries. Thus, some researchers talk about “California effect” – tougher regulations in California facilitated convergence in regulation in other states.<sup>13</sup> The effects could be international as well. Perkins and Neumayer (2011) investigate cross-country automobile emission standards and find that developing countries, which export automobiles and related components to countries with stricter emission standards, tend to have more stringent standards as well. However, estimates of Fredriksson and Millimet (2001) suggest that influence of California legislation on other states was minor, if any.

What others can learn from California’s experience? California’s case shows the role of strong leadership in shaping and implementing environmental policies. Investing in clean technology now could become an engine of economic growth in the future. California’s experience also illustrates that states and regions can go beyond national policies in promoting sustainable economic growth.

## Sources

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## Notes

- 1 Measured as GDP in current USD. California has a GDP of \$1,901.088 billion in 2010 (Source: Bureau of Economic Analysis). Comparisons to GDP data for the world in 2010 (Source: IMF WEO).
- 2 In 1947 the state of California created first county-level Air Pollution Control Districts. See: Mandell and Kelsey 2011.
- 3 This relationship is called the 'Rosenfeld curve' or 'Rosenfeld Effect'. See: Rosenfeld (2008).
- 4 Kandel et al. (2008) suggest that California's green growth policies help explain smaller electricity use in California. Authors use data on per capita electricity use in the US and California. Sudarshan and Sweeney (2008) estimate that for 2001 around 23 percent of the difference between California and the United States electricity consumption could be due to policy measures.
- 5 California Energy Commission, reference year: 2009.
- 6 US Energy Information Administration, reference year: 2010.
- 7 All US states listed with exception of District of Columbia.
- 8 For a comprehensive review of legislation on energy efficiency see Hanemann (2007).
- 9 Served as Commissioner of the California Energy Commission between 2000 and 2010.
- 10 U.S. Energy Information Administration.
- 11 458 patents registered in California. Source: Next 10 (2010).
- 12 In other states GHG emissions reductions are either not legally binding or apply to limited sectors e.g. only to electric power generation.
- 13 See: Vogel (1995).