



## A Clean Energy Industry Strengthens California's Economy

### The Issue

California and the rest of the world face an unprecedented challenge to address climate change and transition to a clean energy economy. Efforts to deal with this challenge are bringing new economic opportunities. Worldwide activities to develop and invest in clean energy and energy efficiency, reduce greenhouse gas emissions, and adapt to a changing climate have led to a new sector of economic activity centered around clean energy. While extensive research has studied the costs of new energy sources and greenhouse gas control, relatively little research has looked at the economic benefits that may result from these activities. To address this, the Air Resources Board (ARB) funded research to quantify the economic benefits this industry will bring to California – a leader in clean energy and climate change mitigation. Insights gained from this study are expected to help California state agencies advance clean technology development, improve California's competitiveness, and stimulate green businesses and job creation.

### Research Goals

This research was conducted to quantify the importance of the clean energy industry to the California, national, and global economies and to project its future growth. The study also examines state policies and strategies for state agencies to help foster the growth of this new sector in California.

### Results

The clean energy industry was classified into nine major segments and 48 sub-segments. The major segments consist of low-carbon power, carbon capture and storage, energy efficiency and demand response, energy storage, green buildings, transportation, carbon markets, adaptation, and consulting and research. Based on interviews and surveys of industry participants and analysis of market data, the study found:

- The clean energy industry generated an estimated \$27 billion in sales in California in 2009, representing 12 percent of the U.S. sales of \$223 billion and 2.5 percent of the worldwide sales of \$1.1 trillion.
- The clean energy industry accounted for 1.4 percent of the 2009 California gross state product, employing 123,000 Californians in 4,000 companies.
- Economic growth after the recession in 2009 along with carbon credits and other new state programs is expected to grow the clean energy industry in California to over \$140 billion in sales and 345,000 in employment in 2020.

**California Clean Energy Industry 2008-2012 (% growth)**

	2008	2009	2010	2011	2012
Low-Carbon Power	23	26	26	49	44
Carbon Capture & Storage	0	0	100	200	300
Energy Efficiency & Demand Response	11	6	9	6	3
Energy Storage	14	15	20	22	25
Green Buildings	19	-2	-1	17	21
Transportation	-2	-18	7	16	20
Carbon Markets	138	30	-15	346	619
Adaptation	59	31	29	16	16
Services: Consulting & Engineering	15	31	-1	22	13
<b>Total</b>	<b>11</b>	<b>-1</b>	<b>8</b>	<b>22</b>	<b>27</b>

## Conclusions and Impact

This research has shown that the clean energy industry is an important contributor to California's economy and will become increasingly so in the near future. By 2020, the clean energy industry is expected to become a major industry in California, accounting for 4.2 percent of the state's economy and over 2 percent of its total employment. While California currently plays a leading role in low-carbon power, energy storage, green building, and adaptation industries, by 2020, California is also expected to become a major player in transportation and carbon markets. In addition, this research demonstrated that government incentives, increasing energy costs, government standards (Renewable Portfolio Standard and Renewable Electricity Standard), climate policy, and corporate image are important market drivers for this growing industry.



## Related Research

This study provides a benchmark for the state of the clean energy industry prior to the complete implementation of AB 32 and its cap-and-trade program. Future studies will be able to more accurately assess the impact of AB 32 on California business competitiveness, energy dependency, economic growth, and employment.

Additional research assessing the significance of the green industry on job creation has been conducted by the California Employment Development Department (EDD), and by Next 10, a nonprofit organization focused on the economy and environment.



## More Information

For more information on the clean energy industry project, visit [www.arb.ca.gov/research/single-project.php?row\\_id=64818](http://www.arb.ca.gov/research/single-project.php?row_id=64818).

## About the Air Resources Board's Research Program

California's progress on addressing environmental problems is guided by a strong scientific knowledge base. The Air Resources Board sponsors a comprehensive program of research into the causes, effects, and solutions of the air pollution problem, supporting its regulations on cars, trucks, fuels, power plants, and other sources. The research is done under the guidance of ARB's Research Screening Committee and in partnership with the University of California system and other research institutions.

Learn more about these projects including their final reports, public seminars, articles in scientific journals, and other products by visiting [www.arb.ca.gov/research](http://www.arb.ca.gov/research).