

# California's Green Economy

## *Summary of Survey Results*

*A Report Prepared by*  
**State of California**  
**Employment Development Department**  
**Labor Market Information Division**



*October 2010*



**State of California**

*Arnold Schwarzenegger, Governor*

**Employment Development Department**

*Pam Harris, Chief Deputy Director*

*Dennis Petrie, Deputy Director*

*Workforce Services Branch*

*Steve Saxton, Chief*

*Labor Market Information Division*

# Acknowledgements

We would like to acknowledge the following individuals and organizations for their contributions to this work:

- California Air Resources Board
- U.S. Bureau of Labor Statistics
- California Community Colleges' Centers of Excellence
- California Department of Consumer Affairs Call Center
- California Energy Commission
- California Workforce Investment Board
- California Economic Strategy Panel
- California Labor and Workforce Development Agency
- Labor Market Information Division Advisory Group

Additionally, we would like to express our appreciation to the staff of the Labor Market Information Division for their dedication and work on this project.

**This page intentionally left blank.**

# Table of Contents

Executive Summary	7
Green Employment	7
Green Business Practices	8
Green Occupations	8
Introduction	9
Green Jobs: Defining and Understanding Shades of Green	9
Methodology	13
Sample Selection	13
Survey Questionnaire	13
Data Collection and Analysis	14
Survey Results	15
Green Employment	15
Employment by Industry	19
Size Distribution of Green Firms	22
Green Business Practices	25
Green Occupations	28
Conclusion	31
Appendix A – California Green Economy Survey	32
Appendix B – Green Economy Survey Response Rates	36
Appendix C – Green Job Descriptions and Employment Totals	37

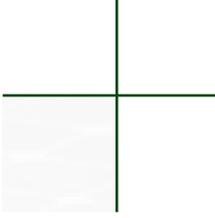
# Figures and Tables

## Figures

Figure 1 / Shades of Green: Sample Green Definitions	10
Figure 2 / Components of the GREEN Economy	11
Figure 3 / State Surveys Abound: Sample Approaches to Green Surveys	12
Figure 4 / Percent Employment by GREEN Categories	17
Figure 5 / Shares of GREEN Jobs And All Jobs in Region	17
Figure 6 / Shares of GREEN Jobs and All Jobs in Region (Work 50% or More)	19
Figure 7 / Industries with the Largest Number of GREEN Jobs	19
Figure 8 / Share of GREEN Jobs to All Jobs within Industry	21
Figure 9 / Size Distribution of Sample Firms	22
Figure 10 / Size of Business Comparison	22
Figure 11 / Size Distribution: Utilities, Manufacturing, and All Firms	23
Figure 12 / Use of Green Practices, Services or Products	25
Figure 13 / Methods of Preparing Current Workers for Green Jobs	26
Figure 14 / New Skills or Knowledge Future Employees Will Need	26
Figure 15 / Employer Expectations for Green Practices	27
Figure 16 / Benefits of Reducing Greenhouse Gas Emissions	27
Figure 17 / Top 10 GREEN Occupations	28
Figure 18 / Top Occupations: All Firms Reporting Green Jobs	30

## Tables

Table 1 / GREEN Employment by Economic Strategy Panel Region	16
Table 2 / GREEN Employment by Economic Strategy Panel Region (Work 50% or More)	18
Table 3 / GREEN Employment by Industry Sector	20
Table 4 / GREEN Employment by Size Class	24
Table 5 / GREEN Employment by Size Class (Work 50% or More)	24



# Executive Summary

In early 2008, following enactment of the federal Green Jobs Act of 2007, the California Employment Development Department's Labor Market Information Division (LMID) began a study of California's green economy, in partnership with state, local and national policy makers and researchers. There was strong interest in understanding the nature of the green economy, the number of green jobs, and the effects of environmental policy initiatives on the growth of industries in the state.

In response, LMID staff initially compiled and studied available research summarizing the assumptions and findings from more than 100 documents produced worldwide. Based on this research, LMID staff found little reliable data on the extent to which the green economy was affecting employment in California. After consulting with stakeholders, LMID decided to conduct a survey covering all segments of California's economy in order to estimate the number of green jobs and green business practices.<sup>1</sup> This report presents major findings from the California Green Economy Survey, focusing on green employment and green business practices.

## Green Employment

The survey estimated the number of green jobs, categorized according to LMID's working definition of GREEN — jobs that produce ("supply") goods or services that result in:<sup>2</sup>

**G**enerating and storing renewable energy

**R**ecycling existing materials

**E**nergy efficient product manufacturing, distribution, construction, installation, and maintenance

**E**ducation, compliance, and awareness

**N**atural and sustainable product manufacturing

The results of the survey indicate that 7.9 percent of California businesses employ workers to produce green products or supply green services. Employment in the production of green goods and services accounted for an estimated 3.4 percent of California's total wage and salary employment for the survey time period, with close to 433,000 individuals performing green work at least part time. Among the workers with green responsibilities, more than 263,000 spend 50 percent or more of their working hours in green activities.

The state's most heavily populated regions reported the largest number of green jobs, although the greatest concentrations were found in some of the least populated regions. Within industry sectors, manufacturing reported the largest number of workers performing green activities, while utilities reported the highest percentage of workers performing green activities.

---

<sup>1</sup> The Green Economy survey form is included in Appendix A and also available online at [www.labormarketinfo.edd.ca.gov/?pageid=1032](http://www.labormarketinfo.edd.ca.gov/?pageid=1032).

<sup>2</sup> More discussion of LMID's working definition of GREEN is included in the Introduction section of this report and can be accessed online at [www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov).

## **Green Business Practices**

The Green Economy Survey also asked businesses to respond to several questions about the extent of their adoption of green business practices. The findings show that an estimated 63 percent of firms in California are involved in green business practices, regardless of whether or not they directly produce a green good or service. The most common practices are recycling and using recycled materials.

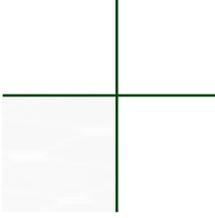
## **Green Occupations**

Thirty-four occupations commonly associated with green work activities were included in the Green Economy Survey. Employers were asked to report the number of staff working in those positions. The occupations most frequently reported were assemblers, carpenters, hazardous material removal workers, recycling center operators, and sustainable farmers and farm workers. About nine percent of workers were identified by respondents as “All Other” — a category that may be viewed as capturing new or emerging green occupations. LMID has compiled and is analyzing the job titles listed in the “All Other” category.

While this report summarizes the main statistical findings of the green economy survey, looking forward, LMID’s research will focus on related topics, such as:

- Regional differences among industries and green activities.
- Green industry details.
- Skills required to perform green jobs and training methods used to obtain these skills.

In addition, LMID plans to follow-up with some of the 5,000 businesses that expressed a willingness to provide additional information about green jobs, associated training requirements, and desirable skill sets.



# Introduction

In May 2009, the California Employment Development Department's (EDD) Labor Market Information Division (LMID) launched the California Green Economy Survey (Green Survey) in collaboration with California's Labor and Workforce Development Agency, Economic Strategy Panel, State Workforce Investment Board, Air Resources Board, Community Colleges, and Energy Commission.

The survey was mailed to a stratified random sample of more than 51,100 private and public-sector employers representing all industries, firm sizes, and counties in the state. The survey objectives were to:

- Obtain an estimate of the current number of green jobs in California.
- Identify the current and changing business practices that are helping California to achieve a cleaner, more sustainable environment — in terms of both producers and users of green or sustainable technology/energy.
- Identify the occupations that are emerging in our movement toward a cleaner, more sustainable economy.
- Identify resources and strategies to assist businesses in cutting costs by reducing energy usage and greenhouse gas emissions.

This report presents major findings from the survey and focuses on analyzing survey results, while touching only lightly on policy implications. In collaboration with the partners identified above, future reports will address policy implications more thoroughly.

## **Green Jobs: Defining and Understanding Shades of Green**

One of the biggest challenges in the national discussion about the emerging green economy is defining and understanding what constitutes a green job. What is a green job? How do we decide if an activity or a job function is green? How do we know if our job is a green job?

The use of the term “green jobs” has become increasingly popularized in policy circles and mainstream media. Interest in green jobs has run parallel with increasing awareness of climate change and a growing desire to redress environmental pollution.

Although sustainability and related concepts are frequently cited, there is no widely accepted definition of a “green job,” either domestically or internationally. There is no agreed upon metric to determine what sectors or sub-sectors of industries qualify as green goods producers or service providers. It is challenging to differentiate between varying types of sustainable practices and to determine what threshold defines an “environmentally-friendly” business.

In some ideal future, businesses may only produce sustainable products and services using sustainable practices. In today's world, however, some businesses use practices that are not green to produce products or services that enable other businesses or individuals to reduce their impact on the environment. Conversely, some businesses use sustainable practices to produce non-sustainable products or services.

In early 2008, the LMID began participating in an ongoing, national dialogue with a consortium of state labor market information offices about measuring the green economy and green jobs. To inform the dialogue, consortium members began reviewing existing research on the subject of clean and green jobs from around the world. The LMID created a Web portal containing links to published green studies, other survey materials, green job activities, and legislative information from contributors throughout the nation.

LMID staff also developed a digest of the green studies, summarizing the information so that important elements, such as the green definitions used and green occupations identified, could be compared between reports.<sup>3</sup> To date, more than 130 studies with varying definitions of “green” have been reviewed and catalogued. Figure 1 contains a sample of the green definitions employed by researchers and government entities.<sup>4</sup>

Figure 1 / Shades of Green: Sample Green Definitions

<p><i>Apollo Alliance</i> www.apolloalliance.org</p>	<p>Green-collar jobs, as we define them, are well paid, career track jobs that contribute directly to preserving or enhancing environmental quality. Like traditional blue-collar jobs, green-collar jobs range from low-skill, entry-level positions to high-skill, higher-paid jobs, and include opportunities for advancement in both skills and wages.</p>
<p><i>Bureau of Labor Statistics</i> www.bls.gov</p>	<p>Green jobs, also called green-collar jobs, are broadly defined as either jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources, or jobs in which workers’ duties involve making their establishment’s production processes more environmentally friendly or use fewer natural resources. Green goods, services, and production processes generally fall into the following categories: renewable energy; energy efficiency; greenhouse gas reduction; pollution reduction and cleanup; recycling and waste reduction; natural resources conservation; and education, compliance, public awareness and training.</p>
<p><i>Pew Report</i> www.pewtrusts.org</p>	<p>A clean energy economy generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.</p>
<p><i>State of Oregon</i> www.leg.state.or.us</p>	<p>Green job: A job that provides a service or produces a product in any of the five green categories...Producing energy efficiency; Producing renewable energy; Preventing, reducing, or mitigating environmental degradation; Cleaning up and restoring the natural environment; and Providing education, consulting, policy promotion, accreditation, trading and offsets, or similar services supporting the above four categories.</p>
<p><i>State of Washington</i> www.energy.wsu.edu</p>	<p>Green Jobs: jobs that promote environmental protection and clean energy security. Jobs that directly support environmental protection and clean energy in one of the four green categories: renewable energy, energy efficiency, mitigation and cleanup of pollution, preventing or reducing pollution.</p>
<p><i>United Nations</i> www.un.org</p>	<p>Green jobs involve some task associated with improving the environment, including reducing carbon emissions and creating and/or using energy more efficiently.</p>

<sup>3</sup>The digest and other green economy materials are available online at [www.labormarketinfo.edd.ca.gov/?pageid=1032](http://www.labormarketinfo.edd.ca.gov/?pageid=1032).

<sup>4</sup>In March 2010, the federal Bureau of Labor Statistics (BLS) solicited comments on their definition of green jobs. The BLS has been charged with developing and implementing the collection of new data on green jobs. To view the actions they have taken to date, go to [www.bls.gov/green](http://www.bls.gov/green).

Informed by these studies and by extensive discussion with partner organizations, LMID developed a working definition of green activities that is both rigorous and flexible. More specifically, LMID defined a green job as one whose activities: 1) generate and store renewable energy; 2) collect and/or process recyclable materials; 3) manufacture, distribute, construct, installation, and maintain energy efficient products; 4) foster education, environmental consulting, regulatory compliance, and awareness; or 5) manufacture natural and sustainable products. For survey purposes, a green job was summarized by the mnemonic GREEN, and is defined more fully in Figure 2.<sup>5</sup>

Figure 2 / Components of the GREEN Economy

- G** *Generating and storing renewable energy*  
This category of green goods and services includes alternative energy generated by, but not limited to: wind, solar, water, biofuels, biomass, hydrogen fuel cells, and geothermal.
- R** *Recycling existing materials*  
Corporations involved in the collection and processing of recyclable materials, including firms running a recycling or wastewater plant. It includes environmental clean-up and remediation but does not include companies that provide bins for recyclable paper, glass and cans.
- E** *Energy efficient product manufacturing, distribution, construction, installation and maintenance*  
Companies involved in the research, development, and manufacturing of products such as solar panels, energy efficient light bulbs and vehicles. It also includes construction companies that install and repair these products in new or existing residential or commercial real estate, as well as real estate planning and land development.
- E** *Education, compliance and awareness*  
Training providers for curricula such as solar panel installation, energy auditing, sustainability management, and environmental careers. It also includes environmental consulting, companies involved with governmental or legislative compliance, conservation and wildlife programs, trading and offsets, and social assistance.
- N** *Natural and sustainable product manufacturing*  
Firms that create products using natural materials. Also includes businesses that produce safe, nontoxic products; bamboo products; products out of previously-recycled materials, and agricultural firms that practice sustainable farming.

California's Green Survey primarily targets the green economy at the job level. Several other states conducting similar research are also collecting information from employers about green jobs. California's survey can be compared to these other states' efforts, including Kansas, Michigan, Minnesota, Oregon, and Washington. All of these surveys provide a baseline understanding of green employment and green business practices.

At the national level, a recent report published by the Workforce Information Council noted the variation of green job definitions, survey questions, and methodologies from state to state.<sup>6</sup>

<sup>5</sup>Access the detailed GREEN definition online at [www.labormarketinfo.edd.ca.gov/article.asp?articleid=1229](http://www.labormarketinfo.edd.ca.gov/article.asp?articleid=1229).

<sup>6</sup>The Workforce Information Council was established by the federal Workforce Investment Act (Section 309) of 1998 and calls for the Secretary of Labor, through the Bureau of Labor Statistics and other federal agencies and the states, to plan for and oversee the nationwide workforce information system. To find out more information about the council and its activities, go to [www.workforceinfocouncil.org](http://www.workforceinfocouncil.org); to access the report referenced here, go to [www.workforceinfocouncil.org/GreenJobs.asp](http://www.workforceinfocouncil.org/GreenJobs.asp).

Drawing on local context, industries included in the surveys reflect the diversity of state economies. A sample of these differing research approaches is shown in Figure 3.<sup>7</sup>

Figure 3 / State Surveys Abound: Sample Approaches to Green Surveys

	<b>Purpose</b>	<b>Context/Use of Survey</b>
<i>California</i>	To estimate current green jobs and identify emerging or evolving occupations related to the green economy. To identify current or changing business practices toward a cleaner, more sustainable environment and identify means to assist businesses in cutting costs through energy efficiency and reduced emissions.	To identify new and emerging green jobs with a focus on 34 pre-defined occupational categories with specific green-related activities or skills. Survey also collects information on green business practices and other related information, employing a significantly different set of questions and questionnaire design than the other states.
<i>Michigan</i>	To estimate direct green jobs, with unique measurement of some support jobs. Other purposes are hiring difficulties, filling job vacancies, and skill requirements.	Survey designed as part of three-pronged approach including quantitative (survey) data, analysis of LMI data, and qualitative information from focus groups.
<i>Oregon</i>	To count jobs where work in green activities is essential to the function of the job, along with associated wages, special job requirements, and education.	Emphasis on collecting wage and educational requirements. The report analyzes green jobs, aggregated to the SOC and NAICS level independent of green categories.
<i>Washington</i>	The goal of the survey was to identify the number of jobs [direct only] that have been created within the state's emerging 'green economy' and to establish a baseline measure that can be used to track industry and job growth over time.	Survey kept short to reduce burden on employer with results intended for use with LMI wage, projections and work requirements information. Washington also determined there was value in collecting information on whether a job was full or part time and whether the business had any green-related industry certifications.

There are two distinctive aspects of California's Green Survey that are not mentioned in Figure 3. First, California constructed an all-encompassing sample of firms. The survey utilized a stratified random sample across all industry types, geographic regions, and employer size classes.<sup>8</sup> Second, in addition to asking employers for information regarding jobs that produce green goods and services, the survey also included questions to identify established green business practices.

<sup>7</sup>As referenced in Figure 3, the Standard Occupational Classification (SOC) is a national used system for classifying occupations; the North American Industry Classification System (NAICS) is used by Canada, Mexico, and the United States to classify industries.

<sup>8</sup>The only industry excluded was Private Household employers. These employers typically employ individuals such as cooks, maids, nannies, butlers, gardeners, caretakers and other maintenance workers who work at a private residence. In 2009, there were an estimated 434,000 private household employers statewide, employing close to 329,000 workers (or less than one worker per employer). Due to the unique nature of these employers, they were excluded from the sample.

# Methodology

The Green Survey goals were to: 1) measure the number of green workers, 2) determine the extent of and reasons behind business adoption of green practices, and 3) identify emerging green occupations to facilitate future research into the skills needed to perform these occupations. To accomplish these goals, LMID developed a rigorous sampling method and survey design.

## *Sample Selection*

LMID's data collection process was designed to support detailed analysis by industry, geographic area, and employer size. A randomly assigned employer sample, stratified by these three variables was selected from EDD's employer database.<sup>9</sup>

- Geographic areas represented all metropolitan areas and non-metropolitan groups of counties.
- Industry stratification was at the two- or three-digit level of the North American Industry Classification System (NAICS).<sup>10</sup>
- Four business size categories were used, with size determined by the number of workers employed at the business location. These categories were 0-19, 20-99, 100-249, and 250 and above. All employers in the largest size category were included in the sample.

Appropriate weights were then assigned to each sample member to represent other firms in their stratum. With the sample of firms selected, EDD mailed a survey questionnaire to more than 51,100 California employers beginning in late May 2009.<sup>11</sup>

## *Survey Questionnaire*

The first section of the survey asked employers to identify the total number of employees at their site and, of these, how many generated products or services as identified by each of the GREEN categories. The question further asked the employer how many of those holding green jobs worked half time or more in this category.

The second section of the survey asked about an employer's green or sustainable business practices (i.e., the manner in which they operate their business) and what new skills or knowledge future employees would need for the firm to be more environmentally friendly.

The final section of the survey asked employers to estimate the number of current employees in 34 occupational categories that are involved in green work activities. This section was intended to provide a sense of the occupations affected by the movement toward environmental sustainability as well as provide information that would help focus further research into occupational skills needed to support the green economy.

---

<sup>9</sup>Employers were sampled from the Quarterly Census of Employment and Wages (QCEW) database. More information can be found at [www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov).

<sup>10</sup>For more information on the NAICS coding system, visit [www.census.gov/eos/www/naics](http://www.census.gov/eos/www/naics).

<sup>11</sup>The Green Economy survey form is included in Appendix A and also available online at [www.labormarketinfo.edd.ca.gov/?pageid=1032](http://www.labormarketinfo.edd.ca.gov/?pageid=1032).

### *Data Collection and Analysis*

Employers had the option of responding to the survey by one of several methods, including mail, telephone, fax, email, or online.

It should be noted that green employment estimates are based on employer self-identification. While the survey team removed a small amount of employment from some respondents that clearly reported incorrectly, the vast majority of responses were accepted without independent outside verification.

As with all surveys, results should be viewed with caution. While every effort was made to draw a representative sample and accurately apply weights to the reported responses, surveys are subject to both sampling and nonsampling error. Recognizing that unrounded data may imply a level of accuracy that cannot be attained, tabulated figures are rounded to the nearest ten.

Following completion of the survey process, administrative data on industry employment were linked to the survey findings to weight survey responses and estimate economy-wide employment. The source of these administrative data was the Quarterly Census of Employment and Wages program, which LMID operates in California for the federal Bureau of Labor Statistics.

# Survey Results

The following survey results are presented as a series of tables and graphs with accompanying narrative that describes the main findings. The survey questionnaire is in Appendix A, with additional survey results presented in Appendices B and C.

Of the businesses contacted during the survey period (May 2009 – January 2010), almost 15,200 chose to participate, representing 30 percent of the more than 51,100 businesses surveyed. When out-of-business firms and consolidations are factored in, the response rate rises to 35 percent.<sup>12</sup>

## Green Employment

The total green jobs estimate of 432,840 accounted for 3.4 percent of California's total employment for the survey period. Classified into the five GREEN areas, as well as an "Other" category for additional jobs that employers reported, Table 1 presents employment totals based on the nine regions defined by California's Economic Strategy Panel.<sup>13</sup>

The state's most heavily populated regions reported the largest number of green jobs, with the San Francisco Bay Area and Southern California accounting for nearly 70 percent of the green jobs statewide. However, when comparing the total percent of green jobs in a region to all jobs in a region, the Northern California Region displayed a higher percentage of green jobs at 8.1 percent, followed by the Central Sierra Region at 4.8 percent. Furthermore, the San Francisco Bay Area, at 4.4 percent, is almost one percentage point higher than the statewide average, whereas Southern California, at 2.9 percent, is one-half of a percentage point lower than the statewide average.

California's green jobs estimate of 3.4 percent of all private- and public-sector employment is in line with estimates from other states. Oregon estimated green jobs employment at 3.0 percent of all private- and public-sector employment.<sup>14</sup> Michigan's estimate was also 3.0 percent, but only for private-sector employment.<sup>15</sup> Washington's initial estimate was 1.6 percent, based on a survey of select private industries. Washington subsequently conducted a second survey across all industries in both the private and public sectors; this second survey increased their estimate of green jobs to 3.3 percent of all jobs.<sup>16</sup> Kansas estimated primary green jobs employment at 1.5 percent and support green jobs employment at 1.9 percent of its total covered employment.<sup>17</sup> However, as each state's survey was based on somewhat different green definitions and samples, outcomes are not directly comparable.

---

<sup>12</sup>A consolidation occurred when firms sampled at more than one location turned in a single questionnaire reporting statewide totals. For example, a firm that initially received five questionnaires for locations in five different counties only turned in one questionnaire with their statewide data, thus reducing their total sample count from five to one.

<sup>13</sup>California's Economic Strategy Panel, initially established by statute in October 1993, examines changes in the state's economic base and industry sectors to help develop strategic initiatives to guide public policy decisions for economic growth and competitiveness. The Panel first identified California's economy as an economy of regions in 1996. More information on the Panel is available online at [www.labor.ca.gov/panel](http://www.labor.ca.gov/panel).

<sup>14</sup>For more on Oregon's green research, access the report online at [www.qualityinfo.org/pubs/green/greening.pdf](http://www.qualityinfo.org/pubs/green/greening.pdf).

<sup>15</sup>For more about Michigan's green employment estimates, access the report online at [www.michigan.gov/documents/nwlb/GJC\\_GreenReport\\_Print\\_277833\\_7.pdf](http://www.michigan.gov/documents/nwlb/GJC_GreenReport_Print_277833_7.pdf).

<sup>16</sup>Washington's green report is available online at [www.workforceexplorer.com/admin/uploadedPublications/9463\\_Green\\_Jobs\\_Report\\_2008\\_WEXVersion.pdf](http://www.workforceexplorer.com/admin/uploadedPublications/9463_Green_Jobs_Report_2008_WEXVersion.pdf).

<sup>17</sup>The 2009 Kansas Green Jobs Report is online at [www.dol.ks.gov/LMIS/GoingGreen/KansasGreenJobsReport.pdf](http://www.dol.ks.gov/LMIS/GoingGreen/KansasGreenJobsReport.pdf).

Table 1 / GREEN Employment by Economic Strategy Panel Region

Work Anytime in this Capacity

Region	G	R	E	E	N	Other	Total	% Green Jobs by Region	Green Jobs:		
									All Firms Total Emp	% All Firms by Region	Share of All Jobs
Bay Area	3,510	25,120	39,810	26,270	25,010	320	120,030	27.7%	2,756,270	21.9%	4.4%
Central Coast	340	1,780	3,740	1,160	6,330	0	13,350	3.1%	336,140	2.7%	4.0%
Central Sierra	60	580	90	250	1,010	0	1,990	0.5%	41,590	0.3%	4.8%
Greater Sacramento	1,550	13,150	4,260	2,290	2,010	0	23,260	5.4%	808,810	6.4%	2.9%
Northern California	550	1,390	1,610	2,740	4,070	0	10,360	2.4%	127,720	1.0%	8.1%
Northern Sacramento Valley	210	650	1,160	510	1,750	0	4,280	1.0%	95,980	0.8%	4.5%
San Joaquin Valley	830	7,720	5,060	2,370	21,750	0	37,730	8.7%	995,480	7.9%	3.8%
Southern Border	1,450	12,530	14,880	5,130	3,730	0	37,740	8.7%	1,176,630	9.3%	3.2%
Southern California	16,510	51,020	46,220	29,310	35,380	100	178,550	41.3%	6,096,480	48.3%	2.9%
Other	10	1,440	540	2,000	1,480	90	5,570	1.3%	175,420	1.4%	3.2%
<b>All Regions</b>	<b>25,030</b>	<b>115,370</b>	<b>117,390</b>	<b>72,020</b>	<b>102,530</b>	<b>510</b>	<b>432,840</b>	<b>100.0%</b>	<b>12,610,520</b>	<b>100.0%</b>	<b>3.4%</b>
	5.8%	26.7%	27.1%	16.6%	23.7%	0.1%	100%				

- G**enerating and Storing Renewable Energy
- R**ecycling Existing Materials
- E**nergy Efficient Product Manufacturing, Distribution, Construction, Installation, and Maintenance
- E**ducation, Compliance, and Awareness
- N**atural and Sustainable Product Manufacturing

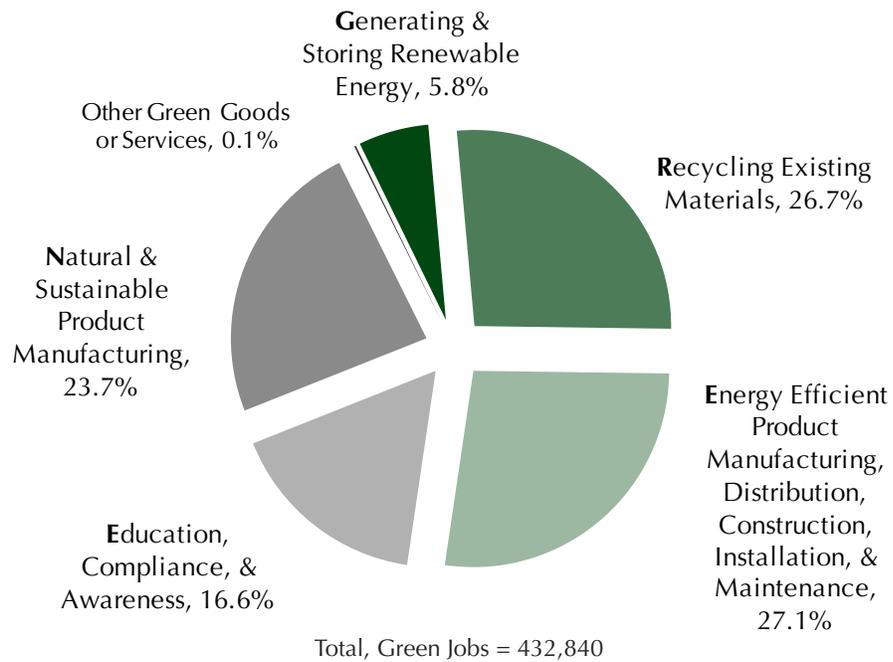
Note: Totals may not add due to rounding.

Economic Strategy Panel Regions

- Bay Area:** Alameda, Contra Costa, Marin, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma Counties
- Central Coast:** Monterey, San Luis Obispo, and Santa Barbara Counties
- Central Sierra:** Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, and Tuolumne Counties
- Greater Sacramento:** El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba Counties
- Northern California:** Del Norte, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Plumas, Sierra, Siskiyou, and Trinity Counties
- Northern Sacramento Valley:** Butte, Colusa, Glenn, Shasta, and Tehama Counties
- San Joaquin Valley:** Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare Counties
- Southern Border:** Imperial and San Diego Counties
- Southern California:** Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties
- Other:** Statewide, Multi-County, no Primary County and Undetermined County

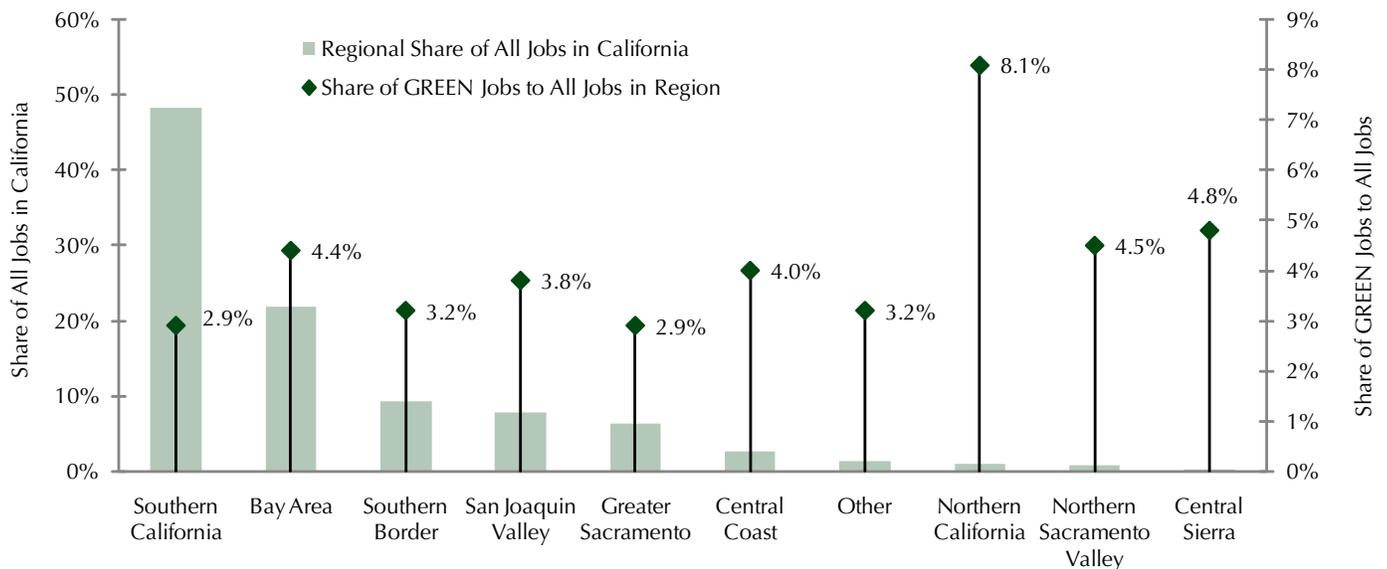
Figure 4 illustrates the statewide percentage of employment by GREEN categories. Energy efficient product manufacturing (27 percent), recycling existing materials (27 percent), and natural and sustainable product manufacturing (24 percent) accounted for the largest shares of green jobs, representing 77.5 percent of total employment.

Figure 4 / Percent Employment by GREEN Categories



In Figure 5, the regions' share of all jobs in the state and the percentage of green jobs to all jobs for every region is displayed — highlighting that the three smallest employment regions in California (Northern California, Northern Sacramento Valley and Central Sierra) had the highest percentage of green jobs.

Figure 5 / Shares of GREEN Jobs and All Jobs in Region



Total, All Jobs in California: 12,610,520  
 Total, Green Jobs: 432,840

The green survey not only asked employers how many of their employees currently produced green goods or services, but also asked how many of them worked 50 percent or more of the time on their green job activities. Some believe that a count of these employees who work 50 percent or more paints a stronger picture of the number of green workers in California. Table 2 shows the 50 percent or more employment estimates. Accounting for 2.1 percent of all jobs during the time period, employers reported more than 263,000 jobs where individuals worked 50 percent or more of their time in green activities.

On the following page, Figure 6 displays each region's share of all jobs in California along with the share of GREEN jobs (working 50% or more) to all jobs by region. Again, two of the smaller employment regions, Northern California and Central Sierra, had the greatest share of green jobs to all jobs.

Table 2 / GREEN Employment by Economic Strategy Panel Region

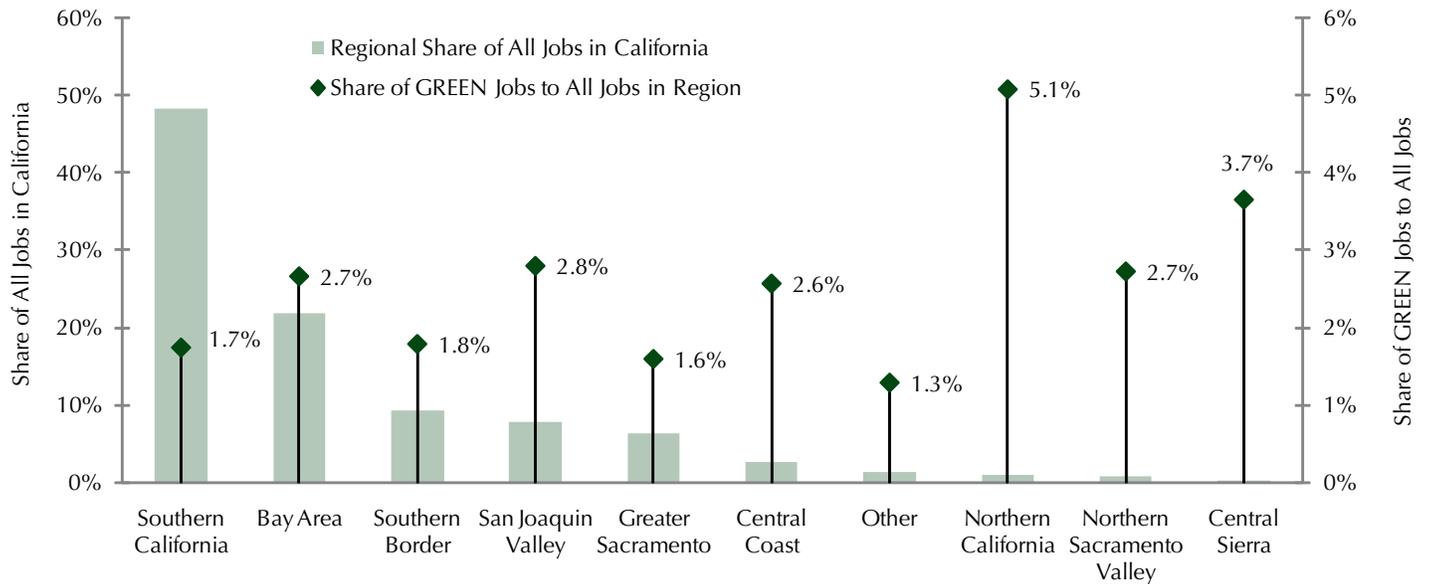
Work 50% or More in this Capacity

Region	G	R	E	E	N	Other	Total	% Green Jobs by Region	Green Jobs:		
									All Firms Total Emp	% All Firms by Region	Share of All Jobs
Bay Area	1,710	11,660	24,720	15,340	19,740	320	73,480	27.9%	2,756,270	21.9%	2.7%
Central Coast	230	390	2,700	520	4,810	0	8,650	3.3%	336,140	2.7%	2.6%
Central Sierra	0	480	20	130	890	0	1,520	0.6%	41,590	0.3%	3.7%
Greater Sacramento	620	9,390	1,710	430	780	0	12,920	4.9%	808,810	6.4%	1.6%
Northern California	190	310	1,030	1,800	3,160	0	6,490	2.5%	127,720	1.0%	5.1%
Northern Sacramento Valley	30	580	750	190	1,070	0	2,620	1.0%	95,980	0.8%	2.7%
San Joaquin Valley	320	4,130	2,780	1,760	18,890	0	27,880	10.6%	995,480	7.9%	2.8%
Southern Border	1,170	5,680	8,860	2,900	2,460	0	21,060	8.0%	1,176,630	9.3%	1.8%
Southern California	13,330	27,640	24,000	13,660	27,590	100	106,330	40.4%	6,096,480	48.3%	1.7%
Other	10	610	510	250	790	90	2,260	0.9%	175,420	1.4%	1.3%
<b>All Regions</b>	<b>17,600</b>	<b>60,870</b>	<b>67,080</b>	<b>36,980</b>	<b>80,170</b>	<b>510</b>	<b>263,220</b>	<b>100.0%</b>	<b>12,610,520</b>	<b>100%</b>	<b>2.1%</b>
	6.7%	23.1%	25.5%	14.0%	30.5%	0.2%	100%				

- G**enerating and Storing Renewable Energy
- R**ecycling Existing Materials
- E**nergy Efficient Product Manufacturing, Distribution, Construction, Installation, and Maintenance
- E**ducation, Compliance, and Awareness
- N**atural and Sustainable Product Manufacturing

Note: Totals may not add due to rounding.

Figure 6 / Shares of GREEN Jobs and All Jobs in Region (Work 50% or More)



Total, All Jobs in California: 12,610,520  
 Total, Green Jobs (Work 50% or More): 263,320

### Employment by Industry

Employers in all 20 major industry sectors reported at least some green jobs, with the manufacturing and construction sectors reporting the greatest numbers. Mining and finance and insurance sector employers reported the fewest number of green jobs. Two of the survey's five GREEN categories, energy efficient product manufacturing and natural and sustainable product manufacturing, focused on manufactured goods. In Figure 7 below, the five sectors with the largest number of GREEN jobs are shown; on the following page, GREEN job estimates by all 20 major industry sectors are shown in Table 3.

Figure 7 / Industries with the Largest Number of GREEN Jobs

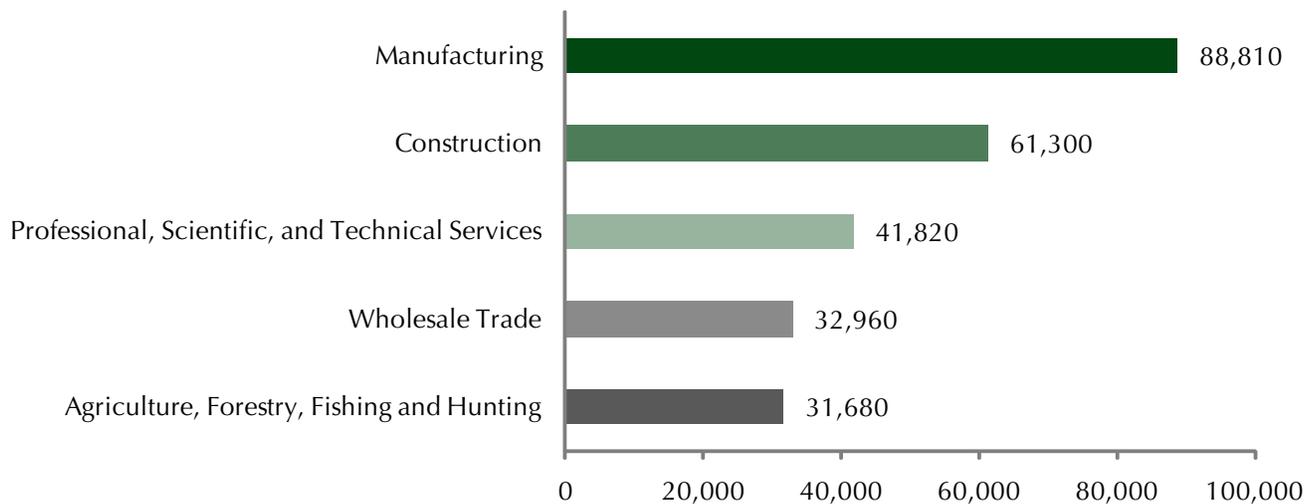


Table 3 / GREEN Employment by Industry Sector

Work Anytime in this Capacity

Industry Sector	G	R	E	E	N	Other	Total	% Green Jobs by Sector	Total Industry Employment
Agriculture, Forestry, Fishing and Hunting	210	610	520	790	29,560	0	31,680	7.3%	359,620
Mining	190	820	10	10	930	0	1,960	0.5%	10,740
Utilities	10,440	4,480	920	1,600	500	0	17,950	4.1%	64,620
Construction	2,370	9,420	42,350	3,600	3,560	0	61,300	14.2%	559,480
Manufacturing	1,590	16,550	25,290	2,690	42,690	0	88,810	20.5%	1,029,090
Wholesale Trade	1,760	16,120	5,230	3,180	6,580	90	32,960	7.6%	592,280
Retail Trade	600	10,330	11,510	2,300	2,860	50	27,660	6.4%	1,349,930
Transportation and Warehousing	690	3,950	4,140	4,300	0	0	13,080	3.0%	400,950
Information	0	550	1,500	2,030	730	0	4,810	1.1%	399,680
Finance and Insurance	0	1,090	0	660	0	50	1,800	0.4%	472,410
Real Estate and Rental and Leasing	50	2,060	1,040	230	0	0	3,370	0.8%	222,210
Professional, Scientific, and Technical Services	4,430	4,080	10,580	18,750	3,980	0	41,820	9.7%	934,750
Management of Companies and Enterprises	560	790	2,440	530	0	0	4,320	1.0%	171,650
Administrative and Support and Waste Management and Remediation Services	530	16,650	3,140	3,280	2,940	0	26,540	6.1%	778,750
Educational Services	410	5,550	2,040	9,270	2,200	0	19,470	4.5%	1,123,150
Health Care and Social Assistance	130	5,270	420	1,160	530	90	7,610	1.8%	1,506,280
Arts, Entertainment, and Recreation	150	590	20	1,540	110	50	2,460	0.6%	246,250
Accommodation and Food Services	80	2,920	1,780	4,580	4,990	0	14,340	3.3%	1,193,490
Other Services (except Public Administration)	170	7,370	1,830	3,380	260	180	13,190	3.0%	367,240
Public Administration	690	5,780	1,680	7,800	100	0	16,030	3.7%	771,270
Unclassified	0	390	920	370	0	0	1,680	0.4%	56,690
<b>Total</b>	25,030	115,360	117,380	72,020	102,530	510	432,840	100.0%	12,610,520

**G**enerating and Storing Renewable Energy

**R**ecycling Existing Materials

**E**nergy Efficient Product Manufacturing, Distribution, Construction, Installation, and Maintenance

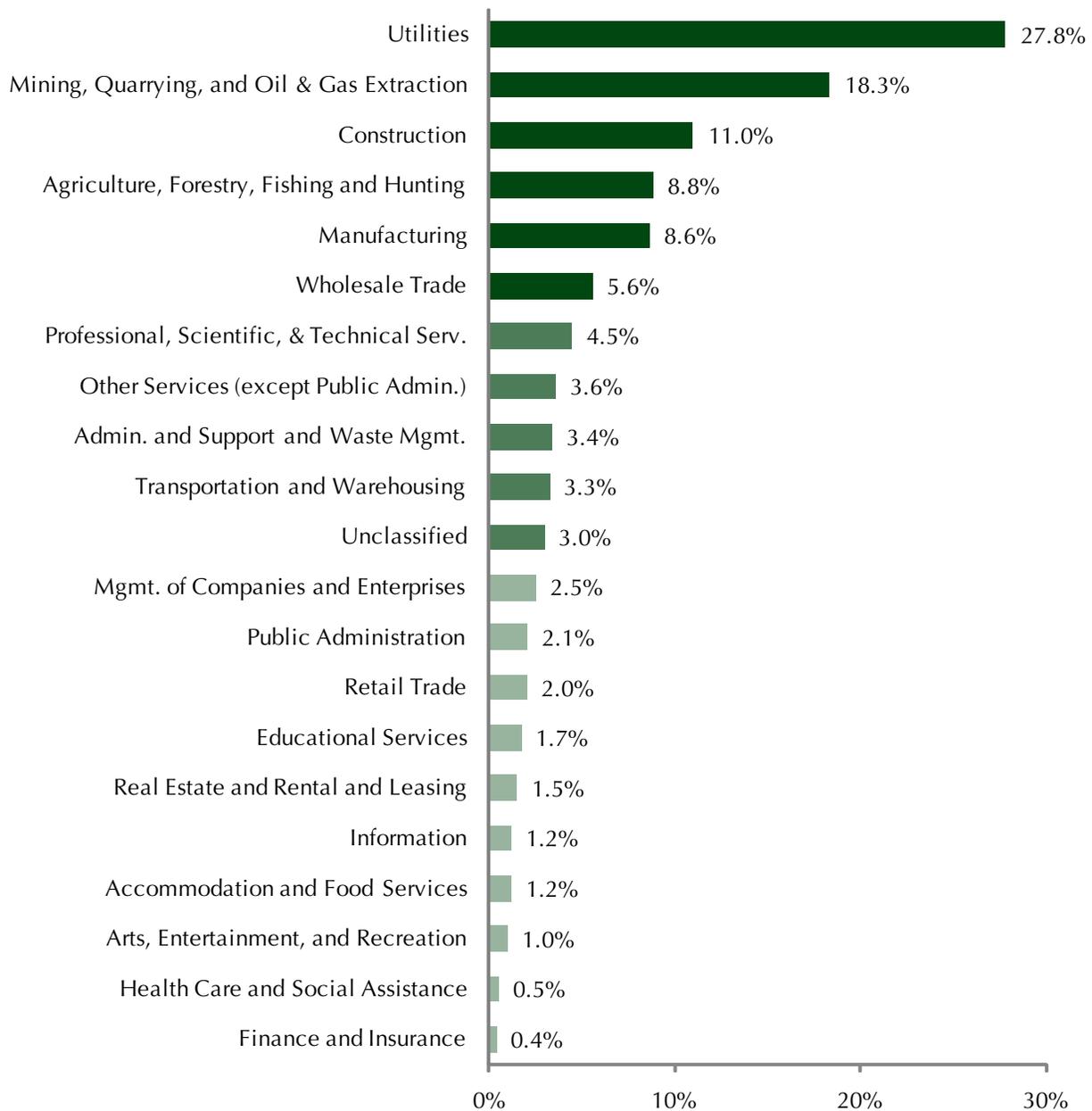
**E**ducation, Compliance, and Awareness

**N**atural and Sustainable Product Manufacturing

Note: Unclassified are new businesses without an assigned NAICS code. Totals may not add due to rounding.

When green jobs are measured as a percentage of all jobs in an industry, the top five sectors are utilities (28 percent), mining (18 percent), construction (11 percent), agriculture (9 percent), and manufacturing (9 percent) — differing from the breakout displayed in Figure 7. These industries may not have the top numbers of green jobs, but they have a greater concentration of green jobs. For example, the utilities sector includes both private and publicly owned establishments that provide the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal, and usually do so through a permanent infrastructure of lines, mains, and pipes.<sup>18</sup> This sector has the largest number of jobs under the “G” category in Table 3 and the largest percentage of green jobs to all jobs for any industry.

Figure 8 / Share of GREEN Jobs to All Jobs within Industry



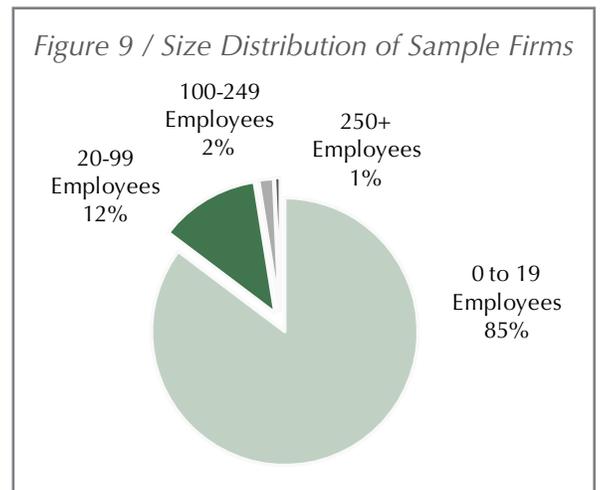
<sup>18</sup>For a more detailed definition of the utilities sector and the subsector within it, see [www.census.gov/naics](http://www.census.gov/naics).

## Size Distribution of Green Firms

Most California businesses — about 91 percent — employ fewer than 20 workers. Of the 1.3 million California businesses in the 3rd quarter of 2009, about 1.2 million had fewer than 20 employees. The smallest category includes about 434,000 private households employing individuals in personal service such as cooks, nannies, housekeepers, in-home health care workers and others.

When LMID selected the Green Survey sample, those private households were excluded from the sample selection to focus on business employment and practices. Despite removal of those smallest businesses, small businesses were still the largest segment of the economy, comprising more than 85 percent of all businesses represented in the sample. LMID's survey sample was selected to effectively represent the size, location and industry distribution of all California businesses.

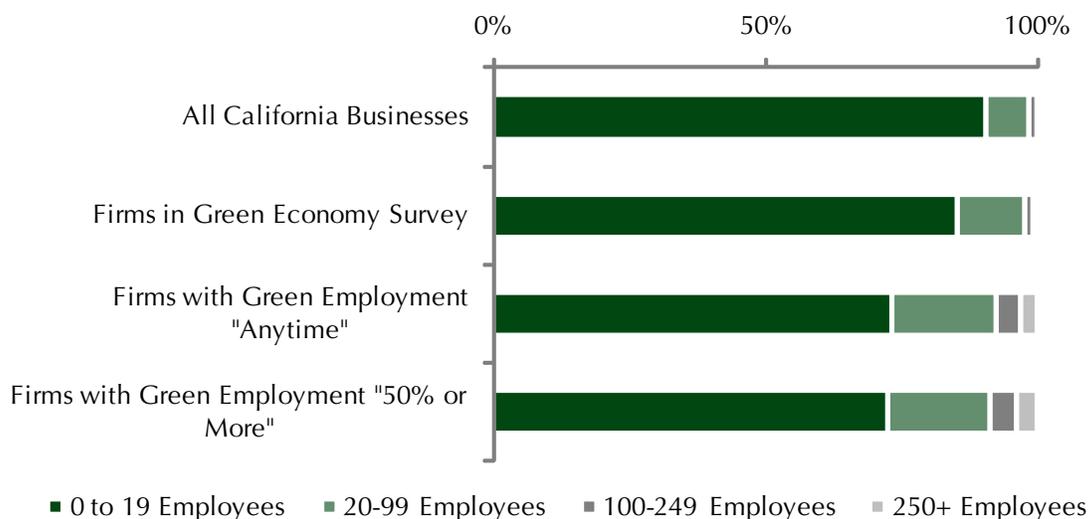
The analysis that follows compares the size distribution of firms reporting green employment to the universe of all businesses from which the sample was selected. The size distribution of businesses in California's green economy differs somewhat from the broader economy.



Green employment was reported a bit more broadly across all size categories than the distribution we see in the general economy, and a greater percentage of firms falls in the larger size classes. The distribution across size classes is similar for all firms reporting green employment, whether workers spend anytime or 50 percent or more of their time on green activities.

“Common thinking” is that most green businesses are small (and they are often referred to as “start-ups”). A look at the survey responses indicates that while 85 percent of all businesses represented in the survey have fewer than 20 employees, about 73 percent of all firms reporting green employment have fewer than 20 employees; about 72 percent of firms reporting workers who spend 50 percent or more of their time on green activities fall in this size category.

*Figure 10 / Size of Business Comparison*

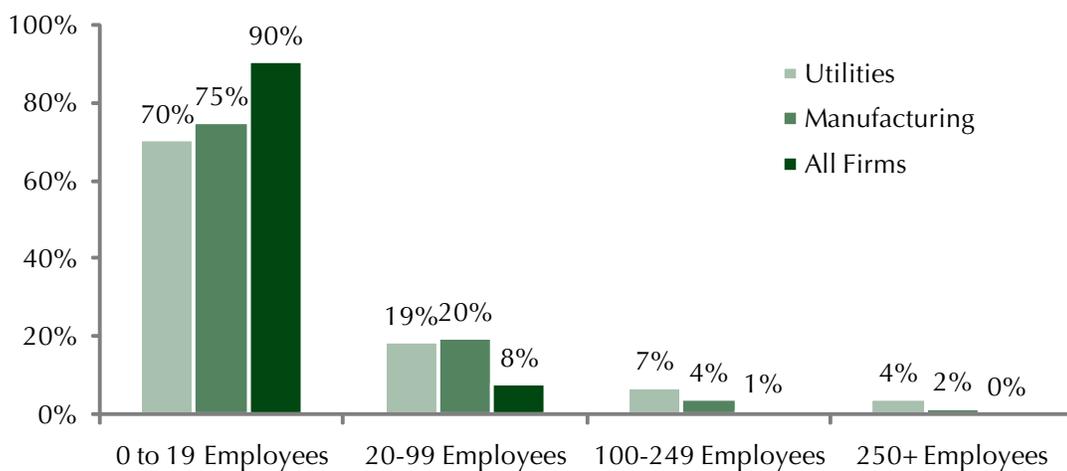


The share of businesses reporting employment in the 20-99 size category also differs somewhat. About eight percent of all California businesses fall in this size category. Our survey sample included about 12 percent of businesses in this category, in order to pull in enough businesses to adequately represent all industries and geographic areas. Green survey responses indicate about 19 percent of employment falls in this 20-99 size class, whether the business reported employees working any time, or 50 percent or more, on green activities.

Only one percent of all businesses in California has employment that falls in the 100-249 size category, and less than one-half percent has employment of 250 or more. (An important clarification is in order—these few largest businesses employ about 45 percent of all California workers.) Green employment is present to a somewhat greater degree among businesses in these larger size classes. In contrast to the one percent or less of California’s larger businesses, four to five percent of businesses reporting green employment fall in the 100-249 size category. Three to four percent of businesses report green employment in the 250 and above size category. (These largest businesses employ about 36 percent of green workers.)

The question arises as to why there is a greater percentage of larger businesses with green workers. As LMID continues our examination of the survey data in subsequent reports, we will attempt to get a better understanding. Two likely reasons are related to the industry distribution touched on in the preceding pages: the greatest number of green jobs were reported in manufacturing firms, which tend to be larger than the all firms distribution, and the greatest percentage of green workers in an industry were found in the Utilities industry, which also tends to be larger than the all firms distribution. The following figure displays all industry employment by size of firm, *not restricted to green employment*.

Figure 11 / Size Distribution: Utilities, Manufacturing, and All Firms



For a more detailed view of the array of workers by our GREEN working definition, Tables 4 and 5 display employment by size class distribution.

The Utilities sector’s largest reported employment falls in the Generating and Storing Renewable Energy sector, although employment was reported in each of the sectors. Manufacturing is also reported across all sectors, but more heavily in Recycling Existing Materials and Energy Efficient Product Manufacturing, and most heavily in Natural and Sustainable Product Manufacturing.

Table 4 / GREEN Employment by Size Class

Work Anytime in this Capacity

Size Class	G	R	E	E	N	Other	Total	% of Businesses		
								Green % by Size Class	Number of Businesses	by Size Class
0-19	6,350	42,740	48,570	30,930	32,070	510	161,170	37.2%	552,480	83.3%
20-99	3,750	37,770	31,110	28,290	38,020	0	138,940	32.1%	93,030	14.0%
100-249	2,120	15,160	13,090	2,310	10,990	0	43,670	10.1%	12,090	1.8%
250+	12,800	19,690	24,620	10,500	21,450	0	89,070	20.6%	5,750	0.9%
<b>Total</b>	25,030	115,360	117,380	72,020	102,530	510	432,840	100.0%	663,350	100.0%
% by Category	5.8%	26.7%	27.1%	16.6%	23.7%	0.1%	100.0%			

Table 5 / GREEN Employment by Size Class

Work 50% or More in this Capacity

Size Class	G	R	E	E	N	Other	Total	% of Businesses		
								Green % by Size Class	Number of Businesses	by Size Class
0-19	3,700	18,530	24,050	16,970	22,570	510	86,340	32.8%	552,480	83.3%
20-99	1,590	22,220	17,580	13,080	28,710	0	83,190	31.6%	93,030	14.0%
100-249	760	7,030	4,670	430	10,190	0	23,070	8.8%	12,090	1.8%
250+	11,560	13,090	20,770	6,500	18,700	0	70,630	26.8%	5,750	0.9%
<b>Total</b>	17,600	60,870	67,080	36,980	80,170	510	263,220	100.0%	663,350	100.0%
% by Category	6.7%	23.1%	25.5%	14.0%	30.5%	0.2%	100.0%			

- G**enerating and Storing Renewable Energy
- R**ecycling Existing Materials
- E**nergy Efficient Product Manufacturing, Distribution, Construction, Installation, and Maintenance
- E**ducation, Compliance, and Awareness
- N**atural and Sustainable Product Manufacturing

Note: Totals may not add due to rounding.

## Green Business Practices

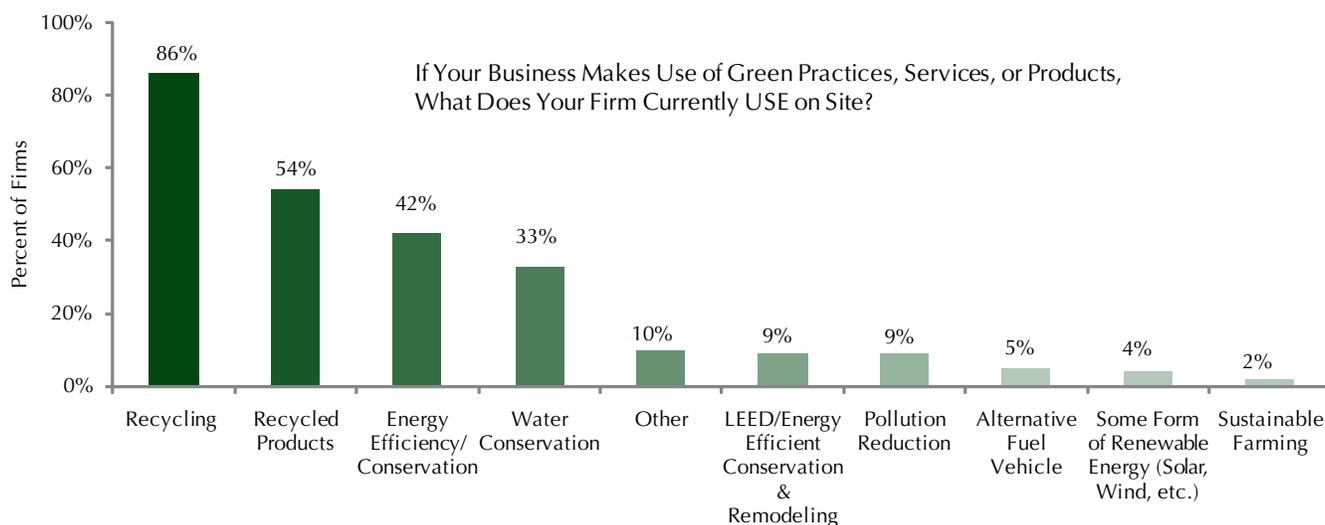
Green practices assist in shrinking a company's environmental footprint; and/or reduce the negative environmental impacts of their day-to-day operations by adopting sustainable business practices, like using recycled products or reducing waste. In economic terms, use of green business practices increases demand for other companies to supply green products and services.

To better understand the extent of these practices in California, the Green Survey asked employers about their green or sustainable business practices. These "practices" questions enhance the information on the green economy by including not just companies that directly produce green goods and services, but also those that participate in the green economy through the adoption of green practices in their day-to-day economic activities.

Businesses were asked to indicate whether or not they engage in a range of green practices: recycling, use of recycled products, energy efficiency/conservation, water conservation, pollution reduction, energy efficient construction and remodeling, alternative fuel vehicles, use of some form of renewable energy, sustainable farming or other green practices. Sixty-three (63) percent of businesses selected at least one of these choices.

As shown in Figure 12, of those checking at least one practice, 86 percent selected recycling, 54 percent of respondents reported they use recycled products on site, and 42 percent reported that they use energy efficiency/conservation practices.

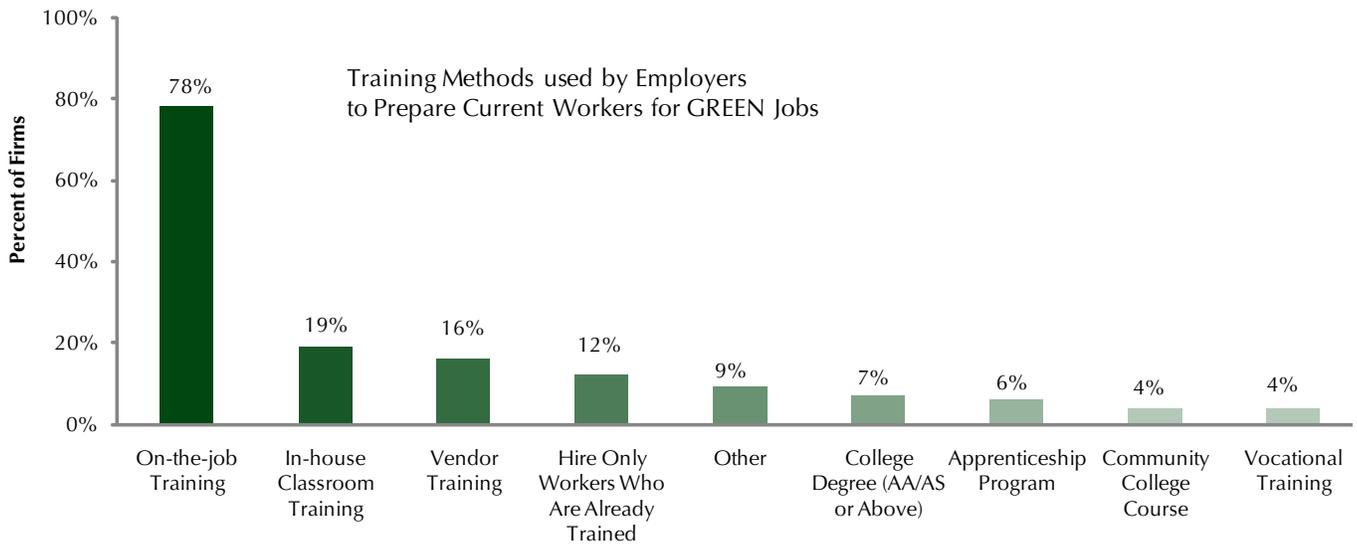
Figure 12 / Use of Green Practices, Services or Products



The Green Survey also asked about the training methods used to prepare employees for green jobs. The most prevalent method used is on-the-job training. Figure 13 indicates that businesses reported 78 percent of businesses trained their employees with green activities on the job; 19 percent used in-house classroom training. A small percentage of firms reported that they used traditional college programs or vocational programs.

The survey responses do not allow LMID to conclude whether businesses were unaware of existing programs available to them, if there was a lack of available green educational and vocational programs at the time that businesses were preparing their workers, or if formal training was not needed. Upcoming occupational research in 2010-11 will attempt to gain a greater understanding of employer training needs.

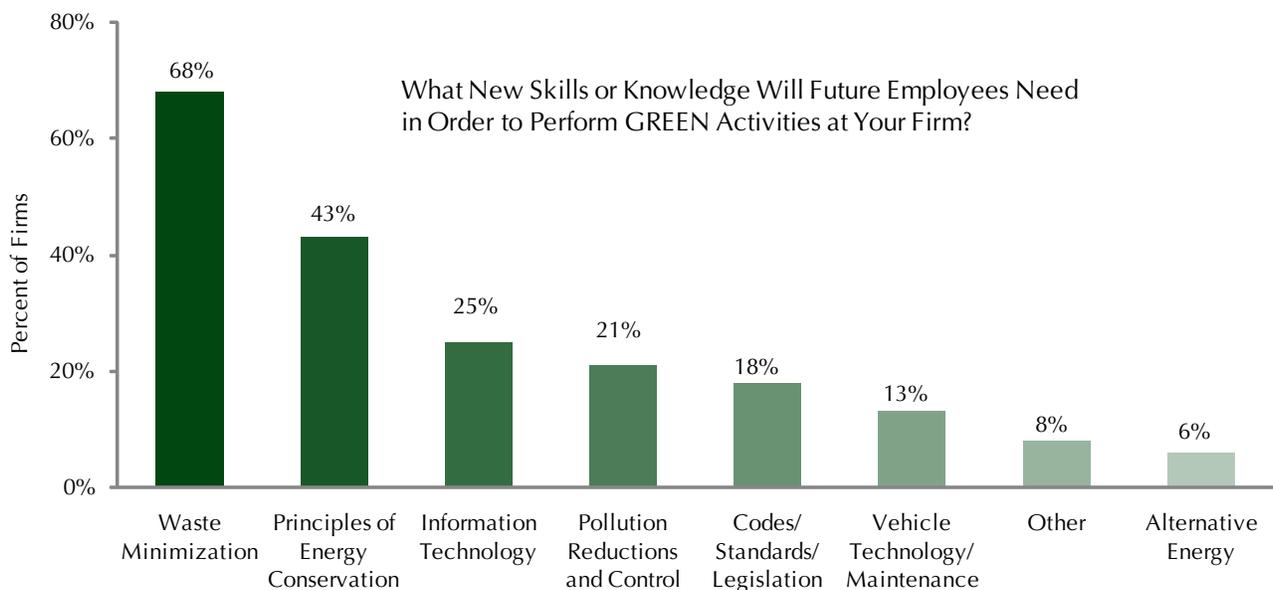
Figure 13 / Methods of Preparing Current Workers for Green Jobs



For firms that make use of sustainable business practices, properly training employees is also important. To that end, the Green Survey asked firms what skill-sets are needed by employees in order to implement green practices.

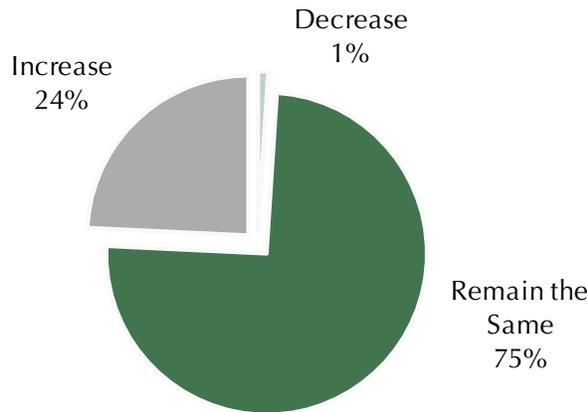
Respondents stated that new skills or knowledge would be needed in a variety of areas. In the following chart, Figure 14 shows that 68 percent of firms reported that new employees would need skills or knowledge of waste minimization to perform green activities. In addition, 43 percent of responses indicated that skills or knowledge in principles of energy conservation would be needed.

Figure 14 / New Skills or Knowledge Future Employees Will Need



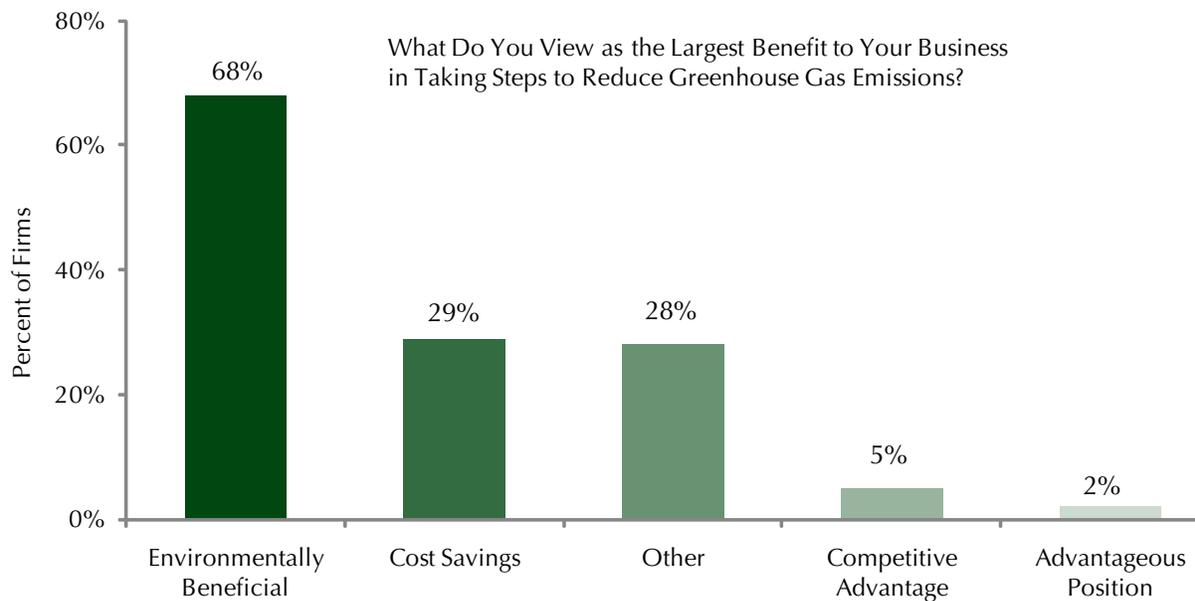
Firms expect to continue green practices in the next year, with 74 percent of firms stating that they expected their firm's green practices to remain the same for the next 12 months, 24 percent of firms expecting their green practices to increase, and only one percent of firms expecting a decrease (see Figure 15). Moreover, some of the firms that expected their green practices to decrease also indicated that they were going out of business.

Figure 15 / Employer Expectations for Green Practices (Next 12 Months)



Firms indicated that both environmental benefits and economic benefits are motivating them to engage in green practices and, in particular, in the implementation of measures that reduce their green house gas emissions. As shown in Figure 16, helping the environment received the greatest response with 68 percent of the firms stated that taking steps to reduce greenhouse gas emissions is “environmentally beneficial.” Twenty-nine percent of firms state that taking steps to reduce greenhouse gas emissions has “cost savings” benefits and 28 percent of firms selected “other benefits.”

Figure 16 / Benefits of Reducing Greenhouse Gas Emissions

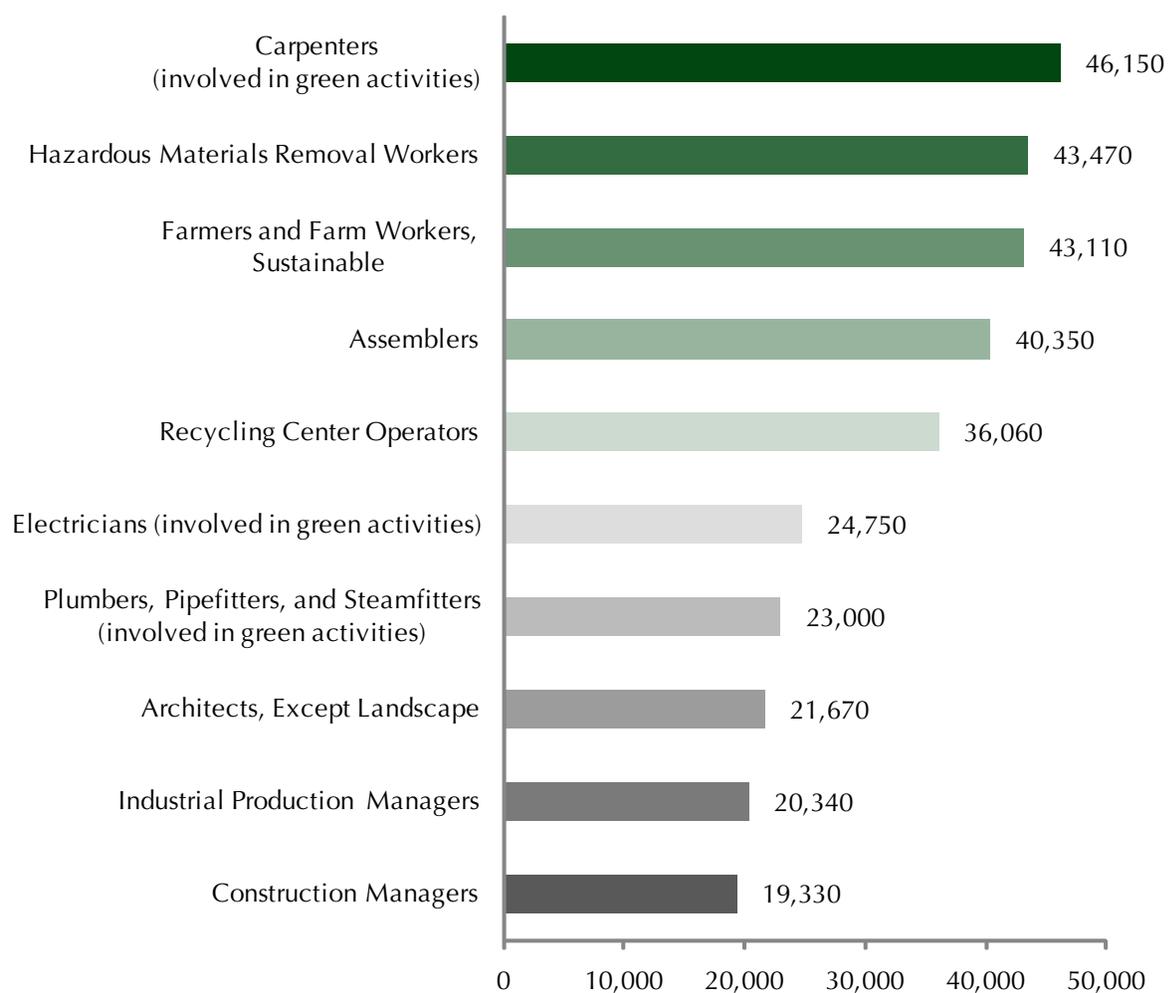


## Green Occupations

The Green Survey (beginning with Question 11) also asked firms to report the number of individuals working in a selected list of 34 emerging green occupations. Survey respondents reported more than 503,000 individuals in these 34 occupational categories, with another 50,000 jobs written into the “Other” category (see Appendix C for a complete breakdown of reported employment by occupation).<sup>19</sup> As shown in Figure 17, within the top 10 green occupations, employment for carpenters, hazardous materials removal workers, sustainable farmers and farm workers, assemblers, and recycling center operators was noticeably higher than the next five occupations.

The key purpose of the occupational section (Question 11) was to identify employers willing to be contacted for future research efforts, particularly LMID’s green occupation skills and training methods projects. As a result of the Green Survey, close to 5,000 employers provided contact information for follow-up interviews.

Figure 17 / Top 10 GREEN Occupations



<sup>19</sup>These 50,000 “Other” jobs are being classified and analyzed in parallel with LMID’s analysis of the 34 occupations and will be described in subsequent reports. In some cases, the employment cited in the “Other” category appropriately falls within one of the 34 occupations. In some instances, it reflects a practice more than an occupation, and in other cases, it reflects new and emerging occupations not included on the initial list.

The 550,000 jobs reported for the occupational section (Question 11) exceeds the number of green jobs reported in the first section (Question 2) by more than 120,000. Some businesses reported green occupational employment in Question 11 but did not report green jobs in Question 2. It is important to note that the main point of the occupational section was to estimate how many workers have jobs that their employer thought involved some green activity; some of these workers are performing green duties, but may not be engaged in **producing** green goods or services. The intent was not to get another count of green jobs but to connect with employers for subsequent detailed research.

For example, many businesses today are hiring a sustainability planner. This is an individual who, among other duties, could review a business's energy use and water practices and develop recommendations to reduce both the costs and use of these resources for that particular business. Another example would be a school district that employs carpenters and electricians who occasionally perform green activities such as repairing solar panels or solar hot-water heaters at campus locations, but who are not performing these services for other customers.

Thus, the business or school district mentioned may well have counted the sustainability planner, carpenter, and electrician in the occupational section, but not earlier in the survey because they believed that their business or school district does not currently produce green goods or services as defined by the Green Survey.

To understand the green occupations in firms that reported green jobs in Question 2, LMID also performed a targeted analysis of the occupational responses from employers that reported employees in both Questions 2 and 11. Figure 18 presents the top occupations employed by firms reporting any green jobs in Question 2 along with the top occupations employed by firms reporting green jobs requiring 50 percent of more of the employee's work time.

The results show that the size order of the top occupations changes when these alternative scenarios are applied. For example, the number of carpenters decrease when counting only those employers who reported workers in Question 2, dropping from more than 46,000 jobs to almost 17,800 jobs for firms that reported some carpenter jobs in Question 2, and to less than 7,750 jobs for carpenters who work 50 percent or more of their time providing green goods or services. Following carpenters at the top of the list in Figure 17, the numbers of hazardous materials removal workers, sustainable farmers and farm workers, and assemblers also decline when filtering results by Question 2.



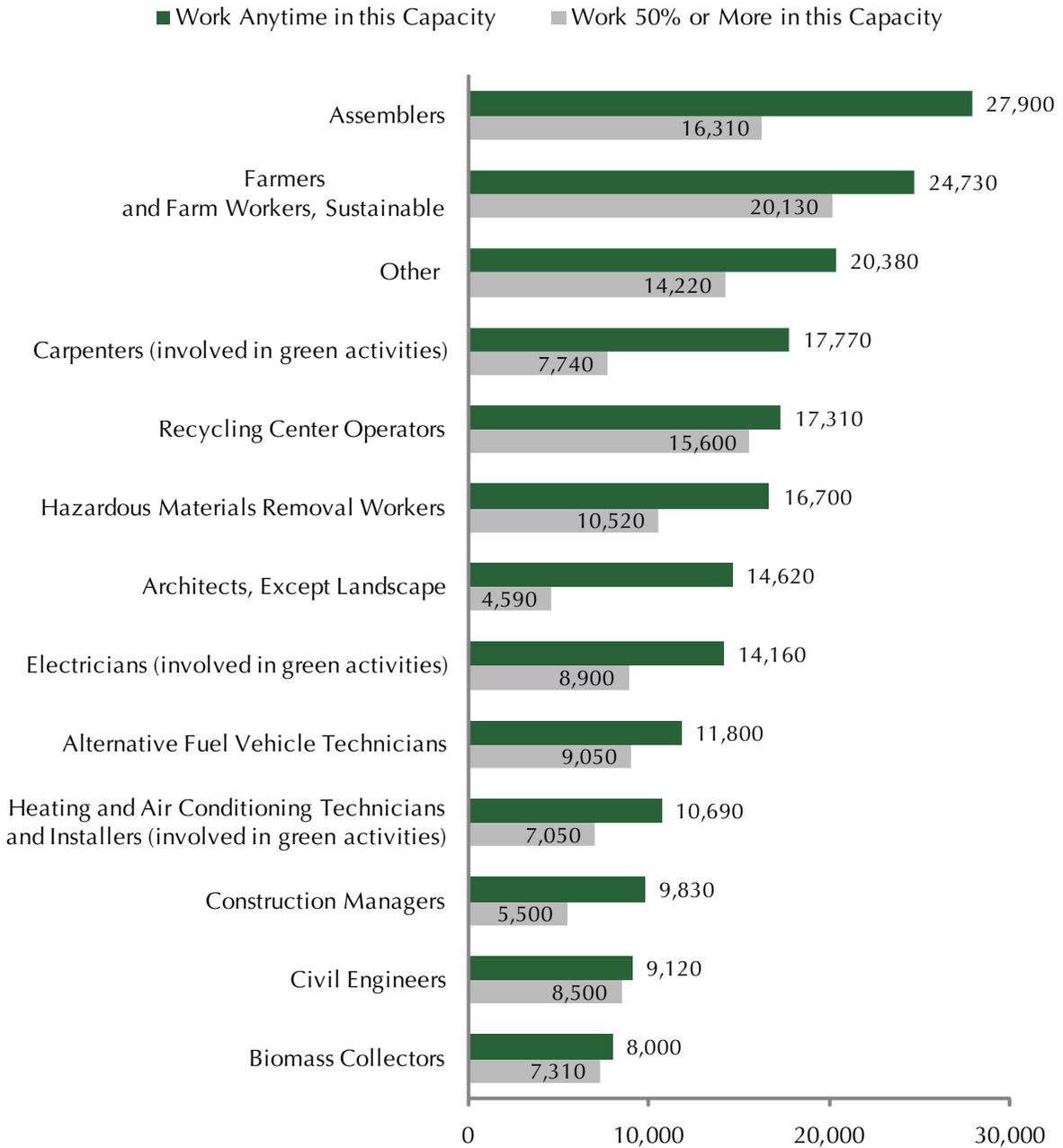
#### *Question 2*

Of the employees that work at this location, please indicate how many currently **PRODUCE** goods or services in any of the following **GREEN** categories.

#### *Question 11*

Does your firm employ individuals involved in "green" practices or activities that have related job titles or who perform similar tasks to those listed below? Please provide an estimate of current employment.

Figure 18 / Top Occupations - All Firms Reporting Green Jobs



# Conclusion

The main objectives of California's Green Economy Survey were to estimate the number of green jobs that exist in the state, measure employers' green practices, and collect information on 34 emerging occupations. The results provide California with baseline data on important segments of the state's green economy.

While much attention is being paid to the green economy today, it is important to note that, as the survey results show, green jobs currently represent a small share of California's economy. For these baseline data to have meaning, the survey will need to be repeated periodically to track changes in the green economy. For example, continued survey efforts could discover whether the number of green jobs is growing, whether green practices are increasing, and if entirely new occupations are being created.

## *Future Research*

This report presents summary findings from the Green Economy Survey and highlights the main statistical results. Future reports based on this survey data could look at such topics as:

- **Regional Differences**

Are there differences in the application of green practices between rural and urban areas, between Northern, Central, and Southern California, or between urban areas in Northern and Southern California?

- **Green Industry Details**

What is the percentage of green jobs within each industry? While this report presents such comparisons at the broadest industry sectors, future reports will look at more detailed industry comparisons.

- **Occupational Characteristics**

The last survey question asked employers if LMID could contact them to learn more about emerging "green" jobs, training requirements, career paths, and skill sets. Almost 5,000 employers agreed by providing contact information. LMID is conducting research, including follow-up interviews with employers, about these topics.

# Appendix A

## CALIFORNIA GREEN ECONOMY SURVEY

Respond to the  
Green Economy Survey  
online at  
[www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)  
Click on Green Survey

**Questions about the  
Green Economy Survey?  
Call us at 1-888-282-1395**

Business Name:

Address:

City, State, Zip:

**Please help us better understand California's Green Economy by taking a few minutes to complete the following survey on green jobs and activities in California**

1. In total, how many employees work at this location? \_\_\_\_\_ Type of business \_\_\_\_\_
2. Of these employees, please indicate how many currently **PRODUCE** goods or services in any of the following GREEN categories. *(Count each employee in only one GREEN Category.)* If none of these categories apply to your business, please skip to question 4.

<b>G . R . E . E . N . Categories</b>	<b>How many employees currently work any of their time in this Category?</b>	<b>Of these employees, how many work 50% or more of their time in this Category?</b>
<b>G</b> enerating and storing renewable energy - Includes alternative energy generated by but not limited to wind, solar, water, biofuels, biomass, hydrogen fuel cells, and geothermal.		
<b>R</b> ecycling existing materials - Businesses involved in the collection and processing of recyclable materials, including firms running a recycling or wastewater plant. Includes environmental clean-up and remediation. <i>(Does not include companies that provide bins for recyclable paper, glass, and cans)</i>		
<b>E</b> nergy efficient product manufacturing, distribution, construction, installation, and maintenance - Includes companies involved in the research, development, and manufacturing of products such as solar panels, energy efficient light bulbs, and alternative fuel vehicles. Also includes companies that install and repair these products in new or existing residential or commercial real estate, as well as real estate planning and land development.		
<b>E</b> ducation, compliance, and awareness - Includes training providers for curricula such as solar panel installation, energy auditing and residential consultation, sustainability management, alternative fuel and vehicle systems, etc. Also includes environmental consulting, governmental/legislative compliance, conservation and wildlife programs, trading and offsets, and social assistance.		
<b>N</b> atural and sustainable product manufacturing - Includes companies that create products using natural materials. Also includes businesses that produce safe, nontoxic products; bamboo products; products out of previously recycled materials; and agricultural firms that practice sustainable farming or forestry.		
Other green categories, please specify:		

## CALIFORNIA GREEN ECONOMY SURVEY

3. If your staff produces green products or services as listed in question 2, what methods are used at your firm to prepare current workers to do this work? (*Check all that apply*)

- |  |  |
|--|--|
| <input type="checkbox"/> In-house classroom training               | <input type="checkbox"/> Community College courses       |
| <input type="checkbox"/> On-the-job training                       | <input type="checkbox"/> Vocational training             |
| <input type="checkbox"/> Vendor training                           | <input type="checkbox"/> College Degree (AA/AS or above) |
| <input type="checkbox"/> Apprenticeship programs                   | <input type="checkbox"/> Other _____                     |
| <input type="checkbox"/> Hire only workers who are already trained |  |

4. If your business makes use of green practices, services or products, what does your firm currently USE on site? (*Check all that apply*)

- |   |  |
|---|--|
| <input type="checkbox"/> Alternative fuel vehicles                            | <input type="checkbox"/> Pollution reduction   |
| <input type="checkbox"/> Energy efficiency/conservation                       | <input type="checkbox"/> Water conservation  |
| <input type="checkbox"/> Sustainable farming                                  | <input type="checkbox"/> Recycling   |
| <input type="checkbox"/> Recycled products                                    | <input type="checkbox"/> Some form of renewable energy such as solar, water, wind, biofuel, etc. |
| <input type="checkbox"/> LEED or energy efficient construction and remodeling | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> None at this time                                    |  |

5. During the next 12 months, do you expect your firm's green practices to:

- Decrease                       Remain the same                       Increase

6. What new skills or knowledge will future employees need in order to perform green activities at your firm? (*Check all that apply*)

- |   |   |
|---|---|
| <input type="checkbox"/> Principles of energy conservation  | <input type="checkbox"/> Vehicle technology/maintenance |
| <input type="checkbox"/> Waste minimization                 | <input type="checkbox"/> Information technology         |
| <input type="checkbox"/> Pollution reduction and control    | <input type="checkbox"/> Codes/standards/legislation    |
| <input type="checkbox"/> Alternative energy (specify) _____ | <input type="checkbox"/> Other _____                    |

7. What barriers, if any, stand in the way of implementing green practices at your firm? (*Check all that apply*)

- |   |  |
|---|--|
| <input type="checkbox"/> Shortage of workers with the knowledge or skills | <input type="checkbox"/> Government policies/regulations |
| <input type="checkbox"/> Shortage of available training programs          | <input type="checkbox"/> Costs of implementation         |
| <input type="checkbox"/> Training classes too full to enroll              | <input type="checkbox"/> Lack of information             |
| <input type="checkbox"/> Economic conditions                              | <input type="checkbox"/> Other _____                     |

8. What do you view as the largest benefit to your business in taking steps to reduce greenhouse gas emissions (air pollutants such as carbon dioxide, methane, nitrous oxide, and others)?

- |   |                                       |
|---|---------------------------------------|
| <input type="checkbox"/> Advantageous position should some regulation occur | <input type="checkbox"/> Cost-savings |
| <input type="checkbox"/> Competitive advantage/community recognition        | <input type="checkbox"/> None         |
| <input type="checkbox"/> Environmentally beneficial                         | <input type="checkbox"/> Other _____  |

9. What resources would help reduce greenhouse gas emissions at your firm? (*Check all that apply*)

- Information about specific actions to take to cost-effectively reduce greenhouse gas emissions
- Success stories showing how similar businesses cost-effectively reduce their greenhouse gas emissions
- Financing options to reduce greenhouse gas emissions
- Online calculator for businesses to calculate their greenhouse gas emissions
- Statewide award program to recognize businesses that successfully reduce greenhouse gas emissions
- Protocol for reporting greenhouse gas emissions
- Technical support (e.g. training and online questions and answers)
- None
- Other \_\_\_\_\_

10. The State of California has many programs and services available to assist your business. If you would like information from any of the following agencies, please check the area of interest and the agency will contact you. (*Check all that apply*)

- Small business development assistance from your local Community College
- Employee training and recruitment from your local Workforce Investment Board
- Employee retraining programs from the Employment Training Panel
- Free Basic Skills Training from the California Department of Education
- How to save money and reduce greenhouse gas emissions from the California Air Resources Board
- Renewable energy system options (e.g. wind, solar, fuel cell, etc.) from the Energy Commission

**Who should be contacted to discuss the area(s) selected in question 10?**

Name \_\_\_\_\_ Telephone \_\_\_\_\_ Email \_\_\_\_\_

## CALIFORNIA GREEN ECONOMY SURVEY

11. We want to learn more about new and emerging green jobs in California. Does your firm employ individuals involved in green practices or activities that have related job titles or who perform similar tasks to those listed below? Please provide an estimate of current employment in the column to the right. **Employees who work in multiple job categories should be counted only once.**

Green Job Description	Estimate of Current Employees
<b>Air Quality Engineers; Air Pollution Specialists; Air Resources Engineers:</b> Design, plan, or perform engineering duties in the prevention, control, and remediation of environmental health hazards.	
<b>Alternative Energy Engineers:</b> Identify and support the development and implementation of alternative energy solutions (fuel, energy or heat) from biomass, landfill, solar, wind, geothermal, and/or other sources.	
<b>Alternative Fuel Vehicle Technicians:</b> Perform specialized service procedures, including field retrofits and advanced electrical and mechanical troubleshooting on hybrid, electric, hydrogen, and other alternative fuel vehicles.	
<b>Architects, Except Landscape:</b> Plan and design energy efficient structures (such as LEED certified), including private residences, office buildings, theaters, factories, and other structural properties.	
<b>Assemblers:</b> Rotate through all the tasks required in a production process to make green products such as energy efficient appliances, hybrid vehicle parts, and solar panels. Determine work assignments and procedures. Shovel and sweep work areas. Operate heavy equipment. Provide assistance in the production of wiring assemblies.	
<b>Battery Engineers; Energy Storage Project Engineers:</b> Generate plans, and perform tests of advanced battery systems and chargers for vehicles, and other storage applications.	
<b>Biological Technicians (involved in green activities):</b> Assist biological scientists in laboratories. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, make observations, and calculate and record results.	
<b>Biomass Collectors:</b> Gather waste wood, sawdust from lumber mills, garbage, yard clippings and livestock manure. Burn on-site or place waste products into trucks and deliver to off-site biomass power plants or fuel producers.	
<b>Building Performance or Retro-Fitting Specialists:</b> Provide green building consulting services including analysis of the potential environmental impact of materials choices; develop energy efficiency analysis proposals including budgets and work scopes.	
<b>Carpenters (involved in green activities):</b> Construct, erect, install, or repair structures and fixtures made of wood, such as concrete forms; building frameworks, including partitions, joists, studding, and rafters; wood stairways, window and door frames, and hardwood floors.	
<b>Chemical Technicians:</b> Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids and gaseous materials for purposes such as research and development of fuels, green products or processes, quality control, and maintenance of environmental standards.	
<b>Civil Engineers:</b> Plan, produce and/or design green land development projects (project management, surveying, water/wastewater, and grading).	
<b>Construction Managers:</b> Manage green construction site/activity including planning, scheduling, constructing, monitoring, forecasting, resource allocation and cost control.	
<b>Electrical Engineers:</b> Develop models for distributed generation equipment (photovoltaic, wind, fuel cells, batteries, turbines, and inverters) and conduct simulation studies for interconnections of distributed generation, electrical distribution systems, and hybrid and electric trucks and cars.	
<b>Electricians (involved in green activities):</b> Install, maintain, and repair electrical wiring, equipment, and fixtures. May install solar electric systems.	
<b>Energy Auditors, Home and Commercial:</b> Conduct energy assessments to identify energy efficiency and renewable energy improvement opportunities and offer recommendations for insulation upgrades. Explain incentives, loans, and tax credits for energy efficiency improvements.	
<b>Energy Regulation Specialists:</b> Perform policy research. Analyze, evaluate, develop and recommend alternatives on various regulatory issues and consult with and advise management, staff and other interested parties.	
<b>Environmental Engineers:</b> Collaborate with environmental scientists, planners, and hazardous waste technicians to address environmental problems. Inspect industrial, municipal facilities, and programs to ensure compliance with environmental regulations.	
<b>Farmers, Sustainable:</b> Operate farms or ranches. Plant, cultivate, harvest, and market crops and livestock without using up soil, water, or other resources faster than they can be replaced. May generate own energy from biomass.	
<b>Hazardous Materials Removal Workers:</b> Identify, remove, pack, transport, or dispose of hazardous materials, including asbestos, lead-based paint, waste oil, fuel, transmission fluid, radioactive materials, and contaminated soil, etc.	

## CALIFORNIA GREEN ECONOMY SURVEY

Green Job Description (cont.)	Estimate of Current Employees
<b>Heating and Air Conditioning Technicians and Installers (involved in green activities):</b> Install, service, and repair energy efficient geothermal or solar heating and air conditioning systems in residences and commercial establishments.	
<b>Industrial Production Managers:</b> Review processing schedules and production orders to make decisions concerning inventory, staffing requirements, and work procedures considering budgetary limitations.	
<b>Insulation Workers, Floor, Ceiling, and Wall (Weatherization Workers):</b> Line and cover structures with insulating materials. May work with batt, roll, or blown insulation materials.	
<b>Mechanical Engineers (involved in green activities):</b> Plan and design tools, engines, machines, and other mechanically functioning equipment to be used in green industries. Oversee installation, operation, maintenance, and repair of equipment used in alternative energy technologies.	
<b>Plumbers, Pipefitters, and Steamfitters (involved in green activities):</b> Assemble, install, alter, and repair tankless hot water heaters, as well as pipelines or pipe systems that carry water, steam, air, or other liquids or gases.	
<b>Recycling Center Operators:</b> Receive, unload, sort, and weigh recycled materials. Operate forklifts. Bale aluminum and cardboard, and make ready for sale. Prepare shipping and monthly reports.	
<b>Remediation Technology Engineers:</b> Design, construct, operate, and write reports on environmental remediation systems such as groundwater treatment, bioremediation, and pesticide/herbicide impacted soils and groundwater.	
<b>Soil and Plant Scientists:</b> Conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to crop growth.	
<b>Solar Photovoltaic Panel Installers and Technicians:</b> Install rooftop solar panels and electric systems. Perform wiring, mounting, carpentry and handyman tasks, troubleshooting, and customer interaction.	
<b>Solar Thermal Installers and Technicians:</b> Install solar hot water and pool heating systems, including pipes, tanks, solar collectors, and electrical control systems. Troubleshoot problems and make repairs.	
<b>Sustainability Planners:</b> Develop and help implement sustainability recommendations and plans for city, county, or private facilities. Educate public and do outreach. Research, prepare, and present reports (e.g. environmental impact).	
<b>Sustainability Program Coordinators/Managers:</b> Responsible for the development and implementation of a firm's sustainability strategy and initiatives. Promotes efficient, cost effective technologies and operations of the company with the objective of being environmentally responsible and economically viable.	
<b>Wastewater Technicians and Operators:</b> Operate or control an entire process or system of machines, often through the use of control boards, to transfer or treat water or liquid waste.	
<b>Wind Turbine Technicians:</b> Build and service wind turbines. Use computers and must have an understanding of hydraulics, welding, electricity, algebra and meteorology. Ability to climb 300-ft. high towers.	
<b>Other Green Job Title not listed above (please describe):</b>	
<b>Other Green Job Title not listed above (please describe):</b>	
<b>Other Green Job Title not listed above (please describe):</b>	

12. Please identify any occupations declining due to implementation of green practices.

**Whom may we contact to learn more about green jobs, training requirements, and skill sets?**

Name \_\_\_\_\_ Telephone \_\_\_\_\_ Email \_\_\_\_\_

For more information about the Green Economy, go to "Understanding the Green Economy" at <http://www.labormarketinfo.edd.ca.gov/>

# Appendix B

## Green Economy Survey Response Rates

<b>Sample Summary</b>	<b>Number of Establishments</b>
Original Sample Drawn	51,129
Out of Business	7,587
Consolidations	233
Number of Remaining Firms in Sample	43,306
Total Responses	15,185
Response Rate	35.1%

## Appendix C

<b>GREEN JOB DESCRIPTION</b>	<b>EMPLOYEES</b>
Carpenters (involved in green activities)	46,145
Hazardous Materials Removal Workers	43,470
Farmers and Farm Workers, Sustainable	43,114
Assemblers	40,353
Recycling Center Operators	36,061
Electricians (involved in green activities)	24,746
Plumbers, Pipefitters, and Steamfitters (involved in green activities)	23,002
Architects, Except Landscape	21,665
Industrial Production Managers	20,344
Construction Managers	19,332
Alternative Fuel Vehicle Technicians	19,017
Civil Engineers	17,240
Heating and Air Conditioning Technicians and Installers (involved in green activities)	15,593
Sustainability Program Coordinators/Managers	13,303
Biomass Collectors	10,797
Air Quality Engineers; Air Pollution Specialists; Air Resources Engineers	10,494
Wastewater Technicians and Operators	8,793
Environmental Engineers	8,693
Electrical Engineers	8,677
Sustainability Planners	8,242
Insulation Workers, Floor, Ceiling, and Wall (Weatherization Workers)	8,202
Building Performance or Retro-Fitting Specialists	7,772
Mechanical Engineers (involved in green activities)	7,283
Alternative Energy Engineers	7,221
Energy Auditors, Home and Commercial	5,860
Biological Technicians (involved in green activities)	5,418
Chemical Technicians	5,371
Remediation Technology Engineers	3,848
Solar Photovoltaic Panel Installers and Technicians	3,582
Soil and Plant Scientists	2,659
Battery Engineers; Energy Storage Project Engineers	2,435
Energy Regulation Specialists	1,966
Solar Thermal Installers and Technicians	1,652
Wind Turbine Technicians	834
All Other Write-in Job Titles and Activities	50,128
Total Green Employment, Including Write-ins	553,313
Percentage of Green Employment in 34 Occupations	90.9%