

The logo for BlueGreen Alliance, featuring the word "BLUEGREEN" in a bold, sans-serif font. "BLUE" is in blue and "GREEN" is in green. Below it, the word "ALLIANCE" is written in a smaller, blue, spaced-out sans-serif font.

**BLUEGREEN**  
A L L I A N C E

HOW TO  
**REVITALIZE AMERICA'S  
MIDDLE CLASS**  
WITH THE  
**CLEAN ENERGY ECONOMY**

We must make a commitment  
to **rebuild America with  
clean and green products  
built here**, to develop new  
forms of clean, renewable  
energy and provide incentives  
to further their deployment.

— **Leo W. Gerard**  
INTERNATIONAL PRESIDENT  
UNITED STEELWORKERS

**Creating good, middle-class  
jobs and protecting the  
environment** go hand-in-hand.  
The green economy will set our  
country, and the planet, **back  
on track.**

— **Carl Pope**  
EXECUTIVE DIRECTOR  
SIERRA CLUB



The new, green renewable energy economy is fundamentally different than our 20th century economy and its over-dependence on polluting fossil fuels imported from regions of the world often hostile to the United States.

Whether wind or solar, biomass or geothermal, renewable fuels are indigenous, home grown. The fuels themselves are often free. They just need to be captured efficiently and then transformed into electricity, hydrogen or clean transportation fuels.

Instead of sending our public and private investments overseas to purchase polluting commodities of finite supply, development of renewable energy invests directly in people, substituting labor for fuel expenses. ***It is this fundamental fact that underscores projections that renewable energy technologies can provide, on average, four to six times as many jobs as equivalent investments in fossil fuels when manufacturing, installation and operations and maintenance jobs are all accounted for.***<sup>1</sup> For example, natural gas power plants generate only about one job per megawatt (MW) during construction and ongoing operations and maintenance, while equivalent investments in solar photovoltaic power technologies would generate over seven jobs per MW.<sup>2</sup>

While not the subject of this report, the construction and maintenance of wind farms, solar, biomass, geothermal and other renewable energy projects also create hundreds of thousands of jobs. Installing new wind farms, for instance, creates temporary construction employment as laborers, carpenters and millwrights build the forms and pour the concrete for the foundations of wind turbines, operating engineers run the cranes that lift the towers, and electricians perform the wiring. Permanent employment is also created operating and maintaining these same machines. Mortenson Construction, a leading wind power contractor in North America with approximately 27 percent national market share, reports nearly 400 construction workers on their wind power construction job sites on any given day around the country. These projects also stimulate the rural economy by pumping \$15-20 million into the local economy for each 100 megawatts of clean energy development.

A methodology developed by the Renewable Energy Policy Project (REPP) looks at how existing U.S. suppliers — makers of steel towers, controls, ball bearings and other components — could create even more new jobs in the manufacturing sector if carbon regulations and renewable energy programs are intelligently designed. To meet the levels of carbon reductions assumed in this analysis would require installing 18,500 MW per year of wind, solar, geothermal and biomass plants. This is roughly equivalent to supply delivered under a national Renewable Electricity Standard (RES) of 25 percent renewable content by 2025.<sup>3</sup> **If this national RES became law, REPP projects that if all renewable energy components were manufactured in the U.S., there would be a manufacturing job opportunity for more than 850,000 full-time equivalents created across all 50 states by U.S. firms that already exist. A full-time equivalent (FTE) is roughly 2,000 hours of work.**

The Blue Green Alliance (BGA) is a national partnership of labor unions and environmental organizations dedicated to expanding the number and quality of jobs in the green economy. Launched by the United Steelworkers and Sierra Club in 2006, BGA has since grown to include the Communications Workers of America, Natural Resources Defense Council, Laborers' International Union of North America and Service Employees International Union.

This policy brief, an update of a 2006 analysis, is designed to highlight the economic benefits renewable energy development can bring to regions throughout the country — even those that do not possess substantial renewable resource potential, but which feature existing companies that can become part of the supply chain supporting the new green economy.

# Estimates of Renewable Energy Manufacturing Job Potential

REPP did a supply chain analysis that identified the component parts of wind turbines, solar panels, geothermal and biomass power plant equipment. They assigned these parts to categories established in the National American Industrial Classification System (NAICS), which is used to track manufacturing activity by U.S. companies. REPP then assumed a growing market for renewable energy equipment large enough to meet carbon reduction goals that roughly match a 25 percent by 2025 RES, or about 18,500 MW of new renewable energy capacity installations annually over a 15-year period.

Given this amount of demand, REPP identified specific current U.S. companies in each of those NAICS categories, on the assumption that they would be the most likely firms to supply components to a growing renewables industry. This methodology was able to identify where the supply chain could be located, the amount of new revenues for these firms and new employees needed to meet demand. The studies did not model multiplier effects, such as indirect and induced employment, nor did it quantify jobs in other parts of the supply chain, such as construction, transportation and logistics, or operations and maintenance. They assumed only that existing firms would supply new demand, not that there would be new market entrants, or that demand would be met by foreign firms. Also, REPP did not study the supply chain for concentrating solar power technologies, due to a lack of data. Lastly, REPP did not evaluate net impacts, such as potential job loss in other sectors due to a growing renewables industry. More information about the REPP studies is available at [www.repp.org](http://www.repp.org).

Here is a list of the overall Top Ten, and the Top Five in each renewable technology category, according to REPP. The following page has the complete listing of jobs for all 50 states.

## Top Ten Potential Renewable Manufacturing Job States

California	95,616
Texas	60,100
Illinois	56,579
Ohio	51,269
New York	47,930
Pennsylvania	42,668
Indiana	39,221
Wisconsin	35,133
Michigan	34,777
North Carolina	28,544

## Top Five Potential Wind Manufacturing States

California	32,046
Illinois	30,010
Ohio	29,820
Indiana	25,180
Wisconsin	25,179

## Top Five Solar PV Potential Manufacturing States

California	48,896
Texas	23,221
Illinois	19,298
Pennsylvania	15,767
New York	14,617

## Top Five Geothermal Potential Manufacturing States

California	8,465
New York	8,150
South Carolina	5,223
Ohio	5,079
Texas	4,660

## Top Five Biomass Potential Manufacturing States

Texas	7,175
New York	6,640
California	6,209
Ohio	4,537
Oklahoma	4,420



## REPP Estimates for all 50 States

Location	# of Firms	New Jobs: Wind	New Jobs: Solar	New Jobs: Geothermal	New Jobs: Biomass	Total Jobs
Alabama	635	10,085	2,035	997	982	14,099
Alaska	34	131	4	14	7	156
Arizona	603	3,315	6,732	255	323	10,625
Arkansas	384	4,572	2,394	656	1,008	8,630
California	5,409	32,046	48,896	8,465	6,209	95,616
Colorado	603	2,354	3,892	414	454	7,114
Connecticut	772	6,160	7,757	812	813	15,542
Delaware	94	495	1,502	110	310	2,417
District of Columbia	1	0	14	0	0	14
Florida	1,617	8,467	7,718	1,070	1,449	18,704
Georgia	864	8,044	6,285	1,016	1,303	16,648
Hawaii	24	29	47	1	19	96
Idaho	197	820	1,347	155	153	2,475
Illinois	2,289	30,010	19,298	3,396	3,875	56,579
Indiana	1,321	25,180	7,485	3,191	3,365	39,221
Iowa	457	4,914	2,889	648	779	9,230
Kansas	425	3,934	5,430	719	1,408	11,491
Kentucky	524	5,113	4,705	1,188	1,610	12,616
Louisiana	507	4,845	1,958	660	1,054	8,517
Maine	155	1,558	1,127	1,003	423	4,111
Maryland	394	2,220	1,178	709	1,129	5,236
Massachusetts	1,193	7,971	12,264	1,186	1,286	22,707
Michigan	2,050	24,350	6,644	1,502	2,281	34,777
Minnesota	1,070	9,246	5,238	1,477	2,444	18,405
Mississippi	318	2,957	1,674	881	2,449	7,961
Missouri	785	10,260	7,532	2,907	2,097	22,796
Montana	90	620	98	19	16	753
Nebraska	200	2,817	2,368	294	731	6,210
Nevada	206	1,753	932	145	171	3,001
New Hampshire	336	2,487	2,060	132	373	5,052
New Jersey	1,351	7,870	6,741	1,620	1,467	17,698
New Mexico	150	662	2,561	32	126	3,381
New York	1,925	18,523	14,617	8,150	6,640	47,930
North Carolina	1,096	10,964	11,062	2,810	3,708	28,544
North Dakota	67	671	165	98	65	999
Ohio	2,465	29,820	11,833	5,079	4,537	51,269
Oklahoma	800	3,696	1,287	3,225	4,420	12,628
Oregon	655	2,805	6,403	645	1,338	11,191
Pennsylvania	2,188	19,588	15,767	3,402	3,911	42,668
Rhode Island	195	2,876	4,197	142	119	7,334
South Carolina	488	11,204	3,559	5,223	2,365	22,351
South Dakota	109	2,253	64	944	217	3,478
Tennessee	853	9,011	5,122	1,078	2,451	17,662
Texas	3,358	25,044	23,221	4,660	7,175	60,100
Utah	356	2,809	1,615	122	446	4,992
Vermont	109	904	743	7	179	1,833
Virginia	624	8,565	3,672	489	1,047	13,773
Washington	790	3,902	3,190	618	852	8,562
West Virginia	189	1,548	1,613	120	318	3,599
Wisconsin	1,331	25,179	4,943	2,037	2,974	35,133
Wyoming	42	193	14	9	6	222

### (Endnotes)

- 1 Studies performed by the California Energy Commission (2002), Union of Concerned Scientists (2006), University of California-Berkeley (2004/2008) and Center for Energy Efficiency and Renewable Technologies (2009), all confirm that renewable energy sources generate greater employment than equivalent investments in fossil fuels. While the job impacts vary according to specific technologies, a general rule of thumb is four to six times as many jobs per MW as conventional coal or natural gas power supplies.
- 2 CALPIRG Charitable Trust, *Renewables Work: Job Growth from Renewable Energy Development in California*, June 2002. The employment estimates included in this study were derived from data provided by the California Energy Commission and the Electric Power Research Institute.
- 3 This assertion is based on the following assumptions: The RES and the renewable energy wedge necessary to stabilize carbon emissions would be in effect for 15 years. The wedge for renewables to stabilize carbon emissions would require annual installations of 18,500 MW annually, totaling 277,500 MW. Now a 25 percent RPS would have to first calculate the level of usage in 2025. That consumption in 2005 was 3.5 trillion kWh. Assuming no growth in consumption due to energy efficiency, 25 percent of 3.5 trillion kWh equals 875 billion kWh from renewable energy resources. Assuming a renewable supply capacity factor of 40 percent results in a total capacity of roughly 250,000 MW, roughly equivalent to meeting a 25 percent RES.