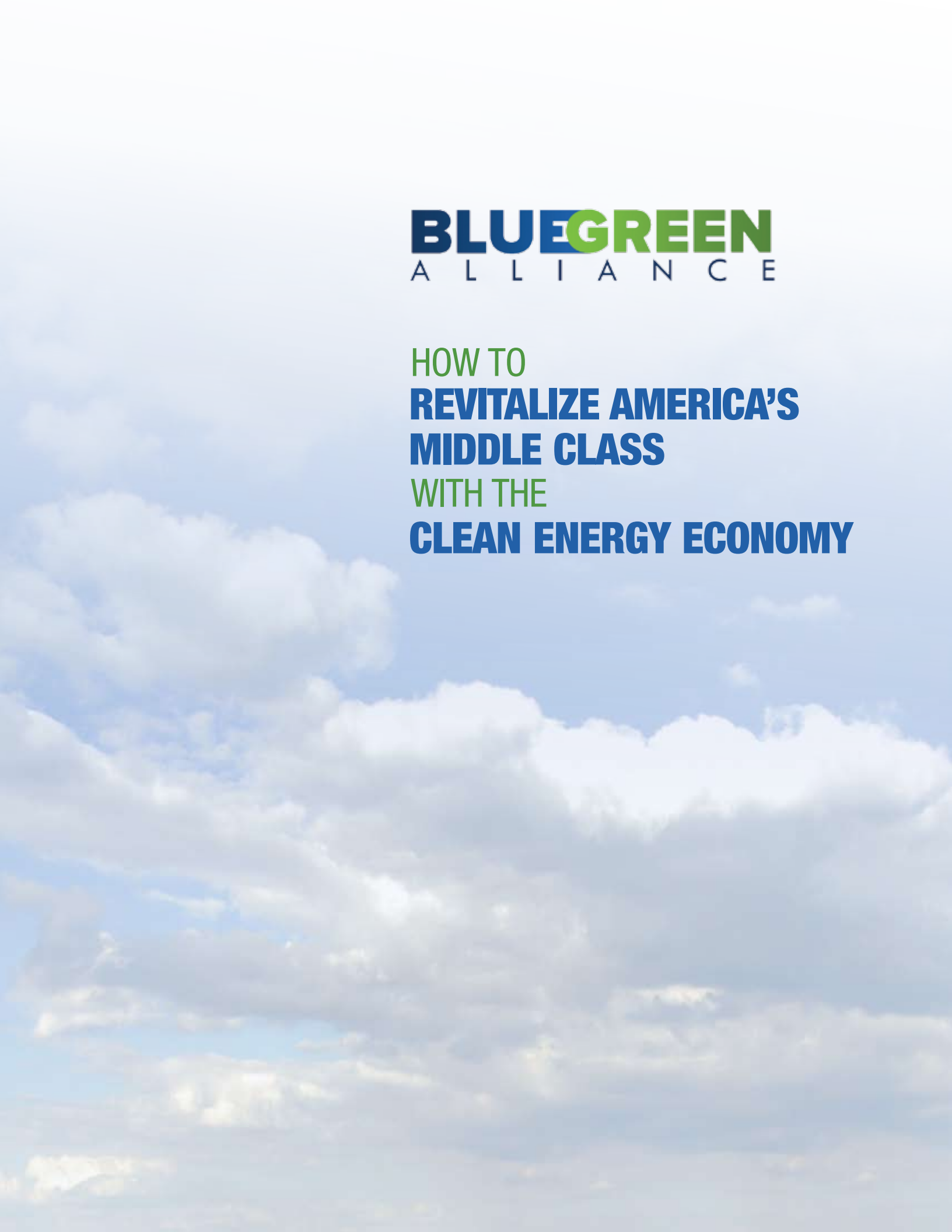
BLUEGREEN ALLIANCE

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***.[1] 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.[2]

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.[3] **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.

Solar Power (and Small Wind) in Wisconsin

Ed Stoll, age 30, was searching for something more than just an everyday electrician's job, particularly after he adopted a little girl from Vietnam to be part of his family in the Milwaukee area. "I wanted to do something to make the world a better place for my daughter," said Stoll. "I was searching for something more."

He found that something: solar and wind power. After taking some classes through the Midwest Renewable Energy Association on weekends, and staying up late at night with his laptop learning about solar photovoltaic (PV) systems, and then small wind turbines, Stoll is embarked on a new career. He hopes to soon be certified through the Solar America Cities Program to teach classes on solar and wind electrical work, educating a new generation about job opportunities with renewable energy in the new green economy.

His background in union trades training gives him an advantage. "There are a lot of folks who may have the will to be in the renewable energy installation business, but they don't have the skill," he said.

The vast majority of his electrical contracting gigs are rooftop solar PV systems, though he likes the occasional small wind turbine work. "Anytime you can get power from nothing, like the wind, that intrigues me," Stoll remarked. The thrill of climbing up and down turbine towers "makes it a little more fun" than some solar PV installations, he admitted.

According to REPP, Wisconsin ranks eighth in the nation in potential new manufacturing jobs created for existing companies supplying components for solar, wind, biomass and geothermal power supplies. 'People don't realize the range of jobs available in the renewable energy sector. These companies need engineers, accountants and CEO's, just like any other business."

Short Versus Long-Term Green Job Growth

New wind projects affect the economy where they are installed. The 230 MW Wild Horse wind farm developed in Kittitas County just outside Ellensburg, Washington provides visible evidence of green energy's economic footprint. This is a big project that provided local jobs for workers installing and then maintaining the facilities, jobs that cannot be sent offshore. However, this wind farm did not account for U.S. manufacturing jobs.

The failure of the federal government in the U.S. to adopt long-term regulatory policies like the RES and programs that encourage domestic manufacturing of new renewable energy technologies has allowed Europe, Japan, China and other countries that do have such policies to capture the lion's share of manufacturing jobs.

In the 21st century, the U.S. needs to put in place smart public policies to rapidly expand production of new renewable energy technologies right here. Despite this lack of federal policy support, wind-power manufacturing is beginning to grow domestically as a result of strong support at the state level. Twenty-eight states already have their own RES. In addition, more companies are willing to brave the risk of erratic federal policy to pursue the reward of the world's largest potential market for wind turbines. Strong and consistent policy support, nonetheless, would greatly accelerate growth in wind-turbine manufacturing, and extend economic opportunity to smaller and less mature industries in the solar, geothermal and biomass sectors.

Failure to support a world-class domestic renewable manufacturing sector in the U.S. in the face of greatly expanded demand for renewable energy will likely have negative consequences for job creation in the U.S. Foreign competitors will capture most of the new manufacturing sector jobs and revenues. U.S. demand for renewable energy technologies currently exceeds domestic manufacturing capacity, which can lead to critical component supply bottlenecks or temporary price increases for clean power. Establishing a U.S. commitment to renewable energy with a strong RES will send a global signal to build manufacturing bases in the U.S. and help match domestic supply with our current demand for clean energy.

The Blue Green Alliance and its partners and allies are encouraged by the story of wind power. Foreign manufacturers are bringing manufacturing jobs to the U.S., instead of the other way around. New factories have been opened up by foreign-based manufacturers in Colorado, Minnesota, Indiana, North Dakota and Pennsylvania, many of them hiring union labor.

A modern wind turbine is composed of some 8,000 parts, from massive steel towers and blades to high precision gearboxes to state-of-the-art software control systems. While much attention is paid to the company that assembles and puts its name on the wind turbine — high-profile names like GE and Siemens — most of the supply chain is composed of small specialty manufacturers. One firm will roll large plates of steel into the towers that support the turbine. Another firm will make the huge turbine blades from special carbon fiber materials. Still another will make the electronic computerized control systems allowing wind turbines to adjust to changes in wind speed and direction.

Spanish Wind Power Company Creates Jobs in Pennsylvania

When Troy Galloway, age 45, lost his job at a steel mill after 15 years of steady employment, he wasn't sure how he was going to make ends meet. The forecast for work employing his skill set looked bleak. He tried real estate, which blew hot and cold, and then tried to "beat the bushes" to get construction job gigs. "After no work for January and February three years ago, my wife said: 'This is not working out.'"

Luckily for Galloway, the Spanish company Gamesa came to Ebensburg, Pennsylvania to open up a new wind turbine blade factory in response to the passage of a state RES. Galloway reasoned that the wind industry could provide him with stable and long-term employment, so he submitted his resume, and got a job. His previous experience operating machines was a nice fit for his present occupation, which makes the spars that serve as the backbone of wind turbine blades that span 150 feet.

"Now I not only have a good job, but a job that feels good," said Galloway. "Working in the wind power sector is a great opportunity to reduce our dependence on foreign oil, help the environment, as well as future generations, our children, and our children's children," he said. To top if off, he's making a little more money now. Since he was president of the local United Steelworkers union, he admires the pro-labor stance of Gamesa. "Even some of their management is unionized," he acknowledged.

According to REPP, Pennsylvania ranks sixth in the nation in potential new manufacturing jobs from renewable energy development. Troy's job is among 800 that Gamesa has created in Pennsylvania, including 300 at the blades manufacturing plant in Ebensburg. Some of the blades produced by this factory have been installed at a nearby wind farm that Gamesa, a vertically-integrated wind-turbine manufacturer, developer and maintenance company, has recently brought online. "I drive by the wind turbines that I helped make every day on the way to work," he concluded.

Supply Chains Spread Economic Benefits

Iowa and Clipper Wind illustrate how supply chains throughout the U.S. benefit from a growing renewable energy industry. Iowa has become a global leader in wind power with nine manufacturing plants, including Clipper Wind's Cedar Rapid facility, which has employed as many as 400 workers directly onsite. Iowa now gets 15 percent of its electricity from wind, the highest percentage of any U.S. state. It passed California to become second only to Texas in the nation in terms of total installed wind power capacity.

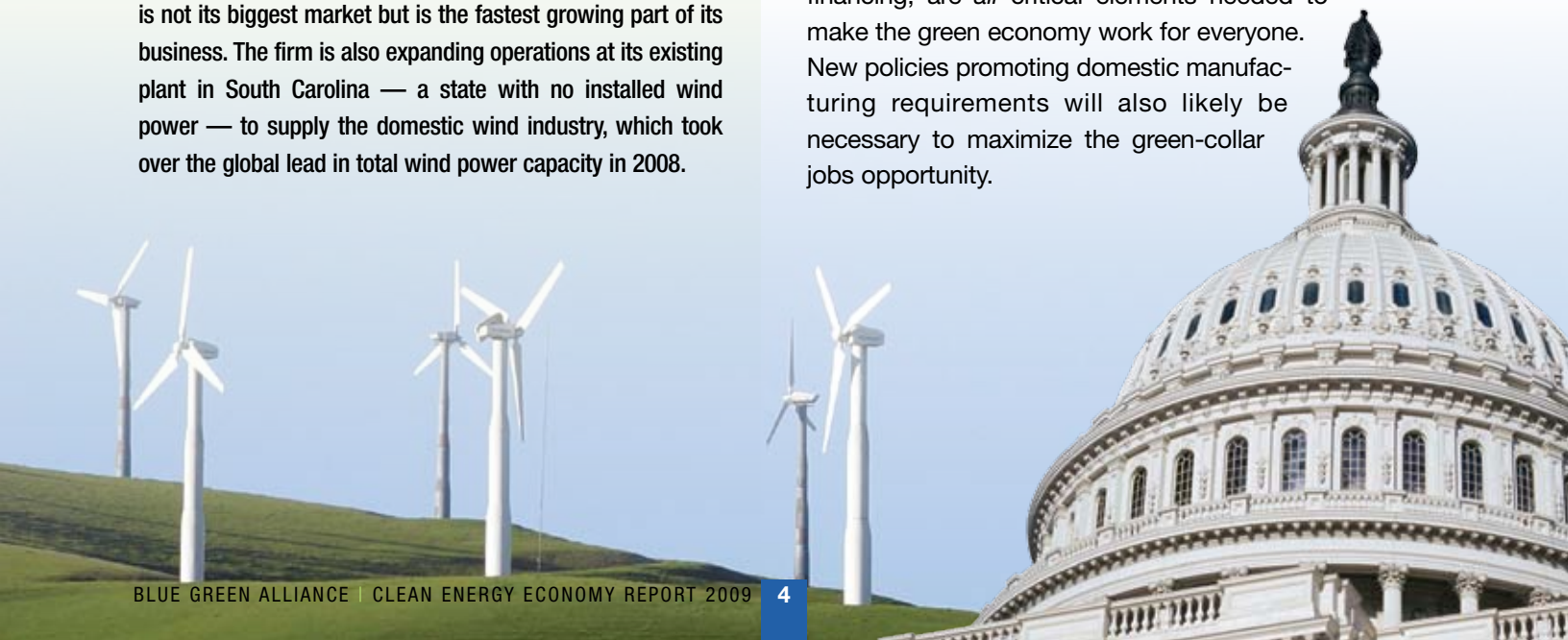
But not all of the benefits of wind power in Iowa accrue to just Iowans. Iowa manufacturers rely upon a supply chain that spreads to other states and around the world. Rust belt manufacturing strongholds like Ohio, Michigan and Indiana have the foundries and heavy-duty manufacturing facilities needed to supply the wind industry. Ohio is particularly well situated. The Timken Company, with sales of $5.2 bilion in 2007, operations in 27 countries and 25,000 employees, makes bearing and other gearbox components for turbines at its Ohio plant. Wind is not its biggest market but is the fastest growing part of its business. The firm is also expanding operations at its existing plant in South Carolina — a state with no installed wind power — to supply the domestic wind industry, which took over the global lead in total wind power capacity in 2008.

For every megawatt of new wind power capacity — enough potential clean electricity to power up to 300 homes — REPP estimates 4.85 Full Time Equivalent (FTE) jobs are created to manufacture, install and then operate and maintain the wind farm. About 70-75 percent of the total labor required for a typical wind turbine or solar panel is in manufacturing the various component parts that could be supplied by existing U.S. businesses. These are the potential "green jobs" that are key to revitalizing the U.S. and global economy. Without new policies promoting domestic manufacturing, an unnecessarily large portion of these jobs will remain overseas.

Blue Green Alliance Executive Director David Foster described these "green jobs" as "blue-collar jobs with a green "purpose." BGA has called on Congress to pass comprehensive clean energy and climate change legislation this year that outlines a long-term vision for the transition to a green economy. This legislation must ensure international competitiveness while moving America toward energy independence. The labor unions and environmental organizations that make up the Blue Green Alliance have outlined principles for legislation in 2009 that will put Americans back to work in a clean energy economy.

Needed Federal Policy Reforms

Climate change reduction targets, a federal RES and reforms of current transmission planning, siting and financing, are *all* critical elements needed to make the green economy work for everyone. New policies promoting domestic manufacturing requirements will also likely be necessary to maximize the green-collar jobs opportunity.



How Wind is Transforming Local Economies in the "Show Me" State

Bonita Bell, age 39, was looking for better pay than what her convenience store job was paying in the Washington, Missouri area. She also was looking for a job with some health insurance. "I've probably done every kind of job out there, from driving a dump truck to herding cattle, even a little plumbing on the side," said Bell. "I'm a widowed mother, and have been taking care of my 18-year old daughter by myself since she was 4."

She found what she was looking for at Pauwels Transformers, her employer for the last two years. The company manufactures transformers that help convert the kinetic energy that spins a wind turbine's blades into electricity. Her annual salary nearly doubled to $34,000, and she's found a job that she'd like to do until she's 90 years old. "I'd like to move around here at the shop," she said, noting that her current job involved recycling scrap steel. "I might even get back into welding, something I used to do when my husband was still alive."

All in all, Bell is glad to be a part of the global green economy. "It's great to have a job that improves the environment and helps us get off foreign oil." She added, "It's also important to keep jobs here in the U.S., where the products are of better quality because workers elsewhere often get paid so very little."

Ivan Marshall, age 46, has been working for one year at Pauwels. When the manufacturing plant where he'd been working at announced it was closing down — and the jobs were going to be sent to Mexico and Brazil — Marshall sent in his resume to Pauwels, a factory that had been making transformers for 40 years or more, but which had just recently begun supplying the burgeoning wind-farm business. He was hired within two days.

"I thought to myself: 'Now this is an industry that looks like it is going to last a while,'" said Marshall. "I wind the transformer coils with copper wire, and I enjoy it. Work is challenging, especially with the constant innovations. We're doing things now at this factory with transformers that have never been done before," he said.

He concluded, "I feel good about my job. I have kids and, God willing, they will be around for a long, long time. That's why I want to make the world a better place for them. These are the kinds of thoughts that go through my mind while working."

Missouri ranks eleventh in the nation in potential new manufacturing jobs created from renewable energy development.

"It's great to have a job that **improves the environment** and helps us get **off foreign oil**."



Here are some key guidelines on climate change and renewable energy regulation that can help make the REPP job projections on manufacturing employment become real jobs for middle-class Americans:

Renewable Energy Development

- A national renewable electricity standard (RES), requiring utilities to get a minimum of 25 percent of their power from renewables by 2025, should be adopted. The RES should have flexible compliance mechanisms and allow states with higher targets to pursue their more aggressive renewable energy deployment programs. This long-term national policy will provide assurances to workers, manufacturers, investors and state and local governments that they can count on the clean energy economy to be a stable source of power, revenue and jobs.
- Development of new transmission lines is critical to meeting both climate change and renewable energy development goals. Federal, state and local governments should be given the tools to better plan new lines to access remote renewable energy zones while avoiding transmission development on environmentally sensitive lands and maintaining a regional planning process. Innovative public and private financing models should also be encouraged.
- The development of new transmission systems should be given top priority and be considered a cornerstone of the U.S. strategy to combat climate change and foster a "Green New Deal," just as past federal investments in hydropower infrastructure was a key factor in the success of the original New Deal in the 1930s and 1940s.

Climate Change Reduction Targets

- Carbon emissions must be capped at levels that are based on the best science. Guidance from the Intergovernmental Panel on Climate Change suggests that emissions contributing to climate change should shrink by at least 80 percent from 1990 levels by 2050. Congress should create interim targets that make steady progress toward this goal.
- Any cap-and-trade system implemented in the U.S. should be applied across all sectors of the economy, but employ a flexible architecture that can be adjusted to address regional disparities and "leakage."
- Leakage refers to shifting of U.S. manufacturing capacity to unregulated countries, thereby circumventing the intent of domestic carbon regulations. Due to inefficient production methods and heavy reliance on coal, each ton of steel made in China generates 2.5 times as many carbon emissions as a ton of steel made in the U.S. This disturbing fact highlights the environmental benefits of domestic manufacturing of equipment for new renewable generation in the U.S.
- Cap-and-trade allowances should be auctioned off or allocated for other public purposes, with significant auction revenues used to finance a transition to the green energy economy. If insufficient funds are raised from auctions, other funding sources may also be required. Renewable energy production and manufacturing should be eligible for carbon allowances sufficient to create long-term growth. Allowance value should be allocated towards renewable energy production in a way that phases out support for technologies as they mature.
- Any climate legislation passed into law must include provisions to retain and create millions of jobs in the renewable energy sector, with special emphasis on bolstering domestic manufacturing through incentives and/or other policy instruments.
- Climate change legislation should directly link economic development goals to communities with current high employment first, and fund training and other activities to assist in the transition to a 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.

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.

BLUEGREEN ALLIANCE

2828 University Ave. SE, Suite 200
Minneapolis, MN 55414
612.466.4479

1133 15th Street NW
Washington, D.C. 20005
202.548.6587

www.bluegreenalliance.org

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