

An illustration showing a person in a blue suit and white shirt, seen from the back, looking towards several green gears. Inside each gear is a yellow sunflower. The text 'Green Data' is written in a green, sans-serif font across the top of the gears.

Green Data

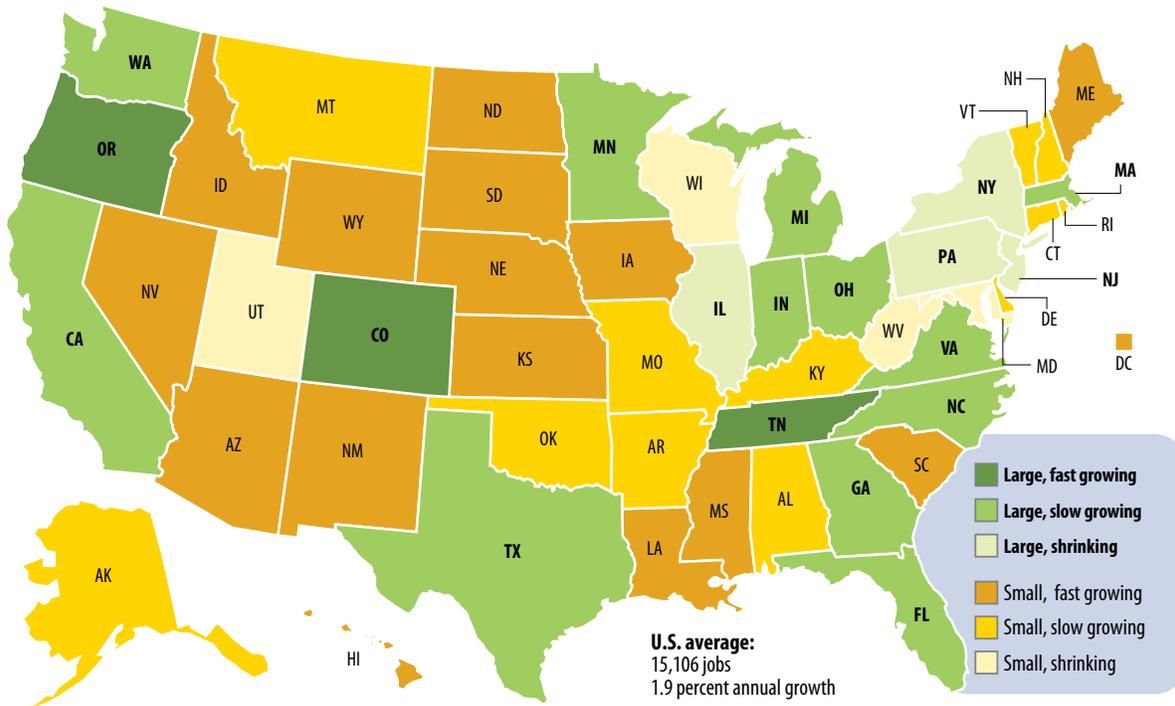
*What Do We Really Know about
Jobs in the Green Economy?*

BY KIL HUH AND LORI GRANGE

THERE HAS BEEN MUCH RHETORIC about building a new “green economy” in the United States, but until recently, there has been little in the way of hard data about where we stand on that promise. And hard data are what we need. If we are serious about rebuilding our economy with green jobs, we need to know more about the types of green jobs that are now in place and what potential exists for a major expansion. If a substantial infusion of public and private capital is to be well spent, it is important to establish whether America’s green economy provides a viable base for such an investment. Is the green revolution indeed an important source of U.S. economic growth in the near- and long-term? And does it provide opportunities for a wide range of workers or just those with highly specialized skills? We seek to address these questions here.

WHERE ARE THE JOBS IN THE CLEAN ENERGY ECONOMY?

Looking simultaneously at the total number of jobs (large or small) and their average annual growth rate (fast growing, slow growing, or shrinking), states' clean energy economies fall into six groups: large and fast-growing, large and slow-growing, and large but shrinking; small and fast-growing, small and slow-growing, or small and shrinking. Large states have more jobs in their clean energy economies in 2007 than the national average of 15,106 jobs. Small states have fewer than the national average of clean energy economy jobs. States with fast-growing clean energy economies have experienced average annual growth between 1998 and 2007 that exceeds the national average of 1.9 percent. Slow-growing states have a positive average annual rate of growth (but less than 1.9 percent) and losing states have experienced negative growth.



SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.

FIGURE 1

Research by The Pew Charitable Trusts suggests that our country's green sector—what we call the clean energy economy—is, in fact, poised for explosive growth, driven by strong consumer demand, venture capital investment, and federal and state government support. As Figure 1 shows, every state has a piece of America's clean energy economy, including traditional manufacturing states such as Ohio, Michigan, and Wisconsin. And although some have suggested that clean energy sector jobs will provide employment mainly for engineers and other highly skilled workers, Pew's data and analysis indicate they can present opportunities for a wide range of workers, including plumbers, administrative assistants, construction workers, machine setters, marketing consultants, teachers, and many others, with annual incomes ranging from \$21,000 to \$111,000.

Why Go Green? The Three Reasons

There are three primary reasons underlying interest in a clean energy economy.

The green economy and global warming: The best-known rationale for building a clean energy economy is that it is a necessary response to climate change, declines in traditional energy sources, and the nation's overreliance on foreign oil. "While our economic engine has for years been powered by relatively inexpensive energy, there is evidence that this era is coming to a close," a National Governors Association report noted in 2007. "Meanwhile, we are increasingly aware of the serious impacts of global climate change—and how America's consumption of fossil fuels is contributing to a warming Earth." Clean energy sector jobs, to the extent that they can be cultivated and established in the United States, hold promise for staunching the problems of global warming and pollution.

The green economy as an economic spark: We refer here to the emerging idea that "going green" makes good economic sense, that even in the absence of any concern with climate change there are opportunities to be had in the clean energy sector.

Research released by Pew in June 2009 highlighted that, nationally, the number of jobs in the clean energy economy grew 2.5 times faster than the number of jobs overall between 1998 and 2007. Industry analysts who follow the cleantech sector estimate that worldwide demand for green products and technology will continue to grow, creating new and unrealized economic opportunities in the clean energy economy. Pew's research found that federal and state policy makers are looking to expand this sector as a way to help the United States better compete in the global marketplace. They want new lines of business that will create jobs and new industries, generate revenues for many years to come, and help America grow as a technological leader. In this paper, we cannot provide anything approaching a full assessment of the clean energy economy's potential, but we will at least be able to weigh in on whether it provides a foundation for substantial growth and investment going forward.

The green economy as diverse jobs generator: The third reason to go green is that it has the potential to deliver employment opportunities for many who have lost jobs in the recession or during earlier declines in the manufacturing base. And while the evidence on behalf of this claim has to date been limited, we will provide some relevant data.

Amid these discussions, and given the burgeoning interest in a clean energy economy, lawmakers, business leaders, and the public need credible, reliable data to ground their policy deliberations and choices and to point to where growth is heading. Both government and the private sector need a clear and concrete definition of this market so they can track jobs, businesses, and investments aimed at both economic growth and environmental sustainability and gauge the effectiveness of public policy choices to support such efforts.

This is where Pew comes in. Pew sought first to define the clean energy economy and then count the number of jobs, businesses, and investments in it. Pew released its findings in the report *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America*.

The Pew analysis tallied actual businesses and jobs in the clean energy economy as of the end of 2007, the latest year for which data were available at the time of our report. The analysis did not assume that entire occupations (e.g., mass transit workers) should be counted. For example, the Pew report included workers who manufacture hybrid cars and buses, technicians who construct wind turbines, electricians who install solar panels on homes, and engineers who research fuel cell technology. But it did not include all auto manufacturers, electricians, technicians, and engineers. In addition, Pew's analysis focused exclusively on producers and suppliers in the clean energy economy, not the jobs that use their products and services. Although the resulting count is conservative, Pew's report provides the most precise depiction to date of the size and composition of the clean energy sector in the United States.

What Is the Clean Energy Economy?

A clear definition of the clean energy economy is necessary before any counting exercise can be undertaken. Based on research and input from experts in the field, including an advisory panel that helped guide our study, Pew developed the following definition:

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.

The clean energy economy comprises five categories: (1) clean energy, (2) energy efficiency, (3) environmentally friendly production, (4) conservation and pollution mitigation goods and services, and (5) training and support for the foregoing activities. Our framework provides a clear, practical, and consistent tool for tracking green investments, jobs, and businesses over time.

A complete data set with which to count these jobs and businesses is not available, and obtaining an accurate count of emerging economic activity is difficult. For these reasons, Pew used data that provide detailed information on individual companies. As a first step, Pew's researchers identified companies receiving clean-technology venture capital. Next, we used the National Establishment Time Series (NETS) database of U.S. public and private establishments based on data from Dun & Bradstreet to identify similar and related companies. This approach enabled Pew to capture the different sets of activities that result in products and services produced and supplied by the clean energy economy. For the purposes of this analysis, Pew studied the growth of jobs and businesses between 1998 and 2007.

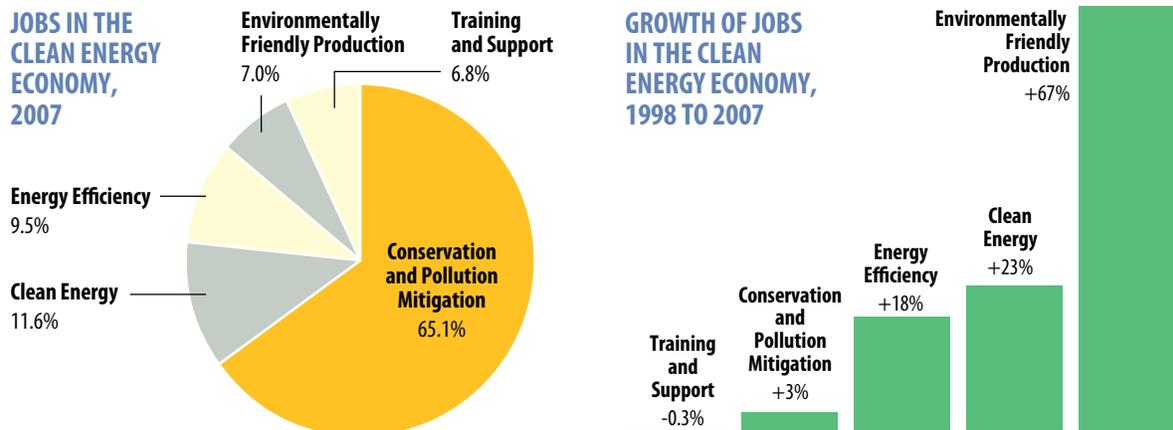
**the clean energy economy—
largely driven by consumer
demand—grew 2.5 times
faster than jobs overall
between 1998 and 2007**

How Large Is the Clean Energy Economy?

Our analysis found that, as of the end of 2007, more than 68,200 businesses across all 50 states and the District of Columbia accounted for about 770,000 jobs that achieve the double bottom line of economic growth and environmental sustainability. This is approximately one-half of one percent of all jobs in the

THE U.S. CLEAN ENERGY ECONOMY: Jobs of Today and Jobs of Tomorrow

65 percent of today's clean energy economy jobs are in the category of Conservation and Pollution Mitigation. Growing recognition among the public, policy makers, and business leaders of the need to recycle waste, conserve water, and work to mitigate emissions of greenhouse gases and other pollutants has helped make this the leading category. But growth trends paint a different picture for the future of the clean energy economy. Jobs in Environmentally Friendly Production, Clean Energy, and Energy Efficiency are growing much faster in response to new market demands.



SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.

FIGURE 2

United States today. These numbers may seem modest, but the following considerations suggest otherwise:

Bigger than biotech: Biotechnology has been the focus of significant public policy and government and private investment. Still, the biotechnology sector, which has developed applications for agriculture, consumer products, the environment, and health care, employed fewer than 200,000 workers in 2007, or about a tenth of a percent of total U.S. jobs, according to a 2008 Ernst & Young report. Likewise, the well-established traditional energy sector—including utilities, coal mining, and oil and gas extraction, industries that have received significant government investment—comprised about 1.27 million workers in 2007, or only about 1 percent of total employment. By these two yardsticks, the clean energy economy, still in its infancy, is relatively substantial in size.

Recent growth: Between 1998 and 2007, clean energy economy jobs—a mix of white- and blue-collar positions, from scientists and engineers to electricians, machinists, and teachers—grew by 9.1 percent, while total jobs grew by only 3.7 percent. Although we expect job growth in the clean energy economy to have declined in 2008, experts predict the drop in this sector will be less severe than the drop in U.S. jobs overall.

Private-sector investment: Growing attention and financial support from the private sector indicates that the clean energy economy is poised to expand significantly. Signaling interest in new market opportunities, venture capital investment in clean

technology crossed the \$1 billion threshold in 2005 and continued to grow substantially, totaling about \$12.6 billion during the past three years. Although they have dropped because of the recession, investments in clean technology have fared better than other industries; they were down 48 percent in the first three months of 2009 compared with a year earlier, while total venture capital across all sectors was down 61 percent for the same period. “It’s important not to miss the forest for the trees,” Nicholas Parker, executive chairman of the Cleantech Group, said in January 2009. “In 2008, there was a quantum leap in talent, resources, and institutional appetite for clean technologies. Now, more than ever, clean technologies represent the biggest opportunities for job and wealth creation.”

Public-sector investment: With the first significant public investments in the clean energy economy, the sector may contribute significantly to the United States’ economic recovery. Through the American Recovery and Reinvestment Act (ARRA), signed into law in February 2009, President Barack Obama and Congress are pumping substantial federal funds into cultivating the clean energy economy—nearly \$85 billion in direct spending and tax credits for energy and transportation programs. Also, a growing, diverse number of states—including Tennessee, Texas, Colorado, Michigan and Ohio—have made investments in the clean energy economy. Indeed, Pew’s study found that every state has a piece of America’s clean energy economy.

With this combination of federal, state, and private investments, the clean energy economy is poised for explosive growth.

What Types of Jobs?

Our data (see Figure 2) show that 65 percent of clean energy economy jobs as of 2007 were in the category of conservation and pollution mitigation, a sector that reflects significant interest to date in recycling waste, conserving water, and mitigating emissions of greenhouse gases and other pollutants. But three other categories—clean energy, energy efficiency, and environmentally friendly production—are growing at a far faster clip. And, as Figure 3 shows, about 80 percent of venture capital investments in 2008 were in the sectors of clean energy and energy efficiency, which focus on developing clean, renewable energy sources such as wind and solar and products and services that reduce our overall energy consumption. Bottom line? Our data indicate that clean energy and energy efficiency are the sectors to watch, both for job growth and public and private investment.

What do these jobs look like? Pew's research showed that the job mix across the clean energy sector includes both highly skilled and semiskilled positions, which suggests that further investments in green jobs are likely to benefit Americans across economic and educational spectrums. In addition, we think it is

reasonable to assume that the impending ramp-up will create new jobs of roughly the same mix as current jobs. The following is a brief description of the largest segments of the clean energy economy.

Conservation and Pollution Mitigation. This segment of the clean energy economy includes trained workers safely remediating hazardous materials from industrial sites; scientists and technicians developing, installing, and supplying products to capture and treat noxious greenhouse gases and pollutants; machinists and system operators treating water and waste; and environmental consultants helping companies and governments improve emissions monitoring, water conservation, and recycling.

Clean Energy. This segment includes electricians, electrical engineers, and plumbers installing new energy systems; plant operators involved in converting renewable sources, such as wind and solar, to electricity; mechanics rebuilding the energy infrastructure by installing sensors and controls that monitor and distribute clean energy more effectively; and researchers and technicians perfecting and implementing battery technologies that improve how we store and distribute energy.

Energy Efficiency. This segment includes engineers developing energy-efficient lighting, meters, software programs, and other products that help curb and monitor energy usage, and electricians and carpenters installing these products in homes, businesses, and government buildings.

Spurring Future Growth

Policy makers and the public are looking to generate new industries and areas of growth to help the United States achieve an economic recovery and better compete in the 21st-century global marketplace. Given the nation's need to create enduring jobs and industries while conserving natural resources and reducing carbon emissions, federal and state leaders alike are deliberating additional measures to spur the clean energy economy. Of course, whether and to what degree any particular measure is effective in fueling economic growth and accelerating the United States' recovery depends on its details. Details will also matter greatly when it comes to improving the employment opportunities of America's displaced workers and ensuring that the benefits of job growth in the clean energy economy accrue to individuals with a diverse range of skills and backgrounds. But as our data make clear, the clean energy economy already is emerging as a vital component of America's new economic landscape—and efforts underway have generated jobs, businesses, and investments benefiting a wide array of Americans.

Kil Huh is a project director and Lori Grange is an interim deputy director in the research unit of the Pew Center on the States.

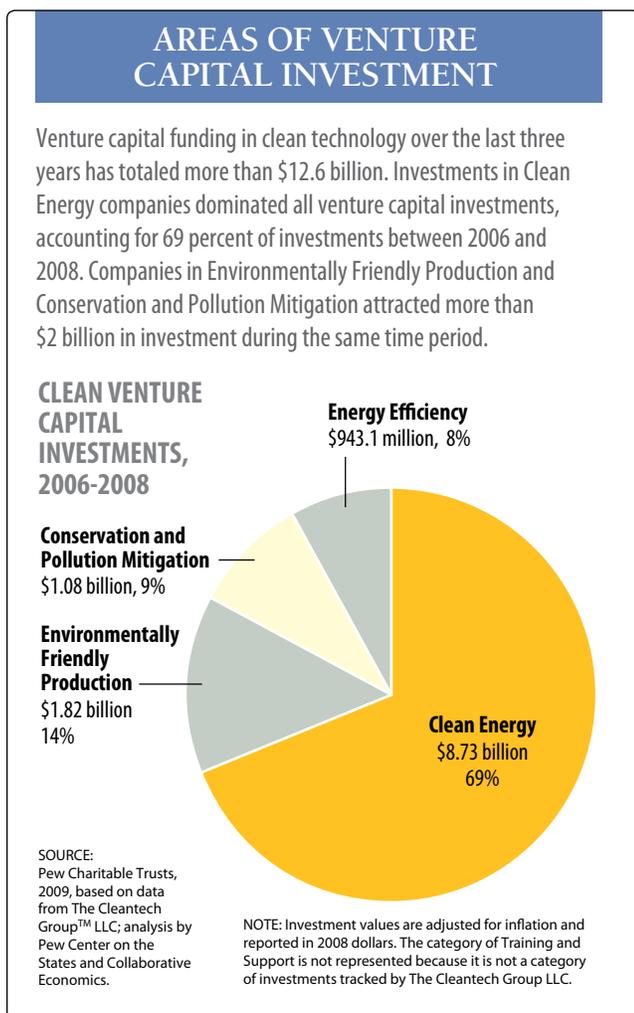


FIGURE 3