

A Review of Green Job Estimations for Colorado

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Abstract

Given the interest in and the growth of the “green economy” there has been a preponderance of recent reports claiming to define and estimate the green economy nationally and within states. The purpose of this study is to survey five recent “green economy” reports, including two for Colorado and to discuss some of the assumptions contained within each, including how green jobs are defined. One study found approximately 17,000 green jobs in Colorado in 2007 and the other found approximately 91,000 green jobs in the same year, this difference resulting mostly from two different definitions of “green jobs”. There are many public policies that would aid in the growth of the Renewable Energy and Energy Efficiency sectors in Colorado but not all are within the authority of state and local decision-makers. That said, Colorado’s Governor Bill Ritter has made the New Energy Economy a centerpiece of his administration and recent policy changes in the state. The Governor’s Energy Office (GEO) here in Colorado offers a wide range of resources related to “green job” workforce development.

Introduction

Given the interest in and the growth of the “green economy” there has been a preponderance of recent reports claiming to define and estimate the green economy nationally and within states. How “green jobs” are defined within the individual studies affects the findings. The purpose of this study is fourfold: 1) to survey recent “green economy” reports and discuss some of the assumptions contained within each, 2) to summarize the findings of two different green jobs reports for Colorado, 3) to identify and discuss some key barriers and opportunities related to future green job growth, and 4) to highlight some green job workforce development and education programs in Colorado.

1) Defining and Measuring “Green Jobs”

Two key points are crucial. First, there is no clear definition of a “green job”. We have offered some examples from five reports in Table 1, please see appendix. Deciding what jobs count as “green” will of course affect the measurement and projections of these job markets.

A second crucial aspect to consider when studying “green jobs”, there are at least two methods of counting green jobs: 1) an “industry approach” which counts the number of employees at a firm that are green companies (industry-output side), and 2) an “occupational approach” which counts the number of employees at all types of firms that have any work activities that are green (industry-input side) (Slaper and Krause 2009). In other words, the former would not count green-related jobs at traditional firms, and this is why the two approaches can lead to very different green job totals.

For example, a Pew report that used the industry approach method found that Michigan had 22,674 green jobs in 2007 while a Michigan Bureau of Labor Market Information and Strategic Initiatives, which used the occupational approach counted 96,767 green jobs in 2008 (Slaper and Krause 2009). Similarly, the Pew study reported a total of 19,340 clean energy jobs in Oregon in 2007 while the Oregon study counted 51,402 green jobs in 2009 (Slaper and Krause 2009). See Table 2 below.

Table 2: Green Job Counts. PEW versus State counts

	Michigan	Oregon	Washington
PEW (<i>Industry Approach</i>)	22,674	19,340	17,013
State (<i>Occupational Approach</i>)	96,767	51,402	47,194

Source: Slaper and Krause 2009

The Pew report had very specific guidelines for “green” classification while the occupational approach used by the states relies often on survey responses sent to businesses. The former seems to be more precise in its measurement of a green job currently but the latter may have more promise in the future as “green” occupations become more formalized within the Bureau of Labor Statistics (BLS) Occupational Employment Statistics Surveys, which has been requested of the BLS by the Obama administration (Slaper and Krause 2009).

As can be seen in Table 1, the ASES “Green Jobs in the U.S. and Colorado” report cited often here defines green jobs as follows: “An RE Job, is one where an employee is working in one of the major RE technologies (wind, PV, solar thermal, hydro power, geothermal, biomass, fuel cells and hydrogen)”. This would fall into the industry approach described above because these companies are clearly involved in “green” business. The same ASES report defines an EE job as “one where an employee works in a sector that is entirely part of the EE industry and recycling sector, and also includes some employees in which a fraction of the industry output is classified as the EE sector (appliances, HVAC systems, construction, auto manufacturing)”. This definition falls more in line with the occupational approach described above. Given that the EE sector is less clear-cut in terms of what is and what is not a “green job”, this suggests that this report counted many EE jobs that would have been missed by a study that used only an industry approach.

The hybrid approach used by the ASES report therefore indicates that this study offers a more comprehensive count of all “green jobs” in Colorado. This is why, similar to the other states’ reports compared to the PEW report discussed above, the ASES report found drastically higher numbers of green jobs in both the U.S. and Colorado. The ASES study also includes in the count “persons involved in RE & EE programs and services in government, universities, nonprofits, trade and professional associations, non-governmental organizations (NGOs) as well as foundations, consultancies, investment companies, and other related organizations” not counted in the PEW study. See a side by side comparison in Table 3 below.

Table 3: Green Jobs Generated in U.S. and Colorado, 2007

	U.S.	Colorado
ASES: <i>Hybrid Occupational & Industry Approach</i>	9,090,000	91,285
PEW: <i>Industry Approach</i>	770,000	17,008

Sources: ASES 2009, PEW 2009

2) Colorado's Current Green Job Environment

In the past five years innumerable decision-makers at the national, state, and local level have become increasingly interested in the expansion and implementation of renewable energy (RE) and energy efficiency (EE) technologies and services. Newly invigorated desires to reduce American reliance on foreign oil and recent concerns regarding greenhouse gas emissions among the general public have also fed the growth of the RE and EE sectors and job markets both globally and locally. The Obama administration has explicitly vaunted this “green collar economy” and has attempted to support it through a number of items contained in the American Recovery and Reinvestment Act or “the stimulus package”.

Echoing the Obama administration’s “green collar economy” Colorado Governor Bill Ritter made the “new energy economy” a central part of his 2006 election campaign. Colorado, home to the National Renewable Energy Lab (NREL), is a nationwide leader in renewable energy and research and development. These facts, plus the statewide renewable portfolio standard (RPS), which is one of the leading the leading RPS’ nationally, and significant wind and solar resources, make it unsurprising that Colorado has benefited from the growing “green economy”. As was discussed earlier and is evident in Table 3, two leading studies on green jobs found different numbers for both the U.S. and Colorado based on methodology.

The ASES study which differentiated the RE and the EE sector (The PEW study did not), found the EE sector is much larger than the RE sector, for both the U.S. and Colorado. In fact, the same ASES report cited above found that the EE industry specifically in Colorado generated more than \$9 billion of that \$10.3 billion of those sales, and created more than 81,000 of those 91,000 jobs. See Table 4 on the next page for a breakdown of the top five RE and EE jobs in Colorado.

For Colorado in 2007, the top five RE jobs represent 86% of all RE jobs. Federal

government jobs represent half of that total, many of those being employed by or with NREL. Examples of these RE “green jobs” at NREL are: lab technicians and managers, and scientists working on photovoltaic cells, wind turbines, and bio fuels.

For Colorado in the same year, the top five EE jobs represent 81% of all EE jobs and the top job generating industry was the recycling, remanufacturing, and reuse industry. Examples of “green jobs” in the EE sector of Colorado are: recycling distribution center technicians and managers, recycling truck drivers, HVAC engineers, energy auditors, sales and finance managers, carpenters, machinists, plumbers, and welders among others (GEO & EDF 2009). All of the job types in the top 5 EE jobs generated are in the private sector. Examples of RE jobs are: sheet metal workers, electrical engineers, installation electricians and engineers, roofers, field technicians, fabricators and designers, and sales managers among others.

See Table 4 (located in the appendix) and Figures 1 and 2 for a breakdown of the top five jobs in both Colorado’s RE and EE sector in 2007. Also, a table listing all RE and EE jobs generated in Colorado in 2007 is included in the Appendix of this report.

Figure 1: Top 5 Renewable Energy Job Generators in Colorado, 2007

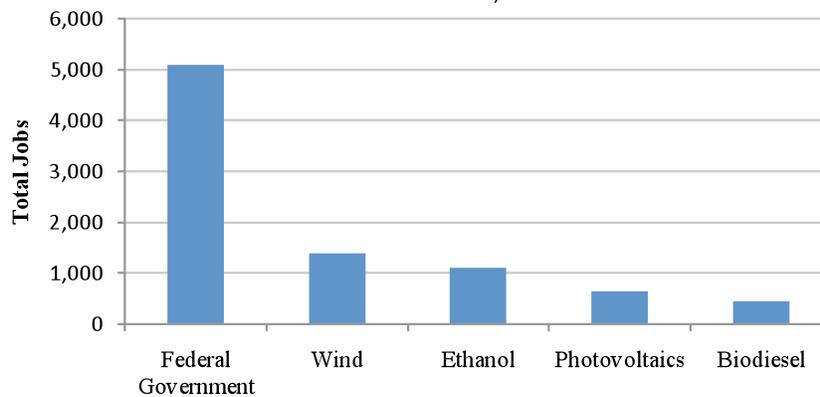
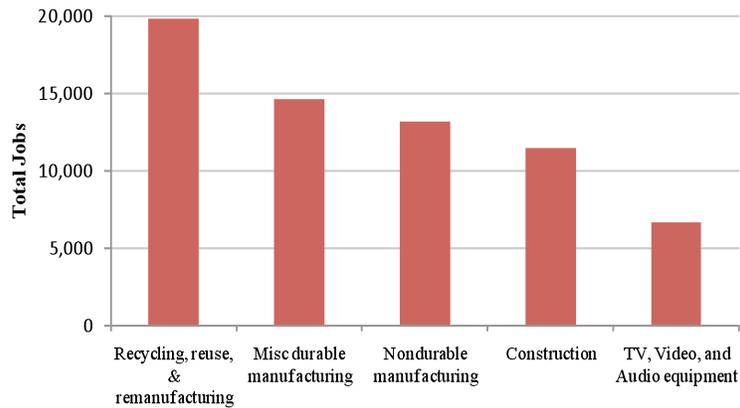


Figure 2: Top 5 Energy Efficiency Job Generators in Colorado, 2007



Of note is that although the Colorado gross state product accounts for less than 2% of national GDP, in 2007 Colorado accounted for approximately 6% of the U.S. wind market, nearly 6% of the U.S. photovoltaics market, about 5% of the U.S. ethanol market, and about 5% of the U.S. biodiesel market (ASES 2009). The New Energy Economy has therefore grown more in Colorado than it has in the U.S. Also noteworthy is that RE and EE sectors represent 4% of Colorado's total gross state product.

Forecasting Future Growth

According to the ASES report, with appropriate federal and state government policies, the RE & EE sectors could generate over 37 million jobs per year in the U.S. by 2030, including over 600,000 jobs in Colorado (ASES 2009). Similar to the case in 2007, the top five RE jobs forecasted for 2030 represent 87% of all RE jobs, and the top five EE jobs represent 83% of all EE jobs. See Table 5 (located in the appendix) and Figures 3 and 4 for a projection of the top five job types in both Colorado's RE and EE sector in 2030.

Figure 3: Top 5 Renewable Energy Job Generators in Colorado, 2030

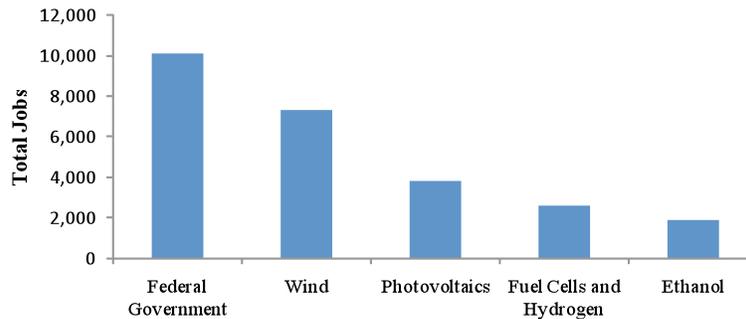
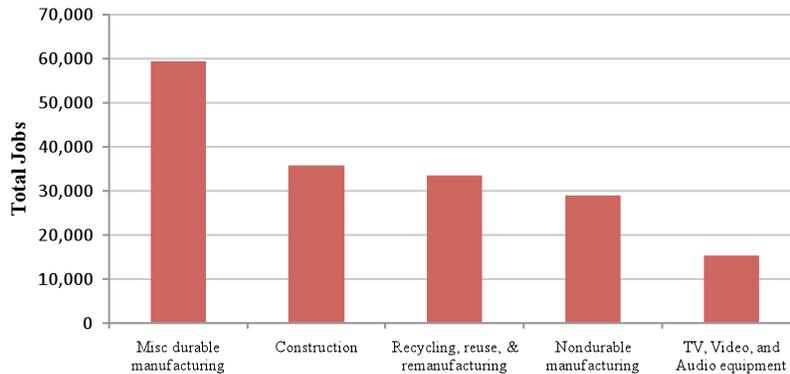


Figure 4: Top 5 Energy Efficiency Job Generators in Colorado, 2030



3) Top Barriers and Opportunities to Green Jobs Growth

There are many public policies that would aid in the growth of the RE and EE sectors in Colorado but not all are within the authority of state and local decision-makers. National policy is important to consider here, as decisions made at the national level such as trade policy would affect the size and scope of the “green economy”. To make an international comparison, one example of a country that has created an incredible strong “green economy” is Germany. While Germany has ¼ of the U.S.’ GDP it has 31,000 more RE jobs than the U.S. The wind energy sector in Germany generates 84,000 jobs while the U.S. wind sector is responsible for 17,000. Similarly, the solar energy sector in Germany is 39,000 jobs large while the U.S. sector is responsible for 9,000.

Barriers

The wind industry would benefit from improved transmission infrastructure. This would

include an expansion and streamlining of tax and lending policies that incentivize the private investment in transmission infrastructure. The wind industry would also benefit from increased state and national renewable portfolio standards (RPS). Expanded and streamlined tax credits would also spur investment in wind energy production by both private and public institutions such as non-profit organizations, schools and universities

The solar industry would benefit from the elimination of local covenant restrictions, which can limit the installation of solar panels in many residential areas. Expanded and consistent net metering policies along with the expansion of investment tax credits for homeowners and businesses would further incentivize local and regional investment in solar energy on the roofs of homes and commercial buildings. Like the wind industry, the solar sector would of course benefit from increased state and national RPS. The stabilization of silicon availability and process is cited in a green jobs report produced by solar industry representatives as something that would benefit the solar industry but as this relates to national and international trade policy seems outside the scope of this report.

Opportunities

As mentioned, Governor Bill Ritter has made the New Energy Economy a centerpiece of his administration. The state has launched a Colorado Climate Action plan setting specific greenhouse gas emission reduction targets and including a “greening government” mandate, which will attempt to make much of the progress on these goals through EE measures in state and local buildings. New state legislation mandating LEED (Leadership in Energy and Environmental Design) and other high performance building standards will also stimulate more growth in Colorado’s EE sector.

The state renewable portfolio standard was doubled, meaning an even greater rise in the renewable energy sector market within the state. RE companies with both a national and international profile have located themselves in Colorado, no doubt at least in part because of the RE friendly policies in this state. These companies have generated thousands of jobs in Colorado and will likely continue to do so.

4) Workforce Development, Trainings, and Public-Private Partnerships.

The Governor’s Energy Office (GEO) here in Colorado offers a wide range of resources

related to “green job” workforce development. A “Green Jobs Guidebook”, a “Colorado Green Jobs Speaker’s Bureau”, and regionally based “Colorado Green Education and Training Resources” are all available at the website below. This third program, the education and training resources, offers region specific lists of educational institutions and organizations providing “green job” workforce development programs, including detailed information on the different programs themselves. These programs are offered all over the state and range from short certification programs in LEED construction and “green carpentry” to two-year, four-year, and graduate degrees in chemistry, engineering, environmental design, and energy management to name just a few. The GEO website:

<http://www.colorado.gov/energy/index.php?/resources/category/green-jobs-resources/>

The RE and EE sectors are both very dependent on research and development and are both capital intensive. For this reason public-private partnerships (PPP) can be essential in bringing innovative technologies and services to the marketplace and lessen the capital requirements for smaller companies. The Colorado Renewable Energy Collaboratory is a partnership between NREL, Colorado’s premier research universities and colleges, and private companies and has become a primer example nationally of a PPP in the renewable energy sector. The Collaboratory works to develop new RE products and technologies for rapid transfer to the market and support economic growth with the RE industries including offering scholarships and program support designed to “educate the finest energy researchers, technicians, and workforce”.

<http://www.coloradocollaboratory.org/>

Appendix:

Table 1: Comparison of Green Job Definition, by Study

Green Collar Jobs in the U.S. and Colorado ^(Bezdek 2009)	1. RE Job: wind, PV, solar thermal, hydro power, geothermal, biomass, fuel cells and hydrogen. 2. EE Job: EE industry and recycling sector, includes some employees in which a fraction of the industry output is classified as the EE sector (construction). 3. RE&EE jobs are involved in programs and services in government, universities, nonprofits, etc.
The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America ^(PEW 2009)	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; and (5) Training and Support.
Washington State Green Economy Jobs ^(Lee et al 2009)	Jobs that promote environmental protection and energy security: Mitigating or Cleaning Up Pollution, Preventing and Reducing Pollution, Energy Efficiency, or Renewable Energy.
Colorado Governors Energy Office ^(GEO 2009)	Those positions of direct employment in a firm or organization that is involved in EE or RE.
U.S. Metro Economies: Current and Potential Green Jobs in the U.S. Economy. ^(Global Insight 2008)	Jobs in renewable energy or nuclear fuels, biofuel agriculture jobs, manufacturing and sales and service jobs producing goods used in RE and EE products, government jobs relating to RE and EE.

Table 4: Top RE/EE Jobs Generated in Colorado, 2007

	Industry	Industry Revenues	Total Jobs
Renewable Energy	Federal Government	\$400	5,100
	Wind	\$200	1,400
	Ethanol	\$250	1,100
	Photovoltaics	\$55	650
	Biodiesel	\$20	450
	Total: TOP 5 RE	\$925	8,700
	TOTAL RE	\$1,082	10,075
Energy Efficiency	Recycling, reuse, & remanufacturing	\$1,900	19,800
	Misc durable manufacturing	\$1,900	14,600
	Nondurable manufacturing	\$2,200	13,200
	Construction	\$730	11,500
	TV, Video, and Audio equipment	\$700	6,700
	Total: TOP 5 EE	\$7,430	65,800
	TOTAL EE	\$9,129	81,560

Source: ASES 2009

Table 5: Top RE/EE Jobs Generated in Colorado, 2030

	Industry	Industry Revenues	Total Jobs
Renewable Energy	Federal Government	\$900	10,100
	Wind	\$1,100	7,300
	Photovoltaics	\$350	3,800
	Fuel Cells and Hydrogen	\$325	2,600
	Ethanol	\$800	1,900
	Total: TOP 5 RE	\$3,475	25,700
	TOTAL RE	\$3,811	29,400
Energy Efficiency	Misc durable manufacturing	\$4,500	59,400
	Construction	\$2,150	35,700
	Recycling, reuse, & remanufacturing	\$3,400	33,400
	Nondurable manufacturing	\$4,600	28,900
	TV, Video, and Audio equipment	\$1,600	15,200
	Total: TOP 5 EE	\$16,250	172,600
	TOTAL EE	\$20,179	208,620

Source: ASES 2009

**All RE/EE Jobs Generated in Colorado, by
Occupation, 2007**

Occupation	Total Jobs
Janitors and Cleaners	1,520
Customer Service Representatives	1,398
Cashiers	1,337
Executive Secretaries and Administrative Assistants	1,288
Bookkeeping and Accounting Clerks	1,260
Business Operations Specialists	953
Accountants and Auditors	950
Stock Clerks	939
Electricians	912
Computer Software Engineers	844
Security Guards	802
Truck Drivers	769
Welders and Solderers	538
Civil Engineers	519
Machinists	498
Plumbers, Pipefitters, and Steamfitters	458
Inspectors, Testers, and Sorters	449
Waste Treatment Plant Operators	408
Construction Managers	377
Computer Support Specialists	376
Electronics Engineers	358
Management Analysts	275
HVAC Mechanics and Installers	241
Mechanical Engineers	219
Order Clerks	209
Industrial Machinery Mechanics	184
Financial Analysts	183
Computer and IT Managers	177
Roofers	167
Glaziers	152
Sheet Metal Workers	145
Training and Development Specialists	137
Environmental Scientists and Specialists	131
Marketing Managers	127
Recyclable Materials Collectors	121
Environmental Engineers	113

Sources: ASES 2009

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