



State of Green: The Definition and Measurement of Green Jobs

The concepts of “green economy” and “green jobs” have been gaining momentum. Two bills, the Green Jobs Act (passed as part of the Energy Independence and Security Act) and the American Recovery and Reinvestment Act of 2009 (ARRA, also known as the stimulus) have allocated tens of billions of dollars to jump-start the green economy, strengthened the concept of ‘green,’ and lent it greater prominence. What green is, and what the green economy constitutes, however, is still a matter of contention. These ‘green’ concepts, which broadly refer to an increasing environmental awareness among both consumers and producers, are both ambitious and ambiguous. There are many different stakeholders pushing for increased attention to and investment in green. Proponents argue that green jobs will revitalize the American economy and are well-paying jobs providing pathways out of poverty for a large number of historically under-served, under- and un- employed workers. Others counter that the green economy is more hot air than reality, a politically useful but economically overhyped sales pitch.

Scores of reports have been written attempting to understand the green economy. The quality and exact topic of these reports vary greatly. Industry groups have also put out reports on the green economy, as have individual states, research institutes, international organizations, task forces, think tanks, etc. All reports related to the green economy are facing the same problem—how to define and quantify a blurry concept. There is as much political advocacy as there is research and, as with any new topic, the solid empirical work uses different methods and scope making comparison nearly impossible; nonetheless, there are important points of consensus.¹ There is currently no universally accepted definition or methodology, but the definition adopted by most reports is inclusive, generally economic activity related to enhancing or preserving the environment and natural resources. Among the reports that are strictly research and not advocacy, there is a clear preference for an industrial, survey-based approach. Such an “industrial” approach makes sense as a way to track macro-economic impact and the relative “greening of particular sectors. Such an approach may not, however, be helpful for the millions of unemployed workers hoping to train for and obtain a “green” job. Although there has been work done on what skills, knowledge, and abilities will be needed for workers in green jobs it is insufficient to draw large

¹ Studies that are primarily concerned with certifications, skills, education, community colleges, and what green jobs will require from the work force are not considered in detail in this review, but many are listed in the bibliography.

conclusions other than that green jobs are traditional jobs that will change very slightly or not at all, depending on the occupation. Finally, the research about the wages for green jobs is inconclusive.

This work was undertaken as part of a labor market information grant given to a consortium of states consisting of Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The consortium is attempting to define green in order to carry out its own green jobs count. The literature review seeks to inform the consortium by reviewing the most prominent working definitions and methodologies for their potential long-term use in labor market and job training research and policy, as well as recount various estimates of the size of the green economy. The reports were selected based on their influence and impact, relevance to labor market economists, as well as their methodological soundness (some papers that fit the first two criteria are excluded because their methodology is either not explained, based on private data sets, unsound, or a combination thereof; while these are not reviewed, they are included in the bibliography). Reports reviewed in detail in this paper include Washington State's green jobs report, "2008 Green Economy Jobs in Washington State," the Workforce Information Council Report "Measurement and Analysis of Employment in the Green Economy," the BLS Federal Register notice related to green jobs, the Occupational Information Network report "Greening of the World of Work," and the Department of Commerce's report "Measuring the Green Economy." In addition, reports from Canada and the European Commission are also reviewed. Additional reports and studies are included in the bibliography.

Defining 'Green'

The first obstacle to understanding and tracking the green economy is defining it. The task of defining and enumerating green jobs in the economy has been attempted by many disparate parties, from industry groups, labor unions and other worker's rights activists, academic and policy institutions, local, state and federal governments, to the workforce development and labor market information community. There are dozens of different definitions and approaches. Environmental and workforce advocates brought green to national prominence, but it has generally been the labor market economist and workforce development community at the forefront of measuring the green economy. A handful of reports undertaken by labor market experts have been the most influential among labor economists in defining and counting green jobs. These include the reports by the Workforce Information Council (WIC), Washington State, the Bureau of Labor Statistics (BLS), and the Occupational Information Network (O*NET). However, it would be wrong to discount other stakeholders who have a clear interest in the

impact of green and how the economy is measured.² These include the Department of Commerce, which has recently put out its own report on green jobs, and the Department of Energy, which is making substantial investments in renewable energy and energy efficiency (RE/EE).³

Defining green is a difficult task. Questions that must be addressed in defining green include, but are not limited to: Is being green the same as being environmentally friendly? How is environmentally friendly defined? Does it include just products and services that are environmentally friendly? What about environmentally friendly production processes? Environmentally friendly can be a continuum, so how green does a product/process have to be to count? If a product is environmentally friendly but it is packaged, delivered, and marketed in an environmentally unfriendly way, is it still green?

These questions, and the reports that have attempted to tackle these issues, have led to three types of green definitions:

1. The social justice/worker-centered definition, which makes green contingent on the job quality and its potential to address poverty and related social problems;
2. The renewable energy and energy efficiency (RE/EE) definition, which defines green as activities in the sectors related to creating renewable energy and increasing energy efficiency, also known as ‘clean energy’; and
3. The broad environmental definition, which defines green as anything relating to environmental protection and quality. This definition is employed by many state surveys, BLS, and O*NET, among others.

The social justice/worker-centered definition is primarily employed by union groups, community advocates, the Vice President’s Middle Class Task Force, and some research institutions. Examples of these groups include Green For All, the Apollo Alliance, the BlueGreen Alliance, and numerous state and local level groups. Reports produced by these groups, which are numerous, share their emphasis on job quality and are focused on getting traditionally disadvantaged workers into this ‘emerging’ sector of the economy. Generally, these reports are pushing for greater investment in workforce development targeted towards low-income individuals and families, and policies to promote a green economy, which they assert

² There were several reports that counted green around the same time that the first state report on the green economy came out in 2008. One of these reports, “US Metro Economies: Current and Potential Green Jobs in the U.S. Economy” is not detailed in this review because its methodology is both not explicitly outlined, and what methodology was described is not well-established.

³ To the best of the author’s knowledge, the Department of Energy has not released any reports pertaining to defining or measuring the green economy; however, they do have a significant portion of the ARRA money to hand out. Presumably, as the Department of Energy, they utilize the RE/EE definition.

will benefit these workers. These reports are numerous and include, but are not limited to: Jones, 2008; Pollin, et al. 2009; Pollin, et al. 2008; Altstadt, 2010; Bivens, et al. 2009; Mattera, et al., 2009; and the Vice President's Middle Class Task Force report on Green Jobs, 2010.⁴ While this concept of green jobs and green collar workers galvanized political support for green jobs, it is unhelpful for labor market analysts.

The RE/EE (renewable energy/energy efficiency) definition is the most measurable and concrete definition, and is also consistent with federal legislation. The RE/EE definition encompasses everything related to clean energy—investments in reducing energy and fossil fuel consumption (i.e., energy efficiency), including 'green construction'/retrofitting homes and buildings, engineers who design new, hybrid cars, workers who build those cars, and all work on renewable energies such as wind, biomass, solar, geothermal, oceanic (wave and tidal), hydropower, and, in some cases, nuclear energy. The RE/EE definition is taken up in isolation by some states (including New York and New Jersey), but not by any major reports, although all reports on the green economy include RE/EE as a primary component.

The broad environmental definition is expansive and the most widely-used by labor market analysts and economists. This definition, which encompasses all environmental activities, includes environmental protection and remediation, and generally any activity that enhances, preserves, or restores the quality of the environment.

Reports aside, the RE/EE definition is the one favored by the national (and some state) legislation, most prominently the Green Jobs Act (Title X in the Energy Independence and Security Act of 2007) and ARRA. The Green Jobs Act is focused on workforce development. It amends the Workforce Investment Act (WIA) and mandates the establishment of an energy efficiency and renewable energy worker training program, and directs BLS to collect statistics related to workforce trends in the energy sector. It funds grants to institutions and group to carry out training to develop an energy efficiency and renewable energy industries workforce, states to do labor market information and exchange work, and states to administer RE/EE workforce development programs. Although there is no stated definition of what green jobs are or what the green economy is in this bill, it is clear that the RE/EE definition is employed.

⁴ Interestingly, this report uses data prepared by the Council of Economic Advisors to show that wages for green jobs are higher than wages for similar positions that are not green by between 10-20%. This data is not fully corroborated by any other report.

The same is true of the ARRA. Unlike the Green Jobs Act, it is not focused exclusively on workforce development. Among other things, ARRA funds the Green Jobs Act, allocated \$17 billion exclusively on RE/EE including weatherization, state energy program grants, and research for advanced battery technologies. An additional \$11 billion is allocated to modernize the electric grid. The bill also funds a renewable energy loan guarantee program and commissions a renewable electricity transmission study, funds additional clean energy projects, and provides for a host of tax incentives for renewables. In total, RE/EE projects amount to about \$50 billion, excluding tax incentives and loan guarantees; it is estimated that including the latter, the total comes to about \$100 billion.⁵ This is about 14 percent of all ARRA money. In contrast, about \$7 billion dollars is allocated for environmental clean-up and research. The environmental thrust of the bill is clearly in the RE/EE sector. However, as with the Green Jobs Act, no definition of green or green jobs is explicitly stated.

Report Definitions

Washington State's Approach

Washington State employs the broad environmental definition of green, although it explicitly includes RE/EE within that definition. Washington State's Employment Security Department was the first state to produce a green jobs report. The initial report was published in January of 2009, and they have since followed up with an additional report published in March of 2010. These reports, mandated by the Washington State legislature during the 2008 legislative session, identify the number and type of green jobs in Washington State, as well as establish a baseline against which to measure future industry and job growth of the green economy in the state. The reports are to be used in conjunction with other research to, among other things, "guide state policies and strategies that will support future growth in Washington's green economy" (2009: 4). Washington defines green economy as "rooted in the development and use of products and services that promote environmental protection and energy security. It is composed of industries and businesses engaged in: Energy efficiency; Preventing and reducing pollution; Renewable energy; Mitigating or cleaning up pollution. *Green jobs* promote environmental protection and energy security" (2009: 4). In the 2010 report, the definition of green jobs is where employees are directly and predominately employed in the four core areas cited above. Both reports measure only direct jobs.

Workforce Information Council's Approach

⁵ See "American Recovery and Reinvestment Act." Speaker Nancy Pelosi. Available online at <http://www.speaker.gov/newsroom/legislation?id=0273#energy>. Accessed 21 June 2010.

The Workforce Information Council (WIC) published a report on green jobs, “Measurement and Analysis of Employment in the Green Economy” in October of 2009, the purpose of which was to define green jobs and describe and recommend methods to count and analyze them. While writing the report, the group’s focus was modified to “identifying lessons learned and sharing information among states” (5). The report is essentially a ‘how to’ manual for LMI units and other interested parties, detailing guidelines, recommendations, and best practices for defining green jobs and carrying out a green jobs study and LMI assessment. WIC emphasizes that green jobs should be classified as jobs “whose work is essential to *green economic activity*,” which is then broken down into categories. These jobs, in other words, are defined by their relationship to economic activity that is considered green, and not by their particular skills or skill-level, wages or other compensation, or even the tasks being performed (this also means direct jobs, not indirect jobs, although this is not explicitly stated). The measurable definition WIC proposes is “a green job is one in which the **work is essential** to products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability. The job involves work in any of these green economic categories: renewable energy and alternative fuels; energy efficiency and conservation; pollution, waste, and greenhouse gas management, prevention, and reduction; environmental cleanup and remediation and waste clean-up and mitigation; sustainable agriculture and natural resource conservation; education, regulation, compliance, public awareness, and training and energy trading” (emphasis in original, 5-6). Importantly, WIC’s definition makes the job the unit of observation.

BLS’s Approach

The FY2010 and 2011 budget proposed to fund the Bureau of Labor Statistics (BLS) to do exactly what the WIC report recommended—count green jobs at a national level via an establishment survey. Relying heavily on the framework that WIC outlined while also moving beyond it, BLS has developed a green definition as well as a green methodology. BLS has started to study green jobs, and intends to implement a green jobs survey in FY2011. Following the WIC report, BLS will to identify environmental economic activity, and count the associated jobs. The collection of data on green jobs is to serve two purposes: understand the number of jobs and the trends over time related to green employment; determine the industrial, occupational, and geographic distribution of jobs; ascertain the wages of workers in green jobs.

As observed by others, BLS also notes that no standard classification system being currently used in the United States (i.e., NAICS and SOC) identifies ‘green’ as a grouping of industries or occupations. That fact necessitates a new way to accurately capture and count uniquely green occupations.

In identifying environmental activity, BLS plans to recognize two approaches:

1. The output approach, which identifies establishments which produce green goods and services and count the associated jobs; and
2. The process approach, which identifies establishments which use environmentally friendly production processes/practices and count the associated jobs.

After reviewing many studies, including international studies, consulting with stakeholders, and issuing a notice for public comment, BLS announced in September 2010 that it has decided to use the following definition for green jobs: “Green jobs are either: A. Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources. B. Jobs in which workers’ duties involve making their establishment’s production processes more environmentally friendly or use fewer natural resources.” In settling on a final definition, BLS revised the categories that green goods and services may be placed into. They are now in one or more of five groups: energy from renewable sources; energy efficiency; pollution reduction and removal, greenhouse gas reduction, and recycling and reuse; natural resources conservation; and environmental compliance, education and training, and public awareness. In addition, BLS has dropped the four categories that they were going to further categorize green goods and services in, and made numerous technical changes and drops to the industry list it had initially provided.

In sum, BLS is interested in counting direct jobs associated with both green products, such as solar panels or environmentally friendly soap, and processes, such as a plastic bottle that uses only recycled materials or a retail store that has installed solar panels.⁶

*O*NET’s Approach*

Relative to other reports, which heavily emphasize industry, the O*NET report, “Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations” takes an occupational approach. From a workforce development perspective, the O*NET report is helpful because O*NET examines how the green economy will affect occupational requirements and demand across twelve green sectors. The actual definition of the green economy is similar to the definitions above; however, it is how O*NET approaches the green economy that is radical. O*NET defines the green economy as: “. . .the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy” (3).

⁶ The methodology for counting processes not been worked out yet by BLS.

This report is unique in several respects. The O*NET report argues that considering an occupation green or not green is misguided. Instead, the report takes an occupational approach, and insists that the focus of labor economists and workforce development should be on the ‘greening’ of the economy. The report believes that by doing so, workforce development folks and economists can concentrate on the effects that a green economy will impose on occupational requirements. That is, the report discards the concept of static green jobs, and instead believes that the degree to which the ‘green’ economy affects the work context, and worker requirements, is dynamic. The greening of occupations is defined as: “...the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements” (11). This is the only framework in which an occupation can be partially green.

The O*NET report is explicit in positing that technology is the driver of the green economy. Currently, the report observes, “the extant green economy literature has not taken an occupational-level approach, focusing instead on broader industry-level outputs or products, such as renewable power generation and environmental protection enhancement” (10). However, because the direction that the green economy will take is still unclear and the technologies are not all invented and developed, the authors believe that the focus should shift from green ‘jobs’ to green ‘occupations,’ so that we concentrate on the work performed and worker requirements.

Building on this observation, the report identifies three general categories that describe the effects of the green economy and green technologies on occupational requirements:

1. *Green increased demand occupations*, where the work context may change, but the tasks, knowledge, skills, and abilities do not;
2. *Green enhanced skills occupations*, where the occupation’s purposes “remain the same, but tasks, skills, knowledge, and external elements, such as credentials, have been altered”; and
3. *Green new and emerging occupations*, where the demand of the green economy and technologies have created the need for “unique work and worker requirements” (4).

The twelve sectors identified by the O*NET report as being affected by the greening of the economy are: renewable energy generation; transportation; energy efficiency; green construction; energy trading; energy and carbon capture and storage; research, design, and consulting services; environment protection; agriculture and forestry; manufacturing; recycling and waste reduction; and governmental and regulatory administration. The report further outlines all of the sectors it identifies in green in detail, outlining potential areas of growth, workforce implications, and the consequences of the greening of occupations on the sector.

Department of Commerce's Approach

Finally, the Department of Commerce's (DOC) Economics and Statistics Administration recently released a report (in April 2010) that estimated private sector green employment in the United States based on publically-available Economic Census data (which excludes government employment, as well as agriculture, rail transportation, educational institutions, political organizations, and private households).⁷ Green economic activity is defined as products and services whose predominant function serves to conserve energy and other natural resources, and/or reduce pollution.

Measuring the Green Economy and Green Jobs

Measuring green is difficult for labor market specialists because the traditional way of understanding, counting, and classifying trends in the labor market is through the categories of industry and occupation which do not have a category for 'green.' Green jobs pose an especially difficult problem in this context, as the Texas Workforce Commission explains,

“...The greenness of jobs even within a single occupation will vary according to the nature of the firm or establishment, the current project or specific work assignment and the specific employer's workplace rules and policies. Thus, labor market analysts can't merely count all employees in a particular occupation (much less in an entire industry) as green collar workers. Moreover, the greening of the economy is an evolutionary process (albeit one that is picking up a head of steam). That is, employers in virtually every sector are striving to conserve energy and resources while reducing their carbon footprint and switching from oil-dependence to renewable energy. Arrayed along any of the various dimensions popularly identified as comprising the green movement, there is no current benchmark at which green companies can be separated from non-green ones. Nor is there any useful milestone for deciding at what point in time to move all of a company's employees from the non-green column to the green column. Therefore, labor market analysts can't simply count all of the employees of a specific firm as green and employees of other companies in the same industry as non-green” (1).

An engineer that designs hybrid vehicles, for example, may spend half of his time designing non-hybrid vehicles, or may work at an office/plant where some of the employees spend time on 'green' activities and others don't. Moreover, what is true of a particular employee/firm may not be true of the whole firm/industry. In other words, there is no way, short of asking every employer about every employee, to determine whether an occupation or industry should be counted as green.

⁷ For green products that could not be separately assessed because they share a product code with non-green products (such as energy efficient appliances), publically available supplemental data were used, when possible.

Washington State

To measure green jobs, Washington State sent out a survey to a random sample of 17,000 employers in Washington State in 2008. To determine the sample, Washington looked at NAICS codes at the 3-digit level; the design team selected industries that it thought might contain green jobs, as well as a random sample of 7,500 firms not represented by the NAICS codes previously selected. If any of the 7,500 firms reported producing a green service or product, their NAICS code was added to the list; all industries in the state were ultimately sampled.

Employers were asked to list the job title(s) and number of employees that held green jobs, as defined by Washington State. In addition, the employers were asked whether the green employment was full time or part time, whether any special certifications were related to the job, and in which of the four core areas the job is classified (as defined by the predominant amount of time). In addition to the survey, existing LMI data were compiled on earnings and education level.

For Washington's first survey, over 9,500 employers who were contacted over a three-month period chose to participate in the survey (the participation rate was over 60 percent). Almost a quarter of the respondents reported one or more green business activities. The survey results were weighted to be proportional to the rest of Washington's economy, "which enabled the computation of estimates of the number of green economy industries, employers, and employment by occupation" (12). The total green jobs count in Washington's private sector economy was 47,194 in 2008; the second report, which included the public sector, found 99,319 green jobs (76,137 in the private sector and 23,182 in the public sector). The increase was due in part to the increased response rate (70%; a total of 13,000 firms responded to the survey), surveying of the public sector, and the expanded number of firms and industries included in the survey (2010: 6).

Washington State also conducted secondary analysis to determine what skills, training, and wages were attached to green jobs. They found that wages and required education level are highly dependent on the job title and work performed. In 2009, Washington found that of the occupations with the largest share of green jobs, one to four years of postsecondary training (including on-the-job) and coursework is needed.

WIC

In terms of methodology, WIC advises that a survey of business establishments is the best method of counting green jobs, due to the inability of NAICS and SOC codes to differentiate green and non-green industries and occupations; further, WIC states that there is a need for a national survey to establish standard methodology and definitions. In addition, the report offers advice and lessons learned specific to

conducting a green jobs survey. The primary sources for WIC's report are four state surveys of green jobs (from WA, MI, OR, and CA) and two analytic reviews (from CT and NY).⁸

Key lessons identified by the report include clearly establishing the purpose and parameters of a survey, that the survey should cover a defined period of time, as well as provide clear examples of what does and does not constitute a green job. In addition, the report covers the importance of utilizing existing LMI data and makes recommendations for integrating LMI into green jobs studies. Finally, WIC also proposes a brief action plan to facilitate information sharing among stakeholders such as states and the federal government.

BLS

BLS plans to utilize the NAICS and SOC codes to identify green economic activity and count jobs to allow comparison with existing measures of employment and wages; however, BLS may develop more detailed subcategories. BLS intends to count green jobs in two separate surveys—one survey to count jobs that produce green goods and services, and a separate survey to count jobs associated with green processes. The latter is fairly underexplored territory, as no survey has explicitly attempted to only count jobs associated with green processes, and the most recent BLS Federal Register Notice solicits comments on how exactly to carry this out (the Federal Register Notice in September does not clarify this point).

The approach adopted by BLS to count green goods and services follows the recommendations of the WIC report very closely. However, as of yet this methodology is still being tested and no surveys will go out until FY2011. As it stands, BLS intends to survey employers to determine revenue share from green goods and services at the establishment level, and use revenue share as a proxy for employment. Results will be presented at the industry level.⁹ However, in establishments that produce *only* green products, BLS intends to count *all* employment at that establishment (such as accountants, filing clerks, etc.); for establishments that produce green and non-green products, BLS will only count a portion of employment based on revenue (see below).

DOC

⁸ These reports are cited in the bibliography, and can be found at: <http://www.labor.state.ny.us/workforcenypartners/PDFs/NYS%20Clean%20Energy%20Jobs%20Report%20FINAL%2006-09-09.pdf> (NY); http://www.michigan.gov/documents/nwlb/GJC_GreenReport_Print_277833_7.pdf (MI); <http://www.ctdol.state.ct.us/lmi/misc/ceddec08.pdf> (CT); <http://www.qualityinfo.org/pubs/green/greening.pdf> (OR); http://www.workforceexplorer.com/admin/uploadedPublications/9463_Green_Jobs_Report_2008_WEXVersion.pdf (WA, 2009).

⁹ According to the Federal Registry notice, "The concepts, methods, and definitions described here may change based on input from the public and experience gained in data collection." Vol. 75, No. 50, 16 March 2010.

BLS and the Department of Commerce (DOC) have come up with a similar strategy.¹⁰ Both apportion green jobs to an industry based on revenue (unless an establishment produces only a single service or product and it is green).¹¹ Total revenue will be based either at the level of establishment (BLS) or of an industry's green products and services (DOC). The proportion of green revenue to non-green revenue is used to estimate the proportion of green jobs in an industry. For example, if for every \$100 of an establishment/product's revenue, \$10 is a green product/service or percentage of establishment revenue, then 10% of revenue is green. The same proportion transfers over to employment. Therefore, for every 100 workers in an industry, 10 are green workers.

The major difference between BLS and DOC is in the data source—BLS intends to survey establishments, whereas DOC relies on data from the Economic Census. The Economic Census has the advantage of being a publically available data source, but it also has several disadvantages. First, it is taken only every five years, and released after a two year lag. Given the rapidly changing nature of the 'greening' economy, this could provide numbers that are outdated to the point of uselessness (the next Census released, then will not be until 2014). In addition, the Economic Census has the potential to undercount green jobs, since it does not count the agriculture, rail transportation, private education, and public administration sectors, nor government-owned establishments (including public mass transit), all of which are covered under BLS's green definition. Further, since they measured by product code, some product codes could not be separated by green and non-green (i.e., energy efficient cars and appliances, and, importantly, green construction). Commerce makes up for this by estimating the green share of the total market using other sources. Even after taking into account other sources, some green products and services are still not included, such as green personal care and beauty products, green IT, and small wind turbines, hydro turbine manufacturing, green chemicals, architectural, landscaping, and urban planning, and utility scale wind turbine manufacturing; fuel cells and hybrid batteries accounted for such a small percentage of their respective markets that they were also not counted). Further, BLS will estimate the number of green jobs for a NAICS industry by summing the green jobs found at individual establishments within an industry.¹²

¹⁰ Again, BLS methodology is only proposed; it has not yet become official. In BLS's call for comments on its green definition and methodology, one of the listed desired focuses of comments from BLS was "The apportioning of employment at establishments producing green and non-green jobs using revenue share." Therefore, it is possible that BLS would revise this method of counting green jobs.

¹¹ For establishments in the non-market sector, an unidentified alternative will be used.

¹² For a list of industries selected by BLS, go to www.bls.gov/green.

Size of the ‘Green’ Economy

Among labor economists and labor market information specialists, broad consensus has emerged on a number of different issues related to the green economy. The first and most important point of agreement is that the green economy is still nascent and makes up a relatively small portion of the economy and total employment. Figures vary, representing between less than one to two percent of the total jobs in the economy; at the state level, employment share goes as high as almost five percent. At the low end are the following reports: Department of Commerce’s report found 1.8-2.4 million jobs nationally (2010), the Pew Charitable Trust found about 770,000 jobs nationwide (2009),¹³ while the US Metro Economies report found about 750,000 (2008), less than one percent of the total employment. State green job shares of the economy vary; Missouri found 4.8% (2010), Michigan found 3%, Washington found 1.6% in 2008 and 3.3% in 2009, and Oregon found 3% (2008). On the opposite end of the spectrum and very much alone in these numbers is Bezdek (2009), who found 8.5 million jobs in the Renewable Energy and Energy Efficiency sectors in the United States in 2006, 9 million jobs in 2007, and sales revenue of \$1 trillion. Further, the green economy will probably not require a significant number of new jobs in the immediate future. As the Texas Workforce Commission puts it, “...not everyone believes that as it grows the field will require significant quantities of new workers, or that it will be a boom industry for the under and unemployed. Some of those working in the field note that the work, at least at first, is defaulting to the current labor force. Electricians are installing solar panels. Plumbers will put in low-flush toilets” (17).

Due to its emerging status, it is difficult, at this point in time, to project employment demand and know exactly where green jobs are going to be, what they will look like, what industries and occupations they will be in, and what types of skills and training will be needed to fill them. Further, it is impossible to predict how the green economy will change the current workforce in the long-term, because many potential jobs, skills, and possibly even industries have yet to be invented and developed. Unforeseen technologies could play a decisive role in the development of the green economy.

Other points of broad consensus in the literature is that there are ‘shades of green’ or a ‘greening’ of the economy; that green jobs currently make up about 1-2% of the U.S. economy; that green jobs are fundamentally the same as traditional jobs but may require an extra layer of skills/training; and that there is no good way to get a precise count of green jobs because of the current coding systems. Importantly, no study found a significant number of uniquely green jobs; green jobs were likely to be traditional occupations and in traditional industries.

¹³ This report was not included because their methodology was based on private data sources.

International Approaches

Both Statistics Canada and Eurostat, the European Commission's statistical arm, have put out reports on the green economy and green employment, or what they refer to as the environmental sector (or environmental good and services sector, EGSS). These reports, put out well before the surge in green reports in the United States, define and measure the extent of the green economy in Canada and the European Union with an emphasis on products and services related to explicit protection and conservation of natural resources. However, these reports focus on measuring the size of the environmental economy; they do take into account employment, but it is not the primary focus of these reports.

Statistics Canada has been measuring the size of the 'environment' economy in Canada (they do not use the term 'green') with its Canadian Environment Industry Strategy since 1994. Their estimates of revenue (gross) and employment are taken mostly from the Environment Industry Survey, which surveys establishments deemed to produce environmental goods and services, supplemented by a few other sources. Statistics Canada defines environmental goods and services as those which "are used to measure, prevent, limit, or correct environmental damage (both natural or by human activity) to water, air, soil, as well as problems related to waste, noise, and ecosystems. They also include clean or resource-efficient technologies that decrease material inputs, reduce energy consumption, recover valuable by-products, reduce emissions and/or minimize waste disposal problems" (5). Statistics Canada emphasizes end-use and not physical attributes of goods and services; consumer goods such as LED light bulbs, organic produce, hybrid vehicles, etc, are not included. Finally, employment is counted directly by the survey, not tabulated based on revenue.¹⁴

The European Commission's report is a comprehensive manual and reference for countries that are interested in collecting data on the EGSS, put together by a task force in 2006 comprised of representatives from many European countries, and with input from Canada. The manual seeks to ensure comparability across countries within the EU as well as with their coding systems, the European System for the Collection of Economic Data on the Environment (SERIEE) and the System of Integrated Environmental and Economic Accounting (SEEA), as well as the European equivalent of NAICS, the NACE system and the Classification of Environmental Protection Activities (CEPA). In addition, a new

¹⁴ However, the report notes, "This section of the questionnaire continues to be a work-in progress. Responding establishments, particularly those with both environmental and non-environmental activities, tend to have difficulty estimating the proportion of environmental employees" (Statistics Canada, 12). A report by the EC mentions that Canada has "estimated employment figures for the EGSS using three methods (i.e. the estimate methods with ratios at aggregate level, at company level and via direct response survey) in order to test and compare them" (EC, 134).

classification system pertaining to resource management activities was created for the purpose of collecting data on EGSS (CReMA).¹⁵ Definition and classification of the EGSS, therefore, is based on the existing SERIEE and SEEA frameworks.

The EC's manual makes clear that the interest in collecting these statistics, and its impetus, comes not from a need to get accurate employment figures but to gain a better understanding of how EU environmental policies and regulations impact the economy. The EC defines the EGSS as follows: "The environmental goods and services sector consists of a heterogeneous set of producers of technologies, goods, and services that measure, control, restore, prevent, treat, minimize, research, and sensitize environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity, and landscapes. This includes 'cleaner' technologies, goods and services that prevent or minimize pollution; and goods and services that measure, control, restore, prevent, minimize, research, and sensitize resource depletion. This results mainly in resource-efficient technologies, goods and services that minimize the use of natural resources" (29). There are two main groups of EGSS, then, the environmental protection group and the resource management group; the first encompasses products and services of a preventative or remedial nature; the latter is to manage and conserve the stock of natural resources.¹⁶ Fundamental to the definition is that these goods and services must be produced *for* their environmental protection or resource management purpose—that is, it should be their "prime objective" (Ibid.). Only products and services that meet these criteria are to be measured; the "user's purpose is, on the contrary, never to be used in the EGSS context" (EC, 32).¹⁷

In measuring EGSS, the manual favors a supply-side approach. The manual identifies a variety of different approaches for identifying EGSS producers, either by using NACE codes to do an analysis of

¹⁵ The report states, "The main purpose of this handbook is to provide a complete reference tool for developing a new data collection system on the environmental sector at national level. It aims at facilitating the development and production of harmonized and comparable data. Its scope is thus to gather classifications, standards, and compilations methods of data on the environmental sector in order to assist in developing new data collection systems and to enable more rigorous and improved cross-country comparison of data" (23).

¹⁶ These include "inland waters, natural forests, wild flora and fauna and subsoil reserves (fossil energy and minerals)" (EC, 43).

¹⁷ Producers of components, as well as retailers, are not included, nor are those who supply non-exclusively environmental components; this is in contrast to the BLS definition. There are other rules as well, related to 'connected' and 'adapted' goods and services. For example, if new piping is installed for ordinary maintenance, but not for environmental purposes, they are not counted; when they are carried out exclusively for reducing water consumption, they are counted. When the installer is specialized in environmental services, it is counted. Also, if a product is 'cleaner' than its counterpart—for example, biodegradable shampoo versus regular shampoo—it is not included in the total amount of "economic aggregates related to adapted goods, but only an 'environmental share' which can be measured by the extra cost...compared to its equivalent normal good" (36).

activities, or by selecting products and services with an environmental purpose and relating them to production activities. Next, compiling a register is recommended; then collecting data either from existing statistics or by surveys sent to a sample of establishments. More complete detail is available in the manual itself than can be replicated here.

To measure employment, if an establishment is concerned only with EGSS, all employees are considered a part of EGSS. However, if there are both non-EGSS and EGSS goods and services produced, the manual recommends several methods, all based on calculating ratios: calculating employment as the same proportion of suppliers that produce EGSS goods and services within the general economy; using the turnover rate; or using the ration of environmental revenues to total revenues at the sector level. The manual also lists several other ratios that can be applied, including productivity; alternatively, it also suggests asking directly for employment in a survey.¹⁸

For Further Study

Many different stakeholders have attempted to define and count green accurately; all have come upon the same problems. How to define an amorphous and still-emerging concept and how to count something when it does not easily fit into current coding systems have all been answered in a variety of ways by different parties. Many have taken the survey approach; others the labor market information approach. Yet while there is a growing body of literature on the subject, the green jobs picture still remains fuzzy. This is due in part to the lack of consensus on a definition, but is also due to the lack of helpful information on projections and nationwide data. While there has been some work done on which sectors of green are potentially the largest, this has been done at the state level. There has been very little unbiased information put out about which sectors will grow the fastest, and which are stagnant.

In addition, scant attention has been paid to the effects that public policy, particularly ARRA, has had on green jobs employment beyond stating that it has had an effect. Public policy in the United States is driving these changes and influencing investment and workforce training, and it would be helpful to know how and how much. Finally, and on a related note, missing from the literature is a retrospective look at the green economy—that is, tracing its growth in the previous thirty years and investigating the reason that it developed the way that it did and the impact that it has already had on workforce development.

¹⁸ Annex 13 to Chapter 4 also includes specific country examples of how to measure employment—what Austria, Belgium, France, The Netherlands, Sweden, and Canada have approached the issue of counting EGSS employment.