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Curriculum Development for Recession Displaced Workers in Green Construction Industries

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CURRICULUM DEVELOPMENT FOR RECESSION DISCPLACED WORKERS IN GREEN CONSTRUCTION INDUSTRIES

by

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CURRICULUM DEVELOPMENT FOR RECESSION DISPLACED WORKERS IN GREEN CONSTRUCTION INDUSTRIES

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More than 8 million U.S. jobs were lost during 'The Great Recession', pushing unemployment from 4.4% in 2007 to 10.2% in 2009. Nearly half of all job losses occurred among lower-skilled workers in construction and manufacturing industries. During this same period, however, jobs in energy efficiency and renewable energy industries grew an unprecedented 9%. As part of a $4.8M grant from the U.S. Department of Labor, the University of Nebraska began development of a workforce transition program to 'retool' recession displaced workers for career opportunities in new and emerging green industries. To date, the knowledge, skills, and abilities (KSAs) of recession displaced 'blue collar' workers have been assessed in relation to the skill sets required of 'green collar' workers in building-related industries as determined by a survey of more than 6,000 Nebraska businesses. Using this data, a multi-tier curriculum was then developed to address common 1) pre-vocational skills training needed for the unskilled and *un*employed, and 2) green skills training for the skilled and *under*employed with the goal of creating sustained reemployment for 1,000 Midwest workers.

Dedicated to my wife Ashley,

who exemplifies dedication and faith.

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Chapter 1

Introduction

1.0 Research Topic and Problem

The 21st century has ushered in changing attitudes and an increased awareness of energy efficiency and environmentally beneficial energy generation. Recession conditions throughout the country have heightened responsiveness of political policy and market behavior toward American dependency on, and consumption rate of fossil fuels. A majority of states in the U.S. have adopted policy to increase use of renewable energy sources in an effort to decrease the dependency on oil, coal, and other traditional energy sources. Economic conditions in the United States, beginning in 2007, have underscored the growing need for the American people and businesses to make changes in their energy efficiency and consumption behavior in order to save or create jobs. With unemployment on the rise in the manufacturing and construction industries, many recession displaced, long-tenured American workers found it increasingly difficult to secure employment in industry areas in which they had previously been trained and employed. The American Recovery and Reinvestment Act of 2009 (ARRA) provided funding for state agencies to research employment gaps, develop curricula for retooling (provide knowledge, skills, and abilities training) unemployed and underemployed persons.

1.1 Research Question

The fundamental questions underlying this research is whether or not green jobs can provide reemployment opportunities for recession displaced workers, and if so, what

gaps exist between the KSAs of these long-tenured displaced (or blue collar) workers in relation to those required of green collar workers. Additionally, what curriculum will provide the long-tenured displaced worker the advantage in reestablishing and sustaining employment in the *greening* future?

1.2 Research Goal and Purpose

To answer both research questions, the Nebraska Department of Labor was awarded a 3-year grant wherein a pilot program, named syNErgy, was developed with the goal of transitioning 650 unemployed workers and 350 underemployed workers from recession impacted occupations to high growth green jobs by 2013. For the purpose of this research, a green job was defined as:

> *"…one in which an employee produces a product or provides a service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability."*

To achieve this goal, a survey of more than 6,000 Midwest businesses was first conducted in 2010 to assess the gaps between 1) the existing skills sets of recession displaced workers in construction and manufacturing industries, and, 2) the new skills sets required of workers in green building-related industries (e.g. energy auditors, HVAC and weatherization technicians, solar and small wind power installers, etc.). Next, a multi-tiered series of curricula were developed through the University of Nebraska - Lincoln to provide 1) prevocational training to unskilled workers, and 2) green training to skilled workers as a pathway for higher-level wage-earning reemployment.

Chapter 2

Background and Literature Review

2.0 Background

A recession is generally defined as a decline in gross domestic product (GDP) for two consecutive quarters, or an increase in unemployment of 1.5% or more within 12 months or less. In the modern era of economic statistics (e.g. 1945 to present), there have been 11 recessions averaging 10 months in duration. Given the duration and severity of the most recent recession, there exist a large number of unemployed workers throughout the country. Much of the unemployed population is comprised of long-tenured displaced workers; employees who have lost jobs held for 3 or more years. This particular demographic of the unemployed population is a common indicator of poor labor-market conditions "rather than as a result of a job that ended because the employee was not a good fit for that particular job or employer." (Borbely, 2011) The majority of the job losses in this recession have come from the manufacturing, wholesale and retail trade, and construction sectors. Typically, construction and manufacturing activity recovers quickly following a recession. However, job losses in these areas have been slow to recover because the market demand is low for American manufactured goods and construction products, (e.g. new homes, office and retail buildings). As a result, new job creation has not been what it historically has been in a recession recovery.

In recent decades, some areas of the construction industry have performed above the industry average. Research by the PEW Charitable Trusts indicate that from the years

1998 to 2007 growth in the 'clean energy economy' grew by 9.1% while the total job growth in the entire economy only grew 3.7%.

> *"Today, a growing number of states are looking to identify and cultivate new industries and areas of economic growth to help them better compete in the 21st century global marketplace. The public and policy makers alike want more than a short-term fix for the immediate fiscal crisis. They want new lines of business that will create jobs, generate revenues for many years to come and help America re-emerge as a technological leader." (Reichert et al., 2010)*

The Pew Charitable Trust did acknowledge the expected decrease in growth for the years following 2007, however, the expectation is that the clean energy sector will still outgrow the overall market.

2.1 Market Trends to Green Economy

As a result of this movement towards clean energy and conservation, a majority of the states, including the District of Columbia, have adopted standards which require the utilities industry to generate a certain level of the energy (typically 10 to 25 percent) to be produced by renewable sources (Sciortino, 2011). Many of the utility providers in these states provide incentives for reducing energy consumption by the end user.

The new standards in energy production and the increase of awareness of energy consumption by the consumer has increased the market demand for new industries in construction and manufacturing which provide green products and services.

Consequently, new employment opportunities have emerged for individuals who are educated and trained in green construction and manufacturing. In response to the desire to meet the demand, this movement has created an increasing void between those careers which previously could be learned through empirical means (blue collar) and the trending careers which require a higher educational standard and skill set (green collar). The disparity between the worker's skill set and the job requirements contributes to the growing unemployment rate because much of the available workforce lacks the skills required for the current jobs available.

2.2 Unemployment Trends

The Monthly Labor Review, published by the U.S. Bureau of Labor Statistics in September, 2011 classifies the unemployment data from the previous two calendar years (Labor, 2011). The report indicates that long-tenured displaced workers have doubled since 2008. The loss of long-tenured employees is of particular interest because these job losses are more indicative of a poor labor market rather than a reflection of choices made by the employee. Long-tenured employees have often gained job-specific specialized skills through an informal training process known as *tribal knowledge*. Tribal knowledge is training or skills gained within an organization which may be unique to the job, the employer, or even a specialty trade within a given firm. This knowledge is often not written, but passed on from trainer to trainee. Long-tenured employees tend to gain a great deal of tribal knowledge that is difficult to transfer to other employment opportunitites. Among the long-tenured displaced workers, the groups with the highest percentage still either unemployed or no longer in the labor force include: women (51.5%), persons under the age of 24 (45.2%) and over the age of 55(64.8%), as well as

persons with less than a high school diploma (60.9%). Figures 1 through 5 provide the percentage of unemployed long-tenured workers from 1984 to 2010, and the demographics of long-tenured workers from 2008 to 2010.

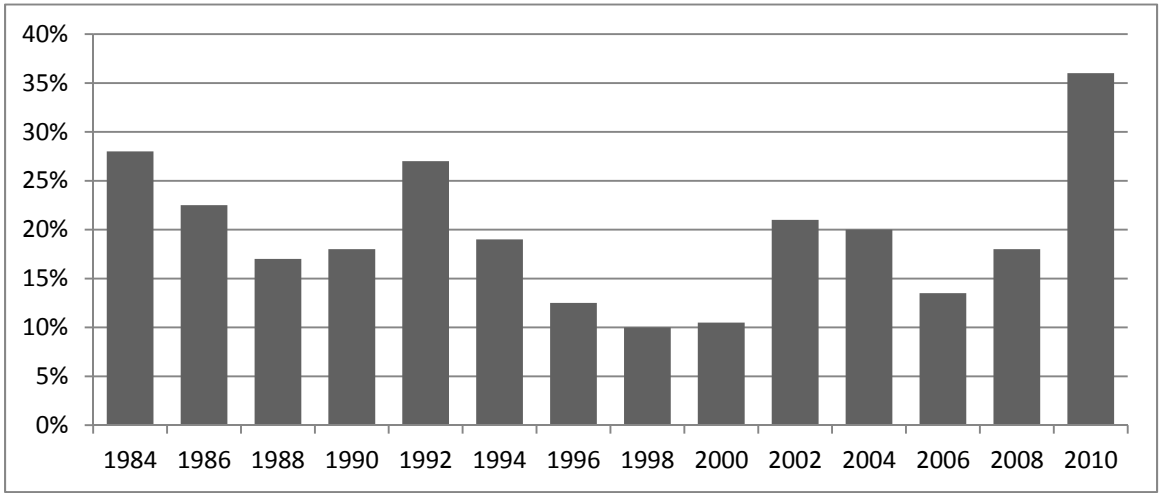

Figure 1 – Percentage of unemployed long-tenured workers, 1984 – 2010 (Labor, 2011)

The dramatic increase in the number of long-tenured displaced workers from 2008 to 2010 highlights the need for targeted training leading to reemployment. Of the 15.4 million individuals who lost their jobs from 2005 to 2007, 6.9 million were long-tenured employees. In January of 2010, 36% of these employment candidates were not reemployed.

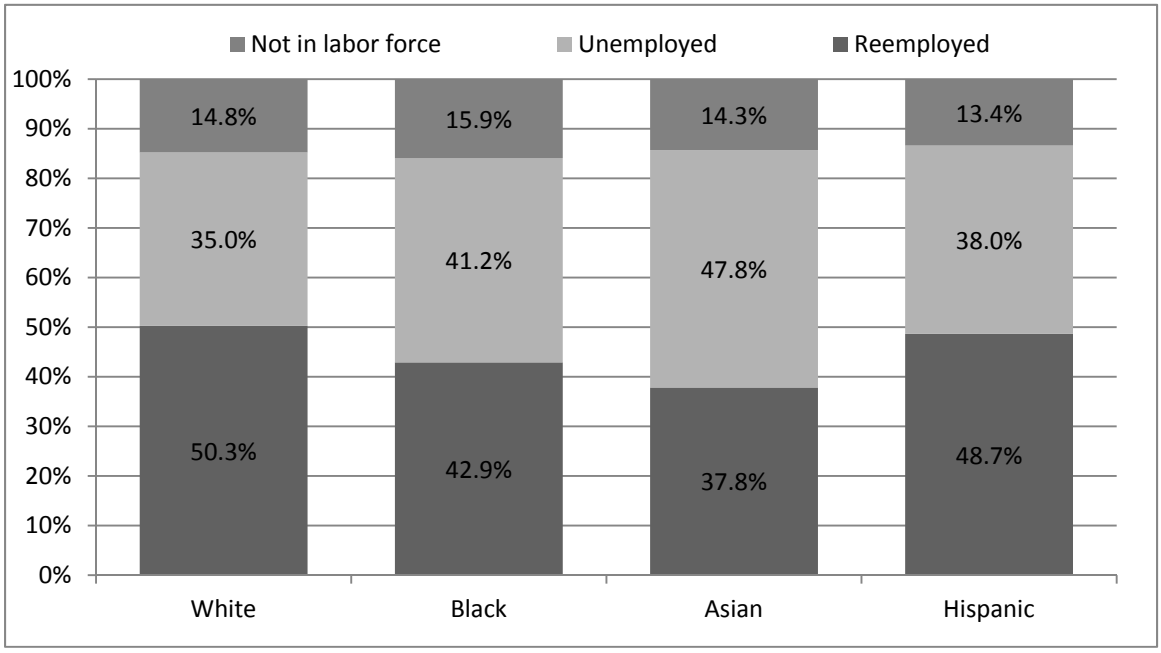

Figure 2 – Reemployment status of displaced long-tenured employees by ethnicity, 2008 – 2010 (Labor, 2011).

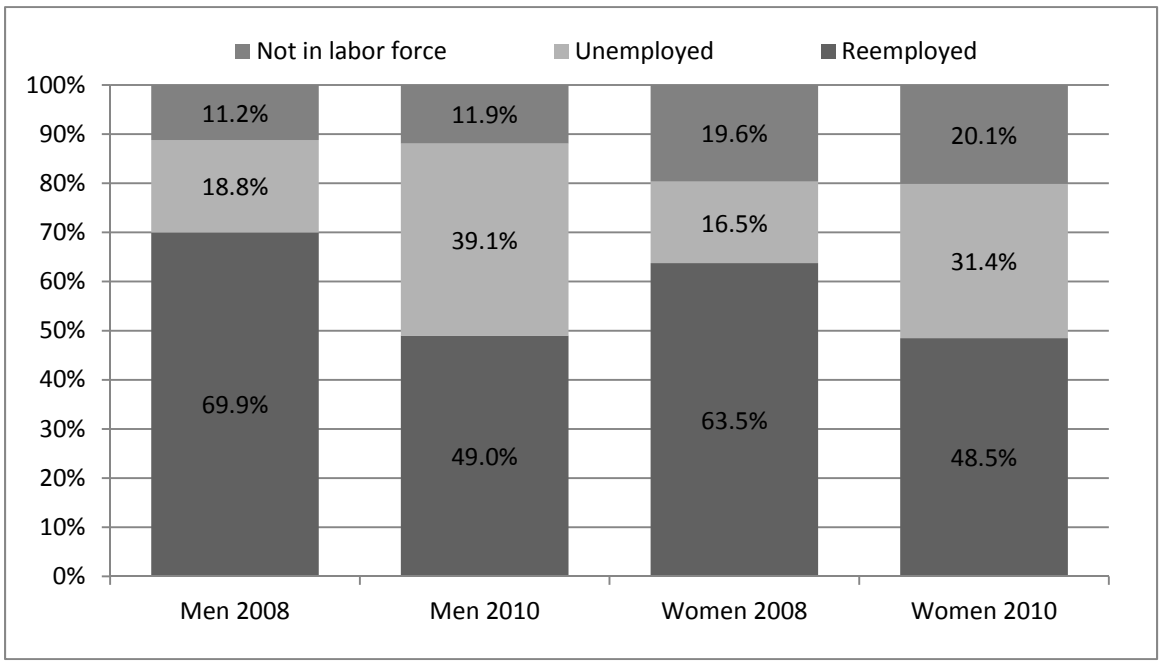

Figure 3 – Reemployment status of displaced long-tenured employees by ethnicity, 2008 – 2010 (Labor 2011).

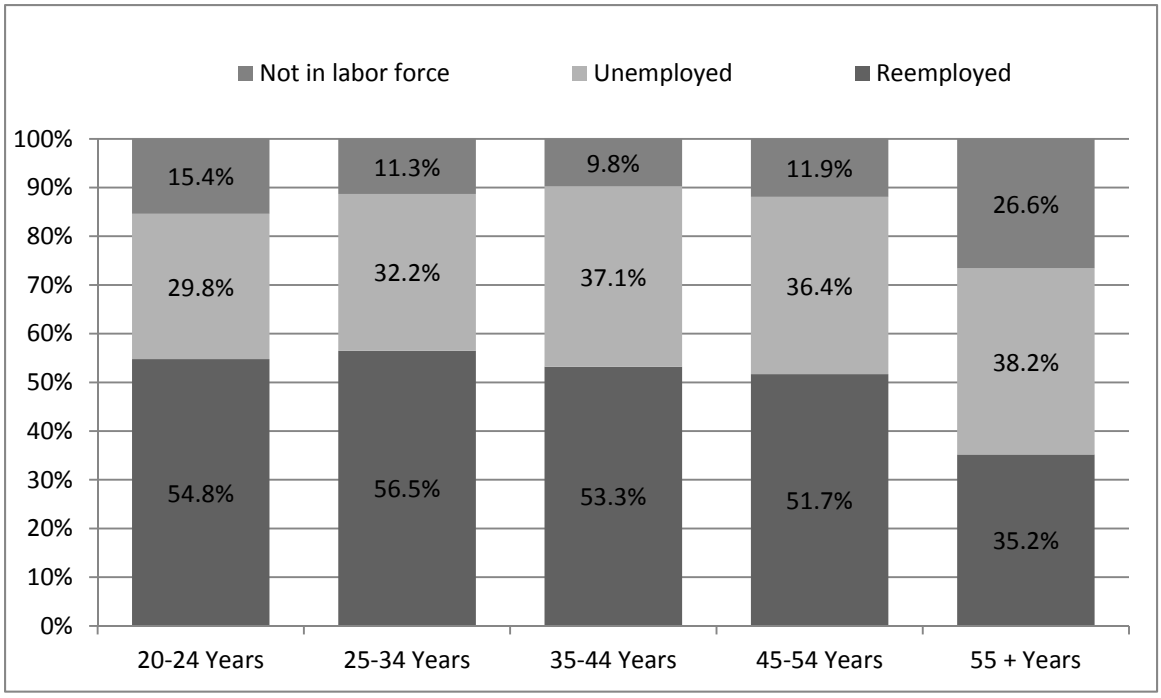

Figure 4 – Reemployment status of displaced long-tenured employees by age, 2008 – 2010 (Labor, 2011).

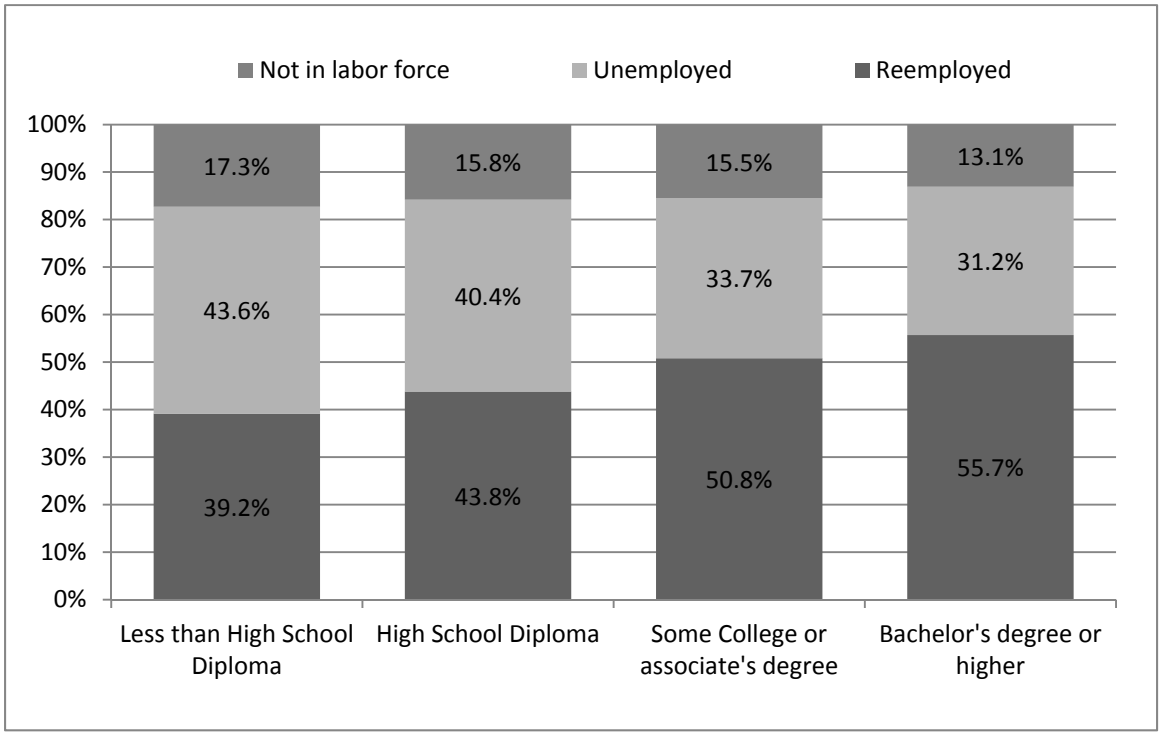

Figure 5 – Reemployment status of displaced long-tenured employees by level of education, 2008 – 2010 (Labor, 2011).

A survey conducted by a consortium of six Midwestern states was performed to determine trends in the growth of green jobs, and, to identify gaps in the educational and employment training programs available to the workforce. Results of the 2011 Midwest survey support the findings of the Monthly Labor Review, indicating that women, young males and those lacking high school education are least likely to transition from recession displaced industries to green occupations (Thompson et al., 2011). Both surveys suggest that a possible hypothesis for this phenomenon is that members of these demographic groups may lack the adult basic education (ABE) or transferable knowledge, skills, and abilities (KSAs) necessary to compete for jobs in new and emerging green industries.

2.3 The Adult Learner's Disparity Problem

The challenge facing any undertaking of curriculum development for the adult learner is to understand how this particular demographic of the population learns new skills and abilities. Research in adult basic education has shown that the approach to teaching adult learners is entirely unique. Traditional ABE learners have been older adults whose educational path has been interrupted because of the complexities of life, (e.g. marriage, children, work, and social problems) (St.Clair & Belzer, 2010).

> *"Participation in ABE programs (added for clarification) is often short term, lacking intensity, and episodic due to the conflicting and diverse demands of adulthood" (Comings & Cuban, 2007).*

Adult literacy specialist at Brown University, Janet Isserlis suggests that many adult learners are classified as 'academically underprepared' (Isserlis, 2008), stating:

> *"Having been pushed out of high school in the wake of high-stakes testing or having been socially promoted, many have been handed a high school diploma while lacking the ability to use print to access information, as a vehicle of expression, as a tool for accomplishing tasks in the world, and as a means of gaining control, connection, and meaning."*

Adults with basic skills deficiencies find it increasingly difficult to maintain employment in a market driven toward new and emerging green energy production and efficiency jobs. "A large gap remains between the requirements of increasingly complex well-paying jobs and the skills of unemployed, under-educated workers" (Bozell & Liston, 2010). Adult education programs are in need of curriculum which addresses the disparity between the current skills set of many unemployed adults, and the required skills set of the 'green' trained worker.

As part of the $787B American Recovery and Reinvestment Act of 2009 (ARRA), nearly $43B in 'stimulus' funds were earmarked to promote investment and job growth in energy efficiency and renewable energy industries (Congress, 2009). Following a global movement toward a greener economy, alternative energy markets are viewed as catalysts for sustainable job growth as well as environmental protection, energy independence and national security.

2.4 Developing Meaningful Curriculum

Two pathways provide means for the employment candidate to advance in a chosen career, whether through work experience (i.e. tribal knowledge and skills) or through educational experience (i.e. verifiable, or transferable training). The pathway to

meaningful employment in the ‘green’ sector, however, requires some level of educational experience (e.g. industry recognized credentials, certificates, degrees, etc.). Green jobs, or jobs in which specific training in clean energy production or energy conservation, require credentials from an accredited training provider. The nature of green employment suggests that specific training was gained and can be practiced only by a credentialed individual. Specific training in green jobs may require understanding of energy related building systems and the interaction of those systems with issues such as human health and safety, performance and productivity, and economics. Much of this knowledge may indeed be gained through empirical means, i.e. on-the-job training, however credentials from accredited training providers lend credibility to the individual and the organization. Credentials also contribute to decreased costs and liability of the employee and employer (White, et al, 2010). The credentials ensure that the individual has been trained to an acceptable standard.

> *“A competency-based credentials system, marking individual mastery of desired skills, immensely reduces employer search and other transaction costs in hiring and promotion; reliable data on the aggregate human capital pool also facilitates planning. The ability to demonstrate mastery of desired skills, in effect to carry a recognized credential, increases worker security on external labor markets and, given that, flexibility in internal labor markets. Students or trainees gain clear signposts to desired achievement, making the achievement more likely. The general public gains performance accountability over public and private training*

providers. All this leads to greater as well as more directed training efforts, improving the general human capital pool." (White, et al, 2010)

A nationally recognized accreditation is therefore a necessary companion to any meaningful curriculum written and developed to enhance or advance the knowledge, skills and abilities of an employment candidate. The Multi-tier pathway training program shown in Figure 6, illustrates the several levels an individual may pass through in advancing in their respective careers. An individual, through experience and a demonstration of expertise, may advance sufficiently to re-enter the same pathway at a higher level of education or employment.

Note that as an individual advances along the employment pathway the individual arriving at the Tier 2 Employment level must enter the educational pathway in order to gain green training. To advance to Tier 3 Green Employment, the candidate must receive credentials provided by an accredited training program. On-the-job training and trade certifications are insufficient for advancement to Tier 3 Green Employment. Tier 3 employment is defined as green collar jobs which require verifiable, and transferable, industry recognized certification or credentials.

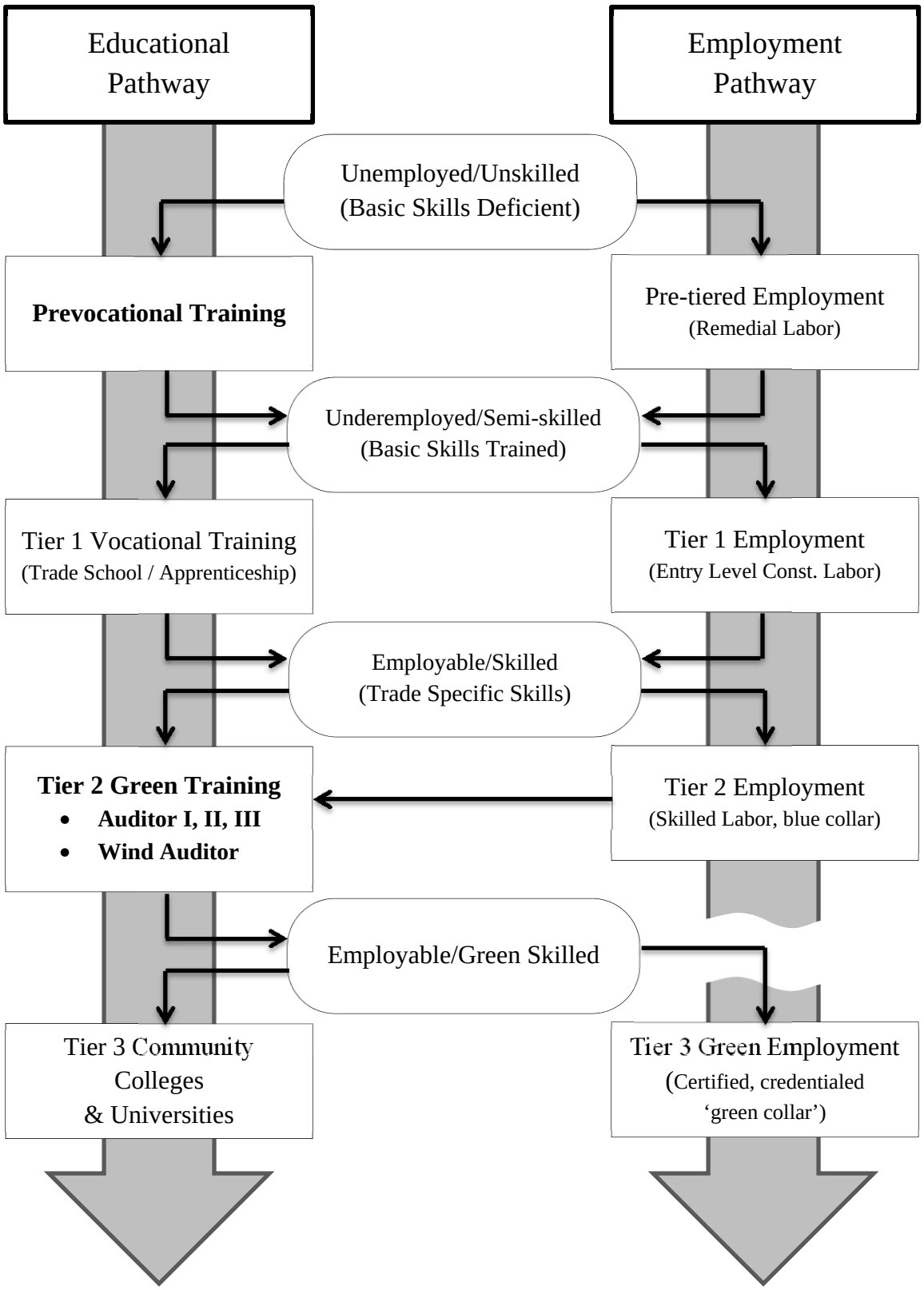

Figure 6 - Multi-tier pathway training program.

2.5 Deficiencies in the Literature

Despite the much given attention by federal and state government to determine current employment training needs in construction industries, limited curricula have been made publicly available for state-wide training partners. Traditionally curricula have been developed independently and guarded by intellectual property concerns. Human capital theory and research provides an excellent, in-depth approach to economic and community development, and has done so for many years (Becker, 1994). Though researchers in human resource development have begun to define workforce development (Jacobs & Hawley, 2003) and examine the relationship of the community colleges and trade organizations in the employment training (Tyler, 2002), yet there is limited research material defining the educational and experiential learning process of the long-tenured worker.

2.6 Precedence for Research Design

Research in the construction industry often deals with the social or behavioral science of laborers. Mixed method research, also referred to as triangulated studies, is relatively new in its application to the construction industry, but does have a precedent (Fellows & Liu, 2003). Qualitative methods for gathering data are commonplace in instances where understanding an individual's perspective are valuable. Quantitative methods, on the other hand, are applied where measurable results are desired. This style allows the researcher to apply the advantages of both methods in an attempt to provide a more cohesive result; meaning that results from both sources of data will tend to support each other, (Abowitz & Toole, 2010).

2.7 Summary of Literature Review

Considering the diversity of challenges that the long-tenured displaced workforce faces, (e.g. economics, social behaviors, ethnicity, education levels, and linguistics), the advancement of knowledge in this research field is timely and necessary. Hiring trends indicate that employers seek for credentialed employees to further promote their respective organizations and stay competitive in a greening market. Additionally, the loss of many long-tenured workers in the construction employment pool has been a growing concern as the knowledge base (e.g. individuals with empirical or "tribal knowledge") lacks the necessary skills to fill the available employment opportunities. An increased loss of long-tenured workers has only exacerbated the disparity between the KSAs of the current workforce and the KSAs needed for green jobs. Furthermore, the need for meaningful, credentialed training programs contributes to this division of qualified construction workers to sustained employment.

Research in the area of curriculum development specific to the construction industry, and particularly for unskilled, prevocational workers and for semi-skilled workers seeking employment in the green sector is a growing need in the building industry. Without quality training programs, the employment pool of qualified workers will quickly be diminished and the costs to advance green construction practices, will become more costly.

Chapter 3

Methodology

3.0 KSA Gap Analysis Survey

As part of a six-state Midwest survey, nearly 12,000 Nebraska businesses were mailed questionnaires to determine trends in the growth of green jobs, and to identify unique green collar KSAs requiring training. Employers within the state were categorized by type of business activity using the North American Industry Classification System (NAICS). Of nearly 1,200 total industry categories, 127 industries representing 11,917 Nebraska businesses were identified as producing a product or service that improves energy efficiency, expands the use of renewable energy or, supports environmental sustainability.

3.0.1 Research Instrument Design

As much of this research relies on data gathered through various outside means and resources, (e.g. interviews, forums, government administered surveys), a mixed method research style is applied for analyzing, and processing statistics. Mixed methods research implies that the varied sources of information are from both qualitative and quantitative data.

The Nebraska Green Jobs Survey (Appendix A) used both qualitative and quantitative questions to identify and measure the gap between current KSAs and those required for green jobs. Quantitative questions were framed to determine the make-up and size of the organization, which included references to the number of employees each business employed, which green activity the business was involved in, and the number of

employees of the business which currently produce a green product. Questions were asked to quantify the current growth trends in job creation, as well as the expected growth in the near future, and the percentage of time devoted to green activities in each respective organization.

Qualitative questions were used to determine the need for green training programs in the state. Examples of these questions included the following:

- *"What training or skills development programs would your business find most useful in preparing workers for a green job at your company?"*
- *"What methods are used at your business to prepare current workers to produce green products or services?"*
- *"What barriers prevent your business from implementing green activities?"*
- *"Is there anything else you would like to share about your green business practices?"* (Baker, 2011)

For several questions, the survey provided a number of short answers to help categorize the responses. In each question, however, the survey allowed the respondent to provide answers that best suited the needs of the business. The survey instrument allowed some interpretation through analysis of the data. Of the 18 questions in the survey, four questions (22%) were designed to allow open-ended answers from the respondents. These four questions, though requiring some level of interpretation, provide better insight into the needs of the industry, business, and employees.

3.0.2 Survey Response

The initial survey was sent to the nearly 12,000 businesses classified as potential candidates for green industry involvement. After the initial survey, a second survey was sent to businesses which had not responded within one month of the first survey mailing. Finally, a phone survey was conducted with businesses that had not responded to either mail survey. The overall response rate after the two mailings and phone survey was 52.8% (n = 6,292).

Survey findings (see Chapter 4 Results) revealed three (3) distinct occupational groups of construction and related industry jobs available for recession displaced workers; 1) those that did not require vocational training, but did require a pre-vocational level of adult basic education (ABE) and employability (e.g. soft) skills, 2) those that require some vocational, or on-the-job training, and, 3) those that required specialized training and credentials for green collar jobs. Curriculum was developed for the purpose of providing training for those individuals with the greatest risk for job-losses in recessed economies, namely young adult men and women with ABE deficiencies and experienced semi-skilled lacking specialized green skills for advancement.

3.1 Prevocational Training Curriculum

For those occupations that did not require vocational training, but did require ABE, an 80-hour prevocational curriculum was developed to provide basic skills deficient adults, having at least an 8^{th} grade literacy level, exposure to the verbal and non-verbal (e.g. written) communication skills, mathematics and reading comprehension skills

necessary to obtain entry-level construction or related industry employment. In addition, the prevocational curriculum was developed to provide basic labor skills training, including the use of general (e.g. non-trade specific) hand and power tools, job safety and work readiness skills. To provide added value, content was developed to qualify participants for industry recognized certification training programs and provide an orientation into green building-related trades.

Unlike traditional classroom instruction, however, ABE instruction was integrated or 'contextualized' within the framework of practical skills training. Contextualized learning has proven particularly effective for ABE deficient adult learners who value short, hands-on instructional segments where they can relate new skills to their real-world experiences. The 80-hour prevocational curriculum was developed with variability for delivering the material. Each module, and unit within the module, was designed to be delivered in a non-linear fashion, providing flexibility to the instructor based on needs of the audience receiving the training. Individual and group projects were designed to provide an environment wherein students apply their newly gained skills and knowledge. Given the challenges of providing extended training to a largely unskilled audience, many with language and socioeconomic barriers to employment, the 80-hour curricula was designed to be delivered in both English and Spanish during a continuous 8-hour per day, two-week 'boot-camp'. The course was written to be adjusted to the availability and dynamic of the student audience. The 80-hour prevocational curriculum was also designed to be used as a prequalification program for entrance into vocational training, (e.g. trade organization apprenticeship, community college).

3.2 Vocational Training Curriculum

Vocational training has traditionally been provided either through one of three means; 1) formal trade union apprenticeship training programs, 2) community college trade training programs, and 3) on-the-job training. Historically, the traditional means of education and been successful for vocational training, particularly for specialty trades (e.g. electrical workers, plumbing and pipefitting, iron workers, and carpenters). For these trades, some level of certification is necessary for career advancement. Tier 1 Vocational Training programs are made mention herein to show the natural progression an employment candidate may take as he or she advances in their respective careers. An employment candidate who has received the 80-hour prevocational training may gain entry-level employment and subsequently work his or her way through on-the-job training and experience to be prepared for increased responsibilities and advancement. Many of the Tier 1 vocational trainees are required to enroll in continuing education units (CEUs) for which many of the Tier 2 Training programs are written to qualify. These CEUs are required for many vocational credentials.

Traditional vocational training becomes a prerequisite for many green training programs. Trade organizations and community college courses serve to prepare individuals in introductory fields which prepare the individual for specialized green training, (i.e. basic electrical training may lead to small wind analyst training).

3.3 Green Training Curricula

For those green collar occupations that required vocational training, several vocational curricula were developed to provide ABE competent adults a nationally-recognized credential. The curricula were to provide meaningful training to employable,

skilled workers from a variety of trades, and provide certification recognized by high-growth green building industries identified by the survey (see Chapter 4 Results). The vocational curricula were designed to be adaptable to several delivery formats including a one-week seminar, or a 3-contact hour course within a construction industry-related apprenticeship, diploma or degree program.

Tier 2 Green Training was developed to address the needs of four building related industries; 1) building analyst I (residential auditors), 2) building analyst II (commercial-electrical auditors), 3) building analyst III (commercial-mechanical auditors), 4) wind analyst I (small urban wind auditor). Each of the analyst training programs was designed to provide specialized training and credentials which qualify the trainee to perform audits in their respective industries. The curricula, therefore, met the underlining need for industry trained individuals with green certification or credentials.

Both Pre-tiered (prevocational) and Tier 2 (green employment training) curricula were developed in 2010-12 to be deployed by each of six (6) Nebraska community colleges and three (3) in-state trade labor organizations specializing in work readiness certificate programs by 2013. Subsequently, the focus of this work-in-progress was dedicated to the Green survey, and the data on the Pre-tier and Tier 2 curricula completed at the time of this publication. To date, the prevocational training and the building analyst I&II were completed, while the building analyst III and wind analyst training programs were still under development.

Chapter 4

Results

4.0 KSA Gap Analysis Survey Results

Data extrapolated from 6,292 survey respondents found that approximately 30,725 green jobs, roughly 3.4% of Nebraska's workforce, produce a product or provide a service that; 1) improves energy efficiency, 2) expands the use of renewable energy, or 3) supports environmental sustainability. Of those Nebraska businesses reporting green economic activity, 36.1% identified themselves under the category of energy efficiency and conservation (Figure 7). Nearly one third (29.1%) of businesses in the construction industry classified themselves within the energy efficiency and conservation category.

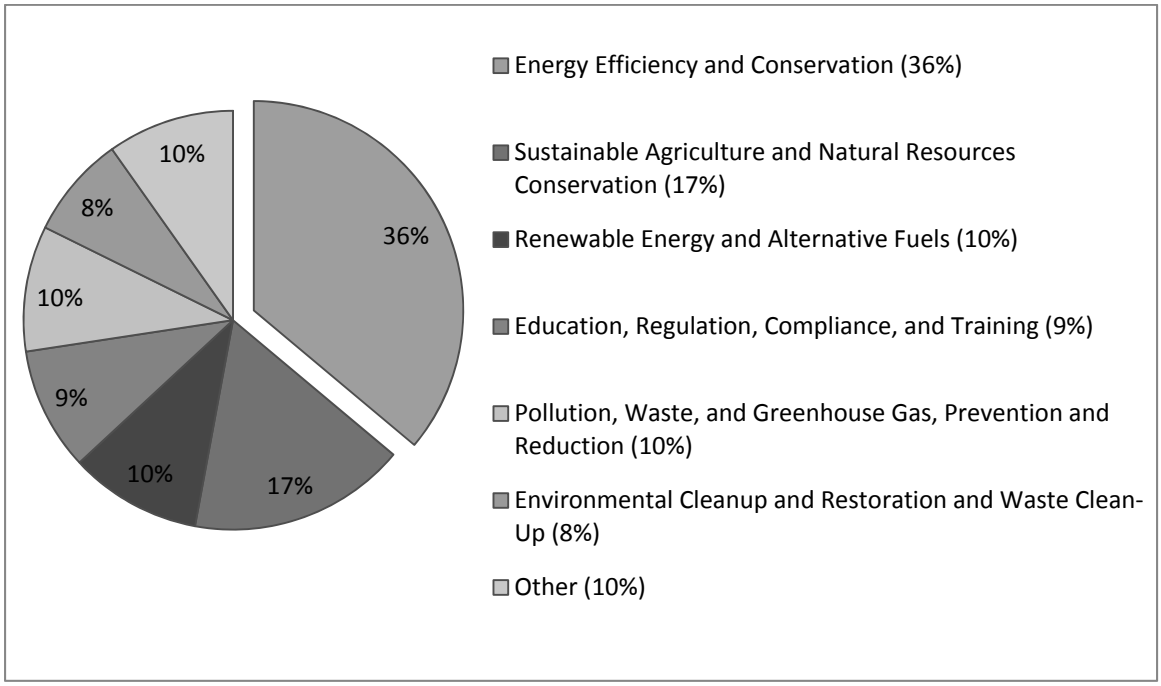

Figure 7 - Nebraska businesses by green economic activity (Baker, 2011).

The construction industry had the highest number of businesses reporting at least one green employee with 266 of 1,039 businesses (25.6%). With 43,704 construction industry employees, 15.1% (6,595) of the construction workforce dedicated some portion of their time to performing sustainable building practices in 2010. Mechanical trades were found to have the highest number of workers (1,656) and highest percentage of workforce (87.2%) dedicating some portion of their time to energy efficiency or other sustainable building related activities. Overall, roughly two-thirds of all green workers (63.9%) dedicated 50% or more of their time to green work.

In addition to having the highest number of workers and highest percentage of workforce engaged in green building-related activities, mechanical trades are anticipated to achieve the highest growth rate in green jobs (37.9%) by 2018 (Figure 8) followed by electricians (15.7%). More than 70% of new jobs in the mechanical trades are projected to be 'growth' openings, compared to roughly 30% replacement (e.g. attrition) openings. In contrast, less than 40% of new jobs in electrical trades are expected to be generated by growth in green economic activities.

Businesses were also asked what types of barriers exist in preventing implementation or expansion of green economic activities, including the creation of green jobs. Barriers most commonly cited by respondents included cost of implementation (20.4%), economic conditions (18.5%) and government policies and regulations (9.7%). However, nearly one-third of respondents cited either a lack of information or expertise (19.4%), a shortage of workers with applicable knowledge or skills (6.9%), or, a shortage of available training programs (4.2%) as barriers to implementing or expanding green economic activity.

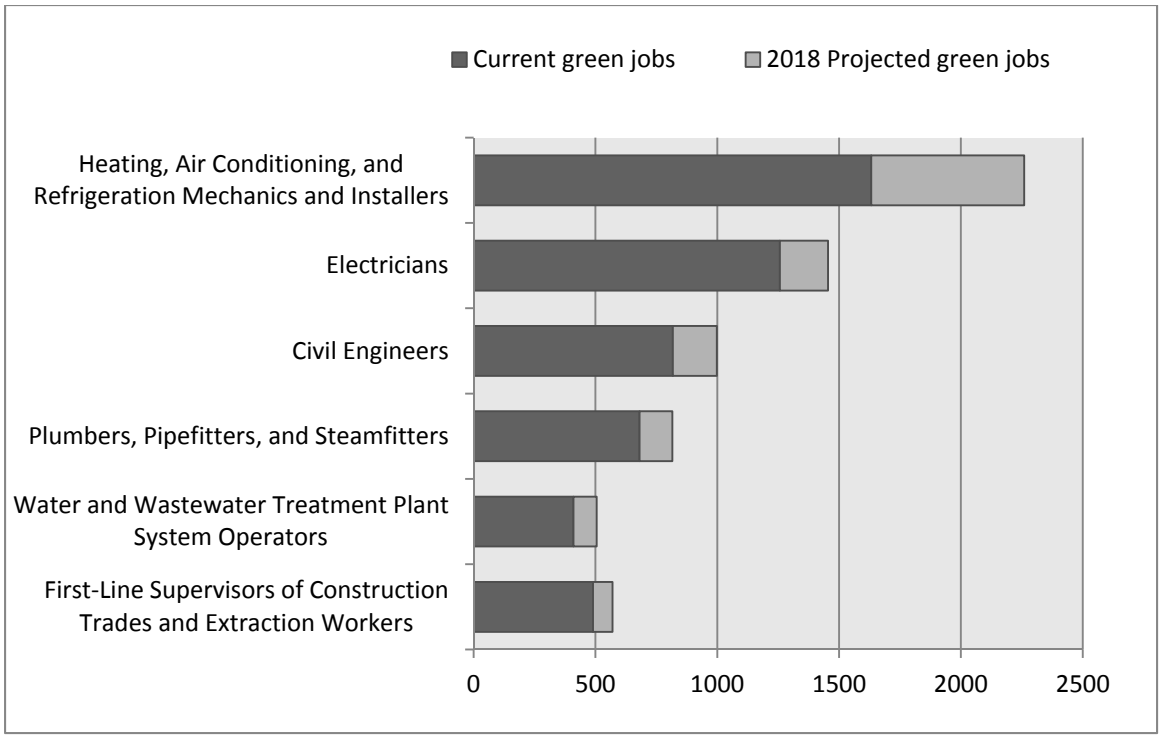

Figure 8 - Current and projected green jobs by trade or occupation (Baker, 2011).

Employers were also asked what they considered to be the minimum KSAs required to perform green jobs. When asked to indicate the top-ranked skill deemed by the employer to be the most important, 36.8% indicated that employability or soft skills were most important, followed closely by vocational or job-specific skills (35.5%) and pre-vocational basic skills (15.8%). Employability skills were defined as social skills, teamwork, attitude, reliability, work ethic and appearance. Vocational skills were defined as documented knowledge and experience such nationally or industry recognized licensure, certification and credentialing.

Of green jobs associated with construction, 80.7% require a minimum of a high school diploma or at least a 9th grade equivalent. However, among occupations expected to experience the highest growth in green jobs through 2018 (e.g. mechanical and electrical trades), most will require vocational or trade certification in addition to secondary education. Workforce demographic data indicates that *under*employed workers, or workers that have work experience or informal (e.g. 'on-the-job') training beyond the requirements (and compensation) of their current job, are generally 'semi-skilled' in nature and often lack documented or transferable vocational skills certification. Worse, *un*employed workers, or workers without jobs but actively seeking employment, are generally 'unskilled' and often lack the prevocational skills necessary to qualify for vocational training, or, to obtain even entry level employment.

As a result, the KSA gap analysis clearly indicates the need to develop a multi-tiered curriculum to address 1) pre-vocational skills training needed for the unskilled and unemployed, and 2) green skills training for the skilled and long-tenured displaced worker with an emphasis on building energy efficiency and conservation. Tier 3 programs address the higher educational needs of long-tenured worker as non-traditional students. Certain individuals, including the author, seek professional degrees after a long-tenured career has reached an earnings and on-the-job experiential learning limit.

4.1 Pre-Tier – Prevocational Curriculum

An 80-hour prevocational training curricula was developed to provide basic skills deficient adults exposure to the ABE skills and basic labor skills required for either vocational training (e.g. Tier 1), or, entry-level employment. After consultation with ABE experts in the Department of Educational Administration at the University of

Nebraska - Lincoln, 80 continuous contact hours was considered the optimal instruction time necessary to prepare ABE deficient employment candidates gaining basic prevocational and work readiness skills. Considering the dynamics and complexities of adult learner, the 80-hour program is best delivered in a two-week time frame. However, the curriculum was developed to provide some flexibility. For ABE persons currently seeking employment, the course was written to be offered as evening courses.

The curriculum was organized into six (6) modules (Figure 9). These modules were identified by industry respondents as required for entry-level employment, or, qualification for vocational training (e.g. trade apprenticeships, skills certifications, etc.). Each module was organized into several 1-2 hour instructional subunits, each with a list of core ABE learning objectives, labor skills demonstration objectives, material and equipment requirements (including personal protective equipment or 'PPE' – Figure 10), exercises and projects (both individual and group). Daily training segments were created by integrating a complimentary mix of ABE skills subunits (e.g. math, reading and communication skills) and hands-on basic labor skills subunits (e.g. safety, tools, employability skills, etc.) within both classroom and lab environments.

Prevocational Boot Camp Workbook

Table of Contents

Figure 9 – Table of Contents from the 80-hour Prevocational Boot Camp Workbook.

1.1.2 Appropriate Work Clothing

You need to think about what you are going to wear to school and to your new job. Is it safe? Loose-fitting clothes, baggy jeans, dangly scarves, and even long hair can all become caught in power equipment. Long hair should be taken up. Loose-fitting clothes are not appropriate in the laboratory or on the job site.

1.1.3 Hard Hat

This picture shows a typical hard hat. The outer shell of the hat protects your head from a hard blow. The webbing inside the hat maintains space between the shell and your head. Adjust the headband so that the webbing fits your head and there is at least one inch of space between your head and the shell.

Do not alter your hard hat in any way. Inspect your hard hat every time you use it. If there are any cracks or dents in the shell or if the webbing straps are worn or torn, get a new hard hat. Wash the webbing and headband with soapy water as often as needed to keep them clean. Wear the hard hat only as the manufacturer recommends. Never wear anything under your hard hat.

Figure 10 – Module 1, Unit 1 of the Prevocational Boot Camp PPE.

As an example, one exercise typically delivered on the second day of training involves proper selection and placement of ladders (Figure 11). Specifically, students are first required to understand the significance of fall hazards on the jobsite, identify the basic types of ladders and their use, and, be able to read and comprehend the manufacturer's safety instructions (e.g. side rail labeling). Next, students are presented with several scenarios in which they must select the proper ladder according to the required working height and load capacity. Students are asked to review U.S. Occupational Safety and Health Administration (OSHA) excerpts on ladders (CFR1926 Subpart X) and identify main points that apply to each scenario, such as proper placement and use. In scenarios involving extension ladders for example, students are required to calculate the proper placement angle (e.g. setback distance), determine the extension length required above the landing surface, and, visually identify nearby hazards (e.g. electrical). The exercise reinforces basic ABE concepts in *module 2-mathematics* (e.g. geometry and ratios) within the context of basic labor skills training in both *module 1-safety* (e.g. fall hazards) and *module 3-tools and equipment* (e.g. hand tools-ladders).

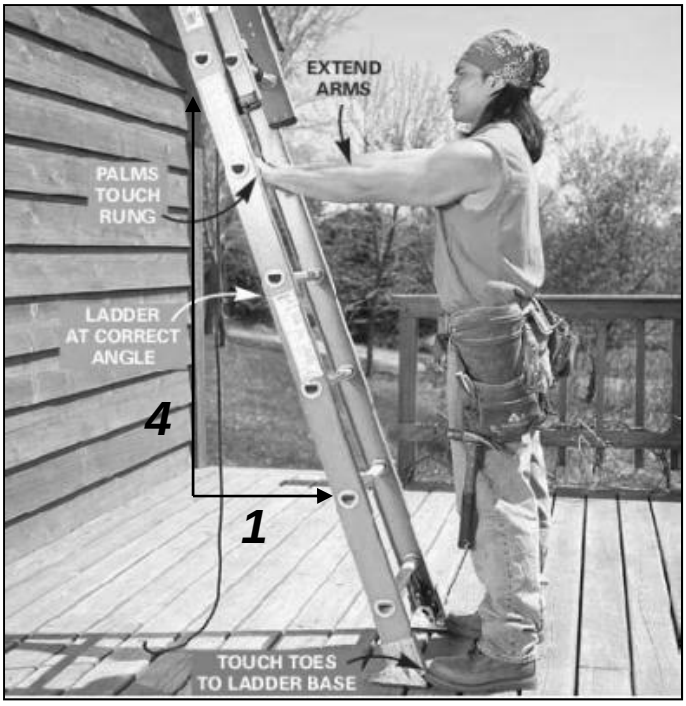

Figure 11 – Sample contextualized learning approach for ABE learners.

Example question: Given 3' minimum extension above the landing surface, and if the landing surface is 12' above grade, what is:

a) The OSHA prescribed base distance from the wall, and

b) The minimum length of extension ladder required

Answers:

1. *a)3' b)16'*
2. *a)4' b)12'*
3. *a)5' b)14'*
4. *a)3' b)14'*

Although the organization of modules (and subunits) did not necessarily dictate the order of training, early instruction was intended to focus on the safety and basic mathematic competencies necessary for the safe and effective use of tools and equipment used in later progressions. A focus on safety during the first three days of training would also help to ensure that dropouts could, at a minimum, obtain an industry recognized certification, the OSHA 10-hour safety card, even if they did not complete the two-week course. Related, students were required to complete all safety instruction and demonstrate proficiency in non-energized hand tools before progressing to power tools training.

Elements of *module 4-communications skills* and *module 5-employability skills* were integrated throughout the training to allow the instructor a certain level of flexibility to apply (or supplement) training material to their particular audience. These modules provide an overview of soft skills, identified by employers as a significant deficiency in many ABE employment prospects. *Module 5 – employability skills* – provides

instruction to the student in the process of locating employment, preparing a resume and for an interview, and roll-play activities that give the student practice in an interview scenario.

Finally, *module 6-green building industry*, was developed to provide students an orientation into the concept of resource efficient design and construction and the various trades involved in green building. As an over-arching goal in the grant, curriculum was developed to introduce workers to green industries. Module 6 – green building industry, was prepared as an orientation, for the purpose of familiarizing the student with principles commonplace to the green construction industry. This module includes an overview of Energy Star and LEED certification, as well as the concept of what is renewable energy and energy efficiency. Specifically, students participate in an activities that help them determine their carbon footprint, or rather, their energy consumption. This activity is followed by instruction on simple methods used to improve the energy performance of their home.

To date, five (5) 80-hour prevocational boot camps have been delivered by three educational providers in the Omaha – Lincoln metropolitan area, including the International Brotherhood of Electrical Workers (IBEW) local union 22, Steamfitters & Plumbers local union 464, and the Metropolitan Community College (MCC). With varied results in enrollment for each offering, (typically five to twelve students each), the course continues to be delivered since the first offering of the course on November 22nd, 2011. Two other training providers with upcoming training dates include Boys Town – Omaha, Nebraska and The Center for People in Need – Lincoln, Nebraska.

Input from the instructors at each of the training facilities was a valuable source for evaluation of the effectiveness of the curriculum. Instructors were asked how, specifically, the course has been, or not been helpful and effective. Don Gerjevic, of the IBEW local union 22, responded that,

> *"… in these very difficult times of high unemployment along with harsh economic environments, these classes offer a starting point for individuals that are affected most. This curriculum helps in guiding the student in a positive direction along with goal-setting for each individual."(Gerjevic, 2012)*

Trade unions have customized the curriculum to test candidates in their ability to learn and apply basic trade skills. Students are observed and examined to determine whether or not they are suited for the rigors inherent in the construction industry.

4.2 Tier-1 Vocational Training Curricula

For those individuals seeking Tier 1 vocational training offered by a trade union or community college, the prevocational boot camp has served as a prequalifying program. The curriculum for prevocational training has provided instruction and basic training as well as ABE skills necessary for advancement into specialty training. For individuals seeking training as an electrical worker, the IBEW local union 22 has used the prevocational curriculum to prequalify four (4) prospective electrical apprenticeships and five (5) individuals have entered the workforce since November, 2011. The Steamfitters and Plumbers local union 464 has offered the program once, and MCC has offered the program twice with similar results.

New curriculum for vocational training was not developed as part of this research grant. Only the analysis of the effective outcomes of pre-vocational training as it pertains to the preparation of individuals for vocational, specialized, Tier-1 training was considered. Partnership with community colleges and local unions was critical to the successful outcome of the curriculum development. Establishing a mutually beneficial relationship with these partners ultimately contributes to the advancement of an individual in a given career path. Further training beyond the prevocational boot camp is expected to assist an individual's ability to gain and sustain employment in the construction industry. Community colleges and trade unions provide the essential next steps in vocational training for these employment candidates.

4.3 Tier-2 Green Training Curricula

As advancement in the employment pathway continues, workers are finding it increasingly necessary to gain specialty training in order to maintain a competitive advantage in the employment market. Tier-2 green training programs provide underemployed and long-tenured workers with knowledge, skills, and training to perform specialty trades in the construction industry. Curricula were developed in several areas of green construction industries, including residential building analyst, commercial building analyst, and small-wind energy generation analyst. These curricula prepare workers to perform analysis on multiple building systems, for which some experience and knowledge is required as a prerequisite to entrance into the program. Training providers for the Tier-2 curricula apply organizational specific methods for prequalifying training candidates.

4.3.1 Building Analyst I (Residential)

A 40-hour vocational training curricula was developed to provide candidates a nationally-recognized green building certification. Specifically, the *Building Analyst I* curriculum was developed to provide an entry-level credential in the fundamentals of building energy science. For the purposes of the *syNErgy* program, this 40-hour vocational curriculum was intended for skilled, underemployed, and long-tenured workers lacking transferable credentials recognized by new and emerging green building industries. As a pre-requisite for more advanced training in building energy efficiency and renewable energy technologies, this vocational curriculum provides participants the KSAs necessary to perform residential energy audits according to the standards set forth by the Building Performance Institute (BPI) as recognized by the U.S. Department of Energy (DOE).

Figure 12 – BPI train-the-trainer classroom instruction

Adaptable to either a one-week workshop, or a 3-contact hour per week semester/quarter course, the 40-hour curricula was organized into fourteen (14) modules (below) to assess home energy performance, health and safety as well as provide the foundation for more specialized training in commercial energy auditing (e.g. *Building Analyst II & III*), and 'small' wind power generation.

Module 1 – Introduction

Module 2 – Principles of Energy

Module 3 – Basics of Heat

Module 4 – Basics of Moisture

Module 5 – Basics of Airflow

Module 6 – Building Structural Elements

Module 7 – Insulation

Module 8 – Building Mechanical Systems

Module 9 – Blower Door & Pressure Diagnostics

Module 10 – Combustion Testing

Module 11 – Common Problems & Solutions

Module 12 – Energy Audit Process

Module 13 – Health and Safety

Module 14 – Business of Energy Audit

Each of the above 1-hour classroom modules begins with a content overview and concludes with sample problems, questions and exercises. Classroom instruction is followed by approximately 16 hours of field training which includes conducting an actual home energy audit. Beginning at the exterior of the building, the prospective auditor is taught to identify potential hazards, structural concerns, and areas where bulk and vapor moisture can infiltrate the building. The condition of windows, doors, roofs, and other aspects of the envelope are analyzed. Conditions which would allow bulk moisture or vapor to enter the building or cause structural damage, as shown in Figure 12, are noted

in an auditor's report. The auditor is instructed to provide a thorough audit of the building to the home owner.

Figure 12 – BPI inspection of exterior conditions

In addition to moisture concerns, the auditor is taught to identify and report on any existing hazardous materials, such as mold or asbestos. Auditors are taught to make note of the condition and continue with the audit, unless there is a potential for the hazardous material to become airborne. The home used in the case study for training purposes, shown in Figure 13, was suspected of containing asbestos base roof shingles. The weathering condition of the shingles and gutters were noted in the report.

The audit continues throughout the interior of the home, identifying areas of concern where moisture and energy loss/gain can potentially occur. Figure 14 shows an example of an interior condition which students are required to identify as an area for potential energy conservation and include in the audit report.

Figure 14 – BPI inspection of interior conditions

The mechanical system is audited for efficiency. A combustible appliance zone (CAZ) test is performed on each appliance which uses combustible fuel. A monometer and other instruments are used to teach the students how to perform spillage, draft and carbon monoxide (CO) tests in a CAZ. A blower door test is also performed as part of the audit. The blower door test depressurizes the residence and allows the auditor to use the monometer to determine pressure changes throughout the home. Knowing where the pressure differentials exist in a building helps the auditor understand and identify potential areas of concern where infiltration may exist. The audit is completed by providing a home owner with the written results of the tests and diagnostic solutions to make the residence more energy efficient. Figure 15 shows the instructor providing training with the monometer in the CAZ and at the blower door.

Figure 15 – CAZ and blower door testing

In addition to classroom and field training, the *Building Analyst I* certification requires both a written and field examination. The 2-hour online written exam consists of 100 questions with a passing score of 70%. The 2-hour field exam requires the student to perform an actual home energy audit. During the field exam, the instructor grades the student's performance. The audit is video-taped and further reviewed by BPI staff prior to certification.

An initial train-the-trainer course was provided by Everblue, Inc. The participants in the train-the-trainer course were comprised of 14 instructors from trade unions and

community colleges in the Omaha – Lincoln metropolitan area. Having received the training and passed the examinations, auditors are authorized to offer the same instruction to individuals who have qualified for the specialized training. The first Building Analyst I courses were offered in February and March of 2012 by Metropolitan Community College and IBEW Local Union 22.

4.3.2 Building Analyst II (Commercial)

A 20-hour curriculum for the Building Analyst II was developed in conjunction with researchers at the University of Florida and the University of Nebraska - Lincoln. The format of the training was proposed to be delivered in a 3-day classroom setting. The delivery is designed in a flexible manner so as to adjust for a particular audience and teaching environment. Curriculum was written to be credited toward continuing education units (CEUs) for individuals requiring such units for licensure. The curriculum addressed the commercial building auditing needs from the perspective of lighting and electrical energy management.

Through the Building Analyst II curriculum, electrical journeymen, apprentices, and electrical contractors are trained in a series of 3 units. The first two units of the curriculum are comprised of 7 modules each, shown below:

Unit 1: Commercial Building Audits (7 hours)

Module 1: Introduction to Energy Conservation

Module 2: Interior Lighting and Lighting Systems

Module 3: Exterior Lighting and Lighting Systems

Module 4: Lighting Sensors and Controls

Module 5: Building Energy Codes and Standards

Module 6: Utility Rates and Structures

Module 7: Audit Procedures, Equipment and Safety

Unit 2: Energy Management in Commercial Buildings (7 hours)

Module 8: Characterization of Building Energy End Use

Module 9: Plug Loads

Module 10: Power Quality

Module 11: Energy Monitoring Systems

Module 12: Building Commissioning

Module 13: Life Cycle Assessments and Performance Contracting

Module 14: Smart Grid

Unit 3: Commercial Building Case Studies

Each of these units begins with a pre and post assessment. The assessment serves as a tool for both the instructor and student. For unit 3, students are required to perform a series of five (5) case studies, including "1) pre-audit assessment (e.g. utility records, facility information, etc.), 2) walk-thru audit (e.g. documentation of existing systems, use patterns, age/condition, etc.), and 3) post-audit report (e.g. retrofit options, benefit-cost,

etc.)" (Miller, 2012). These case studies of actual commercial buildings provide the students with practical experience to reinforce the application of principles taught in classroom settings. Case studies are designed as a model and can be adapted and added upon based on the audience and unique conditions that may exist in the industry.

A train-the-trainer session was held in January, 2012 wherein nine participants from IBEW, Southeast Community College, Miller Electric, and Commonwealth Electric, as well as researcher from UNL, were instructed in the delivery methods of the curriculum. The first course offering is scheduled for February, 2012.

4.3.3 Wind Analyst

A 40-hour curriculum was developed to introduce prospective retailers, installers, and energy auditors wind energy generation. This course was designed to provide students an introductory course in the "principles of both the mechanical (aerodynamics) and electrical components and systems, along with economic and environmental considerations for siting, and associated public policy to appropriately cover the relevant topics for all scales of wind energy implementation" with a focus on small wind turbine energy generation (Hudgins, 2011). As an introductory course, the intent is to provide students an opportunity to pursue further education or certification in either small wind installation, or prepare the student for training in large-wind industry training. Enrollment in the course requires prequalification of a modest level of knowledge in electrical systems, whether through educational or vocational experience.

Students completing the Wind Analyst course will be positioned to pursue employment with small wind turbine manufacturers, or an turbine technician or installer.

Further training may also be pursued through the North American Board of Certified Energy Practioners (NABCEP), or continued in an associate's degree program as a wind technician with a regional community college program.

The Wind Analyst curriculum was written to be delivered in a classroom and field setting. The curriculum contains eleven (11) modules, shown below, which are finalized with case studies and a small wind turbine installation activity. The modules are designed with the basic objective of helping the student acquire understanding of 1) the various wind resources, 2) the skills to process wind data, 3) basic aerodynamics, 4) basic operational characteristics of wind generators, 5) siting issues, 6) wind energy economics, and 7) issues related to the environmental impact of wind turbines.

List of Modules in the Small Wind Energy Generation Curriculum:

Module 1: Introduction to Wind

Module 2: Wind Resources Assessment

Module 3: Wind Turbines

Module 4: Basics of Electricity

Module 5: Turbine Electricity

Module 6: Turbine Siting

Module 7: Energy Storage

Module 8: Safety

Module 9: Training & Certification

Module 10: Economics

Module 11: References

Case studies include practical application in decision making for the installation of a small wind turbine. A case study of a site includes the measurement of potential wind energy source, siting the turbine, and the economics of the particular site. A small

wind turbine (a Burgey, Excel I) was purchased by the University of Nebraska – Lincoln, to be used for instructional purposes. The small wind turbine can be assembled and stood in a few hours by a group of students, whereupon measurements can be taken of the generation of electrical power. The mobility of the small wind turbine provides an opportunity for students to experience the assembly process and field measurements first-hand.

A train-the-trainer session was held at the University of Nebraska, wherein 12 participants were provided an overview of the curriculum in a classroom setting (see Figure 16), and training on the assembly and erection of the turbine (see Figures 17 & 18). Training partners from community colleges and the IBEW were among the participants.

Figure 16 – Wind Analyst I train-the-trainer classroom

Figure 17 – Assembly of wind turbine

Figure 18 – Temporary erection of wind turbine

4.4 Summary of Results

The Prevocational Boot Camp curriculum provides the student with an introductory training to the ABE knowledge and the basic skills required for entry level construction workers. The Prevocational curriculum provides trade organizations, community colleges, and adult learning centers a standard for assessment of prospective students, apprentices, and employees.

The Building Analyst I, Building Analyst II, and the Wind Analyst I curricula provide an excellent opportunity for the long-tenured displaced worker to acquire specialized training and industry recognized certification, in which the individual increases their personal market value in a more greening industry. The higher level tier-2 training has been successfully delivered and continues to be delivered by established trade organizations and community colleges.

Chapter 5

Discussions and Implications

5.0 Summary of Findings

To determine whether or not green jobs can provide reemployment opportunities for recession displaced workers, a 'pilot' program was developed to transition 1,000 *un*employed and *under*employed workers from recession impacted occupations to high growth green jobs by 2013. As part of this program, more than 6,000 businesses were surveyed to assess the gaps between 1) the existing KSAs of recession displaced workers in relation to 2) the new skills sets required of workers in green building industries. A multi-tiered curriculum was then developed to provide 1) prevocational training to unskilled workers, and 2) green training to skilled, long-tenured workers as a pathway for either entry-level reemployment, or higher-level training and reemployment.

To date, both pre-tier (prevocational) and Tier-2 (green training) curricula have been completed. 'Train-the-Trainer' (TtT) sessions have been conducted with instructors from six (6) Nebraska community colleges and three (3) in-state trade labor organizations specializing in work readiness certificate programs. A total of 431 Nebraska participants have enrolled in training, including 177 (41.1%) unemployed and 254 (58.9%) underemployed participants. Of these, 256 (59.4%) have completed training with 214 (83.6%) completions resulting in a recognized credential. Of the unemployed participants entering training, 44 (24.9%) have entered reemployment, including 38 (86.4%) that have entered training-related employment.

5.1 Interpretation and Implications of Findings

From the endorsement of trade unions and community colleges by successful delivery of the various training programs, and the intention to continue to offer the courses, the curriculum therefore, is accepted by its developers and the Nebraska Department of Labor as having achieved the purposes of the grant. The process of developing curriculum is an ongoing and evolutionary process. The current curriculum is accepted as an initial and successful offering, though in order to determine its effectiveness, continued research and monitoring of its delivery, as well as measurement of the outcomes for students of the program, is a necessary part. Technology advancements will play an ongoing part in curriculum advancement as well. As the construction industry advances in its application of green practices, and as further research provides newer technologies, curriculum will need to be refined to provide the student of the trade the necessary skills, knowledge, and abilities to maintain a competitive advantage in the labor market. No curriculum should be perceived as a completed work, rather a step forward in an ever advancing process.

As part of the 3-year *syNErgy* program, a series of 'short-course' curricula and certification programs have been, and are being developed in more specialized areas of building energy efficiency, renewable energy such as 'small' wind generation, commercial energy auditing (e.g. *Building Analyst II*), agricultural energy auditing, and on-site biofuels (Figure 19). These specialized areas of training and certification are intended to provide the knowledge, skills and abilities required of employees in new and emerging green industries. As a result, it is anticipated that the training program will be

self-sustaining beyond the grant, providing participants long-term and sustainable employment opportunities.

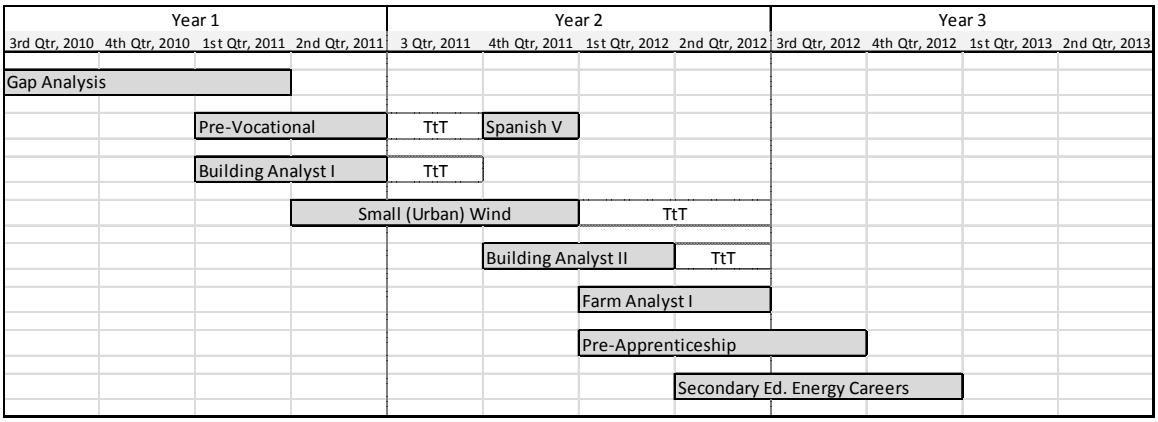

Figure 19 syNErgy program plan, 2010 – 2013.

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Appendix A

Nebraska Green Jobs Survey

Nebraska Green Jobs Survey

NEBRASKA
DEPARTMENT OF LABOR

greenjobs

The Nebraska Department of Labor is gathering information about jobs in our economy where green activities are a part of employees' work and where employees use specific job-related skills that result in environmental benefits. Your response to the survey is important even if you do not consider your business activities to be green. Please complete all items to the best of your knowledge and **by June 30, 2010**.

Survey Completion Options:

- Save time and complete the survey online at <<website address>>. **Token:** <<SurveyID>>
- Fax a copy of this survey to (402) 471-9867.
- Call us toll free at (800) 876-1377.
- Return the completed survey in the provided postage-paid envelope.

☐ If your business is not currently in operation or has been sold/merged, please indicate here and return the survey using the included envelope. Thank you for your time.

Section 1a - Company Information

1. How many employees does your organization currently have at this location? _____

2. Your company may be involved in more than one of the green activity categories listed below, but please check the box that most closely corresponds to the majority of green activity within your business.
Please refer to the enclosed flyer for categories' definitions and examples.

☐ Renewable Energy and Alternative Fuels
Manufacturing, construction, design, research, delivery, operation, storage or maintenance of wind, solar, biomass, hydro, alternative transportation fuels, geothermal, methane and waste incineration as a fuel source.

☐ Energy Efficiency and Conservation
Manufacturing, construction, or installation of energy efficient products, energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements, and transportation technology.

☐ Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction
Activities related to controlling emissions and pollution. Includes controlling and reducing greenhouse gas emissions, waste water and other pollutants.

☐ Environmental Cleanup and Restoration and Waste Clean-up and Mitigation
Environmental restoration including the cleanup and disposal of pollution, waste, and hazardous materials; Superfund/Brownfield redevelopment;and landfill restoration.

☐ Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading
Activities that educate on energy efficiency, renewable energy, energy rating systems certifications, and more efficient energy consumption. Enforcement of compliance requirements and regulations, and training on effective use of energy related products and processes.

☐ Sustainable Agriculture and Natural Resource Conservation
Products and services to conserve, maintain and improve natural resources and environment, including low carbon and organic agriculture, land management, water management and conservation, wetlands restoration and environmental conservation.

☐ None *This establishment does not participate in any of the above green categories*

Section 1b - Green Employee Activities

Even if your primary business may not participate in green activities, you may still have employees performing green-related activities. **These do not include**: consultants, contractors or temporary agency employees not on your payroll; employees not directly involved in green activities, such as administrative support employees; and employees who perform green practices which do not directly contribute to your business's product or service, like those that carpool or recycle.

3. Based on the criteria described above, how many of your employees currently produce a product or service that can be considered green related? _____ (please specify "zero" if none)

*If your answer to #3 **is more than zero**, please continue to Section 2 (page 2).*
*If your answer to #3 **is zero**, please continue to Section 4 (page 4).*

Section 2 - Green Jobs

Please fill out the following chart by occupational category regarding only those green jobs you have indicated in question 3, at this location, within your organization. If you have more than 10 green jobs, please photocopy and continue or use the online version.

Job Title & Brief Description	Number of Employees	Miniumum Education/Training Requirement	Special Requirements	Number of workers having green job responsibilities. (Based on percent of time dedicated to green work)			Starting Wage	
Only list current jobs which produce a product or service that can be considered green. List job title and briefly describe duties related to green related activities.	Enter the number of employees with this job title that participate in green activities.	***Use the following codes:*** 1 = No Requirements 2 = HS Diploma/GED 3 = Post HS, No Degree 4 = Apprenticeship/ On-The-Job Training 5 = Trade Certified 6 = Vocational Degree 7 = Associate Degree 8 = Bachelor's Degree 9 = Graduate/Professional Degree	Please list any required special licenses, certificates or other training above and beyond the normal requirements of this occupation which are necessary due to the green activities of this position.	Between 1-49%	Between 50-99%	100%	Enter the annual or hourly average starting wage for this position.	**Hour Wag** **Annu Sala**
Example: Wind Turbine Technician - Installs & Repairs wind turbines	*7*	*5*	*Renewable energy technician certification*	*2*	*4*	*1*	*$32,000*	
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

[1] A vacancy exists if it meets the following criteria: a specific position exists; work could start within 30 days; and you are actively s

A green job is one in which an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability.

Indicate the number of workers having green job responsibilities in each wage category. (Please do not include the value of benefits)													**Jobs Recently Created or Modified**	**Current Vacancies**[1]	**Projected Creation or Elimination**	
rly ge	Under $9.25	$9.25 - $11.49	$11.50 - $14.49	$14.50 - $18.24	$18.25- $22.74	$22.75 - $28.74	$28.75 - $35.99	$36.00 - $45.24	$45.25 - $56.99	$57.00 - $71.49	$71.50 - $89.99	$90.00 and over	How many of these jobs were created as green positions or modified to include green tasks since January 2009?	How many current vacancies does your organization have in this green job?	How many positions in this green job does your organization expect to **create or eliminate** within the next 2 years?	
ual ry	Under $19,240	$19,240 - $23,919	$23,920 - $30,159	$30,160- $37,959	$37,960 - $47,319	$47,320 - $59,799	$59,800 - $74,879	$74,880 - $94,119	$94,120 - $118,559	$118,560 - $148,719	$148,720 - $187,199	$187,200 and over			**Create**	**Eliminate**
				6	*1*								*2*	*1*	*5*	*1*

seeking workers to fill this position.

Please continue with Section 3 on the next page.

Section 3 - Green Employees

4. What training or skills development programs would your business find most useful in preparing workers for a green job at your company? _____

_____

5. What methods are used at your business to prepare current workers to produce green products or services? (Check all that apply)

- ☐ In house classroom/on-the-job training
- ☐ Industry-recognized green certification or training
- ☐ Apprenticeship programs
- ☐ Hire only workers who are already trained
- ☐ Tuition assistance for college courses
- ☐ Tuition assistance for a degree (AA/AS or above)
- ☐ Others (specify) _____
- ☐ None

6. Do you have any positions that have the same job title where some employees participate in green activities and other employees do not? ☐ Yes **(Continue)** ☐ No **(Skip to Section 4)**

6a. Is there any difference between green and non-green positions in regards to:

Job Responsibilities	☐ Yes	☐ No	☐ Do not know
Work Activities	☐ Yes	☐ No	☐ Do not know
Tools, Technology, and Equipment Usage	☐ Yes	☐ No	☐ Do not know
Skills and Abilities	☐ Yes	☐ No	☐ Do not know
Training	☐ Yes	☐ No	☐ Do not know
Education Level	☐ Yes	☐ No	☐ Do not know
Licensing/Certification	☐ Yes	☐ No	☐ Do not know
Wage	☐ Yes	☐ No	☐ Do not know
Benefits Offered	☐ Yes	☐ No	☐ Do not know

Please Continue to Section 4

Section 4 - Green Activities

7. What barriers prevent your business from implementing or expanding green activities (check all that apply)?

- ☐ No interest in implementing green production at this time
- ☐ Shortage of workers with applicable knowledge or skills related to green jobs
- ☐ Shortage of available training programs
- ☐ Cost of implementation
- ☐ Training classes too full to enroll
- ☐ Economic conditions
- ☐ Government policies/regulations
- ☐ Lack of information on implementing green business practices
- ☐ Other (specify) _____
- ☐ None

8. Is there anything else you would like to share about your green business practices?

_____

_____

CONTACT INFORMATION

Name: _____

Organization: _____

Phone Number: _____

E-mail: _____

☐ If you would you like to receive an e-mail copy of the survey's findings please check this box and provide your e-mail to the left.

If you have any questions about the survey, please contact the Nebraska Dept. of Labor, Office of Labor Market Information at (402) 471-2600.

If you have any questions about the survey, please contact the Nebraska Department of Labor, Office of Labor Market Information at (402) 471-2600.

Thank you for taking the time to provide us with this valuable information.

Appendix B

Nebraska Green Jobs Report

Nebraska

Green Jobs Report





NEBRASKA
DEPARTMENT OF LABOR

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Colorado, Iowa, Montana, South Dakota, Utah, Wyoming

The great employers of Nebraska without who this project would not have been possible

Executive Summary

Nebraska collaborated with several other states to form the Northern Plains and Rocky Mountain Consortium. These states included Iowa, Montana, South Dakota, Utah, and Wyoming. Collectively, almost 64,000 businesses were surveyed to determine the frequency of green jobs within the consortium states. Nebraska's efforts, along with the other consortium states, represent a first-time collaboration to seek valuable information about green efforts from a workforce standpoint.

The purpose of the Green Jobs Survey was to learn about businesses' green economic categories and how occupations are evolving or being created to embrace a new area within the workforce. Specific information related to green jobs included job titles, education levels, green certifications, and other training needed. The Consortium defined a green job as *"one in which an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability."*

Nebraska sampled 11,917 businesses throughout the entire state. The sample was stratified according to industry and the number of employees within the business. Over 6,000 businesses responded, for an overall response rate of 52.8%.

Key Survey Findings

The Nebraska 2010 Green Jobs Report discloses a multitude of findings as it relates to businesses' green economic categories and green jobs within the state. Below are some of the highlights of these results:

- During the second quarter 2010, there were an estimated 30,725 green jobs throughout Nebraska, or 3.4% of Nebraska's workforce. Green employees are found in approximately 13% of businesses.

- There were 26.6% of Nebraska businesses that reported green economic activity within their business. Of these businesses having a primary green economic category, 36.1% identified themselves under the Energy Efficiency and Conservation category.

- The industry with the largest green employment was Construction with 6,595 green employees; 15.1% of Construction's total employment was green. The Wholesale Trade industry employed 4,115 green employees, or 10.2% of its total employment.

- The Production Occupations had the largest green employment numbers with 6,565 green employees, where 21.3% of its total employment was construed as green employment.

- Heating, Air Conditioning, and Refrigeration Mechanics and Installers had the largest green employment where 1,656 individuals in this occupation were reported as having a green job. Other top occupations by green employment include: Electricians; Heavy and Tractor-Trailer Truck Drivers; Industrial Truck and Tractor Drivers; and First-Line Supervisors of Production and Operating Workers.

- Top green occupations by green percentage include: Hazardous Materials Removal Workers; Environmental Science and Protection Technicians, Including Health; Forest and Conservation Technicians; Transportation Workers, All Other; and Production Workers, All Other.

Introduction

Purpose

"Going green" is transforming daily life at the local, national and global levels. For environmental protection, national security, job creation and other reasons, the world is evolving within and toward a greener economy. With the growth of green technologies and industries comes a need for a skilled and knowledgeable workforce. Unfortunately, federal and state agencies have not had an opportunity to identify how occupations have evolved to include green tasks or track these growing and emerging markets. This lack of information on green industries and occupations means that workforce development boards and training programs may not be able to focus on providing the skills and training needed for the green workforce.

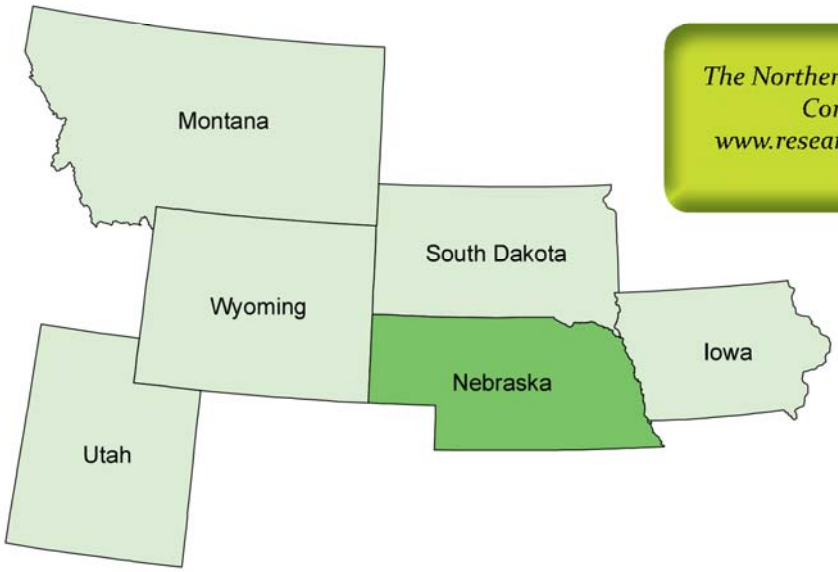
The Northern Plains and Rocky Mountain Consortium, seen below in Figure 1, formed to study green industries and occupations in an attempt to answer some of these questions. The consortium states of Nebraska, Iowa, Montana, South Dakota, Wyoming, and Utah constitute a contiguous landmass with some common industry characteristics and workforce demographics. By combining resources and using common methodologies, a better overall picture of green industries and occupations in the consortium area could be determined. The goals of the consortium were to:

1. Define green economic activities and what a green job entailed.

2. Survey businesses throughout the consortium states to determine their identification of green economic activities and whether they had green occupations.

3. Identify these green occupations and detail training needs in order to encourage job growth.

Figure - 1 The Northern Plains and Rocky Mountain Consortium



The Northern Plains and Rocky Mountain Consortium's website is: www.researchingthegreeneconomy.com

It was necessary for the consortium to draft definitions for both the green economic activities of businesses and green jobs since there was not a commonly accepted definition for either. The consortium identified six different economic activities that were to be used to define a green business. The economic activities identified were:

Renewable Energy and Alternative Fuels

Manufacturing, production, construction, design, research, delivery, operation, storage and maintenance of wind, solar, biomass, hydro, alternative transportation fuels, geothermal, methane and waste incineration as a fuel source.

Environmental Cleanup and Remediation & Waste Clean-up Mitigation

Environmental remediation including the cleanup and disposal of pollution, waste and hazardous materials; Superfund/Brownfield redevelopment; and landfill restoration.

Education, Regulation, Compliance, and Training & Energy Trading

Activities to educate the public, business and government on energy efficiency, renewable energy, energy rating systems certifications, and more efficient energy consumption. Also informing appropriate parties and enforcing compliance requirements and regulations, promoting state energy standards and plans, and training on effective use of energy related products and processes. In theory, energy trading could include buying and selling of power or fuels related to energy efficiency and renewable energy as well as cap and trade activity to control pollution.

Energy Efficiency and Conservation

Manufacturing, construction, installation, production of energy efficient products (such as Energy Star rated appliances, more efficient lighting), energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements (smart grid), transportation technology, and battery development and storage improvement.

Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction

Activities and research related to controlling commercial, transportation, and industrial emissions and pollution, water treatment, recycling operations, waste product management and treatment; includes controlling and reducing emissions of carbon dioxide, other greenhouse gases, waste water and other pollutants.

Sustainable Agriculture & Natural Resource Conservation

Products and services to conserve, maintain and improve natural resources and environment, including low carbon agriculture, land management, water management and conservation, wetlands restoration and mitigation, and environmental and wildlife conservation. Includes bio-science related activities and research.

While it was expected that most green jobs would be related to businesses that had operations related to one of the aforementioned activities, green jobs could exist in businesses that did not directly engage in these activities. Due to this, the definition of a green job was left more open so the consortium research could capture as many green jobs as possible.

The definition used for a green job was:

"One in which an employee produces a product or provides a service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability."

For the purposes of this study, employers were asked not to include employees that were consultants, contractors, or temporary employees when reporting green jobs so as to avoid double counting these jobs during data collection.

The data contained in this report contains the study results for Nebraska only. Information for the Consortium study and secondary studies on related topics of interest including the labor force, new and emerging technologies, and economic analysis can be found at **www.researchingthegreeneconomy.com.**

Methodology

Sample Selection

The Nebraska Green Jobs Survey's sampling frame was based upon employers found in the Quarterly Census of Employment and Wages (QCEW) during the fourth quarter of 2009. The QCEW is a census of businesses that are liable to Nebraska's Unemployment Insurance program. There were 61,660 Nebraska business establishments during the sample time-frame.

Businesses with an average quarterly employment of 0.67 or less were removed from the sampling frame. This exclusion sought to avoid businesses that could be closing down or have seasonal employment. Private households were also excluded in the sampling frame.

Several states' research prior to Nebraska's incorporated the North American Industry Classification System (NAICS) into their sampling process. The NAICS classifies every establishment into a specific industry code, which is based upon the establishment's primary economic activity. Unlike previous research from other states, Nebraska elected to include all industries within the sample frame. For instance, Hawaii excluded the Public Administration industry, while Missouri picked certain industries at the 6-digit NAICS level.

A multi-stage sampling technique was used to draw Nebraska's sample. First, a stratified random sample was selected. Businesses were stratified by industry at the 2-digit NAICS level and class size. In the second step, Nebraska Labor Market Information staff went through each 6-digit NAICS code to determine the likelihood that the industry participated in green activities. Staff referenced three states' (Michigan, Oregon, and Washington) previous sample and methodological designs during the oversampling selection of specific industries.

Ultimately, Nebraska selected 127 of approximately 1,200 6-digit NAICS codes to possibly have a higher proportion of green businesses and/or green occupations. These 127 industries were oversampled

to 100%. Tables A1 through A7 in the Appendix lists these industries and details both the number of businesses selected in the original random sample and the oversampling. The Sampling Frame by Strata table displays the breakdown of businesses sampled by industry and class size.

Data Collection

A total of 11,917 businesses were sent the Nebraska's Green Jobs Survey. The survey form was created in collaboration with Consortium states' and can be found in Appendix Figure A1.

The survey sought to collect information regarding how a business classified its green economy activity. The survey also inquired into green job titles, the number of employees within the green occupation and the percentage of time spent on green job responsibilities. The survey, along with a brochure defining green economic activities, was mailed out at the end of May 2010. The brochure can be found in Appendix Figure A2.

Respondents had the option to return by mail, fax, or complete the survey online. Follow-up surveys were sent out in June to those that had not yet completed the survey. At the end of July 2010, the response rate was approximately 35%. Follow-up phone calls were then conducted in August 2010. The final, overall response rate was 52.8%. The Final Response Rate by Strata table, found in Appendix Table A8, discloses the response rates by sampled strata.

Estimates Calculation

All responses were weighted utilizing an employment weight, a sample weight, and a non-response weight. The employment weight controlled for sampled employment and reported employment. It was calculated by dividing the reported employment over the sampled employment. The sample weight was calculated using the stratum's share of sample units divided by the total universe of businesses.
The non-response weight was calculated as one divided by the stratum's response rate. These weight calculations enabled a count of estimates for total green jobs by occupation.

Table - 1 Sampling Frame by Strata

Sector	1 - 4 employees	5 - 9 employees	10 - 19 employees	20 - 49 employees	50 - 99 employees	100 - 249 employees	250 - 499 employees	500 or more employees	Total
11	147	247	185	82	22	10	1	1	695
21	73	30	18	6	3	-	-	-	130
22	129	39	45	45	14	12	5	4	293
23	1,004	474	285	242	98	35	12	1	2,151
31	139	115	160	225	129	112	39	31	950
42	91	71	105	151	49	21	5	2	495
44	27	59	81	81	58	81	44	3	434
48	53	65	72	127	64	33	4	8	426
51	56	71	124	86	45	10	7	6	405
52	64	73	74	96	56	31	24	13	431
53	130	113	97	58	14	8	-	-	420
54	648	197	145	124	79	36	13	6	1,248
55	95	81	76	63	30	23	10	7	385
56	140	104	96	113	88	48	20	5	614
61	12	13	23	130	141	51	20	19	409
62	20	35	50	84	91	103	21	28	432
71	38	57	122	113	42	25	3	1	401
72	15	33	87	186	81	26	1	-	429
81	99	122	106	74	28	14	1	-	444
92	204	106	100	117	103	68	17	10	725
Total	3,184	2,105	2,051	2,203	1,235	747	247	145	11,917

*2-Digit Sector to Industry Titles can be found in the appendix on Table A45

General Information

Green Jobs Overview

There were an estimated 30,725 green jobs throughout Nebraska during the 2nd quarter of 2010, or 3.4 percent of Nebraska's workforce. These employees are found in approximately 13.0 percent of businesses, throughout all major economic sectors and class sizes.

Table 2 shows the class size with the green jobs being spread fairly evening throughout the different business classes. There were 215 businesses within the smallest class size reporting green jobs, or 15.6 percent of total businesses with 1 to 4 employees, but the largest class size (500 or more employees) reported the highest percentage of green employees within the company at 21.2 percent. All class sizes found to have double-digit percentages of businesses reporting green jobs. Over 14 percent of businesses employing 250 to 499 employees reported at least one green job, while 13.7 percent of businesses employing 5 to 9 employees reported at least one green job. Even the smallest percentage within the 100 to 249 employee class size still reported green jobs in 10.0 percent of total businesses.

Table - 2 Green Jobs Reported by Class Size

Class Size (by employees)	Has Green Employees	Total Businesses	% of Businesses Reporting Green Job
1 - 4	215	1,374	15.6%
5 - 9	147	1,071	13.7%
10 - 19	140	1,070	13.1%
20 - 49	133	1,205	11.0%
50 - 99	72	670	10.7%
100 - 249	41	412	10.0%
250 - 499	19	132	14.4%
500 or more	18	85	21.2%

Table - 3 Green Jobs Reported by Industry

Sector	Has Green Employees	Total Businesses	% of Businesses Reporting Green Job
11	45	334	13.5%
21	3	64	4.7%
22	50	188	26.6%
23	266	1,039	25.6%
31 - 33	67	444	15.1%
42	25	225	11.1%
44 - 45	5	252	2.0%
48 - 49	9	194	4.6%
51	5	208	2.4%
52	3	243	1.2%
53	7	212	3.3%
54	102	571	17.9%
55	9	228	3.9%
56	52	336	15.5%
61	23	220	10.5%
62	7	247	2.8%
71	13	224	5.8%
72	2	188	1.1%
81	20	229	8.7%
92	76	380	20.0%

*2-Digit Sector to Ind. Titles found on Table A45

Table 3 shows that businesses in the Utilities (sector 22) industry had the highest occurrence of reporting at least one green job within their business at 26.6 percent. The Public Administration industry had the third highest at 20.0 percent, with 76 of its 380 businesses reporting a green job.

The Construction industry had the highest number of businesses reporting at least one green job with 266 of its 1,039 businesses, or 25.6 percent of total businesses, stating they employed at least one green employee. Businesses in Accommodation and Food Services and Finance and Insurance had the lowest reported occurrences of green jobs, with only 1.1 and 1.2 percent reporting green jobs, respectively. Coupled together, these two industries only had five businesses that reported at least one green job.

As mentioned in the Purpose section of this report, green economic categories were different than green jobs. Businesses could have a primary activity that could be considered green, but not meet the more stringent definition of a green job. They could also not fit into a green economic category, but have employees participating in work that could be considered green.

Green economic categories and green jobs do not have to be mutually inclusive, but they can correlate with one another. This is evident when 46.0 percent of businesses that chose at least one green economic category also reported at least one green job within their business.

Table 4 shows two different statistics. First, it shows how many total businesses identified themselves within the green economic category. Secondly, it displays how many of those businesses that selected that green economic category also reported at least one green job within their business. Businesses that stated their primary green economic category was Renewable Energy and Alternative Fuels had the highest occurrences of green jobs. Almost 56 percent of these businesses disclosed at least one green job within their business. Businesses that stated their primary green economic activity fell under the Sustainable Agriculture and Natural Resource Conservation category reported the second highest occurrences of green jobs, with 136 of 270 businesses, or 50.4 percent, reporting a green job.

Over half (53.6%) of employers reported only one green job within their business. Almost three-fourths of businesses had only one or two green employees.

Businesses that stated their primary green economic activity was Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading had the lowest occurrences of green jobs at 34.0 percent.

The green economic category that was most identified by businesses as their primary green economic activity was Energy Efficiency and Conservation, where 581 businesses self-identified within this category.

Table - 4 Green Jobs Reported by Green Economic Category

Green Economic Category	Has Green Employees	Total Businesses	% of Businesses Reporting Green Job
Renewable Energy and Alternative Fuels	91	164	55.5%
Energy Efficiency and Conservation	256	581	44.1%
Pollution, Waste and Greenhouse Gas (GHG) Management, Prevention, and Reduction	77	156	49.4%
Environmental Cleanup and Restoration and Waste Cleanup and Mitigation	55	127	43.3%
Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	52	153	34.0%
Sustainable Agriculture and Natural Resource Conservation	136	270	50.4%

Green Economic Activities

Businesses could conceive their primary activity was green, yet not meet the more rigorous definition of a green job. It was important to consider a business' economic activity if its output could be construed as green in some manner. Thus, each business was asked to identify its primary green economic activity, regardless of the number of green jobs it may report. Almost 27 percent of businesses identified themselves into one or more of the provided green economic categories in the survey. Comparatively, only 13 percent of businesses reported jobs that fit the provided definition of green jobs.

2.6% of all businesses reported more than one green economic category. The percentage increased to 4.5% when only looking at businesses that reported green jobs.

There were 26.6 percent of businesses that reported any green economic activity. Figure 2 shows how businesses selecting a green economic category responded. There were 36.1 percent of businesses that identified their primary green activity under the Energy Efficiency and Conservation category, followed next by a distant 16.8 percent in the Sustainable Agriculture and Natural Resource Conservation category. The Environmental Cleanup and Restoration and Waste Cleanup and Mitigation category had the lowest identification from businesses at 7.9 percent.

Table 5, on the following page, analyzes how businesses responded to the green economic category by industry level. The Energy Efficiency and Conservation category had the highest identification among businesses, as previously mentioned. A breakdown of industries with the highest responses within this specific industry includes Construction (29.1 percent), Utilities (19.1 percent), and Transportation and Warehousing (17.5 percent). In other words, 29.1 percent of businesses in the Construction industry categorized themselves within the Energy Efficiency and Conservation green

Nebraska Businesses in Green Economic Categories

Figure - 2

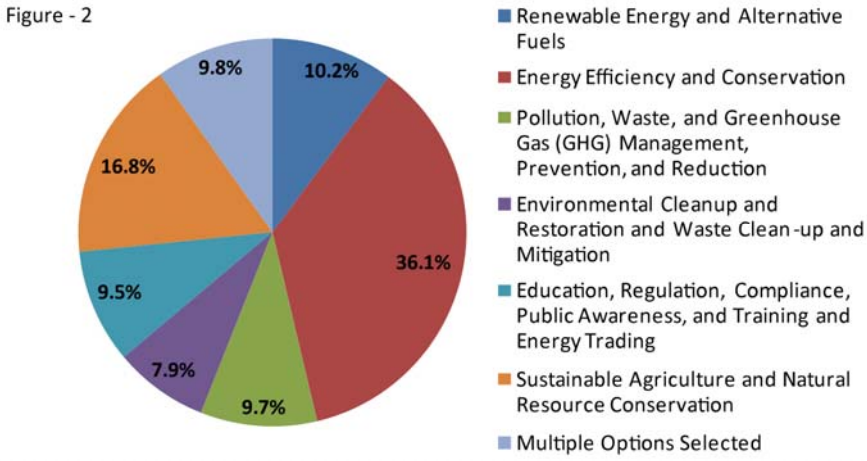


Table - 5 Green Economic Analysis at the 2-Digit Industry Level

Sector	Renewable Energy and Alternative Fuels	Energy Efficiency and Conservation	Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction	Environmental Cleanup and Restoration and Waste Clean-up and Mitigation	Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	Sustainable Agriculture and Natural Resource Conservation	None
11	1.5%	1.5%	1.8%	2.7%	0.0%	24.3%	67.1%
21	1.6%	0.0%	6.3%	7.8%	0.0%	0.0%	84.4%
22	21.3%	19.1%	8.5%	2.7%	16.0%	5.3%	23.4%
23	4.1%	29.1%	2.1%	1.3%	0.4%	3.9%	55.5%
31	4.7%	8.1%	6.8%	0.9%	0.5%	2.9%	71.2%
42	3.1%	3.6%	1.3%	3.1%	0.0%	2.7%	82.2%
44	1.2%	9.5%	3.6%	2.0%	4.0%	0.0%	76.6%
48	3.6%	17.5%	3.1%	1.0%	1.5%	0.5%	71.1%
51	0.0%	1.0%	0.0%	1.0%	4.8%	0.0%	92.8%
52	0.0%	1.6%	0.4%	1.2%	0.4%	0.4%	95.1%
53	0.5%	8.0%	0.0%	0.5%	0.0%	0.5%	89.6%
54	3.0%	7.4%	3.3%	2.1%	3.0%	4.0%	75.0%
55	1.3%	6.6%	0.4%	0.0%	1.8%	0.9%	88.6%
56	1.5%	2.1%	3.3%	7.1%	1.8%	1.2%	80.4%
61	0.9%	4.1%	0.0%	1.4%	19.5%	0.0%	70.0%
62	0.4%	2.0%	0.4%	2.4%	3.2%	1.2%	88.7%
71	0.9%	4.0%	0.9%	1.3%	0.9%	2.2%	87.9%
72	0.5%	2.7%	0.0%	1.1%	0.5%	0.0%	91.5%
81	0.0%	2.6%	3.5%	4.8%	2.2%	2.2%	83.4%
92	1.3%	3.9%	4.5%	2.4%	1.8%	19.5%	62.9%
Total	**2.7%**	**9.6%**	**2.6%**	**2.1%**	**2.5%**	**4.5%**	**73.3%**

*2-Digit Sector to Industry Titles can be found on Table A45

economic category. Businesses in the Mining industry were the only ones that did not list any participation within this category.

The only other double-digit occurrences for businesses identifying their green economic category were in the Sustainable Agriculture and Natural Resource Conservation category. Not surprisingly, 24.3 percent of Agriculture, Forestry, Fishing and Hunting businesses and 19.5 percent of Public Administration agencies identified themselves within this category. Four percent of Professional, Scientific, and Technical Services also identified themselves within this category. This was the second highest response for the Professional, Scientific, and Technical Services industry; their highest identification within the green economic categories was Energy Efficiency and Conservation at 7.4 percent.

There were 14 businesses that reported having ten or more green jobs within their businesses.

It is important to note the Utilities industry revealed several interesting findings. Many states purposefully excluded the Utilities industry from their sample, but Nebraska elected to include it within its sample. Businesses within this industry that reported any green economic category had the highest selection in the Renewable Energy and Alternative Fuels category with 21.3 percent fitting into this category. This is the only double digit response within this green economic category out of all the industries.

Furthermore, Utilities is the only industry where its businesses cited not fitting into the 'none' option at such a low rate. Only 23.4 percent of Utility businesses chose this option. This finding should indicate to others that the Utilities industry is a viable

Table - 6 Green Economic Analysis by Class Size

Class Size (by employees)	Renewable Energy and Alternative Fuels	Energy Efficiency and Conservation	Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction	Environmental Cleanup and Restoration and Waste Clean-up and Mitigation	Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	Sustainable Agriculture and Natural Resource Conservation	None
1 - 4	3.3%	13.0%	2.7%	1.7%	2.0%	6.8%	68.3%
5 - 9	3.5%	9.2%	2.1%	2.8%	1.5%	6.3%	72.5%
10 - 19	2.3%	8.8%	3.0%	2.3%	2.2%	4.2%	75.0%
20 - 49	2.6%	7.8%	2.4%	1.8%	2.2%	3.0%	77.8%
50 - 99	1.6%	8.9%	1.6%	3.0%	3.1%	2.4%	75.1%
100 - 249	2.4%	9.2%	2.2%	0.7%	3.9%	2.2%	77.2%
250 - 499	1.5%	8.3%	6.1%	3.0%	6.8%	1.5%	68.9%
500 or more	1.2%	7.1%	9.4%	0.0%	12.9%	1.2%	57.6%

industry to study when attempting to understand green economic activities within businesses.

Utilities' third highest category was the Education, Regulation, Compliance, Public Awareness, and Training, and Energy Trading category, with 16.0 percent of its businesses falling within this category. When looking within this specific category, only one other industry outranks Utilities: Educational Services at 19.5 percent. The third top industry within the Education category was the Retail Trade industry at 4.0 percent.

One would expect to see a hierarchy in businesses reporting a green economic business with the largest occurrences from small businesses and moving to smaller occurrences in larger businesses. This would duplicate the actual pattern of businesses; there are more small businesses than large businesses within Nebraska, with the exception of businesses with 20 to 49 employees.

The only green economic category that actually follows this pattern is Renewable Energy and Alternative Fuels. Energy Efficiency and Conservation almost follows this pattern. Businesses with 1 to 4 employees reported 13.0 percent in this category. The percentage jumped to 9.2 percent for the next class size of 5 to 9 employees and continued to do so until the class size with 50 to 99 employees, where it jumped up 1.1 percentage points. The next class size, 100 to 249, also increased the percentage of businesses reporting within the category despite the decrease in number of available businesses in the stratum.

The complete opposite effect occurred for businesses identifying with the Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading category. As the class size increased, the percentage of businesses identifying themselves within the category also increased. Almost 13 percent of businesses with 500 or more employees identified within this category, while only 2.0 percent of businesses with 1 to 4 employees did the same. Businesses with 500 or more employees also had a high percentage rate of identifying with more than one green economic category.

Many businesses reported various types of recycling as an effort on their behalf to become more green. Common recycleables included: cans, paper, aluminum, plastic, ink, cardboard, and glass.

Barriers to Green

The Green Jobs Survey also asked what types of barriers prevented the business from implementing or expanding green activities. There were seven provided response categories, as well as options stating they had no interest in expanding to include green production, "none" because they were already implementing or expanding and other, and a space to provide additional "other" barriers.

Almost 51% of businesses only selected one possible barrier to expanding or implementing green jobs, meaning that approximately 49% cited more than one barrier would need to be overcome in order to expand green activities.

Almost 4,200 surveyed businesses responded, or 70.6 percent of the total. Businesses were allowed to select multiple options. As a result, there were over 5,700 total responses for this question.

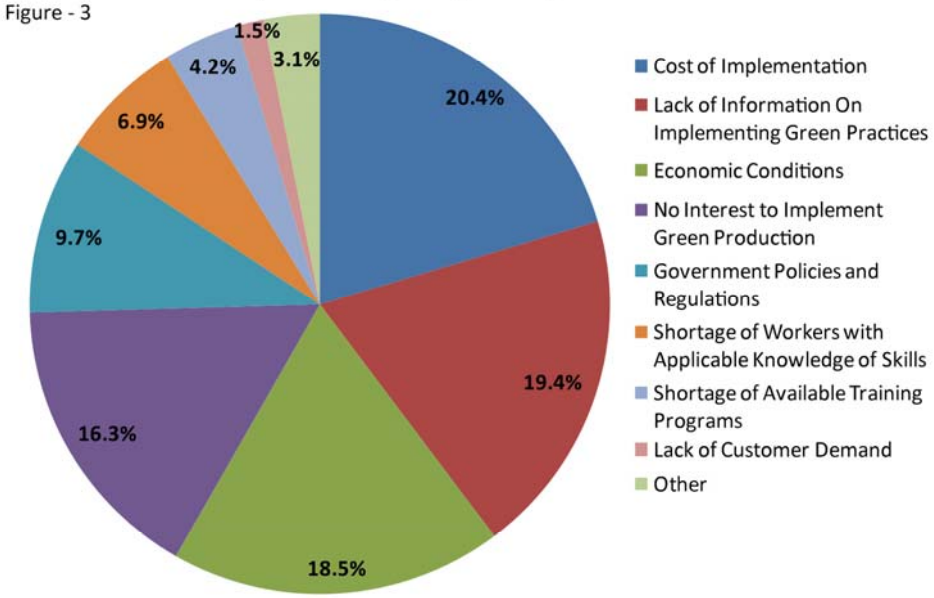
Analysis revealed the most frequently cited barrier to implementing or expanding green activities was cost of implementation with 20.4 percent. Lack of information on implementing green practices was the second most cited response with 19.4 percent of the total responses. Economic conditions were the third most common barrier with 18.5 percent of responses from all of the businesses. A little over 16 percent of responses from these businesses stated they did not have an interest in implementing or expanding green activities within their business; on the other hand, a little over 20 percent of responses from these businesses stated they were currently implementing or expanding green activities.

There were almost 1,800 'other' responses provided by businesses. After cleaning through these responses, additional codes were created to measure the open-ended responses. One open-ended code was reported enough to be included in Figure 3. Almost 90 businesses stated that a barrier not provided on the survey that was hindering green practices was a lack of customer demand. Many of these businesses also stated economic conditions were another barrier.

The 'Other' section included seven answers that were too small to list individually for the chart: Internal company polices (68), Training classes too full to enroll (37), Lack of time (9), Manufacturers have control over green products (8), Contract out green work (3), An indirect connection to green work (21), and A mixture of other answers that were not categorized (33).

Top Barriers Preventing Businesses from Implementing or Expanding Green Activities

Figure - 3



Industry Analysis

Top Green Industries

The Green Jobs Survey was stratified by the economic sectors found in the NAICS system at the most broad level, or 2-digit NAICS level. The Construction and Professional, Scientific, and Technical Services industries were the two industries with the largest amount of businesses sampled; the Construction industry had over 2,100 businesses included in the sample, while the Professional, Scientific, and Technical Services industry had a little more than 1,200 businesses in the sample.

Table 7 displays the top ten green industries by percentage of green employment. The industry with the highest concentration of total green employment was also the industry with the largest number of green jobs: the Construction industry. The Construction industry had 15.1 percent green employment with a total of 6,595 green jobs.

The second highest concentration of green employment was found in the Wholesale Trade industry; however, its green employment ranked third with 4,115 green jobs. The second highest green employment occurred within the Manufacturing industry with 6,170 green jobs, yet it ranked fourth in terms of percent green concentration at 6.1 percent.

What is NAICS?

The North American Industry Classification System (NAICS) was developed in cooperation with Canada and Mexico using a production-oriented conceptual framework. It is a coding system that enables multiple agencies and organizations to gather, tabulate, present and analyze statistical information on business establishments. Standard classifications facilitate the grouping of businesses with similar primary business activities into a 6-digit hierarchy; thereby encouraging uniformity, comparability, and reliability between businesses within the United States, as well as Mexico and Canada.

A complete NAICS code will have 6-digits, but the hierarchical system built into NAICS offers five levels of details for establishments. The larger the numbers in the code, the more narrow the industrial categories are, as well as a more detailed classification for the establishment. They are:

First 2 digits – economic sector; total of 20
3rd digit – economic subsector
4th digit – industry group
5th digit – industry specific
6th digit – U.S. specific detail

The six-digit NAICS industry that had the highest frequency of businesses reporting at least one green job was Residential Plumbing, Heating, and Air-Conditioning Contractors, with 125 different businesses in this industry reporting some type of green job.

Professional, Scientific, and Technical Services ranked third for percent green concentration and fourth for total green employment with 3,998 green employees. Agriculture, Forestry, Fishing and Hunting; Administrative and Support and Waste Management and Remediation Services; Other Services; Utilities; Public Administration; and Real Estate and Rental and Leasing rounded out the top ten industries with the highest concentration of green jobs.

Table - 7 Top Ten Green Industries by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
23	Construction	43,704	6,595	15.1%
42	Wholesale Trade	40,176	4,115	10.2%
54	Professional, Scientific, and Technical Services	43,344	3,998	9.2%
31-33	Manufacturing	93,335	6,170	6.6%
11	Agriculture, Forestry, Fishing and Hunting	10,456	641	6.1%
56	Administrative and Support and Waste Management and Remediation Services	42,353	2,514	5.9%
81	Other Services (except Public Administration)	26,387	1,304	4.9%
22	Utilities	9,322	377	4.0%
92	Public Administration	52,986	1,826	3.4%
53	Real Estate and Rental and Leasing	8,857	139	1.6%

The complete industry results can be found in Appendix Table A11. It can be noted that the lowest concentration of green jobs was found in the Finance industry at 0.2 percent green concentration; yet it employed 82 green employees, which is not the lowest total green employment numbers by industry. The lowest green employment was in the Mining industry with only 12 green jobs. The Mining industry only had a 1.3 percent green concentration.

Table 7 analyzes the 2-digit NAICS level ranked the top industries by the concentration of green employment.

Table 8 displays the same type of information as Table 7 (Total & Green Employment within the industry and the percentage of employment that was construed to be green by employers) however, this analysis is at the 3-, 4-, and 6-digt levels to provide a more insightful analysis to green industries.

The top five green industries at the 3-digit NAICS level, or economic subsector, included Specialty Trade Contractors within the Construction economic sector; Professional, Scientific, and Technical Services within the Professional, Scientific, and Technical Services economic sector; Merchant Wholesalers, Durable Goods within the Wholesale Trade economic sector; Transportation Equipment Manufacturing within the Manufacturing economic sector; and Waste Management and Remediation Services within the Administration and Support and Waste Management and Remediation Services economic sector.

These top five green subsectors accounted for 59.8 percent of green employment at the 3-digit NAICS level. The Specialty Trade Contractors subsector had 5,454 green jobs within Nebraska with a 16.6 percent green job concentration. On the other hand, the Waste Management and Remediation Services had the highest green concentration of the top five economic subsectors at 22.1 percent, but had a total green employment of only 1,596, the lowest green employment count of the five economic subsectors.

When looking at the top five green industries at the 4-digit NAICS, or industry group, the Waste Management and Remediation Services economic subsector from the 3-digit NAICS analysis was dropped from the top five list and replaced by Administration of Environmental Quality Programs with 1,205 green employees and a 14.8 percent green concentration.

The Building Equipment Contractors industry group accounted for 4,464 green jobs from the 5,454 green jobs in the Specialty Trade Contractors subsector. This 4-digit industry group had a 17.8 percent green employment concentration. While the Merchant

There were 201 different six-digit NAICS industries that reported green jobs.

Wholesalers, Durable Goods economic subsector (3-digit NAICS) had a green concentration of 15.4 percent, the more detailed industry group of Miscellaneous Durable Goods Merchant Wholesalers had a higher percent of green concentration at 58.0 percent, largely because of the removal of other Wholesale businesses from the total employment.

Looking at the most specific level of the industry hierarchy, the 6-digit NAICS, Recycleable Material Merchant Wholesalers businesses had the highest total green employment and a green concentration of 72.6 percent, the highest percentage of the top five 6-digit NAICS industries. Two Construction industries appear in the top five when looking at the detailed industry analysis: Residential Plumbing, Heating, and Air-Conditioning Contractors had 1,603 green jobs and a 22.3 green concentration percentage, while Nonresidential Plumbing, Heating, and Air-Conditioning Contractors had 1,390 green jobs and a 15.9 green concentration percentage.

Table - 8 Top Green Industries at the 3-, 4-, and 6-Digit NAICS Levels by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
Top Green Industries at the 3-Digit NAICS Level				
238	Specialty Trade Contractors	32,873	5,454	16.6%
541	Professional, Scientific, and Technical Services	43,344	3,998	9.2%
423	Merchant Wholesalers, Durable Goods	23,670	3,638	15.4%
336	Transportation Equipment Manufacturing	9,458	1,936	20.5%
562	Waste Management and Remediation Services	7,211	1,596	22.1%
Top Green Industries at the 4-Digit NAICS Level				
2382	Building Equipment Contractors	25,109	4,464	17.8%
5413	Architectural, Engineering, and Related Services	13,727	3,212	23.4%
4239	Miscellaneous Durable Goods Merchant Wholesalers	4,665	2,707	58.0%
3369	Other Transportation Equipment Manufacturing	3,932	1,771	45.0%
9241	Administration of Environmental Quality Programs	8,157	1,205	14.8%
Top Green Industries at the 6-Digit NAICS Level				
423930	Recyclable Material Merchant Wholesalers	3,731	2,707	72.6%
541330	Engineering Services	8,115	1,850	22.8%
336999	All Other Transportation Equipment Manufacturing	3,932	1,771	45.0%
238221	Residential Plumbing, Heating, and Air-Conditioning Contractors	7,181	1,603	22.3%
238222	Nonresidential Plumbing, Heating, and Air-Conditioning Contractors	8,718	1,390	15.9%

Industry Spotlights

Electric Power Distribution
NAICS Code 221122

Description: Establishments within this industry are primarily engaged in operating electric power distribution systems, such as lines, poles, meters, and wiring, and operating as electric power brokers or agents that seek to sale electricity through power distribution systems that are operated by others.

Examples: electric power brokers; electric power distribution systems

Total Establishments in Sample: 117
Total Responding Establishments: 105
Total Establishments Reporting Green Jobs: 23

Green Economic Category Selected the Most:
Renewable Energy and Alternative Fuels

Green Jobs listed within industry: Managers, All Other (11-9199); Compliance Officers (13-1041); Market Research Analysts and Marketing Specialists (13-1161); Business Operations Specialists, All Other (13-1199); Environmental Engineers (17-2081); Environmental Scientists and Specialists, Including Health (19-2041); Customer Service Representatives (43-4051); Construction and Related Workers, All Other (47-4099); Power Plant Operators (51-8013)

Method most frequently cited to prepare current workers to produce green products within industry: On-the-job training and Tuition assistance for college courses

Recyclable Material Merchant Wholesalers
NAICS Code 423930

Description: Establishments within this industry are primarily engaged in distributing merchant wholesale of automotive scrap, industrial scrap, and other recycleable materials.

Examples: auto wreckers; bottles, waste, merchant wholesalers; glass scrap merchant wholesalers; rags merchant wholesalers; tires, scrap, merchant wholesalers; waste materials merchant wholesalers

Total Establishments in Sample: 48
Total Responding Establishments: 15
Total Establishments Reporting Green Jobs: 6

Green Economic Category Selected the Most:
Environmental Cleanup and Restoration and Waste Cleanup and Mitigation

Green Jobs listed within industry: General and Operations Managers (11-1021); Market Research Analysts and Marketing Specialists (13-1161); Public Relationship Specialists (27-3031); First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011); First-Line Supervisors of Production and Operating Workers (51-1011); Heavy and Tractor-Trailer Truck Drivers (53-3032); Production Workers, All Other (51-9199)

Method most frequently cited to prepare current workers to produce green products within industry: On-the-job training and hire only workers with green qualifications

Occupational Analysis

Top Green Jobs

A green job was defined as *"one in which an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability."* Employers were instructed to not include consultants, contractors or temporary agency employees within their counts of green jobs.

The Nebraska Green Jobs Survey asked employers to provide the occupation title of green jobs within their business, as well as how many employees were within each occupation, minimum required education, additional certificates or licenses needed to be considered green, the time spent on green responsibilities within each occupation, starting wages, vacancies, and projected employment. After weight implementation, Nebraska had 30,725 green jobs within Nebraska, or 3.4 percent of the workforce.

Each listed occupation was coded using the Standard Occupational Classification (SOC) code system for comparable results to other occupational wage and employment data. Table 9 is an overview of the 23 major SOC groups. It includes the number of green jobs, the total green employment, and the percentage of total employment that is green within each Occupational Category.

There are 821 detailed occupations at the six-digit SOC level. There were 241 different six-digit SOC coded occupations within the Green Jobs Survey.

What is SOC and O*Net?

The Standard Occupational Classification (SOC) was designed in cooperation of all federal agencies that needed an occupational classification system. It is a coding system that classifies all occupations where work is performed for pay or profit within a four-tiered hierarchy. It seeks to provide uniformity, comparability and reliability by classifying each occupation according to performed work, skills, education, training, and credentials.

A complete SOC code will have six-digits. There are 23 major groups at the most broad level within the hierarchy, or the two digit level. A complete SOC code will have six-digits; the more specific the number is, the more specific an occupation will be. Nebraska's analysis focused on the most detailed analysis, at the six-digit level.

O*Net Online expands SOC codes by providing comprehensive occupational descriptions such as tasks, knowledge, skills, abilities, work context and many other characteristics to all six-digit SOC codes. Often times, it provides a more specific occupational analysis by offering an eight-digit code. For more information about O*Net Online, as well as their classifications of green jobs, go to www.onetonline.org.

The highest percentage of green jobs was found in the major category of Production Occupations with 21.3 percent; it employed 6,565 green employees. Common occupations included: First-Line Supervisors of Production and Operating Workers; Team Assemblers; Welders, Cutters, Solderers, and Brazers; Water and Wastewater Treatment Plant and System Operators; Mixing and Blending Machine Setters, Operators, and Tenders; and Inspectors, Testers, Sorters, Samplers, and Weighers. Collectively, these six occupations accounted for 51.6 percent of all green jobs within Production Occupations.

Table - 9 Green Jobs Reported by the Standard Occupational Classification Major Groups

Major Group	2010 Standard Occupational Classification Code	Green Employment	% Total Green
11-0000	Management Occupations	1,140	3.7%
13-0000	Business and Financial Operations Occupations	808	2.6%
15-0000	Computer and Mathematical Occupations	89	0.3%
17-0000	Architecture and Engineering Occupations	3,358	10.9%
19-0000	Life, Physical and Social Science Occupations	1,430	4.6%
21-0000	Community and Social Service Occupations	149	0.5%
23-0000	Legal Occupations	0	0.0%
25-0000	Education, Training, and Library Occupations	350	1.1%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	305	1.0%
29-0000	Healthcare Practitioners and Technical Occupations	198	0.6%
31-0000	Healthcare Support Occupations	109	0.4%
33-0000	Protective Service Occupations	14	0.0%
35-0000	Food Preparation and Serving Related Occupations	55	0.2%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	1,305	4.2%
39-0000	Personal Care and Service Occupations	0	0.0%
41-0000	Sales and Related Occupations	711	2.3%
43-0000	Office and Administrative Support Occupations	1,243	4.0%
45-0000	Farming, Fishing, and Forestry Occupations	644	2.1%
47-0000	Construction and Extraction Occupations	4,192	13.6%
49-0000	Installation, Maintenance, and Repair Occupations	4,304	14.0%
51-0000	Production Occupations	6,565	21.3%
53-0000	Transportation and Material Moving Occupations	3,805	12.4%
55-0000	Military Specific Occupations	0	0.0%

Installation, Maintenance, and Repair Occupations employed 4,304 green employees and had 14.0 percent of green jobs. Common occupations within this specific grouping include: First-Line Supervisors of Mechanics, Installers, and Repairers; Automotive Service Technicians and Mechanics; Farm Equipment Mechanics and Service Technicians; Heating, Air Conditioning, and Refrigeration Mechanics and Installers; and Maintenance and Repair Workers, General. Collectively, these five occupations accounted for 80.8 percent of all green jobs within Installation, Maintenance, and Repair Occupations.

Three other major occupational groupings had a double-digit green concentration: Construction and Extraction Occupations, with 13.6 percent of its total employees being reported as green; Transportation and Material Moving Occupations, with 12.4 percent of its total employees being reported as green; and Architecture and Engineering Occupations, with 10.9 percent of its total employees being reported as green.

Common occupations within the Construction and Extraction grouping included: First-Line Supervisors of Construction Trades and Extraction Workers; Carpenters; Operating Engineers and Other Construction Equipment Operators; Electricians; Plumbers, Pipefitters, and Steamfitters; and Construction and Related Workers, All Other. Collectively, these six occupations accounted for 71.4 percent of green jobs within Construction and Extraction Occupations.

Common occupations within the Transportation and Material Moving grouping included: First-Line

Supervisors of Helpers, Laborers, and Material Movers, Hand; Heavy and Tractor-Trailer Truck Drivers; Industrial Truck and Tractor Operators; Laborers and Freight, Stock and Material Movers, Hand; and Refuse and Recyclable Material Collectors. Collectively, these five occupations accounted for 91.1 percent of green jobs within Transportation and Material Moving Occupations.

Common occupations within the Architecture and Engineering grouping included: Architects, Except Landscape and Naval; Civil Engineers; Industrial Engineers; Mechanical Engineers; Architectural and Civil Drafters; and Civil Engineering Technicians. Collectively, these six occupations accounted for 77.8 percent of all green jobs within Architecture and Engineering Occupations.

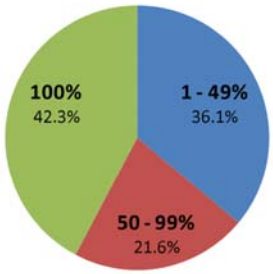
Despite smaller green concentration levels, there were several occupational groupings that reported a fair amount of green jobs for a decent amount of green employment. Life, Physical and Social Science Occupations had a total of 1,430 green employees. Building and Grounds Cleaning and Maintenance Occupations had 1,305 green employees. Management Occupations reported 1,140 green employees.

There were only three major occupation groups without any green jobs within them: Legal Occupations, Personal Care and Service Occupations, and Military Specific Occupations. Examples of occupations found in Legal Occupations include Lawyers and Court Reporters. Examples of occupations within the Personal Care and Service Occupations are: Animal Trainers; Hairdressers; Childcare Workers; and Travel Guides. Finally, examples of Military Specific Occupations include Special Forces Officers and Radar and Sonar Technicians.

Figure 4 displays how much time of green employees' work was dedicated completing green work responsibilities. Analysis revealed that not all green jobs are involved with 100 percent green job responsibilities, or work. Only 42.3 percent of employers listed employees dedicated their entire time to green work and responsibilities. Employees that spent 1 and 49 percent of their time on green work had the next highest percentage at 36.1 percent.

Percentage of Time Spent Completing Green Work

Figure - 4



There were 21.6 percent of all green employees that spent between 50 and 99 percent of their time dedicated to green work.

This analysis is important to consider in that it shows there is a hierarchy of time spent on green work. Jobs that are considered green may engage in both green and non-green activities at different rates. Only time will show if this trend continues, or if time spent on green work will continue to increase as demands evolve.

Two top 25 lists were created for top occupations: Table 10 shows the top green jobs based upon employment numbers. It also shows the percentage of employees that were reported green within the occupation; Table 11 displays the results for the top 25 occupations based on the percentage of green employment.

It is important to consider both rankings to understand both the employment impact and the concentration of green jobs within an occupation. An occupation could have high green employment, but still have a low green concentration because the total employment within the occupation is much higher.

The opposite could be true for an occupation with a high concentration of green; it may have a high green concentration, but not have a high employment number. Individuals seeking to go into any of these occupations should be aware of demand for that occupation before seeking additional green training. Production Occupations were most frequently cited in Table 10 with six specific occupations: First-Line

Table - 10 Top Green Occupations by Weighted Employment Count Ranking

SOC Code	SOC Title	Green Employment	Green Jobs Percentage	Employment Ranking	Green Jobs Percentage Ranking
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,656	87.2%	1	6
47-2111	Electricians	1,262	26.6%	2	44
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,129	4.2%	3	129
53-7051	Industrial Truck and Tractor Drivers	1,116	44.3%	4	23
51-1011	First-Line Supervisors of Production and Operating Workers	1,066	23.9%	5	49
51-2092	Team Assemblers	971	14.7%	6	67
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	887	5.8%	7	113
17-2051	Civil Engineers	829	50.9%	8	19
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	778	5.0%	9	119
51-9199	Production Workers, All Other	773	92.0%	10	5
49-3041	Farm Equipment Mechanics and Service Technicians	734	42.2%	11	24
51-2041	Structural Metal Fabricators and Fitters	692	75.2%	12	7
47-2152	Plumbers, Pipefitters, and Steamfitters	689	19.0%	13	57
49-9071	Maintenance and Repair Workers, General	627	8.0%	14	98
17-2141	Mechanical Engineers	533	61.3%	15	15
47-1011	Supervisors of Construction and Extraction Workers	482	13.4%	16	70
11-1021	General and Operations Managers	464	6.2%	17	108
51-8031	Water and Wastewater Treatment Plant and System Operators	421	43.9%	18	23
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	407	49.6%	19	20
17-1011	Architects, Except Landscape and Naval	393	56.1%	20	17
43-5081	Stock Clerks and Order Fillers	376	3.0%	21	136
19-4093	Forest and Conservation Technicians	351	100%*	22	3
17-2112	Industrial Engineers	344	31.9%	23	36
51-4121	Welders, Cutters, Solderers, and Brazers	326	7.6%	24	99
53-7081	Refuse and Recyclable Material Collectors	319	27.3%	25	43

*Analysis calculated a result greater than 100%

Supervisors of Production and Operating Workers; Team Assemblers; Production Workers, All Other; Structural Metal Fabricators and Fitters; Water and Wastewater Treatment Plant and System Operators; and Welders and Cutters, Solderers, and Brazers. Total green employment from these six Production Occupations was 4,249, or 24.1 percent of the total employment of this top 25 ranking. Transportation and Material Moving Occupations also had a strong presence with four different detailed occupations from this major occupational group appearing on the list.

The top occupations by green employment were: Heating, Air Conditioning, and Refrigeration Mechanics and Installers; Electricians; Heavy and Tractor-Trailer Truck Drivers; First-Line Supervisors of Production and Operating Workers; and Team Assemblers.

Architecture and Engineering Occupations were most frequently cited in Table 11, the Top Green Occupations by Green Percentage Ranking with six specific occupations: Environmental Engineering Technicians; Health and Safety engineers, Except Mining Safety Engineers and Inspectors; Mechanical Engineers; Architects, Except Landscape and Naval; Civil Engineers; and Environmental Engineers. The collective green percentage within these six occupations is 55.1 percent. Life, Physical and Social Science and Production Occupations also had strong presences on this list with five and four detailed occupations within each major occupation grouping, respectively. Life, Physical and Social Science Occupations had a collective green percentage of 78.5 percent, while Production Occupations had a collective green percentage of 69.4 percent.
The top occupations by green percentages were: Hazardous Materials Removal Workers; Environmental Science and Protection Technicians, including Health;

Table - 11 Top Green Occupations by Green Percentage Ranking

SOC Code	SOC Title	Green Employment	Green Jobs Percentage	Green Employment Ranking	Green Jobs Percentage Ranking
47-4041	Hazardous Materials Removal Workers	198	100%*	45	1
19-4091	Environmental Science and Protection Technicians, Including Health	234	100%*	39	2
19-4093	Forest and Conservation Technicians	351	100%*	22	3
53-6099	Transportation Workers, All Other	106	96.4%	67	4
51-9199	Production Workers, All Other	773	92.0%	10	5
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,656	87.2%	1	6
51-2041	Structural Metal Fabricators and Fitters	692	75.2%	12	7
51-8099	Plant and System Operators, All Other	15	75.0%	161	8
17-3025	Environmental Engineering Technicians	97	69.3%	73	9
11-9013	Farmers, Ranchers, and Other Agricultural Managers	61	67.7%	91	10
19-4011	Agricultural and Food Science Technicians	109	64.1%	64	11
11-9121	Natural Sciences Managers	106	62.4%	67	12
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	93	62.0%	76	13
19-2043	Hydrologists	31	62.0%	125	13
17-2141	Mechanical Engineers	533	61.3%	15	15
41-9031	Sales Engineers	110	61.1%	63	16
17-1011	Architects, Except Landscape and Naval	393	56.1%	20	17
19-1031	Conservation Scientists	119	54.1%	62	18
17-2051	Civil Engineers	829	50.9%	8	19
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	407	49.6%	19	20
17-2081	Environmental Engineers	128	47.4%	58	21
47-4099	Construction and Related Workers, All Other	61	46.9%	91	22
53-7051	Industrial Truck and Tractor Drivers	1,116	44.3%	4	23
51-8031	Water and Wastewater Treatment Plant and System Operators	421	43.9%	18	24
49-3041	Farm Equipment Mechanics and Service Technicians	734	42.2%	11	25

*Analysis calculated a result greater than 100%

Forest and Conservation Technicians; Transportation Workers, All Other; and Production Workers, All Other. As seen in Table 11, three occupations show they are 100 percent green. Multiple factors could have lead to this analysis; the Office of Labor Market Information cautions individuals from stating all employees within these occupations are green.

There were ten occupations that appeared on both lists. Accordingly, these occupations have been further detailed and can be found in the next pages of the report. It is interesting to note that of these occupations, only two of them had single-digit responses of employees spending 100% of their time on green work. Only 9.9 percent of Heating, Air Conditioning, and Refrigeration Mechanics and Installers spent 100% of their time on green work, while 6.6 percent of Mechanical Engineers did the same.

All other occupations within the top ten occupations being detailed have a double-digit amount of employees dedicating 100% of their time green work. Three of the occupations have more than 50 percent of their employees dedicating all of their time to green work: Production Workers, All other; Structural Metal Fabricators and Fitters; and Farm Equipment Mechanics and Service Technicians.

Occupational Spotlights

51-2041	Structural Metal Fabricators and Fitters	
	Weighted Green Employment:	692
	2018 Projected Green Employment:	704
	Standard Education Requirement:	HS Diploma/GED
	Entry Wage:	$11.69
	Median Wage:	$15.20
	Experienced Wage:	$17.23

Structural Metal Fabricators and Fitters have tasks that include fabricating, laying-out, positioning, and aligning parts of structural metal products. Often, those who reported in our survey worked on and assembled green related materials such as irrigation pivots or efficient plumbing systems. Many of these workers are also certified in welding and metal fabrication.

Skills: Active Listening; Speaking; Critical Thinking; Monitoring; Coordination
Knowledge: Design; Mechanical; Mathematics; Education and Training; Building and Construction
Abilities: Visualization; Near Vision; Trunk Strength; Arm-Hand Steadiness; Manual Dexterity
Required Licenses: None
Sample job titles from survey: Fabricator, Installer
Industry most cited in: Manufacturing (100.0%)

19-4093	Forest and Conservation Technicians	
	Weighted Green Employment:	351
	2018 Projected Green Employment:	376
	Standard Education Requirement:	Bachelor's Degree
	Entry Wage:	$10.25
	Median Wage:	$13.03
	Experienced Wage:	$18.65

It is easy to see why these occupations are considered green jobs in Nebraska. They cover a large span of different workers who are involved in forestry. These workers may do anything from patrol a park to study the animals that live within it. All of them work to preserve, enhance, or learn from the natural environment.

Skills: Reading Comprehension; Critical Thinking; Active Listening; Judgment and Decision Making; Monitoring
Knowledge: Geography; English Language; Transportation; Education and Training; Mathematics
Abilities: Oral Comprehension; Far Vision; Oral Expression; Deductive Reasoning; Written Comprehension
Required Licenses: None
Sample job titles from survey: Resource Management Specialist, Soil Technician, Forestry Technician, Conservation Management, Program Technician
Industry most cited in: Public Administration (99.2%)

17-2051	Civil Engineers	
	Weighted Green Employment:	829
	2018 Projected Green Employment:	992
	Standard Education Requirement:	Bachelor's Degree
	Entry Wage:	$25.15
	Median Wage:	$35.45
	Experienced Wage:	$42.20

The civil engineers occupation code also includes transportation engineers and water/ wastewater engineers all of which O*NET considers green occupations. Often these workers perform duties in planning, designing structures as well as overseeing the construction and maintenance of the structures. These include but are not limited to roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, water and sewage systems, and waste disposal units.

Skills: Mathematics; Reading Comprehension; Critical Thinking; Operations Analysis; Complex Problem Solving
Knowledge: Engineering and Technology; Design; Building and Construction; Mathematics; Physics
Abilities: Oral Comprehension; Deductive Reasoning; Oral Expression; Problem Sensitivity; Mathematical Reasoning
Required Licenses: Civil, Professional or Structural Engineer License
Sample job titles from survey: Design Engineer, Engineer Procure Construct, Structural Engineer
Industry most cited in: Professional, Scientific, and Technical Services (100.0%)

17-2141	Mechanical Engineers	
	Weighted Green Employment:	533
	2018 Projected Green Employment:	581
	Standard Education Requirement:	Bachelor's Degree
	Entry Wage:	$17.62
	Median Wage:	$30.48
	Experienced Wage:	$37.75

This occupation also includes all fuel cell engineers as well as automotive engineers and represent just under 2.7 percent of green jobs in Nebraska. Regular tasks include planning and designing tools, engines, machines and other mechanical equipment such as heat, gas, water, and steam systems. These workers have the opportunity to design equipment that is more efficient and less wasteful, thus creating a greener environment.

Skills: Mathematics; Reading Comprehension; Complex Problem Solving; Judgment and Decision Making; Critical Thinking
Knowledge: Engineering and Technology; Design; Mathematics; Mechanical; Physics
Abilities: Deductive Reasoning; Written Comprehension; Mathematical Reasoning; Information Ordering; Oral Comprehension
Required Licenses: Mechanical or Control Systems Engineer License
Sample job titles from survey: Project Manager, Mechanical Engineer, R&D Engineer, Hydraulic Design Specialist
Industry most cited in: Manufacturing (59.9%)

These mechanics work directly with farming (especially irrigation) and sustainable agriculture. Common tasks include diagnosing, adjusting, repairing, or overhauling farm machinery and vehicles, such as tractors, harvesters, dairy equipment, and irrigation systems.

49-3041	Farm Equipment Mechanics and Service Technicians	
	Weighted Green Employment:	734
	2018 Projected Green Employment:	820
	Standard Education Requirement:	Apprenticeship
	Entry Wage:	$10.92
	Median Wage:	$14.79
	Experienced Wage:	$18.14

Skills: Repairing; Equipment Maintenance; Troubleshooting; Quality Control Analysis; Critical Thinking
Knowledge: Mechanical; Customer and Personal Service; Physics; Computers and Electronics; Engineering and Technology
Abilities: Control Precision; Multi-limb Coordination; Arm-Hand Steadiness; Finger Dexterity; Manual Dexterity
Required Licenses: None
Sample job titles from survey: Livestock Manager, Center Pivot Irrigation Technician, Field Service Employee
Industry most cited in: Wholesale Trade (51.8%)

Architects have the ability to create and support green activities by planning and designing green buildings and structures. Many of these concepts can be LEED certified by the U.S. Green Building Council. The blueprints can then be put into action and create green jobs for those workers who fabricate the design to completion.

17-1011	Architects, Except Landscape and Naval	
	Weighted Green Employment:	393
	2018 Projected Green Employment:	433
	Standard Education Requirement:	Bachelor's Degree
	Entry Wage:	$22.41
	Median Wage:	$35.06
	Experienced Wage:	$46.36

Skills: Critical Thinking; Reading Comprehension; Judgment and Decision Making; Complex Problem Solving; Speaking
Knowledge: Design; Building and Construction; Engineering and Technology; Customer and Personal Service; Administration and Management
Abilities: Visualization; Deductive Reasoning; Near Vision; Oral Comprehension; Oral Expression
Required Licenses: Architect License
Sample job titles from survey: Architect, LEED AP
Industry most cited in: Professional, Scientific, and Technical Services (100.0%)

Many of these workers who were reported as green fell under the sustainable agriculture and natural resource conservation section of our survey. They work towards maintaining and improving the natural resources in our environment and the soil they plant on. Many use low carbon and organic agriculture practices as well as land management practices.

45-2092	Farmworkers and laborers, Crop, Nursery, and Greenhouse
Weighted Green Employment:	407
2018 Projected Green Employment:	350
Standard Education Requirement:	No Requirements
Entry Wage:	$8.27
Median Wage:	$10.72
Experienced Wage:	$14.08

Skills: Coordination; Operation and Control; Monitoring; Operation Monitoring; Critical Thinking
Knowledge: Production and Processing; English Language; Mechanical; Mathematics; Transportation
Abilities: Control Precision; Multi-limb Coordination; Static Strength; Trunk Strength; Manual Dexterity
Required Licenses: None
Sample job titles from survey: Farmhand, Manure Hauler, Irrigation System Operator, Vegetable and Herb Producer
Industry most cited in: Agriculture, Forestry, Fishing and Hunting (86.5%)

Water and wastewater treatment and conservation are some of the best ways to help the environment. These operators help control our entire water systems and keep them running cleanly and efficiently. Since water is a finite resource it is important to keep it as useful and environmentally friendly as possible.

51-8031	Water and Wastewater Treatment Plant and System Operators
Weighted Green Employment:	421
2018 Projected Green Employment:	521
Standard Education Requirement:	HS Diploma/GED
Entry Wage:	$10.89
Median Wage:	$17.15
Experienced Wage:	$20.80

Skills: Operation Monitoring; Operation and Control; Monitoring; Quality Control Analysis; Critical Thinking
Knowledge: Mechanical; Mathematics; Physics; Public Safety and Security; Chemistry
Abilities: Near Vision; Oral Comprehension; Oral Expression; Written Comprehension; Problem Sensitivity
Required Licenses: Water Treatment Plant Operator License
Sample job titles from survey: Wastewater Operator, Control Room Operator, Waste Handlers, Biosolids Technicians
Industry most cited in: Administrative and Support and Waste Management and Remediation Services (34.8%)

These occupations represented 5.3 percent of all reported green jobs; a large part of the green job movement in Nebraska. They also have the largest projected percentage growth between 2008 and 2018. As the technology to make our heating, air conditioning, and refrigeration units become more efficient, these workers help install, repair, and upgrade our residential and commercial units to use less energy and produce less waste. Workers who specialize in geothermal energy or who are LEED certified in these positions are pushing towards a greener environment through their work.

49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
Weighted Green Employment:	1,656
2018 Projected Green Employment:	2,288
Standard Education Requirement:	Trade Certificate
Entry Wage:	$14.14
Median Wage:	$19.97
Experienced Wage:	$23.90

Skills: Repairing; Troubleshooting; Installation; Equipment Maintenance; Critical Thinking
Knowledge: Heating, Air Conditioning and Refrigeration Mechanics and Installers; Mechanical; Customer and Personal Service; Building and Construction; Mathematics
Abilities: Visualization; Extent Flexibility; Near Vision; Problem Sensitivity; Oral Comprehension
Required Licenses: None
Sample job titles from survey: Geothermal Closed Loop Installer, HVAC Tech, Service Technician, Geothermal Heat Pump Installer
Industry most cited in: Construction (99.4%)

The majority of green occupations that were reported under this occupation code came from Recycling and Reclamation Workers. These workers prepare and sort materials or products for recycling as well as identify and remove hazardous substances from such material.

51-9199	Production Workers, All Other
Weighted Green Employment:	773
2018 Projected Green Employment:	790
Standard Education Requirement:	No Requirements
Entry Wage:	$7.83
Median Wage:	$10.81
Experienced Wage:	$15.09

Skills: None*
Knowledge: None*
Abilities: None*
Required Licenses: None
Sample job titles from survey: Scrap Recyclers, Compost Foreman, Recycling Assistant, Transfer Station Attendant, Recycling Coordinator
Industry most cited in: Wholesale Trade (57.6%)

*Due to variation of occupations included under Production Workers, All Other no specific information was available.

Top Occupations by Green Activity

Two additional in-depth analyses revealed how green jobs were dispersed among green economic category responses and by industry. Each table lists the SOC code and occupation title, the green employment for the SOC code within the green economic category, the total employment for the SOC code, and the percent of green employment for the SOC code within the category. Table 12 shows the top five occupations by

Table - 12 Top Five Green Occupations by Each Green Economic Activity Category

SOC Code	SOC Occupation Title	Green Employment within Category	Total Green Employment	% Total Green Employment
	Renewable Energy and Alternative Fuels	**5,018**	**30,725**	**16.3%**
53-7051	Industrial Truck and Tractor Operators	1,860	1,860	100.0%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	357	1,632	21.9%
51-1011	First-Line Supervisors of Production and Operating Workers	331	1,037	31.9%
51-4072	Molding, Coremaking, & Casting Machine Setters, Operators, & Tenders, Metal and Plastic	285	308	92.6%
11-1021	General and Operations Managers	285	846	33.8%
	Energy Efficiency and Conservation	**9,332**	**30,725**	**30.4%**
51-2092	Team Assemblers	1,771	2,081	85.1%
47-2111	Electricians	1,016	1,141	89.1%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	913	1,632	55.9%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	822	940	87.5%
17-1011	Architects, Except Landscape and Naval	362	430	84.2%
	Pollution, Waste, and Greenhouse Gas Management, Prevention and Reduction	**2,991**	**30,725**	**9.7%**
19-2041	Environmental Scientists and Specialists, Including Health	424	629	67.5%
11-1011	Chief Executives	298	542	55.0%
47-5012	Rotary Drill Operators, Oil and Gas	192	192	100.0%
53-3032	Heavy and Tractor-Trailer Truck Drivers	184	638	28.9%
51-1011	First-Line Supervisors of Production and Operating Workers	180	1,037	17.4%
	Environmental Cleanup and Restoration and Waste Cleanup and Mitigation	**2,559**	**30,725**	**8.3%**
43-5081	Stock Clerks and Order Fillers	447	447	100.0%
47-4041	Hazardous Materials Removal Workers	223	226	98.6%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	211	211	100.0%
53-3032	Heavy and Tractor-Trailer Truck Drivers	176	638	27.7%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	174	626	27.8%
	Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	**1,927**	**30,725**	**6.3%**
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	361	582	62.1%
11-3011	Administrative Services Managers	360	362	99.6%
11-1011	Chief Executives	244	542	45.0%
25-3099	Teachers and Instructors, All Other	179	179	100.0%
49-9071	Maintenance and Repair Workers, General	145	352	41.2%
	Sustainable Agriculture and Natural Resource Conservation	**4,232**	**30,725**	**13.8%**
17-2141	Mechanical Engineers	496	828	59.9%
19-4093	Forest and Conservation Technicians	403	403	100.0%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	241	353	68.2%
11-9121	Natural Sciences Managers	216	223	96.9%
19-1031	Conservation Scientists	207	207	100.0%
	None	**1,469**	**30,725**	**4.8%**
11-1021	General and Operations Managers	251	846	29.6%
51-9199	Production Workers, All Other	218	335	65.1%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	153	582	26.4%
53-7081	Refuse and Recyclable Material Collectors	125	255	48.8%
41-3031	Securities, Commodities, and Financial Services Sales Agents	106	106	100.0%

each green economic category. The Energy Efficiency and Conservation green economic category had 66 different occupations cited within the category, the highest number of occurrences out of all the categories.

The top green job with the highest employment in the Energy Efficiency and Conservation category was Team Assemblers. Accordingly, 85.1 percent of Team Assemblers were listed under this green economic category. Heating, Air Conditioning, and Refrigeration Mechanics and Installers were among the top cited occupations in two different green economic categories: 55.9 percent of these employees were reported in the Energy Efficiency and Conservation category and 21.9 percent of these employees were reported in the Renewable Energy and Alternative Fuels category.

Several green jobs were reported as operating only in businesses that engaged in a single green economic activity. All Industrial Truck and Tractors Operators employees were employed by businesses that cited Renewable Energy and Alternative Fuels as their primary green economic activity. Likewise, all Rotary Drill Operators, Oil and Gas employees were reported in businesses citing Pollution, Waste, and Greenhouse Gas Management, Prevention, and Reduction as their primary green economic activity. Both green economic categories Environmental Cleanup and Restoration and Waste Cleanup and Mitigation and Sustainable Agriculture and Natural Resource Conservation had two green jobs (of the top five) that were solely located within the economic category.

Businesses that stated they did not fit into any green economic activity listed 27 different green jobs. General and Operations Managers had the largest employment count within this category; however, only 29.6 percent of these managers fit inside this category. One green job, Securities, Commodities, and Financial Services Sales, had all of its 106 green employment count within this green economic category.

A full listing of occupations by each green economic category can be found in the Appendix in table A16 - A22.

Top Occupations by Industry

Table 13 shows the top five occupations within the top five industries. Construction and Manufacturing accounted for the highest occurrences of green employment with 6,594 and 6,171 green employees, respectively. Not surprisingly, businesses within the Construction industry cited 57 different occupations within this sector. Businesses in the Professional, Scientific, and Technical Services reported 47 different occupations, followed by Manufacturing businesses that reported 39 different occupations.

The top occupations in the Construction industry were Heating, Air Conditioning, and Refrigeration Mechanics and Installers; Electricians; Plumbers, Pipefitters, and Steamfitters; First-Line Supervisors of Construction Trades and Extraction Workers; and Cost Estimators. As noted in Table 10, Heating, Air Conditioning, and Refrigeration Mechanics and Installers, Electricians, and Plumbers, Pipefitters, and Steam Fitters were listed as top green occupations by employment count. Table 13 shows that the vast majority of individuals within these occupations are located in the Construction industry.

The top occupations for the Manufacturing industry were: Team Assemblers; First-Line Supervisors of Production and Operating Workers; Mechanical Engineers; Molding, Coremaking & Casting Machine Setters, Operators, and Tenders, Metal & Plastic; and Chief Executives. The latter occupation, Chief Executives, is only one of two Management Occupations that can be found within Table 13, suggesting that managers found in the Manufacturing industry are more likely to have green responsibilities than perhaps managers in other industries. Multiple green jobs were reported as only occurring in a singular industry. Cost estimators were solely reported by Construction businesses, yielding 279 green jobs. All reported Architects, Except Landscape and Naval, as well as Civil Engineers, were located in the Professional, Scientific, and Technical Services. Many of these occupations in singular industries made sense.

There were other occupations that had the top five employment counts within each industry that also made sense. For instance, First-Line Supervisors of

Construction Trades and Extraction Workers made up 48.1 percent of the Construction industry with 453 employees and 39.2 percent of Professional, Scientific, and Technical Services with 369 employees. This is the only occupation within this table that is listed twice. Table A23 in the appendix shows the top five occupations within the latter portion of the original top ten industry list (Table 7).

The Wholesale Trade industry and Professional, Scientific, and Technical Services industry had an array of occupational groupings. Wholesale Trade had two Transportation & Material Moving Occupations, while Professional, Scientific, and Technical Services had two Architecture & Engineering Occupations. Interestingly, one of the top occupations found in the Agriculture, Forestry, Fishing and Hunting industry was one that was not listed by employers. 'Job Title Undisclosed' was when an employer stated there were green jobs within the business, but did not list the job title. This occurred within each industry, as seen in the tables in the appendix, but it occurred at a higher rate for the Agriculture, Forestry, Fishing, and Hunting industry.

A full listing of occupations by each industry can be found in the Appendix in tables A24-A43.

New and Emerging

The Green Jobs Survey inquired if the green job reported by an employer had been recently created or modified to include green tasks. Table 14 shows the top ten occupations with the largest newly created or modified green employment counts. Almost 20 percent of reported green jobs had been created or modified since January 2009 to include green job responsibilities. In other words, one out of every five jobs reported on the Green Jobs Survey had either

Table - 13 Top Five Green Occupations in the Top Five Industries

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupation Employment	% of Occupation within Industry
	Construction	**6,594**	**30,725**	**21.5%**
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,623	1,632	99.4%
47-2111	Electricians	1,133	1,141	99.4%
47-2152	Plumbers, Pipefitters, and Steamfitters	453	549	82.5%
47-1011	First Line Supervisors of Construction Trades and Extraction Workers	453	940	48.1%
13-1051	Cost Estimators	279	279	100.0%
	Wholesale Trade	**4,115**	**30,725**	**13.4%**
53-7051	Industrial Truck and Tractor Operators	1,860	1,860	100.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	433	552	78.5%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	211	211	100.0%
53-3032	Heavy and TractorTrailer Truck Drivers	202	638	31.6%
51-9199	Production Workers, All Other	193	335	57.6%
	Professional, Scientific, and Technical Services	**3,998**	**30,725**	**13.0%**
17-1011	Architects, Except Landscape and Naval	430	430	100.0%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	369	940	39.2%
17-2051	Civil Engineers	305	305	100.0%
19-2041	Environmental Scientists and Specialists, Including Health	247	629	39.3%
13-1199	Business Operations Specialists, All Other	192	242	79.3%
	Manufacturing	**6,171**	**30,725**	**20.1%**
51-2092	Team Assemblers	2,081	2,081	100.0%
51-1011	First-Line Supervisors of Production and Operating Workers	551	1,037	53.1%
17-2141	Mechanical Engineers	496	828	59.9%
51-4072	Molding, Coremaking, & Casting Machine Setters, Operators, and Tenders, Metal & Plastic	308	308	100.0%
11-1011	Chief Executives	298	542	55.0%
	Agriculture, Forestry, Fishing and Hunting	**642**	**30,725**	**2.1%**
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	305	353	86.5%
11-9013	Farmers, Ranchers, and Other Agricultural Managers	106	106	100.0%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	60	60	100.0%
99-9998	Job Title Undisclosed	54	450	11.9%
19-1013	Soil and Plant Scientists	22	126	17.3%

Table - 14 Top Ten Green Occupations that were Recently Created or Modified since January 2009

SOC Code	SOC Title	Green Jobs Created/Modified in 2009	Total Green Employees	% Green Jobs Newly Created by Occupation
	Total	**5,951**	**30,725**	**19.4%**
53-3032	Heavy and Tractor-Trailer Truck Drivers	557	1,129	49.3%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	492	887	55.5%
49-3041	Farm Equipment Mechanics and Service Technicians	335	734	45.6%
51-1011	First-Line Supervisors of Production and Operating Workers	236	1,066	22.1%
47-2111	Electricians	217	1,262	17.2%
51-2092	Team Assemblers	211	971	21.7%
11-1021	General and Operations Managers	197	464	42.5%
51-9199	Production Workers, All Other	141	773	18.2%
51-2041	Structural Metal Fabricators and Fitters	126	692	18.2%
17-2051	Civil Engineers	111	829	13.4%

been newly created or modified so the job could be green.

The occupation with the largest amount of newly created or modified green jobs was Heavy and Tractor-Trailer Truck Drivers, SOC 53-3032. Almost 50 percent of the total green employment within this occupation had been newly created or modified, or 557 newly created positions from the total 1,129 green employment. The survey did not differentiate between newly created or modified, so how many of these 557 'new' green jobs are actually 'new' is unknown. It could be that many pre-existing truck drivers expanded their duties to incorporate green tasks. Future research could take a closer examination at new jobs compared to modified jobs.

Several other occupations in the top ten, as well as in the full list documented in Table A44 of the Appendix, had a relatively high percentage of newly created green jobs when compared to total employment by SOC code. Janitors and Cleaners, Except Maids and Housekeeping Cleaners, SOC 37-2011, saw 55.5 percent of their total green employment to be categorized as newly created or modified since January 2009.

Farm Equipment Mechanics and Service Technicians, SOC 49-3041, had 45.6 percent of their total green employment, or 335, categorized as newly created or modified. General and Operations Mangers, SOC 11-1021, also had a high newly created or modified percentage to total green employment, with 42.5 percent, or 197, of their total employment being categorized as newly created or modified. Civil Engineers rounded out the top ten listing with 111 newly created or modified positions, or 13.4 percent of their total green employment count.

The SOC system is regularly updated and occupations are added or deleted as needed based on findings from surveys of employers.

All ten of the top new and emerging occupations listed in Table 14 were capable of being classified using the SOC taxonomy. This suggests that there are not as many 'new' green occupations as there are of existing occupations that are evolving to include green tasks. However, there were multiple occasions where occupations could not be easily classified because they did not have a category of their own in the SOC system. This suggests that these occupations may be new or emerging.

There were 97 job titles that could not be easily classified under a specific six-digit SOC code were placed into a major groups' 'All Other' category. The 'All Other' category is designed to capture residual occupations not elsewhere classified in a specific occupation.

In the top ten listing in Table 14, one 'All Other' code is present: Production Workers, All Other, SOC code 51-9199. Reported job titles under this SOC code include: Compost Foreman, Recycling Sorter, Scrap Recyclers, Recycling Assistants, and Transfer Station Attendants. A little over 18 percent of the total green employment was considered newly created of modified for this specific occupation. Employers reported that they project creating 108 new positions within this reported green job within the next two years. There were no projected eliminations, resulting with a 14.0 percent growth rate over the next two years.

Similar patterns were found in Table 15, which details what job titles were reported in the survey that led to the coding into an 'All Other' code, as well as in which industries these jobs can be found. The additional six 'All Other' codes were: Business Operations Specialists, All Other; Teachers and Instructors, All Other; Construction and Related Workers, All Other; Managers, All Other; Postsecondary Teachers, All Other; and Engineering Technicians, Except Drafters, All Other. Business Operations Specialists, All Other, SOC 13-1199, had 40 different reported job titles coming from industries such as Utilities, Construction, and Manufacturing. A little over 20 percent of the total employment within this occupation was listed as newly created or recently modified by employers.

Table - 15 Original Job Titles and Industries of Green Jobs Coded into an 'All Other' Occupations

SOC Code	SOC Title	Original Job Titles	Industries citing Job Titles
51-9199	Production Workers, All Other	Compost Foreman; Recycling Sorter; Recycling Assistant; Scrap Recyclers; Transfer Station Attendants; Deli workers	Administrative and Support and Waste Management and Remediation Services; Manufacturing; Construction; Wholesale Trade
13-1199	Business Operations Specialists, All Other	Energy Service Specialist, Energy Efficiency Consultant, EHS Analyst, Renewable Resource Locator, LEED Consultant, Consumer Services, Sustainability Coordinator, Business Partners Program Consultant	Utilities; Construction; Manufacturing; Professional, Scientific, and Technical Services; Educational Services; Other Services (Except Public Administration); Public Administration
25-3099	Teachers and Instructors, All Other	Environmental Educator; Ag & Science Teacher; Industrial Technology Teacher	Retail Trade; Educational Services; Other Services (except Public Administration)
47-4099	Construction and Related Workers, All Other	Line Superindendent; Apprentice Lineperson; Hydronic Solar Installation; Weatherization Worker	Utilities; Construction; Other Services
11-9199	Managers, All Other	Renewable Energy Development Manger; EHG Manager; Conservation Director; Energy Effiencies Manager; Environmental Protection Supervisor; Manager of Safety and Regulatory Compliance	Utilities; Manufacturing; Transportation and Warehousing; Public Administration
25-1199	Postsecondary Teachers, All Other	Wind Technology Instructor; Energy Operations Instructor; Renewable Fuels Instructor	Educational Services
17-3029	Engineering Technicians, Except Drafters, All Other	Production Technicians; Designer; Energy Saving Mechanical & Electrical Design System; Chief Facility Manager	Manufacturing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises

Percentage of Industries Reporting Green Jobs Coded into an 'All Other'

Figure - 5

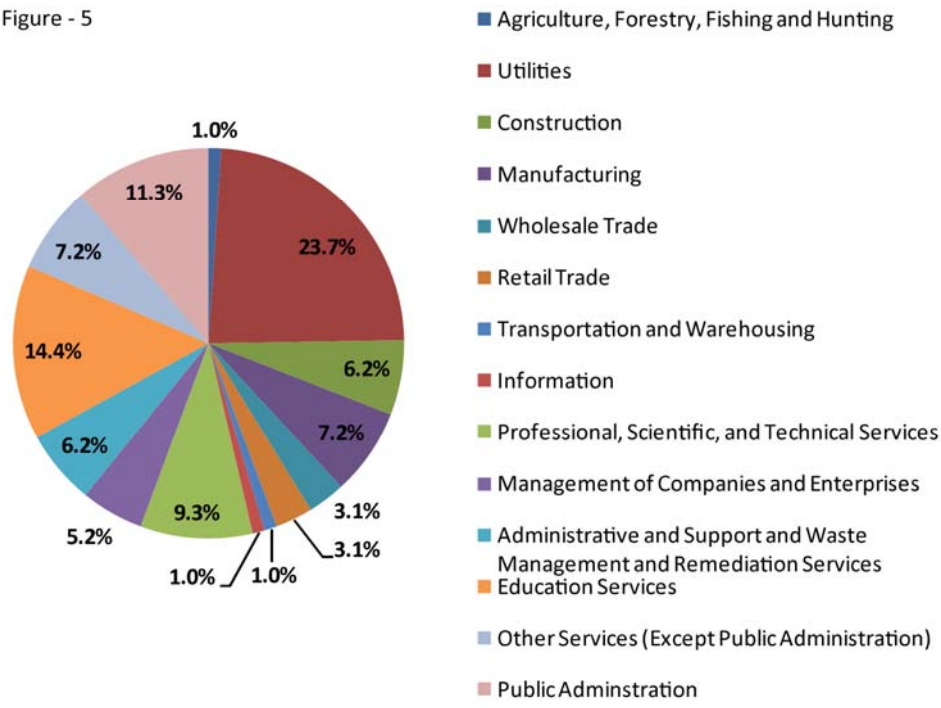
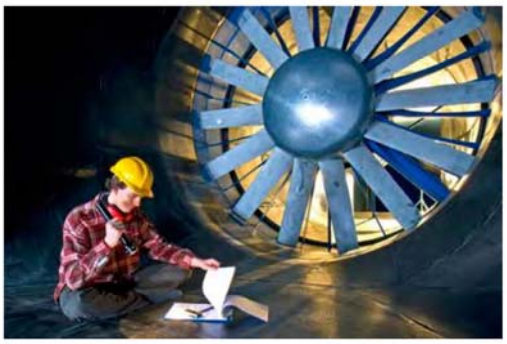


Figure 5 shows the breakdown of which industries reported job titles that resulted with them being coded as 'All Other' codes. Utilities had the highest occurrence of job titles being coded into an 'All Other' occupation with 23 'All Other' coded occupations, or 24 percent. This may be due to the rapid changes in biofuels, solar, wind, and other technologies in the Utilities industry. Educational Services followed next with 14 coded 'All Other' occupations and Public Administration had 11 coded 'All Other' occupations. There were three industries where only one listed job title was coded into an 'All Other' occupation: Agriculture, Forestry, Fishing, and Hunting; Transportation and Warehousing; and Information. Occupations classified into 'All Other' categories may indicate new and emerging occupations in the state's economy.

Almost 76% of employees in any of the seven 'All Other' occupations spent 100% of their time dedicated to green work responsibilities. This compares to 40.8 percent of all non-other green jobs dedicating 100% of their time to green work responsibilities.



Projections

The projection methodology to predict the number of green jobs in 2018 was obtained by applying the percentage change from the 2008-2018 occupational projections to the weighted green employment. The projections focused on the top 25 occupations by both green employment and percentage green. These two lists were combined and duplicates were removed to create a targeted list of green occupations to analyze for projections.

When focusing on these top green occupations, Heating, Air Conditioning, and Refrigeration Mechanics and Installers were projected to add the most jobs and to be the fastest growing occupation with an addition of 628 jobs, a growth rate of 37.9 percent by 2018. Truck Drivers of Heavy and Tractor-Trailers were expected to add the second highest amount of jobs by 2018, increasing by 241, a 21.3 percent increase. Electricians were also projected to experience healthy growth adding 198 jobs, an increase of 15.7 percent. Only two occupations on the targeted list were expected to decline: Farmworkers and Laborers, Crop, Nursery, and Greenhouse with a loss of 57 jobs, or a 14 percent decrease, and Laborers and Freight, Stock, and Material Movers by Hand with a loss of 6 jobs, or a 0.8 percent decrease.

Several engineering-related occupations were expected to experience rapid growth when ranking green jobs by projection percentage change. Environmental Engineering Technicians were expected to see the second highest growth rate of the targeted occupations and the highest of the engineering occupations at 27.8 percent, adding

Figure - 6 2018 Green Job Projections by Selected Green Jobs

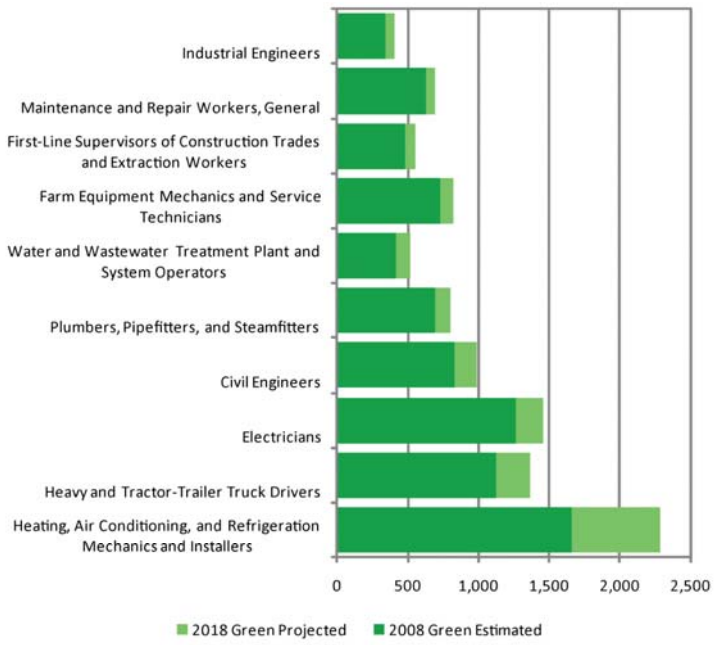
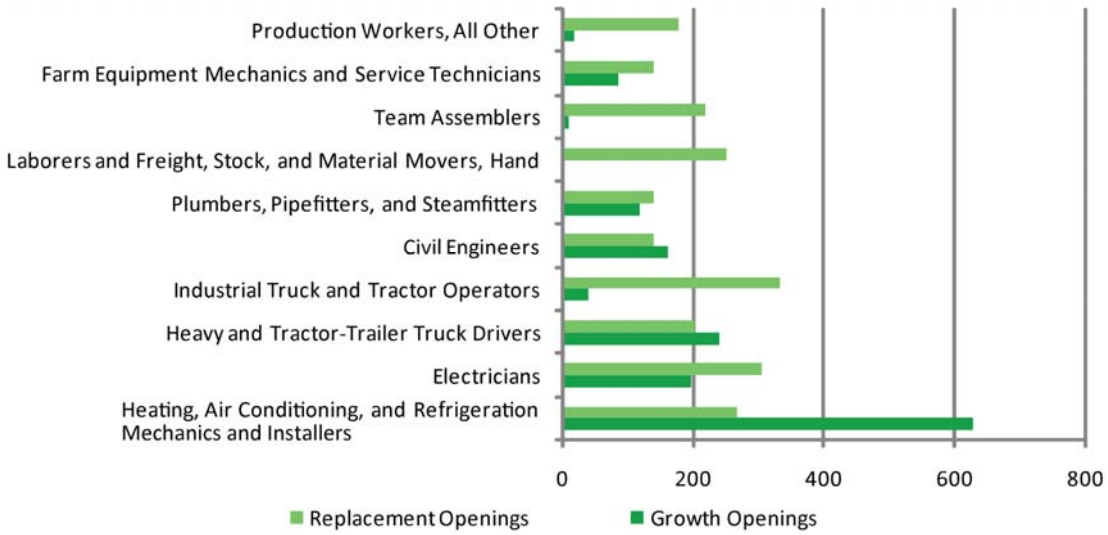


Figure - 7

Total Green Job Openings by Selected Green Jobs



27 jobs. Environmental Engineers were expected to increase by 25 percent and add 32 new jobs by 2018. Civil Engineers and Industrial Engineers also made the top ten with an expected increase of 19.7 percent and 17.4 percent, respectively.

Total openings are another facet of projected employment, which is comprised of growth and replacement openings. Growth openings come from new positions being created in these occupations by economic expansion, while replacement openings are created by people permanently leaving the labor force through death, retirement, disability, or by transfer to another occupation.

When the target green jobs were ranked by total openings, Heating, Air Conditioning, and Refrigeration Mechanics and Installers topped the list with a projected 895 total openings. A little over 70 percent of these total openings results from growth openings, or 628. Electricians were expected to have 503 total openings. However, only 39.4 percent of these openings result from growth; the remaining 60.6 percent result from replacement openings.

One occupation on this top ten list, Laborers and Freight, Stock, and Material Movers by Hand, had all of the total openings from replacement openings, suggesting there will be little economic expansion within this occupation. This was also one of the two occupations from the targeted list of green jobs that were projected to decline in the ten year projections period.

Combining projections figures for just these targeted green jobs resulted in total employment of 19,093 which is expected to increase to 21,278 by 2018. This represents an expected 2,185 green jobs to be added to Nebraska's workforce, an 11.4 percent increase. In comparison, total employment (both green and non-green) for Nebraska is expected to increase by 10.1 percent during the same time period, adding 110,844 jobs.

This methodology did have some limitations that should be noted. First, it made the assumption that green jobs will increase or decrease at the same rate as non-green jobs. Second, the projections were based on 2008 employment whereas the green employment was from second quarter 2010. There is a possibility for an employment disparity to exist because it was drawn from two different time periods. Despite these limitations, this methodology is the most accurate available process at determining future demand for green jobs.

Education and Training

Education

An educational analysis was conducted to see the occurrences of reported education level by SOC title. Table 16 shows the number of occurrences by each level of education or training, including Bachelor's Degrees, trade certifications, high school diploma or GED, and no education requirement.

Many employers stated that work experience was just as important and needed as certain educational requirements, like a Bachelor's Degree.

In the Bachelor's Degree section, the most cited major occupational grouping was Management Occupations, major group 11-0000, with three different occupations requiring a Bachelor's Degree. They were Chief Executives, Construction Managers, and Managers, All Other. Examples of original job titles and which industries they are most likely to be found under Managers, All Other can be found in Table 15.

Table - 16 Top Selected Green Jobs by Various Education Levels

SOC Code	Occupational Title
	Most reported Green Jobs Requiring a Bachelor's Degree
13-1199	Business Operations Specialists, All Other
17-2051	Civil Engineers
51-1011	First-Line Supervisors of Production and Operating Workers
19-2041	Environmental Scientists and Specialists, Including Health
11-1021	Chief Executives
11-9021	Construction Managers
11-9199	Managers, All Other
19-4093	Forest and Conservation Technicians
13-1041	Compliance Officers
17-2081	Environmental Engineers
	Most reported Green Jobs Requiring Trade Certificate or Apprenticeship/On-the-Job Training
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
47-2111	Electricians
47-2152	Plumbers, Pipefitters, and Steamfitters
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers
49-9071	Maintenance and Repair Workers, General
	Most Reported Green Jobs Requiring a High School Diploma or GED
43-4051	Customer Service Representatives
53-7062	Laborers and Freight, Stock, and Material Movers, Hand
51-8031	Water and Wastewater Treatment Plant and System Operators
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners
47-2031	Carpenters
53-3032	Heavy and Tractor-Trailer Truck Drivers
	Most Reported Green Jobs without Any Requirements
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse
51-9199	Production Workers, All Other
53-7081	Refuse and Recyclable Material Collectors
43-1011	First-Line Supervisors of Office and Administrative Support Workers
49-9099	Installation, Maintenance, and Repair Workers, All Other

The most frequently cited occupation requiring a Bachelor's degree comes from the Business and Financial Operations grouping; it is Business Operations Specialists, All Other. Examples of original job titles and which industries they are most likely to be found can be found in Table 15. Compliance Officers, also included in the Business and Financial Operations Occupational grouping, was found to have high reported occurrences of requiring a Bachelor's degree as the minimum requirement held by employers. Architecture and Engineering Occupations and Life, Physical and Social Science Occupations also had two of their own occupations included in the top occupations requiring a Bachelor's degree.

For occupations requiring trade certification, apprenticeships or on-the-job training, occupations

with higher occurrences only come from the Construction and Extraction Occupations (47-0000) or the Installation, Maintenance, and Repair Occupations (49-0000). Employers reported that Heating, Air Conditioning, and Refrigeration Mechanics and Installers employees were most cited as requiring either a trade certificate, apprenticeship, or on-the-job training to be hired. This occupation was ranked first in the Top Green Occupations by Weighted Employment Count, Table 10, with 1,656 green employees in Nebraska. Further, it was sixth in the Top Green Occupations by Green Percentage, Table 11, with 87.2 percent of the total employment within this occupation being labeled green by employers.

Maintenance and Repair Workers, General, were the other Installation, Maintenance, and Repair Occupation included in the top cited occupations needing trade certification, apprenticeship or on-the-job training. Electricians (47-2111), Plumbers, Pipefitters, and Steamfitters (47-2152), and First-Line Supervisors of Construction Trades and Extraction Workers (47-1011) were the other frequently cited occupations requiring a trade certificate or similar training by employers.

There were more diverse occupation types when examining the top occurring occupations with an education level of high school diploma or GED. Two Transportation and Material Moving Occupations were cited in this category, with other occupations coming from Building and Grounds Cleaning and Maintenance, Construction and Extraction, and Office and Administrative Support Occupations. The Transportation and Material Moving Occupations included Laborers and Freight, Stock, and Material Movers (Hand), and Heavy and Tractor-Trailer Truck Drivers. Both of these occupations are found in the Top Green Occupations by Weighted Employment Count. Laborers and Freight, Stock and Material Movers (Hand) ranked ninth with 778 green employees throughout Nebraska, while Heavy and Tractor-Trailer Truck Drivers ranked third with 1,129 green employees in Nebraska. The top cited occupation in this education level was Customer Service Representatives, SOC 43-4051.

Employers did state for several green occupations that there are no educational requirements to be employed within the position. These occupations were just as diverse as the occupations requiring a high school diploma or GED. The most cited occupation not requiring any level of education was Farmworkers and Laborers, Crop, Nursery, and Greenhouse, SOC 45-2092. There were 407 green employees within this occupation; it ranked 19th on the Top Green Occupations by Weighted Employment Count, Table 10, and 20th on the Top Green Occupation by Green Percentage Ranking, Table 11.

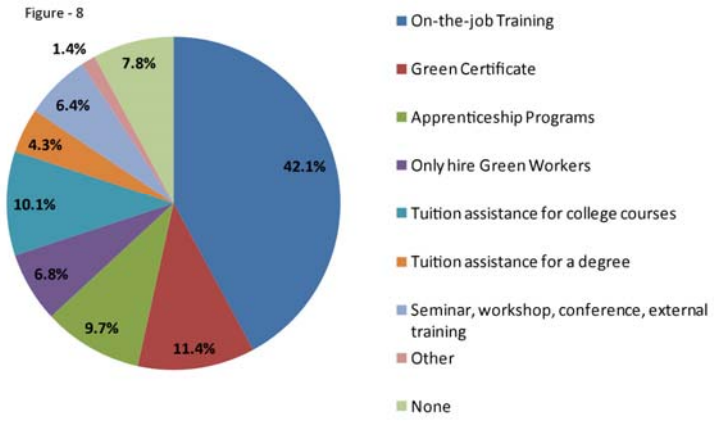
Training

Employers were asked what kinds of methods were used within their business to prepare current workers to produce green products or services; results are found in Figure 8. Almost 70 percent of responding employers stated that their method of choice was to implement an in-house classroom or on-the-job training. The next most frequently cited method was having a worker obtain an industry-recognized green certificate with 18.8 percent of employers selected this method. Examples of industry-recognized green certificates could be waste water certificates, LEED certificates, freon certificates, or certified energy manager certificates. Employers were also willing to provide tuition assistance for employees interested in expanding their credentials to include green skills; a total of 23.8 percent of employers stated they would assistant with either specific college courses or a degree to prepare workers for green employment.

Employers had the option writing in additional methods not provided by the Green Jobs Survey that could prepare current workers for green employment. A little over 2 percent of employers took this opportunity. Some of these responses included methods such as trade articles or publications, training by supplier or distributor, grants for training, and webinars.

Method used to prepare current workers to produce green products or services

Figure - 8



8.4% of employers stated their green employees needed to have a LEED certificate. 8.6% of employers stated their green employees need to have some type of waste water certificate.

Table 17 shows the top reported occupations requiring LEED certification. First-Line Supervisors of Construction Trades and Extraction were reported to have LEED certification, followed by Engineers, All Other. There was a second occupation that was considered an 'All Other,' Business Operation Specialists that topped this list. Many occupations requiring the LEED that were coded into one of the 'All Other' codes was difficult to code under the current taxonomy of the SOC system.

What is LEED Certification?

Leadership in Energy & Environmental Design (LEED) is a world-wide recognized green building certification system. The system provides verification that a building or community is designed and built using strategies intended to improve performance in various areas including water efficiency, energy savings, carbon dioxide emissions reduction, improved indoor environmental quality, and use of resources and sensitivity to their impacts.

LEED was developed by the U.S. Green Building Council (USGBC) and is intended to provide building owners and operators a specific guideline for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.

Why get LEED Certification?

LEED certification for employees represents the streamlining of building efficiencies. As green initiatives rise, candidates carrying the expertise to implement cutting-edge construction techniques will be absorbed by the job market.

The implementation of LEED standards can strengthen business throughout the economy. Construction companies can leverage their improved expertise for higher fees, while consumers can save in the long-run on energy and waste. The value added to a building by LEED certification can help reduce costs of maintenance for decades. Many projects can receive government dollars for meeting LEED standards as well. Grants, low-interest loans and even tax exemptions can be found for LEED registered projects around the country. More than just satisfying environmental niche markets, LEED-registered

Table - 17 Top Occupations Requiring LEED Certification

SOC Code	SOC Title	Weighted Employees
47-1011	First-Line Supervisor of Construction Trades and Extraction Workers	605
17-2199	Engineers, All Other	143
17-1011	Architects, Except Landscape and Naval	129
13-1199	Business Operations Specialists, All Other	78
17-2081	Environmental Engineers	39
17-2141	Mechanical Engineers	29
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	13
17-2051	Civil Engineers	12
17-3022	Civil Engineering Technicians	2

building has been known for both its short and long-term financial advantages.

Within a single company, the real value of a LEED certified employee may translate into millions in revenue. That is why LEED training does just what it says—it puts candidates in the "lead" for each open position they apply to. HR managers that stumble across LEED certifications on a resume are not soon to forget it (or the effect that candidate can have on their bottom line).

What is a CDL?

A person wishing to drive a tractor-trailer (a.k.a. "semi") is required to hold a valid Class A commercial driver's license commonly referred to as a CDL. To obtain a CDL, the truck driver must pass a knowledge and driving skills test administered by their resident state. The skills test must be for the type of vehicle which the driver intends to be licensed. In addition to the standard general knowledge test required for a CDL, truck drivers must also obtain endorsements on their CDL to legally operate a tractor trailer. Drivers need to pass the combination vehicle and air brake knowledge tests and skills test on a vehicle with these features. Failure to pass these components will result in a restriction on the driver's CDL.

Wastewater Licensing

Wastewater licensure is different in each state, but is generally available at several different grade levels. The lowest grade, Water Operator, is usually required to complete an approved 32-hour course, as well as a licensure exam. The requirements increase at interval levels up to a top grade Water Operator, which is usually required to obtain an amount of college experience and multiple years of work experience in water systems. These licenses are also generally progressive; in other words, to obtain a top Grade license, you must first complete each previous licensing level and its requirements in consecutive order. To find out more about Nebraska wastewater licensing and certification, visit the Nebraska Department of Environmental Quality website at www.deq.state.ne.us.

Professional Engineer (PE)

In the United States, registration or licensure of Professional Engineers is performed by individual states. Each registration or license is valid only in the state in which it is granted. Many Professional Engineers maintain licenses in several states for this reason, and comity between states can make it easy to obtain a license in one state based on licensure in another state without going through the full application process.

The licensing procedure varies, but the general process includes obtaining a four-year degree in engineering and completing a written exam based on fundamentals of engineering (FE). Completion of these first two steps typically qualifies as certification as an Engineer-In-Training (EIT) or an Engineer Intern (EI). Upon completion of a certain amount of engineering experience, or four years in Nebraska, applicants are required to complete another written exam covering the principles and practices of engineering (PE). This examination also concentrates on testing an applicant's knowledge and skills in a chosen engineering discipline such as civil, electrical, mechanical, and environmental to list a few.

56.9% of employers said that there were training differences between green and non-green employees within the same occupation, but only 17.6% of employers stated there was a wage difference between green and non-green employees.

Additional Research

New Hires

As part of the Labor Market Information Improvement grant, Nebraska conducted a study of individuals who were newly hired within a specific time-frame. The sample was composed of those individuals who were hired in the fourth quarter of 2009 and had no employee-employer relationship present during the previous quarter. Sample selection preference was given to those who had either received Workforce Investment Act training assistance or were registered with the Career Center for Staff Assisted Services. A total of 2,717 surveys were sent to different businesses.

The survey instrument collected information from the employer on both the employee and the job the employee holds. The survey covered several topics including skills required for the job, desired skills of applicants, pre-identified green skills, education requirements, demographics, compensation, benefits, and satisfaction with employee performance. Results from the survey are tabulated by industry and occupational category.

Detailed information about the Nebraska New Hires Survey can be accessed online in the Publications section of Nebraska's Labor Market Information website at http://neworks.nebraska.gov/analyzer.

Economic Impact of Green ARRA Projects

The Bureau of Economic Research at the University of Nebraska Lincoln provided an analysis of the economic implications for American Reinvestment and Recovery Act (ARRA) funded green projects in Nebraska. There were 82 green ARRA projects implemented in Nebraska which had a total budget of $192.1 million. These projects were overseen by several different federal agencies including the Department of Energy, the Environmental Protection Agency, the Department of Transportation, the Department of Housing and Urban Development, and the National Science Foundation.

The focus of these ARRA projects included research on alternative energy sources such as geothermal and solar; energy efficiency programs that dealt with weatherization of buildings, efficient light bulbs, energy star appliances or heating and cooling systems; research and funding for hybrid or clean diesel vehicles; and funding for environmental clean-up and research for Brownfield or wetlands. The analysis done by the Bureau of Economic Research focused on the gross economic impact of the funding for these projects to the Nebraska economy and labor market using IMPLAN software. It was determined that the funding for these projects provided the equivalent of 1,970 Nebraskan jobs for a year. Analysis was also run for Lincoln, Omaha, and the five other economic regions in Nebraska.

The full Economic Impact Analysis report can be found online in the publication section of the NEworks website at http://neworks.nebraska.gov/analyzer.

Green Jobs as a Source of Re-Employment

The Bureau of Economic Research at the University of Nebraska Lincoln completed a study for the consortium area on utilizing demand for green jobs to re-employ those who lost jobs due to the economic recession. The study identified sub-sectors in the Construction and Manufacturing industries as well as the service industries relate Construction and Manufacturing. Occupations in those industries that had the relatable skills or attributes to transfer into green occupations from traditionally non-green occupations were also identified. Analysis drew from data sets provided by the Displaced Worker Survey, which is part of the Current Population Survey conducted by the Bureau of Labor Statistics. When looking at worker's skills and attributes, the analysis found that: 1) workers with an associate's, bachelor's, or master's degree were less likely to switch into a green occupation than workers with a high school degree or lower, 2) age did not have a statistically significant effect on the probability of

switching into a green occupation, 3) males were more likely to switch into green occupations than females, and 4) workers who moved were more likely to switch into green occupations. After identifying the characteristics of individuals more likely to switch to green occupations, handouts were developed for career centers and displaced workers identifying green occupations that matched their skill set.

The full report on green occupations for displaced workers can be found online in the publication section of the NEworks website at http://neworks.nebraska.gov/analyzer.

Drinking Water Systems Infrastructure

The American Recovery and Reinvestment Act (ARRA) provided Nebraska with $19.5 million for improvements to the drinking water system infrastructure such as water well fields, water meters, power lines, water basins, variable frequency pumps, and water treatment plans. A little over four million dollars of this funding was provided specifically for "Green Infrastructure".

The Bureau of Business Research at the University of Nebraska Lincoln used IMPLAN software to determine the economic impact of ARRA spending on drinking water system infrastructure. It was determined that the majority of the funding (79.1%) was utilized in the Construction of Other New Nonresidential Structures sector. The balance of the funding was utilized by three other sectors: Architecture, Engineering, and Related Services (11.5%), Maintenance and Repair of Residential Structures (8.7%), and Maintenance and Repair of Nonresidential Structures (0.7%). These sectors were used to determine the economic multiplier of ARRA funding. The results of this analysis indicate that for every one million dollars of funding, 7.3 jobs were directly funded for a year. Additionally, 5.3 jobs were indirectly funded for a total of 13 jobs for every one million dollars of funding.

The full report on the Special Multiplier Study for Drinking Water Systems Infrastructure can be found online in the publications section of the NEworks website at http://neworks.nebraska.gov/analyzer.

Waste Water Systems Infrastructure

The American Recovery and Reinvestment Act (ARRA) provided Nebraska with over twenty million dollars for improvements to the wastewater system infrastructure such as retention lagoons, variable frequency pumps, sewer lines, lift stations, and enhancement of treatment stations. Approximately $4.86 million dollars of this funding was provided specifically for "Green Infrastructure".

The Bureau of Business Research at the University of Nebraska Lincoln used IMPLAN software to determine the economic impact of ARRA spending on wastewater systems infrastructure. It was determined that the majority of the funding (72.9%) was utilized in the Construction of Other New Nonresidential Structures sector. Two other sectors received most of the rest of the funding: Architecture, Engineering, and Related Services (13.1%) and Wholesale Trade (11.1%). Three other sectors received less than 2.4% of the funding combined. These sectors were used to determine the economic multiplier of ARRA funding. The results of this analysis indicate that for every one million dollars of funding, 6.4 jobs were directly funded for a year. Additionally, 5.2 jobs were indirectly funded for a total of 11.6 jobs for every one million dollars of funding.

The full report on the Special Multiplier Study for Wastewater Systems Infrastructure can be found online in the publications section of the NEworks website at http://neworks.nebraska.gov/analyzer.

Consortium Research

The Northern Plains and Rocky Mountain Consortium plan on releasing report on green jobs spanning the full consortium area, including Nebraska, Iowa, Montana, South Dakota, Wyoming, and Utah on the consortium website at http://researchingthegreeneconomy.com. There is also information on state-specific studies, workforce development handouts, and special consortium studies such as the report on new and emerging green technologies. Materials from the Researching the Green Economy Conference held in Des Moines are also available for download.

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Appendix Table of Contents

Table - A1 Oversampled Construction Industry in the Nebraska Sample

NAICS	Construction	Total Sample	Assigned Random	Certainty Total
237110	Water and Sewer System Construction	184	25	159
237120	Oil and Gas Pipeline Construction	19	4	15
237130	Power/Communication System Construction	80	23	57
237990	Other Heavy Construction	80	14	66
238211	Residential Electrical Contractors	347	20	327
238212	Nonresidential Electrical Contractors	234	55	179
238221	Residential Plumbing/HVAC Contractors	530	51	479
238222	Nonresidential Plumbing/HVAC Contractors	208	59	149

Table - A2-1 Oversampled Manufacturing Industry in the Nebraska Sample

NAICS	Manufacturing	Total Sample	Assigned Random	Certainty Sample
314999	All Other Textile Product Mills	22	0	22
321911	Wood Window and Door Manufacturing	7	4	3
321991	Manufactured/Mobile Home Manufacturing	3	3	0
322122	Newsprint Mills	1	0	1
322211	Corrugated/Solid Fiber Box Manufacturing	7	5	2
322212	Folding Paperboard Box Manufacturing	4	4	0
322214	Fiber Can, Tube and Drum Manufacturing	1	0	1
322222	Coated and Laminated Paper Manufacturing	2	2	0
322224	Uncoated Paper Bag Manufacturing	2	2	0
322232	Envelope Manufacturing	1	0	1
322291	Sanitary Paper Product Manufacturing	3	3	0
322299	All Other Converted Paper Products	2	1	1
324110	Petroleum Refineries	1	1	0
324122	Asphalt Shingle and Coating Materials	1	0	1
324191	All Other Petroleum and Coal Products	2	0	2
325120	Industrial Gas Manufacturing	8	2	6
325188	All Other Basic Inorganic Chemicals	1	0	1
325193	Ethyl Alcohol Manufacturing	29	20	9
325199	All Other Basic Organic Chemicals	8	4	4
325211	Plastics Material & Resin Manufacturing	6	4	2
325311	Nitrogenous Fertilizer Manufacturing	3	1	2
325312	Phosphatic Fertilizer Manufacturing	1	0	1
325314	Fertilizer (Mixing Only) Manufacturing	13	2	11
325320	Agricultural Chemicals Except Fertilizer	2	1	1
325411	Medicinal and Botanical Manufacturing	2	1	1
325412	Pharmaceutical Preparation Manufacturing	9	4	5
325413	In-Vitro Diagnostic Substance Mfg	1	1	0
325414	Other Biological Product Manufacturing	8	1	7
325510	Paint and Coating Manufacturing	4	0	4
325520	Adhesive Manufacturing	2	1	1

*Continued on next page

Table - A2-2 Oversampled Manufacturing Industry in the Nebraska Sample

NAICS	Manufacturing	Total Sample	Assigned Random	Certainty Sample
325611	Soap and Other Detergent Manufacturing	1	0	1
325612	Polish and Sanitation Good Manufacturing	2	0	2
325620	Toilet Preparation Manufacturing	1	1	0
325910	Printing Ink Manufacturing	4	0	4
325991	Custom Compounding of Purchased Resins	1	0	1
325992	Photographic Film and Chemicals	1	0	1
325998	Other Miscellaneous Chemicals Mfg	2	0	2
326111	Unsupported Plastics Bag Manufacturing	1	0	1
326113	Nonpackaging Plastics Film and Sheet	2	0	2
326122	Plastics Pipe and Pipe Fitting Mfg	9	6	3
326130	Laminated Plastics Plate, Sheet & Shapes	1	0	1
326140	Polystyrene Foam Product Manufacturing	3	3	0
326150	Urethane and Other Foam Product Mfg	5	3	2
326191	Plastics Plumbing Fixture Manufacturing	2	1	1
326192	Resilient Floor Covering Manufacturing	1	1	0
326199	All Other Plastics Product Manufacturing	35	20	15
326299	All Other Rubber Product Manufacturing	2	1	1
331511	Iron Foundries	4	3	1
331513	Steel Foundries (except Investment)	3	1	2
332111	Iron and Steel Forging	1	1	0
332114	Custom Roll Forming	1	0	1
332311	Prefabricated Metal Building & Component	12	4	8
332312	Fabricated Structural Metal Mfg	24	11	13
332313	Plate Work Manufacturing	8	3	5
332321	Metal Window and Door Manufacturing	4	1	3
332322	Sheet Metal Work Manufacturing	18	9	9
332323	Ornamental and Architectural Metal Work	12	2	10
332420	Metal Tank (Heavy Gauge) Manufacturing	6	4	2
332431	Metal Can Manufacturing	1	1	0

*Continued on next page

Table - A2-3 Oversampled Manufacturing Industry in the Nebraska Sample

NAICS	Manufacturing	Total Sample	Assigned Random	Certainty Sample
325611	Soap and Other Detergent Manufacturing	1	0	1
325612	Polish and Sanitation Good Manufacturing	2	0	2
325620	Toilet Preparation Manufacturing	1	1	0
325910	Printing Ink Manufacturing	4	0	4
325991	Custom Compounding of Purchased Resins	1	0	1
325992	Photographic Film and Chemicals	1	0	1
325998	Other Miscellaneous Chemicals Mfg	2	0	2
326111	Unsupported Plastics Bag Manufacturing	1	0	1
326113	Nonpackaging Plastics Film and Sheet	2	0	2
326122	Plastics Pipe and Pipe Fitting Mfg	9	6	3
326130	Laminated Plastics Plate, Sheet & Shapes	1	0	1
326140	Polystyrene Foam Product Manufacturing	3	3	0
326150	Urethane and Other Foam Product Mfg	5	3	2
326191	Plastics Plumbing Fixture Manufacturing	2	1	1
326192	Resilient Floor Covering Manufacturing	1	1	0
326199	All Other Plastics Product Manufacturing	35	20	15
326299	All Other Rubber Product Manufacturing	2	1	1
331511	Iron Foundries	4	3	1
331513	Steel Foundries (except Investment)	3	1	2
332111	Iron and Steel Forging	1	1	0
332114	Custom Roll Forming	1	0	1
332311	Prefabricated Metal Building & Component	12	4	8
332312	Fabricated Structural Metal Mfg	24	11	13
332313	Plate Work Manufacturing	8	3	5
332321	Metal Window and Door Manufacturing	4	1	3
332322	Sheet Metal Work Manufacturing	18	9	9
332323	Ornamental and Architectural Metal Work	12	2	10
332420	Metal Tank (Heavy Gauge) Manufacturing	6	4	2
332431	Metal Can Manufacturing	1	1	0

Table - A3 Oversampled Wholesale Trade Industry in the Nebraska Sample

NAICS	Wholesale Trade	Total Sample	Assigned Random	Certainty Sample
423140	Used Motor Vehicle Part Merchant Whsle	23	1	22
423930	Recyclable Material Merchant Wholesalers	48	7	41

Table - A4 Oversampled Professional, Scientific, and Technical Services Industry in the Nebraska Sample

NAICS	Professional, Scientific, and Technical Services	Total Sample	Assigned Random	Certainty Sample
541310	Architechtural Services	91	11	80
541320	Landscape Architechtural Services	17	2	15
541330	Engineering Services	322	46	276
541340	Drafting Services	15	2	13
541350	Building Inspection Services	26	2	24
541360	Geophysical Surveying & Mapping Services	5	1	4
541370	Other Surveying and Mapping Services	35	1	34
541380	Testing Laboratories	38	3	35
541420	Industrial Design Services	4	0	4
541614	Process & Logistics Consulting Services	70	4	66
541620	Environmental Consulting Services	43	4	39
541690	Other Technical Consulting Services	169	11	158
541711	Research and Development in Biotechnology	26	3	23
541712	R&D in Physical, Engineering, Life Sciences	56	11	45

Table - A5 Oversampled Administrative & Support and Waste Management & Remediation Services in the Nebraska Sample

NAICS	Administrative and Support and Waste Management and Remediation Services	Total Sample	Assigned Random	Certainty Sample
562111	Solid Waste Collection	104	16	88
562112	Hazardous Waste Collection	7	2	5
562119	Other Waste Collection	27	6	21
562211	Hazardous Waste Treatment and Disposal	7	2	5
562212	Solid Waste Landfill	13	3	10
562219	Other Nonhazardous Waste Disposal	12	2	10
562910	Remediation Services	21	2	19
562920	Materials Recovery Facilities	3	1	2
562991	Septic Tank and Related Services	22	1	21
562998	Miscellaneous Waste Management Services	6	0	6

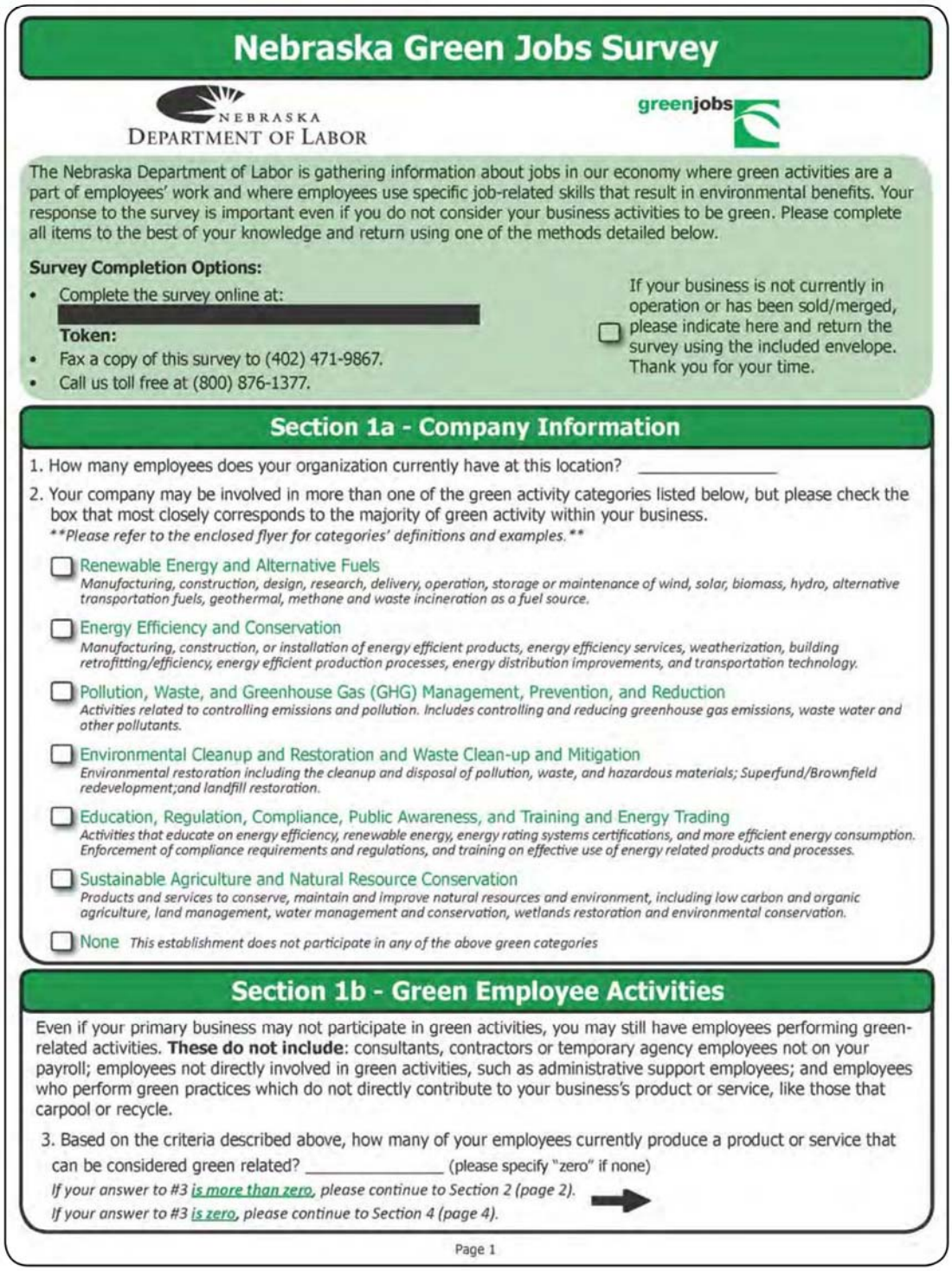
Table - A6 Oversampled Other Services Industry in the Nebraska Sample

NAICS	Other Services (Except Public Administration)	Total Sample	Assigned Random	Certainty Sample
813312	Environment & Conservation Organizations	22	7	15

Table - A7 Oversampled Public Administration Industry in the Nebraska Sample

NAICS	Public Administration	Total Sample	Assigned Random	Certainty Sample
924110	Air, Water and Waste Program Admin	21	5	16
924120	Administration of Conservation Programs	292	31	261
926130	Utility Regulation and Administration	28	3	25

Figure - A1-1 **Sample Green Jobs Survey Form**



Nebraska Green Jobs Survey

NEBRASKA DEPARTMENT OF LABOR

greenjobs

The Nebraska Department of Labor is gathering information about jobs in our economy where green activities are a part of employees' work and where employees use specific job-related skills that result in environmental benefits. Your response to the survey is important even if you do not consider your business activities to be green. Please complete all items to the best of your knowledge and return using one of the methods detailed below.

Survey Completion Options:

- Complete the survey online at: [redacted]
  Token:
- Fax a copy of this survey to (402) 471-9867.
- Call us toll free at (800) 876-1377.

☐ If your business is not currently in operation or has been sold/merged, please indicate here and return the survey using the included envelope. Thank you for your time.

Section 1a - Company Information

1. How many employees does your organization currently have at this location? _____

2. Your company may be involved in more than one of the green activity categories listed below, but please check the box that most closely corresponds to the majority of green activity within your business.
   Please refer to the enclosed flyer for categories' definitions and examples.

☐ Renewable Energy and Alternative Fuels
Manufacturing, construction, design, research, delivery, operation, storage or maintenance of wind, solar, biomass, hydro, alternative transportation fuels, geothermal, methane and waste incineration as a fuel source.

☐ Energy Efficiency and Conservation
Manufacturing, construction, or installation of energy efficient products, energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements, and transportation technology.

☐ Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction
Activities related to controlling emissions and pollution. Includes controlling and reducing greenhouse gas emissions, waste water and other pollutants.

☐ Environmental Cleanup and Restoration and Waste Clean-up and Mitigation
Environmental restoration including the cleanup and disposal of pollution, waste, and hazardous materials; Superfund/Brownfield redevelopment;and landfill restoration.

☐ Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading
Activities that educate on energy efficiency, renewable energy, energy rating systems certifications, and more efficient energy consumption. Enforcement of compliance requirements and regulations, and training on effective use of energy related products and processes.

☐ Sustainable Agriculture and Natural Resource Conservation
Products and services to conserve, maintain and improve natural resources and environment, including low carbon and organic agriculture, land management, water management and conservation, wetlands restoration and environmental conservation.

☐ None *This establishment does not participate in any of the above green categories*

Section 1b - Green Employee Activities

Even if your primary business may not participate in green activities, you may still have employees performing green-related activities. **These do not include**: consultants, contractors or temporary agency employees not on your payroll; employees not directly involved in green activities, such as administrative support employees; and employees who perform green practices which do not directly contribute to your business's product or service, like those that carpool or recycle.

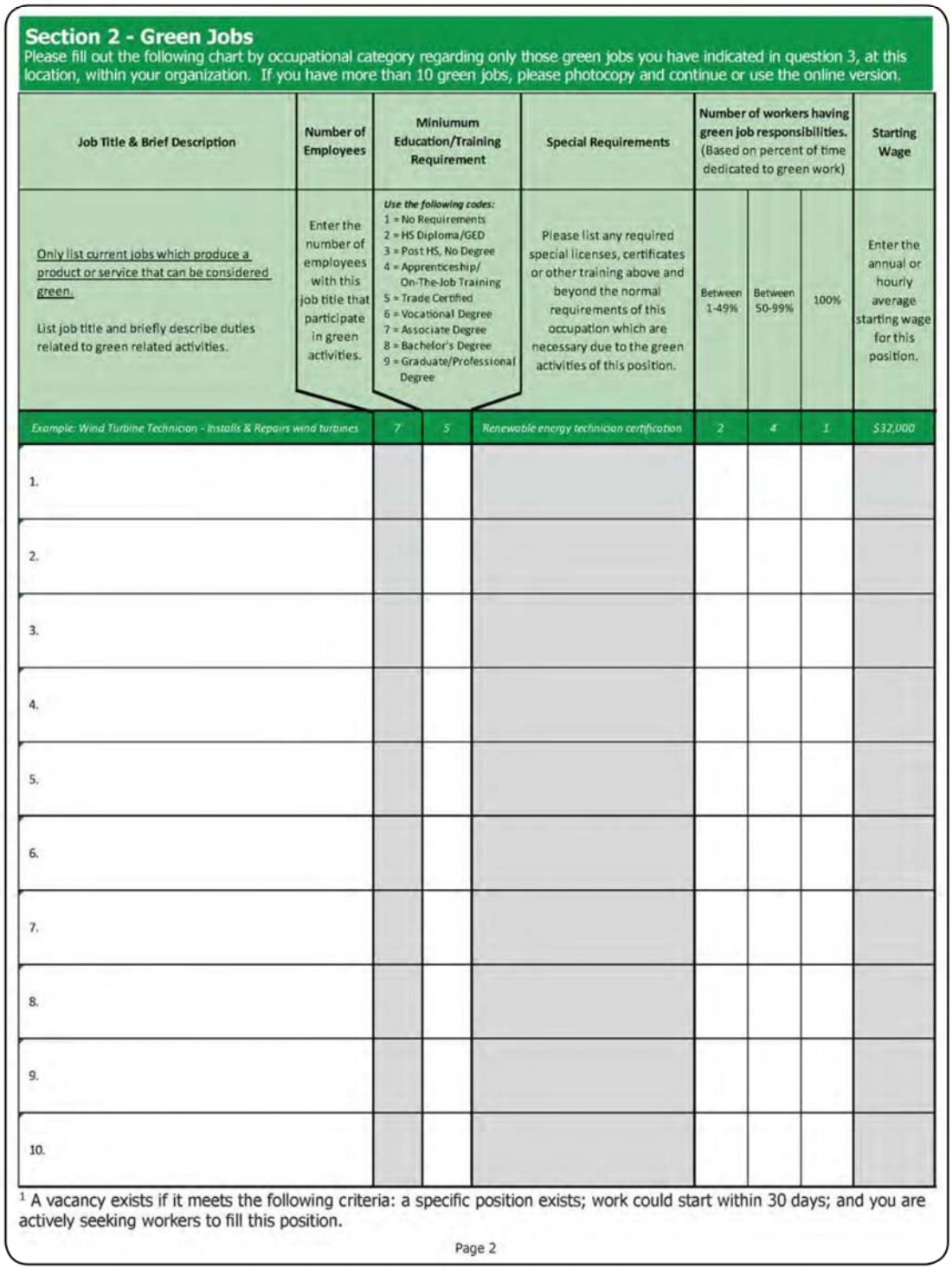
3. Based on the criteria described above, how many of your employees currently produce a product or service that can be considered green related? _____ (please specify "zero" if none)

If your answer to #3 is more than zero, please continue to Section 2 (page 2). →

If your answer to #3 is zero, please continue to Section 4 (page 4).

Page 1

Figure - A1-2



Section 2 - Green Jobs

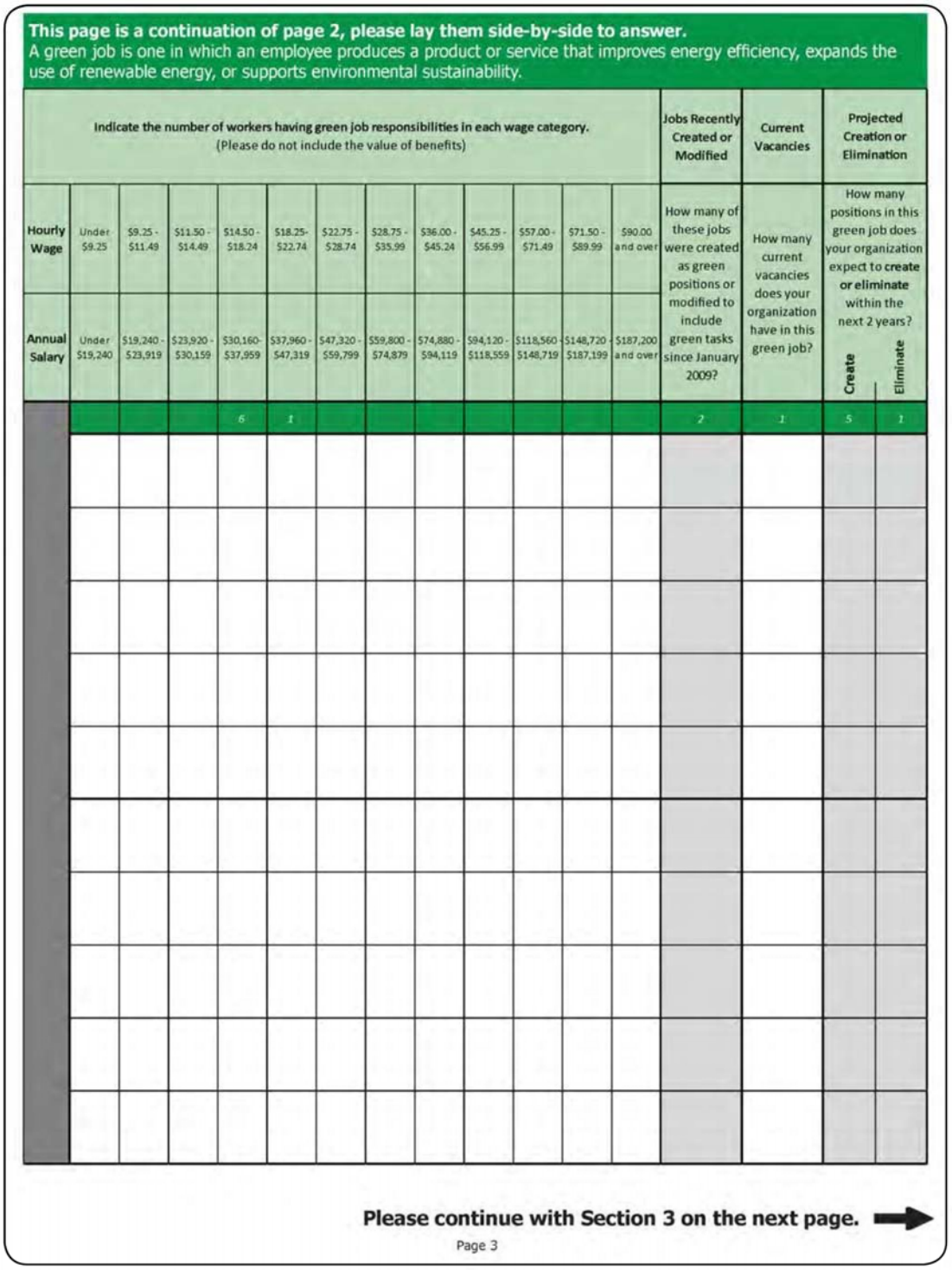
Please fill out the following chart by occupational category regarding only those green jobs you have indicated in question 3, at this location, within your organization. If you have more than 10 green jobs, please photocopy and continue or use the online version.

Job Title & Brief Description	Number of Employees	Miniumum Education/Training Requirement	Special Requirements	Number of workers having green job responsibilities. (Based on percent of time dedicated to green work)			Starting Wage
Only list current jobs which produce a product or service that can be considered green. List job title and briefly describe duties related to green related activities.	Enter the number of employees with this job title that participate in green activities.	*Use the following codes:* 1 = No Requirements 2 = HS Diploma/GED 3 = Post HS, No Degree 4 = Apprenticeship/ On-The-Job Training 5 = Trade Certified 6 = Vocational Degree 7 = Associate Degree 8 = Bachelor's Degree 9 = Graduate/Professional Degree	Please list any required special licenses, certificates or other training above and beyond the normal requirements of this occupation which are necessary due to the green activities of this position.	Between 1-49%	Between 50-99%	100%	Enter the annual or hourly average starting wage for this position.
Example: Wind Turbine Technician - Installs & Repairs wind turbines	*7*	*5*	*Renewable energy technician certification*	*2*	*4*	*1*	*$32,000*
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

[1] A vacancy exists if it meets the following criteria: a specific position exists; work could start within 30 days; and you are actively seeking workers to fill this position.

Page 2

Figure - A1-3



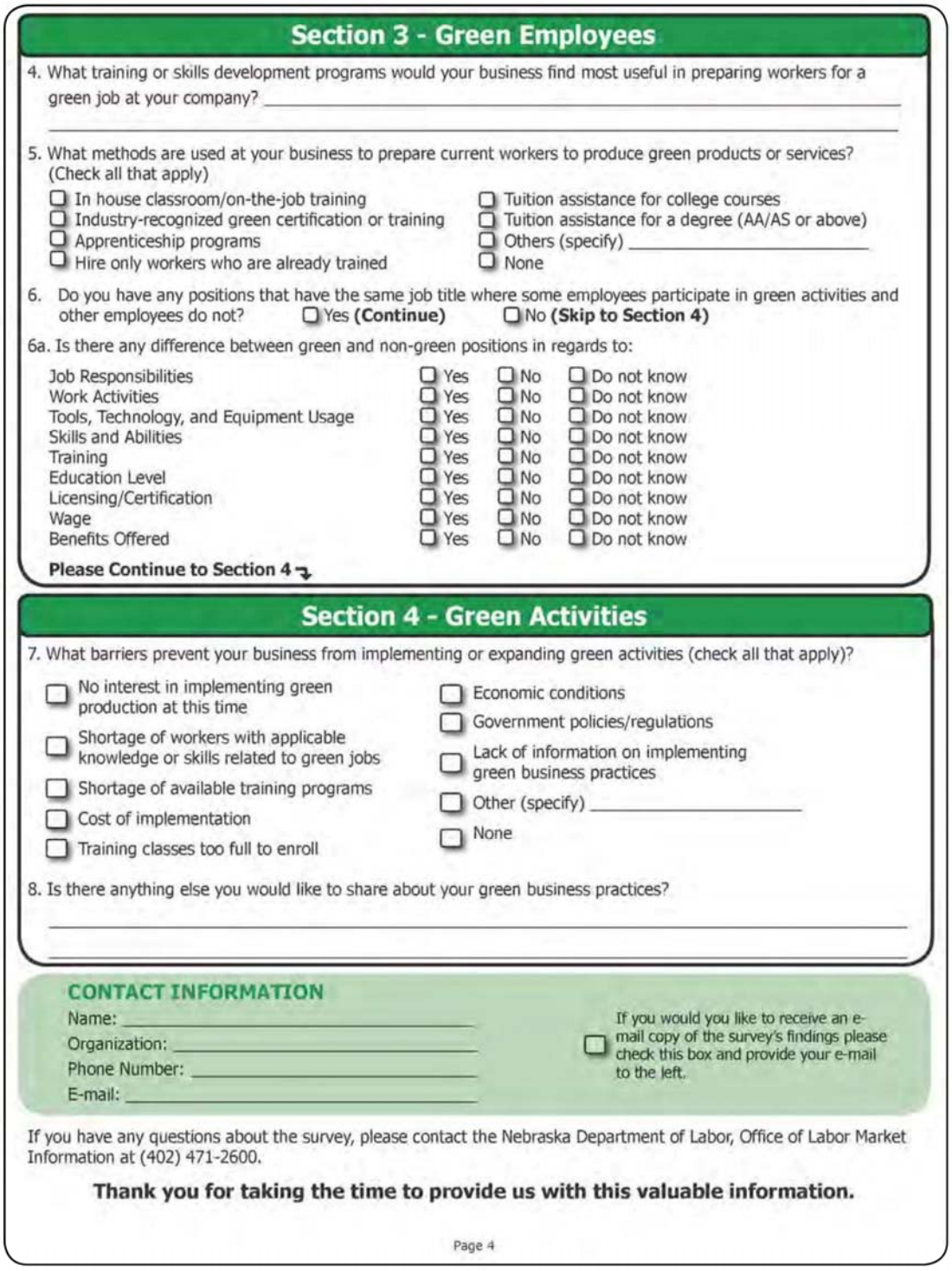
This page is a continuation of page 2, please lay them side-by-side to answer.
A green job is one in which an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability.

Indicate the number of workers having green job responsibilities in each wage category. (Please do not include the value of benefits)													Jobs Recently Created or Modified	Current Vacancies	Projected Creation or Elimination	
Hourly Wage	Under $9.25	$9.25 - $11.49	$11.50 - $14.49	$14.50 - $18.24	$18.25- $22.74	$22.75 - $28.74	$28.75 - $35.99	$36.00 - $45.24	$45.25 - $56.99	$57.00 - $71.49	$71.50 - $89.99	$90.00 and over	How many of these jobs were created as green positions or modified to include green tasks since January 2009?	How many current vacancies does your organization have in this green job?	How many positions in this green job does your organization expect to **create** or **eliminate** within the next 2 years?	
Annual Salary	Under $19,240	$19,240 - $23,919	$23,920 - $30,159	$30,160- $37,959	$37,960 - $47,319	$47,320 - $59,799	$59,800 - $74,879	$74,880 - $94,119	$94,120 - $118,559	$118,560 - $148,719	$148,720 - $187,199	$187,200 and over			Create	Eliminate
				6	1								2	1	5	1

Please continue with Section 3 on the next page.

Page 3

Figure - A1-4



Section 3 - Green Employees

4. What training or skills development programs would your business find most useful in preparing workers for a green job at your company? _____

_____

5. What methods are used at your business to prepare current workers to produce green products or services? (Check all that apply)

- ☐ In house classroom/on-the-job training
- ☐ Industry-recognized green certification or training
- ☐ Apprenticeship programs
- ☐ Hire only workers who are already trained
- ☐ Tuition assistance for college courses
- ☐ Tuition assistance for a degree (AA/AS or above)
- ☐ Others (specify) _____
- ☐ None

6. Do you have any positions that have the same job title where some employees participate in green activities and other employees do not? ☐ Yes **(Continue)** ☐ No **(Skip to Section 4)**

6a. Is there any difference between green and non-green positions in regards to:

Job Responsibilities	☐ Yes	☐ No	☐ Do not know
Work Activities	☐ Yes	☐ No	☐ Do not know
Tools, Technology, and Equipment Usage	☐ Yes	☐ No	☐ Do not know
Skills and Abilities	☐ Yes	☐ No	☐ Do not know
Training	☐ Yes	☐ No	☐ Do not know
Education Level	☐ Yes	☐ No	☐ Do not know
Licensing/Certification	☐ Yes	☐ No	☐ Do not know
Wage	☐ Yes	☐ No	☐ Do not know
Benefits Offered	☐ Yes	☐ No	☐ Do not know

Please Continue to Section 4 →

Section 4 - Green Activities

7. What barriers prevent your business from implementing or expanding green activities (check all that apply)?

- ☐ No interest in implementing green production at this time
- ☐ Shortage of workers with applicable knowledge or skills related to green jobs
- ☐ Shortage of available training programs
- ☐ Cost of implementation
- ☐ Training classes too full to enroll
- ☐ Economic conditions
- ☐ Government policies/regulations
- ☐ Lack of information on implementing green business practices
- ☐ Other (specify) _____
- ☐ None

8. Is there anything else you would like to share about your green business practices?

_____

_____

CONTACT INFORMATION

Name: _____

Organization: _____

Phone Number: _____

E-mail: _____

☐ If you would you like to receive an e-mail copy of the survey's findings please check this box and provide your e-mail to the left.

If you have any questions about the survey, please contact the Nebraska Department of Labor, Office of Labor Market Information at (402) 471-2600.

Thank you for taking the time to provide us with this valuable information.

Page 4

Figure - A2-1 **Sample Green Jobs Brochure**

greenjobs

The Northern Plains & Rocky Mountain Consortium: researching the green economy

Iowa, Montana, Nebraska, South Dakota, Utah, & Wyoming

Contact the Nebraska Department of Labor

550 South 16th Street, P.O. Box 94600

Lincoln, NE 68509-4600

Phone: 1-800-876-1377 or 402-471-2600

Fax: 402-471-9867

E-mail: LMI_NE@nebraska.gov

The Northern Plains & Rocky Mountain Consortium

Green Jobs Survey

NEBRASKA DEPARTMENT OF LABOR

Figure - A2-2

What We Mean By Green

Nebraska has partnered with five other states to form The Northern Plains & Rocky Mountain Consortium. This consortium is conducting research on green jobs in the six-state area to obtain information that will help businesses in Nebraska remain competitive.

Your business has been selected to provide Nebraska with valuable information about how green activities are evolving within the workforce. For the purpose of this study, a green job is defined as one where an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, or supports environmental sustainability.

The inside of this brochure provides details about each green economic activity category listed on the first section of the survey. It also provides possible examples of jobs that the category may include or exclude.

All information you provide in the survey is kept strictly confidential. It will be combined with data collected from other employers; any data published or released will be in aggregate form. Any publications derived from this data will be available online at www.dol.nebraska.gov.

If you have any questions about the study or need assistance filling out the survey, please call the Department of Labor at 1-800-876-1377 or 1-402-471-2600.

Figure - A2-3

Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention and Reduction

Activities and research related to controlling commercial, transportation, and industrial emissions and pollution; water treatment, recycling operations, waste product management and treatment; includes controlling and reducing emissions of carbon dioxide, other greenhouse gases, waste water and other pollutants.

Examples include:
- ✔ Carbon emissions monitoring, biomass or biodiversity preservation
- ✔ Recycling center operations
- ✔ Mass transit administration
- ✔ Wastewater treatment plants

Examples DO NOT include:
- ✘ Workers who telecommute or carpool
- ✘ Cleaning services using "eco-friendly" chemicals
- ✘ Workplaces using recycled paper

Energy Efficiency & Conservation

Manufacturing, construction, installation, production of energy efficient products (such as Energy Star rated appliances, more efficient lighting), energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements (smart grid), transportation technology, and battery development and storage improvement.

Examples include:
- ✔ Manufacturing/installation of geothermal components
- ✔ Insulation, energy efficient windows and doors
- ✔ LEED certified design and construction

Examples DO NOT include:
- ✘ Workers at firms that have become "greener" by replacing light bulbs, reducing office thermostat temperatures, purchasing fuel efficient fleet vehicles, carpooling

Environmental Cleanup and Remediation & Waste Clean-up Mitigation

Environmental remediation including the cleanup and disposal of pollution, waste and hazardous materials; Superfund/ Brownfield redevelopment; and landfill restoration.

Examples include:
- ✔ Operations which recycle plastic, metal and other salvage, and Freon and ethylene glycol
- ✔ Hazardous waste handling and disposal
- ✔ Wetlands restoration

Examples DO NOT include:
- ✘ Volunteers
- ✘ Workers that "adopt-a-street"
- ✘ Garbage disposal service

Figure - A2-4

Education, Regulation, Compliance, and Training & Energy Trading

Activities to educate the public, business and government on energy efficiency, renewable energy, energy rating systems certifications, and more efficient energy consumption. Also informing appropriate parties and enforcing compliance requirements and regulations, promoting state energy standards and plans, and training on effective use of energy related products and processes. In theory, energy trading could include buying and selling of power or fuels related to energy efficiency and renewable energy as well as cap and trade activity to control pollution.

Examples include:

- ✔ Policy analysis, energy auditing, environmental science research
- ✔ Carbon credit brokering, certifying environmental practices
- ✔ Environmental testing

Examples DO NOT include:

- ✘ Educational administrative staff
- ✘ Secretarial services at law firms

Sustainable Agriculture & Natural Resource Conservation

Products and services to conserve, maintain and improve natural resources and environment, including low carbon agriculture, land management, water management and conservation, wetlands restoration and mitigation, and environmental and wildlife conservation. Includes bioscience related activities and research.

Examples include:

- ✔ Sustainable organic farming, including practices that lessen the admissions of carbon and/or increase removal of carbon from the atmosphere when compared to standard farming practices
- ✔ Conservation activities which reduce soil erosion, enhance water supplies and water quality

Examples DO NOT include:

- ✘ Workers who garden or buy organic products
- ✘ Landscapers

Renewable Energy & Alternative Fuels

Manufacturing, production, construction, design, research, delivery, operation, storage and maintenance of wind, solar, biomass, hydro, alternative transportation fuels, geothermal, methane and waste incineration as a fuel source.

Examples include:

- ✔ Manufacturing/installation of wind turbines, methane gas captures, solar photovoltaic (PV) cells or electrolyzes
- ✔ Hydro-electric generator repair, design of renewable energy plants
- ✔ Geothermal drilling
- ✔ Production of bio-fuels, biomass or cellulose

Examples DO NOT Include:

- ✘ Electrical power distribution
- ✘ Producing high voltage electric lines

Table - A8

Final Response Rates by Strata

Sector	1 - 4 employees	5 - 9 employees	10 - 19 employees	20 - 49 employees	50 - 99 employees	100 - 249 employees	250 - 499 employees	500 or more employees	Total
11	49.0%	51.8%	48.1%	56.1%	68.2%	50.0%	100.0%	100.0%	51.4%
21	53.4%	53.3%	61.1%	66.7%	66.7%				55.4%
22	51.9%	76.9%	73.3%	84.4%	57.1%	58.3%	60.0%	100.0%	64.8%
23	46.2%	53.2%	55.4%	55.8%	58.2%	45.7%	66.7%	0.0%	50.7%
31	45.3%	51.3%	46.9%	50.7%	52.7%	49.1%	51.3%	32.3%	48.8%
42	37.4%	40.8%	53.3%	53.6%	46.9%	47.6%	0.0%	100.0%	47.5%
44	48.1%	59.3%	63.0%	48.1%	70.7%	69.1%	56.8%	33.3%	60.1%
48	37.7%	53.8%	43.1%	52.0%	42.2%	45.5%	50.0%	75.0%	47.4%
51	50.0%	50.7%	57.3%	54.7%	57.8%	70.0%	42.9%	83.3%	55.1%
52	50.0%	54.8%	63.5%	57.3%	60.7%	64.5%	54.2%	69.2%	58.0%
53	49.2%	55.8%	50.5%	62.1%	64.3%	50.0%			53.6%
54	43.7%	53.8%	53.8%	54.8%	54.4%	50.0%	61.5%	33.3%	48.6%
55	57.9%	61.7%	60.5%	69.8%	76.7%	52.2%	70.0%	100.0%	63.4%
56	55.7%	59.6%	55.2%	54.0%	56.8%	62.5%	60.0%	40.0%	56.7%
61	33.3%	38.5%	47.8%	58.5%	53.2%	58.8%	65.0%	52.6%	54.8%
62	35.0%	57.1%	48.0%	59.5%	58.2%	63.1%	61.9%	64.3%	57.9%
71	52.6%	63.2%	54.1%	61.1%	54.8%	68.0%	33.3%	100.0%	58.1%
72	46.7%	48.5%	43.7%	47.3%	37.0%	57.7%	100.0%		45.5%
81	59.6%	51.6%	52.8%	54.1%	42.9%	57.1%	0.0%		53.6%
92	38.7%	41.5%	56.0%	68.4%	64.1%	61.8%	52.9%	70.0%	52.8%
Total	47.1%	53.9%	54.4%	58.4%	57.2%	54.1%	49.3%	52.7%	52.8%

*2-Digit Sector to Industry Titles can be found on Table A45

Table - A9

Green Economic Analysis by Economic Industry (3-Digit Level)

Sector	Renewable Energy and Alternative Fuels	Energy Efficiency and Conservation	Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction	Environmental Cleanup and Restoration and Waste Clean-up and Mitigation	Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	Sustainable Agriculture and Natural Resource Conservation	None
111	3.0%	1.0%	0.0%	0.0%	0.0%	33.7%	60.4%
112	1.1%	1.6%	3.2%	4.3%	0.0%	20.7%	68.1%
115	0.0%	2.2%	0.0%	2.2%	0.0%	17.8%	77.8%
211	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
212	2.6%	0.0%	10.3%	7.7%	0.0%	0.0%	79.5%
213	0.0%	0.0%	0.0%	13.3%	0.0%	0.0%	86.7%
221	21.3%	19.1%	8.5%	2.7%	16.0%	5.3%	23.4%
236	1.4%	34.2%	0.0%	2.7%	0.0%	0.0%	60.3%
237	9.0%	7.4%	3.2%	2.1%	0.5%	13.2%	62.4%
238	3.1%	33.9%	2.1%	1.0%	0.4%	2.1%	53.5%
311	8.3%	8.3%	12.5%	0.0%	0.0%	2.1%	58.3%
312	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
313	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%
314	0.0%	0.0%	0.0%	0.0%	0.0%	5.6%	94.4%
316	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
321	0.0%	13.3%	0.0%	0.0%	0.0%	6.7%	80.0%
322	0.0%	7.1%	14.3%	7.1%	0.0%	0.0%	64.3%
323	0.0%	6.3%	3.1%	0.0%	0.0%	6.3%	81.3%
324	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%
325	23.9%	2.2%	4.3%	0.0%	2.2%	4.3%	47.8%
326	7.4%	3.7%	0.0%	3.7%	3.7%	0.0%	77.8%
327	4.5%	4.5%	9.1%	0.0%	0.0%	9.1%	68.2%
331	0.0%	9.1%	9.1%	0.0%	0.0%	0.0%	72.7%
332	1.2%	8.2%	3.5%	0.0%	0.0%	0.0%	85.9%
333	4.7%	9.3%	7.0%	2.3%	0.0%	9.3%	62.8%
334	9.1%	9.1%	27.3%	0.0%	0.0%	0.0%	45.5%
335	0.0%	33.3%	0.0%	0.0%	0.0%	0.0%	66.7%
336	0.0%	5.0%	35.0%	0.0%	0.0%	0.0%	60.0%
337	0.0%	17.6%	0.0%	0.0%	0.0%	0.0%	82.4%
339	0.0%	10.0%	0.0%	5.0%	0.0%	0.0%	85.0%
423	2.4%	5.6%	0.8%	4.8%	0.0%	1.6%	79.4%
424	4.8%	1.2%	0.0%	1.2%	0.0%	4.8%	85.5%
425	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	87.5%
441	6.1%	3.0%	15.2%	0.0%	0.0%	0.0%	75.8%
442	0.0%	50.0%	0.0%	0.0%	50.0%	0.0%	0.0%
443	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	90.0%
444	0.0%	19.4%	3.2%	0.0%	22.6%	0.0%	51.6%
445	1.6%	20.6%	1.6%	1.6%	0.0%	0.0%	73.0%
446	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	90.9%
447	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	93.3%
448	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
451	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	87.5%
452	0.0%	5.7%	2.9%	5.7%	5.7%	0.0%	71.4%
453	0.0%	0.0%	0.0%	10.0%	0.0%	0.0%	90.0%
454	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	90.9%
484	4.9%	2.4%	4.9%	2.4%	1.2%	1.2%	80.5%
485	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
487	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%
488	10.0%	0.0%	10.0%	0.0%	0.0%	0.0%	70.0%
491	1.8%	52.6%	0.0%	0.0%	1.8%	0.0%	43.9%
492	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	94.7%
493	0.0%	6.7%	6.7%	0.0%	6.7%	0.0%	80.0%

*3-Digit Sector to Industry Titles can be found on Table A46

Table - A10 Green Economic Analysis by Ecnomic Industry (3-Digit Level)

Sector	Renewable Energy and Alternative Fuels	Energy Efficiency and Conservation	Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction	Environmental Cleanup and Restoration and Waste Clean-up and Mitigation	Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading	Sustainable Agriculture and Natural Resource Conservation	None
511	0.0%	0.0%	0.0%	3.8%	7.7%	0.0%	88.5%
512	0.0%	0.0%	0.0%	0.0%	4.5%	0.0%	95.5%
515	0.0%	3.3%	0.0%	0.0%	6.7%	0.0%	90.0%
517	0.0%	1.3%	0.0%	0.0%	1.3%	0.0%	96.1%
518	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	95.0%
519	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	85.7%
522	0.0%	0.8%	0.8%	1.7%	0.0%	0.8%	95.8%
523	0.0%	8.3%	0.0%	0.0%	0.0%	0.0%	87.5%
524	0.0%	1.0%	0.0%	1.0%	1.0%	0.0%	95.8%
525	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
531	0.7%	9.7%	0.0%	0.7%	0.0%	0.7%	87.6%
532	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%	93.7%
533	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
541	3.0%	7.4%	3.3%	2.1%	3.0%	4.0%	75.0%
551	1.3%	6.6%	0.4%	0.0%	1.8%	0.9%	88.6%
561	0.9%	1.9%	1.4%	1.4%	2.3%	1.4%	90.1%
562	2.4%	2.4%	6.5%	17.1%	0.8%	0.8%	63.4%
611	0.9%	4.1%	0.0%	1.4%	19.5%	0.0%	70.0%
621	0.0%	0.0%	0.0%	1.2%	4.9%	1.2%	91.5%
622	2.4%	4.8%	2.4%	2.4%	0.0%	0.0%	83.3%
623	0.0%	3.6%	0.0%	3.6%	1.2%	2.4%	89.3%
624	0.0%	0.0%	0.0%	2.6%	7.7%	0.0%	87.2%
711	0.0%	6.7%	6.7%	0.0%	0.0%	0.0%	86.7%
712	0.0%	5.3%	0.0%	0.0%	10.5%	0.0%	73.7%
713	1.1%	3.4%	0.0%	1.7%	0.0%	2.9%	89.7%
721	0.0%	11.1%	0.0%	0.0%	5.6%	0.0%	72.2%
722	0.6%	1.8%	0.0%	1.2%	0.0%	0.0%	93.5%
811	0.0%	4.5%	7.9%	7.9%	1.1%	1.1%	76.4%
812	0.0%	1.4%	1.4%	1.4%	1.4%	0.0%	92.9%
813	0.0%	1.4%	0.0%	4.3%	4.3%	5.7%	82.9%
921	0.0%	5.5%	8.5%	3.0%	1.8%	1.8%	73.8%
922	0.0%	7.4%	0.0%	0.0%	3.7%	0.0%	88.9%
923	0.0%	0.0%	3.4%	3.4%	6.9%	0.0%	86.2%
924	1.8%	0.0%	0.9%	1.8%	0.0%	58.6%	36.0%
925	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	50.0%
926	7.3%	7.3%	0.0%	2.4%	0.0%	14.6%	61.0%
928	0.0%	25.0%	25.0%	0.0%	0.0%	0.0%	50.0%

*3-Digit Sector to Industry Titles can be found on Table A46

Table - A11 Green Industries at the 2-Digit NAICS Level by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
11	Agriculture, Forestry, Fishing and Hunting	10,456	641	6.1%
21	Mining	941	12	1.3%
22	Utilities	9,322	377	4.0%
23	Construction	43,704	6,595	15.1%
31-33	Manufacturing	93,335	6,170	6.6%
42	Wholesale Trade	40,176	4,115	10.2%
44-45	Retail Trade	107,878	642	0.6%
48-49	Transportation and Warehousing	43,692	514	1.2%
51	Information	16,999	82	0.5%
52	Finance and Insurance	52,003	124	0.2%
53	Real Estate and Rental and Leasing	8,857	139	1.6%
54	Professional, Scientific, and Technical Services	43,344	3,998	9.2%
55	Management of Companies and Enterprises	16,536	124	0.7%
56	Administrative and Support and Waste Management and Remediation Services	42,353	2,514	5.9%
61	Educational Services	86,388	704	0.8%
62	Health Care and Social Assistance	130,820	461	0.4%
71	Arts, Entertainment, and Recreation	14,126	87	0.6%
72	Accommodation and Food Services	68,262	298	0.4%
81	Other Services (except Public Administration)	26,387	1,304	4.9%
92	Public Administration	52,986	1,826	3.4%
	Total	**908,565**	**30,727**	**3.4%**

Table - A12 Top 25 Green Industries at the 3-Digit NAICS Level by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
238	Specialty Trade Contractors	32,873	5,454	16.6%
541	Professional, Scientific, and Technical Services	43,344	3,998	9.2%
423	Merchant Wholesalers, Durable Goods	23,670	3,638	15.4%
336	Transportation Equipment Manufacturing	9,458	1,936	20.5%
562	Waste Management and Remediation Services	7,211	1,596	22.1%
924	Administration of Environmental Quality Programs	8,157	1,205	14.8%
333	Machinery Manufacturing	14,186	1,039	7.3%
325	Chemical Manufacturing	13,361	1,006	7.5%
561	Administrative and Support Services	35,142	918	2.6%
237	Heavy and Civil Engineering Construction	7,258	782	10.8%
611	Educational Services	86,388	704	0.8%
811	Repair and Maintenance	8,059	678	8.4%
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	11,493	582	5.1%
424	Merchant Wholesales, Nondurable Goods	14,828	477	3.2%
453	Miscellaneous Store Retailers	4,793	447	9.3%
326	Plastics and Rubber Products Manufacturing	3,463	436	12.6%
322	Paper Manufacturing	2,697	432	16.0%
921	Executive, Legislative, and Other General Government Support	32,929	421	1.3%
334	Computer and Electronic Product Manufacturing	3,527	379	10.7%
221	Utilities	9,322	377	4.0%
484	Truck Transportation	25,798	350	1.4%
236	Construction of Buildings	3,543	328	9.3%
111	Crop Production	3,063	312	10.2%
722	Food Services and Drinking Places	59,435	298	0.5%

Table - A13 Top 25 Green Industries at the 4-Digit NAICS Level by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
2382	Building Equipment Contractors	25,109	4,464	17.8%
5413	Architectural, Engineering, and Related Services	13,727	3,212	23.4%
4239	Miscellaneous Durable Goods Merchant Wholesalers	4,665	2,707	58.0%
3369	Other Transportation Equipment Manufacturing	3,932	1,771	45.0%
9241	Administration of Environmental Quality Programs	8,157	1,205	14.8%
3251	Basic Chemical Manufacturing	3,447	975	28.3%
2381	Foundation, Structure, and Building Exterior Contractors	3,026	841	27.8%
3331	Agriculture, Construction, and Mining Machinery Manufacturing	11,508	840	7.3%
5617	Scientific Research and Development Services	6,530	728	11.1%
5621	Waste Collection	4,291	709	16.5%
5416	Management, Scientific, and Technical Consulting Services	5,382	630	11.7%
8133	Social Advocacy Organizations	1,793	534	29.8%
2371	Utility System Construction	4,105	456	11.1%
5622	Waste Treatment and Disposal	1,174	452	38.5%
4533	Used Merchandise Stores	1,539	447	29.0%
3261	Plastics Product Manufacturing	2,377	436	18.3%
5629	Remediation and Other Waste Management Services	1,747	435	24.9%
3222	Converted Paper Product Manufacturing	2,697	432	16.0%
9211	Executive, Legislative, and Other General Government Support	32,929	421	1.3%
6113	Colleges, Universities, and Professional Schools	13,280	369	2.8%
8111	Automotive Repair and Maintenance	5,749	364	6.3%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	7,589	363	4.8%
2379	Other Heavy and Civil Engineering Construction	1,258	326	25.9%
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	4,577	285	6.2%

Table - A14 Top 25 Green Industries at the 6-Digit NAICS Level by Green Employment

Sector	Industry Title	Total Employment	Green Employment	% of Industry with Green Employment
423930	Recyclable Material Merchant Wholesalers	3,731	2,707	72.6%
541330	Engineering Services	8,115	1,850	22.8%
336999	All Other Transportation Equipment Manufacturing	3,932	1,771	45.0%
238221	Residential Plumbing, Heating, and Air-Conditioning Contractors	7,181	1,603	22.3%
238222	Nonresidential Plumbing, Heating, and Air-Conditioning Contractors	8,718	1,390	15.9%
924120	Administration of Conservation Programs	7,738	1,081	14.0%
541310	Architectural Services	3,054	924	30.3%
333111	Farm Machinery and Equipment Manufacturing	10,131	840	8.3%
238211	Residential Electrical Contractors and Other Wiring Installation Contractors	3,350	686	20.5%
325193	Ethyl Alcohol Manufacturing	2,735	669	24.5%
561720	Janitorial Services	4,457	585	13.1%
562111	Solid Waste Collection	3,248	512	15.8%
813312	Environmental, Conservation and Wildlife Organizations	1,140	510	44.7%
453310	Used Merchandise Stores	1,539	447	29.0%
921140	Executive and Legislative Offices, Combined	32,014	400	1.2%
611310	Colleges, Universities, and Professional Schools	13,280	369	2.8%
237110	Water and Sewer Line and Related Structures Construction	3,071	365	11.9%
541380	Testing Laboratories	1,374	355	25.8%
541690	Other Scientific and Technical Consulting Services	1,872	329	17.6%
237990	Other Heavy and Civil Engineering Construction	1,258	326	25.9%
541620	Environmental Consulting Services	915	301	32.9%
322291	Sanitary Paper Product Manufacturing	298	298	100.0%
423140	Motor Vehicle Parts (Used) Merchant Wholesalers	2,212	285	12.9%
484121	General Freight Trucking, Long-Distance, Truckload	20,627	262	1.3%

Table - A15-1 All Reported Green Occupations by SOC Code

SOC Code	2010 SOC title
13-2011	Accountants and Auditors
11-3011	Administrative Services Managers
19-4011	Agricultural and Food Science Technicians
17-2021	Agricultural Engineers
25-1041	Agricultural Sciences Teachers, Postsecondary
45-2021	Animal Breeders
13-2021	Appraisers and Assessors of Real Estate
17-1011	Architects, Except Landscape and Naval
17-3011	Architectural and Civil Drafters
11-9041	Architectural and Engineering Managers
51-2099	Assemblers and Fabricators, All Other
19-2021	Atmospheric and Space Scientists
49-3023	Automotive Service Technicians and Mechanics
19-4021	Biological Technicians
47-2011	Boilermakers
43-3031	Bookkeeping, Accounting, and Auditing Clerks
47-2021	Brickmasons and Blockmasons
37-2019	Building Cleaning Workers, All Other
13-1199	Business Operations Specialists, All Other
13-1021	Buyers and Purchasing Agents, Farm Products
25-3032	Career/Technical Education Teachers, Secondary School
47-2031	Carpenters
17-1021	Cartographers and Photogrammetrists
35-1011	Chefs and Head Cooks
51-8091	Chemical Plant and System Operators
19-4031	Chemical Technicians
19-2031	Chemists
11-1011	Chief Executives
17-3022	Civil Engineering Technicians
17-2051	Civil Engineers
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders
53-2012	Commercial Pilots
13-1041	Compliance Officers
15-1111	Computer and Information Research Scientists
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic
43-9011	Computer Operators
15-1131	Computer Programmers
15-1121	Computer Systems Analysts
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic
19-1031	Conservation Scientists
47-4099	Construction and Related Workers, All Other
47-2061	Construction Laborers
11-9021	Construction Managers
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door
53-7011	Conveyor Operators and Tenders
13-1051	Cost Estimators
41-2021	Counter and Rental Clerks
53-7021	Crane and Tower Operators

*Continued on next page

Table - A15-2 All Reported Green Occupations by SOC Code

SOC Code	2010 SOC title
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders
43-4051	Customer Service Representatives
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
43-9021	Data Entry Keyers
31-9091	Dental Assistants
17-3019	Drafters, All Other
53-7031	Dredge Operators
53-3031	Driver/Sales Workers
47-5021	Earth Drillers, Except Oil and Gas
11-9039	Education Administrators, All Other
11-9032	Education Administrators, Elementary and Secondary School
11-9031	Education Administrators, Preschool and Childcare Center/Program
51-2022	Electrical and Electronic Equipment Assemblers
17-3012	Electrical and Electronics Drafters
17-3023	Electrical and Electronics Engineering Technicians
17-2071	Electrical Engineers
49-9051	Electrical Power-Line Installers and Repairers
47-2111	Electricians
51-2023	Electromechanical Equipment Assemblers
49-2097	Electronic Home Entertainment Equipment Installers and Repairers
43-4061	Eligibility Interviewers, Government Programs
17-3029	Engineering Technicians, Except Drafters, All Other
17-2199	Engineers, All Other
17-3025	Environmental Engineering Technicians
17-2081	Environmental Engineers
19-4091	Environmental Science and Protection Technicians, Including Health
19-2041	Environmental Scientists and Specialists, Including Health
53-7032	Excavating and Loading Machine and Dragline Operators
43-6011	Executive Secretaries and Executive Administrative Assistants
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders
49-3041	Farm Equipment Mechanics and Service Technicians
11-9013	Farmers, Ranchers, and Other Agricultural Managers**
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals
51-2091	Fiberglass Laminators and Fabricators
11-3031	Financial Managers
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers
43-1011	First-Line Supervisors of Office and Administrative Support Workers
51-1011	First-Line Supervisors of Production and Operating Workers
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders
35-9099	Food Preparation and Serving Related Workers, All Other
51-3099	Food Processing Workers, All Other

*Continued on next page

Table - A15-3 All Reported Green Occupations by SOC Code

SOC Code	2010 SOC title
11-9051	Food Service Managers
19-4093	Forest and Conservation Technicians
45-4011	Forest and Conservation Workers
33-2022	Forest Fire Inspectors and Prevention Specialists
19-1032	Foresters
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic
51-4071	Foundry Mold and Coremakers
51-8092	Gas Plant Operators
11-1021	General and Operations Managers
19-2042	Geoscientists, Except Hydrologists and Geographers
47-2121	Glaziers
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
47-4041	Hazardous Materials Removal Workers
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
21-1091	Health Educators
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
53-3032	Heavy and Tractor-Trailer Truck Drivers
47-3019	Helpers, Construction Trades, All Other
47-3011	Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters
47-3012	Helpers--Carpenters
49-9098	Helpers--Installation, Maintenance, and Repair Workers
51-9198	Helpers--Production Workers
49-9031	Home Appliance Repairers
11-3121	Human Resources Managers
19-2043	Hydrologists
17-2112	Industrial Engineers
49-9041	Industrial Machinery Mechanics
11-3051	Industrial Production Managers
53-7051	Industrial Truck and Tractor Operators
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
49-9099	Installation, Maintenance, and Repair Workers, All Other
47-2131	Insulation Workers, Floor, Ceiling, and Wall
47-2132	Insulation Workers, Mechanical
27-1025	Interior Designers
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners
53-7062	Laborers and Freight, Stock, and Material Movers, Hand
17-1012	Landscape Architects
37-3011	Landscaping and Groundskeeping Workers
51-6011	Laundry and Dry-Cleaning Workers
29-2061	Licensed Practical and Licensed Vocational Nurses
19-4099	Life, Physical, and Social Science Technicians, All Other
13-2072	Loan Officers
51-4041	Machinists
37-2012	Maids and Housekeeping Cleaners
49-9071	Maintenance and Repair Workers, General
13-1111	Management Analysts
11-9199	Managers, All Other
13-1161	Market Research Analysts and Marketing Specialists**
11-2021	Marketing Managers
17-2131	Materials Engineers

*Continued on next page

Table - A15-4 All Reported Green Occupations by SOC Code

SOC Code	2010 SOC title
49-9011	Mechanical Door Repairers
17-3013	Mechanical Drafters
17-2141	Mechanical Engineers
29-2012	Medical and Clinical Laboratory Technicians
29-2011	Medical and Clinical Laboratory Technologists
19-1022	Microbiologists
51-4035	Milling and Planning Machine Setters, Operators, and Tenders, Metal and Plastic
17-2151	Mining and Geological Engineers, Including Mining Safety Engineers
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders
49-3042	Mobile Heavy Equipment Mechanics, Except Engines
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic
25-4013	Museum Technicians and Conservators
11-9121	Natural Sciences Managers
29-9011	Occupational Health and Safety Specialists
43-9061	Office Clerks, General
47-2073	Operating Engineers and Other Construction Equipment Operators
53-7064	Packers and Packagers, Hand
47-2141	Painters, Construction and Maintenance
51-9122	Painters, Transportation Equipment
41-2022	Parts Salespersons
47-2071	Paving, Surfacing, and Tamping Equipment Operators
29-1065	Pediatricians, General
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation
17-2171	Petroleum Engineers
51-8099	Plant and System Operators, All Other
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic
47-2152	Plumbers, Pipefitters, and Steamfitters
33-3051	Police and Sheriff's Patrol Officers
25-1199	Postsecondary Teachers, All Other
51-8013	Power Plant Operators
49-9069	Precision Instrument and Equipment Repairers, All Other
51-5111	Prepress Technicians and Workers
51-9199	Production Workers, All Other
43-5061	Production, Planning, and Expediting Clerks
11-9141	Property, Real Estate, and Community Association Managers
33-9099	Protective Service Workers, All Other
11-2031	Public Relations and Fundraising Managers
27-3031	Public Relations Specialists
53-7072	Pump Operators, Except Wellhead Pumpers
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products
29-2034	Radiologic Technologists
43-4171	Receptionists and Information Clerks
53-7081	Refuse and Recyclable Material Collectors
29-1141	Registered Nurses
47-2171	Reinforcing Iron and Rebar Workers
27-3022	Reporters and Correspondents
41-2031	Retail Salespersons
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic

*Continued on next page

Table - A15-5 All Reported Green Occupations by SOC Code

SOC Code	2010 SOC title
47-2181	Roofers
47-5012	Rotary Drill Operators, Oil and Gas
41-9031	Sales Engineers
11-2022	Sales Managers
41-3099	Sales Representatives, Services, All Other
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
25-2031	Secondary School Teachers, Except Special and Career/Technical Education
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
41-3031	Securities, Commodities, and Financial Services Sales Agents
49-2098	Security and Fire Alarm Systems Installers
25-3021	Self-Enrichment Education Teachers
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners
47-2211	Sheet Metal Workers
43-5071	Shipping, Receiving, and Traffic Clerks
19-3099	Social Scientists and Related Workers, All Other
19-1013	Soil and Plant Scientists
51-8021	Stationary Engineers and Boiler Operators
43-5081	Stock Clerks and Order Fillers
47-2221	Structural Iron and Steel Workers
51-2041	Structural Metal Fabricators and Fitters
17-3031	Surveying and Mapping Technicians
17-1022	Surveyors
25-3099	Teachers and Instructors, All Other
51-2092	Team Assemblers
49-9052	Telecommunications Line Installers and Repairers
51-2093	Timing Device Assemblers and Adjusters
49-3093	Tire Repairers and Changers
53-6041	Traffic Technicians
13-1151	Training and Development Specialists
53-6099	Transportation Workers, All Other
11-3071	Transportation, Storage, and Distribution Managers
51-6093	Upholsterers
19-3051	Urban and Regional Planners
25-1194	Vocational Education Teachers, Postsecondary
35-3031	Waiters and Waitresses
51-8031	Water and Wastewater Treatment Plant and System Operators
51-4121	Welders, Cutters, Solderers, and Brazers
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders
13-1022	Wholesale and Retail Buyers, Except Farm Products
49-9081	Wind Turbine Service Technicians
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing
19-1023	Zoologists and Wildlife Biologists

Table - A16 All Occupations Listed Under the Green Economic Category 'Renewable Energy and Alternative Fuels'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**5,018**	**30,725**	**16.3%**
53-7051	Industrial Truck and Tractor Operators	1,860	1,860	100.0%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	357	1,632	21.9%
51-1011	First-Line Supervisors of Production and Operating Workers	331	1,037	31.9%
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	285	308	92.6%
11-1021	General and Operations Managers	285	846	33.8%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	263	626	42.0%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	117	117	100.0%
99-9998	Non-disclosed Job Title	113	450	25.1%
53-3032	Heavy and Tractor-Trailer Truck Drivers	99	638	15.6%
17-2071	Electrical Engineers	97	97	100.0%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	89	250	35.4%
17-2051	Civil Engineers	79	305	26.0%
51-8021	Stationary Engineers and Boiler Operators	79	79	100.0%
51-2022	Electrical and Electronic Equipment Assemblers	68	81	84.6%
17-2112	Industrial Engineers	63	160	39.3%
53-3031	Driver/Sales Workers	62	62	100.0%
47-5021	Earth Drillers, Except Oil and Gas	56	70	80.0%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	55	353	15.6%
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	53	182	29.0%
17-3022	Civil Engineering Technicians	47	51	92.1%
35-9099	Food Preparation and Serving Related Workers, All Other	45	45	100.0%
17-1011	Architects, Except Landscape and Naval	45	430	10.4%
51-4121	Welders, Cutters, Solderers, and Brazers	43	242	18.0%
13-1111	Management Analysts	39	157	25.1%
47-2152	Plumbers, Pipefitters, and Steamfitters	39	549	7.1%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	38	72	52.3%
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	36	36	100.0%
11-3051	Industrial Production Managers	33	33	100.0%
11-9013	Farmers, Ranchers, and Other Agricultural Managers	29	106	27.9%
47-2073	Operating Engineers and Other Construction Equipment Operators	22	552	4.0%
17-2141	Mechanical Engineers	22	828	2.7%
51-8091	Chemical Plant and System Operators	19	25	74.9%
43-4051	Customer Service Representatives	18	35	52.5%
19-2041	Environmental Scientists and Specialists, Including Health	14	629	2.2%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	13	111	12.0%
11-9021	Construction Managers	13	38	33.9%
19-2031	Chemists	12	12	100.0%
19-2021	Atmospheric and Space Scientists	12	12	100.0%
35-1011	Chefs and Head Cooks	10	11	88.9%
49-9081	Wind Turbine Service Technicians	9	88	10.5%
51-8099	Plant and System Operators, All Other	7	7	100.0%
11-3031	Financial Managers	6	6	100.0%
53-7081	Refuse and Recyclable Material Collectors	6	255	2.2%
49-9051	Electrical Power-Line Installers and Repairers	5	36	14.5%
47-2111	Electricians	5	1,141	0.4%
49-9071	Maintenance and Repair Workers, General	4	352	1.2%
19-2042	Geoscientists, Except Hydrologists and Geographers	4	43	8.3%
47-4099	Construction and Related Workers, All Other	3	62	5.6%
11-9199	Managers, All Other	3	188	1.4%
13-1199	Business Operations Specialists, All Other	2	242	0.8%
13-1022	Wholesale and Retail Buyers, Except Farm Products	1	20	7.5%

Table - A17-1 All Occupations Listed Under the Green Economic Category 'Energy Efficiency and Conservation'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**9,332**	**30,725**	**30.4%**
51-2092	Team Assemblers	1,771	2,081	85.1%
47-2111	Electricians	1,016	1,141	89.1%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	913	1,632	55.9%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	822	940	87.5%
17-1011	Architects, Except Landscape and Naval	362	430	84.2%
47-2152	Plumbers, Pipefitters, and Steamfitters	339	549	61.8%
17-2141	Mechanical Engineers	310	828	37.4%
13-1051	Cost Estimators	279	279	100.0%
47-2031	Carpenters	245	247	99.0%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	197	298	66.1%
13-2021	Appraisers and Assessors of Real Estate	192	192	100.0%
51-1011	First-Line Supervisors of Production and Operating Workers	184	1,037	17.7%
49-9041	Industrial Machinery Mechanics	182	186	97.9%
49-9071	Maintenance and Repair Workers, General	152	352	43.3%
51-2099	Assemblers and Fabricators, All Other	149	149	100.0%
47-2121	Glaziers	129	129	100.0%
53-7021	Crane and Tower Operators	129	129	100.0%
47-2131	Insulation Workers, Floor, Ceiling, and Wall	123	123	100.0%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	122	626	19.5%
47-2021	Brickmasons and Blockmasons	117	117	100.0%
11-1021	General and Operations Managers	111	846	13.1%
53-6099	Transportation Workers, All Other	106	106	100.0%
15-1131	Computer Programmers	101	101	100.0%
17-3011	Architectural and Civil Drafters	98	134	73.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	92	178	51.4%
17-2051	Civil Engineers	92	305	30.0%
13-1199	Business Operations Specialists, All Other	82	242	33.9%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	81	111	73.0%
41-2031	Retail Salespersons	71	118	59.6%
51-2023	Electromechanical Equipment Assemblers	67	67	100.0%
49-9031	Home Appliance Repairers	62	62	100.0%
47-4099	Construction and Related Workers, All Other	52	62	83.8%
11-9041	Architectural and Engineering Managers	49	49	100.0%
51-2093	Timing Device Assemblers and Adjusters	48	48	100.0%
17-3029	Engineering Technicians, Except Drafters, All Other	43	43	100.0%
49-9081	Wind Turbine Service Technicians	39	88	44.4%
49-9011	Mechanical Door Repairers	37	37	100.0%
51-4121	Welders, Cutters, Solderers, and Brazers	36	242	14.8%
49-9051	Electrical Power-Line Installers and Repairers	30	36	85.5%
37-3011	Landscaping and Groundskeeping Workers	23	165	14.0%
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	23	308	7.4%
49-9098	Helpers—Installation, Maintenance, and Repair Workers	22	22	100.0%
11-9021	Construction Managers	19	38	50.7%
41-2021	Counter and Rental Clerks	19	19	100.0%
43-4171	Receptionists and Information Clerks	17	33	52.1%
17-3023	Electrical and Electronic Engineering Technicians	15	15	100.0%
43-4051	Customer Service Representatives	15	35	42.5%
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	14	14	100.0%
51-2022	Electrical and Electronic Equipment Assemblers	13	81	15.4%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	12	582	2.0%
13-2011	Accountants and Auditors	12	12	100.0%

Table - A17-2 All Occupations Listed Under the Green Economic Category 'Energy Efficiency and Conservation'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
49-2097	Electronic Home Entertainment Equipment Installers and Repairers	11	11	100.0%
47-2132	Insulation Workers, Mechanical	11	11	100.0%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	10	115	8.7%
47-2061	Construction Laborers	9	17	56.2%
47-2171	Reinforcing Iron and Rebar Workers	9	9	100.0%
17-2112	Industrial Engineers	8	160	5.2%
25-2032	Career/Technical Education Teachers, Secondary School	7	9	75.4%
53-7072	Pump Operators, Except Wellhead Pumpers	7	19	36.0%
43-4061	Eligibility Interviewers, Government Programs	7	7	100.0%
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	6	6	100.0%
17-1012	Landscape Architects	5	34	14.6%
47-2073	Operating Engineers and Other Construction Equipment Operators	4	552	0.8%
11-2021	Marketing Managers	3	3	100.0%
17-3022	Civil Engineering Technicians	2	51	4.7%
11-9199	Managers, All Other	1	188	0.7%

Table - A18 All Occupations Listed Under the Green Economic Category 'Education, Regulation, Compliance, Public Awareness, and Training and Energy Trading'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**1,927**	**30,725**	**6.3%**
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	361	582	62.1%
11-3011	Administrative Services Managers	360	362	99.6%
11-1011	Chief Executives	244	542	45.0%
25-3099	Teachers and Instructors, All Other	179	179	100.0%
49-9071	Maintenance and Repair Workers, General	145	352	41.2%
99-9998	Non-disclosed Job Title	116	450	25.8%
13-1199	Business Operations Specialists, All Other	113	242	46.7%
13-1111	Management Analysts	70	157	44.4%
13-1041	Compliance Officers	48	82	58.8%
25-1199	Postsecondary Teachers, All Other	36	36	100.0%
25-2021	Elementary School Teachers, Except Special Education	33	33	100.0%
13-1151	Training and Development Specialists	29	29	100.0%
53-6041	Traffic Technicians	27	27	100.0%
25-1194	Vocational Education Teachers, Postsecondary	25	34	72.7%
13-1022	Wholesale and Retail Buyers, Except Farm Products	18	20	92.5%
11-9031	Education Administrators, Preschool and Childcare Center/Program	17	17	100.0%
17-2051	Civil Engineers	14	305	4.5%
11-1021	General and Operations Managers	12	846	1.4%
51-1011	First-Line Supervisors of Production and Operating Workers	11	1,037	1.1%
19-3051	Urban and Regional Planners	11	24	46.0%
11-3121	Human Resource Managers	9	9	100.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	9	178	5.1%
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	8	28	29.6%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	7	111	6.6%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	7	24	28.9%
33-9099	Protective Service Workers, All Other	5	5	100.0%
11-9032	Education Administrators, Elementary and Secondary School	3	3	100.0%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	3	47	5.5%
25-2032	Career/Technical Education Teachers, Secondary School	2	9	24.6%
27-3031	Public Relations Specialists	2	242	0.9%
43-4051	Customer Service Representatives	2	35	5.0%
47-4099	Construction and Related Workers, All Other	1	62	1.6%

Table - A19 All Occupations Listed Under the Green Economic Category 'Pollution, Waste, and Greenhouse Gas (GHG) Management, Prevention, and Reduction'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**2,991**	**30,725**	**9.7%**
19-2041	Environmental Scientists and Specialists, Including Health	424	629	67.5%
11-1011	Chief Executives	298	542	55.0%
47-5012	Rotary Drill Operators, Oil and Gas	192	192	100.0%
53-3032	Heavy and Tractor-Trailer Truck Drivers	184	638	28.9%
51-1011	First-Line Supervisors of Production and Operating Workers	180	1,037	17.4%
51-2092	Team Assemblers	153	2,081	7.4%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	148	342	43.1%
51-8031	Water and Wastewater Treatment Plant and System Operators	145	265	54.8%
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	129	182	71.0%
11-9199	Managers, All Other	119	188	63.2%
17-2051	Civil Engineers	85	305	28.0%
19-4091	Environmental Science and Protection Technicians, Including Health	81	122	66.0%
17-2112	Industrial Engineers	63	160	39.7%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	60	250	24.2%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	60	60	100.0%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	56	582	9.6%
11-1021	General and Operations Managers	55	846	6.5%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	54	626	8.7%
53-7081	Refuse and Recyclable Material Collectors	52	255	20.3%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	47	1,632	2.8%
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	40	66	60.7%
47-2152	Plumbers, Pipefitters, and Steamfitters	38	549	7.0%
49-3023	Automotive Service Technicians and Mechanics	38	319	11.8%
17-3011	Architectural and Civil Drafters	36	134	27.0%
47-2141	Painters, Construction and Maintenance	36	51	70.5%
99-9998	Non-disclosed Job Title	34	450	7.6%
13-1041	Compliance Officers	26	82	32.0%
51-9198	Helpers—Production Workers	25	42	59.5%
17-2081	Environmental Engineers	17	94	17.9%
37-2012	Maids and Housekeeping Cleaners	15	24	61.9%
19-3099	Social Scientists and Related Workers, All Other	15	15	100.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	14	552	2.5%
51-9199	Production Workers, All Other	14	335	4.2%
17-3025	Environmental Engineering Technicians	12	12	100.0%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	11	353	3.2%
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	8	8	100.0%
51-8013	Power Plant Operators	8	8	100.0%
11-9121	Natural Sciences Managers	7	223	3.1%
11-9021	Construction Managers	6	38	15.4%
47-4041	Hazardous Materials Removal Workers	3	226	1.4%
13-1199	Business Operations Specialists, All Other	2	242	0.9%

Table - A20 All Ocupation Listed Under the Green Economic Category 'Environmental Cleanup and Restoration and Waste Cleanup and Mitigation'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**2,559**	**30,725**	**8.3%**
43-5081	Stock Clerks and Order Fillers	447	447	100.0%
47-4041	Hazardous Materials Removal Workers	223	226	98.6%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	211	211	100.0%
53-3032	Heavy and Tractor-Trailer Truck Drivers	176	638	27.7%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	174	626	27.8%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	137	342	40.0%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	132	1,632	8.1%
31-9091	Dental Assistants	109	109	100.0%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	101	298	33.9%
51-1011	First-Line Supervisors of Production and Operating Workers	96	1,037	9.2%
29-2012	Medical and Clinical Laboratory Technicians	89	137	64.9%
51-6093	Upholsterers	60	60	100.0%
17-2081	Environmental Engineers	58	94	61.9%
19-4091	Environmental Science and Protection Technicians, Including Health	42	122	34.0%
51-9199	Production Workers, All Other	41	335	12.3%
17-3031	Surveying and Mapping Technicians	41	41	100.0%
19-2042	Geoscientists, Except Hydrologists and Geographers	40	43	91.7%
53-7081	Refuse and Recyclable Material Collectors	39	255	15.2%
13-1199	Business Operations Specialists, All Other	36	242	14.8%
19-2041	Environmental Scientists and Specialists, Including Health	35	629	5.5%
37-3011	Landscaping and Groundskeeping Workers	27	165	16.2%
19-1013	Soil and Plant Scientists	27	126	21.0%
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	26	66	39.3%
27-3031	Public Relations Specialists	22	242	9.2%
41-3099	Sales Representatives, Services, All Other	17	17	100.0%
43-4171	Receptionists and Information Clerks	16	33	47.9%
47-2141	Painters, Construction and Maintenance	15	51	29.5%
37-2019	Building Cleaning Workers, All Other	14	14	100.0%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	14	82	17.3%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	14	24	58.9%
53-7072	Pump Operators, Except Wellhead Pumpers	12	19	64.0%
29-1141	Registered Nurses	10	10	100.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	10	552	1.7%
25-1194	Vocational Education Teachers, Postsecondary	9	34	27.3%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	9	940	1.0%
49-9052	Telecommunications Line Installers and Repairers	9	9	100.0%
99-9998	Non-disclosed Job Title	8	450	1.7%
53-7032	Excavating and Loading Machine and Dragline Operators	7	7	100.0%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	5	111	4.7%

Table - A21 All Occupation Listed Under the Green Economic Category 'Sustainable Agriculture and Natural Resource Conservation'

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**4,232**	**30,725**	**13.8%**
17-2141	Mechanical Engineers	496	828	59.9%
19-4093	Forest and Conservation Technicians	403	403	100.0%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	241	353	68.2%
11-9121	Natural Sciences Managers	216	223	96.9%
19-1031	Conservation Scientists	207	207	100.0%
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	194	194	100.0%
27-1025	Interior Designers	175	175	100.0%
99-9998	Non-disclosed Job Title	166	450	36.9%
21-1091	Health Educators	161	161	100.0%
49-3041	Farm Equipment Mechanics and Service Technicians	143	257	55.6%
19-2041	Environmental Scientists and Specialists, Including Health	126	629	20.0%
51-4121	Welders, Cutters, Solderers, and Brazers	125	242	51.9%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	105	115	91.3%
53-3032	Heavy and Tractor-Trailer Truck Drivers	102	638	16.1%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	101	250	40.4%
19-1013	Soil and Plant Scientists	100	126	79.0%
19-4011	Agricultural and Food Science Technicians	98	98	100.0%
11-1021	General and Operations Managers	88	846	10.5%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	78	178	43.5%
11-9013	Farmers, Ranchers, and Other Agricultural Managers	76	106	72.1%
51-5111	Prepress Technicians and Workers	75	75	100.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	68	552	12.3%
11-9199	Managers, All Other	65	188	34.6%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	64	82	77.9%
37-3011	Landscaping and Groundskeeping Workers	61	165	36.8%
27-3031	Public Relations Specialists	54	242	22.5%
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles	45	45	100.0%
51-8031	Water and Wastewater Treatment Plant and System Operators	41	265	15.6%
13-2072	Loan Officers	41	41	100.0%
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	31	31	100.0%
47-2011	Boilermakers	31	31	100.0%
17-1012	Landscape Architects	29	34	85.4%
47-2111	Electricians	24	1,141	2.1%
19-2043	Hydrologists	24	24	100.0%
45-4011	Forest and Conservation Workers	21	21	100.0%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	16	940	1.7%
53-2012	Commercial Pilots	16	16	100.0%
51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, and Tenders, Metal & Plastic	14	14	100.0%
19-3051	Urban and Regional Planners	13	24	54.0%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	12	626	2.0%
43-9021	Data Entry Keyers	12	12	100.0%
49-9071	Maintenance and Repair Workers, General	11	352	3.3%
19-1023	Zoologists and Wildlife Biologists	11	11	100.0%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	11	47	23.4%
17-2051	Civil Engineers	11	305	3.5%
51-1011	First-Line Supervisors of Production and Operating Workers	10	1,037	0.9%
17-1022	Surveyors	9	9	100.0%
47-2061	Construction Laborers	7	17	43.8%
53-7011	Conveyor Operators and Tenders	3	3	100.0%
35-1011	Chefs and Head Cooks	1	11	11.1%

Table - A22

All Occupations Listed Under the 'None' Option

SOC Code	SOC Occupation Title	Occupational Employment within Industry	Total Occupational Employment	% of Occupation within Industry
	Total	**1,469**	**30,725**	**4.8%**
11-1021	General and Operations Managers	251	846	29.6%
51-9199	Production Workers, All Other	218	335	65.1%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	153	582	26.4%
53-7081	Refuse and Recyclable Material Collectors	125	255	48.8%
41-3031	Securities, Commodities, and Financial Services Sales Agents	106	106	100.0%
51-2092	Team Assemblers	79	2,081	3.8%
49-3023	Automotive Service Technicians and Mechanics	72	319	22.6%
41-9031	Sales Engineers	56	145	39.0%
47-2111	Electricians	56	1,141	4.9%
27-3031	Public Relations Specialists	48	242	20.0%
13-1111	Management Analysts	48	157	30.5%
49-9099	Installation, Maintenance, and Repair Workers, All Other	36	128	28.3%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	33	47	71.0%
37-3011	Landscaping and Groundskeeping Workers	24	165	14.6%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	22	353	6.3%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	22	22	100.0%
25-4013	Museum Technicians and Conservators	21	21	100.0%
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	20	28	70.4%
47-2152	Plumbers, Pipefitters, and Steamfitters	14	549	2.5%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	14	342	4.0%
99-9998	Non-disclosed Job Title	13	450	2.9%
51-1011	First-Line Supervisors of Production and Operating Workers	11	1,037	1.1%
37-2012	Maids and Housekeeping Cleaners	9	24	38.1%
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	7	7	100.0%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	4	111	3.6%
13-1041	Compliance Officers	4	82	4.5%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	3	24	12.2%

Table - A23 Top Five Green Occupations for the Remaining Top Ten Industries

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Administrative and Support and Waste Management and Remediation Services	**2,514**	**30,725**	**8.2%**
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	532	582	91.5%
53-7081	Refuse and Recyclable Material Collectors	255	255	100.0%
53-3032	Heavy and TractorTrailer Truck Drivers	176	638	27.7%
47-4041	Hazardous Materials Removal Workers	167	226	73.6%
11-1021	General and Operations Managers	153	846	18.1%
	Other Services (except Public Administration)	**1,304**	**30,725**	**4.2%**
49-3023	Automotive Service Technicians and Mechanics	288	319	90.2%
11-1011	Chief Executives	244	542	45.0%
11-9121	Natural Sciences Managers	191	223	85.6%
49-9041	Industrial Machinery Mechanics	178	186	95.8%
27-3031	Public Relations Specialists	119	242	49.5%
	Utilities	**377**	**30,725**	**1.2%**
13-1111	Management Analysts	39	157	25.1%
17-3022	Civil Engineering Technicians	39	51	75.9%
43-4051	Customer Service Representatives	35	35	100.0%
13-1199	Business Operations Specialists, All Other	34	242	14.2%
51-8031	Water and Wastewater Treatment Plant and System Operators	34	265	12.9%
	Public Administration	**1,824**	**30,725**	**5.9%**
19-4093	Forest and Conservation Technicians	400	403	99.2%
19-2041	Environmental Scientists and Specialists, Including Health	323	629	51.3%
19-1031	Conservation Scientists	157	207	76.2%
11-1021	General and Operations Managers	121	846	14.3%
99-9998	Job Title Undisclosed	120	450	26.7%
	Real Estate and Rental and Leasing	**105**	**30,725**	**0.3%**
47-1011	First Line Supervisors of Construction Trades and Extraction Workers	71	940	7.6%
41-2021	Counter and Rental Clerks	19	19	100.0%
49-9071	Maintenance and Repair Workers, General	9	352	2.5%
47-2031	Carpenters	6	247	2.5%

Table - A24 All Occupations Listed within Agriculture, Forestry, Fishing, and Hunting

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**642**	**30,725**	**2.1%**
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	305	353	86.5%
11-9013	Farmers, Ranchers, and Other Agricultural Managers	106	106	100.0%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	60	60	100.0%
99-9998	Undisclosed Job Title	54	450	11.9%
19-1013	Soil and Plant Scientists	22	126	17.3%
37-3011	Landscaping and Groundskeeping Workers	21	165	12.7%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	18	115	15.7%
53-2012	Commercial Pilots	16	16	100.0%
53-7072	Pump Operators, Except Wellhead Pumpers	12	19	64.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	10	552	1.7%
11-1021	General and Operations Managers	5	846	0.5%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	4	626	0.7%
53-7011	Conveyor Operators and Tenders	3	3	100.0%
11-9121	Natural Sciences Managers	3	223	1.5%
19-4093	Forest and Conservation Technicians	3	403	0.8%

Table - A25 All Occupations Listed within Mining

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**12**	**30,725**	**0.0%**
53-7032	Excavating and Loading Machine and Dragline Operators	7	7	100.0%
27-3031	Public Relations Specialists	4	242	1.5%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1	626	0.2%

Table - A26 All Occupations Listed within Utilities

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**377**	**30,725**	**1.2%**
13-1111	Management Analysts	39	157	25.1%
17-3022	Civil Engineering Technicians	39	51	75.9%
43-4051	Customer Service Representatives	35	35	100.0%
13-1199	Business Operations Specialists, All Other	34	242	14.2%
51-8031	Water and Wastewater Treatment Plant and System Operators	34	265	12.9%
19-4091	Environmental Science and Protection Technicians, Including Health	31	122	25.0%
51-1011	First-Line Supervisors of Production and Operating Workers	27	1,037	2.6%
51-8091	Chemical Plant and System Operators	19	25	74.9%
13-1022	Wholesale and Retail Buyers, Except Farm Products	18	20	92.5%
51-8021	Stationary Engineers and Boiler Operators	15	79	19.1%
11-1021	General and Operations Managers	11	846	1.3%
49-3041	Farm Equipment Mechanics and Service Technicians	10	257	3.8%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	9	1,632	0.6%
51-8013	Power Plant Operators	8	8	100.0%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	7	111	6.6%
51-8099	Plant and System Operators, All Other	7	7	100.0%
47-4099	Construction and Related Workers, All Other	6	62	9.0%
49-9051	Electrical Power Line Installers and Repairers	5	36	14.5%
19-2041	Environmental Scientists and Specialists, Including Health	5	629	0.8%
11-9199	Managers, All Other	4	188	2.2%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	4	353	1.1%
49-9041	Industrial Machinery Mechanics	4	186	2.1%
11-2021	Marketing Managers	3	3	100.0%
27-3031	Public Relations Specialists	2	242	0.9%

Table - A27

All Occupations Listed within Construction

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**6,594**	**30,725**	**21.5%**
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,623	1,632	99.4%
47-2111	Electricians	1,133	1,141	99.4%
47-2152	Plumbers, Pipefitters, and Steamfitters	453	549	82.5%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	453	940	48.1%
13-1051	Cost Estimators	279	279	100.0%
17-2141	Mechanical Engineers	274	828	33.1%
47-2031	Carpenters	148	247	60.0%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	129	626	20.6%
53-7021	Crane and Tower Operators	129	129	100.0%
99-9998	Undisclosed Job Titles	127	450	28.2%
47-2121	Glaziers	126	129	97.5%
47-2131	Insulation Workers, Floor, Ceiling, and Wall	123	123	100.0%
47-2021	Brickmasons and Blockmasons	117	117	100.0%
51-2099	Assemblers and Fabricators, All Other	111	149	74.5%
47-2073	Operating Engineers and Other Construction Equipment Operators	109	552	19.7%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	94	111	85.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical & Scientific Products	92	178	51.4%
51-1011	First-Line Supervisors of Production and Operating Workers	84	1,037	8.1%
51-4121	Welders, Cutters, Solderers, and Brazers	81	242	33.3%
47-5021	Earth Drillers, Except Oil and Gas	70	70	100.0%
49-9081	Wind Turbine Service Technicians	64	88	72.8%
49-9031	Home Appliance Repairers	62	62	100.0%
19-4091	Environmental Science and Protection Technicians, Including Health	50	122	41.0%
19-1031	Conservation Scientists	49	207	23.8%
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles	45	45	100.0%
49-3041	Farm Equipment Mechanics and Service Technicians	39	257	15.1%
11-9021	Construction Managers	38	38	100.0%
11-1021	General and Operations Managers	38	846	4.5%
49-9011	Mechanical Door Repairers	37	37	100.0%
47-2141	Painters, Construction and Maintenance	36	51	70.5%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	34	72	47.7%
47-4099	Construction and Related Workers, All Other	32	62	52.0%
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	31	31	100.0%
47-2011	Boilermakers	31	31	100.0%
49-9051	Electrical Power Line Installers and Repairers	30	36	85.5%
49-9098	Helpers—Installation, Maintenance, and Repair Workers	22	22	100.0%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	19	353	5.3%
47-2061	Construction Laborers	17	17	100.0%
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	14	14	100.0%
51-9199	Production Workers, All Other	14	335	4.2%
19-2041	Environmental Scientists and Specialists, Including Health	14	629	2.2%
37-3011	Landscaping and Groundskeeping Workers	13	165	7.9%
13-2011	Accountants and Auditors	12	12	100.0%
49-2097	Electronic Home Entertainment Equipment Installers and Repairers	11	11	100.0%
47-2132	Insulation Workers, Mechanical	11	11	100.0%
51-8031	Water and Wastewater Treatment Plant and System Operators	10	265	3.9%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	10	115	8.7%
49-9052	Telecommunications Line Installers and Repairers	9	9	100.0%
53-3032	Heavy and Tractor Trailer Truck Drivers	9	638	1.4%
47-2171	Reinforcing Iron and Rebar Workers	9	9	100.0%
53-7072	Pump Operators, Except Wellhead Pumpers	7	19	36.0%
11-3031	Financial Managers	6	6	100.0%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	6	47	12.6%
17-1012	Landscape Architects	5	34	14.6%
47-4041	Hazardous Materials Removal Workers	3	226	1.1%
17-3022	Civil Engineering Technicians	2	51	4.7%
17-2071	Electrical Engineers	2	97	2.0%

Table - A28

All Occupations Listed within Manufacturing

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**6,171**	**30,725**	**20.1%**
51-2092	Team Assemblers	2,081	2,081	100.0%
51-1011	First-Line Supervisors of Production and Operating Workers	551	1,037	53.1%
17-2141	Mechanical Engineers	496	828	59.9%
51-4072	Molding, Coremaking, & Casting Machine Setters, Operators, and Tenders, Metal & Plastic	308	308	100.0%
11-1011	Chief Executives	298	542	55.0%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	266	626	42.5%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	250	250	100.0%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	197	298	66.1%
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	194	194	100.0%
11-1021	General and Operations Managers	132	846	15.7%
17-2112	Industrial Engineers	128	160	79.9%
51-4121	Welders, Cutters, Solderers, and Brazers	125	242	51.9%
51-9061	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	117	117	100.0%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	115	115	100.0%
11-9199	Managers, All Other	113	188	60.1%
51-2022	Electrical and Electronic Equipment Assemblers	81	81	100.0%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	73	342	21.4%
51-2023	Electromechanical Equipment Assemblers	67	67	100.0%
51-8021	Stationary Engineers and Boiler Operators	64	79	80.9%
51-9199	Production Workers, All Other	62	335	18.4%
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	53	182	29.0%
47-2031	Carpenters	51	247	20.8%
11-9041	Architectural and Engineering Managers	49	49	100.0%
51-9198	Helpers—Production Workers	42	42	100.0%
51-8031	Water and Wastewater Treatment Plant and System Operators	41	265	15.3%
49-9071	Maintenance and Repair Workers, General	39	352	11.1%
51-2099	Assemblers and Fabricators, All Other	38	149	25.5%
51-9012	Separating, Filtering, Clarifying, Precipitating, & Still Machine Setters, Operators, & Tenders	36	36	100.0%
17-3011	Architectural and Civil Drafters	30	134	22.6%
17-3023	Electrical and Electronic Engineering Technicians	15	15	100.0%
19-2031	Chemists	12	12	100.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	9	178	5.1%
47-2111	Electricians	7	1,141	0.6%
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	7	7	100.0%
13-1041	Compliance Officers	6	82	7.4%
19-2041	Environmental Scientists and Specialists, Including Health	6	629	1.0%
37-3011	Landscaping and Groundskeeping Workers	5	165	3.1%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	2	115	1.9%
13-1199	Business Operations Specialists, All Other	2	242	0.9%

Table - A29 All Occupations Listed within Wholesale Trade

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**4,115**	**30,725**	**13.4%**
53-7051	Industrial Truck and Tractor Operators	1,860	1,860	100.0%
47-2073	Operating Engineers and Other Construction Equipment Operators	433	552	78.5%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	211	211	100.0%
53-3032	Heavy and Tractor Trailer Truck Drivers	202	638	31.6%
51-9199	Production Workers, All Other	193	335	57.6%
51-1011	First-Line Supervisors of Production and Operating Workers	166	1,037	16.0%
11-1021	General and Operations Managers	155	846	18.4%
49-3041	Farm Equipment Mechanics and Service Technicians	133	257	51.8%
27-3031	Public Relations Specialists	115	242	47.5%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	115	342	33.5%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	101	298	33.9%
49-9099	Installation, Maintenance, and Repair Workers, All Other	92	128	71.7%
41-9031	Sales Engineers	88	145	61.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical & Scientific Products	78	178	43.5%
41-2031	Retail Salespersons	71	118	59.6%
19-4011	Agricultural and Food Science Technicians	38	98	39.3%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	38	72	52.3%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	19	582	3.3%
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	4	4	100.0%
47-2031	Carpenters	4	247	1.5%

Table - A30 All Occupations Listed within Retail Trade

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**642**	**30,725**	**2.1%**
43-5081	Stock Clerks and Order Fillers	447	447	100.0%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	141	626	22.6%
49-3023	Automotive Service Technicians and Mechanics	31	319	9.8%
25-3099	Teachers and Instructors, All Other	18	179	9.9%
11-1021	General and Operations Managers	5	846	0.5%

Table - A31 All Occupations Listed within Trasportation and Warehousing

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**514**	**30,725**	**1.7%**
53-3032	Heavy and Tractor Trailer Truck Drivers	250	638	39.3%
53-6099	Transportation Workers, All Other	106	106	100.0%
49-9071	Maintenance and Repair Workers, General	78	352	22.0%
53-3031	Driver/Sales Workers	36	62	58.3%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	22	22	100.0%
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	8	8	100.0%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	8	582	1.3%
11-9199	Managers, All Other	6	188	3.2%

Table - A32 All Occupations Listed within Information

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**82**	**30,725**	**0.3%**
41-9031	Sales Engineers	56	145	39.0%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	24	24	100.0%
13-1199	Business Operations Specialists, All Other	1	242	0.5%

Table - A33 All Occupations Listed within Finance and Insurance

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**124**	**30,725**	**0.4%**
41-3031	Securities, Commodities, and Financial Services Sales Agents	106	106	100.0%
11-9039	Education Administrators, All Other	16	16	100.0%
11-3011	Administrative Services Managers	2	362	0.4%

Table - A34 All Occupations Listed within Real Estate and Rental and Leasing

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**105**	**30,725**	**0.3%**
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	71	940	7.6%
41-2021	Counter and Rental Clerks	19	19	100.0%
49-9071	Maintenance and Repair Workers, General	9	352	2.5%
47-2031	Carpenters	6	247	2.5%

Table - A35 All Occupations Listed within Management of Companies and Enterprises

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**87**	**30,725**	**0.3%**
51-1011	First-Line Supervisors of Production and Operating Workers	50	1,037	4.8%
11-1021	General and Operations Managers	12	846	1.4%
17-2081	Environmental Engineers	7	94	7.4%
43-4061	Eligibility Interviewers, Government Programs	7	7	100.0%
13-1199	Business Operations Specialists, All Other	4	242	1.8%
49-9071	Maintenance and Repair Workers, General	4	352	1.2%
25-1194	Vocational Education Teachers, Postsecondary	1	34	4.4%
13-1022	Wholesale and Retail Buyers, Except Farm Products	1	20	7.5%

Table - A36 All Occupations Listed within Professional, Scientific, and Technical Services

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**3,998**	**30,725**	**13.0%**
17-1011	Architects, Except Landscape and Naval	430	430	100.0%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	369	940	39.2%
17-2051	Civil Engineers	305	305	100.0%
19-2041	Environmental Scientists and Specialists, Including Health	247	629	39.3%
13-1199	Business Operations Specialists, All Other	192	242	79.3%
13-2021	Appraisers and Assessors of Real Estate	192	192	100.0%
47-5012	Rotary Drill Operators, Oil and Gas	192	192	100.0%
27-1025	Interior Designers	175	175	100.0%
11-1021	General and Operations Managers	163	846	19.2%
17-2199	Engineers, All Other	143	143	100.0%
13-1111	Management Analysts	118	157	74.9%
51-1011	First-Line Supervisors of Production and Operating Workers	115	1,037	11.1%
19-1013	Soil and Plant Scientists	104	126	82.7%
17-3011	Architectural and Civil Drafters	104	134	77.4%
15-1131	Computer Programmers	101	101	100.0%
17-2081	Environmental Engineers	87	94	92.6%
13-1041	Compliance Officers	72	82	88.1%
17-2141	Mechanical Engineers	58	828	7.0%
19-4011	Agricultural and Food Science Technicians	55	98	56.6%
47-4041	Hazardous Materials Removal Workers	54	226	23.8%
29-2012	Medical and Clinical Laboratory Technicians	48	137	35.1%
51-2093	Timing Device Assemblers and Adjusters	48	48	100.0%
41-2031	Retail Salespersons	48	118	40.4%
99-9998	Undisclosed Job Titles	44	450	9.8%
19-2042	Geoscientists, Except Hydrologists and Geographers	43	43	100.0%
17-3029	Engineering Technicians, Except Drafters, All Other	43	43	100.0%
17-3031	Surveying and Mapping Technicians	41	41	100.0%
51-4121	Welders, Cutters, Solderers, and Brazers	36	242	14.8%
11-3051	Industrial Production Managers	33	33	100.0%
43-4171	Receptionists and Information Clerks	33	33	100.0%
17-2112	Industrial Engineers	32	160	20.1%
13-1151	Training and Development Specialists	29	29	100.0%
17-1012	Landscape Architects	29	34	85.4%
53-6041	Traffic Technicians	27	27	100.0%
37-3011	Landscaping and Groundskeeping Workers	27	165	16.1%
19-2043	Hydrologists	24	24	100.0%
49-9081	Wind Turbine Service Technicians	24	88	27.2%
19-3099	Social Scientists and Related Workers, All Other	15	15	100.0%
51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, and Tenders, Metal & Plastic	14	14	100.0%
19-3051	Urban and Regional Planners	13	24	54.0%
17-2071	Electrical Engineers	12	97	12.4%
17-3025	Environmental Engineering Technicians	12	12	100.0%
19-2021	Atmospheric and Space Scientists	12	12	100.0%
43-9021	Data Entry Keyers	12	12	100.0%
51-8031	Water and Wastewater Treatment Plant and System Operators	12	265	4.5%
17-1022	Surveyors	9	9	100.0%
47-2121	Glaziers	3	129	2.5%

Table - A37 All Occupations Listed within Administrative and Support and Waste Management and Remediation Services

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**2,514**	**30,725**	**8.2%**
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	532	582	91.5%
53-7081	Refuse and Recyclable Material Collectors	255	255	100.0%
53-3032	Heavy and Tractor-Trailer Truck Drivers	176	638	27.7%
47-4041	Hazardous Materials Removal Workers	167	226	73.6%
11-1021	General and Operations Managers	153	846	18.1%
49-9071	Maintenance and Repair Workers, General	145	352	41.2%
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	129	182	71.0%
47-2152	Plumbers, Pipefitters, and Steamfitters	96	549	17.5%
99-9998	Undisclosed Job Titles	92	450	20.5%
51-8031	Water and Wastewater Treatment Plant and System Operators	92	265	34.8%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	84	626	13.3%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	78	82	95.2%
51-5111	Prepress Technicians and Workers	75	75	100.0%
37-3011	Landscaping and Groundskeeping Workers	71	165	42.8%
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	66	66	100.0%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	64	342	18.6%
19-4091	Environmental Science and Protection Technicians, Including Health	42	122	34.0%
51-9199	Production Workers, All Other	41	335	12.3%
19-2041	Environmental Scientists and Specialists, Including Health	35	629	5.5%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	33	47	71.0%
53-3031	Driver/Sales Workers	26	62	41.7%
41-3099	Sales Representatives, Services, All Other	17	17	100.0%
37-2012	Maids and Housekeeping Cleaners	15	24	61.9%
37-2019	Building Cleaning Workers, All Other	14	14	100.0%
11-3121	Human Resources Managers	9	9	100.0%
51-8091	Chemical Plant and System Operators	6	25	25.1%

Table - A38 All Occupations Listed within Educational Services

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**704**	**30,725**	**2.3%**
11-3011	Administrative Services Managers	360	362	99.6%
25-3099	Teachers and Instructors, All Other	161	179	90.1%
25-1199	Postsecondary Teachers, All Other	36	36	100.0%
25-2021	Elementary School Teachers, Except Special Education	33	33	100.0%
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	28	28	100.0%
25-1194	Vocational Education Teachers, Postsecondary	23	34	68.3%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	22	582	3.8%
11-9031	Education Administrators, Preschool and Childcare Center/Program	17	17	100.0%
25-2032	Vocational Education Teachers, Secondary School	9	9	100.0%
99-9998	Undisclosed Job Titles	9	450	1.9%
11-9032	Education Administrators, Elementary and Secondary School	3	3	100.0%
49-9071	Maintenance and Repair Workers, General	2	352	0.7%

Table - A39 All Occupations Listed within Health Care and Social Assistance

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**497**	**30,725**	**1.6%**
21-1091	Health Educators	161	161	100.0%
31-9091	Dental Assistants	109	109	100.0%
29-2012	Medical and Clinical Laboratory Technicians	89	137	64.9%
49-9071	Maintenance and Repair Workers, General	63	352	18.0%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	36	940	3.9%
29-2011	Medical and Clinical Laboratory Technologists	24	24	100.0%
37-2012	Maids and Housekeeping Cleaners	9	24	38.1%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	5	111	4.7%

Table - A40 All Occupations Listed within Arts, Entertainment, and Recreation

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**87**	**30,725**	**0.3%**
37-3011	Landscaping and Groundskeeping Workers	29	165	17.5%
25-4013	Museum Technicians and Conservators	21	21	100.0%
35-1011	Chefs and Head Cooks	11	11	100.0%
11-1021	General and Operations Managers	7	846	0.9%
33-9099	Protective Service Workers, All Other	5	5	100.0%
99-9998	Undisclosed Job Titles	4	450	0.9%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	4	111	3.6%
49-9041	Industrial Machinery Mechanics	4	186	2.1%

Table - A41 All Occupations Listed within Accommodation and Food Services

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**298**	**30,725**	**1.0%**
43-5061	Production, Planning, and Expediting Clerks	254	254	100.0%
35-9099	Food Preparation and Serving Related Workers, All Other	45	45	100.0%

Table - A42

All Occupations Listed within Other Services (except Public Administration)

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**1,304**	**30,725**	**4.2%**
49-3023	Automotive Service Technicians and Mechanics	288	319	90.2%
11-1011	Chief Executives	244	542	45.0%
11-9121	Natural Sciences Managers	191	223	85.6%
49-9041	Industrial Machinery Mechanics	178	186	95.8%
27-3031	Public Relations Specialists	119	242	49.5%
49-3041	Farm Equipment Mechanics and Service Technicians	75	257	29.3%
51-6093	Upholsterers	60	60	100.0%
11-1021	General and Operations Managers	44	846	5.2%
49-9099	Installation, Maintenance, and Repair Workers, All Other	36	128	28.3%
51-9199	Production Workers, All Other	25	335	7.5%
47-4099	Construction and Related Workers, All Other	24	62	39.0%
47-2141	Painters, Construction and Maintenance	15	51	29.5%
13-1041	Compliance Officers	4	82	4.5%

Table - A43

All Occupations Listed within Public Administration

SOC Code	SOC Occupation Title	Green Employment	Total Employment	% of Occupation within Industry
	Total	**1,824**	**30,725**	**5.9%**
19-4093	Forest and Conservation Technicians	400	403	99.2%
19-2041	Environmental Scientists and Specialists, Including Health	323	629	51.3%
19-1031	Conservation Scientists	157	207	76.2%
11-1021	General and Operations Managers	121	846	14.3%
99-9998	Undisclosed Job Title	120	450	26.7%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	91	342	26.5%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	85	115	73.8%
17-2071	Electrical Engineers	83	97	85.6%
51-8031	Water and Wastewater Treatment Plant and System Operators	76	265	28.6%
11-9199	Managers, All Other	65	188	34.6%
51-1011	First-Line Supervisors of Production and Operating Workers	44	1,037	4.3%
13-2072	Loan Officers	41	41	100.0%
47-2031	Carpenters	37	247	15.1%
11-9121	Natural Sciences Managers	29	223	12.9%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	25	353	7.1%
45-4011	Forest and Conservation Workers	21	21	100.0%
19-1023	Zoologists and Wildlife Biologists	11	11	100.0%
49-9071	Maintenance and Repair Workers, General	11	352	3.3%
19-3051	Urban and Regional Planners	11	24	46.0%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	11	940	1.2%
17-3022	Civil Engineering Technicians	10	51	19.4%
29-1141	Registered Nurses	10	10	100.0%
25-1194	Vocational Education Teachers, Postsecondary	9	34	27.3%
13-1199	Business Operations Specialists, All Other	8	242	3.3%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	8	47	16.3%
17-2111	Architects, Except Landscape and Naval	6	6	100.0%
19-4011	Agricultural and Food Science Technicians	4	98	4.1%
53-1031	First-Line Supervisors of Transportation and Material Moving Machine and Vehicle Operators	4	82	4.8%
47-4041	Hazardous Materials Removal Workers	3	226	1.4%
27-3031	Public Relations Specialists	2	242	0.7%

Table - A44 All Green Jobs Reported that were Recently Created or Modified to Include Green Tasks since January 2009 by Green Employment

SOC Code	SOC Title	Green Jobs Created/Modified in 2009	Total Green Employees	% Green Jobs Newly Created by Occupation
	Total	**5,951**	**30,725**	**19.4%**
53-3032	Heavy and Tractor-Trailer Truck Drivers	557	1,129	49.3%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	492	887	55.5%
49-3041	Farm Equipment Mechanics and Service Technicians	335	734	45.6%
51-1011	First-Line Supervisors of Production and Operating Workers	236	1,066	22.1%
47-2111	Electricians	217	1,262	17.2%
51-2092	Team Assemblers	211	971	21.7%
11-1021	General and Operations Managers	197	464	42.5%
51-9199	Production Workers, All Other	141	773	18.2%
51-2041	Structural Metal Fabricators and Fitters	126	692	18.2%
17-2051	Civil Engineers	111	829	13.4%
53-7081	Refuse and Recyclable Material Collectors	107	319	33.5%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	90	160	56.3%
13-1161	Market Research Analysts and Marketing Specialists	75	108	69.4%
17-2141	Mechanical Engineers	70	533	13.1%
37-3011	Landscaping and Groundskeeping Workers	69	282	24.5%
11-9021	Construction Managers	58	147	39.5%
41-2031	Retail Salespersons	57	162	35.2%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	57	482	11.8%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	49	1,656	3.0%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	48	126	38.1%
13-1199	Business Operations Specialists, All Other	48	239	20.1%
49-9081	Wind Turbine Service Technicians	47	57	82.5%
19-4093	Forest and Conservation Technicians	46	351	13.1%
47-2152	Plumbers, Pipefitters, and Steamfitters	43	689	6.2%
13-1111	Management Analysts	38	175	21.7%
11-1011	Chief Executives	37	60	61.7%
17-3022	Civil Engineering Technicians	37	301	12.3%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	37	310	11.9%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	36	778	4.6%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	34	407	8.4%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	31	123	25.2%
25-3099	Teachers and Instructors, All Other	27	208	13.0%
17-2112	Industrial Engineers	26	344	7.6%
19-4011	Agricultural and Food Science Technicians	23	109	21.1%
19-1013	Soil and Plant Scientists	23	130	17.7%
47-4041	Hazardous Materials Removal Workers	21	198	10.6%
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	20	50	40.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	20	246	8.1%
17-3011	Architectural and Civil Drafters	19	214	8.9%
19-2041	Environmental Scientists and Specialists, Including Health	19	257	7.4%
49-9071	Maintenance and Repair Workers, General	18	627	2.9%
47-4099	Construction and Related Workers, All Other	16	61	26.2%
11-9013	Farmers, Ranchers, and Other Agricultural Managers	15	61	24.6%
47-2031	Carpenters	14	226	6.2%
47-2073	Operating Engineers and Other Construction Equipment Operators	14	275	5.1%
51-8031	Water and Wastewater Treatment Plant and System Operators	14	421	3.3%
17-2081	Environmental Engineers	12	128	9.4%
11-9199	Managers, All Other	11	45	24.4%
17-1011	Architects, Except Landscape and Naval	9	393	2.3%
19-1031	Conservation Scientists	8	119	6.7%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	6	41	14.6%
25-1199	Postsecondary Teachers, All Other	5	14	35.7%
25-1194	Vocational Education Teachers, Postsecondary	5	26	19.2%
17-3029	Engineering Technicians, Except Drafters, All Other	4	61	6.6%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	4	75	5.3%
43-4051	Customer Service Representatives	4	102	3.9%
13-1041	Compliance Officers	4	126	3.2%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	4	291	1.4%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	3	32	9.4%
17-3025	Environmental Engineering Technicians	3	97	3.1%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	2	94	2.1%
11-3031	Financial Managers	1	28	3.6%

Table - A45 2-Digit Sector to Industry Titles

Sector	Industry Title
11	Agriculture, Forestry, Fishing and Hunting
21	Mining
22	Utilities
23	Construction
31	Manufacturing
41	Wholesale Trade
44	Retail Trade
48	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
82	Other Services (except Public Administration)
92	Public Administration

Table - A46-1 3-Digit Sector to Industry Titles

Sector	Industry Title
111	Crop Production
112	Animal Production
115	Support Activities for Agriculture & Forestry
211	Oil and Gas Extraction
212	Mining (except Oil & Gas)
213	Support Activities for Mining
221	Utilities
236	Construction of Buildings
237	Heavy & Civil Engineering Construction
238	Specialty Trade Contractors
311	Food Manufacturing
312	Beverage & Tobacco Product Manufacturing
313	Textile Mills
314	Textile Product Mills
316	Leather & Allied Product Manufacturing
321	Wood Product Manufacturing
322	Paper Manufacturing
323	Printing & Related Support Activities
324	Petroleum & Coal Products Manufacturing
325	Chemical Manufacturing
326	Plastics & Rubber Products Manufacturing
327	Nonmetallic Mineral Product Manufacturing
331	Primary Metal Manufacturing
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
334	Computer & Electronic Product Manufacturing
335	Electrical Equipment, Appliance, & Component Manufacturing
336	Transportation Equipment Manufacturing
337	Furniture & Related Product Manufacturing
339	Miscellaneous Manufacturing
423	Merchant Wholesalers, Durable Goods
424	Merchant Wholesalers, Nondurable Goods
425	Wholesale Electronic Markets & Agents & Brokers
441	Motor Vehicle & Parts Dealers
442	Furniture & Home Furnishings Stores
443	Electronics & Appliance Stores
444	Building Material & Garden Equipment & Supplies Dealers
445	Food & Beverage Stores
446	Health & Personal Care Stores
447	Gasoline Stations
448	Clothing & Clothing Accessories Stores
451	Sporting Goods, Hobby, Book, & Music Stores
452	General Merchandise Stores
453	Miscellaneous Store Retailers
454	Nonstore Retailers

*Continued on next page

Table - A46-2 3-Digit Sector to Industry Titles

Sector	Industry Title
484	Truck Transportation
485	Transit & Ground Passenger Transport
487	Scenic & Sightseeing Transportation
488	Support Activities for Transportation
491	Postal Service
492	Couriers & Messengers
493	Warehousing & Storage
511	Publishing Industries
512	Motion Picture & Sound Recording Industries
515	Broadcasting (except Internet)
517	Telecommunications
518	Internet Service Providers, Web Search Portals, & Data Processing Services
519	Other Information Services
522	Credit Intermediation & Related Activities
523	Securities, Commodity Contracts, & Other Financial Investments & Related Activities
524	Insurance Carriers & Related Activities
525	Funds, Trusts, & Other Financial Vehicles
531	Real Estate
532	Rental & Leasing Services
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
541	Professional, Scientific, & Technical Services
551	Management of Companies & Enterprises
561	Administrative & Support Services
562	Waste Management & Remediation Service
611	Educational Services
621	Ambulatory Health Care Services
622	Hospitals
623	Nursing & Residential Care Facilities
624	Social Assistance
711	Performing Arts, Spectator Sports, & Related Industries
712	Museums, Historical Sites, & Similar Institution
713	Amusement, Gambling, & Recreation Industries
721	Accommodation
722	Food Services & Drinking Places
811	Repair & Maintenance
812	Personal & Laundry Services
813	Religious, Grantmaking, Civic, Professional, & Similar Organizations
921	Executive, Legislative, and Other General Government Support
922	Justice, Public Order, and Safety Activities
923	Administration of Human Resource Programs
924	Administration of Environmental Quality Programs
925	Administration of Housing Programs, Urban Planning, and Community Development
926	Administration of Economic Programs
928	National Security and International Affairs

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Nebraska Workforce Development – Department of Labor

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NEBRASKA
DEPARTMENT OF LABOR

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