JANUARY 2011

SAINT LOUIS GREEN JOBS REPORT

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This Green Labor Market Information Project was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration, in partnership with the Missouri Economic Research and Information Center (MERIC) – Missouri Department of Economic Development and Missouri Career Center. Additional partners include the St. Louis Regional Chamber and Growth Association and Southwestern Illinois workNet.

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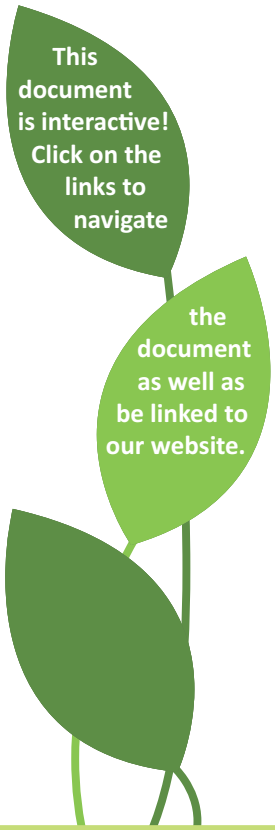


When the U.S. Department of Labor awarded a Labor Market Information (LMI) grant to our state, it was an important step forward, giving our community the opportunity to develop the capacity needed to sustain a green workforce. At the statewide level, the project involved the Missouri Department of Economic Development as grant awardee in partnership with the Missouri Economic Research and Information Center (MERIC). Locally, the St. Louis Regional Chamber and Growth Association (RCGA) and The St. Louis Agency on Training and Employment (SLATE) facilitated the participation of the Workforce Investment Boards in our area, including St. Louis, St. Louis County, St. Charles, St. Clair and Franklin/Jefferson Counties in Missouri and Madison-Bond County and Mid-America in Illinois. The RCGA brought important business representation to our taskforce. This represents the first time these diverse organizations throughout the region have worked together so closely for a common purpose. The river is no boundary for our developing workforce.

This *St. Louis Green Jobs Report* gathers data that will ultimately allow workforce development agencies, including SLATE, to provide valuable direction to job seekers and training providers. The depth and breadth of the LMI project has been both exciting and humbling. The St. Louis region has a great deal of potential as a future hub of green industries. In addition to its central location, St. Louis offers logistic capacity, a strong advanced manufacturing base and world-class biotech research facilities. It is clear that jobs based on energy efficiency, reuse of materials and new technologies are not simply an idea, a philosophy or an abstract goal. They are here now and as they continue to grow, green careers will help shape the face of our local workforce for many years to come. This information will provide us with a solid foundation on which to build effective strategies that fully embrace emerging green jobs.

In many ways the real work has only just begun. The relationships formed during the course of this project will take our region to the next level in regards to green talent. In particular, we must engage disadvantaged populations and displaced auto workers, ensuring that valuable skills are transitioned into green industries. We must collaborate with other partners, whether they are existing employers, relocating businesses, or entrepreneurs. Through the website, www.stlouisgreenjobs.com, we will continue to partner with Missouri Career Source and Illinois workNet to provide up-to-date information on green job openings and education resources. By continuing to work together, we can and will align our workforce with the growing green economy of the St. Louis region

Sincerely,

Michael K. Holmes
Executive Director
St. Louis Agency on Training and Employment

EXECUTIVE SUMMARY

The following report is a final product of the Green Labor Market Information (LMI) Project funded by the U.S. Department of Labor through the Missouri Department of Economic Development's Missouri Economic Research and Information Center. Participating Workforce Investment Boards include the St. Louis Agency on Training and Education (MO), St. Louis County (MO), St. Charles County (MO), Jefferson/Franklin County Employment Consortium (MO), Madison-Bond County (IL) and Mid America Workforce Investment Board (IL). The mission of the project is to help align the St. Louis region's workforce to meet the growing demands of the green economy. Because workforce has no boundaries, the goal of this project was to be inclusive of the bi-state metropolitan region as much as possible.

This project was completed by the St. Louis Regional Chamber and Growth Association, which was selected because of their connections between the St. Louis business, education, and governmental communities.

The Green LMI Project has several aims:

1. Align the St. Louis region's workforce to meet the growing demands of the green economy;
2. Connect employers, workforce professionals, training providers, and economic development professionals;
3. Define and understand the St. Louis green economy;
4. Provide relevant material to workforce professionals, employers and job seekers about opportunities in the green economy;
5. Build relationships in the St. Louis region around workforce needs for a green economy.

In order to achieve these aims, the Green LMI project began with comprehensive research of area employers. In July and August of 2010, project focus groups were held with over 50 green employers in order to better understand the needs and skills demanded for employees who are trained for green jobs. From August until October, a large survey of 665 employers in the St. Louis region was conducted to learn even more about employers' perspective on occupations in the green economy and the workforce and skills needed to fill these positions.

GREEN ECONOMY TRENDS

The survey of 665 employers revealed that energy efficiency was important for their company's success. Half of all companies surveyed agreed with the statement that "the growth of the green economy presents opportunities for growth for my company." The business case for green is the most important indicator of green adoption. If companies can save money or increase their sales of products or services by going green, they are more likely to do so.

GREEN JOB TRENDS

Green job opportunities are coming from positions that are taking on new green demands, rather than completely new green jobs. Out of 590 green job titles listed in the survey, 530 were positions that previously existed and were taking on new green responsibilities in addition to their other job functions. This illustrates the importance of understanding the adaptive nature of the green economy, jobs and skills. There may be more merging, transitioning and additions of green work to non-green job titles rather than new distinct green positions.

However, these distinct new green jobs are expected to increase as the green economy grows. According to the survey of area employers, 125 job titles described as performing green work, were vacant in October 2010. Although these positions, such as carpenters, electricians, project managers, engineers and architects may be filling fast, it is still a reflection that green work is available in St. Louis. They are filling fast because employers are currently finding the necessary workforce to fill these positions, and that is often a pipeline of available, trained workers.

SKILLS TRENDS

Soft skills, such as integrity, honesty, initiative and professionalism were identified by employers as critical for hiring. These soft skills are necessary to teach employees new skills, such as those needed for green products and services. Many employers felt that green skills were useful and favorable; yet, they were secondary to basic and soft skills.

TRAINING OPPORTUNITIES

Employers stated that there was an opportunity to expand training in these particular areas:

- *Basic sustainability training* is useful as employers look for employees, who can apply basic skills like recycling and waste management without supervision.
- *Soft skills* such as promptness, professionalism, ability to learn are an important indicator of employee success.
- *Teamwork* is often utilized in many of the companies that have green positions.
- *Management skills* are useful as many employees quickly advance from technical positions to management and leadership positions.
- *Safety training* is useful and needed in most green positions. Employers stated a lack of workers who were adequately trained in safety skills.

SECTOR TRENDS

This report includes specific sector sections such as Green Building , Green Salvage and Remediation, Green Energy, Green Agriculture, Green Manufacturing, Green Public Administration. Below are a few summary points from each sector report. Included are examples of green occupations that have projected employment growth in each sector.

GREEN BUILDING:

Construction laborers, electricians, plumbers, pipefitters, steamfitters, team assemblers, construction managers, roofers, heating, air conditioning mechanics, sheet metal workers, architects

Green building certifications are becoming standard, and it is predicted that most new workers in this field will need to understand basic sustainability principles. It is predicted that the green building industry will grow through increased education to the public and to real estate developers, owners, and builders.

GREEN SALVAGE AND REMEDIATION:

laborers, hazardous materials removal workers, refuse and recyclable materials collectors, truck drivers, shipping and receiving clerks, environmental scientists

Employers are confident that this sector will become increasingly important to other sectors. Employers in green salvage and remediation look for employees who can understand new markets and the potential of this sector to tap into new markets.

GREEN ENERGY:

Civil engineers, environmental engineers, electrical power-line installers, architects, team assemblers, mechanical engineers, power plant operators, energy auditors

Green energy employers are looking for employees who know about the energy regulatory environment and are adaptable to many positions within a company.

GREEN AGRICULTURE:

Industrial production managers, farmworkers and laborers, agricultural and food science technicians, sales representatives

Many of the positions in green agriculture are high-level research and development positions. Green agriculture employers look for potential employees who understand farm operations, knowledge of the agriculture policy and regulations, and possess management and team skills.

GREEN MANUFACTURING:

Team assemblers, civil engineers, inspectors, testers, sorters, samplers, industrial engineers, laborers, purchasing agents, engineering managers

Green manufacturing employers look for employees who have supervisory skills as well as foundational skills like soft skills and safety training. Many of the skills for green manufacturing are similar to that in the entire manufacturing industry, although it will require employees who can quickly learn on-the-job.

GREEN PUBLIC ADMINISTRATION:

Construction and building inspectors, operations managers, urban and regional planners, conservation scientists, environmental science and protection technicians, environmental engineers

Green Public Administration professionals typically have skills in planning, policy and analysis, teamwork, problem solving and decision making, and the ability to conduct systems analyses. The influx of federal dollars has increased the work done in the green public administration sector, although these funding sources will most likely be short-term.

In the end, this report showed that there is a robust group of green businesses in St. Louis, and several non-green companies are looking to transform their company with green practices. There will likely be new jobs and skills that emerge from the growth of the green economy in St. Louis. in the current economic recession, there is a surplus workforce that is trained and ready to take these green jobs. However, employers predict that these green skills will only become more common and prevalent. In this way, it is expected that green principles have the potential to affect positions at most companies. The best preparation will be learning basic green principles for the desired sector and still keeping an eye to that industry's basic competencies.

The Green Labor Market Information Project sought to build relationships between education and training providers, employers, job seekers, workforce professionals, and economic development professionals. By continuing to share resources and gathering employers and workforce professionals to discuss training needs, the St. Louis region will be in the best position for growth when the green economy expands.

Visit StLouisGreenJobs.com to see the entire report and view other green resources

STLOUISGREENJOBS

WHAT'S NEXT?

The green economy is coming and will continue to grow in the St. Louis region. However, to expedite growth and build an economy that utilizes locally trained green talent, a greater regional effort needs to exist. The following are recommendations for action based on the research findings of this report. There is always more that can be done to promote the green economy, and these were some of the key messages that surfaced in the Green LMI Project, in which each person who reads this report may play a role.

Promote public adoption of green products and services

A resounding theme from employers is the need to increase public education about sustainability, primarily in the green building and energy fields. This will increase the consumer demand for green products and services that many employers said were lacking. Green building may be one of the St. Louis region's strongest sustainable areas, with a great deal of potential growth. Employers expressed a need to convince developers about the cost savings that may accrue through using sustainable products and techniques that may have greater upfront costs. It is recommended that the region begin to promote green products and services in a unified effort.

Employers also look for employees who are able to illustrate the importance of green to their future customers. Employers are looking for employees who are adaptable and able to understand the importance of green, even without yet mastering all the techniques and concepts.

Embed sustainability literacy into common workplace skills

Employers stated that basic skills are still the most important indicator of hiring ability. Green skills are looked upon favorably, and in many cases, a basic understanding of green was enough for employers. Many employers felt like they could augment a basic understanding of sustainability with on-the-job training. As a region, St. Louis can work towards providing basic sustainability training to all workers, as this will significantly enhance companies' ability to find prepared green workers.

Contribute to collaborative projects like StLouisGreenJobs.com

Many business representatives spoke of a need to have access to all green training opportunities. As part of the Green LMI Project, a new green jobs website was established, StLouisGreenJobs.com. This website will catalog the green training opportunities for the region that will be of use to employers, training seekers, and the training providers listed in the inventory. Through strong collaborations between employers, workforce investment boards, and higher education institutions, StLouisGreenJobs.com can be the lasting legacy of the project and become the on-line access point for the St. Louis region's green job opportunities. By continuing to share resources and gathering employers and workforce professionals to discuss training needs, the St. Louis region will be in the best position for growth when the green economy expands.

WHAT DOES GREEN MEAN?

There are a lot of different theories and definitions about what constitutes green. A goal of this project was to build a working definition of green for the St. Louis region. The next two pages outline main definitions used by the Green Labor Market Information (LMI) Project.

In 2009, the State of Missouri through the Department of Economic Development and the Missouri Economic Research and Information Center completed the *Missouri Green Jobs Report*. This report established six main industry sectors that will be most impacted by the green economy and generate many green jobs. These six sectors were chosen as green-related sectors because they were most likely to comprise specific industries that are considered green.

BUILDING

SALVAGE & REMEDIATION

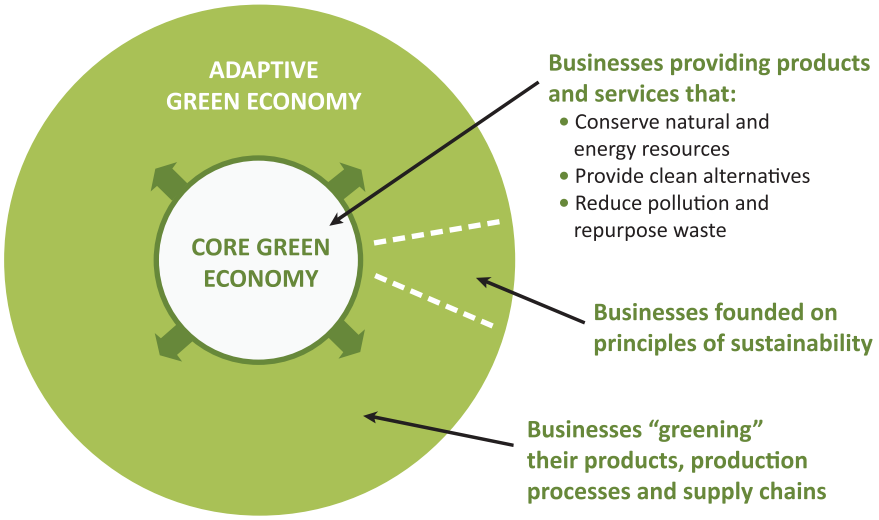
ENERGY

AGRICULTURE

MANUFACTURING

PUBLIC ADMINISTRATION

To further the refine the definition of green, The Green LMI project utilized a method created by Collaborative Economics in consultation with the St. Louis Regional Chamber and Growth Association. Collaborative Economics, a Silicon Valley economics research firm, worked with the Pew Charitable Trusts and National Governors' Association on green topics, and recently created *The St. Louis Region Green Economy Profile*, which looks at the core green economy in St. Louis. A main goal of this project was to bring clarity to the idea of green and continue to use a common definition in our region of the green economy and green jobs. Below is a graphic description of the definition of green, which was used in each focus group and posed to survey participants.



There are companies and occupations in the green economy that are specifically focused on green practices, and these companies are in the **core green economy**. In addition, there are companies are shifting their practices to become *more* green, but not entirely. This group is the **adaptive green economy**. Collaborative Economics estimated that St. Louis had nearly 9,000 core green jobs as of 2008. The Green LMI project expanded this definition to see what adaptive jobs could also be cataloged. This was an important component of the project, because many companies whose main business model lies outside green product and services are being influenced by the growth of a green economy that is creating new pressures and demands. The following page outlines some of the sector definitions that used to build the Green LMI Project.

WHAT DOES GREEN MEAN?

GREEN SECTOR DEFINITIONS

GREEN BUILDING

Green building includes environmentally friendly materials and methods for residential and non-residential infrastructure, converts existing property to lessen negative impacts on the environment, provides healthy living spaces, converts sustainable or renewable resources into energy, replenishes resources such as water and oxygen.
Examples of local companies in this sector: Tarlton, HOK, Clayco, Alberici

GREEN SALVAGE AND REMEDIATION

Green Salvage/Remediation is the process of renewing resources through: material extraction, environmental cleanup, re-use, and product conversion.
Examples of local companies in this sector: Smurfit Stone, Environmental Operations, Hilex Poly

GREEN ENERGY

Green Energy is the conversion from conventional sources of energy to the technology and development of renewable, clean energy resources.
Examples of local companies in this sector: Phycal, Abengoa, MicroGrid Energy, Wind Capital Group, Kineta Energy

GREEN AGRICULTURE

Green Agriculture falls into the following classifications: organic/free range food production, forest preservation, renewable energy resource production.
Examples of local companies in this sector: Solae, Monsanto, Novus, Bunge, Divergence

GREEN MANUFACTURING

Green Manufacturing is the research, development, and production of materials, parts, and final products within the following categories: energy efficiency, environmental health, renewable energy, and workplace safety.
Examples of local companies in this sector: Duke Manufacturing, Halcyon Shades, MEMC, Trinity Products

GREEN PUBLIC ADMINISTRATION

Green Public Administration is the execution, oversight, and operational management of public policy in the areas of: environmental conservation, green building, resource management, and energy.
Examples of local organizations in this sector: City and county government, EPA, East-West Gateway, Great Rivers Greenway District

*Definitions adapted from MERIC's *Missouri Green Jobs Report*

KEY FINDINGS

ST. LOUIS GREEN ECONOMY

The St. Louis Region Green Economy Profile illustrated that employment growth in green has grown by 11% from 2007 to 2008 (and grown 54% from 1995), whereas the total economy employment declined by 2% from 2007 to 2008 (and grown 4% since 1995). Although this upward trend may slow as the base of the green economy increases, this is a remarkable increase despite a recession.

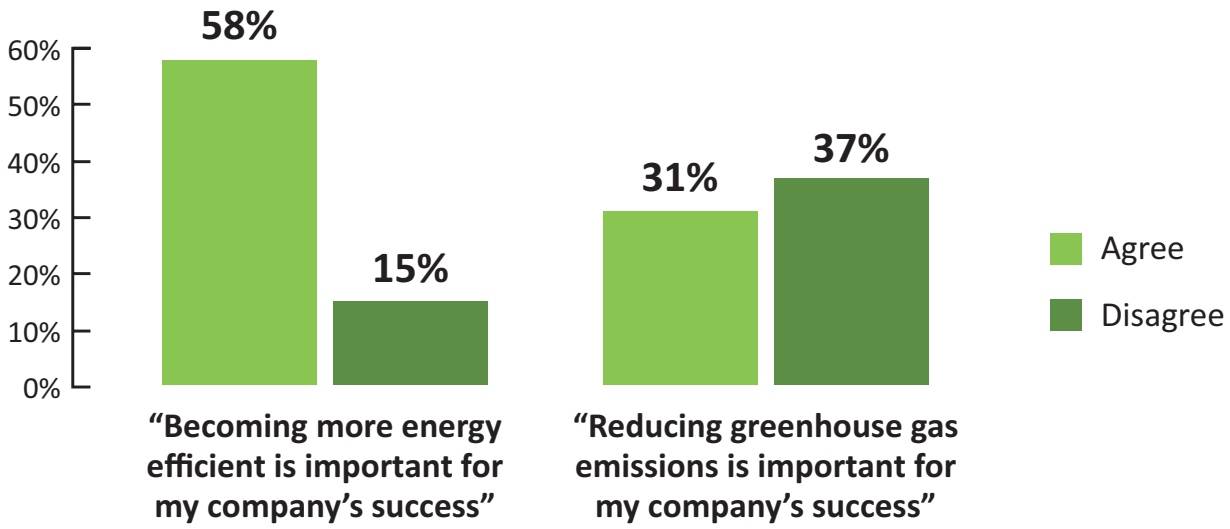
St. Louis companies are responding to a growing green economy, as was learned from both focus groups and survey results. Businesses that were not primarily green, are often adapting their practices based on customer demand to *go green*. Employers stated an increasing need to offer green alternatives to consumers in a number of areas. **In the end, the consumer demand and company savings are what will drive companies to move to green products and services.**

COMPANY ATTITUDE TOWARD GREEN

One aim of this project is to better understand how St. Louis region businesses feel the green economy is impacting their company and bottom line, and to assess the health of the regional green economy. In the green business survey for the Green LMI Project, 665 companies surveyed were asked basic attitudinal questions about the green economy.

Half of all companies surveyed agreed with the statement that "the growth of the green economy presents opportunities for growth for my company." This is a promising result, as perception of growth and opportunity is an important indicator of future investment in this area. When customer demand for green products or services increases, people with the skills to build and deliver them inevitably follow.

Similarly, this project sought to understand what was encouraging companies to go green. To do this, the survey asked companies to agree or disagree with the two separate statements below:



Survey results illustrate that becoming energy efficient is more important to companies than reducing green house gas emissions. As predicted, companies are more concerned with being sustainable when there is a business and financial incentive in the practice. Reducing greenhouse gas emissions is an environmental principle rather than a business principle for most companies surveyed. This aligns with the trend from the focus groups illustrating that energy efficiency work in the building and construction trades will be a very important component of the burgeoning green economy. Energy auditors and construction professionals will be important occupations for companies that choose to improve their energy efficiency in facility, product, and operation.

> ***"The public is more educated about sustainable techniques."***
>
> ***— Green salvage and remediation employer***

> ***"In building, we used to get calls because we used green practices. Now, sustainability and green practices are needed to get in the game."***
>
> ***— Green building employer***

GREEN IS BECOMING STANDARD

Employers are moving towards a holistic model of green integration. Many industries expect that green will become the standard in a few years much like safety and diversity training is now compulsory training. Practices that formerly set providers apart from their competition now are necessary stakes to enter the game. Employers stated that green skills are becoming foundational skills throughout their industries rather than supplementary skills.

Employers will be looking for employees that show "interest and initiative" in green and sustainable practices. For many employers, green practices are common sense in recycling and resource savings, i.e. turning off lights, using less products, recycling more efficiently. The interest and initiative is key, because this is what supports new practices that ultimately permeate a company and remain long-term. Employers are looking for a workforce that can learn and apply green practices – even in non-green positions – with little supervision. **As a result, even job-seekers who normally would not be faced with sustainability or green principles may be asked to be prepared by learning green practices beforehand or as a part of an on-the-job training program.** When green practices become company policy, it will undoubtedly touch each and every position at a company.

> ***"People are asking what we are doing to be more environmentally friendly before we get the job."***
>
> ***— Green building employer***

GROWING GREEN AND GOING GREEN

Core green businesses have grown considerably over the last few years, even through the recession. As stated, employment in the St. Louis core green economy has grown by 54% from 1995 to 2008, compared to 4% in the entire economy. As the business case for these core green businesses becomes easier to make, accelerated growth is expected. Using green alternatives is not now something clients feel is essential, therefore creating a positive public image will accelerate growth when the green alternative becomes the most economical option.

> ***"Sometimes it is hard to get past the CFO."***
>
> ***— Green building employer***

For some sectors (energy, building) this moment may be rapidly approaching, and for other sectors there may be a lag before the green options are seen as the *best* option for consumers. When the economic case can be objectively made, it will act as a multiplier in influencing potential customers. Employers indicate that many of the decision makers, such as executive staff, in organizations continue to make decisions based entirely on bottom line price. When that group becomes convinced that green methods are going to have a positive impact on the profitability of their organizations, we will see a dramatic shift to green.

> ***"When you are talking about the kind of scale some consumers are dealing with, a few cents per square foot is too much difference."***
>
> *— Green building employer*

It is important for the public to understand that in some industries, movement to green practices and products requires organizations to compete with their own, less green offerings. Energy, salvage and remediation, and building and construction all have legacy offerings that the public expects them to continue to provide. It is sometimes difficult to shift resources to more green offerings when most people do not fully understand all of the potential benefits associated with the green alternatives. Employers struggle with the public perception that they should be doing more for the environment when they are having difficulty making their product or service more green without charging customers a great deal more.

> ***"We need to start thinking about buildings as long-term investments that may be around for decades that we continue to give to and gain from, rather than one time structures that cease to have value after they are built."***
>
> *— Green building employer*

As a result, green employers emphasized a strong need to create a positive public image of green standards and practices, especially when a product or service was concerned. Green businesses want customers to see the green alternatives as the best long-term courses of action, even if the upfront cost is marginally higher. Right now the sell to build or "go green" is a tough one, especially when few companies are making that decision. **Businesses stake a lot of value in the possibility of educating the greater public about the benefits associated with paying just a little bit more for sustainable practices and materials.** Companies that are green, or going green, need employees who can articulate that greater benefit of a green product or service. In a way, everyone is a salesperson.

WHAT ABOUT GREEN JOBS?

The market is currently saturated with skilled and experienced workers. Generally, employers did not voice concern that there would be a shortage of workers to meet increasing needs in both our focus groups and survey.

Employers are getting the green talent they need by often retraining existing employees who illustrate interest and basic competencies. 52% of employers stated that they find the green talent they need through retraining existing employees, and 55% promote in-house to fill green roles. This may indicate that often the green work being done at a company is being added to an existing job description or is a transitioning employee from one department to another. Accordingly, an overwhelming majority of

the green job titles identified by employers were positions where green work was "added to an existing job title." **Out of 590 green job titles listed, 530 were positions that previously existed and were taking on new green responsibilities in addition to their other job functions. This illustrates the importance of understanding the adaptive nature of the green economy, jobs and skills. There may be more merging, transitioning and additions of green work to non-green job titles rather than new distinct green positions.**

GREEN JOB OPENINGS

Companies are hiring in green jobs, at least according to companies surveyed in this project. 590 green job titles were identified from 510 green companies surveyed in the St. Louis region.[1] According to the 510 green companies surveyed , there are 125 current openings for green jobs, as of October 2010. Although this number may be rapidly changing, this is a compelling statement for need to find a workforce that can fill positions in companies that are expanding and growing.

Although there are some current green job openings, there was also a large response from companies that stated there were real barriers to hiring more green workers. Below are the barriers employers feel to hiring more green workers:

Regional economic conditions – 70%
Customers not demanding enough for this product or service – 46%
Government policies and regulations – 34%
Shortage of workers with knowledge or skills – 17%
Shortage of available training programs – 7%
Training classes too full to enroll – 2%

Companies are adapting their businesses to fulfill the green model in their own ways. 94% of employers plan to use existing resources to fulfill their projected green needs. 6% percent of green companies surveyed stated that they plan to create new job titles for employees whose primary function is a green product or service.

Close to 89% of employers stated that they currently have the workforce they need to manage their green work, leaving 11% to state that they did not have enough workforce. When asked to explain the reason they did not have the workforce they need to fulfill their green work, a majority of respondents stated that they were a small business operation, had money shortages, or were on hiring freezes. Only few referenced the lack of available trained workers, and similarly few referenced that they planned to hire in the near future for these positions.

RELATIONSHIPS ARE KEY TO FINDING A GREEN JOB

Because of the nature of the economy, many employers are stating that they do not need to seek applicants for jobs, and often have a pipeline of potential hires already waiting from other job openings

[1]Companies that answered YES to at least one of these green screening questions were labeled a green company. Screen_1: As a business, do you provide a product or service that directly does any of these things: conserve natural and energy resources, provide clean alternatives, reduce pollution and/or repurpose waste?
Screen _2: Is your business adopting principles of sustainability, or energy efficiency, or reducing green house gas emissions?

at their company. Some employers stated that they receive hundreds of unsolicited applications each month. 77% of employers reference "relationships and referrals" as the method by which they find their green talent. Utilizing personal relationships is often advice given to job seekers, and again this is important with entry into the green fields.

> ***"Soft skills are going to continue to be a lot more relevant than anything else."***
>
> ***— Green salvage and remediation employer***

SKILLS FOR GREEN JOBS

Basic skills (foundational academic skills and soft skills) are the best predictor of employment success, even in the green fields. Generally, most employers look for individuals who are familiar with green techniques or practices, but they hire based on basic skills and industry experience. Many report a desire to employ people who believe in sustainable techniques and understand the concepts on a basic level. **Organizations believe that there are opportunities for outside sources to teach green techniques or to familiarize potential job candidates with the concepts of green or sustainability.**

> ***"I think we can train a lot of the people who have lost their jobs. We have people waiting to come back."***
>
> ***— Green salvage and remediation employer***

The skills for entry-level workers do not appear to have significantly changed as a result of green or adaptations to work. **Going green has not changed the need for skills in traditional training areas, but rather has been added to the basic skills that employers seek.** Several employers state that they are trying to make use of their current employees, as long as they have basic aptitude and show a desire to learn. Individuals that can demonstrate strong basic math skills, general science ability, and verbal and written language skills continue to be highly valued. The exception across sectors is found in high science jobs associated with fields that require knowledge of advanced technology, research and development. These higher-level jobs possess a need for skills in advanced math and specialized science, often requiring bachelor's degrees or advanced degrees. These high-level positions are often found in the green agriculture and green energy sector, where research and development is leading the green movement in many companies.

> ***"A lot of schools teach so much technical material that they do not have time for anything else like soft skills or management skills. Even the electives strongly recommended are in the technical fields."***
>
> ***— Green agriculture employer***

Across sectors, employers seek adaptable employees, open and ready to deal with the rapid change that defines the current and future industrial environment. Many employers stated that they sought employees who would be willing to learn, because as an employer, their needs shift day-to-day as the market demand and regulations shift in turn. Often this need for a "jack-of-all-trades" candidate requires strong critical thinking skills in job applicants. The ability to solve problems independently and troubleshoot simple issues, and work in teams is looked upon very favorably.

Employers strongly value soft skills and report that these skills are often lacking in jobs applicants. Often technical training and education programs focus exclusively on technical skills and knowledge.

Some employers in the focus groups report difficulty in gaining cooperation from learning institutions in closing the soft skills gap. They stated that colleges, universities and other training sources often have to saturate their programs with technical classes in order to compete for students. Employers felt that students do not seem to value training in soft skills as strongly as potential employers desire.

Employers specified which soft skills were most important for potential job candidates at their company . As expected, employers stated that all of the soft skills listed were important. However, the order of their importance as surveyed is as follows:

1. ***Dependability*** *– holding appointments; meeting deadlines*
2. ***Integrity*** *– being clear about progress on projects, honest about shortcomings and work*
3. ***Ability to learn*** *– quickly learning without repetitive guidance from supervisors, can move to different types of jobs easily*
4. ***Professionalism*** *– proper attire, promptness, grammar, speech, topics of conversation, positive attitude*
5. ***Initiative*** *– offering ideas without prompting, questioning activities in a productive manner with commitment to company growth*
6. ***Interpersonal skills*** *– team work, effective communication skills, ability to deal with difficult people*

Basic academic skills were important to employees as they hired for green positions in their companies. Below are what employers responded as desired basic academic competencies in green jobs:

1. *Reading*
2. *Oral communication*
3. *Critical & analytical thinking*
4. *Mathematics*
5. *Multi-disciplinary thinking*
6. *Writing skills*
7. *Science*
8. *Engineering & Technology*

Over 50% of respondents found the most important skills or knowledge that potential employees in green jobs at their company should know were (starting with most important):

1. *Safety Skills*
2. *Waste Minimization*
3. *Knowledge of the Regulatory Environment*
4. *Knowledge of Building Codes*
5. *Pollution Reduction and Control*
6. *Energy Conservation*
7. *Information Technology*
8. *Knowledge of Alternative Energy*

> *"Larger organizations have internal training departments, but a lot of the smaller companies don't have a training resource to teach new techniques."*
>
> *— Green energy employer*

When employers were asked to explain what was most important to them when hiring a candidate in a green position, the resounding answers were (starting with most important) "soft skills," "experience in the industry," and finally "education."

GREEN TRAINING

When asked where employers find the talent they need to fill green jobs, 55% percent said "in-house promotion of existing employees," and 52% said "retrain existing employees." These results show that companies are still undergoing primarily an adaptive response to the green economy. Positions at companies are adapting to reflect increased or slightly altered job responsibilities in order to fulfill the company's need for green practices. There are less distinct and new job titles being formed that solely perform green functions. However, employers believe that opportunities may exist to lessen the training burden on smaller companies and/or organizations that do not have the resources for an internal training department. The opportunity lies in offering training that provides participants general knowledge in green practices, to offering specific training in technical skills associated with adapting current skills to meet new, more green demands.

> *"The local universities have programs, but our high-level jobs are competitive and draw from around the country and even the world."*
>
> *— Green agriculture employer*

Employers believe that entry-level green talent exists on the local level, and that current training institutions have adequately prepared them for these positions. They currently believe that there are enough displaced workers to meet any future demand that would result from a recovering economy and an increase in demand for their products and services. Many do not actively recruit for positions at this level outside of the St. Louis area. However, satisfying higher-level talent needs require widespread recruitment. Both local and out of state universities are often utilized. In some industries, international relationships bring talent to the area for education and training.

GREEN TRAINING PARTNERSHIPS

Close to 27% of our sampled employers stated that they do work with training institutions to find and create the green talent they need for their companies. Of those companies that do work with training institutions, 81% stated that they feel these institutions sufficiently prepare people for green jobs they have at their company. **Across sectors, training institutions are viewed positively when used, yet there is a training gap that can be met with the 73% of employers who do not currently use training providers to find their green talent.**

> *"I'm not sure what our partners could do better. They are responsive and do a lot to help us along."*
>
> *— Green public administration employer*

University and college partnerships exist in many sectors for both entry-level and higher-level technical positions. Partnerships for entry-level positions tend to focus on providing basic training and education. These efforts often target the improvement of basic math and reading skills of

those being served. In some instances, there is a direct link from the services offered to pre-employment services or on-the-job improvement. For more specialized position needs, these partnerships between colleges and universities and local employers become more important. They link potential employers and participants through internships or on-the-job learning, providing opportunities for both parties to learn more about each other.

Product providers are often training providers as well. Many new products require first-time training to installers and product users. In many ways, this has been beneficial for both provider and end-user as product providers can help promote the benefit of their sustainable product. This relationship may account for some of the short-term training at workplaces.

Professional organizations are considered valuable for employers, especially when recruiting for higher-level positions. Several employers suggested that allowing student members in professional organizations would provide an opportunity for early introduction to local opportunities and start the process of building valuable relationships with talent.

PARTNERSHIPS ARE IMPORTANT FOR BUILDING A GREEN ECONOMY

In the end, most green employers were optimistic about the St. Louis region's potential to have a strong green economy. However, they stressed the importance of continuing conversations between companies, government officials, economic development professionals, and workforce professionals. Employers in the St. Louis region who are green or looking to go green, realize the importance of involving all sectors of the economy in order to make an effective public case for green. Only then will the consumer demand increase enough to fuel the green economy in the St. Louis region.

WHAT'S NEXT?

The green economy is coming and will continue to grow in the St. Louis region. However, to expedite growth and build an economy that utilizes locally trained green talent, a greater regional effort needs to exist. The following are recommendations for action based on the research findings of this report. There is always more that can be done to promote the green economy, and these were some of the key messages that surfaced in the Green LMI Project, in which each person who reads this report may play a role.

Promote public adoption of green products and services

A resounding theme from employers is the need to increase public education about sustainability, primarily in the green building and energy fields. This will increase the consumer demand for green products and services that many employers said were lacking. Green building may be one of the St. Louis region's strongest sustainable areas, with a great deal of potential growth. Employers expressed a need to convince developers about the cost savings that may accrue through using sustainable products and techniques that may have greater upfront costs. It is recommended that the region begin to promote green products and services in a unified effort.

Employers also look for employees who are able to illustrate the importance of green to their future customers. Employers are looking for employees who are adaptable and able to understand the importance of green, even without yet mastering all the techniques and concepts.

Embed sustainability literacy into common workplace skills

Employers stated that basic skills are still the most important indicator of hiring ability. Green skills are looked upon favorably, and in many cases a basic understanding of green was enough for employers. Many employers felt like they could augment a basic understanding of sustainability with on-the-job training. As a region, St. Louis can work towards providing basic sustainability training to all workers, as this will significantly enhance companies' ability to find prepared green workers.

Contribute to collaborative projects like StLouisGreenJobs.com

Many business representatives spoke of a need to have access to all green training opportunities. As part of the Green LMI Project, a new green jobs website was established, StLouisGreenJobs.com. This website will catalog the green training opportunities for the region that will be of use to employers, training seekers, and the training providers listed in the inventory. Through strong collaborations between employers, workforce investment boards, and higher education institutions, StLouisGreenJobs.com can be the lasting legacy of the project and become the on-line access point for the St. Louis region's green job opportunities. By continuing to share resources and gathering employers and workforce professionals to discuss training needs, the St. Louis region will be in the best position for growth when the green economy expands.

OCCUPATIONAL TRENDS

There are several tools that may be useful for better understanding occupational projections now and into the future. One data source, The Occupational Information Network (O*NET) is being developed under the sponsorship of the **US Department of Labor/Employment and Training Administration** (USDOL/ETA) through a grant to the North Carolina Employment Security Commission. The O*NET program is the nation's primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database, which is available to the public at no cost, is continually updated by surveying a broad range of workers from each occupation. Information from this database forms the heart of O*NET Online, an interactive application for exploring and searching occupations. The database also provides the basis for the Career Exploration Tools, a set of valuable assessment instruments for workers and students looking to find or change careers.

O*NET has defined what they consider the green occupations, and The Green LMI Project used this list in order to categorize green occupations in the St. Louis area. O*NET's definition of "green occupations" and the "greening of occupations" aligns nicely with the definition this project has utilized. O*NET defines the ***green economy*** as economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy. The ***"greening" of occupations*** refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements.

Because O*NET projections are completed on a national scale, The St. Louis Green Jobs Report does not draw significant conclusions about St. Louis Regional trends based on O*NET information. This report uses the O*NET green occupation list, which can be viewed online.

The green job forecasts in this section were created with public occupational information created by the State of Missouri. The chart entitled, "Green Jobs in St. Louis with Recent High Employment" was created by using St. Louis staffing patterns to understand which green positions were employed most in 2008. The charts entitled, "Current Green Job Opportunities in St. Louis (2009 – 2011)" and "Future Green Job Opportunities in St. Louis (2018)" are derived from the Missouri Career Exploration Tool. The Missouri Career Tool ranks these occupations and provides letter grades to occupations that are likely to be a strong according to several factors like salary, projected growth, and predicted openings. These documents were created by taking occupations with the highest grade rankings and cross-referencing these with green occupational codes that O*NET defined. They were then separated into educational attainment levels typically required for these positions. The document entitled "Projected Fastest Growing Green Jobs (2018)" is also taken from the Missouri Career Tool data, which illustrates those green occupations that are projected to have the highest percentage growth by 2018.

THE GREEN OCCUPATIONS ABOVE ARE PROJECTED TO HAVE THE FASTEST GROWTH RATE WITH THE LARGEST PERCENTAGE CHANGE IN TERMS OF NET NEW JOBS BY 2018. THE AVERAGE WAGE FOR THESE JOBS AT AN EXPERIENCED LEVEL WAS $60,672.

GREEN JOBS IN ST. LOUIS WITH RECENT HIGH EMPLOYMENT

2008

Recent

O*NET Occupational Code	
53-7062	Laborers and Freight, Stock, and Material Movers, Hand
11-1021	General and Operations Managers
49-9042	Maintenance and Repair Workers, General
51-2092	Team Assemblers
47-2061	Construction Laborers
43-5071	Shipping, Receiving, and Traffic Clerks
53-7051	Industrial Truck and Tractor Operators
47-2111	Electricians
49-3023	Automotive Service Technicians and Mechanics
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
51-1011	Managers of Production and Operating Workers
47-2152	Plumbers, Pipefitters, and Steamfitters
51-4041	Machinists
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
47-2073	Operating Engineers and Other Construction Equipment Operators
49-1011	Managers of Mechanics, Installers, and Repairers
43-5061	Production, Planning, and Expediting Clerks
17-2051	Civil Engineers
51-4121	Welders, Cutters, Solderers, and Brazers
13-1073	Training and Development Specialists
15-1032	Computer Software Engineers, Systems Software
49-9041	Industrial Machinery Mechanics
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
17-2112	Industrial Engineers
17-2072	Electronics Engineers, Except Computer
11-9021	Construction Managers
47-2211	Sheet Metal Workers
47-2051	Cement Masons and Concrete Finishers
17-2141	Mechanical Engineers
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
51-2022	Electrical and Electronic Equipment Assemblers
53-3021	Bus Drivers, Transit and Intercity
11-9041	Engineering Managers
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic
47-2181	Roofers
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders
47-4011	Construction and Building Inspectors
17-3011	Architectural and Civil Drafters

This list of Current Green Occupations in St. Louis is taken from 2008 St. Louis staffing patterns. The occupations represented had the highest percentage of green-related employment in the St. Louis region in 2008.

* This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

CURRENT GREEN JOB OPPORTUNITIES IN ST. LOUIS

2009 – 2011

Now

Training Requirements		Projected Total Jobs in 2011	Total Openings (2 Year Period)	Entry Wage	Average Wage	Experienced Wage	Education/Training Typically Required
SHORT-TERM	Maintenance and Repair Workers, General	10,750	292	$25,190	$38,890	$45,740	Moderate-term OJT
	Operating Engineers and Other Construction Equipment Operators	2,680	83	$37,700	$51,470	$58,360	Moderate-term OJT
	Bus Drivers, Transit and Intercity	1,040	56	$22,190	$33,960	$39,850	Moderate-term OJT
	Refuse and Recyclable Material Collectors	640	53	$23,380	$31,280	$35,230	Short-term OJT
	Roofers	1,140	34	$38,420	$52,190	$59,080	Moderate-term OJT
	Insulation Workers, Floor, Ceiling, and Wall	180	10	$31,570	$49,770	$58,880	Moderate-term OJT
LONG-TERM	Electricians	4,330	199	$43,260	$62,870	$72,680	Long-term OJT
	Welders, Cutters, Solderers, and Brazers	3,030	199	$23,650	$35,110	$40,840	Postsecondary vocational award
	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	3,190	142	$43,220	$80,670	$99,400	Work exp. in related occupation
	Plumbers, Pipefitters, and Steamfitters	3,340	126	$43,760	$61,670	$70,610	Long-term OJT
	Managers of Mechanics, Installers, and Repairers	2,550	122	$42,950	$61,940	$71,440	Work exp. in related occupation
	Managers of Production and Operating Workers	3,540	103	$38,670	$58,620	$68,600	Work exp. in related occupation
	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,770	94	$32,050	$46,930	$54,370	Long-term OJT
	Electrical Power-Line Installers and Repairers	1,180	76	$34,800	$53,270	$62,500	Long-term OJT
	Sheet Metal Workers	1,310	66	$29,690	$54,820	$67,380	Long-term OJT
	Industrial Production Managers	770	57	$59,640	$95,160	$112,920	Work exp. in related occupation
	Industrial Machinery Mechanics	1,860	54	$39,320	$52,550	$59,160	Long-term OJT
	Construction and Building Inspectors	850	44	$37,620	$49,230	$55,040	Work exp. in related occupation
	Transportation, Storage, and Distribution Managers	580	32	$47,310	$81,050	$97,930	Work exp. in related occupation
	Power Plant Operators	350	28	ND	ND	ND	Long-term OJT
	Agricultural and Food Science Technicians	320	26	$49,860	$49,860	$57,060	Associate degree
ADVANCED	Training and Development Specialists	1,940	144	$33,740	$54,520	$64,910	Bachelor's or higher + work exp.
	Computer Software Engineers, Systems Software	2,110	75	$62,250	$82,33	$92,370	Bachelor's degree
	Mechanical Engineers	1,210	63	$54,850	$76,070	$86,680	Bachelor's degree
	Industrial Engineers	1,190	61	$54,810	$75,010	$85,110	Bachelor's degree
	Electronics Engineers, Except Computer	1,030	46	$59,220	$82,560	$94,240	Bachelor's degree
	Chemists	610	41	$41,990	$68,340	$81,520	Bachelor's degree
	Electrical Engineers	840	38	$55,390	$77,890	$89,140	Bachelor's degree
	Architects, Except Landscape and Naval	1,230	37	$43,800	$68,600	$81,000	Bachelor's degree
	Environmental Scientists and Specialists, Including Health	430	34	$35,780	$56,070	$66,210	Master's degree
	Engineering Managers	850	34	$81,760	$109,650	$123,590	Bachelor's or higher + work exp.
	Environmental Engineers	480	25	$49,730	$70,800	$81,330	Bachelor's degree
	Construction Managers	2,210	25	$51,000	$88,830	$107,750	Bachelor's degree
	Occupational Health and Safety Specialists	400	25	$46,990	$68,130	$78,700	Bachelor's degree
	Occupational Health and Safety Technicians	190	14	$35,000	$51,800	$60,200	Bachelor's degree
	Natural Sciences Managers	250	12	$80,260	$121,840	$142,620	Bachelor's or higher + work exp.
	Urban and Regional Planners	150	10	$41,750	$55,8900	$62,970	Master's degree

Occupations ranked according to Missouri Economic Research & Information Center's (MERIC), Missouri Career Exploration Tool, Short-term occupational projections. These projections are based on occupation's job growth rate, total openings, and average wages relative to other occupations in the state.

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FUTURE GREEN JOB OPPORTUNITIES IN ST. LOUIS

2018

Future

Training Requirements	Occupation Title	Projected Total Jobs	Total Openings (10 year Period)	Entry Wage	Average Wage	Experienced Wage	Education/Training Typically Required
SHORT-TERM	Maintenance and Repair Workers, General	12,170	2,401	$21,680	$34,270	$40,570	Moderate-term on-the-job training
	Construction Laborers	10,240	1,696	$23,240	$38,620	$46,310	Moderate-term on-the-job training
	Operating Engineers and Other Construction Equipment Operators	3,480	783	$30,390	$46,570	$54,660	Moderate-term on-the-job training
	Mixing and Blending Machine Setters, Operators, and Tenders	1,780	571	$23,890	$35,130	$40,760	Moderate-term on-the-job training
	Computer-Controlled Machine Tool Operators, Metal and Plastic	1,420	350	$21,580	$30,460	$34,890	Moderate-term on-the-job training
	Helpers--Carpenters	550	163	$19,870	$31,120	$36,740	Short-term on-the-job training
LONG-TERM	Electricians	5,310	1,297	$32,410	$53,110	$63,460	Long-term on-the-job training
	Welders, Cutters, Solderers, and Brazers	3,580	1,175	$22,960	$33,030	$38,070	Postsecondary vocational award
	Managers of Construction Trades and Extraction Workers	3,740	965	$40,620	$62,280	$73,110	Work exp. in a related occupation
	Plumbers, Pipefitters, and Steamfitters	4,210	952	$32,640	$54,240	$65,040	Long-term on-the-job training
	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	3,950	918	$40,080	$76,070	$94,060	Work exp. in a related occupation
	Managers of Mechanics, Installers, and Repairers	2,840	751	$37,850	$57,150	$66,800	Work exp. in a related occupation
	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2,420	680	$26,120	$40,880	$48,260	Long-term on-the-job training
	Managers of Production and Operating Workers	3,990	574	$31,920	$50,830	$60,290	Work exp. in a related occupation
	Industrial Machinery Mechanics	2,370	514	$29,080	$43,550	$50,780	Long-term on-the-job training
	Electrical Power-Line Installers and Repairers	1,330	505	$38,130	$53,750	$61,560	Long-term on-the-job training
	Sheet Metal Workers	1,520	388	$25,140	$49,290	$61,360	Long-term on-the-job training
	Industrial Production Managers	880	331	$51,720	$87,740	$105,750	Work exp. in a related occupation
	Construction and Building Inspectors	920	217	$32,130	$45,050	$51,510	Work exp. in a related occupation
	Transportation, Storage, and Distribution Managers	620	184	$47,300	$79,210	$95,160	Work exp. in a related occupation
ADVANCED	Training and Development Specialists	2,420	884	$30,320	$49,530	$59,140	Bachelor's or higher + work exp.
	General and Operations Managers	12,350	3,791	$46,890	$96,030	$120,600	Bachelor's or higher + work exp.
	Computer Software Engineers, Systems Software	2,810	659	$56,420	$78,380	$89,370	Bachelor's degree
	Civil Engineers	2,690	648	$51,180	$75,810	$88,130	Bachelor's degree
	Construction Managers	3,150	496	$46,050	$82,580	$100,850	Bachelor's degree
	Industrial Engineers	1,600	492	$51,600	$71,350	$81,230	Bachelor's degree
	Mechanical Engineers	1,450	380	$52,160	$73,210	$83,730	Bachelor's degree
	Electronics Engineers, Except Computer	1,120	281	$57,420	$79,900	$91,140	Bachelor's degree
	Architects, Except Landscape and Naval	1,410	240	$39,050	$65,800	$79,180	Bachelor's degree
	Chemists	700	240	$39,690	$64,590	$77,050	Bachelor's degree
	Electrical Engineers	950	230	$56,330	$79,160	$90,570	Bachelor's degree
	Environmental Scientists and Specialists, Including Health	550	214	$34,190	$48,820	$56,140	Master's degree
	Engineering Managers	1,000	211	$77,070	$104,880	$118,790	Bachelor's or higher + work exp.
	Environmental Engineers	620	204	$49,610	$71,920	$83,080	Bachelor's degree
	Logisticians	630	163	$43,810	$65,780	$76,770	Bachelor's degree
	Occupational Health and Safety Specialists	450	162	$35,880	$58,030	$69,110	Bachelor's degree

Occupations ranked according to Missouri Economic Research & Information Center's (MERIC), Missouri Career Exploration Tool, Long-term occupational projections. These projections are based on occupation's job growth rate, total openings, and average wages relative to other occupations in the state.

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SECTOR REPORTS

GREEN BUILDING

Examples of Green Building Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Building Sector
47-2061	**Construction Laborers**	**$54,340**	**8.73%**
47-2111	**Electricians**	**$72,680**	**7.69%**
47-2152	**Plumbers, Pipefitters, and Steamfitters**	**$70,610**	**6.17%**
51-2092	**Team Assemblers**	**$29,800**	**2.79%**
11-9021	**Construction Managers**	**$107,750**	**2.61%**
47-2073	**Operating Engineers and Other Construction Equipment Operators**	**$58,360**	**2.52%**
47-2181	**Roofers**	**$59,080**	**2.43%**
49-9021	**Heating, Air Conditioning, and Refrigeration Mechanics and Installers**	**$54,370**	**2.17%**
47-2211	**Sheet Metal Workers**	**$67,380**	**2.08%**
17-1011	**Architects, Except Landscape and Naval**	**$81,000**	**1.74%**

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008

The St. Louis region is a Midwestern leader in the green building industry. According to the USGBC Missouri Gateway Chapter, ten years ago there was just one LEED certified building. Today, there are over 80 commercial and over 50 residential LEED certified buildings in the St. Louis region. This USGBC chapter has over 500 members, and is a central point for professional growth and career progression in this sector. The USGBC Missouri Gateway Chapter has consistently won national and regional awards for educational programs and community involvement.

Employers across sectors reference the importance of green building in all of their work. This sector will affect energy, salvage and remediation, manufacturing, and public administration most directly. As building practices develop and become more sustainable, there is a great potential to influence the bottom line of companies and institutions. The building sector has been significantly impacted by the green economy. It makes sense, as buildings are the largest contributors to greenhouse gas emissions.

Green building companies state now virtually every project involves considerations regarding sustainability and environmental impact. In the last five years green building projects have gone from 2% of total builds nationally to 33% nationally. Many green employers see investing in green building techniques as a way to simply stay competitive in the market for projects. LEED certified techniques are quickly becoming the new standard. Among other aspects of building, LEED now impacts external and internal design and construction, neighborhood development, maintenance, lighting and landscaping. The consensus is that a shift to green construction techniques will continue over the next several years until most of these practices become standard.

TARLTON CORPORATION

Back in 2003, Tarlton made a corporate commitment to sustainable construction. They moved into their new LEED Silver headquarters in 2004, creating a healthy environment for employees, clients, and visitors. And more than 20 Tarlton employees are LEED-Accredited Professionals.

They introduced sustainable construction practices not only on LEED-registered projects, but on all their jobs. They recycle construction waste and worker trash, and fulfill other LEED requirements such as reducing dust and dirt by removing mud from trucks before they leave the site. They have developed a Sustainability Policy that applies to both projects and operations.

BARRIERS TO HIRING MORE GREEN WORKERS

Despite the growing importance and use of green standards in buildings, there exists a large population of clients and developers of buildings in the St. Louis region that does not yet see the financial benefit of building green in the St. Louis region. Green building companies struggle to convince this clientele that building green is important, and ultimately good for their company's profitability.

Employers across sectors state the importance of educating the public regarding the cost and benefits of sustainable techniques. There are some who consider green techniques an added cost that only gains them public relations capital. When the business case for using sustainable techniques takes hold, growth will accelerate.

TRAINING

As with many of the other sectors, employers believe that the talent pool in the St. Louis metropolitan area will support future increases in labor demand. They believe that this pool of potential workers will be a better fit if they have an understanding of LEED and sustainable processes. Many employers report that it is not as important that they have mastered all of the required skills, than that they have an understanding of the importance of sustainability and a willingness to learn. LEED process has been compared to safety training, in that it is becoming a pervasive principle that will affect many positions in a company. Consistent changes in LEED techniques create a constant need to stay up-to-date on standard practices. Many employers stated they would like to see the LEED practices continue to be updated and taught at the trade level. Currently there are several trade organizations in the St. Louis regions, such as the Sheet Metal Workers and the International Brotherhood of Electrical Workers that incorporate sustainability and green practices in their training courses.

TRAINING OPPORTUNITIES

Below are training opportunities that employers stated are important preparation for a strong green building industry, and the people they employ:

- o Sustainable construction
- o Sustainability degree programs
- o Shadow programs that can build into internships
- o Continuing education opportunity for long-tenured workers in the field
- o Safety training or certification
- o On-the-job training

EXAMPLES OF AREA TRAINING INSTITUTIONS
(To view the full list visit www.stlouisgreenjobs.com):

Southern Illinois University Edwardsville –
Construction Management

Washington University – College of Architecture and Graduate School of Architecture and Design

St. Charles Community College – LEED Green Associate, Green Fundamentals of Sustainable Buildings, Sustainable Building Advisor

Metropolitan Training Alliance – Heating, Ventilation and Air Conditioning Service Technician Program, Home Energy Auditor Program, Residential Energy Efficiency Technician

St. Louis Community College – LEED Green Associate Training

The purpose of St. Louis Green Shadow is to expose students to green jobs in the St. Louis region through a one day shadow of local business people. Participating companies get access to local students interested in the industry without the financial commitment of an internship. USGBC-Missouri Gateway Chapter members provide the mentorship to area students as they learn whether a career in sustainability is of interest to them. Some of the partner mentors include: Missouri Botanical Garden, S. M. Wilson & Co., Halcyon Shades, Kozeny Wagner, City of St. Louis, Enterprise Holdings, Inc., St Louis Community College Webster University, Stratus Building Solutions, and Clayco.

GREEN SALVAGE & REMEDIATION

Examples of Green Salvage and Remediation Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Salvage & Remediation Sector
53-7062	Laborers and Freight, Stock, and Material Movers	$33,430	9.29%
47-4041	Hazardous Materials Removal Workers	$52,060	5.69%
53-7081	Refuse and Recyclable Material Collectors	$35,230	4.68%
47-4011	Construction and Building Inspectors	$55,040	3.39%
53-3032	Truck Drivers, Heavy and Tractor-Trailer	$49,310	3.15%
53-7051	Industrial Truck and Tractor Operators	$34,970	2.05%
43-5071	Shipping, Receiving, and Traffic Clerks	$34,220	1.49%
19-2041	Environmental Scientists and Specialists, Including Health	$66,210	1.28%
19-2031	Chemists	$81,520	1.10%
51-8091	Chemical Plant and System Operators	ND	1.00%

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008

According to the Missouri Green Jobs report, salvage and remediation is an area that has a great deal of potential for job growth. The recycling market has grown so substantially that a number of businesses within this sector would not exist without the customers who are looking for greener options. In the salvage and remediation sector there has been, and continues to be, a shift moving towards more sustainable processes. Because there is more reported "shifting of processes and procedures," there is a strong emphasis on utilizing the existing workforce to fulfill these needs. This has created opportunities for training on new green procedures and safety related to those procedures. New employment opportunities largely exist in research and design of sustainable systems and will utilize individuals with an engineering education and background.

HILEX POLY CO, LLC

Located in St. Louis, Hilex Poly, Co. is the largest closed loop plastic bag recycling facility in the world with several hundred employees. Plastic bags are turned back into resin pellets and then back in to bags. More than just plastic bags, Hilex Poly Co. is able to make bags with levels of post consumer content. Their commitment to more sustainable packaging reduces shopping carbon footprint and preserves natural resources.

SHIFTING FROM WASTE TO RECYCLING

Employers in this sector were hesitant to state that there would be a large influx of new green positions in this field. Several companies report that their work has changed from waste management to recycling. Employers stated that in fact, other jobs may be eliminated that were traditionally dealing with waste and transitioned to the recycling processes. There is a great opportunity to build a supply-chain in this sector as emphasis turns from waste to recycling, which creates new end-products that can be used for a new market.

Employers stated that many companies in this industry exist in silos to complete their work. However, they would like to see more cooperation across the industry as the green economy changes the way companies do business. It is believed that the companies that can capitalize on new sectors and markets will be most successful. For example, some salvage and remediation employers tie their industry's growth to the green building industry, as waste remediation and recycling are important components of LEED certification. Developers of buildings must comply with strict recycling standards when constructing their buildings in order to achieve LEED status. There is a potential for salvage and remediation companies to expand into this consulting service for green building developers. In turn, as green building becomes standard in the industry, the salvage and remediation industry will see benefit from these effects.

> ***"There is a big market potential in St. Louis to create companies that effectively manage the products from recycling processes. If we can create value-added products locally, we will greatly benefit."***
>
> *— Green salvage and remediation employer*

SKILLS:

Employers in this area are seeking a range of employees from basic-level employee with little to no work experience to an advanced environmental engineer with a professional engineering degree and possibly more.

As is the case with other sectors, there is a reported shortage of soft skills among entry-level workers. In many cases, employers stated this as a major reason to hire and ultimately retain some of the basic-skilled workers. Additionally, employers communicated a desire for employees with an understanding of safety procedures. There is a belief that local training providers can improve the attractiveness of candidates by providing soft skills and concepts associated with safety to potential job applicants. This can be achieved by utilizing assessment and training that prepares candidates for work-like experiences.

SYSTEMS THINKING:

Employers would also like people who understand the big picture of how this sector can work with other sectors. Now and even more in the future, the salvage and remediation sector will be

REMEDIATION TRAINING

EPA selected St. Louis Community College for a remediation job training grant in 2009, as part of the American Recovery and Reinvestment Act. The training program consisted of over 200 hours of technical training in hazardous materials handling and remediation techniques. Graduates received certifications in HAZWOPER, OSHA 10-hour health and safety, mold remediation, weatherization, ecosystem restoration, and lead and asbestos abatement. The primary trainers were instructors from the college and from the Saint Louis University Center for Environmental Education and Training. The college's placement services helped graduates find jobs with area employers and work with an advisory group of local employers to place graduates in environmental jobs.

working with the green building, green energy, and green public administration sectors to accomplish large projects. Companies need employees who can make those important business connections to create new work through building collaborative projects with these sectors.

When this sector grows employers would look for people who understand the life-cycle processes of products and materials. They want to employ people who can understand without supervision how materials, energy and costs flow through their operation. These jobs may be individualized and require some consultation experience, such as working with businesses to provide advice for more efficient recycling practices.

SKILLS EMPLOYERS WANT TO SEE AT ANY LEVEL:

- Ability to learn
- Soft skills
- Basic safety skills

ADVANCED SKILLS THAT MAY BE UTILIZED:

- Consultation experience
- Ability to calculate energy efficiency
- LEED certification
- P.E. Certification
- Engineering

EXAMPLES OF TRAINING PROVIDERS IN SALVAGE AND REMEDIATION

(To view the full list visit www.stlouisgreenjobs.com):

St. Louis University – Environmental Remediation Technician

Jefferson College – Waste Water Training Institute

GREEN ENERGY

Examples of Green Energy Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Energy Sector
17-2051	Civil Engineers	$85,630	6.99%
17-2081	Environmental Engineers	$81,330	3.27%
49-9051	Electrical Power-Line Installers and Repairers	$62,500	2.66%
17-3011	Architectural and Civil Drafters	$53,290	2.43%
47-2073	Operating Engineers and Other Construction Equipment Operators	$58,360	2.30%
51-2092	Team Assemblers	$29,800	2.26%
17-2141	Mechanical Engineers	$86,680	1.86%
47-2061	Construction Laborers	$54,340	1.84%
17-2071	Electrical Engineers	$89,140	1.79%
51-8013	Power Plant Operators	ND	1.58%

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008

PHYCAL

Phycal, Inc. is an algae biofuels company that maintains a molecular genetics research and development operation located in St. Louis, Missouri at the BioResearch and Development Growth (BRDG) Park facility at the Donald Danforth Plant Science Center. Work involves biotechnology research and development to improve oil producing algae strains. Phycal incorporates traits into algae to facilitate their growth potential, hardiness and metabolic efficiency and versatility with the aim to lower costs of producing algal biofuels. These renewable fuels will be replacements for fossil fuels in several applications including aviation and motor vehicle transportation, heating and electricity production, reducing dependence on foreign oil.

A number of the core green energy businesses have experienced growth, even through the recession. Advances in technology have made green alternatives more efficient and economically attractive. Larger, mainstream energy providers report a need to balance their desire to commit to more green technologies with the obligation to provide least cost options to the public. At this point, the general public in the St. Louis region seems to want green energy options, yet are not interested in paying higher rates or dealing with the added inconvenience that may come with that product.

Employers in our region see a great deal of growth opportunity in wind energy, solar energy and electric car markets. Regulatory changes and renewable energy portfolio standards might help to spur growth in some energy areas, but a major factor continues to be the difficulty in expressing the cost and benefits to consumers. The case for large investment in areas like wind generated energy is easier to make as advances shorten the time between investment and savings.

> ***"Customers want green energy, but right now are not willing to pay for it. Our industry is highly dependent upon customer demand, and our success is in supplying their demands."***
>
> ***— Green energy employer***

As with most sectors, this sector believes strongly that public education regarding green energy options will significantly impact growth. They report that a failure to fully embrace and support green energy is currently the biggest obstacle to growth for the sector.

SKILLS

A majority of the employment opportunities within this sector are limited to areas that require a high-level of education with an emphasis on science and engineering with a strong technical skills emphasis as well. Broader opportunities in manufacturing within the sector tend to occur outside of the St. Louis area. The manufacturing sector is challenged to overcome a perception that this particular labor pool is expensive and may not be flexible or adaptable enough to perform in such a dynamic industry. The participants believe that if the area became more accommodating and supportive of green energy options, the workforce would be positively impacted.

SKILLS EMPLOYERS ARE SEEKING:

- Emphasis is in math and science
- Engineering
- Critical thinking
- Adaptibility

TRAINING OPPORTUNITIES:

- Focus on green alternatives and how they work
- Long-term & short-term benefits of using green energy

SIUE/NATIONAL CORN-TO-ETHANOL RESEARCH CENTER TRAINING PROGRAM

Workforce training at the National Corn-to-Ethanol Research Center provides a comprehensive overview of the skills required of a process operator in today's ethanol industry. Participants receive classroom training from industry leading experts, process simulation training on a distributed control system and hands-on learning in an operating biofuels pilot plant. Training is complimented by the laboratory and pilot scale research expertise of the Corn-to-Ethanol research staff.

The following topics are covered in a 5-day training program, including classroom (30 hours) and pilot plant (10 hours) experience:

- **Overview of the Corn-to-Ethanol process**
- **Safety**
- **Grain Quality**
- **Cooking, liquefaction, enzymes**
- **Fermentation and yeast propagation**
- **Distillation, molecular sieves**
- **Quality control/lab tests**
- **Process Operations**
- **Process Controls**
- **Co-product production (centrifugation, evaporation, drying)**
- **Maintenance**
- **Plant Sanitation**
- **Wastewater**
- **Biomethanators**
- **Future trends in biofuels**

EXAMPLES OF AREA TRAINING INSTITUTIONS

(To view the full list visit www.stlouisgreenjobs.com):

Washington University – Consortium for Clean Coal Utilization, Photosynthetic Antenna Research Center, International Center for Advanced Renewable Energy and Sustainability (I-CARES)

East Central College – Wind Energy Technology

Ranken Technical College – Green Technology and Solar Systems

SIUE /National Corn-to-Ethanol Research Center Training Program

St. Louis Community College – Wind Energy Apprentice, Green Photovoltaic System & Design

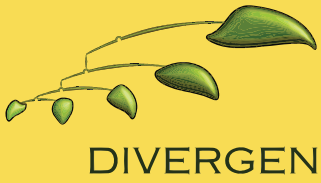
Southwestern Illinois College – Solar Installation

GREEN AGRICULTURE

Examples of Green Agriculture Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Agriculture Sector
11-3051	Industrial Production Managers	$112,920	2.07%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	$35,860	1.81%
19-4011	Agricultural and Food Science Technicians	$57,060	1.29%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	$83,090	0.52%

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008



DIVERGENCE

Divergence, located at BRDG Park in Creve Coeur, is a company focused on the discovery of safe and effective products for various markets, especially crop protection. Since the company's inception in 1999, Divergence has focused primarily on the prevention and treatment of parasitic infections, a market that is poorly served in agriculture due to the lack of products that are broad-spectrum in their activity, flexible in their means of application, economical to manufacture, and safe for the environment and non-target organisms. Divergence has a nematicide in development that could meet these specifications. Additionally, Divergence is active in the discovery of crop biotechnology solutions to the same parasitic infections. Divergence's novel research platform is the source of other innovative agrochemicals being advanced by Divergence.

St. Louis region is known as the Biobelt because of the abundance of bioresearch and development, specifically in the plant sciences. Leaders in this sector recognize a need to educate the public regarding the important role their organizations are playing in the green economy, and to counter misconceptions regarding the use of chemicals and biological engineering. These industries are moving away from chemical solutions towards more sustainable techniques to ensuring the world population has plenty to eat for the foreseeable future. This sector is strongly tied to green energy and public administration work, as green agriculture includes bio-energy, and the regulatory environment of public administration influences a great deal of agriculture market trends.

A majority of this sector supports an employee base that is highly educated in science and math. Employers in the groups believe that it is important to create education opportunities at a young age to introduce local youth to career pathways developing in the agriculture industry. If interest can be built in the work, youth may be more likely to pursue educational opportunities in math and science.

INDUSTRY SPECIFIC SKILLS EMPLOYERS SEEK:

- Advanced science and math attainment
- Knowledge of farm operations
- Knowledge of the agriculture industry, including policy and regulation
- Information technology

GENERAL SKILLS EMPLOYERS SEEK:

- *Soft skills* – interpersonal relationship building, effective communication
- *Team work* – ability to work on large projects with a team
- *Leadership skills* – these skills are needed as employees progress through management levels

> ***"Some people in this field have never even seen a real farm. You need to know how a real farm works to be effective in this line of work. This type of education needs to start young."***
>
> ***— Green agriculture employer***

Team work is a highly valued quality of applications in this agriculture field. Employees in this field are often tasked with large-scale team projects. Employers expressed that many traditional education and training programs did not prepare job applicants adequately enough for this type of team-based work. Employers also stated a general lack of soft skills among scientists working in this research field, and that these skills are still very important to acquiring a position in emerging green agriculture field.

Leadership skills are needed among new and existing workers in green agriculture. Workers are promoted for the success they have working as individuals into leadership roles. As leaders, the skills that made them successful as individual contributors often are different than the skills needed for effective leadership and management. Employers report that many degree programs focus exclusively on science and technical skills, and neglect teaching soft skills that would be beneficial for leadership. Some larger organizations have created leadership programs to close this skills gap, but many of the mid-size to small organizations do not have internal training departments. There may be an opportunity to serve these organizations by providing on-the-job training for employees.

With heavy emphasis on specific science background, recruitment for many positions in this sector often spans the globe. Relationships with universities (national and international) are strongly

EMERGING LEADERS IN SCIENCE PROGRAM AT MONSANTO

The Emerging Leaders in Science Program at Monsanto is a rotational program that consists of three, one-year rotational assignments within selected strategic focus areas. Following successful completion of the three-year program, participants are placed in a key role within Monsanto's Technology Organization. This program recruits top scientific talent in advanced engineering/bioenergy, biochemistry, bio-informatics & computational biology, chemistry, crop science/seed biology, entomology, environmental sciences, genetics, plant biology (physiology or molecular), plant breeding, plant pathology, statistical genetics, toxicology/pharmacology, and weed science.

leveraged. There are local resources, yet many of the top level jobs are heavily desired, attracting applicants from all over the country and the world. Even if growth accelerates, there will not be a great deal of increase in demand for these high-level jobs. However, programs like the St. Louis Community College Plant and The Center for Plant and Life Science at BRDG Park prepares students for many of the lab positions that will be needed in the research field of the green agriculture sector. This program has successfully placed students in local positions with area agriculture research companies.

There is also an increasing trend in urban farming across the nation and the region. These job opportunities tend to be less available and lower paying. However, there are apprenticeship programs in the region that prepare one for this type of work. These types of jobs are also less common to find through traditional job search avenues, and often involve individuals who are entrepreneurial and start their own farms. Additionally, there are opportunities to work in the field of local food management, such as Community Supported Agriculture (CSAs), and local grocery stores like Local Harvest, The Old North Grocery Coop, and Sappington Farmers' Market.

TRAINING AND EDUCATION:

To better prepare workers for green agriculture jobs, employers recommended these types of training and education:

- Promote sustainability principles at a much earlier age
- Leadership and soft skills
- Job experience training through coops, internships, and externships

EXAMPLES OF TRAINING INSTITUTIONS IN THE AREA

(To view the full list visit www.stlouisgreenjobs.com):

St. Louis Community College – Florissant Valley, Center for Plant and Life Science at BRDG Park

Washington University – Plant Biology, and Evolution, Ecology and Population Biology

EarthDance – Urban Farm Apprenticeship Program

Monsanto – Emerging Leaders in Science Program

GREEN MANUFACTURING

Examples of Green Manufacturing Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Manufacturing Sector
51-2092	Team Assemblers	$29,800	2.62%
17-2051	Civil Engineers	$85,630	2.01%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	$46,280	1.87%
17-2112	Industrial Engineers	$85,110	1.80%
53-7062	Laborers and Freight, Stock, and Material Movers	$33,430	1.74%
17-2141	Mechanical Engineers	$86,680	1.68%
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	$68,220	1.64%
11-9041	Engineering Managers	$123,590	1.61%
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	ND	1.49%
17-2011	Aerospace Engineers	ND	1.41%

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008

The Missouri Green Jobs Report and the *St. Louis Green Economy Profile* identify manufacturing as a strong potential growth area for the St. Louis region in terms of the green economy because of the region's strong manufacturing base. However, the manufacturing sector continues to feel the impact of the difficulties related to the downturn in the economy. In both the core and adaptive business areas, growth has been significantly slowed and the workforce has declined. Employers were less than optimistic about significant growth in the immediate present, and felt that any future growth that would occur would be easily handled by the current pool of displaced manufacturing workers in the area. Employers stated the difficulty of attracting investors in new technologies during difficult economic times.

Members of the manufacturing focus groups communicated a reluctance to expand the workforce until demand for their products increases significantly. Most employers are looking to become more efficient, reengineering processes so that they are able to do more with less. When the workforce is expanded, or called back, they will be returning to a brand new way of doing things. Training or retraining will be an important step in expanding the workforce.

Employers stated that becoming more efficient is always profitable for manufacturing companies. Additionally, manufacturing companies are facing stricter policy regulations that may require them to green their practices even more. They are looking for employees who know basic principles of sustainability and can apply it to other parts of the company. In general, employers stated that entry-level workers in manufacturing will need the same basic skills for a green or non-green position.

HALCYON SHADES

Halcyon Shades, with manufacturing in St. Louis, has been making high-tech solar control shades since 2005. Halcyon shades produce a "smart" window shade that preserves natural daylight thereby reducing the need for artificial lighting while reducing the energy consumption needed for building cooling by as much as 15% - regardless of the size of the building.

Below is an example of some of the main training opportunities that were expressed from employers:

FOUNDATIONAL SKILLS:

- *Green processes in production* – changes in manufacturing to greener or more sustainable techniques may be taught to potential applicants prior to the increased workforce need.
- *Safety* – potential workers with recent training in basic safety would be well positioned as green manufacturers experience growth. Safety specific to new and emerging green manufacturing techniques would be an area of emphasis in these types of courses.
- *Soft Skills* – not directly related to green, this area remains one that all sectors see as an area of training need. Technical skills and practical, hands-on training remain the emphasis for training programs, while organizations continue to look for people that can get along with others, handle conflict and interact effectively with customers.
- *Life Skills* – a number of participants shared with the group a need to find employees who understand the importance of being on time, dressing appropriately and attending work every day. They report losing an increasing number of otherwise qualified employees be cause they are unable to demonstrate simple, life skills.

INDUSTRY SPECIFIC SKILLS:

- *Supervisory skills* – a great deal of manufacturing requires teaching others how to perform tasks and evaluating their execution. This also allows for things like sustainability to permeate through a company.

> ***"There is a lot of on-the-job training potential for manufacturing workers. Existing employees' work skills can be adapted to meet a future need for green skills."***
>
> ***— Green manufacturing employer***

- *Six Sigma* - seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Black Belts", "Green Belts", etc.) who are experts in these methods.
- *Lean Manufacturing* - a production practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful, and thus a target for elimination.

EXAMPLES OF TRAINING INSTITUTIONS IN THE AREA

(To view the full list visit www.stlouisgreenjobs.com):

MET Center – Manufacturing Technical Prep Program (MTPP), Computer Numerical Controlled Operation (CNC), Computer Aided Drafting and Design (CADD), DOL Apprenticeship Program

Missouri Enterprise – Six Sigma Greenbelt Training

St. Louis Community College – The Emerson Center for Engineering and Manufacturing

GREEN PUBLIC ADMINISTRATION

Green Public Administration represents the roles in and public policy and civic leadership that manage or administer regulation setting and compliance seen today. This group involves sustainability directors, environmental health inspectors, urban planners, and public works officials. This field is wide-ranging and difficult to categorize in the same career progression as the other technical fields. Many of the occupations in this category require highly trained professionals, with specific knowledge of the regulatory and lawmaking process.

Examples of Green Public Administration Jobs in the St. Louis Region

Occupational Code		Experienced Wage	Percentage of Total Employment in the Public Administration Sector
49-9042	Maintenance and Repair Workers, General	$45,740	2.13%
47-4011	Construction and Building Inspectors	$55,040	1.07%
51-8031	Water and Liquid Waste Treatment Plant and System Operators	$47,810	0.75%
11-1021	General and Operations Managers	$137,750	0.47%
19-3051	Urban and Regional Planners	$62,970	0.26%
27-3031	Public Relations Specialists	$70,140	0.17%
19-1031	Conservation Scientists	$48,490	0.15%
19-4091	Environmental Science and Protection Technicians, Including Health	$42,070	0.13%
19-2041	Environmental Scientists and Specialists, Including Health	$66,210	0.12%
53-6051	Transportation Inspectors	$81,450	0.12%
17-2081	Environmental Engineers	$81,330	0.08%
19-4093	Forest and Conservation Technicians	ND	0.06%

*Occupational codes sourced by Missouri Economic Research and Information Center (MERIC), 2008

The influx of federal stimulus dollars to the region has brought new opportunities and programs for public administrators. However, these funding sources are short-term. Many employers were uncertain about their future potential for hiring employees in green positions because of a changing and demanding regulatory environment. They did, however, acknowledge the increasing amount of work that is being done at the government level.

Employers stated that knowledge of the regulatory policy and compliance was one of the most important knowledge sets for employees in this area. With a fluctuating regulatory environment, this sector is primarily involved in understanding and following regulatory decisions, and advocating for various new policies. Many employees in the public administration field are tasked with understanding and being able to connect several various sectors in their work.

SKILLS NEEDED IN THIS SECTOR:

- Planning & Policy Analysis
- Teamwork
- Problem Solving & Decision Making
- Systems Analysis

This sector agreed with the general views of those in the industry sector groups, citing a need for education of the public in the benefits of supporting green alternatives. The development of local professional organizations like Sustainable St. Louis, Sustainable Business Network, among others, will be a key to providing support to individuals and organizations in need of assistance in following regulation and policy related to sustainability, and promoting more public awareness of green. These groups provide much needed seminars and educational opportunities for public officials and individuals working in sustainability fields.

EXAMPLES OF TRAINING PROVIDERS IN THE AREA (To view the full list visit www.stlouisgreenjobs.com):

St. Louis University –
Masters of Sustainability Degree Program,
Masters in Urban Planning and Real Estate Development

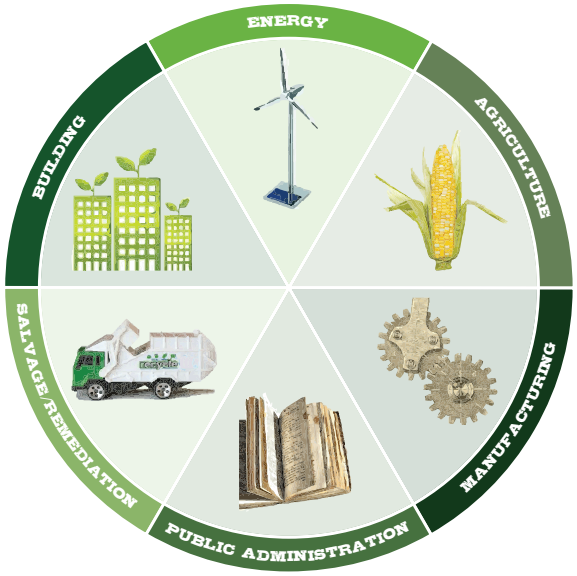
St. Charles Community College –
Certified Sustainability Professional

Washington University – University College –
Certificate in Sustainable Communities and Development,
Bachelors of Science in Sustainability

ST. LOUIS UNIVERSITY MASTER OF SUSTAINABILITY DEGREE PROGRAM

The cross-disciplinary degree integrates knowledge on sustainable business practices, effective public policy processes and innovative design and engineering approaches. The SLU Master of Sustainability degree, the first Masters of Sustainability in the Midwest, is a holistic approach to sustainability, integrating cross disciplinary knowledge and skills throughout the program of study. The rigorous course work and field training offered enables graduates to lead the attack on sustainability related issues with a systems approach to solution development.

GREEN CAREER PATHWAYS

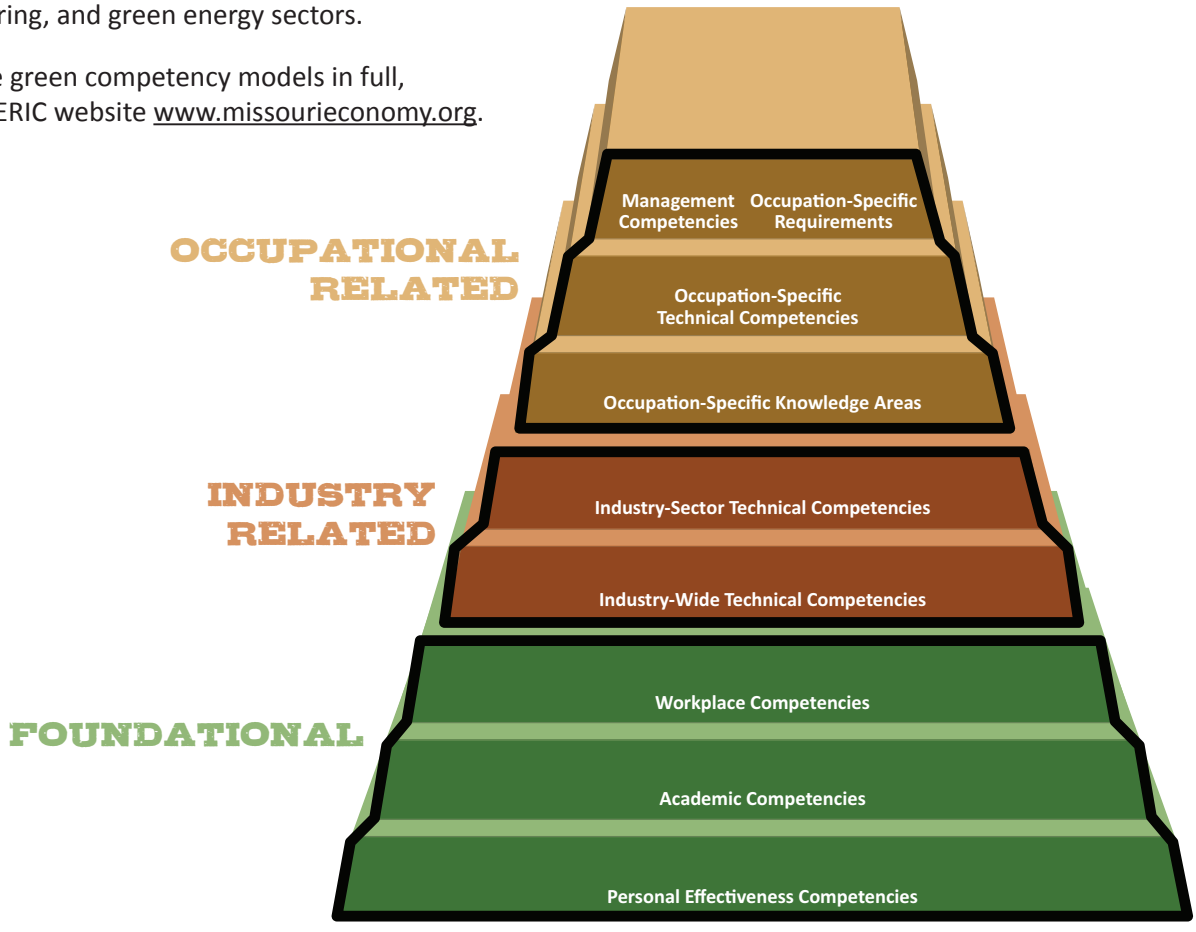


There are many pathways to advance through the green careers discussed in this report. This section explores the types of knowledge, skills and tasks that are generally expected for occupations in these sectors. This report expands upon Green Building, Green Manufacturing, and Green Energy sectors that are projected to have great potential for job growth in the St. Louis Region.

The Missouri Economic Research and Information Center (MERIC) has detailed Green competency models (see figure below) that explore several tiers of competencies and skills most likely important for success in a given green sector. The competency models outline foundational competencies, which include essential skills required for early success in school and work life. These **foundational competencies** can be used for any type of work. Next, are **industry-related competencies** that are common to all jobs within a particular industry and reflects the consensus of industry professionals. Finally, these reports outline **occupational-related competencies**, which includes specific knowledge, education, credentials and performance needed for specific jobs within a specific industry. As one advances towards to the top of the competency model pyramid, skills become more specialized and specific to a particular job title.

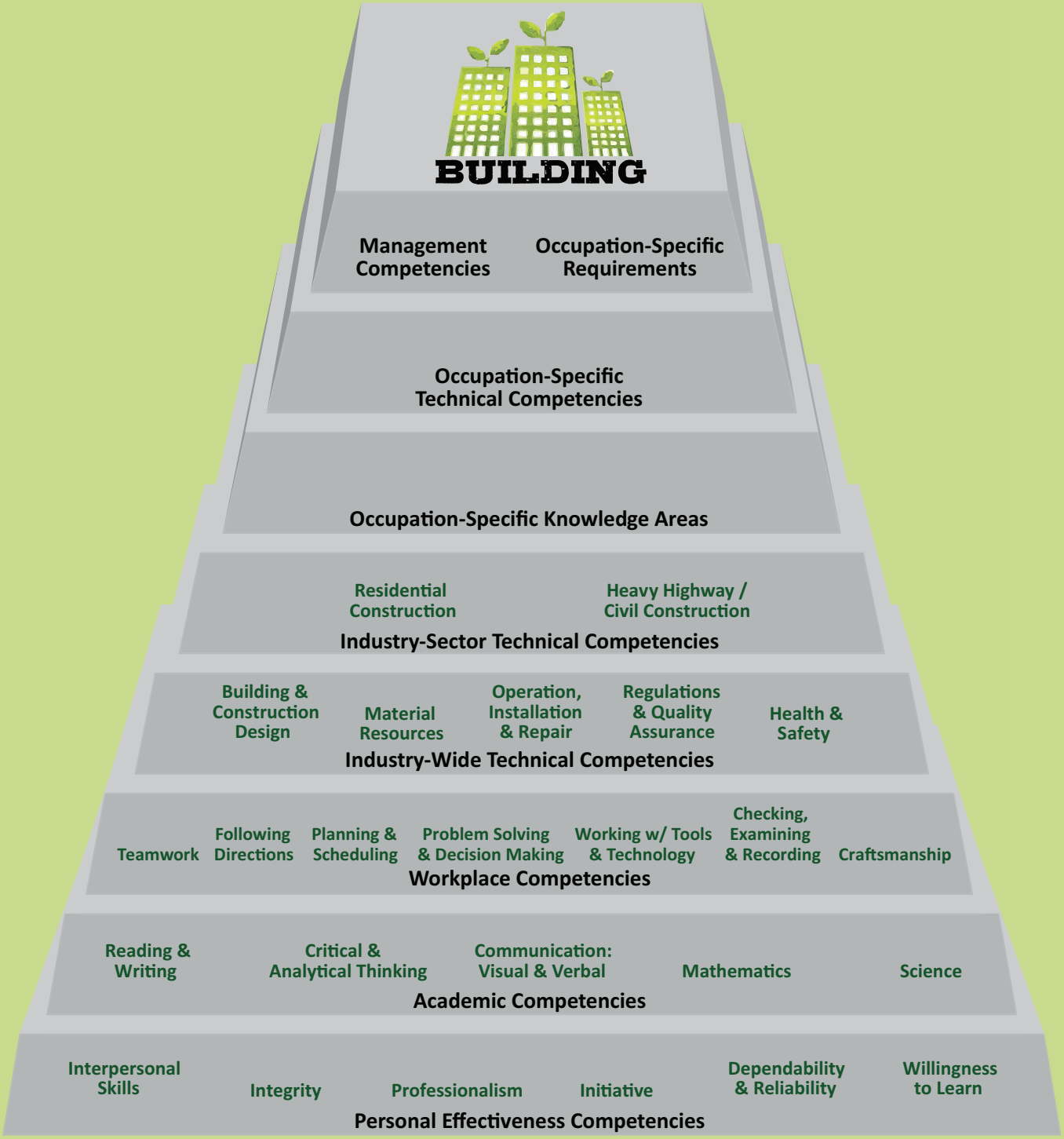
After each competency models are example job descriptions (O*NET) within the green building, green manufacturing, and green energy sectors.

To view the green competency models in full, visit the MERIC website www.missourieconomy.org.



Adapted from www.CareerOneStop.org/CompetencyModel

GREEN BUILDING COMPETENCY MODEL



*Adapted from 2010 MERIC Green Competency Model

GREEN BUILDING OCCUPATION

CONSTRUCTION LABORERS

Tasks

- Clean or prepare construction sites to eliminate possible hazards.
- Read plans, instructions, or specifications to determine work activities.
- Control traffic passing near, in, or around work zones.
- Signal equipment operators to facilitate alignment, movement, or adjustment of machinery, equipment, or materials.
- Dig ditches or trenches, backfill excavations, or compact and level earth to grade specifications, using picks, shovels, pneumatic tampers, or rakes.
- Position, join, align, or seal structural components, such as concrete wall sections or pipes.
- Measure, mark, or record openings or distances to layout areas where construction work will be performed.
- Load, unload, or identify building materials, machinery, or tools, distributing them to the appropriate locations, according to project plans or specifications.
- Erect or dismantle scaffolding, shoring, braces, traffic barricades, ramps, or other temporary structures.
- Position or dismantle forms for pouring concrete, using saws, hammers, nails, or bolts.

Knowledge

- Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

Abilities

- Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- Multilimb Coordination — The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- Trunk Strength — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing.
- Near Vision — The ability to see details at close range (within a few feet of the observer).
- Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong.

*Source: O*NET Online

GREEN BUILDING OCCUPATION

CONSTRUCTION MANAGER

Tasks

- Schedule the project in logical steps and budget time required to meet deadlines.
- Confer with supervisory personnel, owners, contractors, and design professionals to discuss and resolve matters such as work procedures, complaints, and construction problems.
- Prepare contracts and negotiate revisions, changes and additions to contractual agreements with architects, consultants, clients, suppliers and subcontractors.
- Prepare and submit budget estimates and progress and cost tracking reports.
- Interpret and explain plans and contract terms to administrative staff, workers, and clients, representing the owner or developer.
- Plan, organize, and direct activities concerned with the construction and maintenance of structures, facilities, and systems.
- Take actions to deal with the results of delays, bad weather, or emergencies at construction site.
- Inspect and review projects to monitor compliance with building and safety codes, and other regulations.
- Study job specifications to determine appropriate construction methods.
- Select, contract, and oversee workers who complete specific pieces of the project, such as painting or plumbing.

Knowledge

- Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.

Skills

- Time Management — Managing one's own time and the time of others.
- Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- Management of Personnel Resources — Motivating, developing, and directing people as they work, identifying the best people for the job.
- Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- Coordination — Adjusting actions in relation to others' actions.
- Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- Negotiation — Bringing others together and trying to reconcile differences.
- Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.

*Source: O*NET OnLine

GREEN BUILDING OCCUPATION

SUSTAINABLE DESIGN SPECIALIST

Tasks

- In coordination and collaboration with the regional practice, defines, collects, analyzes and reports progress on sustainable goals.
- Leads the definition, capture and analysis of sustainable project information.
- Manages the collection and distribution of sustainable resources.
- In coordination and collaboration with the regional practice, develops and executes strategic practice projects.
- Acts as mentor to project managers and other practice staff by providing technical expertise and leadership.
- Acts as mentor by coaching and motivating teams and individuals; fostering an environment of mutual respect and trust among members of the group as it grows and develops.
- Creates a collaborative work environment.
- Participates in On Boarding training for upper-level, new hires.
- Participates, as needed, in LEED and Sustainable Consulting projects.
- Launches and manages in-house, regular projects and campaigns.
- May act as Project Manager of assigned projects.
- Participates in local or state professional associations, maintains active membership, and attends conferences valued by clients as appropriate.
- Pursues periodic speaking and publishing opportunities.
- Takes personal responsibility for fostering a green workplace through sustainable work practices.

Knowledge / Skills / Abilities:

- Bachelor's degree in Design or Environmental fields, or equivalent in education or experience.
- Three to ten years experience, preferrably in sustainable design preferred.
- LEED Accreditation required.
- Advanced knowledge of Sustainable Design Principles.
- Ability to understand, evaluate and communicate with new technology and programs.
- Ability to manage multiple projects of a complex scope.
- Proficiency in MS Office, including Word, Excel and PowerPoint.
- Proficiency in Photoshop, Illustrator, Sketchup, and InDesign graphic software preferred.
- Ability to communicate effectively both verbally and in writing.
- Ability to work in team environment and ability to supervise others.
- Ability to effectively meet deadlines.
- Ability to document and manage documentation of projects using LEED-NC v2.2 and LEED v3 using the LEED Online tool.

*Source: St. Louis Green employer

GREEN MANUFACTURING COMPETENCY MODEL

MANUFACTURING

Management Competencies | **Occupation-Specific Requirements**

Occupation-Specific Technical Competencies

Occupation-Specific Knowledge Areas

Production of Green Technology | **Production of Green Goods & Services** | **Production using Green Manufacturing Processes**

Industry-Sector Technical Competencies

Quality Assurance/ Continuous Improvement | **Manufacturing Process Design & Development** | **Production** | **Maintenance Installation & Repair** | **Supply Chain Logistics** | **Sustainable & Green Manufacturing** | **Health, Safety, Security & Environment**

Industry-Wide Technical Competencies

Business Fundamentals | **Teamwork** | **Adaptability & Flexibility** | **Marketing & Customer Focus** | **Planning & Organizing** | **Problem Solving & Decision Making** | **Working w/ Tools & Technology** | **Sustainable Practices** | **Checking, Examining & Recording**

Workplace Competencies

Reading & Writing | **Mathematics** | **Basic Computer Skills** | **Communication: Listening & Speaking** | **Engineering & Technology** | **Critical & Analytical Thinking** | **Information Literacy**

Academic Competencies

Interpersonal Skills | **Integrity** | **Professionalism** | **Initiative** | **Dependability & Reliability** | **Lifelong Learning**

Personal Effectiveness Competencies

*Adapted from 2010 MERIC Green Competency Model

GREEN MANUFACTURING OCCUPATION

TEAM ASSEMBLERS

Tasks

- Rotate through all the tasks required in a particular production process.
- Determine work assignments and procedures.
- Shovel and sweep work areas.
- Operate heavy equipment such as forklifts.
- Provide assistance in the production of wiring assemblies.

Knowledge

- Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

Skills

- Coordination — Adjusting actions in relation to others' actions.
- Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- Speaking — Talking to others to convey information effectively.

Abilities

- Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- Finger Dexterity — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- Near Vision — The ability to see details at close range (within a few feet of the observer).
- Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

*Source: O*NET OnLine

INDUSTRIAL ENGINEERING TECHNICIANS

Tasks

- Recommend revision to methods of operation, material handling, equipment layout, or other changes to increase production or improve standards.
- Study time, motion, methods, and speed involved in maintenance, production, and other operations to establish standard production rate and improve efficiency.
- Interpret engineering drawings, schematic diagrams, or formulas and confer with management or engineering staff to determine quality and reliability standards.
- Recommend modifications to existing quality or production standards to achieve optimum quality within limits of equipment capability.
- Aid in planning work assignments in accordance with worker performance, machine capacity, production schedules, and anticipated delays.
- Observe worker using equipment to verify that equipment is being operated and maintained according to quality assurance standards.
- Observe workers operating equipment or performing tasks to determine time involved and fatigue rate using timing devices.
- Prepare charts, graphs, and diagrams to illustrate workflow, routing, floor layouts, material handling, and machine utilization.
- Evaluate data and write reports to validate or indicate deviations from existing standards.
- Read worker logs, product processing sheets, and specification sheets, to verify that records adhere to quality assurance specifications.

Knowledge

- Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- Clerical — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.
- Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Education and Training — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
- Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.

*Source: O*NET OnLine

GREEN ENERGY COMPETENCY MODEL

ENERGY

Management Competencies | **Occupation-Specific Requirements**

Occupation-Specific Technical Competencies

Occupation-Specific Knowledge Areas

Renewable Energy Generation | **Energy Efficiency** | **Energy Trading** | **Energy & Carbon Capture & Storage**

Industry-Sector Technical Competencies

Industry Concepts & Fundamentals | **Business & Financial Management** | **Regulatory Compliance** | **Operations & Maintenance** | **Safety & Security**

Industry-Wide Technical Competencies

Teamwork | **Planning & Organizing** | **Working w/ Tools & Technology** | **Problem Solving & Decision Making** | **Following Directions**

Workplace Competencies

Reading | **Mathematics** | **Basic Computer Skills** | **Communication: Listening & Speaking** | **Engineering & Technology** | **Critical & Analytical Thinking**

Academic Competencies

Interpersonal Skills | **Integrity** | **Professionalism** | **Initiative** | **Dependability & Reliability** | **Willingness to Learn**

Personal Effectiveness Competencies

*Adapted from 2010 MERIC Green Competency Model

GREEN ENERGY OCCUPATION

SOLAR ENERGY INSTALLATION MANAGERS

Tasks

- Plan and coordinate installations of photovoltaic (PV) solar and solar thermal systems to ensure conformance to codes.
- Supervise solar installers, technicians, and subcontractors for solar installation projects to ensure compliance with safety standards.
- Assess potential solar installation sites to determine feasibility and design requirements.
- Assess system performance or functionality at the system, subsystem, and component levels.
- Coordinate or schedule building inspections for solar installation projects.
- Monitor work of contractors and subcontractors to ensure projects conform to plans, specifications, schedules, or budgets.
- Perform start-up of systems for testing or customer implementation.
- Provide technical assistance to installers, technicians, or other solar professionals in areas such as solar electric systems, solar thermal systems, electrical systems, and mechanical systems.
- Visit customer sites to determine solar system needs, requirements, or specifications.
- Develop and maintain system architecture, including all piping, instrumentation, or process flow diagrams.

Tools & Technology

- Handheld refractometers or polarimeters — Digital refractometers
- Personal computers
- Pipe wrenches — Large pipe wrenches; Medium pipe wrenches
- Pitch measuring instruments — Inclinometers
- Portable data input terminals — Solar analysis systems
- Inventory management software — Inventory tracking software
- Office suite software — Microsoft Office software
- Presentation software — Microsoft PowerPoint
- Project management software — Cost estimating software; Microsoft Project
- Word processing software — Microsoft Word

*Source: O*NET OnLine

GREEN ENERGY OCCUPATION

SOLAR ENERGY SYSTEMS ENGINEERS

Tasks

- Conduct engineering site audits to collect structural, electrical, and related site information for use in the design of residential or commercial solar power systems.
- Design or coordinate design of photovoltaic (PV) or solar thermal systems, including system components, for residential and commercial buildings.
- Create checklists for review or inspection of completed solar installation projects.
- Create electrical single-line diagrams, panel schedules, or connection diagrams for solar electric systems using computer-aided design (CAD) software.
- Create plans for solar energy system development, monitoring, and evaluation activities.
- Develop design specifications and functional requirements for residential, commercial, or industrial solar energy systems or components.
- Perform computer simulation of solar photovoltaic (PV) generation system performance or energy production to optimize efficiency.
- Provide technical direction or support to installation teams during installation, start-up, testing, system commissioning, or performance monitoring.
- Design or develop vacuum tube collector systems for solar applications.
- Develop standard operation procedures and quality or safety standards for solar installation work.

Tools & Technology

- Ageing ovens — Accelerated weathering machines; Solar simulators
- Coulometers — Flow coulometric detectors
- Laboratory mechanical convection ovens — Bench ovens; Humidity ovens
- Semiconductor process systems — Focused ion beam FIB systems; Ion beam assisted deposition IBAD systems; Ion mills; Plasma enhanced chemical vapor deposition PECVD systems
- Spectrometers — Auger electron spectrometers; Electron energy loss spectrometers; Energy dispersive x-ray spectrometers EDS; X-ray photoelectron spectrometers
- Analytical or scientific software — Optical Physics Technologies SUN_CHART; SOLAR-2; SolTrace; The MathWorks MATLAB
- Computer aided design CAD software — Autodesk AutoCAD LT; Autodesk AutoCAD software; Dassault Systemes SolidWorks software; IMSI Design TurboCAD software
- Office suite software — Microsoft Office software
- Presentation software — Microsoft PowerPoint
- Word processing software — Microsoft Word

*Source: O*NET OnLine

GREEN ENERGY OCCUPATION

BIOFUELS PRODUCTION MANAGERS

Tasks

- Manage operations at biofuels power generation facilities, including production, shipping, maintenance, or quality assurance activities.
- Adjust temperature, pressure, vacuum, level, flow rate, or transfer of biofuels to maintain processes at required levels.
- Approve proposals for the acquisition, replacement, or repair of biofuels processing equipment or the implementation of new production processes.
- Conduct cost, material, and efficiency studies for biofuels production plants or operations.
- Monitor meters, flow gauges, or other real-time data to ensure proper operation of biofuels production equipment, implementing corrective measures as needed.
- Prepare and manage biofuels plant or unit budgets.
- Review logs, datasheets, or reports to ensure adequate production levels or to identify abnormalities with biofuels production equipment or processes.
- Shut down and restart biofuels plant or equipment in emergency situations or for equipment maintenance, repairs, or replacements.
- Supervise production employees in the manufacturing of biofuels, such as biodiesel or ethanol.
- Confer with technical and supervisory personnel to report or resolve conditions affecting biofuels plant safety, operational efficiency, and product quality.
- Draw samples of biofuels products or secondary by-products for quality control testing.
- Monitor transportation and storage of flammable or other potentially dangerous feedstocks or products to ensure adherence to safety guidelines.
- Provide direction to employees to ensure compliance with biofuels plant safety, environmental, or operational standards and regulations.
- Provide training to subordinate or new employees to improve biofuels plant safety or increase the production of biofuels.

Tools & Technology

- Air samplers or collectors — Air monitoring equipment
- Belt conveyors — Belt conveyor systems
- Control valves — Flow control valves FCV; Throttle control valves TCV
- Globe valves — Stop valves
- Plant samples analysis equipment — Sample ports
- Industrial control software — Distributed control systems DCS software; Human machine interface HMI software
- Inventory management software — Inventory control software
- Office suite software — Microsoft Office software
- Presentation software — Microsoft PowerPoint
- Word processing software — Microsoft Word

*Source: O*NET OnLine

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Members of the Green Workforce Taskforce

Charles Juneau	Juneau Associates, Inc.
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Janet Hogan	Monsanto
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Rick Stubblefield	Mid America Workforce Investment Board
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Leonard Toenjes	Associated General Contractors of St. Louis
Catherine Werner	Mayor's Office, City of St. Louis
Shirley Wilson	Jefferson/Franklin County Workforce Investment Board
Harold Zinn	Missouri Enterprise

APPENDIX

RESEARCH METHODS

Two methods of data collection were planned for this project: Employer Survey and Focus Groups. This document is focused on describing the process and outcomes related to the focus group data collection that occurred between July 14, 2010 and August 19, 2010.

As the first step in this process, Green Industries were grouped by common factors into the six green industry sectors (link back to what is a green job)

1) Green Building and Construction
2) Green Salvage and Remediation
3) Green Energy
4) Green Agriculture
5) Green Public Administration
6) Green Manufacturing

The RCGA utilized its membership database to contact and invite green companies in the area. In addition companies identified in a report released by Collaborative Economics concerning core green economy business in the St. Louis region and all other companies recognized as potential green employers were sent invitations to attend the focus group within their sector.

Focus group structure and questions were carefully designed to examine current activities related to the green economy and to elicit information regarding current and future plans for growth in green areas. The same focus group items and structure were utilized for each sector. Particular attention was paid to plans for expanding and growing green product lines and the St. Louis based workforce. In addition, participants were asked to discuss community partnerships, relationships with educational institutions and training centers as well as hiring and training procedures. Specific questions were asked regarding the qualities and characteristics organizations will be looking for as job opportunities arise. Held as an open discussion, participants were given the opportunity to share openly, ask questions of each other and provide feedback on the process.

There were seven focus group sessions scheduled in total with a time frame of approximately two hours each. The focus groups were moderated by staff from the Center for Business Industry and Labor (CBIL) at St. Louis Community College. Two were held for green building and construction and one session each for the remaining sectors. Group size ranged from 3 participants to 10 for each session. Each group member was encouraged to speak in every session and facilitation focused on ensuring that no member was allowed to dominate discussion or have a disproportionate impact on the group's reported observations and recommendations.

The survey was administered by the Center for Advanced Social Research (CASR) at the University of Missouri.

SURVEY INSTRUMENT

The survey instrument was jointly developed by researchers of St. Louis RCGA and CASR. It was designed to collect and examine the following information.

- Perception of importance of green economy
- Number of employees related to green economy
- Number of job openings related to green economy & their descriptions
- Need for training/retraining & plan for green-related jobs
- Importance of soft skills for green job holders
- Importance of academic competencies for green job holders
- Partnership with educational or training institutions
- Values in recruiting green talents

SAMPLING METHOD

The sample of the 2010 St. Louis Green Business Survey was from a database of all the businesses in the St. Louis region. The database was provided by RCGA using a compilation of public and proprietary business directory sources.

At least fifteen (15) attempts were made to complete an interview at every sampled telephone number. The calls were scheduled over days of the week to maximize the chances of making a contact with a potential respondent. All refusals were recontacted at least once in order to attempt to convert them into completed interviews.

FIELD OPERATION

Six hundred sixty-five (665) interviews were completed via telephone with business owners/managers from August 18 to November 5, 2010, by the trained interviewing and supervising staff of CASR.

RESPONSE RATE CALCULATION

Description	Telephone Numbers
A. Total number released	3,340
B. Completed surveys	665
C. Disconnected	504
D. Wrong numbers	235
E. Fax	76
F. Ineligible numbers[1]	183
G. Refusals (after two attempts)	314
H. Communication barriers[2]	12
I. Ring No Answer[3]	1,289
J. Callbacks[5]	62

$$\text{Response Rate (RR)} = \frac{B}{B + G + J} = 63.8\%$$

Notes:

1. Ineligible numbers are defined as those in which the listing was (1) no longer in business, (2) no operation in Missouri, (3) non-business entities such as church, (4) residential households, and etc.
2. Communication barriers are defined as those that could not be communicated in English, were hearing impaired, and etc.
3. Ring-no-answers are defined as the phone numbers in which no one answered to any of the fifteen attempts made during the period when the project was implemented.
4. Callbacks are defined as the numbers in which someone answered during the project implementation period but a callback was scheduled because the selected person was not available.

REFERENCE

The American Association for Public Opinion Research. 1998. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for RDD Telephone Surveys and In-Person Household Surveys.* Ann Arbor, MI: AAPPOR

TABLE I: Completed Interviews by State

Description of State	Percent (%)
Illinois	23.5
Missouri	76.5

TABLE II: Completed Interviews by Green Business or Non-Green[1]
[According to the definitions of research]

Green or Non-Green	Percent (%)
Non-Green	23.3
Green	76.7

TABLE III: Completed Interviews by State & Green Business

	Illinois	Missouri	Total
Non-Green	37 (24%)	118 (23%)	155
Green	119 (76%)	391 (77%)	510
Total	156	509	665

TABLE IV: Completed Interviews by Green Sector

Green Building:	275
Green Salvage and Remediation:	91
Green Energy:	123
Green Agriculture:	52
Green Manufacturing:	35
Green Public Administration:	54

[1]Companies that answered YES to at least one of these green screening questions were labeled a green company. Screen_1: As a business, do you provide a product or service that directly does any of these things: conserve natural and energy resources, provide clean alternatives, reduce pollution and/or repurpose waste? Screen _2: Is your business adopting principles of sustainability, or energy efficiency, or reducing green house gas emissions?

LIST OF GREEN RELATED INDUSTRIES

GREEN BUILDING

NAICS	Industry Description
236115	New Single-Family Housing Construction
236116	New Multifamily Housing Construction
236117	New Housing Operative Builders
236118	Residential Remodelers
236210	Industrial Building Construction
236220	Commercial Building Construction
237110	Water and Sewer System Construction
237310	Highway, Street, and Bridge Construction
237990	Other Heavy Construction
238151	Residential Glass/Glazing Contractors
238152	Nonresidential Glass/Glazing Contractors
238161	Residential Roofing Contractors
238162	Nonresidential Roofing Contractors
238170	Residential Siding Contractors
238191	Other Residential Exterior Contractors
238192	Other Nonresidential Exterior Contractors
238211	Residential Electrical Contractors
238212	Nonresidential Electrical Contractors
238221	Residential Plumbing/HVAC Contractors
238222	Nonresidential Plumbing/HVAC Contractors
238311	Residential Drywall and Insulation Contractors
238312	Nonresidential Drywall and Insulation Contractors
238911	Residential Site Preparation Contractors
238912	Nonresidential Site Preparation Contractors
283172	Nonresidential Siding Contractors
321219	Reconstituted Wood Product Manufacturing
333414	Heating Equipment, Except Warm Air Furnaces
333415	AC, Refrig., & Forced Air Heating
335121	Residential Electric Lighting Fixture Manufacturing
335122	Nonresidential Electric Lighting Fixture Manufacturing
541310	Architechtural Services
541320	Landscape Architechtural Services
541350	Building Inspection Services
541410	Interior Design Services
541420	Industrial Design Services
541410	Interior Design Services
541420	Industrial Design Services
562910	Remediation Services

LIST OF GREEN RELATED INDUSTRIES

GREEN SALVAGE AND REMEDIATION

NAICS	Industry Description
325314	Fertilizers (Mixing Only)
326212	Tire Retreading
423140	Motor Vehicle Parts (Used Wholesale)
423930	Recyclable Material Wholesalers
453310	Used Merchandise Stores (Excluding Pawn Shops)
541380	Testing Laboratories
541620	Environmental Consulting services
562111	Solid Waste Collection
562112	Hazardous Waste collection
562119	Other Waste Collection
562211	Hazardous Waste Treatment and Disposal
562212	Solid Waste Landfill
562213	Solid Waste Combustors and Incinerators
562219	Other Hazardous Waste Disposal
562910	Remediation Services
562991	Septic Tank and Related Services
562920	Materials Recovery Facilities
562998	Miscellaneous Waste Management Services

GREEN ENERGY

NAICS	Industry Description
221111	Hydroelectric Power Generation
221119	Other Electric Power Generation
221121	Electric Bulk Power Transmission
221122	Electric Power Distribution
237130	Power & Communication Line & Related Structures Construction
237130	Power/Communication System Construction
311222	Soybean Processing
325193	Ethyl Alcohol Manufacturing
333611	Turbine Generator & Generator Set Units
333911	Pump & Pumping Equipment Manufacturing
334413	Semiconductor & Related Devices
335311	Electric Power & Specialty Transformers
335999	Miscellaneous Electrical Equipment
541330	Engineering Services

GREEN AGRICULTURE

NAICS	Industry Description
111000	Crop Production
112000	Animal Production
113000	Forestry and Logging
114000	Fishing, Hunting, and Trapping
115000	Agriculture and Forestry Support Activities

LIST OF GREEN RELATED INDUSTRIES

GREEN MANUFACTURING

NAICS	Industry Description
221330	Steam and Air-conditioning Supply
325412	Pharmaceutical Preparation Manufacturing
325611	Soap and Other Detergent Manufacturing
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing
333132	Oil and Gas Field Machinery and Equipment Manufacturing
333319	Other Commercial and Service Industry Machinery Manufacturing
333618	Other Engine Equipment Manufacturing
334512	Automatic Environmental Control Manufacturing
334513	Industrial Process Variable Instruments
334514	Totalizing Fluid Meters and Counting Devices
334519	Other Measuring and Controlling Device Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
335221	Household Cooking Appliance Manufacturing
335222	Household Refrigerator and Home Freezer Manufacturing
335224	Household Laundry Equipment Manufacturing
335228	Other Major Household Appliance Manufacturing
335228	Other Major Household Appliance Manufacturing
335312	Motor and Generator Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
336111	Automobile Manufacturing
336112	Light Truck and Utility Vehicle Manufacturing
336120	Heavy Duty Truck Manufacturing
336213	Motor Home Manufacturing
336312	Gasoline Engine and Engine Parts Manufacturing
336350	Motor Vehicle Power Train Components Manufacturing
336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336611	Ship Building and Repairing
336612	Boat Building
336991	Motorcycle, Bicycle, and Part Manufacturing
541320	Landscape Architectural Services
541330	Engineering Services
541614	Process and Logistics Consulting Services
541711	Research and Development in Biotechnology
541712	Physical, Engineering, and Biological Research

GREEN PUBLIC ADMINISTRATION

NAICS	Industry Description
221310	Water Supply and Irrigation Systems
221320	Sewage Treatment Facilities
924110	Administration of Air Water Resource and Solid Waste Management Programs
924120	Administration of Conservation Programs
925110	Administration of Housing Programs
925120	Administration of Urban Planning and Community and Rural Development
926130	Regulation and Admin. of Communications, Electric, Gas, and Other Utilities
926150	Regulation, Licensing, and Inspection of Misc. Commercial Sectors

SELECTED SURVEY RESPONSES

Current Green Job Openings in St. Louis; October 1, 2010

JOB TITLE	# of Openings
Architect	18
Biologist	1
Building Inspector	1
Business Manager	1
Carpenter	2
Commissioning Agent	1
Commissioning Specialist	1
Design Engineers	2
Electrical Engineer	6
Electrician	3
Engineer	14
Geologist	2
HVAC Service Technician	2
Installation and Service Technician	2
Installation Technician	4
Insulators	4
Laborer	5
LEED Carpenter	1
LEED Green Associate	1
LEED Service Technician	2
Material Handler	1
Mechanical Engineer	2
Medical Planner	3
Microbiologist I	1
Microbiologist II	1
Part-time Technician	1
Planters	2
Plumbing Engineer	1
President	2
Production Worker	2
Professional Engineer	10
Project Engineer	2
Project Manager	4
Project Superintendent	5
Refuse Collection Department	1
Research Microbiologist	1
Sales Representative	4
Supervisor	2
Technician	4
Vice President	3

SELECTED SURVEY RESPONSES

Green Job Titles from Green Employer Survey; October 1, 2010

- Account Managers
- Administration
- Air Pollution Inspectors
- Animal Waste Technician
- Apprentice Plumber
- Architect
- Architectural Designers
- Assistant Manager
- Assistant Nature Center Manager
- Assistant Public Works Director
- Assistant Resource Forester
- Assistant to Consultant
- Associate
- Biological Technicians
- Biologist
- Branch Manager
- Building Inspector
- Building Services
- Business Development and Project Promotion
- Business Manager
- CADD Technician
- Caretaker of Horses
- Carpenter
- Cashier/Sales
- CEO
- Certified Commercial Energy Auditor
- Certified Energy Manager
- Certified Home Energy Auditor
- Chemist
- Chief Engineer
- Chief Operations Officer
- Civil Engineer
- Commercial Plumbers
- Commissioning Agent
- Commissioning Specialist
- Communications Coordinator
- Community Recycling Specialist
- Conservation Information Manager
- Conservation Projects Coordinator
- Construction Manager
- Construction Supervisor
- Consultant
- Control Engineers
- Control Systems Engineer
- Control Systems Specialist
- Crew Workers
- Crop Manager
- Customer Service
- Deputy Director
- Design Engineers
- Designer
- Development Assistant
- Development Manager
- Director of Interior Design Services
- Director of Maintenance
- Director of Modernization
- Director of Purchasing
- Director of Renewable Energy
- Director of Safety and Environmental Issues
- Director of Sales
- Director of Special Projects
- Director of Support Service
- District Conservationist
- District Engineer
- Division Manager
- Driller/Rig Tender
- Driller Assistant
- Driller for Geothermal Drilling
- Driver
- Electric Sales
- Electrical Engineer
- Electrician
- Electronic Technician
- Electronics Engineer
- Energy Conservationist
- Energy Services Manager
- Engineer
- Engineering and Design
- Environmental Compliance Auditor
- Environmental Engineer
- Environmental Manager
- Environmental Planner
- Environmental Supervisor
- Environmental Workers
- Environmentalist
- Equipment Operator
- Estimator
- Executive Director
- Facility Managers
- Facility Operators
- Farmer
- Firmware Engineer
- Foreman
- Forester
- Forklift Driver/Baler
- Front Desk
- Gardeners
- General Laborer
- General Manager
- Generator Technician
- Geologist
- Geotechnical engineer
- Geothermal Driller
- GIS Planner
- Glazers
- Graduate Architect
- Green House Employees
- Green House Foreman
- Head Feeder
- Horticulturalist
- Housekeeper
- HVAC Service Technician
- Independent Software Consultant
- Inspector
- Installation and Service Technician
- Installation Manager
- Installation Technician
- Insulatators
- Interior Designer
- Interior Designer/Architect
- Internal Audits
- Irrigation Worker
- Job Foreman
- Journey Wireman
- Journeyman
- Journeyman plasterer
- Journeyman plumber
- Journeyman Sheet metal Worker
- Kennel Workers
- Laboratory Analyst
- Laboratory Director
- Laboratory Manager
- Laboratory Technician
- Laborer
- Land Conservationist
- Landscape Architect
- LEED Carpenter
- LEED Engineer
- LEED Green Associate
- LEED Operator
- LEED Service Technician
- LEED Service Technician
- Licensed Architect/LEED Certified
- Line Workers
- Machine Operator
- Maintenance
- Maintenance Clerk
- Maintenance Supervisor
- Maintenance Worker
- Manager
- Manager of Green Initiatives

SELECTED SURVEY RESPONSES

Green Job Titles from Green Employer Survey; October 1, 2010

- Manager of Loss Control
- Manager of Environmental Compliance
- Manufacturing Line Workers
- Master Plumber
- Material Handler
- Mechanic
- Mechanic
- Mechanical Engineer
- Medical Planner
- Meteorologist
- Methane Technician
- Microbiologist
- Modernization Coordinator
- Municipal Clerks
- Natural Resource Manager
- Nature Center Manager
- Office Manager
- Operations Manager
- Operator
- Owner
- Park Ecologist
- Park Operations Manager
- Parks Superintendent
- Parlor Manager
- Part-time Technician
- Pipe Installers
- Planner
- Plant Material Center Manager
- Plant Material Center Specialist
- Plant Operator
- Plant Propagator
- Plant Worker
- Planters
- Plasterer
- Plumber
- Plumbing & Heating Technician
- Plumbing Engineer
- President
- President
- Principal Senior Designer
- Principle
- Principle Geotechnical Engineer
- Principle Investigators
- Principle Owners
- Processors
- Product Supervisor
- Production Manager
- Production Scheduler
- Production Supervisor
- Production Worker
- Professional Engineer
- Professional Engineer
- Program Manager
- Project Architect
- Project Coordinator
- Project Designer
- Project Designer/Specifier
- Project Engineer
- Project Manager
- Project Manager LEED Accredited Professional
- Project Scientist
- Project Superintendent
- Promotion sales and installation
- Public Works Director
- Purchasing Agent
- Quality and Air Control
- Quality Control Manager
- Receptionist
- Refuse Collection Department
- Regional Director
- Regional Supervisor
- Registered Roof Observer/ Project Manager
- Research and Development Technician
- Research Microbiologist
- Resource Conservationist
- Resource Forester
- Resource Technicians
- Retail Sales Associates
- Retreaders
- Roofer
- Route Driver
- Route Drivers
- Sales Designer
- Sales Representative
- Sanitary Engineer
- Secretary
- Secretary Treasurer
- Senior Designer Project Manager
- Senior Designer Project Manager
- Senior Laboratory Analyst
- Senior Microbiologist
- Senior Research Scientist
- Senior Scientist of Product Development
- Service Installer
- Service Manager
- Service Residential
- Service Technician
- Shift Supervisor
- Shop Superintendent
- Shredder Manager
- Siding Installers
- Site Operators
- Soil Conservation Technician
- Soil Conservationist
- Solid Waste Technician
- Stationary Engineer
- Stationary Engineer
- Store Manager
- Storm Water Management Coordinator
- Structural Engineer
- Superintendent
- Supervisor
- Surveyors
- Sustainable Design Consultant
- Systems Engineer
- Technical Director
- Technician
- Tire Vulcanizers
- Transportation Manager
- Treatment Plant Operator
- Vice President
- Vice President of Energy Services
- Vice President of Engineering
- Vice President of Operations
- Vice President of Production
- Vice President of Research and Development
- Vice President of Training and Development
- Warehouse Foreman
- Warehouse Manager
- Warehouse Worker
- Waste Water Collections
- Waste Water Plant Operator
- Waste Water Plant Supervisor
- Waste Water Treatment Manager
- Waste Water Treatment Manager
- Water and Waste Water Supervisor
- Water District Operator
- Water Environment Manager
- Water Quality Manager
- Wildlife Biologist
- Wildlife Management Biologist
- Window Installer