The Greener Side of Alabama's Workforce

Your Pathway to Green Jobs

Alabama Department of Industrial Relations
Labor Market Information Division

A Report By:

Alabama Department of Industrial Relations

Labor Market Information Division

In fulfillment of the Alabama State Labor Market Information Improvement Grant

Executive Summary

In July of 2009 the Alabama Department of Industrial Relations, Labor Market Information Division conducted a Green Survey for the State of Alabama. Simultaneously, through the American Recovery and Reinvestment Act (ARRA), grant money was being offered for labor market research in the Green Economy. Alabama applied for one of those grants and received a $1.14 million Labor Market Improvement Grant in December of 2009. During the two years of study on this topic, the research team uncovered the following information about the presence of a green economy in Alabama.

- Out of the 10,562 employers who responded to the Green Survey, there were 2,844 jobs reported as green, which equaled 0.3% of the total employment of the survey sample.

- Of the organizations in the sample who reported they had job vacancies at the time of the survey, just over 1% was reported as green job vacancies. The rest of the job vacancies were categorized as general jobs.

- Approximately 39% of the green jobs in the state were identified in the green category as *Pollution Prevention and Environmental Cleanup*, the largest green activity in the state. The categories of *Increasing Energy Efficiency* and *Producing Renewable Energy* each made up approximately 23% respectively.

- The data collected from the green sample led to the statewide estimation that just over 1.0% of Alabama's total employment across all industries was involved in green tasks and responsibilities.

- Industry sectors with the largest number of green jobs were *Manufacturing*, *Utilities*, *Wholesale Trade*, *Construction*, and *Agriculture*. Recycling companies in the state are classified under the *Wholesale Trade* industry.

- The occupations estimated with the largest number of green jobs throughout the state were *Forest and Conservation Workers*; *Laborers*; *Electrical and Electronic Repairers*; *Retail Salespersons*, and *Office Clerks*.

- In the analysis of the transferability of skills between projected declining occupations and green occupations, the declining groups *Other Management Occupations*; *Plant and System Operators and Vehicle Mobile Equipment Mechanics;* and *Installers and Repairers* have the skills and knowledge to transfer easily into green jobs.

- Although certain declining occupations that fall into *Financial* groups and *Assembler and Fabricator* groups have skills to easily transfer into green occupations, people in those occupations would need additional knowledge through training and education to be successful in green positions.

Acknowledgements

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- Labor Market Information Division Advisory Group
- NGA Center for Best Practices
- The University of Alabama, Center for Business and Economic Research (CBER)
- U.S. Bureau of Labor Statistics (BLS)

Additionally, the Labor Market Information Division is under the direction of the Department of Industrial Relations, Director Tom Surtees. We would like to express our appreciation to Tom Surtees and Jim Henry, Director of Labor Market Information Division for their support to apply for this grant and take the time needed to work on it. Furthermore, we express great appreciation to other divisions in the Department of Industrial Relations who aided us through the process of attaining assistance with this project. We would especially like to express our sincere thanks to all of the businesses who responded to the survey. Without your support labor market analysis of this nature would not be possible.

We would also like to acknowledge all the community colleges, vocational schools, 4- year institutions, and all other training programs in Alabama which have the vision to provide training and programs in the area of environmental sustainability and energy conservation. Furthermore, we recognize all those across the state who are conducting research in the areas of alternative fuels, and energy conservation.

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Introduction

Green Activities – Global Movement

Global enlightenment regarding environmental activities such as air pollution, water quality, and climate change is more prevalent in our society than ever before. In 2002, Yale University and Columbia University began collaborating with the World Economic Forum and the Joint Research Centre, European Commission to create the Environmental Performance Index (EPI). Using an empirical approach, the EPI centers on two broad environmental protection objectives; (1) reducing environmental stresses on human health, and (2) promoting ecosystem vitality and sound natural resources management (Yale & Columbia, 2007). The EPI program analysis is designed to quantify, benchmark, and track 25 environmental and public health indicators for each country included in the analysis. These EPI reports are published every two years.

Presently, three EPI reports have been published: (1) 2006 Pilot EPI Report, (2) 2008 EPI Report and (3) 2010 EPI Report. Out of 133 countries included in the 2006 Pilot EPI Report study, United States ranked in 28th place with a score of 78.5 percent. Out of 149 countries studied in the 2008 EPI Report, United States ranked in 39th place with a score of 81.0 percent. Lastly, out of 163 countries studied in the 2010 EPI Report, United States ranked in 61st place with a score of 63.5 percent. Table 1 illustrates countries with the highest EPI scores described in the 2010 EPI Report.

Table 1: 2010 Environmental Performance Index (EPI) Rankings & Scores

Rank	Country	Score	Rank	Country	Score
1	Iceland	93.5	11	Malta	76.3
2	Switzerland	89.1	12	Finland	74.7
3	Costa Rica	86.4	13	Slovakia	74.5
4	Sweden	86.0	14	United Kingdom	74.2
5	Norway	81.1	15	New Zealand	73.4
6	Mauritius	80.6	16	Chile	73.3
7	France	78.2	17	Germany	73.2
8	Austria	78.1	18	Italy	73.1
9	Cuba	78.1	19	Portugal	73.0
10	Colombia	76.8	20	Japan	72.5

Source: http://sedac.ciesin.columbia.edu/es/epi/downloads.html

The biannual reports noted United States consistently decreasing its momentum in the green movement. However, as documented in every EPI report, "*The EPI's real value lies not in the numerical rankings, but rather in careful analysis of the underlying data and performance metrics.*" The 25 environmental and public health indicators were broken down into subcategories for detailed performance assessment. All categories were aggregated and assigned percentage weights based on the following criterion: relevance, performance orientation, transparency and data quality. The quantitative performance metrics range from 0 to 100 percent. Figure 1 lists each indicator, subcategory and assigned weight of measurement.

Figure 1: Environmental Performance Index (EPI) Indicators
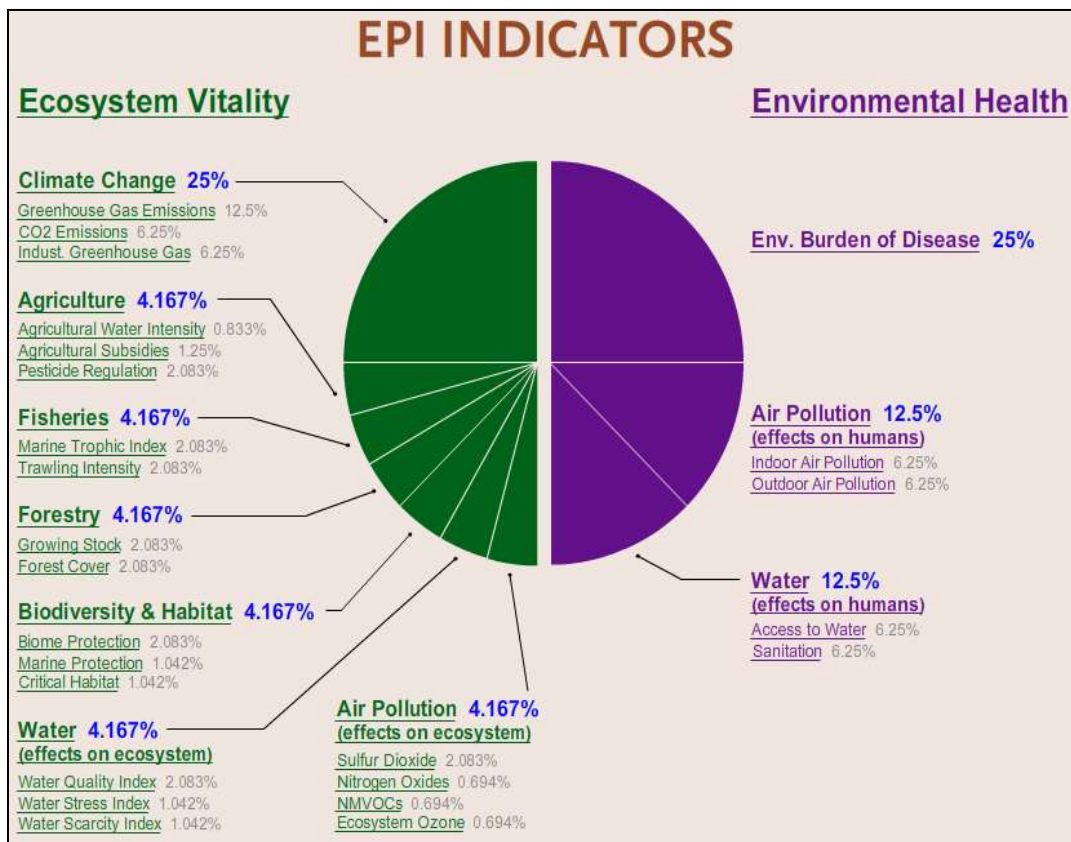
Additionally, every EPI report prefaces with a statement explaining that the study results are dependent on accuracy and availability of the data (i.e., data constraints and methodology limitations apply). Therefore, the premise of EPI report development necessitates the importance of environmental action from all geographical sectors of society: national, statewide and local.

Green Activities – National Movement

On February 17, 2009, United States President Barack Obama signed into law the $787 billion American Recovery and Reinvestment Act (ARRA). The ten-year initiative was intended to jumpstart the U.S. economy, create new employment opportunities, save existing jobs, and pave the way for long-term economic growth and stability. One important facet created from the ARRA is the provision to integrate green sustainability. This integration leads to the creation and provision of funding, technology, resources and employment through the following defined green categories: clean energy; energy efficiency; green training and support; conservation and pollution mitigation; and, environmental friendly production.

Increased awareness of a green economy and the U.S. labor market shortfalls coincide with the nation's movement towards decreasing the unemployment rate and encouraging environmental sustainable development. For instance, 2.8 million jobs were supported by the natural gas

industry which equates to approximately $172 billion for the United States economy (IHS Global Insight, 2009). The traditional energy sectors such as utilities, oil and gas extraction industries, which received significant government investment, comprised about 1.27 million workers in 2007, or about 1.0 percent of total employment (Ernest & Young, 2009). The support of green innovation efforts could potentially provide increased employment opportunities and job attainment for unemployed citizens.

Green Activities – State Movement

Vital to Alabama's economy is the $2.4 billion annual production of oil and gas. Recent investigations have pinpointed techniques that can be used to improve oil recovery, identify basic geologic controls on coal bed methane production, and characterize aging oil reservoirs in the Black Warrior basin and the Gulf Coast (Geological Survey of Alabama, 2010). In comparison to other states, Alabama ranks 14th in coal production, producing 20 million short tons of coal annually. The use of coal has risen to more than 30 million annually because of its use in producing electricity.

Alabama Power is the largest utility company in the state. One of Alabama Power's insightful renewable energy programs affects the average residential customer from a 5.0 percent monthly energy usage to a $2.25 per month renewable energy usage. This is a phenomenal advancement towards energy efficiency for Alabama and its citizens. Throughout the state, more than 50.0 percent of generated power is based on electricity of which 25.0 percent is produced from renewable energy. Another 6.0 percent of its electrical services is generated from hydroelectric power.

By 2007, according to the Geological Survey of Alabama, Alabama ranked 9th in regards to United States' carbon dioxide emissions, as the southeastern states accounted for 40.0 percent of these emissions in the nation. Alabama has maintained a carbon sequestration research program purposed to identify potential geological formation, identify geologic sequestration risks and utilize sequestration technology. Furthermore, the industrial minerals (e.g., limestone, lime, crushed stone and common clay) produced from over 200 Alabama companies has Alabama ranked 16th compared to other states in the value of these minerals.

Additional environmental sustainability efforts are noted in other industry sectors in the state. In July 2010, partnering with the University of Alabama Industrial Assessment Center (AIAC), the following Alabama businesses were recognized by the U.S. Department of Energy Industrial Technologies Program for significantly reducing energy usage (Woodbury, 2010):

- *VonGal Corp.* (reported 19 percent energy savings) – Provider of high performance palletizer solutions to diversified industries, including baking, bottling, brewing, paint, pet food, and publishing.
- *EGS Electrical Group* (reported 15 percent energy savings) – Global manufacturer of industrial electrical products for explosion proof, hazardous and ordinary location environments.
- *Rusken Packaging* (reported 10.2 percent energy savings) – Manufacturer of corrugated shipping containers that are not commonly available through any single manufacturer.

- *W.R. Grace and Co.* (reported 9.7 percent energy savings) – Global supplier of catalysts and other products to petroleum refiners; catalysts for the production of plastics; silica-based engineered and specialty materials for a wide range of industrial applications; sealants and coatings for food and beverage packaging; and specialty chemicals, additives and building materials for commercial and residential construction.
- *Mid-South Electronics* (reported 9.3 percent energy savings) – Manufacturer of a broad range of commercial products in the IT hardware, automotive and consumer/large appliance industries.
- *Southwire's Forte Power Systems* (reported 8.5 percent energy savings) – Manufacturer and provider of wire and cable such as metal-clad cable, cord products, utility cable products, industrial power cable, copper and aluminum rod, and continuous casting technology in North America.

Green Activities – Local Movement

Other American Recovery and Reinvestment Act (ARRA) grant award winners in Alabama included Corps of Engineers, Department of Education, National Science Foundation and the Alethia House. Located in Birmingham, Alabama, Alethia House was the only organization in Alabama to be one of sixty-two recipients of the Green Capacity Building grant offered throughout the United States. In collaboration with the Employment and Training Administration (ETA), the Green Capacity Building grant program provides aid to organizations building training programs that will help individuals acquire necessary green skills to cultivate the advancement of green technology within industries and occupations.

Montgomery, Alabama has an entire fully-implemented green community called Hampstead. The purpose of this community is to provide environmentally sustainable housing development area that promotes economical sustainable living. Three builders, Brasfield & Gorrie, Lowder New Homes and Mercer Home built the homes in this development. One-third of the 416 acres are devoted to parks, gardens, walking trails and other green spaces. Additionally, the community offers a farm, playgrounds, a coffee shop, library, several restaurants, a gym, retail stores, a salon and spa, tennis courts and green, open space community socializing areas. Hampstead features its own farm to grow local and organic foods. The farm supplies Hampstead's Farmers Market and restaurants.

EcoMax is a sustainable living resource initiated by Max Credit Union. It is designed to help educate the Alabama's River Region (i.e., Montgomery, Prattville, Millbrook and Wetumpka) about sustainable living solutions. EcoMax holds expos that focus on energy efficient products and eco-friendly building materials. EcoMax provides information on other companies that produce green goods or provides green services. Every year EcoMax awards Green Leadership Awards to people and companies that produce or support innovative green initiatives.

In the spring of 2011, the string of tornados that swept through Alabama, uprooted families, homes, and livelihoods. The estimates of the amount of debris range as high as 70,000 tons. Rather than burying this material, the City of Birmingham has taken steps to recover this material and reuse or recycle as much as possible. Southeast Renewables (SER), a proven operator of Material Recovery Facilities, was chosen to help divert up to 80% of Birmingham's tornado debris away from landfills. SER will recover, recycle and find ways to reuse the material. This industry leading move will save Birmingham money, extend the life of the existing

landfills and establish a new and innovative method to revitalize communities affected by disasters.

These are a few examples that illustrate the green focus-driven efforts that organizations in Alabama are actively pursuing with the mission to positively contribute to Alabama's green economy, impact environmental sustainability, and provide job and training/certification opportunities to the citizens in Alabama. Successful implementation of green processes can be measured through increased occupancy of green job vacancies, rise in the supply and demand for energy efficient goods and services, and intensified energy conservation measures to determine the impact these methods have on achieving a sustainable green economy.

The Alabama Department of Industrial Relations was awarded the Labor Market Information Improvement Grant in December, 2009. The purpose of the grant was to analyze Alabama's green activities in relation to the labor exchange infrastructure, available green training opportunities and resources, and skill requirements of identifiable green occupations in Alabama industries. Administered by the Alabama Labor Market Information Division, a green survey study was conducted in 2009. The objectives of the green study were to define, identify and quantitatively estimate the location of green jobs in Alabama, the number of jobs available within the state and the state's potential for maintaining environmental sustainable employment in the future.

Green Glossary of Terms

'Green' Defined

Although federal funding is available to build and analyze the green economy in America, currently, there is not a unified definition of what a green job is. The emergence of the green economy, and the creation of 'green baselines' for data analysis and reporting, has caused green terms and definitions to become revolutionary. Therefore, for the purposes of this study, the following green definitions and green categories were used.

Green Terminology

- *Green* – For the purposes of this study, 'green' refers to the impact of consumer habits, behaviors and lifestyles which contribute to the vitality and sustainability of our health, environment and community.

- *Green Economy* – The economic sectors aiming to create jobs and wealth by producing goods and providing services that restore and preserve environmental quality (Green For All, 2009).

- *Green Jobs* – Workers' job duties pertinent to products or services that improve energy efficiency, expand use of renewable energy, or support environmental sustainability (Workforce Information Council, 2009). Essentially, green jobs means work performed in any identifiable green activity/category.

Green Categories

- *Increasing energy efficiency* – Develop methods to reduce the amount of energy used, stored and distributed while producing the same levels of goods and services.

- *Producing renewable energy* – Produce renewable energy generated from natural resources such as sunlight, wind, rain, tides and geothermal heat. Green activity indicators include production and/or distribution of supplies, parts and equipment for the purpose of energy collection.

- *Clean transportation and fuels* – Research, development and production of new technology for energy storage and the creation of alternative fuels in order to reduce emissions and improve fuel efficiency.

- *Agriculture and natural resource conservation* – Conservation includes protection, enhancement and restoration of natural resources through research, installation and maintenance of goods and services related to organic agriculture, land management, and resource conservation (e.g., forestry, animal, and water) for the purpose of sustaining productive and viable lands.

- *Pollution prevention and environmental cleanup* – Utilization of advanced methods that reduce and/or eliminate sources of pollution, waste and emissions of pollutants. Modification production and service processes to remove solid, liquid and hazardous waste materials.

- *Research, consulting and environmental support* – Actively engaged in green activities through daily business practices and contribute to the green economy in areas of energy efficiency, clean transportation, environmental cleanup, research and development. Assist in developing the green economy by offering specialized training, certifications, and various resources on green products and services.

Alabama Green Survey Results & Employment Projections

Survey Methodology

The Alabama Green Survey was completed in July 2009. The survey methodology was comprised of proportionate stratified sampling with a goal of 75% response rate. The project team designed the foundation of study using three key components:

1. The survey sample was based on the Quarterly Census of Employment and Wages (QCEW), Unemployment Insurance Compensation database using year 2008 employment data.

2. North American Industry Classification System (NAICS): A standardized classification system for industries which identifies, compiles, and analyzes units of measure - industrial statistics.

3. Standard Occupational Classification System (SOC): This system is utilized by federal agencies to classify the labor workforce into 840 detailed occupational categories to collect and analyze occupational statistics.

The NAICS industries used for this survey were defined by Alabama's six green categories listed on pages 8 and 9. The team extensively examined green research studies published from other states to determine the 44 industries that would be the foundation for the Alabama green survey administration. In further analysis, the decision was made to employ 3-digit NAICS industries, rather than more detailed 4-digit NAICS industries, for these 44 pre-selected industries in order to capture as many identifiable green activities as possible (Appendix B).

The strata identified for the Alabama Green Survey labor market analysis consisted of:

1. NAICS codes - Selection was based upon employers within the forty-four (44) pre-selected industries from 14 industry sectors.

2. Geographical location – Survey population included 10 Alabama regions, plus out-of-state organizations with satellite offices located within the State of Alabama.

3. Employment size and ownership - Alabama employers considered as part of the survey population consisted of:
    a. Inclusion of employers with more than one employee.
    b. Inclusion of employers identified with 100+ employees. These organizations were selected to be surveyed with a 1.0 selection probability.
    c. Inclusion of employers regardless of ownership status.
    d. Only employers covered by Unemployment Insurance which would include mostly private businesses.

Alabama Green Survey Results

Green Survey Summary
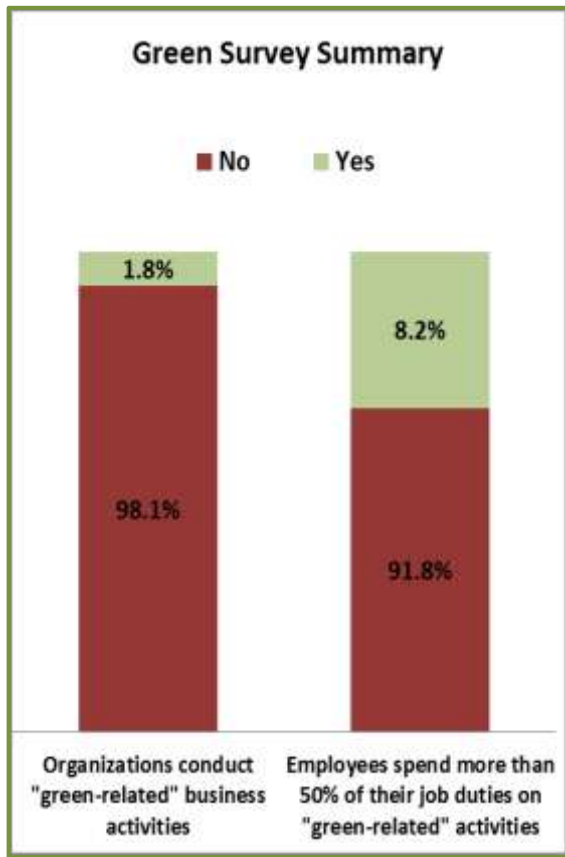
Figure 2: Employment Activities Summary

- The State of Alabama is comprised of sixty-seven counties which are grouped into 10 Workforce Development Regions (WDRs).

- In 2008, over 2.2 million workers were employed by approximately 121,000 employers in Alabama.

- A total of 10,562 employers responded to the Alabama Green survey.

- About 2.0 percent of these employers reported that their organizations conduct green-related business activities.

- A little over 8.0 percent of the survey respondents stated that they had at least one employee who spent more than 50.0 percent of their time performing green-related job duties.
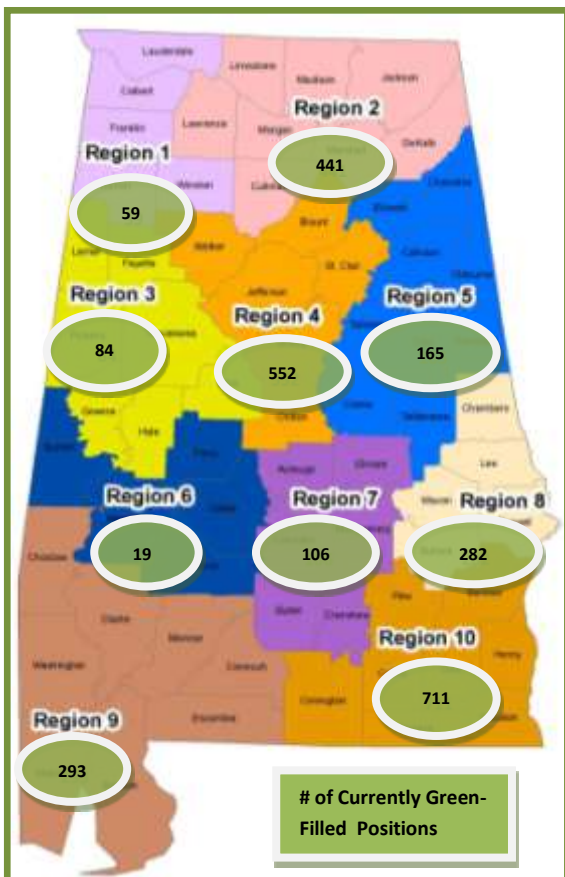
Figure 3: Currently Green-Filled Positions by Workforce Development Regions

- 2,844 total jobs were reported as currently green-filled positions within Alabama.

- Region 10 reported the highest number of green jobs, 711 positions (25.0 percent of the currently green-filled positions).

- Region 6 reported the lowest number of green jobs, 19 (less than 1.0 percent of currently green-filled positions).

- Noted as 'Other', 132 green jobs were reported by employers with satellite offices in Alabama.

The chart below illustrates the responses of two standardized questions: (1) does any of the employees in the organizations spend more than 50.0 percent of their time engaged in green related activities; and, (2) how many current employees are engaged in green-related activities.

Figure 4: Regional Green Activities Summary
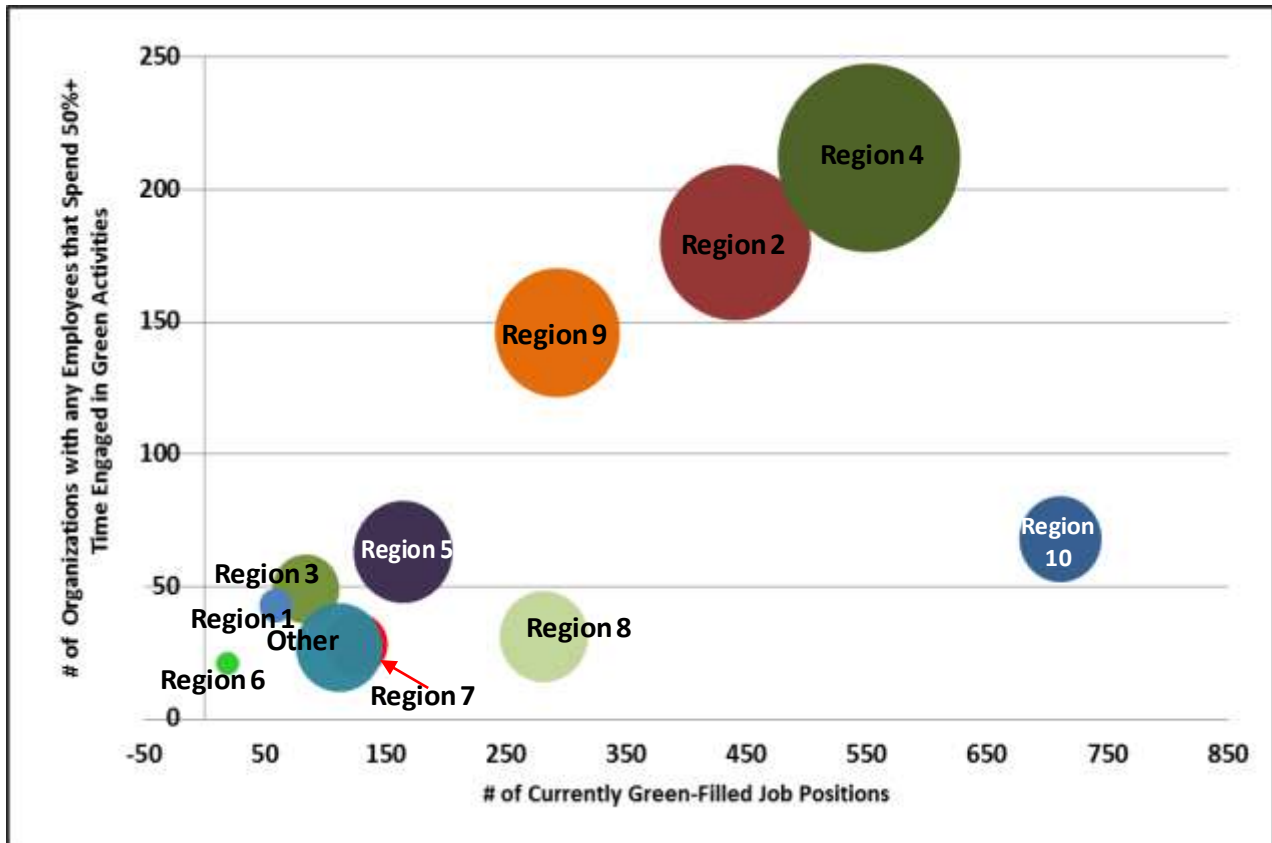
Notes:
(1) Bubble size represents the number of organizations that responded that their workers performed green activities (i.e., employees engaged in green activities 50% or more of work time and have green job positions).
(2) Total Currently Green-Filled Job Positions, 2,844

Out of 10,562 survey respondents, 868 organizations explained that their employees spent 50.0 percent or more of their work duties engaged in green-related activities. Region 4 had the highest number of organizations (212 survey respondents) with employees spending 50.0 percent or more of their time on green-related work activities. Additionally, the survey respondents in this region reported the 2nd highest number of employees in currently green-filled positions. Region 10 had the highest number of employees in currently green-filled positions (711 positions) from relatively a low number of survey respondents. However, it is important to note that one organization reported the majority of all green jobs in Region 10, hence skewing of the data results.

The share of currently green-filled employment compared to total employment of the selected industries sampled in the green survey is illustrated in Figure 5. As noted above, Region 10 reported the highest number of green-filled job positions. Consequently, this region has the highest share of green-filled employment at 1.16 percent. The green-filled employed in Region 6 seems to be about 0.1%.

Figure 5: Green Jobs Employment Share
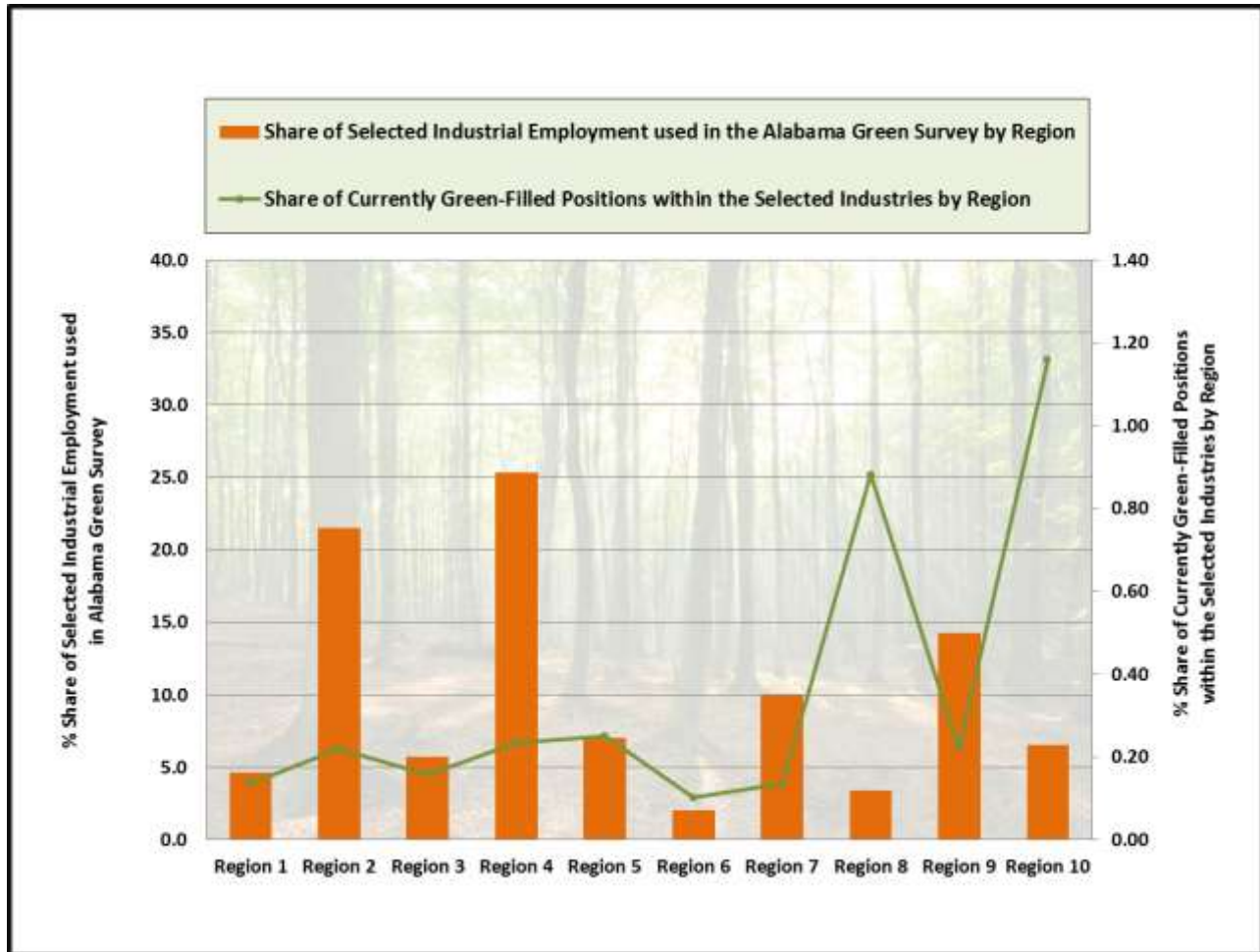
Notes:
(1)   Total Employment of 44 Selected Industries used for the Green Survey Sample 934,520
(2)   Total Currently Filled Green Positions, 2,844
(3)   Share of Statewide Employment is based on 2008-2018 Occupational Projections provided by the Alabama Department of Industrial Relations, Labor Market Information Division.

Total employment data in year 2008 (i.e., Alabama Occupational Projections, 2008-2018) of the 44 industries selected to be included in the sample was extracted for use in the Alabama Green Survey analysis. As illustrated in the chart above, Region 4 has the highest share of total employment at 25.0 percent based on total employment of the pre-selected industries. However, this region ranked fifth in the percent share of green-related jobs. Region 8 has the second lowest share of total employment at 3.4 percent. However, this region represents the second highest share of green-filled positions at 0.90 percent with 197 currently green-filled jobs.

The sample selected for the respective area represented the same proportional share of employment as that of the state. For example, Region 4 represents 25.0 percent of total employment in Alabama. Therefore, the sample pulled for Birmingham was 25.0 percent of the total employment of the sample.

Figure 6: Top 5 Industry Sectors with Currently Green-Filled Occupations
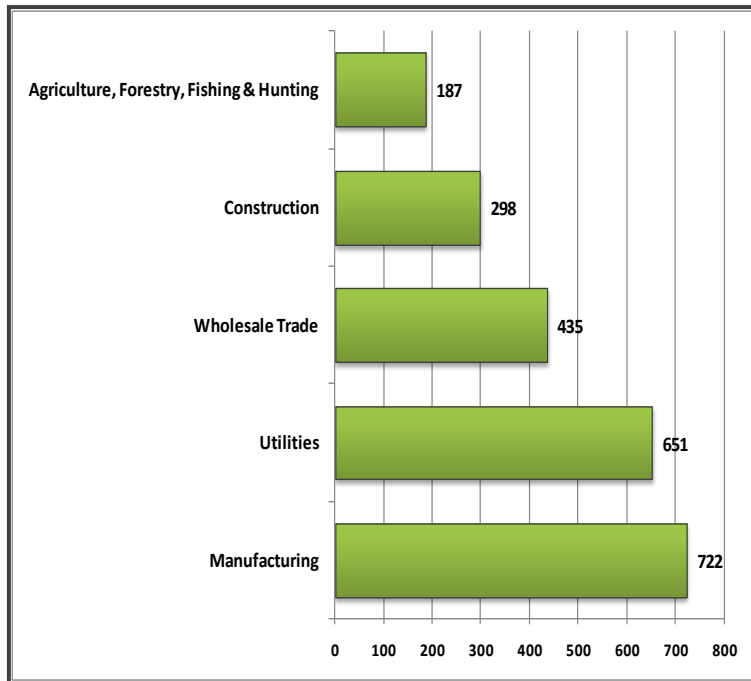
14 of the 44 industries selected for the green survey had workers completing green-related business activities. The top five industries with green employment are listed in Figure 6. These industries reflect a little over 74.0 percent of the currently green-filled jobs reported in Alabama based on survey findings.

Figure 7: Top 10 Currently Green-Filled Occupations

As illustrated in Figure 7, the survey respondents reported Electrical and Electronics Repairers as the occupation with the highest number of workers employed in green-filled positions, 114 jobs. The ten occupations listed represents 40.0 percent of all currently green-filled jobs reported by survey respondents. A total number of 181 occupations based on the Standard Occupational Classification System (SOC) were reported supporting environmental sustainability, only the top 10 is listed to the right.
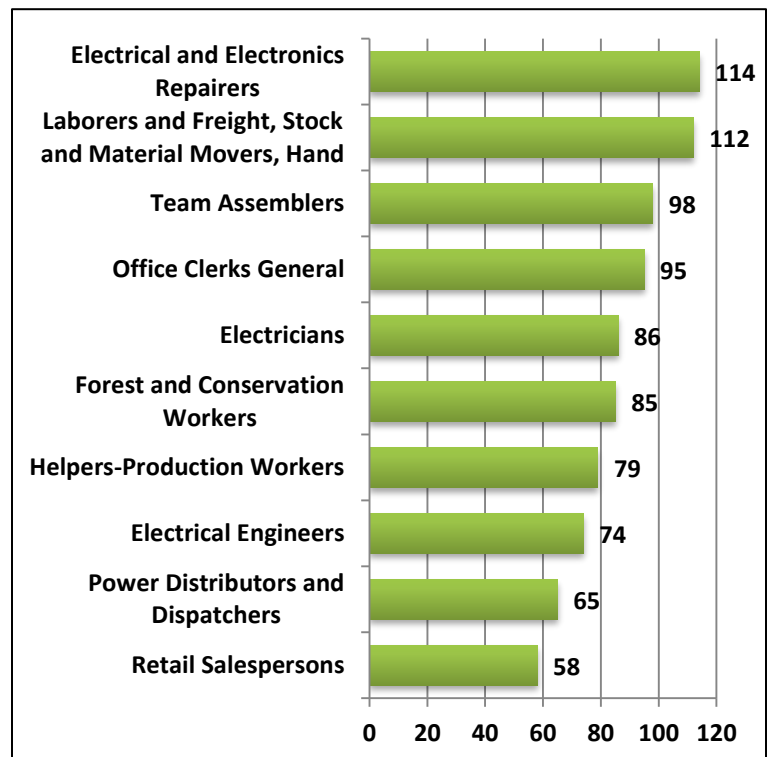
Figure 8: Organizations with employees that spend more than 50% of their time performing green activities
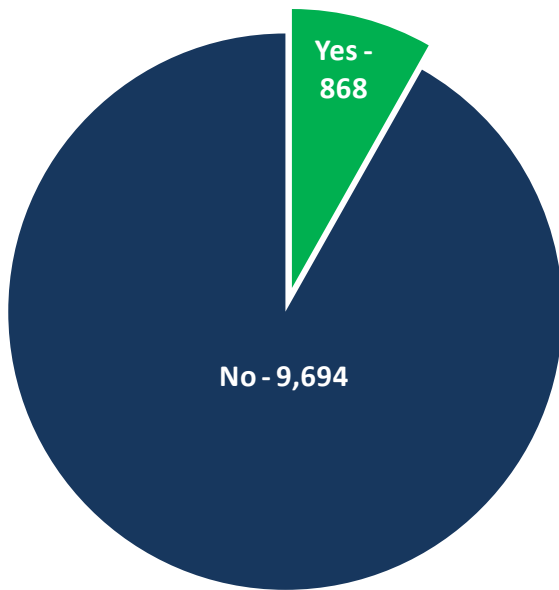
- Out of 10,562 survey respondents, 868 (8.2 percent) of the organizations surveyed stated that at least one employee spent more than 50.0 percent of their work time performing green activities.

- 9,694 (91.8 percent) organizations in the survey stated that they did not have any employees that spend more than 50.0 percent of their work time performing green activities.

Figure 9: General and Green Job Vacancies Comparison
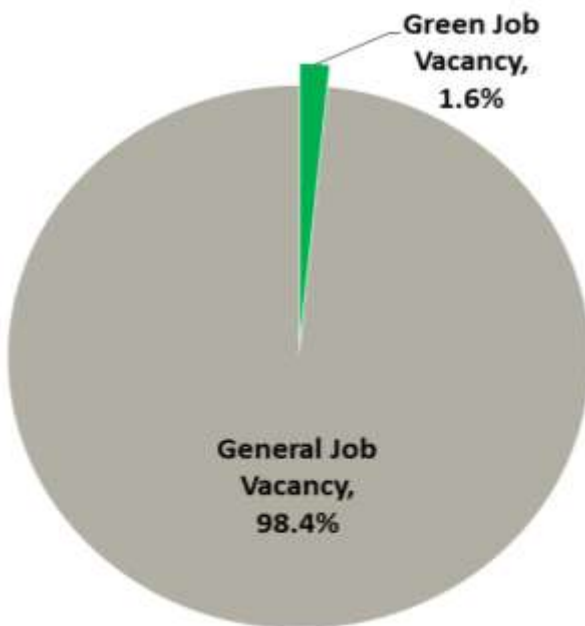
- Out of 2,083 organizations who stated they had job vacancies, over 98.4 percent of those vacancies were reported as general jobs.

- A little over 1.0 percent of survey respondents stated that they currently had green job vacancies.

Figure 10: Work Activities Identified by a Green Category

- In Alabama, a majority of workers completing green- related activities were reported in the areas of *Pollution Prevention and Environmental Cleanup* at 39.0 percent.

- Survey respondents reported minimal green activities performed by workers in *Clean Transportation and Fuels* with less than 1.0 percent jobs reported.

Research & Consulting 2.3%

Clean Transportation & Fuels 0.4%

Agriculture & Natural Resource Conservation 11.5%

Pollution Prevention & Environmental Cleanup 39.0%

Producing Renewable Energy 23.0%

Increasing Energy Efficiency 23.8%
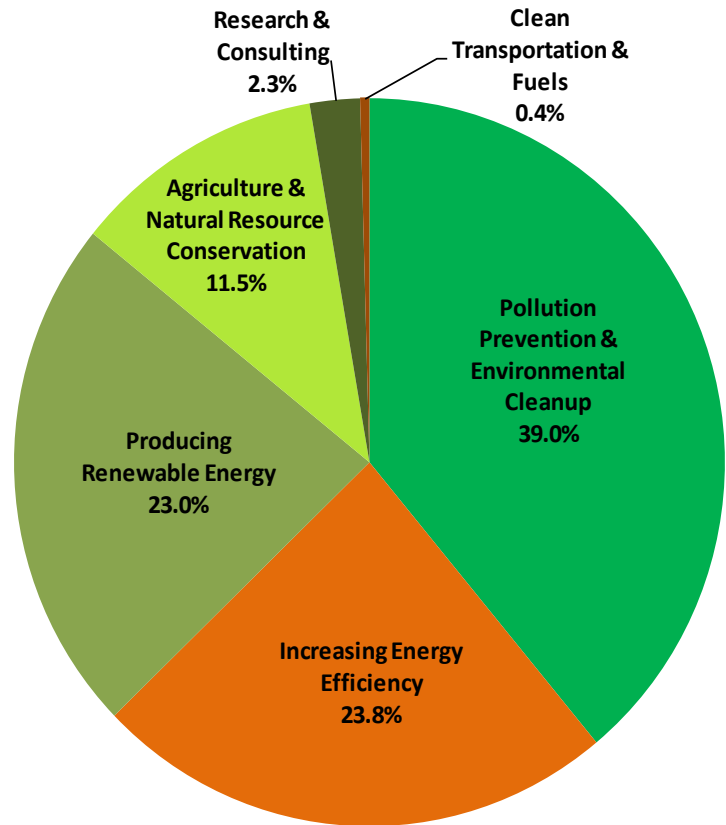
Green-Related Certifications/Training

From the 245 organizations who responded that they have some type of green business activity, 46 organizations stated that their businesses and/or employees had some aspect of specialized green-related certifications and/or training. Types of certification and/or training that were reported included, but were not limited to Leadership in Energy and Environmental Design (LEED) certifications; Sustainable Forestry Initiative (SFI) certification; ISO14001 Environmental Management standards; and, Water Sense an Environmental Protection Agency (EPA) Partnership program.

Of the 2,844 currently green-filled positions, 12.3 percent (351 positions) had green-related certification and/or training.

Of the 57 green job vacancies reported, 68.0 percent would require green-related certification and/or training.

Alabama Statewide: 2008 Green Job Estimates

In 2008, Alabama had approximately 121,000 firms covered by unemployment insurance (UI covered). Using the green survey results to estimate total employment statewide, in 2008, there were 3,784 green businesses, employing approximately 10,000 people. The green businesses made up 3.0 percent of the state's total number of organizations covered by UI. A little over 20.0 percent of the total workforce is not covered by UI. Green jobs made up just over 1.0 percent of the total workforce including both covered and non-covered workers.

Figure 11: Industry Sectors with Green Jobs
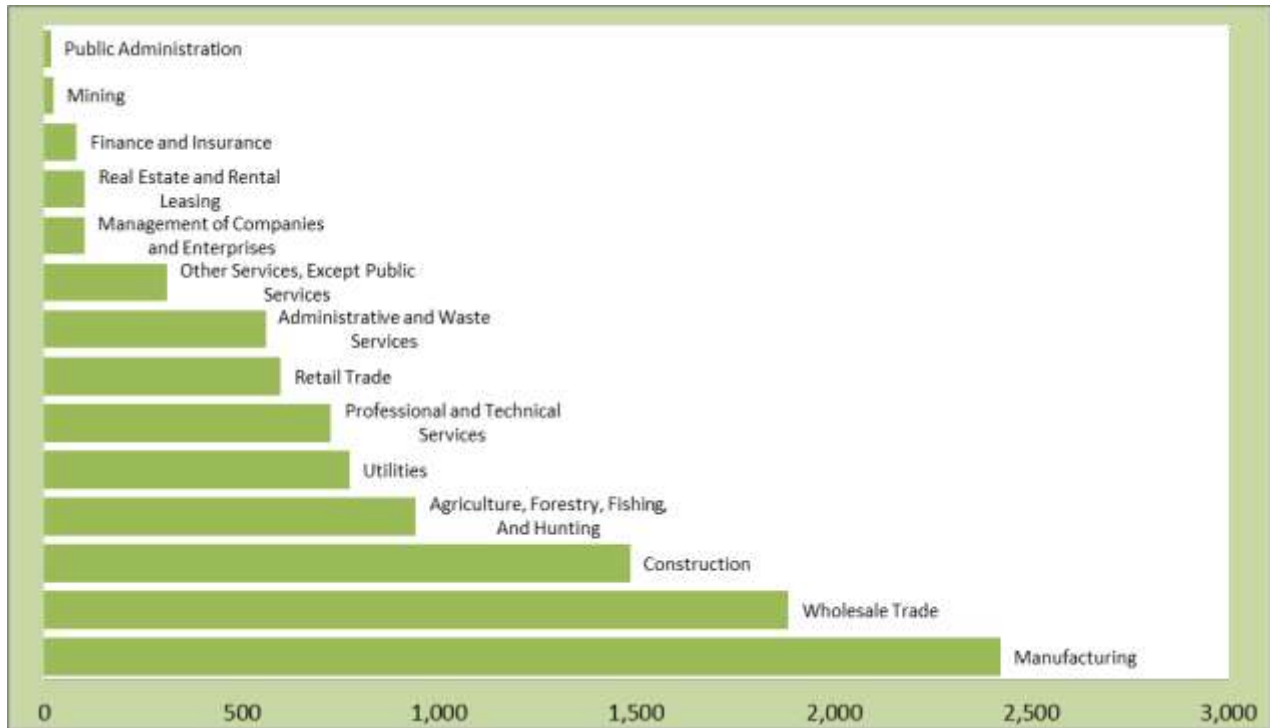
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results.

The Manufacturing industry had the highest number of estimated green jobs in 2008, with 2,400 jobs (Figure 11). Manufacturing plants have opportunities to employ green practices in order to increase energy efficiency and also produce goods that are considered environmentally sustainable.   Wholesale Trade, the industry where a majority of the recycling companies are located, was estimated to have a total of 1,900 green jobs.

The Construction industry has increased its participation in the green economy especially in the last few years, for they incorporate green practices into the engineering, structure and design of buildings. Leadership in Energy and Environmental Design, (LEED) provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. More construction companies are becoming LEED certified than ever before.

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Agriculture, Forestry, Fishing, and Hunting had an estimated employment of 940 green jobs, with nearly half of these attributed to Forest and Conservation Workers. Forest and Conservation workers dedicate their lives to developing, maintaining, and protecting forests, woodlands, wetlands, and the plants and animals that live within them.

In the State of Alabama, a majority of the Utilities companies are contributing to the green concept through developing alternative energy sources using water and nuclear resources. Some national green definitions do not include hydroelectric or nuclear as clean alternative energy sources. As a result, the survey did not reflect the number of people employed in Utilities industries who work with hydroelectric energy sources. However, some companies in the nuclear field were captured in the survey, which contributed to the total estimate of approximately 770 workers employed in green jobs in Utilities companies.

Employers in the mining industry reported very few green jobs since mining extracts natural resources, while green practices encourage conservation of them. Through further analysis, the project team noted that the government sample included mostly agencies that were associated with the education of citizens on energy conservation and environmental preservation.

The industries with the highest percentage of green jobs were those that labor market professionals would expect them to be concentrated in. Utilities had the highest percentage of green jobs with 3.4 percent (Table 2). Although Utilities is a relatively small industry within the state, a larger percent of its workforce is concerned with alternative fuels, considering the nature of the industry. Industries such as Real Estate, Retail Trade, and Finance and Insurance that include a very low portion of green jobs are likely involved in pollution reduction and removal rather than directly producing green products. These are still considered vital to natural resource conservation, but somewhat secondary to direct production. Finally, the Alabama Green Survey results showed Public Administration with the least amount of green jobs.

Table 2: Percent of Green Jobs Within an Industry

Industry	Total Estimated Green Jobs	Total Alabama Jobs in 2008	Green Jobs as % of total
Utilities	770	22,740	3.40%
Wholesale Trade	1,890	81,360	2.32%
Agriculture, Forestry, Fishing, and Hunting	940	50,750	1.85%
Construction	1,490	110,730	1.34%
Manufacturing	2,425	287,750	0.84%
Professional and Technical Services	740	99,730	0.73%
Other Services, Except Public Services	315	43,870	0.71%
Management of Companies and Enterprises	110	15,310	0.67%
Administrative and Waste Services	560	110,650	0.51%
Real Estate and Rental and Leasing	100	26,940	0.38%
Mining	20	7,540	0.30%
Retail Trade	590	239,740	0.25%
Finance and Insurance	80	72,280	0.11%
Public Administration	20	118,820	0.02%

Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Green Jobs as percent of total is based on unrounded data.

The top green estimated occupation in Alabama was Forest and Conservation Workers (Figure 12), which is a result of the duties of this occupation. Additionally a majority of the top green occupations are in Manufacturing and Construction Industries. Others such as Retail Salespersons and Office Clerks tend to be either those involved indirectly in green activities, like recycling or administering paperless operations, or workers employed in very small operations that require them to be involved in all aspects of the business. On the other hand, the top 10 occupations only make up 30.0 percent of the total estimated green occupations, for most of the state's green jobs are not concentrated in one field or occupational group. Instead, they are spread throughout several occupational groups that are considered green.

Figure 12: Year 2008 Top 10 Estimated Green Occupations and Mean Wage
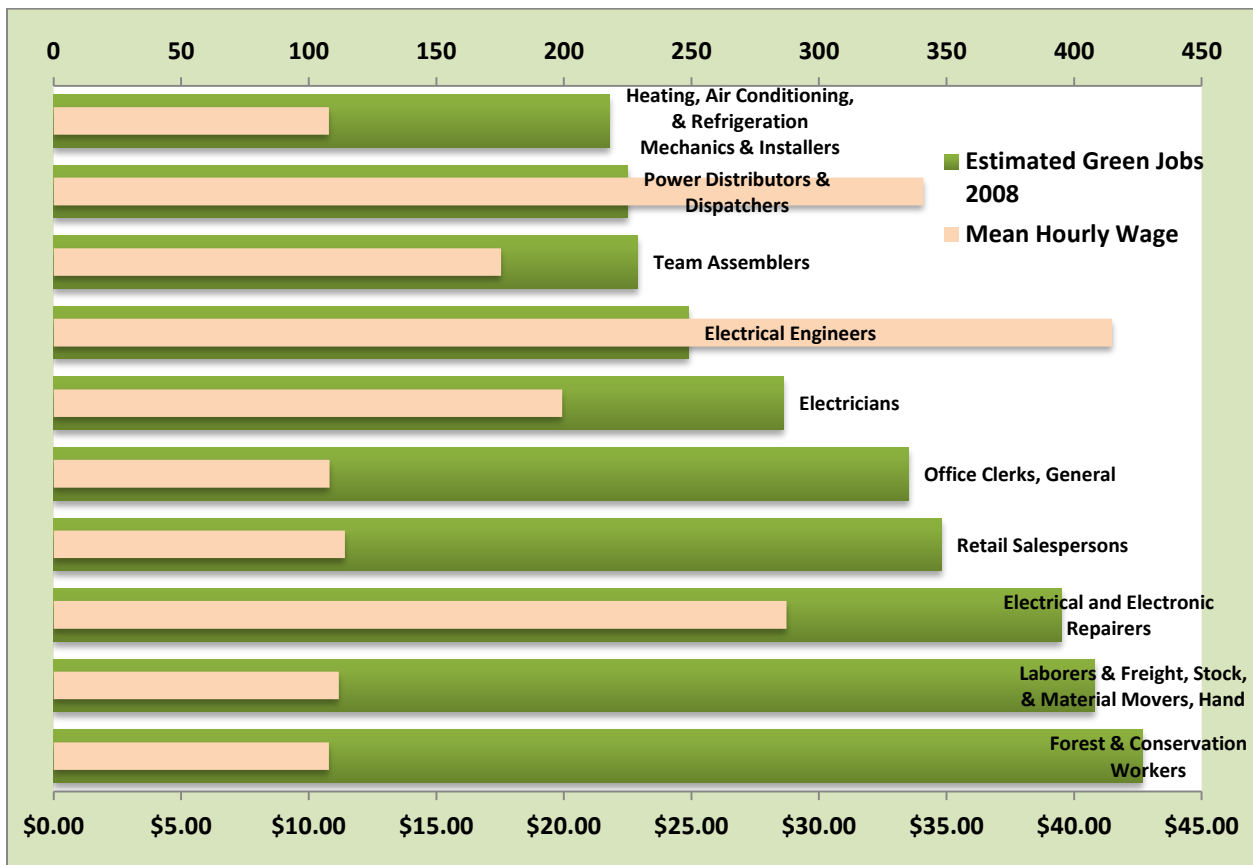
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results.

Of the top 10 green occupations in the state, Electrical Engineers had the highest mean wage at $41.49 per hour (Figure 12). Power Distributors and Dispatchers had the second highest mean wage with $34.10 an hour. These two occupations are associated with the Utilities industry. More specifically, they are related to the Nuclear Energy industry, which is one of the better paying industries in the state. Half of the top 10 green occupations in the state have an average mean wage lower than the state's average of $18.55 per hour. Office Clerks and Retail Salespersons generally report lower wages than more technical jobs. Depending on the industry they are located in, wages will vary for Laborers. Those people in occupations such as Heating,

Air Conditioning and Refrigeration Mechanics and Forest and Conservation workers normally have a wider range of wages based on experience.

The total number of green jobs is estimated to increase by just over 1,250 by 2018, which is an increase of over 12.0 percent (Table 3). Agriculture, Forestry, Fishing, and Hunting had the largest change in employment of any industry. This is due to an increase in the use of green techniques and conservation in this industry. Construction will also see a large increase in green employment, for most new buildings and homes are now being built to be energy efficient and/or are equipped with energy efficient products. Public Administration is predicted to remain constant through 2018 due to budget constraints at state and local levels. Utilities are not expected to gain many green jobs, but this industry was only projected to gain 410 total new jobs, both green and general, according to the *2008-2018 Industry Projections* published by the Department of Industrial Relations.

Table 3: Industry Forecast for Year 2018

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Mining	20	30	10	50.00%
Agriculture, Forestry, Fishing, and Hunting	940	1,280	340	36.17%
Administrative and Waste Services	560	690	130	23.21%
Professional and Technical Services	740	860	120	16.22%
Construction	1,490	1,700	210	14.09%
Finance and Insurance	80	90	10	12.50%
Real Estate and Rental and Leasing	100	110	10	10.00%
Wholesale Trade	1,890	2,070	180	9.52%
Management of Companies & Enterprises	110	120	10	9.09%
Retail Trade	590	630	40	6.78%
Other Services, Except Public Services	315	335	20	6.35%
Manufacturing	2,425	2,570	145	5.98%
Utilities	770	800	30	3.90%
Public Administration	20	20	0	0.00%
Total	**10,050**	**11,305**	**1,255**	**12.49%**

Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Industry projections may show a zero gain due to rounding.

The top ten green occupations have a projected employment increase of about 250 by the year 2018 (Table 4). Team Assemblers is expected to have the highest percentage change. This occupation is in the Manufacturing Industry where Team Assemblers work to assemble an entire product or components of a product, of which more will be energy efficient in years to come. Power Distributors and Dispatchers, located in the Nuclear Energy Industry, is expected to remain constant through 2018 but this could change if the Tennessee Valley Authority is permitted to open up the Bellefonte Nuclear Generating Station in Hollywood, Alabama. This would also affect other occupations such as Electrical Engineers, Nuclear Engineers, Industrial Machinery Mechanics, and also Electricians. Forest and Conservation workers are not expected to experience much growth, because most of these occupations are located in the public sector which is suffering cutbacks due to the slow economy.

Table 4: Occupational Forecast for the Top 10 Jobs

SOC Code	SOC Description	Estimated Green Jobs 2008	Projected 2018 Green Jobs	Employment Change	Employment Change %
512092	Team Assemblers	230	280	50	21.74%
412031	Retail Salespersons	350	400	50	14.29%
499021	Heating, Air Conditioning, & Refrigeration Mechanics & Installers	220	250	30	13.64%
472111	Electricians	290	320	30	10.34%
172071	Electrical Engineers	250	270	20	8.00%
439061	Office Clerks, General	340	360	20	5.88%
492095	Electrical and Electronics Repairers	400	420	20	5.00%
454011	Forest & Conservation Workers	430	450	20	4.65%
537062	Laborers & Freight, Stock, & Material Movers, Hand	410	420	10	2.44%
518012	Power Distributors and Dispatchers	230	230	0	0.00%

Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Lauderdale

Colbert

Franklin

Marion

Winston

Workforce Development Region 1

Region 1 Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 1 is estimated to employ over 105,300 workers.

- As of year 2008, Region 1's workforce represented 4.5 percent of Alabama's total employment of 2.2 million.

- Of the10, 562 survey respondents, 413 organizations responded from Region 1.

- In Region 1, 43 organizations responded that at the time of the survey, at least one employee spent 50.0 percent or more of their time engaged in green activities.

- Of the 413 survey respondents in Region 1, none of the organizations reported having any green job vacancies at the time of the survey.

Figure 13: Percent of Employees Performing Green Activities by Green Category

In Region 1, survey respondents reported 59 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, the green category *Increasing Energy Efficiency* had the highest number of employees providing and/or producing green-related goods and services. According to the survey respondents, their organizations did not report any employees performing work activities in the following green categories: *Producing Renewable Energy* and *Clean Transportation and Fuels.*
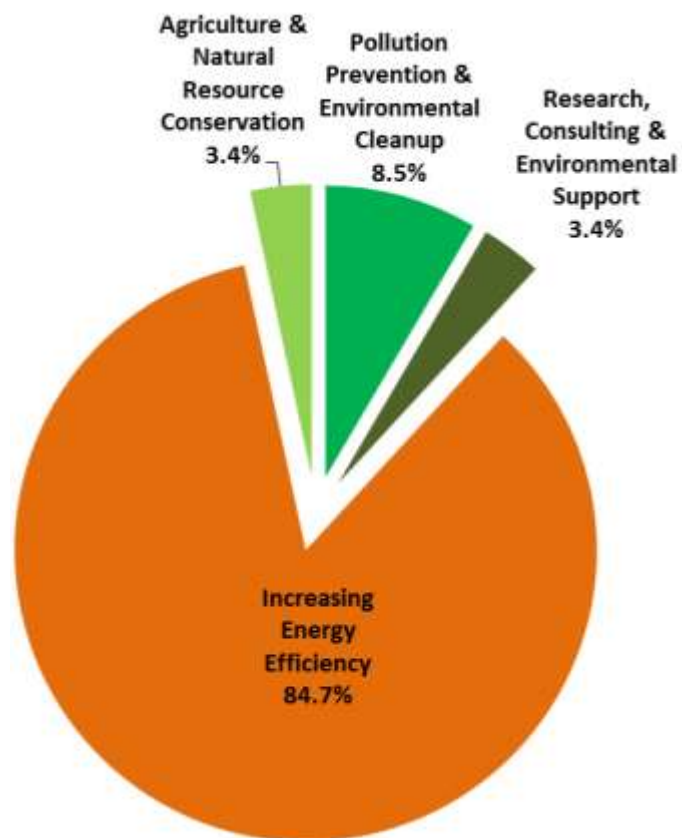
Table 5: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 1	% of Region 1	% Share of Statewide
Retail Trade	52	88.1%	41.6%
Wholesale Trade	3	5.1%	0.7%
Agriculture, Forestry, Fishing & Hunting	2	3.4%	1.1%
Professional, Scientific & Technical Services	2	3.4%	1.2%
Total	59	100.0%	2.1%

Out of 44 major industry sectors selected for this green survey, Table 5 illustrates the four industries with currently green-filled positions in Region 1. In this region, a little over 88.0 percent of the currently green-filled positions were reported in the Retail Trade compared to Alabama Statewide percent share of 41.6 percent.

The currently green-filled jobs in Retail Trade consist of employees selling products and services that contribute to environmental sustainability, such as selling energy efficient electronic devices, appliances and equipment. As illustrated in Table 6, Region 1 represents a little over 2.1 percent of Alabama Statewide share of currently green-filled positions.

Table 6: Currently Green-Filled Positions by Occupation

Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 1	% of Region 1	% Share of Statewide
412031	Retail Salespersons	50	84.7%	86.2%
537062	Laborers and Freight, Stock and Material Movers, Hand	3	5.1%	2.7%
493093	Tire Repairers and Changers	2	3.4%	100.0%
173011	Architectural and Civil Drafters	2	3.4%	12.5%
454011	Forest and Conservation Workers	1	1.7%	1.2%
436014	Secretaries, Except Legal, Medical, and Executive	1	1.7%	1.1%
	All Other Occupations	0	0.0%	0.0%
	Grand Total	59	100.0%	2.1%

Region 1: Year 2008 Green Job Estimates Summary

Table 7: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Retail Trade	260	270	10	3.85%
Agriculture, Forestry, Fishing, and Hunting	10	10	0	0.00%
Wholesale Trade	10	10	0	0.00%
Professional and Technical Services	10	10	0	0.00%

Region 1 had an estimated 260 green jobs in the Retail industry; the highest number of green jobs in the region (Table 7). Employers in this industry are involved in selling energy efficient goods and services. This region is only projected to experience an increase of 10 jobs through 2018. With Retail Trade being the largest industry, it is a logical assumption that Retail Salespersons appeared as the occupation with the most green jobs, having a total of 140 (Figure 14). Furthermore, based on the top six green occupations, this was the only green job projected to increase through 2018. Architectural and Civil Drafters also perform green activities. Most of the green activities in this occupation involve designing energy efficient buildings and homes. The rest of the top green occupations in the region are expected to remain constant through 2018.

Figure 14: Estimated and Projected Green Occupations
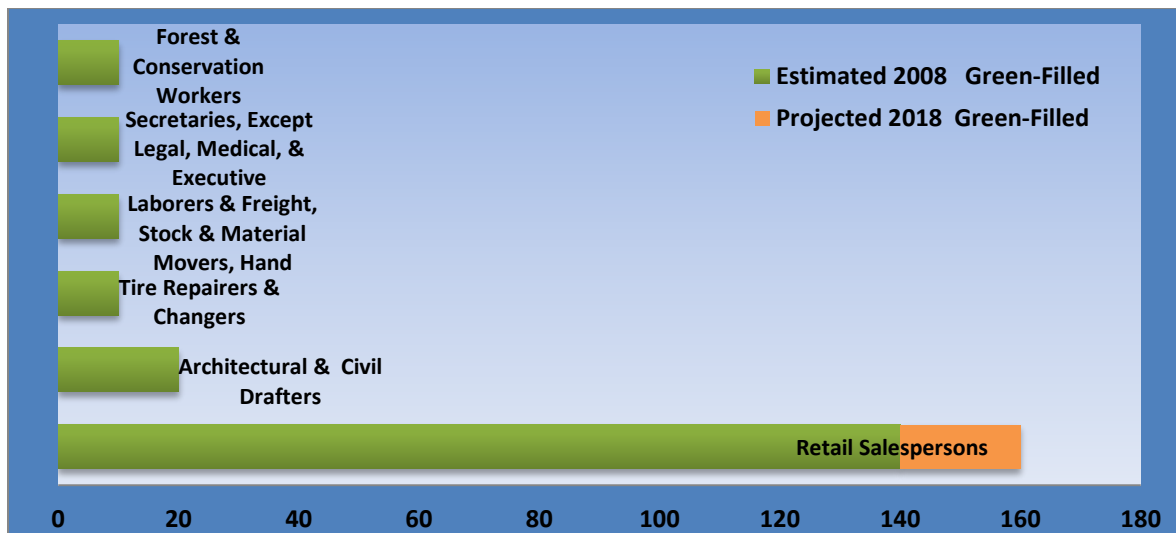
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Workforce Development Region 2

Region 2 Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 2 is estimated to employ over 482,000 workers.

- As of year 2008, the Region 2 workforce represented 19.4 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 1,724 organizations responded from Region 2.

- In Region 2, 180 organizations responded that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 1,724 survey respondents in Region 2, 7 organizations reported having a total of 28 green job vacancies at the time of the survey.

Figure 15: Percent of Employees Performing Green Activities by Green Category

In Region 2, survey respondents reported 441 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, the green category '*Pollution Prevention & Environmental Cleanup'* had the highest number of employees providing and/or producing green-related goods and services. According to the survey respondents, their organizations did not report any employees performing work activities in *'Clean Transportation and Fuels'*.

Research, Consulting & Environmental Support 5.4%

Producing Renewable Energy 0.5%

Increasing Energy Efficiency 15.0%

Agriculture & Natural Resource Conservation 24.7%

Pollution Prevention & Environmental Cleanup 54.4%
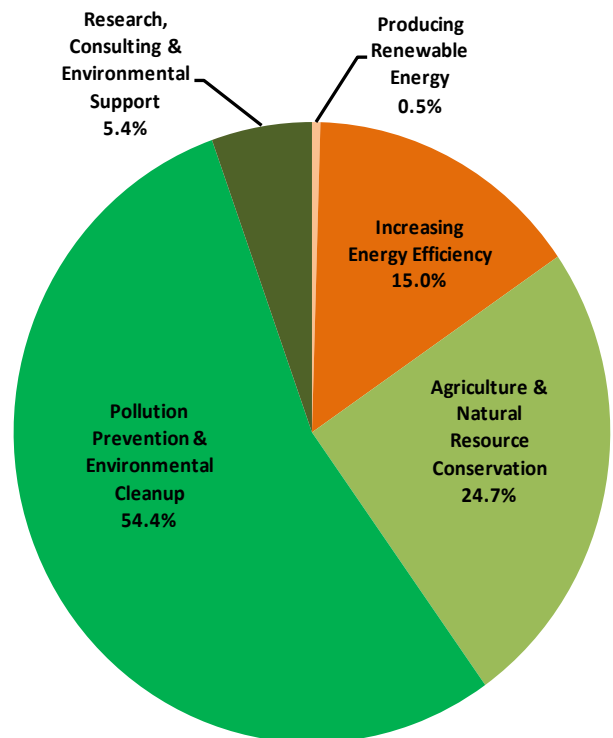
Table 8: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
			% Share of
	Region 2	% of Region 2	Statewide
Manufacturing	98	22.2%	13.6%
Agriculture, Forestry, Fishing & Hunting	88	20.0%	47.1%
Wholesale Trade	82	18.6%	18.9%
Construction	61	13.8%	20.5%
Professional, Scientific & Technical Services	38	8.6%	22.8%
Retail Trade	35	7.9%	28.0%
Administrative and Support & Waste Management and Remediation Services	18	4.1%	16.7%
Finance and Insurance	15	3.4%	75.0%
Utilities	6	1.4%	0.9%
Total	**441**	**100.0%**	**15.5%**

Out of 44 major industry sectors selected for this green survey, Table 8 illustrates the eight industries with currently green-filled positions in Region 2. The top industries with the most employees in green-filled jobs were Manufacturing at 22.2 percent and Agriculture, Forestry, Fishing and Hunting at 20.0 percent compared to Alabama Statewide percent share for the same industries totaling 60.7 percent.

The top five currently green-filled positions in Region 2 constituted to 42.9 percent of all the green-filled jobs in the region. Although, Agriculture, Forestry, Fishing and Hunting ranked second as the industry with the most currently green-filled positions; Forest and Conservation workers had the highest number of green-filled positions in this region (Table 9).

Table 9: Currently Green-Filled Positions by Occupation

| Top 5 Occupations		Currently Green-Filled Positions		
				% Share of
SOC Code	SOC Description	Region 2	% of Region 2	Statewide
454011	Forest and Conservation Workers	80	18.1%	94.1%
537062	Laborers and Freight, Stock and Material Movers, Hand	33	7.5%	29.5%
519197	Tire Builders	30	6.8%	100.0%
439061	Office Clerks General	26	5.9%	27.4%
474071	Septic Tank Servicers and Sewer Pipe Cleaners	20	4.5%	90.9%
	All Other Occupations	252	57.1%	10.1%
	Grand Total	**441**	**100.0%**	**15.5%**

Region 2: Year 2008 Green Job Estimates Summary

Table 10: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Administrative and Waste Services	100	130	30	30.00%
Professional and Technical Services	180	230	50	27.78%
Finance and Insurance	50	60	10	20.00%
Construction	250	290	40	16.00%
Retail Trade	160	180	20	12.50%
Wholesale Trade	350	380	30	8.57%
Utilities	20	20	0	0.00%
Agriculture, Forestry, Fishing, and Hunting	390	380	-10	-2.56%
Manufacturing	380	370	-10	-2.63%

In Region 2, Agriculture, Forestry, Fishing, and Hunting industry had the largest number of estimated green jobs with a total of 390 positions (Table 10), where most of these jobs were Forestry and Conservation Workers as seen below (Figure 16). This occupation is expected to increase by 10 jobs by year 2018. Manufacturing had a high concentration as well, with 380 green jobs. These green jobs are associated with the production of environmental, sustainable and energy efficient goods. The industry with the least number of estimated green jobs was Utilities with 20. This could drastically change if the Tennessee Valley Authority (TVA) gets permission to open the Bellefonte Nuclear Generating Station in Hollywood, Alabama. Tire Builders, specifically, employees performing retread tasks, was estimated to employ 70 workers in Region 2, and is expected to gain jobs through 2018. Heating, Air Conditioning, and Refrigeration Mechanics and Installers are expected to grow over the next ten years, but this figure could be much lower if the tax credit for energy efficient heating and cooling systems is not renewed.

Figure 16: Estimated and Projected Green Jobs by Occupation
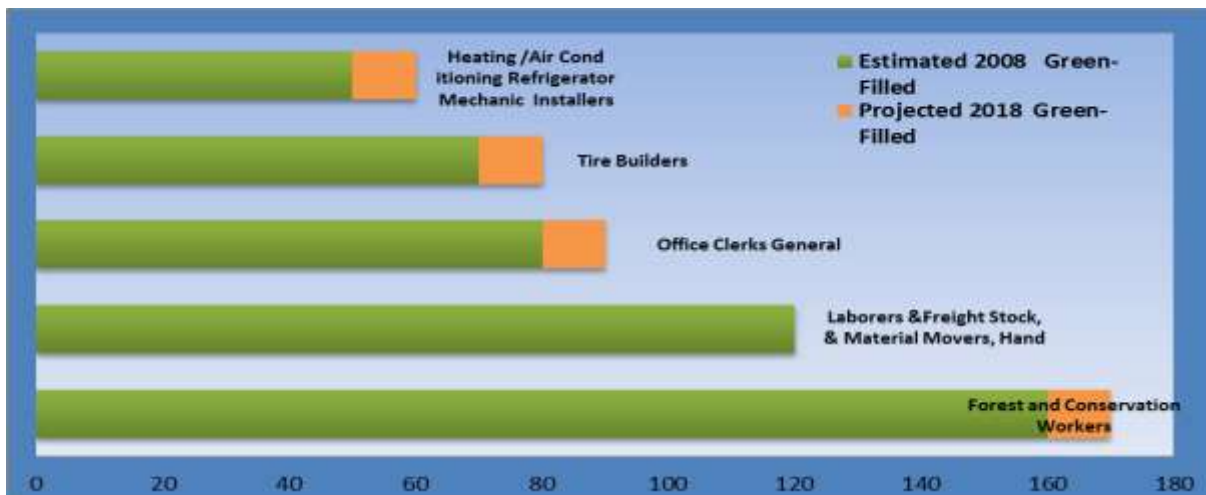
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.
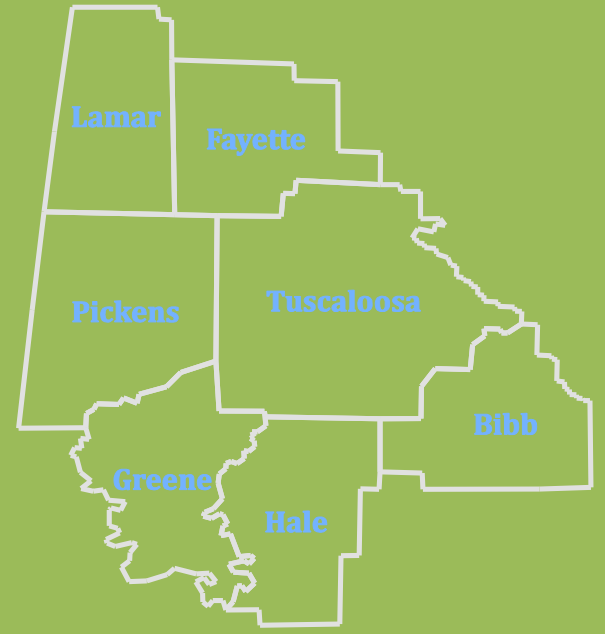
Workforce Development Region 3

Region 3 Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 3 is estimated to employ over 138,400 workers.

- As of year 2008, Region 3 workforce represented 5.7 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 500 organizations responded from Region 3.

- In Region 3, 49 organizations responded that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 49 survey respondents in Region 3, none of the organizations reported having any green job vacancies at the time of the survey.

Figure 17: Percent of Employees Performing Green Activities by Green Category

In Region 3, survey respondents reported 84 currently green-filled positions which were categorized one of the six green categories. Based on the number of currently green-filled positions, the green category *'Pollution Prevention & Environmental Cleanup'* had the highest number of employees providing and/or producing green-related goods and services. According to the survey respondents, their organizations did not report any employees performing work activities in the following green categories: *'Clean Transportation and Fuels'*, *'Producing Renewable Energy' and 'Research, Consulting and Environmental Support'*.

Increasing Energy Efficiency 26.2%

Pollution Prevention & Environmental Cleanup 63.1%

Agriculture & Natural Resource Conservation 10.7%
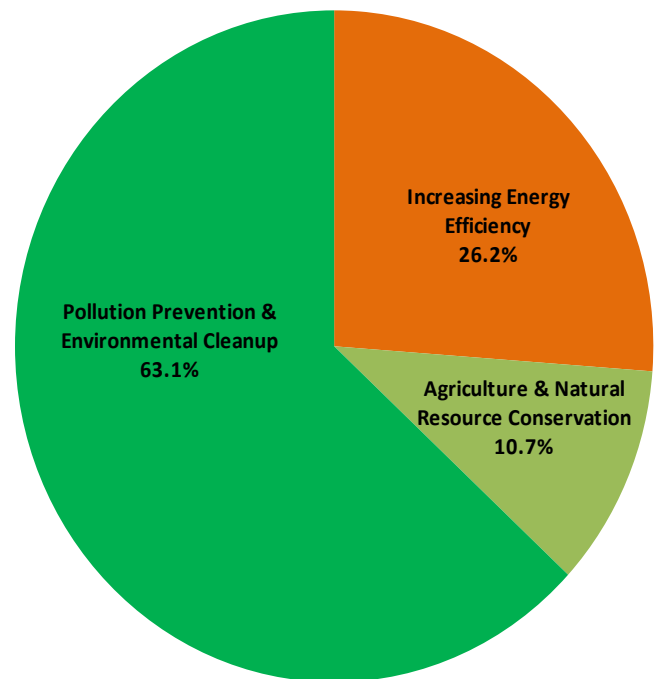
Table 11: Currently Green-Filled Positions by Industry Sector

Industry	Currently Green-Filled Positions		
	Region 3	% of Region 3	% Share of Statewide
Manufacturing	53	63.1%	7.3%
Construction	14	16.7%	4.7%
Agriculture, Forestry, Fishing & Hunting	9	10.7%	4.8%
Retail Trade	6	7.1%	4.8%
Technical Services	1	1.2%	0.6%
Wholesale Trade	1	1.2%	0.2%
All Other Industries	0	0.0%	0.0%
Total	**84**	**100.0%**	**3.0%**

Out of 44 major industry sectors selected for this green survey, Table 11 illustrates the six industries with currently green-filled positions in Region 3. In this region, the top industry with currently green-filled jobs was reported from the Manufacturing industry at 63.1 percent compared to Alabama Statewide percentage share at 7.3 percent.

The top five (5) currently green-filled positions equated to a little over 73.0 percent of the green-filled occupations in this region. As illustrated in Table 12, Region 3 represents 3.0 percent of Alabama Statewide share of currently green-filled positions.

Table 12: Currently Green-Filled Positions by Occupation

| Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 3	% of Region 3	% Share of Statewide
519196	Paper Goods Machine Setters, Operators, and Tenders	35	41.7%	41.2%
533031	Driver/Sales Workers	6	7.1%	5.4%
436014	Secretaries, Except Legal, Medical, and Executive	5	6.0%	16.7%
453021	Hunters and Trappers	5	6.0%	5.3%
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	4	4.8%	18.2%
472181	Roofers	4	4.8%	66.7%
519061	Inspectors, Testers, Sorters, Samplers, and Weighers	3	3.6%	75.0%
	All Other Occupations	22	26.2%	0.9%
	Grand Total	**84**	**100.0%**	**3.0%**

Region 3: Year 2008 Green Job Estimates Summary

Table 13: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	40	60	20	50.00%
Construction	70	80	10	14.29%
Manufacturing	155	180	25	16.13%
Wholesale Trade	5	5	0	0.00%
Retail Trade	30	30	0	0.00%
Professional and Technical Services	10	10	0	0.00%

In Region 3, Manufacturing had the largest number of estimated green jobs, with 155 (Table 13), and is projected to gain the most jobs through 2018. The Paper and Steel Industries contain a large part of these green activities, which is reflected in Paper Goods Machine Setters being the occupation with the most green jobs in this region (Figure 18). Wholesale Trade had the lowest number of green jobs in the region. Driver/Sales Workers is the one green occupation in the region expected to gain jobs through 2018. These occupations are located in retail and are likely selling and delivering energy efficient appliances.

Figure 18: Estimated and Projected Green Jobs by Occupation
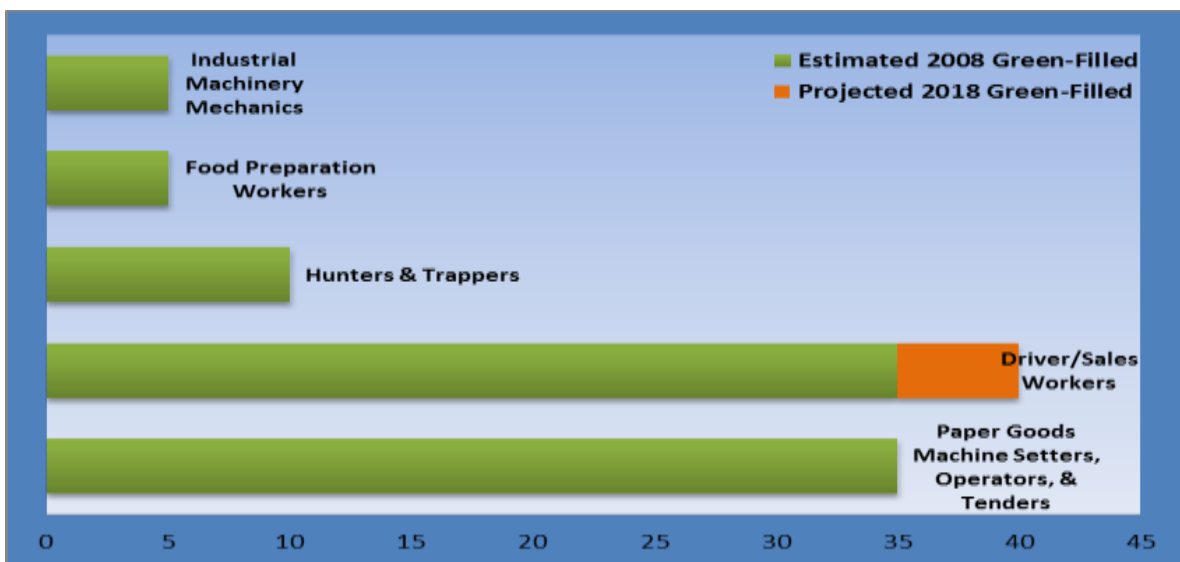
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.
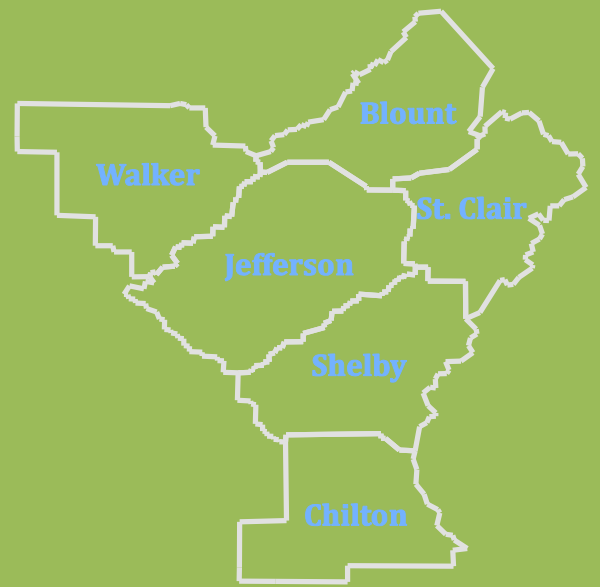
Workforce Development Region 4

Region 4: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 4 is estimated to employ 612,490 workers.

- As of year 2008, Region 4 workforce represented 25.6 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 2,183 organizations responded from Region 4.

- In Region 4, 212 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 2,183 survey respondents in Region 4, six organizations reported having a total of twelve green job vacancies at the time of the survey.

Figure 19: Percent of Employees Performing Green Activities by Green Category

In Region 4, survey respondents reported 552 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, the green category *'Pollution Prevention & Environmental Cleanup'* had the highest percentage of employees providing and/or producing green-related goods and services at 62.5 percent. This green category is composed of employees performing green work activities in Construction, Manufacturing and Wholesale Trade industries.

Clean Transportation & Fuels 0.5%

Producing Renewable Energy 1.1%

Research, Consulting & Environmental Support 0.5%

Increasing Energy Efficiency 20.1%

Pollution Prevention & Environmental Cleanup 62.5%

Agriculture & Natural Resource Conservation 15.2%
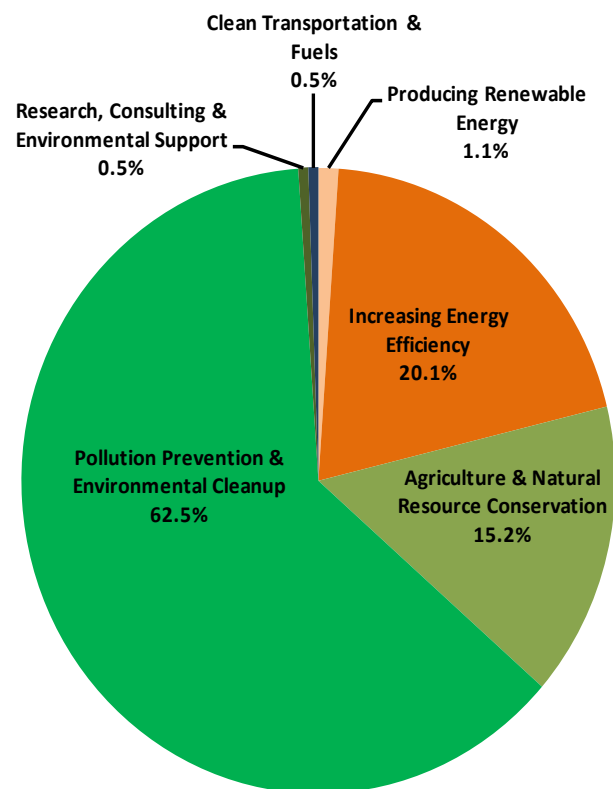
Table 14: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 4	% of Region 4	% Share of Statewide
Manufacturing	216	39.1%	29.9%
Professional, Scientific & Technical Services	91	16.5%	54.5%
Wholesale Trade	85	15.4%	19.5%
Construction	59	10.7%	19.8%
Other Services (except Public Administration)	54	9.8%	76.1%
Real Estate & Rental & Leasing	18	3.3%	100.0%
Administrative and Support & Waste Management & Remediation Services	10	1.8%	9.3%
Retail Trade	8	1.4%	6.4%
Agriculture, Forestry, Fishing & Hunting	6	1.1%	3.2%
Utilities	5	0.9%	0.8%
Total	552	100.0%	19.4%

Out of 44 major industry sectors selected for this green survey, Table 14 illustrates the ten industries with currently green-filled positions in Region 4. The highest number of currently green-filled jobs was reported from the Manufacturing industry at 39.1 percent compared to Alabama Statewide percentage share of 29.9 percent. In this region, Rental Estate and Rental and Leasing made up 100.0 percent of Alabama Statewide share of currently green-filled positions with 18 green jobs.

As illustrated in Table 15, the top five currently green-filled positions equated to 29.7 percent of the green-filled occupations in Region 4. Region 4 represents 19.4 percent of Alabama Statewide share of currently green-filled positions.

Table 15: Currently Green-Filled Positions by Occupation

| Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 4	% of Region 4	% Share of Statewide
519082	Medical Appliance Technicians	47	8.5%	100.0%
439061	Office Clerks General	29	5.3%	30.5%
514034	Lathe and Turning Machine Tool Setters, Operators and Tenders, Metal and Plastic	26	4.7%	100.0%
414012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	22	4.0%	47.8%
519196	Paper Goods Machine Setters, Operators, and Tenders	20	3.6%	36.4%
537061	Cleaners of Vehicles and Equipment	20	3.6%	51.3%
	All Other Occupations	388	70.3%	15.3%
	Grand Total	552	100.0%	19.4%

Region 4: Year 2008 Green Job Estimates Summary

Table 16: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	30	40	10	33.33%
Retail Trade	40	50	10	25.00%
Administrative and Waste Services	50	60	10	20.00%
Professional and Technical Services	440	500	60	13.64%
Construction	290	320	30	10.34%
Real Estate and Rental and Leasing	100	110	10	10.00%
Wholesale Trade	470	510	40	8.51%
Other Services, Except Public Services	240	260	20	8.33%
Manufacturing	940	950	10	1.06%
Utilities	80	80	0	0.00%

Manufacturing had the highest number of green jobs in this region (Table 16). Paper and Primary Metal Manufacturing Companies employ a majority of the green occupations as seen by the chart below (Figure 20). Manufacturing is expected to gain 10 green jobs through 2018. Professional and Technical Services in Region 4 had 440 estimated total green jobs, which are associated with engineering and environmental consulting. Wholesale Trade industry is expected to experience a large increase in jobs in this region through 2018, for this region contains a large number of recycling companies. Office Clerks was reported as the occupation with the largest number of green jobs in Region 4. This is due to the large presence of small green companies in this region with general assistants that perform a vast array of duties, including green activities. The top five green occupations in the region are expected to gain jobs through 2018, with the exception of Lathe and Turning Machine Tool Setters.

Figure 20: Estimated and Projected Green Jobs by Occupation
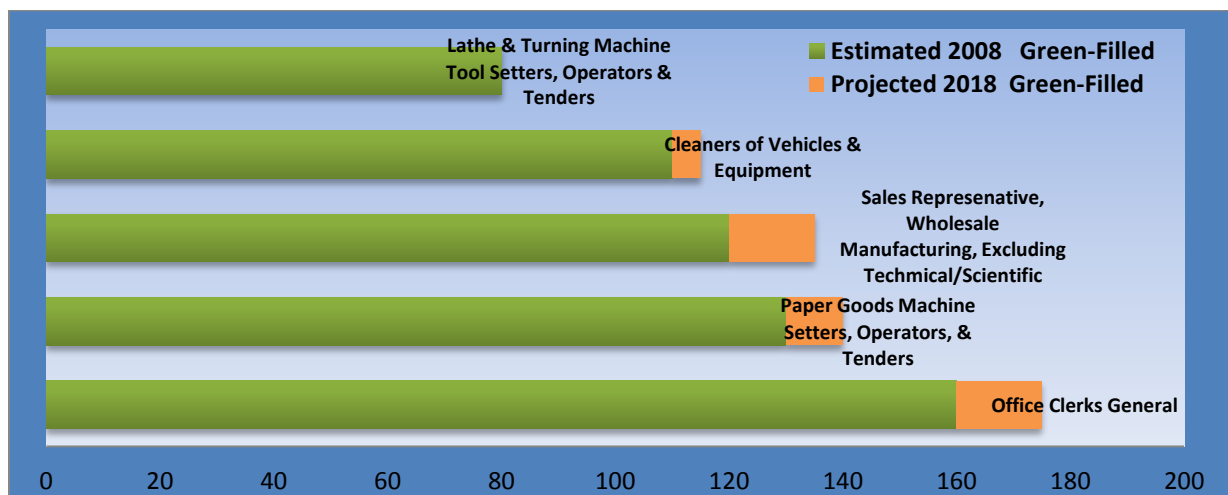
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Workforce Development Region 5

Region 5: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 5 is estimated to employ 183,410 workers.

- As of year 2008, Region 5 workforce represented 7.8 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 633 organizations responded from Region 5.

- In Region 5, 63 organizations explained that at the time of the survey, at least one employee spent 50.0 percent or more of their time engaged in green activities.

- Of the 633 survey respondents in Region 5, two organizations reported having a total of five green job vacancies at the time of the survey.

Figure 21: Percent of Employees Performing Green Activities by Green Category

In Region 5, survey respondents reported 165 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, the green category *Increasing Energy Efficiency* had the highest percentage of employees providing and/or producing green-related goods and services at a little over 49.0 percent. Survey respondents in this region did not report any employees performing work activities in *Research, Consulting and Environmental Support.*

Clean Transportation & Fuels 4.8%

Producing Renewable Energy 6.1%

Pollution Prevention & Environmental Cleanup 31.5%

Increasing Energy Efficiency 49.1%

Agriculture & Natural Resource Conservation 8.5%
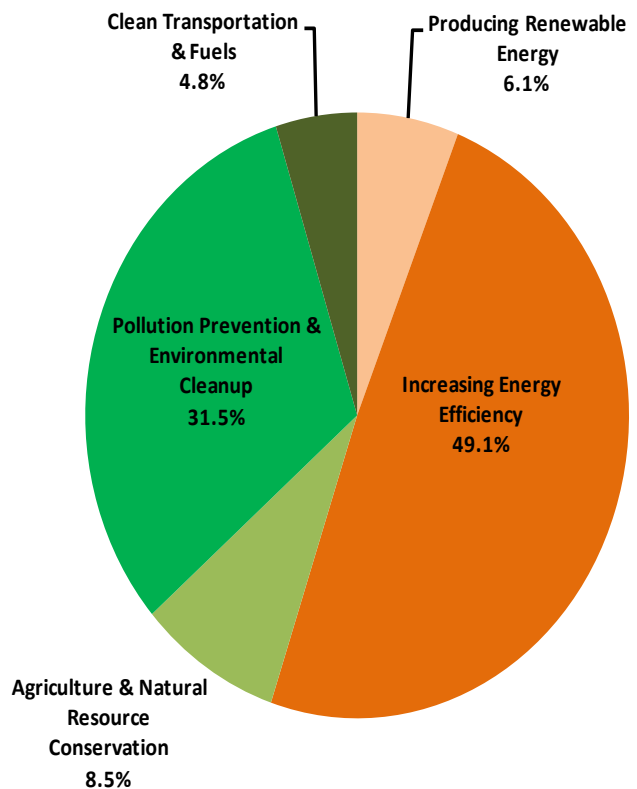
Table 17: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 5	% of Region 5	% Share of Statewide
Manufacturing	82	49.7%	11.4%
Wholesale Trade	29	17.6%	6.7%
Agriculture, Forestry, Fishing & Hunting	15	9.1%	8.0%
Construction	12	7.3%	4.0%
Other Services (except Public Administration)	8	4.8%	11.3%
Utilities	6	3.6%	0.9%
Finance and Insurance	5	3.0%	25.0%
Professional, Scientific & Technical Services	4	2.4%	2.4%
Retail Trade	4	2.4%	3.2%
Total	**165**	**100.0%**	**5.8%**

Out of 44 major industry sectors selected for this green survey, Table 17 illustrates the nine industries with currently green-filled positions in Region 5. The highest number of currently green-filled jobs was reported from the Manufacturing industry at 49.7 percent compared to Alabama Statewide percentage share of 11.4 percent.

As illustrated in Table 18, the top five currently green-filled positions equated to a little over 52.0 percent of the green-filled occupations in Region 5. Region 5 represents 5.8 percent of Alabama Statewide share of currently green-filled positions.

Table 18: Currently Green-Filled Positions by Occupation

| Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 5	% of Region 5	% Share of Statewide
512092	Team Assemblers	55	33.3%	56.1%
517042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	10	6.1%	100.0%
191032	Foresters	8	4.8%	47.1%
533021	Bus Drivers Transit and Intercity	7	4.2%	100.0%
533032	Truck Drivers, Heavy and Tractor-Trailer	6	3.6%	15.4%
	All Other Occupations	79	47.9%	3.0%
	Grand Total	**165**	**100.0%**	**5.8%**

Region 5: Year 2008 Green Job Estimates Summary

Table 19: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	110	150	40	36.36%
Wholesale Trade	150	180	30	20.00%
Manufacturing	350	360	10	2.86%
Construction	70	70	0	0.00%
Other Services, Except Public Services	40	40	0	0.00%
Utilities	30	30	0	0.00%
Finance and Insurance	30	30	0	0.00%
Retail Trade	20	20	0	0.00%
Professional and Technical Services	20	20	0	0.00%

In Region 5, Manufacturing had the largest number of estimated green jobs, with 350 (Table 19). This is apparent through examination of the top five green occupations, for two of them are in the Manufacturing Industry; Team Assemblers and Woodworking Machine Setters. (Figure 22). Team Assemblers, with an estimate of 80 green jobs, are projected to grow more than most manufacturing occupations due to the large presence of Transportation Manufacturing in the region and throughout the state. Wholesale Trade had an estimated 150 green jobs in the region, and is expected to gain 30 new jobs through 2018 through the distribution of recycled products for resale. Agriculture, Forestry, Fishing, and Hunting is expected to gain the largest number of green jobs in this region through 2018, for this industry has a large presence in this area. Within this industry, Foresters were second highest green occupation, and are expected to gain 20 new jobs through 2018.

Figure 22: Estimated and Projected Green Jobs by Occupation
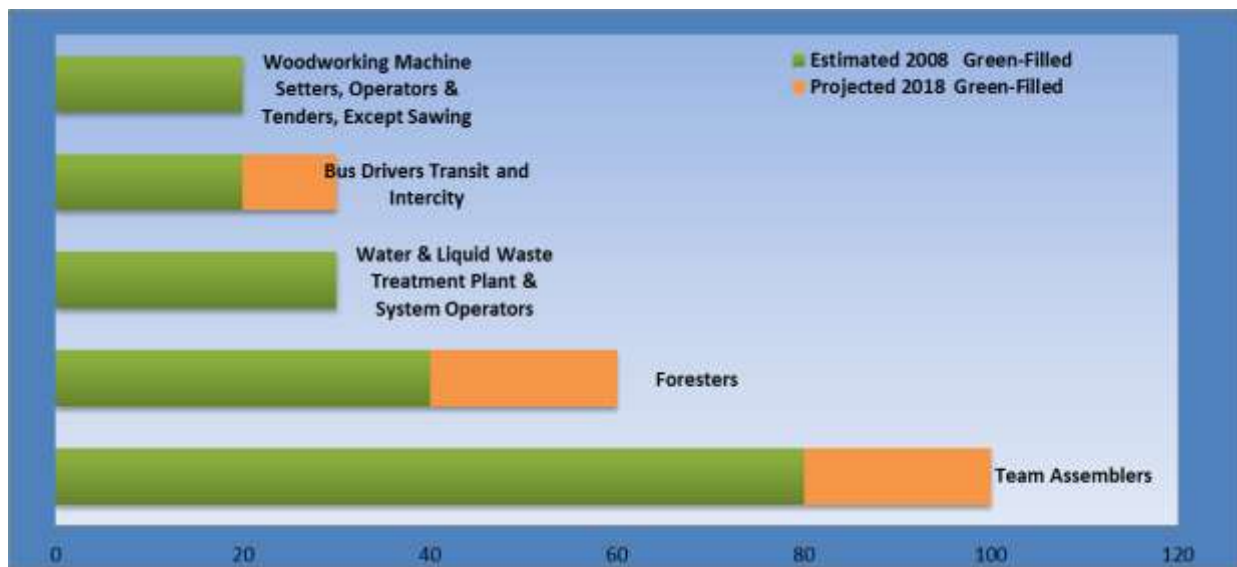
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.
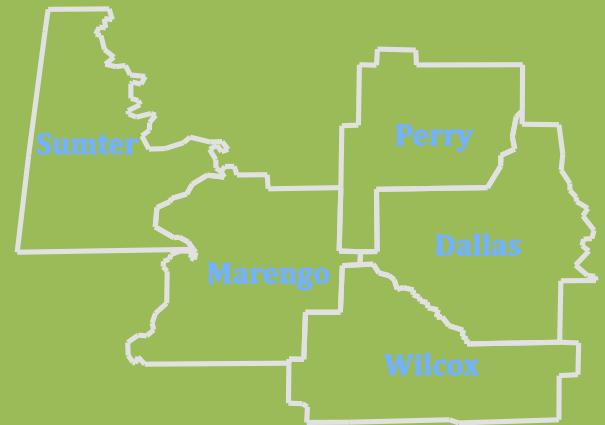
Workforce Development Region 6

Region 6: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 6 is estimated to employ 36,090 workers.

- As of year 2008, Region 6 workforce represented 1.73 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 157 organizations responded from Region 6.

- In Region 6, 21 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 157 survey respondents in Region 6, none of the organizations reported having any green job vacancies at the time of the survey.

Figure 23: Percent of Employees Performing Green Activities by Green Category

In Region 6, survey respondents reported 19 currently green-filled positions which were categorized into one of the six green categories. Survey respondents in this region did not report any employees performing work activities in the following green categories: '*Increasing Energy Efficiency*', '*Research, Consulting and Environmental Support, 'Clean Transportation and Fuels', 'Producing Renewable Energy' and 'Research, Consulting and Environmental Support'.*

Pollution Prevention & Environmental Cleanup 100.0%
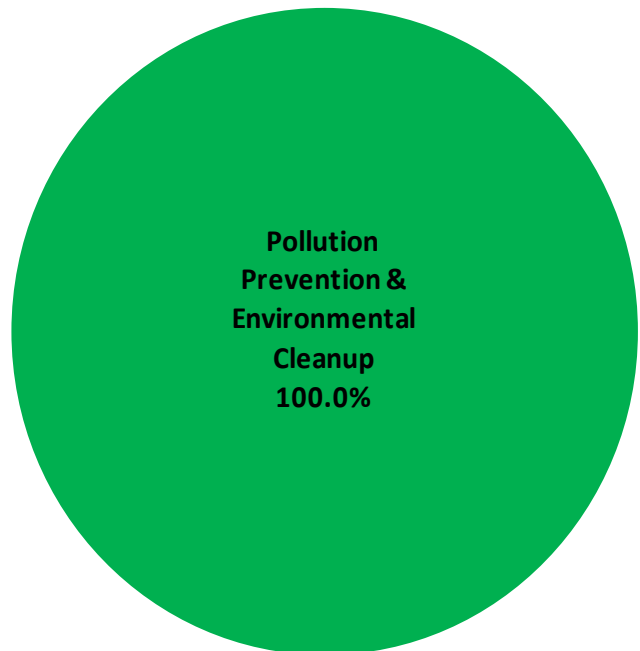
Table 20: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 6	% of Region 6	% Share of Statewide
Manufacturing	16	84.2%	2.2%
Wholesale Trade	3	15.8%	0.7%
Total	**19**	**100.0%**	**0.7%**

Out of 44 major industry sectors selected for this green survey, Table 20 illustrates the two industries with currently green-filled positions in Region 6. The highest number of currently green-filled jobs was reported from the Manufacturing industry at 84.2 percent compared to Alabama Statewide percentage share of 2.2 percent.

As illustrated in Table 21, these are all of the currently green-filled positions reported from survey respondents in Region 6. This region represents 0.7 percent of Alabama Statewide share of currently green-filled positions.

Table 21: Currently Green-Filled Positions by Occupation

| Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 6	% of Region 6	% Share of Statewide
537081	Refuse and Recyclable Material Collectors	16	84.2%	59.3%
537062	Laborers and Freight Stock and Material Movers, Hand	2	10.5%	1.8%
111021	General and Operation Managers	1	5.3%	2.6%
	All Other Occupations	0	0.0%	0.0%
Total		**19**	**100.0%**	**0.7%**

Region 6: Year 2008 Green Job Estimates Summary

Table 22: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Manufacturing	30	30	0	0
Wholesale Trade	30	30	0	0

In Region 6, the green survey results indicated that Manufacturing and Wholesale Trade were the only industries with a significant number of green jobs, each having an estimated 30 green jobs (Table 22). Most of these jobs are in small businesses that provide recycling or recycled product distribution. Through 2018, the green jobs in these industries are expected to increase very little. Refuse and Recyclable Material Collectors, located in the Wholesale Trade Industry, had the highest number of green jobs in this region, with 40 (Figure 24). In addition, Laborers and Freight Stock and Material Movers are also occupations that participate in green activities. In Region 6, this occupation is expected to have 5 new green jobs by 2018.

Figure 24: Estimated and Projected Green Jobs by Occupation
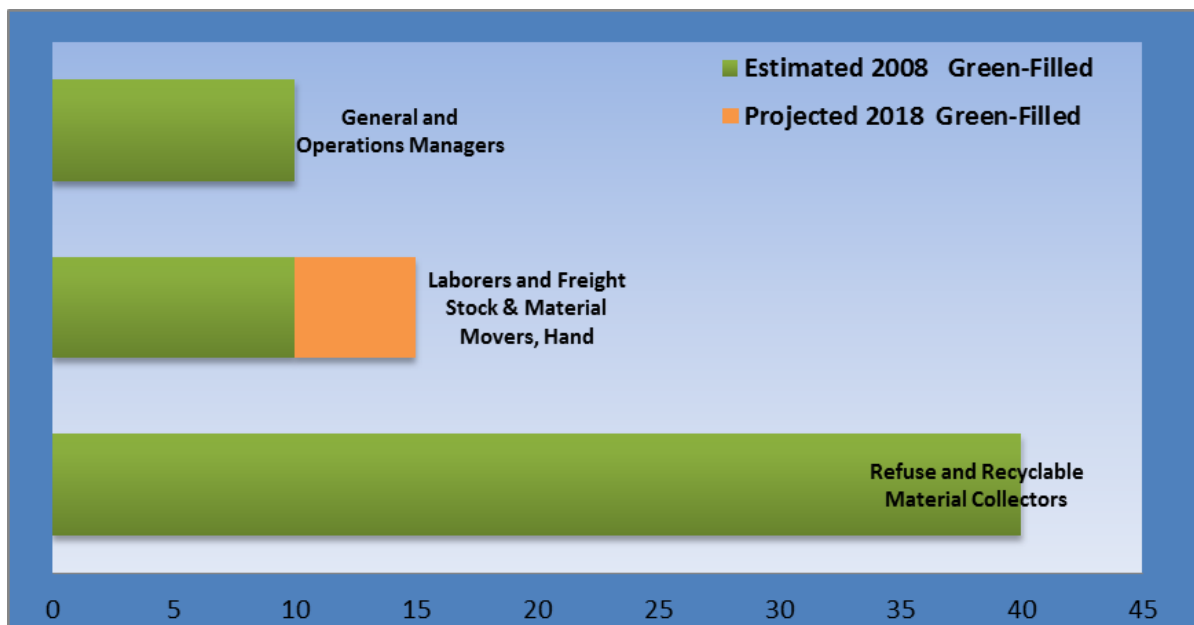
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Autauga
Elmore
Lowndes
Montgomery
Butler
Crenshaw

Workforce Development Region 7

Region 7: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 7 is estimated to employ 234,590 workers.

- As of year 2008, Region 7 workforce represented 9.51 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 764 organizations responded from Region 7.

- In Region 7, 28 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 764 survey respondents in Region 7, one organization reported having a total of three green job vacancies at the time of the survey.

Figure 25: Percent of Employees Performing Green Activities by Green Category

In Region 7, survey respondents reported 126 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, a little over 80.0 percent of employees providing and/or producing green-related goods and services were noted in the following green categories: *'Pollution Prevention & Environmental Cleanup'* and *'Research, Consulting & Environmental Support'*. Survey respondents in this region did not report any employees performing work activities in '*Producing Renewable Energy'* and *'Clean Transportation & Fuels'.*

Research, Consulting & Environmental Support 15.9%

Increasing Energy Efficiency 7.1%

Agriculture & Natural Resource Conservation 13.5%

Pollution Prevention & Environmental Cleanup 63.5%
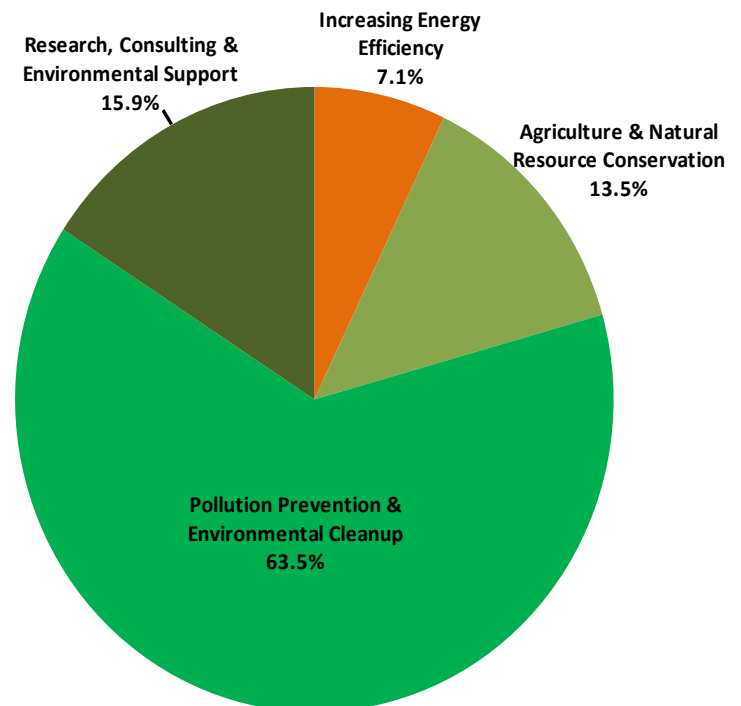
Table 23: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 7	% of Region 7	% Share of Statewide
Wholesale Trade	74	58.7%	17.0%
Administrative and Support & Waste Management & Remediation Services	23	18.3%	21.3%
Public Administration	20	15.9%	100.0%
Construction	6	4.8%	2.0%
Professional, Scientific & Technical Services	3	2.4%	1.8%
Total	126	100.0%	4.4%

Out of 44 major industry sectors selected for this green survey, Table 23 illustrates the five industries with currently green-filled positions in Region 7. The highest number of currently green-filled jobs was reported from the Wholesale Trade at 58.7 percent compared to Alabama Statewide percentage share of 17.0 percent. In this region, Public Administration made up 100.0 percent of Alabama Statewide share of currently green-filled positions with 20 green jobs.

As illustrated in Table 24, the top five currently green-filled positions equated to a little over 80.0 percent of the green-filled occupations in Region 7. Region 7 represents 4.4 percent of Alabama Statewide share of currently green-filled positions.

Table 24: Currently Green-Filled Positions by Occupation

Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 7	% of Region 7	% Share of Statewide
131073	Training and Development Specialists	20	15.9%	100.0%
454022	Logging Equipment Operators	17	13.5%	85.0%
439061	Office Clerks General	15	11.9%	15.8%
537062	Laborers and Freight, Stock and Material Movers, Hand	15	11.9%	13.4%
372011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	15	11.9%	300.0%
435071	Shipping, Receiving and Traffic Clerks	11	8.7%	73.3%
533033	Truck Drivers, Light, or Delivery Services	8	6.3%	32.0%
	All Other Occupations	25	19.8%	1.0%
	Grand Total	126	100.0%	4.4%

Table 25: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Professional and Technical Services	10	20	10	100.00%
Construction	40	50	10	25.00%
Administrative and Waste Services	140	170	30	21.43%
Wholesale Trade	310	330	20	6.45%
Public Administration	20	20	0	0.00%

Wholesale Trade, with 310 jobs, had the largest estimate of green jobs in Region 7 (Table 25). Companies that recycle materials and resell them are located in this industry. Another industry that is likely to include green jobs is Administrative and Waste Services, which in this region includes 140 green jobs. Professional and Technical Services are expected to grow within the next ten years, and Administrative and Waste Services will add the most opportunities with 30 new green jobs. Between these two industries, it is estimated that 50 new green jobs will be added through 2018. The survey results showed that in Region 7, Janitors and Cleaners was the largest green occupation (Figure 26). This occupation is affiliated with the Administrative and Waste Services industry. They are expected to gain ten new green jobs through 2018. Logging Equipment Operators as well as Laborers are also large green occupations in this region. Both of these occupations are associated with Wholesale trade. They are expected to remain fairly stable through year 2018.

Figure 26: Estimated and Projected Green Jobs by Occupation
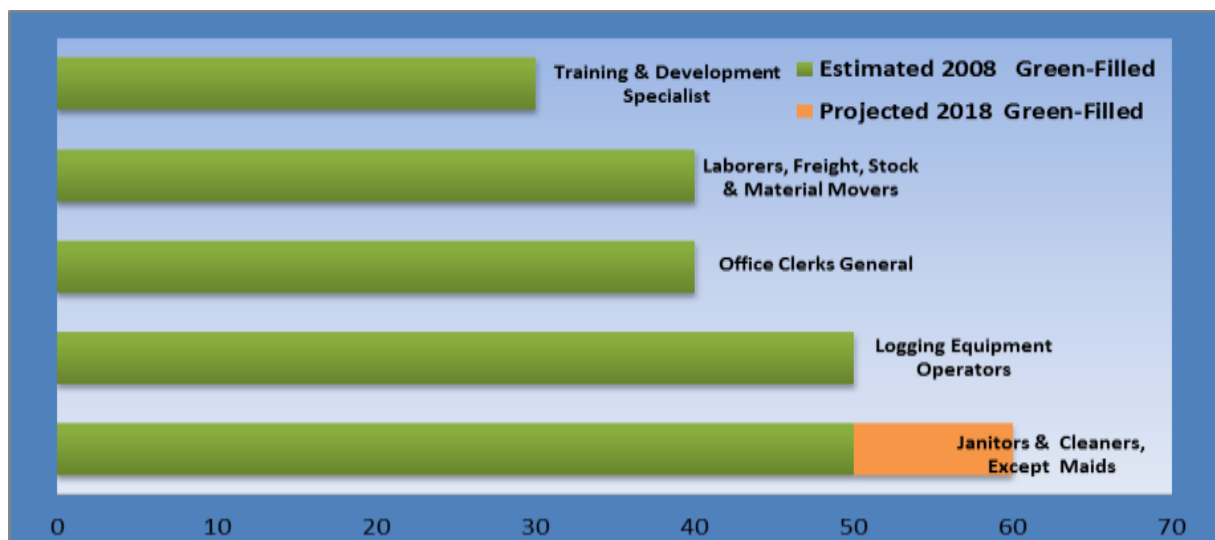
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.
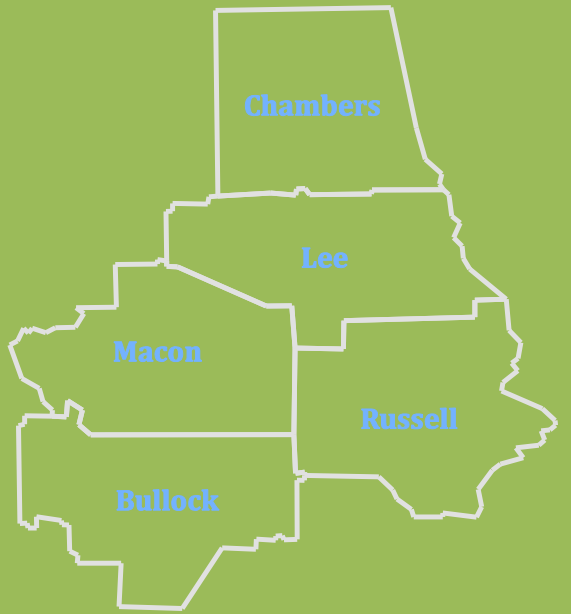
Workforce Development Region 8

Region 8: Green Survey Results

Survey Highlights

- By year 2018, Workforce Development Region 8 is estimated to employ 105,740 workers.

- As of year 2008, Region 8 workforce represented 4.21 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 372 organizations responded from Region 8.

- In Region 8, 31 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 372 survey respondents in Region 8, none of the organizations reported having any green job vacancies at the time of the survey.

Figure 27: Percent of Employees Performing Green Activities by Green Category

In Region 8, survey respondents reported 282 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, a little over 90.0 percent of employees providing and/or producing green-related goods and services were noted in the following green categories: categories: *'Increasing Energy Efficiency'* and *'Pollution Prevention & Environmental Cleanup'.* Survey respondents in this region did not report any employees performing work activities in '*Producing Renewable Energy' and 'Clean Transportation & Fuels'.*

Research, Consulting & Environmental Support 0.4%

Pollution Prevention & Environmental Cleanup 22.3%

Increasing Energy Efficiency 68.4%

Agriculture & Natural Resource Conservation 8.9%
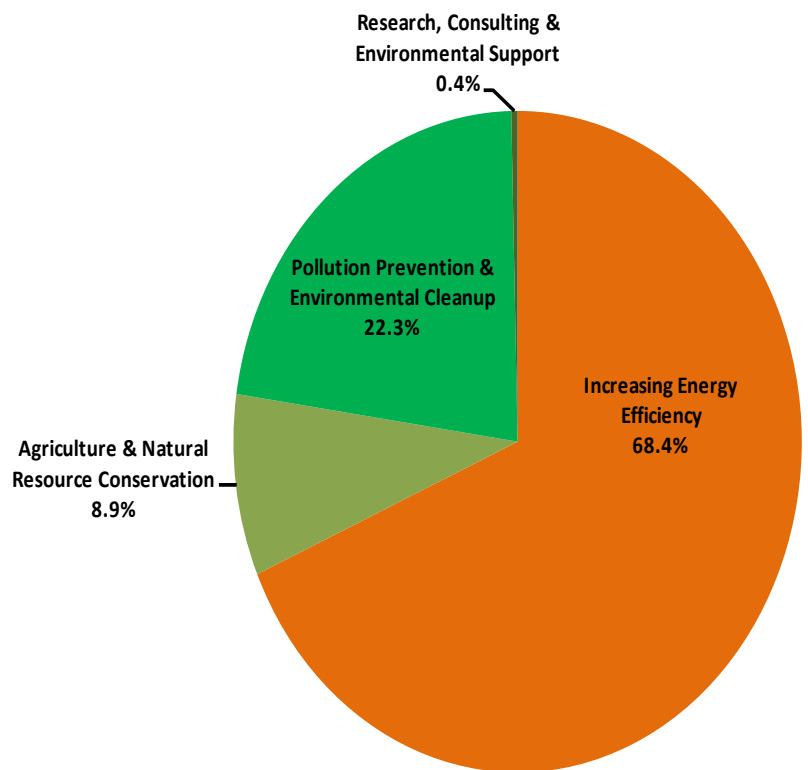
Table 26: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 8	% of Region 8	Share of Statewide
Manufacturing	197	69.9%	27.3%
Wholesale Trade	30	10.6%	6.9%
Administrative and Support & Waste Management & Remediation Services	26	9.2%	24.1%
Retail Trade	17	6.0%	13.6%
Professional, Scientific & Technical Services	5	1.8%	3.0%
Agriculture, Forestry, Fishing & Hunting	4	1.4%	2.1%
Construction	3	1.1%	1.0%
Total	**282**	**100.0%**	**9.9%**

Out of 44 major industry sectors selected for this green survey, Table 26 illustrates the five industries with reported currently green-filled positions in Region 8. The highest number of currently green-filled jobs was reported from the Manufacturing at 69.9 percent compared to Alabama Statewide percentage share of 27.3 percent.

As illustrated in Table 27, the top five currently green-filled positions equated a little over 67.0 percent of the green-filled occupations in Region 8. Region 8 represents 9.9 percent of Alabama Statewide share of currently green-filled positions.

Table 27: Currently Green-Filled Positions by Occupation

Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 8	% of Region 8	% Share of Statewide
519198	Training and Development Specialists	78	27.7%	98.7%
516091	Logging Equipment Operators	43	15.2%	100.0%
372021	Office Clerks General	24	8.5%	88.9%
512092	Laborers and Freight, Stock and Material Movers, Hand	23	8.2%	23.5%
472111	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	22	7.8%	25.6%
	All Other Occupations	92	32.6%	3.7%
	Grand Total	**282**	**100.0%**	**9.9%**

Region 8: Year 2008 Green Job Estimates Summary

Table 28: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	20	30	10	50.00%
Administrative and Waste Services	120	150	30	25.00%
Manufacturing	410	490	80	19.51%
Wholesale Trade	120	140	20	16.67%
Retail Trade	70	80	10	14.29%
Construction	10	10	0	0.00%
Professional and Technical Services	20	20	0	0.00%

Manufacturing, by far, had the most estimated green jobs in Region 8, with 410 (Table 28). Through further analysis, most of the top green occupations were located in the Manufacturing Industry (Figure 28). Furthermore, Manufacturing is expected to add 80 new green jobs through 2018. Team Assemblers is expected to add the most with 90 green jobs. This is due to the presence of several auto suppliers in the area. The other occupations that are green in this region also expected to add jobs; Helpers Production Workers, Extruding, Forming Machine Setters, and Electricians. Besides Manufacturing, Wholesale Trade and Administrative and Waste Services industries are also provide sustainable green activities in this region. Between the two industries, they are expected to add a total of 50 new jobs.

Figure 28: Estimated and Projected Green Jobs by Occupation
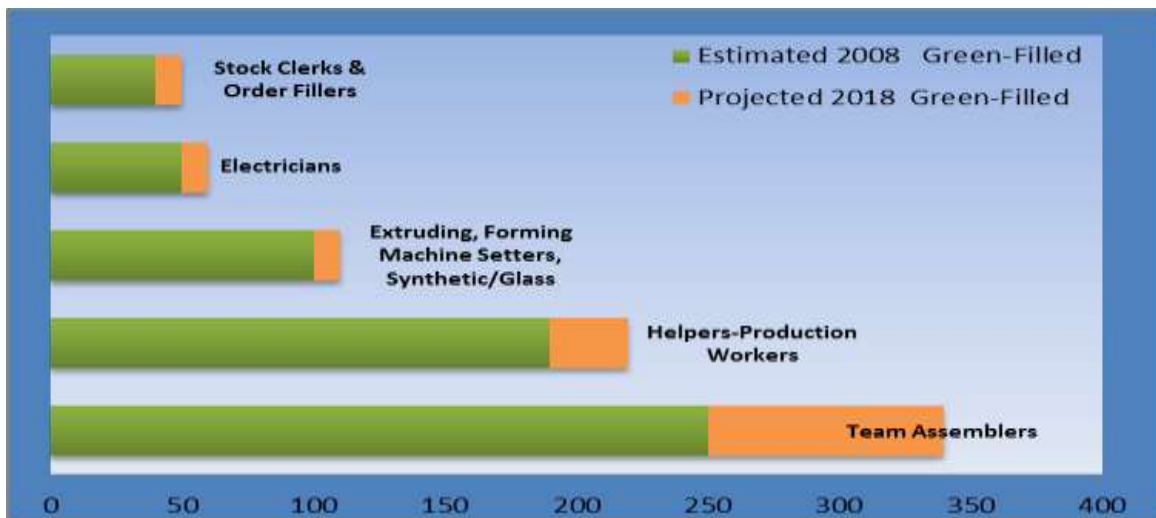
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Choctaw

Clarke

Monroe

Washington

Conecuh

Escambia

Mobile

Baldwin
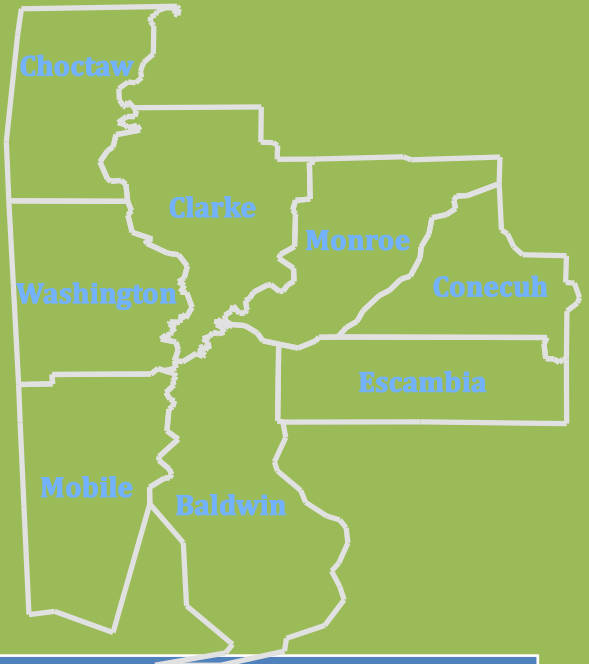
Workforce Development Region 9

Region 9: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 9 is estimated to employ 371,120 workers.

- As of year 2008, Region 9 workforce represented 14.71 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 1,486 organizations responded from Region 9.

- In Region 9, 146 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 1,486 survey respondents in Region 9, six organizations reported a total of six green job vacancies at the time of the survey.

Figure 29: Percent of Employees Performing Green Activities by Green Category

In Region 9, survey respondents reported 293 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, a little over 85.0 percent of employees providing and/or producing green-related goods and services were noted in the following green categories: categories: 'Increasing Energy Efficiency' and 'Pollution Prevention & Environmental Cleanup'. Survey respondents in this region did not report any employees performing work activities in 'Clean Transportation & Fuels'.

Research, Consulting & Environmental Support 0.3%

Producing Renewable Energy 0.3%

Increasing Energy Efficiency 31.1%

Pollution Prevention & Environmental Cleanup 54.3%

Agriculture & Natural Resource Conservation 14.0%
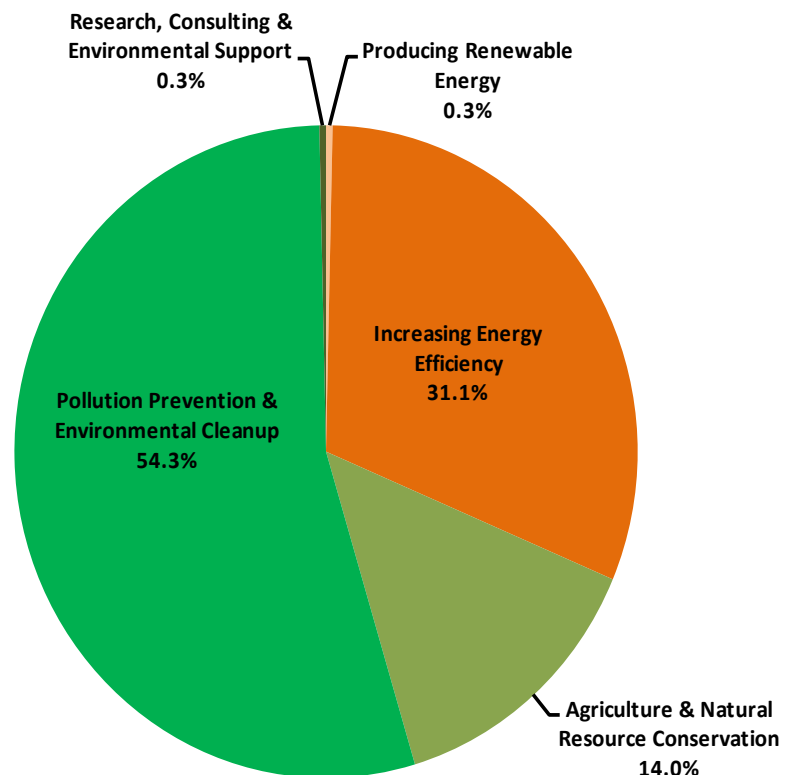
Table 29: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 9	% of Region 9	% Share of Statewide
Construction	127	43.3%	42.6%
Agriculture, Forestry, Fishing & Hunting	58	19.8%	31.0%
Wholesale Trade	52	17.7%	12.0%
Management of Companies & Enterprises	17	5.8%	89.5%
Administrative and Support & Waste Management & Remediation Services	15	5.1%	13.9%
Manufacturing	14	4.8%	1.9%
Other Services (except Public Administration)	7	2.4%	9.9%
Retail Trade	3	1.0%	2.4%
Total	**293**	**100.0%**	**10.3%**

Out of 44 major industry sectors selected for this green survey, Table 29 illustrates the eight industries with currently green-filled positions in Region 9. The highest number of currently green-filled jobs was reported from the Construction at 43.3 percent compared to Alabama Statewide percentage share of 42.6 percent.

As illustrated in Table 30, the top five currently green-filled positions equated a little over 50.5 percent of the green-filled occupations in Region 9. Region 9 represents 10.3 percent of Alabama Statewide share of currently green-filled positions.

Table 30: Currently Green-Filled Positions by Occupation

Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 9	% of Region 9	% Share of Statewide
474021	Elevator Installers and Repairers	47	16.0%	100.0%
452092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	25	8.5%	89.3%
537062	Laborers and Freight, Stock and Material Movers, Hand	23	7.8%	20.5%
537061	Cleaners of Vehicles and Equipment	19	6.5%	48.7%
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	17	5.8%	32.1%
439061	Office Clerks General	17	5.8%	17.9%
	All Other Occupations	145	49.5%	5.9%
	Grand Total	**293**	**100.0%**	**10.3%**

Table 31: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	280	380	100	35.71%
Administrative and Waste Services	80	100	20	25.00%
Manufacturing	50	60	10	20.00%
Construction	695	810	115	16.55%
Management of Companies and Enterprises	100	110	10	10.00%
Wholesale Trade	220	240	20	9.09%
Retail Trade	10	10	0	0.00%
Other Services, Except Public Services	30	30	0	0.00%

In Region 9, the industry with the largest percentage of estimated green jobs was Agriculture, with over 35% (Table 31). However, the industry with the highest number of green jobs was Construction, with 695. Agriculture and Construction combined are expected to add a total of 215 new green jobs through 2018. Region 9 has implemented excellent marketing initiatives to draw in new businesses, which has increased construction employment opportunities, and the industry's capacity to build energy saving features into these new businesses. As a matter of fact, the top three green occupations in the region are in the Construction industry. Both Laborers and Heating, A/C and Refrigeration Mechanics and Installers are large green occupations in the area, and are expected to gain a total of 20 new green jobs through 2018 (Figure 30). Farmworkers, which is affiliated with the Agriculture industry, is also active in the green movement, and is expected to gain jobs over the same period. Agriculture is prevalent in many of the rural counties in Region 9.

Figure 30: Estimated and Projected Green Jobs by Occupation
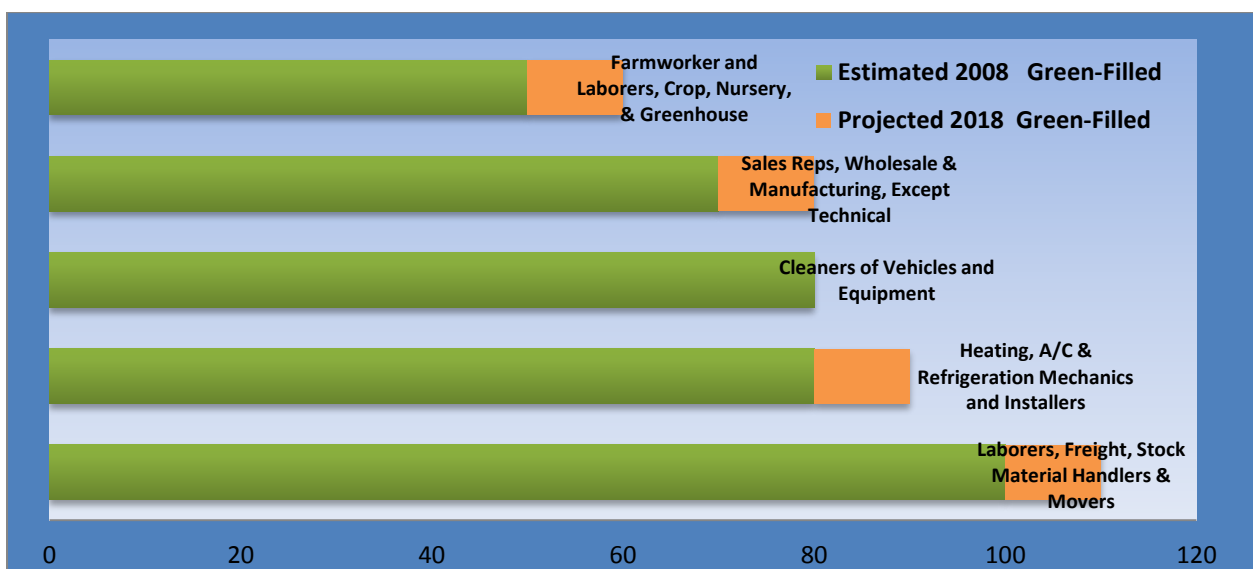
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.
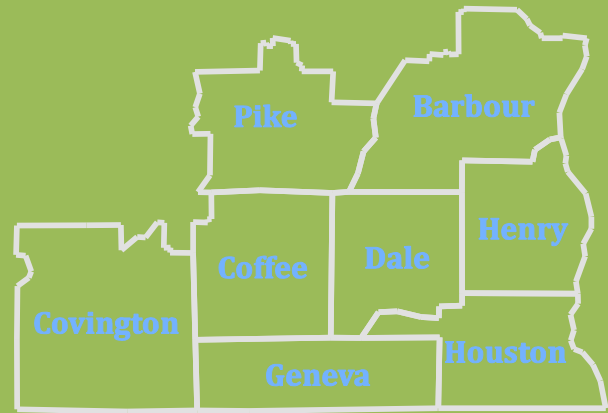
Workforce Development Region 10

Region 10: Green Survey Results

Area Highlights

- By year 2018, Workforce Development Region 10 is estimated to employ 169,030 workers.

- As of year 2008, Region 10 workforce represented 6.92 percent of Alabama's total employment of 2.2 million.

- Of the 10,562 survey respondents, 676 organizations responded from Region 10.

- In Region 10, 68 organizations explained that at the time of the survey, at least one employee spent 50 percent or more of their time engaged in green activities.

- Of the 676 survey respondents in Region 10, none of the organizations reported any green job vacancies at the time of the survey.

Figure 31: Percent of Employees Performing Green Activities by Green Category

In Region 10, survey respondents reported 711 currently green-filled positions which were categorized into one of the six green categories. Based on the number of currently green-filled positions, over 89.0 percent of employees providing and/or producing green-related goods and services were noted in *"Producing Renewable Energy'* green category. Survey respondents in this region did not report any employees performing work activities in '*Research, Consulting & Environmental Support'*.

Pollution Prevention & Environmental Cleanup 4.4%

Agriculture & Natural Resource Conservation 2.8%

Clean Transportation & Fuels 0.1%

Increasing Energy Efficiency 3.2%

Producing Renewable Energy 89.5%
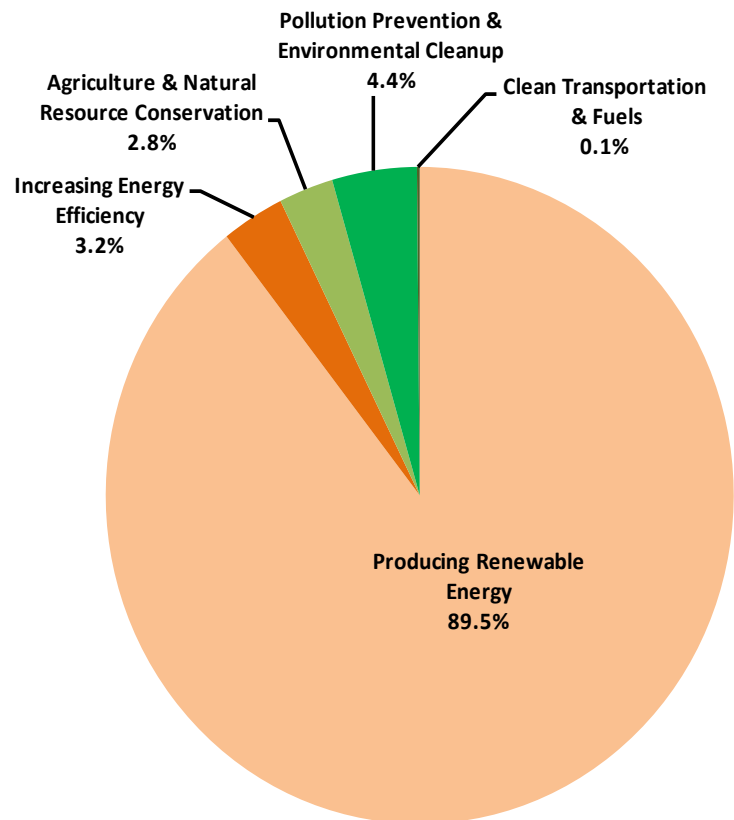
Table 32: Currently Green-Filled Positions by Industry Sector

Industry Sector	Currently Green-Filled Positions		
	Region 10	% of Region 10	% Share of Statewide
Utilities	634	89.2%	97.4%
Manufacturing	21	3.0%	2.9%
Administrative and Support & Waste Management & Remediation Services	16	2.3%	14.8%
Construction	16	2.3%	5.4%
Wholesale Trade	16	2.3%	3.7%
Agriculture, Forestry, Fishing & Hunting	5	0.7%	2.7%
Mining, Quarrying & Oil and Gas Extraction	3	0.4%	100.0%
Total	711	100.0%	25.0%

Out of 44 major industry sectors selected for this green survey, Table 32 illustrates the seven industries with currently green-filled positions in Region 10. The highest number of currently green-filled jobs was reported from the Utilities at 89.2 percent compared to Alabama Statewide percentage share of 97.4 percent.

As illustrated in Table 33, the top five currently green-filled positions equated to 50.5 percent of the green-filled occupations in Region 10. Region 10 represents 25.0 percent of Alabama Statewide share of currently green-filled positions.

Table 33: Currently Green-Filled Positions by Occupation

Top 5 Occupations		Currently Green-Filled Positions		
SOC Code	SOC Description	Region 10	% of Region 10	% Share of Statewide
492095	Electrical and Electronics Repairers	114	16.0%	100.0%
518012	Power Distributors and Dispatchers	65	9.1%	100.0%
172071	Electrical Engineers	60	8.4%	81.1%
499041	Industrial Machinery Mechanics	50	7.0%	87.7%
472111	Electricians	50	7.0%	58.1%
172161	Nuclear Engineers	48	6.8%	100.0%
	All Other Occupations	324	45.6%	13.5%
	Grand Total	711	100.0%	25.0%

Region 10: Year 2008 Green Job Estimates Summary

Table 34: Estimated and Projected Green Jobs by Industry

Industry	2008 Green Jobs Estimated	2018 Green Jobs Projected	Employment Change	Employment Change %
Agriculture, Forestry, Fishing, and Hunting	60	90	30	50.00%
Mining	20	30	10	50.00%
Construction	60	70	10	16.67%
Administrative and Waste Services	70	80	10	14.29%
Wholesale Trade	80	90	10	12.50%
Utilities	640	670	30	4.69%
Manufacturing	80	80	0	0.00%

The Agriculture industry has a large presence in Region 10. Although only a small portion of the industry was used in the sample, at least 50% of the Agriculture industry surveyed was involved in green activities. According to the survey results, Utilities was the dominant industry for green jobs in Region 10 with a total of 640 estimated jobs (Table 34). Utilities are expected to gain 30 new green jobs through 2018. Due to the results of the actual survey, most of the top green occupations are located in the Utilities industry. Electrical and Electronics Repairers was the largest green occupation in the region with an estimate of 150 (Figure 32). The rest of the top five, including Engineers, Electricians, and Industrial Machinery Mechanics, are all fairly large in the region and expected to add a total of 40 jobs through 2018.

Figure 32: Estimated and Projected Green Jobs by Occupation
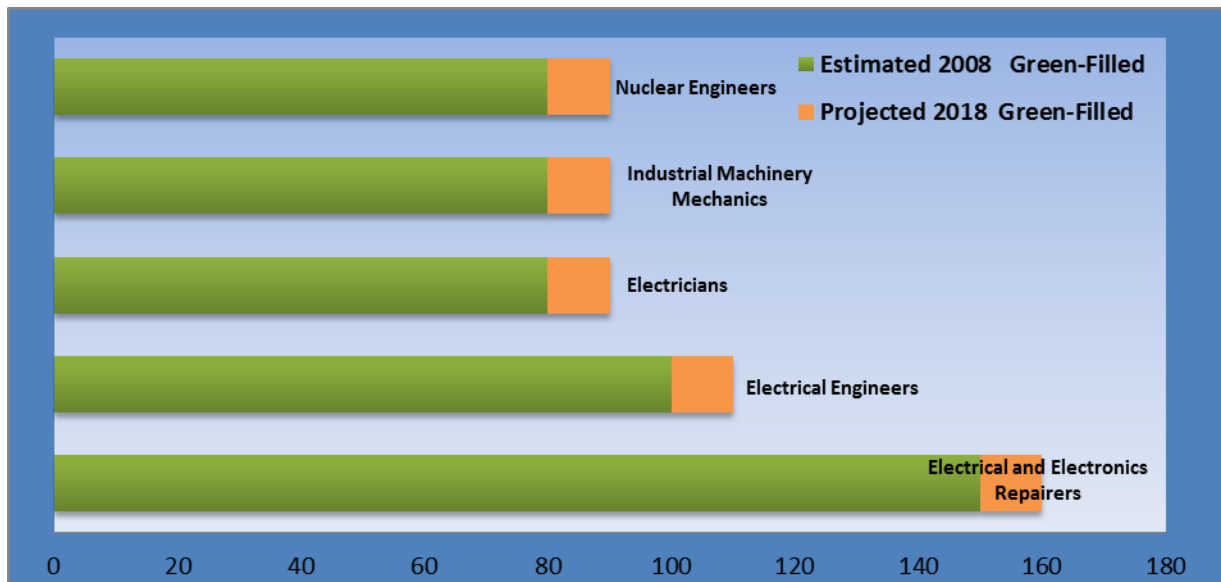
Note: This data is provided by the Alabama Department of Industrial Relations, Labor Market Information Division in cooperation with the Bureau of Labor Statistics and the Alabama Green Survey results. Occupation projections may show a zero gain due to rounding.

Alabama Green Skills & Knowledge Analysis

Green Skills Transferability

Skills are proficiencies that are developed through training or experience. Quantifying skills is important because it measures the required abilities and competencies needed by a worker to succeed in a specific job. The premise of the tables in this section is to illustrate how smoothly skill sets of potentially displaced workers transfer to jobs classified as 'green' occupations.

For the purpose of this analysis, Alabama Declining Occupational Projections for the reporting period of 2008 through 2018 were utilized. Due to the net drop in employment over a period of time, it is believed that potential displaced workers are represented by those occupations projected to decline as a result of economic conditions within Alabama, technological advancements, terminations or lay-offs, and natural disasters.

The analysis of the transferability of skills utilized the Occupational Information Network (O*NET) database to determine levels of skills needed by workers to succeed in the green occupations identified from the Alabama Green Survey administered in 2009. The skills analysis is based on O*NET Analyst Skill Ratings results, data collection, scoring and reporting methodologies (Reference Appendices G-J).

The chart illustrates the comparison of a particular skill application needed to perform in a green occupation and a declining occupation. For example, Figure 33 shows that out of 100% of all the skills needed to be successful in green occupations, workers need to have 18.2% in Technical Skills, 20.6% in Social Skills, and 21.7% in Content Skills.

People working in declining occupations already possess the skills necessary to be successful in green occupations in Process Skills, 16.3% and Complex Problem Solving Skills, 3.9%. Based on the skill level ratings, workers in declining occupations have Technical Skills of 22.9%. Though these workers can easily transfer to reported green occupations, they have the potential to find themselves overqualified in this category, which only requires green occupations to have 18.2% Technical Skills.

Figure 33

Skill Level Needed to Perform in Declining and Green Occupations

Skills Category	Declining Occupations	Green Occupations
Technical Skills	22.9%	18.2%
Systems Skills	8.2%	9.7%
Social Skills	20.0%	20.6%
Resource Management Skills	7.7%	9.7%
Process Skills	16.3%	15.9%
Content Skills	20.9%	21.7%
Complex Problem Solving Skills	3.9%	3.9%

(% Share)
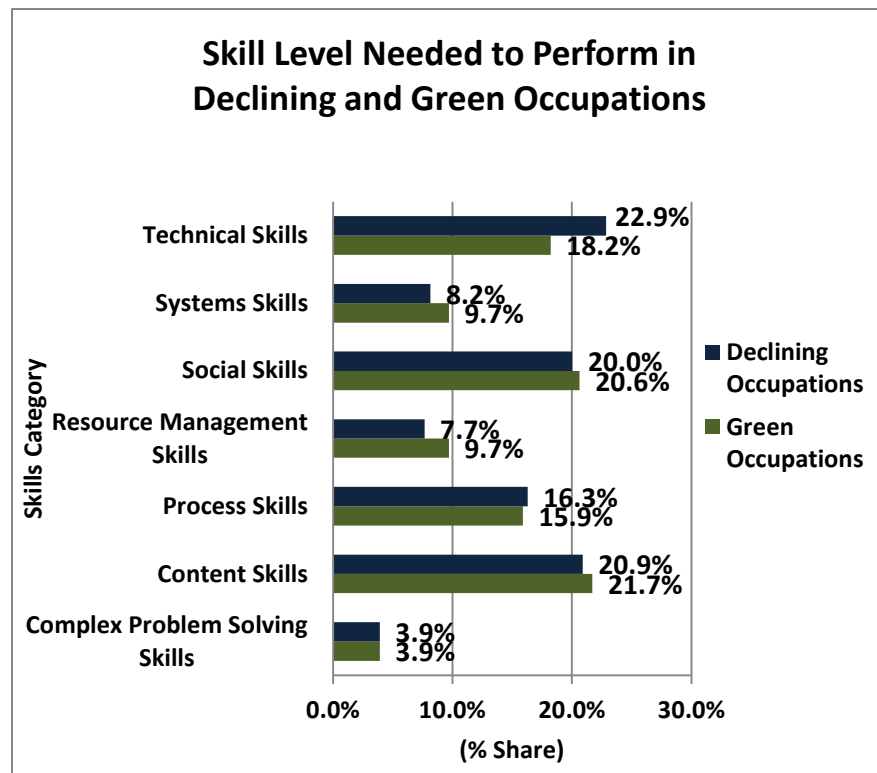
Note:

1.)*Green occupations are selected based on the Alabama green survey results administered in July 2009.*

2.)Declining occupations are occupations that are projected to experience the largest decline over 2008-2018 report period. These occupations were selected based on two variables: 1. net drop in employment over the reporting period. 2. percentage drop in employment over the reporting

The greatest gaps occur in Resource Management Skills (2%) and Systems Skills (1.5%), which are skills that require a higher level of decision making. In order for potentially displaced workers in declining occupations to transfer into green occupations successfully, the gaps in skills must be filled with training and/or experience. Due to the fact there is less than 1% difference between Social Skill and Content Skill needed and possessed, little training or experience is needed for workers in declining occupations to transfer to green jobs.

Based on the Alabama Green Survey, respondents reported 181 detailed occupations that included workers performing green activities. These detailed occupations were then rolled into 61 Standard Occupational Classification (SOC) minor groups adapted from the 2004 SOC Code Manual. There were 30 Projected Declining Occupations (2008-2018 Alabama Occupational Projections) that were rolled into 16 declining SOC groups. The table below demonstrates the number of green SOC groups (green occupations) that displaced workers in declining SOC groups (declining occupations) possess the skills base needed to transition into these green occupations (Table 35). The assumption is based solely on the skill ratings reported.

Table 35

Summary Table: Transferability of Declining SOC Groups to Green SOC Groups Based on Skill Ratings		
Declining SOC Group	**Count of Green SOC Groups**	**% of Green SOC Groups**
Declining SOC Groups are representative of Declining Occupations from the 2008-2018 Alabama Statewide Projections report period.	Representation of the Total # of Green Groups that Declining Groups Can Transfer to Based on Skill	Representation of the Percent Total of Green Groups that Declining Groups can Transfer to Based on Skill
Other Management Occupations	46	75.4%
Financial Specialists	42	68.9%
Plant & System Operators	42	68.9%
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	42	68.9%
Printing Workers	39	63.9%
Assemblers & Fabricators	38	62.3%
Information and Record Clerks	38	62.3%
Material Recording, Scheduling, Dispatching, and Distributing Workers	38	62.3%
Other Office and Administrative Support Workers	38	62.3%
Metal Workers & Plastic Workers	29	47.5%
Communications Equipment Operators	27	44.3%
Fishing and Hunting Workers	27	44.3%
Other Production Occupations	21	34.4%
Textile, Apparel & Furnishings Workers	21	34.4%
Agricultural Workers	12	19.7%
Material Moving Workers	7	11.5%

Note:
1.) Green occupations were selected based on the Alabama green survey results administered in July 2009.
2.) Declining occupations are occupations that are projected to experience the largest decline over 2008-2018 report period. These occupations were selected based on two variables: 1. net drop in employment over the reporting period. 2. percentage drop in employment over the reporting period.

A declining SOC group is only transferable to a green SOC group if the average scores of the occupations that make up the declining SOC group pass five of the seven skill categories. As illustrated in Table 35, all declining SOC groups meet the required transferability criterion due to how the occupations were classified as green and declining SOC groups.

Based on 2008– 2018 Alabama Occupational Projections, potentially displaced workers in *Other Management Occupations* possess the skills to easily obtain employment that requires proficiencies in the areas of all seven of the identified skills categories: Complex Problem Solving, Content, Process, Resource Management, Social, Systems and Technical. *Other Management Occupations* have the highest probability of transitioning to career fields such as *Construction and Extraction Occupations, Health Technologists & Technicians, Media & Communication Workers and Vehicle and Mobile Equipment Mechanics.*

Workers with experience as *Metal Workers & Plastic Workers* possess minimal skills required in order to have the same employment opportunities as workers performing green activities in occupations such as the Extraction Workers, Forest, Conservation, and Logging Workers, Plant & System Operators, and Textile, Apparel & Furnishings Workers. However the probability of these workers transitioning to higher educational and demanding career fields in green occupational groups such as *Computer Specialists, Engineers, or Financial Specialists* is unlikely without obtaining additional skills through training, education or experience. The occupations included in the declining SOC group *Material Moving Workers* are the least transferable into green SOC groups. Without a significant increase in skills proficiencies, workers in the occupations that compose this declining SOC group will be limited in green job opportunities.

A detailed listing of declining occupations (declining SOC groups) that can transition to green occupations (green SOC groups) illustrates the need for further analysis and workforce development planning. The metamorphosis of the term "green" is very evident in the efforts to quantify sustainable energy initiatives through measuring the impact of our nation's workforce. To capture benchmark data and project future employment demands based on organizations providing green goods and services is as subjective as defining what constitutes green activities. However, it is hopeful that the investment of instituting such practices will set the foundation for further research, create business alignment and be used as a crucial evaluation tool for future environmental sustainable projects.

Green Knowledge Transferability

Knowledge is a state of understanding a group of principles and facts gained by experience and study. Quantifying knowledge is important because it measures the required information needed by a worker to succeed in a specific job. The premise of the tables in this section is to illustrate how smoothly knowledge sets of potentially displaced workers transfer to jobs classified as 'green' occupations.

The Alabama Declining Occupational Projections for the reporting period of 2008 through 2018 were used in this research study. In Alabama, due to the net drop in employment over a period of time, the assumption presented is that potential displaced workers are represented by those occupations projected to decline as a result of economic conditions, technological advancements, terminations or lay-offs, and natural disasters.

Additionally, an employment and occupational data warehouse was used as part of the knowledge transferability study called the Occupational Information Network (O*NET). The O*NET database provided a means of quantitatively measuring the levels of knowledge needed by workers to perform in the green occupations identified from the Alabama Green Survey administered in 2009. Part of the knowledge analysis is based on O*NET Analyst Skill Ratings results, data collection, scoring and reporting methodologies (Refer to Appendices K-N).

Figure 34

The chart displayed on the right displays the comparison of knowledge requirements for all green occupations as opposed to all declining occupations. For example, Figure 34 shows that out of 100% of all the knowledge needed to become successful in green occupations, workers are required to have 26.4% in Business and Management; 22.3% in Engineering and Technology, and 19.1% in Mathematics and Science.

In order for displaced workers in the declining occupations to enter into green occupations successfully, the gaps in knowledge must be filled with education and training. People working in the declining occupations already possess the

Level of Knowledge Needed to Perform in Green and Declining Occupations

Transportation — Green 2.6%, Declining 1.9%
Mathematics & Science — Green 19.1%, Declining 15.2%
Manufacturing & Production — Green 4.7%, Declining 8.3%
Law & Public Safety — Green 7.5%, Declining 6.3%
Health Services — Green 0.8%, Declining 0.3%
Engineering & Technology — Green 22.3%, Declining 21.3%
Education & Training — Green 5.7%, Declining 6.3%
Communications — Green 3.4%, Declining 3.3%
Business & Management — Green 26.4%, Declining 28.8%
Arts & Humanities — Green 7.5%, Declining 8.2%

Note:
1.) Green occupations are occupations selected based on the Alabama green survey results administered in July 2009.
2.) Declining occupations are occupations that are projected to experience the largest decline over 2008-2018 reporting period.

knowledge needed to be successful in Business and Management, 28.8%; Engineering and

Technology, 21.3%; and Mathematics and Science, 15.2%. However, the greatest gap of those mentioned is in Mathematics and Science, with a 3.9% point difference. This means that for displaced workers to transfer to green jobs successfully, they need quite a bit of additional education and training in Math and Science. In the other two examples, displaced workers would probably have enough knowledge from previous jobs to smoothly transition to green jobs, for the percentages are fairly close. Finally, a skill gap is noted in Transportation with 0.7 percentage point difference, green occupations at 2.6 percent and declining occupations at 1.9 percent. Although there were fewer green occupations requiring knowledge in Transportation, the 0.7 skills gap is proportionally significant indicating that people transferring from declining occupations to green occupations will need to obtain additional training or education in transportation.

Displaced workers possess the knowledge base to easily transfer to green occupations that require education and training in the following areas: Manufacturing and Production (reported declining occupations at 8.3 percent, green occupations at 4.7 percent), Business and Management (reported declining occupations at 28.8 percent, green occupations at 26.4 percent), and Arts and Humanities (reported declining occupations 8.2 percent, green occupations at 7.5 percent).

Table 36

Summary Table: Transferability of Declining SOC Groups to Green SOC Groups based on Knowledge Ratings		
Declining SOC Groups	**Count of Green SOC Groups**	**Percent of Green SOC Groups**
Declining SOC Groups are represenative of Declining Occupations from the 2008-2018 Alabama Statewide Projections report period.	Representation of the Total # of Green Groups that Declining Groups Can Transfer to Based Job Knowledge	Representation of the Percent Total of Green Groups that Declining Groups Can Transfer to Based Job Knowledge
Plant & System Operators	46	75.4%
Other Management Occupations	31	50.8%
Vehicle and Mobile Equipment Mechanics, Installers & Repairers	30	49.2%
Fishing & Hunting Workers	28	45.9%
Textile, Apparel & Furnishings Workers	24	39.3%
Other Office & Administrative Support Workers	24	39.3%
Other Production Occupations	22	36.1%
Printing Workers	20	32.8%
Material Moving Workers	10	16.4%
Material Recording, Scheduling, Dispatching & Distributing Workers	10	16.4%
Information & Record Clerks	9	14.8%
Communications Equipment Operators	7	11.5%
Metal Workers & Plastic Workers	7	11.5%
Agricultural Workers	6	9.8%
Assemblers & Fabricators	0	0.0%
Financial Specialists	0	0.0%

Note:
1.) Green occupations are occupations selected based on the Alabama green survey results administered in July 2009.
2.) Declining occupations are occupations that are projected to experience the largest decline over 2008-2018 report period. These occupations were selected based on two variables: 1. net drop in employment over the reporting period; and, 2. percentage drop in employment over the reporting period.

Based on the Alabama Green Survey, respondents reported 181 detailed occupations that included workers performing green activities. These detailed occupations were then rolled into 61 Standard Occupational Classification (SOC) minor groups adapted from the 2004 SOC Code Manual. There were 30 Projected Declining Occupations (2008-2018 Alabama Occupational Projections) that were rolled into 16 declining SOC groups. The table illustrated on page 67 demonstrates the number of green SOC groups (green occupations) that displaced workers in declining SOC groups (declining occupations) possess the knowledge base needed to transition into these green SOC groups (Table 36). The assumption is based solely on the knowledge ratings reported.

As illustrated on Table 36, the knowledge ratings reported in the declining SOC groups labeled, '*Assemblers and Fabricators'* and *'Financial Specialists',* did not meet the required knowledge transferability criterion due to the nature of the detailed occupations from the Alabama Green Survey results that were categorized under the more general green SOC groups, and the declining detailed occupations from the Alabama Occupational Projections (reporting period 2008-2018) that also were combined into more general SOC groups. Furthermore, a declining SOC group is only transferable to a green SOC group if the average scores of the occupations included in the declining SOC group pass seven of the ten green knowledge categories.

The declining SOC group with the level of knowledge necessary to smoothly transfer into a green SOC group appeared in the *'Plant and System Operators'* cluster. Workers in these occupations possess the knowledge base to easily obtain employment that requires education and training in areas of Mathematics and Science, Engineering and Technology, Manufacturing and Production, and Law and Public Safety. Additionally, these workers must possess the required education level of a high school diploma or equivalent and/or some college coursework. Occupations grouped into the *'Plant and System Operators'* declining group have the highest probability of transitioning into career fields such as '*Vehicle and Mobile Equipment Mechanics,'* '*Installers and Repairers,'* '*Metal and Plastic Workers,'* '*Construction Workers,'* and '*Extraction Workers.'*

Further findings suggest that workers in declining SOC groups are able to transition to at least 10 identifiable green SOC groups with minimum education and/or training needed to succeed. Many of the workers in the declining occupations were recruited to work in businesses before the workers obtained a high school diploma. The probability of transitioning into higher skilled careers and being afforded the same employment opportunities as workers experienced in the green SOC groups such as '*Plant and System Operators'*, '*Management Occupations'* and '*Vehicle and Mobile Equipment Mechanics',* is suggested to be limited, if workers in lower skilled jobs such as '*Material Moving Workers'* and *'Material Recording, Scheduling, Dispatching and Distributing Workers'* do not pursue additional training and education. However, because of the current state of the nation's economy, workers with educational obtainment beyond a high school diploma are often forced to accept employment in occupations for which they are overqualified and considered out of their expertise or scholastic concentration.

The need for further knowledge analysis and workforce development planning regarding the green workforce is prevalent. The metamorphosis of the term 'green' is very evident in the

efforts to quantify sustainable energy initiatives through measuring the impact of the green movement on our nation's workforce. To capture benchmark data and project future employment demands based on organizations providing green goods and services is as subjective as defining what constitutes green activities. However, it is hopeful that the investment of instituting such practices will set the foundation for further research, create business alliances and be used as a crucial evaluation tool for future environmental sustainable projects.

Alabama Green Businesses Consent for Publication

Green Businesses in Alabama who Responded to Survey

When the Green Survey was conducted in 2009, companies in the sample were asked if they were a green organization or produced any goods or services that were green more than 50% of their production schedule. All survey respondents were asked permission from the survey vendor to be published in the green survey report. If the respondents answered 'yes', below are the companies in the sample who performed green activities who wished to be recognized. These companies were in operation at the time the survey was administered in 2009, and we hope they are still in operation today.

4Site Incorporated   is a LEED certified company that constructs buildings and creates master plans for communities and cities based on the idea of meeting present engineering needs without compromising the ability of future generations to meet their own needs.

Aaron Oil Co. Inc.   is the service solution for collection of oils, oil filters, oily water, PCW, sumps, non-hazardous sludges, and antifreeze, as well as other petroleum fuel products that have been contaminated with used oil, water, or solids.

Activa Inc.   collects over a hundred recyclable materials, including paper, plastic, and rubber. The company brokers recyclable materials to other recycling services or moves to direct end users.

Advantage Forest Resources Inc.   performs forestry conservation practices, consulting and management reforestation.

Advantage Industrial Automation   provides control and automation solutions to industrial end-users and system integrators.

AllSouth Subcontractors Inc.   is a commercial roofing service to include maintenance, inspection, and repairs.

Aluminum Screen & Metal Co.   installs, maintains, and repairs patio covers, sun rooms, custom-built screens, awnings, carports and more.

ASM Recycling Inc.   performs metal recycling for non-ferrous metals and scrap metals.

Bailey PVS Oxides LLC   manufactures chemicals for industrial use such as sulfuric acid sulfur trioxide, petroleum, ammonium bisulfite, and HCL for use in pickle lines for the steel industry.

Barr Group Inc.   is a mortgage corporation that provides title, home loans, and insurance services.

Benjamin Moore Co. is a paint company that provides interior and exterior paints, primers, and wood stains.

Best Buy Stores LP   is a multinational retailer of technology and entertainment products and services.

Bioresources LLC is a consulting company that provides natural resource services to address ecological concerns, such as wetland and stream delineation, wetland mitigation, protected species surveys, and aquatic ecology.

Birmingham Home Theater Inc. designs, sells, and installs premiere entertainment systems for homes or businesses.

Birmingham Recycling & Recovery LLC recycles plastics, paper, cardboard, stretch and film.

C S Automation Inc. is a custom design engineering and manufacturing organization with broad based disciplines in custom machinery applications.

Centimark Corporation is a commercial roofing service to include maintenance, inspection, and repairs from flat roof or green solution like solar, garden, day lighting or reflective.

Chartered Foresters Inc. is a forestry management company.

Chris Matthews Construction Inc. manages water and waste water treatment systems.

Clearwater Foresters Inc. is a full service timber harvesting and forestry consulting company and operates their own "in house" logging company.

Composite Building Systems Inc. produces and manufactures square fiber columns.

Corr Wireless Communications LLC is a communication company that operates as a wireless network service provider.

CRS Engineering Inc. is an engineering and design consulting firm providing integrated design services in areas such as electrical, mechanical, HVAC, and plumbing engineering.

Custom Builders provides services such as building contracting, repairs, remodeling, and home improvements.

Damrich Coatings Inc. performs marine and industrial sandblasting and painting contractors that have developed a solar powered system for water blasting of boats.

Farley Nuclear Plant is a nuclear facility producing approximately nineteen percent of Alabama Power's total electricity needs. Nuclear power is considered by many a safe, reliable, and cost effective power source that has a low impact on the environment, for nuclear power releases minimal greenhouse gases into the environment.

Fortinberry Associates Architects PC is an architecture firm that implements green designs into all of their business.

Freddie Mills Body Shop is an automotive repair shop that offers paint work to repair scratches, scuffs, and dents, as well as damage caused by collision and major accidents.

Garrett Enterprises provides key management resources in the form of project management, inspections, value engineering, constructability, budget controls, and administrative personnel.

Givens Contracting Service installs recycled vinyl siding and wiring in residential buildings.

Greenway Recycling Solutions Inc. recycles wood, plastics, metals, and paper products.

Gulf Coast Industrial Supply sells industrial equipment and supplies including silt fences for erosion control.

Gulf Coast Landscaping Inc. provides landscaping services to clients.

IH Services Inc of SC provides support and cleaning services to its clients, including green cleaning services and helps clients achieve points under the LEED certification system.

Ingle Tree Service transplants, prunes, removes, and plants trees, as well as removes stumps.

Interstate Batteries buys and receives used lead acid batteries from car owners and car dealerships and recycles them to be reused.

Israel Associates PC is an architect firm that designs green energy efficient residential and commercial buildings.

Jake Marshall Service Inc. installs, repairs, and maintains various HVAC units that are mostly Energy Star certified.

Jolly Heating and Air Conditioning sells and installs high efficiency heating and air conditioning units.

Jones Hamilton Co. produces, packages, and distributes chemicals and compounds.

Judson Inc. manages timber tracts.

Kone Inc. sells, manufactures, installs, and maintains elevator and escalators, and leads in innovative technologies for ecofriendly installation and maintenance.

Lighting & Lamp designs, installs, and specifies systems that control the indoor environment using equipment that is energy efficient.

M D Thomas Construction LLC is a construction company specializing in both residential and commercial construction.

Macedon Farms seeks to prevent soil erosion and degradation by planting only in non-depleted soil and giving the soil enough time to regenerate and become nutrient rich before using the land again.

Magneco Metrel Inc. makes high temperature furnace lines. They also spray furnace linings to increase energy efficiency.

Matthews Forest Services performs land conservation and replanting of trees.

McCormack Heating and Cooling installs high efficiency heating and cooling units and water heaters.

McWane Inc. Uses recycled scrap metal to make ductile iron pipes, valves, fittings, propane tanks, fire hydrants, fire extinguishers and fire suppression systems.

Corner Construction Inc. performs site work and preparation, as well as erosion control using earth moving machines. They also specialize in mine reclamation and sediment ponds.

Myhand Services LLC specializes in mulching, which incorporates a system that eliminates the loading, hauling, piling, or burning that is usually involved with land clearing. Instead the company does not disturb the top soil but puts mulch back on the grounds that helps preserve them, eliminating the need for erosion control methods.

N Tab Inc. specializes in making sure heaters and air conditioners meet OSHA requirements for energy consumption.

Novus Manufacturing produces enclosures for the cable television industry and high security lock boxes using only recycled aluminum.

Patton Geologics Inc. are geologists that provide waste minimization solutions, environmental cleanup studies, and environmental site assessments.

Pine City Contracting LLC constructs buildings and sites using green methods for excavation.

Pinnacle Car Wash Inc. uses reclaimed water and biodegradable soap to wash cars. All of their wastewater is either reclaimed, recycled, or goes into the sewage system rather than drained directly into the ground or aquifer.

Pinnacle Coatings Services LLC installs energy efficient roofing systems.

PPM Consultants cleans up brownfields and the waste that other companies make.

Precision Metal Forming Inc. produces metal building products using mostly recycled materials to make the panels.

Recyc LLC specializes in taking waste from wastewater plants to use as fertilizers for farms.

Reliant Specialty Equipment manufactures finishing equipment that is at least 80% environmentally friendly painting machinery.

Rex Roofing Materials Co. Inc. resells environmentally friendly energy efficient products.

Robert Clark Homes Inc. constructs energy efficient homes.

Robinson Company LLC produces the product called the door minder which automatically turns off the central heat and air when doors or windows are left open.

Sajjadieh Engineering provides complete electrical engineering services for commercial, institutional, telecommunication and light industrial facilities.

Sarka Sales Agency Inc. sells energy efficient electric motors and generators.

Sewage Equipment Sales Inc. installs systems that use biological micro-organisms to treat raw sewage to produce clean water.

Siemens Water Technologies Corp. provides industrial, municipal, commercial, and consumer water and wastewater treatment systems, products, and services.

Southern Turfcare Inc. is a turf company that uses organic fertilizers.

Stapp Appliance Center LLC is an appliance store whose inventory consists of 60% Energy Star appliances.

Sun World Inc. is a custom home and remodeling company that makes houses energy efficient.

Sunbelt Metals Inc. sells Energy Star roofing systems and Energy Star insulation.

Troy Systems Integration Group is a systems integrator for wastewater treatment plants.

Turf Techs Lawn Service LLC provides lawn and grounds maintenance.

University Auto Recyclers is an auto scrap yard that receives damaged cars and refurbishes and resells the parts. The remainder of the cars that cannot be reused are crushed and sent to a recycling plant.

Vaughn Appliance Repair repairs appliances as well as selling energy efficient heat pumps.

Waddell Battery Company Inc. sends used batteries to EPA certified smelters who recycles them and sells 100% recyclable light bulbs that are more energy efficient.

West Alabama Bank offers personal and commercial banking services, including paperless.

West Alabama Bank Trust offers personal and commercial banking services, including paperless.

Window World sells Energy Star certified windows and products.

WMB Specialties Inc. specializes in kaolin and ball clay mining, as well as reclamation and restoration after the mining is finished.

Working Cows Dairy Inc. is an organic dairy farm that recycles wastewater. This is the first organic dairy farm in Alabama.

Wright Bros LLC builds modular houses using recycled materials.

Green-Related Degree Programs in Alabama

Many colleges and universities in Alabama offer various educational curriculums that result in a range of degrees from Associates to Ph.Ds. The degree programs are geared to enhance or promote knowledge in green construction, waste reduction, environmental protection, energy efficiency, air quality and renewable energy.

Academic Institution: Alabama A and M University **Website**: http://www.aamu.edu/
Degree(s) Offered: *B.S. Food Science: Minors - Chemistry, Business, Nutrition, Animal Science: 2-yr Pre-Veterinary program through the Dept. of Biology:* Food scientists and technologists help to meet consumer demand for food products that are healthful, safe, palatable and convenient. They use their knowledge of chemistry, physics, engineering, microbiology, biotechnology and other sciences to develop new or better ways of preserving, processing, packaging, storing and delivering foods. Some food scientists engage in basic research, discovering new food sources and analyzing food content to determine levels of vitamins, fat, sugar or protein; or searching for substitutes for harmful additives.
Degree(s) Offered: *B.S. Agriculture Science (Agriscience, Agriscience Education, Agricultural Economics & Agribusiness Management majors):* The Agriscience Education major is designed to meet the requirements to teach Agriscience in public schools. The Agriscience major prepares students for careers in private and public agricultural service agencies, self-employment and graduate studies. The Agricultural Economics major trains students to develop skills to determine the allocation of resources within agriculture and between agriculture and the rest of the economy. The Agribusiness Management major is for those who wish to pursue agricultural business and related careers with business and government.
Degree(s) Offered: *B.S. Forestry (Forest Science and Forest Management majors):* The program is designed to educate broad base, ecologically sensitive resource managers to enable students to succeed as professional land managers and practice conservation of forests and other natural resources. Students conduct applied research of forest ecosystems and resources to provide needed information to land managers, resource planners, scientists and society.
Degree(s) Offered: *B.S. Urban Planning, M.S. Urban and Regional Planning:* Prepares students for diverse professional careers in governmental agencies, land development, consulting businesses, community service organizations, community development corporations, and private industry, or graduate study in urban and regional planning. The curriculum is designed to lead students to an understanding of natural and social environments and their problems and an understanding of urban and rural development issues and problems to formulate programs for achieving public development objectives.

Academic Institution: Auburn University **Website:** http://www.auburn.edu/
Degree(s) Offered: *B.S. Marine Biology:* Graduates pursue careers in academic research in ecology and evolution, cell biology and physiology, fisheries studies and biological and physical oceanography. Other potential careers are aquaculture, state environmental regulation, waste water and coastal zone management, marine animal care, environmental consulting and marine pharmaceutics.
Degree(s) Offered: *B.S. Animal Sciences:* Graduates of the Animal Science programs enter the workforce with hands-on experience and knowledge of many different areas related to animal production and care. The three curriculum options are: Pre-Veterinary/Pre-Professional, Production/Management, and Muscle Foods.
Degree(s) Offered: *B.S. Poultry Science:* Students study the nutrition, marketing,

management and business skills needed in poultry production. Students receive a foundation in basic sciences and mathematics as well as an understanding of the poultry industry. Careers include, food product research and development, food chemistry, food microbiology, food manufacturing, poultry farming, commodity brokerages and many more.

Degree(s) Offered: *B.S. Horticulture:* Horticulture majors learn how to establish, propagate, harvest and manage fruits, vegetables and ornamental plants. They also learn the principles of landscape design to create and manage aesthetically pleasing environments. Horticulture is a multi-billion-dollar industry that offers a wide variety of career choices.

Degree(s) Offered: *B.S. Bio Systems Engineering with a Forest Engineering major:* Students learn the engineering of forest systems, natural resources and related manufacturing industries. These engineers are employed to design, develop, consult, manage, test, construct and do research in their field. Careers include forest operations management, forest and land management, environmental management and protection, machine development, process engineering, structural design and natural resource conservation.

Degree(s) Offered: *B.S. Environmental Science; B.S. Civil Engineering:* Students will be provided with a solid background in mathematics, physical science, and biological science as related to the environmental field. Major environmental regulatory agencies employ many environmental scientists. Any manufacturing company that produces gaseous, liquid, or solid waste is a potential employer. Water and wastewater treatment plant operators, lab analysts, sanitarians and jobs with consulting firms that help governments and industries to solve air, water and soil pollution problems also use environmental scientists. A specialized or general environment science track of courses may be studied.

Degree(s) Offered: *B.S. Bio Systems Engineering with a Forest Engineering major:* The curriculum provides students with the knowledge to sustain and manage diverse forest resources. Grounded in the sciences and mathematics, students will have in-field and classroom training in management, policy, ecology, economics, and physiology.

Degree(s) Offered: *B.S. Wildlife Sciences:* Students obtain the knowledge and insight into the management and conservation of wildlife species. Career field areas include becoming a certified wildlife biologist dealing with management, trapping, habitat analysis, botany, methods of research, and others. This knowledge is applied to jobs such as land management, private consulting for landowners, conservation officers, wildlife technicians and professional wildlife biologists.

Degree(s) Offered: *B.S. Environmental Design; M.S. Community Planning:* Trains students in the planning and design of sustainable urban communities at scales ranging from the neighborhood to the regions. Prepares students for professional planning careers in the public and private sectors through the study of understanding and application of planning methods, policies and processes that collectively shape the physical, social, economic and environmental aspects of urban communities. Courses include design and planning creativity, social responsibility, historical perspective, technical competence and global environmental consciousness.

Degree(s) Offered: *B.S. Horticulture; B.S. Environmental Design; M.S. Landscape Architecture:* The curriculum is designed for the teaching of contemporary landscape design. Emphasis is on urban and regional landscape systems. Students work with real clients and communities.

Degree(s) Offered: *B.S. Agricultural Science:* Learn business and economic concepts that relate to agriculture, agribusiness and management of natural resources. The program includes the study of agribusiness, farming, finance and credit, government service, resource and environmental economics, international agriculture, education and having your own business.

Degree(s) Offered: *B.S. Bio Systems Engineering:* Bio Systems engineers ensure that we have the necessities of life: safe and plentiful food to eat, pure water to drink, clean fuel and energy sources, and a safe, healthy environment in which to live. Bio Systems engineers apply engineering to problems and opportunities presented by living things and the natural

environment.

Degree(s) Offered: *B.S. Zoology, General; B.S. Zoology, Cellular Biology/Physiology concentration; B.S. Zoology, Conservation/Biodiversity concentration; B.S. Zoology, Ecology/Evolution/Behavior concentration:* The Zoology curriculum prepares students for graduate study and a variety of careers in animal biology.

Degree(s) Offered: *B.S. Botany, Cellular/Molecular Concentration; B.S. Botany, Evolution/Ecology Concentration:* The botany major is for those interested in fundamental plant sciences. Required courses serve as a basis of knowledge of plants and future experimentation with plant systems. Electives prepare students for various careers in the plant sciences.

Degree(s) Offered: *Minor in Sustainability:* Teaches students to learn to work and live while reducing their impact on the environment through formal classroom instruction in sustainability, workshops, symposia and guest speakers.

Academic Institution: University of Alabama
Website: http://www.ua.edu/

Degree(s) Offered: *B.S. Environmental Science; Minor in Interdisciplinary Environmental Studies:* The objectives of the Environmental Science Major focus on physical geography environmental geology and ecology. Geographical techniques and statistics are required. The Minor in Environmental Science draws on the humanities, the social sciences, and the natural sciences. It acquaints students with current environmental problems and gives them the tools of analysis to identify cause and work toward solutions.

Degree(s) Offered: *B.S. Geography/Environment and Natural Resources/Regional and Urban Planning; M.S. Geography/Regional, Environmental and Urban Planning:* Students are trained to play important roles in the state's educational, planning, environmental protection and geographic analytical functions. They learn to develop and test theories that explain and predict the location, distribution and interrelationships of the world's human and environmental systems.

Degree(s) Offered: *B.S. Biology; M.S. Biology; Ph.D. Biology:* Required and elective coursework includes both lecture classes and laboratory experience. The program allows considerable flexibility to meet the interest of the individual students, whether it is a general education or a specialized field.

Degree(s) Offered: *B.S. Microbiology; M.S. Microbiology; Ph.D. Microbiology:* The curriculum stresses the sciences of chemistry, biology, physics and mathematics essential to microbiology and prepares for graduate study or employment in microbiological and allied fields. The curriculum meets the requirements for entrance into medical, dental, medical technology and other professional programs.

Degree(s) Offered: *B.S. Biology/Marine Science; M.S. Biology/Marine Science; Ph.D. Biology/Marine Science:* A double major program is offered in marine science. Students must complete the requirements for a major in Biology, Chemistry or Geology in addition to courses in Marine Science. Courses are taken in the summer at the Marine Environmental Sciences Consortium (MESC) at the Dauphin Island Sea Lab. All other courses are taken at the University of Alabama.

Degree(s) Offered: *B.S. Geology; M.S. Geological Sciences; Ph.D. Geological Sciences:* Students prepare for careers in the environmental industry, oil and natural gas, mining and industrial materials, water resources and governments/university/ museum research. Employment prospects and salaries improve with graduate degrees.

Academic Institution: Northwest Shoals Community College
Website: http://www.nwscc.edu/index3.html

Degree(s) Offered: *Associate in Applied Science (A.S.S.)/Environmental Health and Safety Technology; Short Term General Certificate Environmental Health & Safety Technician:* This degree is designed for students who plan to transfer to four year institutions offering a degree in Public Safety Administration or Environmental Health and Safety. A Short term general certificate that is less than 27 semester hours may be earned in this subject.

Degree(s) Offered: *Associate in Science (A.S.)/Water and Wastewater Management & Technology; Short term General Certificate/Waste and Wastewater Management:* This degree is designed as a guideline for students who plan to transfer to four year institutions offering a degree in water and wastewater management and technology. A Short term certificate that is less than 27 semester hours may be earned in this subject.

Green Training Programs & Certifications in Alabama

Training Programs and Certifications

Many companies and educational institutions offer training or certification programs that benefit Alabama's green initiatives and progress. Training courses and classes are geared to enhance or promote proficiencies in green construction, waste reduction, environmental protection, energy efficiency, air quality and renewable energy.

Company Name: Alabama Industrial Development Training **Website**: www.aidt.edu
Program (s) Available:
Maritime Welding Program: Intensive welding and ship fitting training is available at the Maritime Welding Center in Mobile and the Brookley Complex. AIDT is also providing maritime welding training for the citizens of south Mobile County at the Bryant Career Technical Center in Irvington. (Classes in Irvington are day classes only.) The 10-week day classes and the 12-week night classes teach aluminum and steel welding techniques and ship fitting as well as other shipbuilding skills based on employer's production processes. Trainees also demonstrate work ethics and experience in related skills while training, which assists employer hiring decisions. Training is available at no cost.

Company Name: Alabama Nursery and Landscape Association **Website**: www.alnla.org
Program (s) Available:
Alabama Certified Landscape Professional Program: A voluntary testing program that acknowledges those in the landscape profession who are willing to test their skills at the next level: to show to themselves, their colleagues and their customers that they have a thorough knowledge and understanding of job skills required to be successful in the industry.

Company Name: Alabama Technology Network **Website**: www.atn.org
Program (s) Available:
Introduction to Statistical Process Control: This workshop will provide introductory training for developing the basic understanding and skills necessary to use Statistical Process Control (SPC) to effectively control processes. Attendees will learn how to reduce or eliminate defects by learning the tools to prevent defects from occurring. Participants will also gain a knowledge of which SPC tools to apply for specific processes. This course, based upon the AIAG automotive SPC reference manual, also includes this SPC manual and a calculator for each participant.
Hazardous Waste Operations and Emergency Response: In Mobile County, training sessions in Hazardous Waste Operations and Emergency Response (HAZWOPER) are scheduled at Bishop State Community College. The training will take place on the Gulf Shores campus of Faulkner State Community College in Baldwin County. Only individuals who have previously applied and been approved, passed a drug screen and background check and been requested by P2S, the BP contractor for cleanup operations, may participate in training at these locations. The training is being conducted by personnel from the Alabama Technology Network and includes HAZWOPER 24 and HAZWOPER 40. HAZWOPER refers to five types of hazardous waste operations conducted in the United States under Occupational Safety and Health Administration (OSHA) Standard 1910.120 "Hazardous Waste Operations and Emergency Response." The standard contains the safety requirements employers must meet in order to conduct these operations.
Measurement Systems Analysis: The classes are designed for companies interested in becoming automotive suppliers, as well as those currently supplying the industry but need

additional quality training. Today, measurement data is used more often and in more ways than ever before. Decisions to make adjustments to processes, determining statistical control, and product acceptance are all impacted from the results of measured data. This class uses the AIAG automotive MSA manual (copy of MSA manual included in materials) as a reference to review steps in performing measurement system studies to determine if your measurement system is appropriate for applications that provide critical process information. Measurement System Analysis plays a significant part in Six Sigma and continual improvement activities.

Introduction to Design of Experiments: The classes are designed for companies interested in becoming automotive suppliers, as well as those currently supplying the industry but need additional quality training. In today's world of manufacturing, organizations are constantly faced with the continual improvement of their key processes. Process knowledge and experience play critical roles in the continual improvement of a process. However, Design of Experiments (DOE) can be used to move the understanding of your processes to the next level. Process owners can better understand which characteristics are important and how much they actually affect your processes. This can lead to improvements in existing processes and faster, more efficient development of new processes. This Introduction to Design of Experiments class teaches the attendees how to gain information about your processes by using simplified Design of Experiments. This class introduces the use of plots, graphs, and simple calculations (without the emphasis on statistics) to understand the variables that effect and control your processes. Screening experiments using Full and Fractional Factorial experiments are the focus of this class. Process capability and process control are also reviewed so the attendee has an understanding of a process that is in the state of statistical control.

ISO-9001 Internal Auditor Training: This course will cover the specific auditing procedures using quality manual, procedures and forms. Individuals will also learn auditor etiquettes as well as learning unique and different ways to audit from others in the class.

Company Name: Association of Energy Engineers **Website**: www.aeecenter.org
Program (s) Available:
Comprehensive 5-Day Training Program for Business Energy Professionals and Fast Track BEP Certification Training Course for Business Energy Professionals: These programs are designed for professionals who supervise and manage technical professionals in energy. These professionals may not be engineers, technicians or even technically oriented but they are business oriented. Procurement, management, energy accounting and reporting, performance contracting management, alternative financing, utility rates and project financing are critical elements of their job. They need an understanding of how energy efficiency opportunities impact the "bottom line" for their customers. They need to be able to communicate in non technical terms the advantages and disadvantages of the various efficiency opportunities available. The programs will enable these professionals to document that they understand the techniques necessary to excel. The BEP exam will be administered at the close of instruction for each seminar.
Fundamentals of Building Energy Simulation (for Certified Building Energy Simulation Analysts): This in-depth seminar covers the theory and practice of computerized building energy modeling. Students will gain hands on building simulation experience and will be given software to use in the classroom to analyze modeling applications. The BESA exam will be administered at the close of instruction on day three of the seminar.
Fundamentals of Existing Building Commissioning and Comprehensive 5-Day Training Program for Certified Building Commissioning Professionals: These courses are designed to provide a useful preparatory training for AEE's Certified Building Commissioning Professional (CBCP) program. This program will examine all aspects of building commissioning, including project scheduling, roles and responsibilities of the project team, new building commissioning, retro and re-commissioning of existing buildings, system by system commissioning

requirements, TAB and verification procedures, the LEED rating system, building code issues, and commissioning tools and technologies. The CBCP exam will be administered at the close of instruction on final day of each seminar.

Fundamentals of Energy Auditing and Certified Energy Auditor Preparatory Training Programs (for Certified Energy Auditor Professionals): These programs are designed to provide the specific training needed by professionals preparing to sit for AEE's Certified Energy Auditor (CEA) exam. Fundamental knowledge needed to evaluate how energy is being used in a facility and to identify where consumption can be reduced are covered.

Fundamentals of Buying and Selling Energy (for Certified Energy Procurement Professionals): This comprehensive three-day instructional program has been designed to provide the specific training and background information needed by professionals preparing to sit for the Certified Energy Procurement (CEP) Professional certification examination. The program covers the full spectrum of topics essential to the energy procurement process, examining both electricity and natural gas, from a purchasing/procurement and a selling/marketing perspective. You'll learn the best approaches for defining corporate energy goals, assessing energy use parameters, evaluating energy provider options, comparing competitive proposals, and integrating the benefits of competitive energy procurement into an overall energy management program. On the selling side, the program will examine proven strategies for building a customer base, answering RFPs, and establishing overall sound business practices that will build your market share and status as a player in the marketplace.

Certified GeoExchange Designer Course: This course is designed for professional engineers, registered architects, installers and contractors. This course is essential for individuals wanting advanced training and experience in designing GSHPs, and required for experienced individuals who wish to earn certification. The course includes all of the following subjects: Ground Source Heat Pump Design; Loop Systems, Open Systems; Soil/Rock Classification and Conductivity; Grouting Procedures; Commercial Ground Loop Heat Exchanger Software; and Performance of Ground Source Heat Pumps in Housing Units.

Fundamentals of Lighting Efficiency (for Certified Lighting Efficiency Professionals): This program is designed to provide a preparatory vehicle for professionals who wish to take the Certified Lighting Efficiency Professional (CLEP) exam, as well as an excellent broad-based instructional program for those who want to "brush up on the basics" of efficient lighting design, retrofit and application. The practices taught in this seminar use a practical approach to achieving effective visual environments without incurring excessive energy costs or affecting tenant comfort, customer sales, service, or the environment.

Fundamentals of Measurement & Verification (for Certified Measurement & Verification Professionals): This course is designed in part to provide a useful preparatory vehicle for AEE's Certified Measurement and Verification Professional (CMVP) program. Proven energy savings are now playing a significant role in financing energy management programs, whether through energy performance contracts or through emission trades under schemes such as the clean development mechanism of the UNFCCC. While interest in savings data is growing, the state of the art in determining savings has also been rapidly evolving. This seminar will examine current methods of determining and documenting savings, specifically reviewing the 2007 edition of the International Performance Measurement & Verification Protocol (IPMVP). Attendees will learn the process of designing a proper M&V program for their projects, including cost/accuracy tradeoffs, baseline adjustments, the role of estimates, maintaining space conditions, the role of verifiers, and the data needed for emission trading. Examples of specific techniques will be presented, along with common pitfalls which can result in unreliable data.

Fundamentals of Power Quality (for Certified Power Quality Professionals): This comprehensive program is structured to provide the specific training and background information needed by professionals preparing to sit for the Certified Power Quality (CPQ) examination. Whether you aspire to be a knowledgeable buyer of energy, a provider of reliability services, or an energy professional working with new types of energy contracts, you will benefit

enormously by establishing your status as a qualified and certified power quality expert. Among the topics covered during the three-day seminar are powering, grounding and protection solutions for sensitive electronic process and control equipment, how to review plans and specifications for power quality impact on operations, and the direct application of recommended practices found in new consensus IEEE standards. The CPQ certification process requires the completing of this seminar, as well as the submitting of a separate application and $200 application fee, which qualifies you to sit for the exam. The CPQ examination is administered at each seminar site in conjunction with instruction -- only to those candidates who have met the above requirements. For information on obtaining your CPQ application form, or for further information on the CPQ program, visit www.aeecenter.org/certification.

Fundamentals of Residential Energy Auditing and Certified Residential Energy Auditor Preparatory Training Program (for Certified Residential Energy Auditor): The program aims to improve the practice of residential energy auditing via continuing education and professional development, and to identify those demonstrating appropriate knowledge of the principles and practices of residential energy auditing by the completion of an examination and fulfillment of prescribed standards of performance an conduct. All REA candidates are required to complete either the 3-day live Fundamentals of Residential Energy Auditing training program at one of its scheduled locations, or the web-based seminar, Certified Residential Energy Auditor Preparatory Training Program (12 hours in 6 two-hour online sessions) offered several times each year.

Fast Track CRM Preparatory Course for Carbon Reduction Managers and Fundamentals of Carbon Reduction (for Certified Carbon Reduction Managers): AEE's Certified Carbon Reduction Manager (CRM) program is designed to provide recognition for professionals who have distinguished themselves as leaders in the growing field of carbon reduction. All CRM candidates must attend one of AEE's preparatory CRM training seminars, and complete and pass the four-hour written CRM examination. All CRM candidates are required to complete either the 4-day live Fundamentals of Carbon Reduction training program at one of its scheduled locations, or the web-based seminar, Fast Track CRM Training Program for Carbon Reduction Managers (12 hours in 6 two-hour online sessions) offered several times each year.

Fundamentals of Sustainable Development & Carbon Reduction (for Certified Sustainable Development Professionals): AEE's Certified Sustainable Development Professional (CSDP) program is designed to provide recognition for professionals who have distinguished themselves as leaders in the sustainable development field. All candidates are required to complete either the 2-day live Fundamentals of Sustainable Development & Carbon Reduction 2-day training program at one of its scheduled locations, or the web-based seminar, Fundamentals of Sustainable Development (10 hours in 5 two-hour online sessions) offered several times each year. Examination questions are based on concepts and experiences basic to energy efficiency, pollution prevention and sustainable development. The exam is open book, and questions are a mixture of multiple choice and true/false.

Basics of Distributed Generation & Onsite CHP (for Distributed Generation Certified Professionals): This course will cover all of the technical, legal, and economic aspects of onsite generation and CHP systems, including renewable energy and distributed generation concepts. It is designed to provide the knowledge and skills needed to analyze, and economically evaluate all types of onsite generation systems. The seminar will also serve as a preparatory vehicle for AEE's Distributed Generation Certified Professional (DGCP) certification program. For those wishing to qualify for the DGCP certification, the DGCP examination will be administered on the day following the last day of the seminar, at the same location.

Fundamentals of Existing Building Commissioning (for Existing Building Commissioning Professionals): Each applicant for the EBCP certification is required to attend AEE's three-day "Fundamentals of Existing Building Commissioning" training program in order to sit for the exam. Prior to sitting for the exam, each candidate must complete an application. Each

candidate must also pass the four-hour written exam.

Fast Track CEM Preparatory Course for Energy Managers, CEM Training Course for Government Involved Energy Professionals, and Comprehensive 5-Day Training Program for Energy Managers (all for Energy Manager in Training Certification, Certified Energy Manager, and Certified Green Building Engineer): These fast-paced, highly focused seminars are designed to provide the specific training and background needed by professionals preparing to sit for the CEM exam. The topics will include updates on topics of current importance, such as implementation of the most recent federal energy legislation, new energy efficiency equipment standards for commercial buildings, building commissioning basics, and critical indoor air quality considerations. The program will review the technical, economic, and regulatory aspects of effective energy management and the basics of energy efficiency improvement as it relates to electrical, utility, building, and combustion systems.

Fundamentals of Renewable Energy: Technologies, Applications & Strategies (for Renewable Energy Professional (REP) certification): To be awarded the REP designation, candidates must attend the preparatory seminar prior to taking the REP exam and receive a pass rate of 70% on the examination. The certification director keeps examination scores on file for a period of three years. Applicants that do not receive certification status can request that their applications be resubmitted to the REP Board, if during that three-year period their education or experience level changes. The examination will be administered by the Association of Energy Engineers. The applicant must complete the written exam. The applicant is given four hours to complete the exam. Dates and locations are determined by the REP Board. Candidates are notified of this information by the REP Director. The examination questions are based on concepts and experiences basic to renewable energy on recognized tests, and on supplemental reading.

Company Name: Auburn University **Website**: http://www.auburn.edu/outreach/opce/green/
Program (s) Available:
Alternative Energy Operation: Topics include: power generation, turbine system & control, combustion turbine fundamentals, combustion air & flue gas system, boiler fuel systems, efficiency, reliability & environmental sensitive operations, and hydroelectric power plant operations.
ASE Automotive Master Program: ProTrain's Modern Automotive Service Technician online class teaches the construction, operation, service, and repair of automobiles and prepares students for the ASE certification exam.
Carbon Strategies: This course provides an overview of the World Resources Institute (WRI) Greenhouse Gas Protocol Initiative and describes various components of a climate-related strategy.
Certified Green Designer: The Green Designer Certification is a specialized and tailored educational program developed to bring comprehensive and reliable information to you, the Design Professional.
Certified Green Specialist: You may be in the real estate, building, HVAC, engineer, janitorial field, or even as broad as a nursing career. No background is needed to start learning. We will teach you all of the basics to wear the label of "Certified Green Specialist," the proprietary US trademarked title for the serious green professional.
Certified Indoor Air Quality Manager (CIAQM): The Certified Indoor Air Quality Manager (CIAQM) course is designed to help participants diagnose indoor environmental problems in buildings, correct these problems, and prevent them from ever happening again.
Certified Indoor Environmentalist (CIE): The Certified Indoor Environmentalists Course On-line is an in-depth program teaching participants the core skills needed to perform indoor environmental assessments of all building types.

Certified Sustainability Officer: This training teaches students methods in assessing, developing, and executing a company's strategy for energy use, recycling, waster elimination, and transportation to ensure compliance with environmental or governmental regulations.

Certified Sustainability Professional: Our CSP certified program is designed to give our graduates a great balance of core sustainability topics to enable them to stand out individually or to step into a sustainability leadership role with confidence.

Code Training/New Construction Inspection: If you are interested in working as a building inspector doing IRC (International Residential Code) Inspections, use our materials to pass the International Code Council's (ICC) IRC Examination.

Commercial Energy Consultant: This program consists of training, certification, and business start-up kit to be able to go out and start conducting retail energy audits.

Complete Home/Building Inspectors Training: Learn all aspects of inspection and be prepared for whatever type of building your client wants inspected.

CSR/Green Business Practices: This course is offered as a four hour module discussing green business concepts such as recycling, sustainability, and a guide for developing a business energy plan.

Energy Efficient Design for Architects: US Green Building Council approved Education Provider Program and will provide a firm foundation for LEED.

Fundamentals of Mold Inspection: A course for anyone wanting to learn the core skills needed to evaluate the homes and buildings for mold.

Fundamentals of Solar Hot Water Heating: This online course concentrates on the basics of installing code compliant solar hot water systems.

Fundamentals of Sustainable Buildings and High Performance Systems Design: Introduction to green design practices, benefits, new green building ideas, and an overview of the architectural decisions and their impact on sustainable and green project goals.

Green Building for Contractors: Learn green building practices and train your crew to be "green" savvy.

Green Building for Contractors - Level 2: This six-course Advanced Green Builder certification program, presented in partnership with EEBA (Energy & Environmental Building Alliance), features the acclaimed "Houses that Work" housing science curriculum, and is accredited for continuing education by AIA, AIBD, BPI, NAHB, RESNET, & USGBC.

Green Building for Health Care Professionals: This is an eight hour module delivering information on the impact of cleaning practices and explaining the benefits of recycling and waste management.

Green Building for Insurance Professionals: This is a four hour module offering an overview of green building and what the future will hold for insuring these new types of building systems.

Green Building for Mortgage Professionals: Designed as a four hour module, this course offers an overview of green building systems and energy financing products to help a homeowner become more energy efficient.

Green Building for Real Estate Professionals: ARELLO approved, this four hour module offers real estate professionals insight on what they will see as clients begin to show interest in these new types of renovations.

Green Building Sales Professional: This program is specifically for individual professionals selling or marketing a certified Green residential (Real Estate Professionals), commercial or government projects.

Green Building Technical Professional: This course provides participants with the tools needed to determine a Green Project. Discover what the future may hold for a green lifestyle. This track is designed specifically for those individuals who are involved in the nuts and bolts of green building, such as engineers, architects, builders, etc.

Green Certified Government Leader: A four hour training that will include a step-by-step guide for developing an energy plan and define a government's commitment to become more

socially responsible. An overview of green fleet management, renewable energy and resources will be defined.

Green Certified Home Inspector: This four hour module introduces the home inspector to green building, renewable energy, and energy efficiency. Suggestions are offered on what the home inspector can do to assist homeowners and homebuyers in making informed decisions on future green renovations.

Green Cleaning Technician: This is a six hour module that will offer the student information on how to develop recycling programs within a company or government entity and to initiate and monitor performance. Participants will be able to supervise waste management for private firms.

Green Germ Control Specialist: This is a four hour module designed for those in the cleaning and maintenance services industries. This course addresses control of contagious diseases from a cleaning standpoint and green sanitation protocol.

Green Landscaping: The course will teach participants how to reinvent the way traditional landscaping has been done.

Green Purchasing Fundamentals: Green Purchasing Fundamentals introduces foundational concepts that align with systems, policies, and procedures that support green purchasing practices and organization sustainability.

Green Supply Chain Professional: Our GSCP certification program is designed to give our graduates a comprehensive knowledge of sustainability areas confronting supply chain and operations professionals. This program will provide graduates with very unique credentials and experience. 5 Courses included in this program: *Green Purchasing Fundamentals *Sustainability 101: Corporate Social Responsibility Essentials *Green Transportation: 12 Best Practices *Carbon Strategies *Green Supply Chain Management.

HazWoper 24-Hour Moderate Risk: This self-paced HazWoper education course on the internet meets the OSHA/EPA training requirements for workers performing hazardous waste site functions in accord with the provisions of 29 CFR 1910. 120.

Home Energy Analyst (HERS): The Building Analyst and HERS Rater course is based upon a broad building science curriculum. It presents a solid scientific foundation upon which inspectors and auditors can build an accurate understanding of modern buildings.

Home Energy Consultant: This program consists of training, certification, and a business start-up kit. Participants will receive everything needed to be able to go out and start conducting home/residential energy audits. Participants will learn to identify the common energy wasting areas of a residence and will learn more in-depth energy conservation techniques to enable clients to have maximum energy savings insight.

Indoor Air Quality – Fundamentals of ASHRAE Standard 62.1: Properly designed ventilation systems are essential for the well-being of building occupants in order to minimize adverse health effects and improve productivity of workers and students. Standard 62.1, Ventilation and Acceptable Indoor Air Quality, is the industry standard for the design and operation of ventilation systems to provide acceptable indoor air quality.

Intro to Building Energy Efficiency: The training at this level provides prospective weatherization professionals with baseline knowledge in the essential concepts needed for weatherization work.

LEED AP Interior Design & Construction: This program is for professionals participating in the design and construction of environmentally responsible, high-performance commercial spaces and tenant improvements that provide healthful, productive places to work and places that are less costly to operate/maintain. The LEED AP Interior Design & Construction Exam is designed to measure your knowledge and skill in understanding the LEED Rating System and ability to facilitate the project certification process.

LEED AP Operations & Maintenance: Replacing the LEED AP for Existing Buildings Exam track, this specialty provides a standard for professional participants in the operation and maintenance of existing buildings that implement sustainable practices and reduce the environmental impact of a building over its functional life cycle.

LEED Building Design & Construction: Replacing the LEED AP for New Construction Exam track, this specialty provides a standard for professional participants involved in the design and construction phases of high-performance, healthful, durable, affordable, and environmentally friendly sound commercial, institutional, and high-rise residential buildings.

LEED Green Associate: For professionals who want to demonstrate green building expertise in non-technical fields of practice, GBCI has created the LEED Green Associate credential, which denotes basic knowledge of green design, construction, and operations.

Photovoltaic System Design & Construction: This online course will provide the student technician with the fundamental knowledge of photovoltaic system design and installation. This course will be suitable for a supervised, entry-level position with a dealer/installer or other photovoltaic, industry company. Student technicians will learn practical design criteria, installation guidelines, safety issues, maintenance, and legal considerations of photovoltaic systems.

Senior Certified Sustainability Professional: Our SCSP certification program is designed to give our graduates a comprehensive knowledge of sustainability across multiple functional areas, along with a balance of internal and external knowledge of sustainability, leadership, and consultancy. Courses included in this program include: *Green Purchasing Fundamentals *Sustainability 101: Corporate Social Responsibility Essentials *Carbon Strategies *Sustainability Leader: Your First 180 Days to Success *Green Transportation *12 Best Practices * Green Marketing & Sales Force Essentials * Green Packaging *The Sustainability Consultant *Advanced Green Purchasing * Environmental Accounting 101.

Solid Waste Operations Certificate: This 132 hour/four-course program is important training for homeland security as it relates to solid waste management. This introductory course includes instruction in landfill operations, composting operations, household hazardous waste, and wastewater operations (solids). These classes will meet or exceed most state requirements for the educational components of certification and/or licensing required for solid waste professionals.

Sustainability 101: Sustainability resides within three foundational pillars of society: economic, social, and environmental. Our Sustainability 101 & CSR Essentials course establishes a common framework for employees at various levels and roles of the organization, while bringing together a global set of lenses to look through. This course is essential for everyone in the organization.

Sustainability Planning Specialist: A six hour course for professional development to address organizational sustainability issues, how to assist a company in developing a plan to have a more sustainable approach in areas such as waste stream management, green building practices, and green procurement plans.

Waste Management Coordinator: A six hour module that will offer students information on how to develop recycling programs within a company or government entity to initiate and monitor performance. Participants will be able to supervise waste management for private firms.

Wastewater Treatment Operations Certificate – Complete Program: Clean water is essential for everyday life. Water treatment plant and system operators treat water so that it is safe to drink. Most state drinking water and water pollution control agencies require courses to improve operators' skills and knowledge. Courses included in the program are: *Wastewater Treatment 1 *Wastewater Treatment II *Wastewater Treatment - Industrial *Wastewater Collection Systems *Wastewater Analysis.

Wastewater Treatment Operations Certificate – Standard Program: Clean water is essential for everyday life. Water treatment plant and system operators treat water so that it is safe to drink. Most state drinking water and water pollution control agencies require courses to improve operators' skills and knowledge. Courses included in the program are: *Wastewater Treatment 1 *Wastewater Treatment II *Wastewater Treatment - Industrial *Wastewater Collection Systems *Wastewater Analysis.

Water Treatment Operations Certificate – Complete Program: Clean water is essential for

everyday life. Water treatment plant and system operators treat water so that it is safe to drink. Most state drinking water and water pollution control agencies require courses to improve operators' skills and knowledge. Courses included in the program are: *Water Treatment 1 *Water Treatment II *Water Treatment Distribution Systems *Water Analysis *Pumps *Maintenance Safety.

Water Treatment Operations Certificate – Standard Program: Clean water is essential for everyday life. Water treatment plant and system operators treat water so that it is safe to drink. Most state drinking water and water pollution control agencies require courses to improve operators' skills and knowledge. Courses included in the program are: *Water Treatment 1 *Water Treatment II *Water Treatment Distribution Systems *Water Analysis *Pumps *Maintenance Safety.

Weatherization Energy Auditor: This course is tailored specifically for Department of Energy's (DOE) Weatherization Program and similar utility-funded programs. This course is based on the "Core Competencies for the Weatherization Assistance Program" developed by the Weatherization Trainers Consortium.

Weatherization Installer: Instruction on performing the basic and more simplistic forms of energy efficiency measures, including: caulking, CFL installations, weather-stripping of windows and doors, minor home repairs, Health & Safety Environmental Awareness, customer service, construction basics review, building sciences overview, crew chief functions, and much more. Learn weatherization building practices for experts in the field.

Wind Energy Technology: There are very few institutions in the country that provide training for entry-level workers for wind-based electric power plants. Wind-based electric plants (farms) are operated by small groups of highly trained individuals. This online program is designed for people who seek entry level jobs in a wind-based electric power generation facilities. Currently, there are thousands of wind-based electric generators operating in the United States.

Company Name: Auburn University
Website: www.auburnworks.org

Program (s) Available:

Lean Certificate Series: Auburn Technical Assistance Center is offering four sessions of the Lean Certificate Series during 2010. Learn to produce more and be more efficient by eliminating non-value-added activities. Lean manufacturing is a systematic approach to identifying and eliminating waste through continuous improvement techniques. Lean training is for managers, supervisors, plant managers, team leaders, manufacturing engineers and floor/process personnel. This course involves classroom and practical hands-on simulation training.

Lean Office: Apply lean tools to improving the efficiency of the office environment. Only about 20% of total lead time results from manufacturing activities. In a Lean manufacturing environment, administrative functions also need to be efficient and free of waste and non-value-added activities in the process. Through training in Lean Office, participants gain hands on experience through a live simulation in a traditional office environment to apply these principles to the office environment using typical simulated office equipment, supplies, forms, and procedures. By day end, each person will gain a practical understanding of how "Lean" continuous improvement techniques can be applied to the office to eliminate waste, gain more capacity from existing operations, and enhance your company's ability to compete.

Six Sigma Green Belt / Black Belt: Six Sigma is a highly disciplined management strategy to use statistical tools and project work to achieve consistent excellence in quality, reduce costs and deliver products to customers on time. No matter what kind of organization you're in, the Six Sigma experts from ATAC at Auburn University can help you make your processes nearly perfect -- 99.9997% defect-free!

Lean Accounting: This course is designed to assist companies in aligning their lean production system strategies with the organization's accounting and financial strategies. This three-day seminar will teach you – using hands-on and classroom training -- how to make appropriate changes in your accounting systems to support an overall transformation to a lean enterprise. This course is appropriate for accounting managers, operations managers, finance managers, and others involved in the organization's financial management processes.

Lean 101 for Healthcare: Lean Healthcare 101 is a course designed to teach Lean's continuous improvement methodology and tools. This full-day energetic event will give participants a hands-on, learn-by-doing experience by applying Lean philosophies and tools in a simulated Emergency Room environment. Students will learn value stream mapping, workplace organization, batch reduction, standardization, pull systems, continuous flow, and more. This training will prepare participants to apply Lean concepts and tools back in their own organizations to ultimately drive out waste and increase efficiency.

Company Name: Auburn University of Montgomery
Website: www.gatlineducation.com/aum

Program (s) Available

Biofuel Production Operations Online Training Program: The Biofuel Production Operations Online Training Program will give you the education you need to begin an exciting career in biofuel production. As a biofuel production operator, your job will be to ensure the quality and purity of the biofuel your plant produces. This involves inspecting and repairing equipment, operating computer systems, and handling lab equipment. This online program will ensure you have the skills you need to handle these tasks.

Building Analyst Quick Start Program: This program has also been designed to help prepare individuals on the path to various NATE, NARI, BPI, RESNET, and other industry credentials related to green building performance. Instruction aligns with ANSI/ACCA Quality Installation and Maintenance Standards. This program is recognized by North American Technician Excellence (NATE) and Building Performance Institute (BPI) for 28 hours of continuing education (28 CEHs) applicable to NATE and BPI recertification. Must obtain a 75% or higher to obtain CEH recognition.

Certified Green Supply Chain Professional Online Training Program: This professional certification program will help you learn the essentials of green product standards and labeling as well as how to develop sustainability supplier programs, implement sustainable business practices, apply lean and green manufacturing strategies, and integrate these practices across the extended supply chain.

Certified Indoor Air Quality Manager Online Training and Certification Program: This program provides practical skills to improve your building's indoor air; it also prepares you for third-party certification by the American Council for Accredited Certification (ACAC). The Certified Indoor Air Quality Manager Program will educate you on all the pertinent topics covered on the certification exam. You can even take a 100-question practice examination to prepare for the exam. Getting certified is completely optional. Exams are arranged through ACAC at computerized testing centers throughout the U.S. Certain experience requirements and fees apply to ACAC certifications, but there are no experience requirements for this online program.

Certified Indoor Environmentalist (CIE) Online Certification Program: This program provides practical skills to assess indoor environments; it also prepares you for the CIE and CIEC certifications by the American Council for Accredited Certification (ACAC). All the pertinent topics covered on the certification exams, including a 100-question practice examination, are included in this program to prepare you for certification. Getting certified is completely optional. Exams are arranged through ACAC at computerized testing centers throughout the U.S. Certain experience requirements and fees apply to students getting certified

(however, there are no experience requirements for this online program).

Natural Gas Plant Operations Online Training Program: The Natural Gas Plant Operations Online Training Program provides you with the knowledge and skills you'll need to begin an exciting career in natural gas plant operations. Natural gas has two things going for it. First, it provides clean energy. Second, it's plentiful in the United States. This online program provides the fundamental technical background you need to get started in this field. This online certificate program is offered in partnership with major colleges, universities, and other accredited education providers.

Performing Comprehensive Building Assessments Program: The Performing Comprehensive Building Assessments Online Training Program will help you prepare for BPI Building Analyst Certification and NATE HVAC Efficiency Analyst Certification (Senior Level). This program will refer to the BPI Building Analyst as well as to various industry codes and standards. Instruction aligns with ANSI/ACCA Quality Installation and Maintenance Standards. Both BPI and NATE recognition of continuing education hours (30 CEHs) applicable to recertification is pending. You must obtain a 75% or higher to obtain CEH recognition. This program is open-enrollment and self-paced. You'll be given an initial three months to complete the program. If you need more time, you can purchase a three-month extension for $45.

Principles of Green Buildings Online Training Program: The nine modules of Principles of Green Buildings will take you through all of that material. If you have any in-depth questions or if you need further explanation of content, you'll have an SME (Subject Matter Expert) mentor for support and information. This program will help you prepare for BPI, NATE, NARI, RESNET, and other industry credentials for green buildings. If you successfully complete this program with an overall grade of 75% or higher, you'll qualify for 28 hours of continuing education units (CEUS) from BPI or NATE, and those CEUs are applicable to several certifications.

Senior Certified Sustainability Professional Online Training Program: This premier certification program is for sustainable business professional. The course provides skills for coordinating an enterprise's sustainability strategy across multiple functional areas, including sales, marketing, communications, new product development, global supply chain, operations, and corporate social responsibility.

Wind Energy Apprentice Online Training Program: In this program, you'll learn the basics of wind energy principles, including wind technology, wind energy anatomy, wind farm design, wind business, and characteristics of energy sources. This program covers the fundamentals of hydraulics and the basic theory and practice of electrical circuits, including calculations as applied to alternating and direct currents.

Six Sigma Green Belt Online Training Program: Six Sigma is a quality improvement methodology structured to reduce product or service failure rates to a negligible level (roughly 3.4 failures per million opportunities). The Six Sigma Green Belt Online Training Program provides you with an overview of the Six Sigma concepts and tools, including Six Sigma deployment practices, project development, and the DMAIC problem-solving approach. Once you've completed this program, you'll be ready to successfully participate in a Six Sigma team.

Company Name: Gadsden Job Corps Center
Website: www.gadsden.jobcorps.gov

Program (s) Available:

Carpentry and Heating, Ventilation, and Air Conditioning (HVAC): Job Corps has been awarded funds under the American Recovery and Reinvestment Act (ARRA) of 2009 to be used for construction, rehabilitation and acquisition, as well as operations needs. Since the act was signed into law one year ago, Job Corps has implemented "green" student training programs and commenced construction projects on more than 65 centers across the nation.

Company Name: Green Advantage
Website: www.greenadvantage.org
Program (s) Available:
Green Advanced Builder Certification: Green Advantage offers three types of certification exams – Commercial, Residential, and Commercial/Residential. Although many of the exam questions for the Commercial and Residential versions of the exam are identical, some are unique to the respective field requirements presented by green commercial or residential projects. In order to become a Green Advantage® Certified Practitioner, individuals must demonstrate foundational knowledge, comprehension, application and ability to analyze green construction concepts, materials, and practices by passing a Green Advantage exam with a score of 75% or higher.

Company Name: Green Builder College
Website: www.greenbuildercollege.com
Program (s) Available:
Green Builder College Certification Program: To become Green Builder certified, each enrolled user must complete the first seven courses listed on the left. Each study course in this curriculum addresses the fundamental principles of green building relating to energy efficiency, building durability, indoor air quality, resource efficiency, and water efficiency. Completion of the course work includes passing the test associated with each course. Users who pass all tests, and complete a student feedback evaluation, will be eligible to receive a Green Builder Certificate.
Advanced Green Builder Certification: This six-course Advanced Green Builder certification program, presented in partnership with EEBA, the Energy and Environmental Building Alliance, features the acclaimed Houses that Work housing science curriculum, and is accredited for continuing education by AIA, AIBD, BPI, and RESNET. Completion of the course work includes passing the test associated with each course. Users who pass all Course Tests will be eligible to receive an Advanced Green Builder Certificate.
Environments for Living Certification Program: To become Environments for Living certified, each participant must complete the first six Environments For Living courses listed on the left. Each study course in this curriculum addresses the fundamental areas of green building relating to framing, insulation, HVAC, and indoor environmental quality. Completion of the Environments for Living course work includes passing the test associated with each course, and completing a student feedback evaluation.

Company Name: Montgomery Job Corp Center
Website: www.montgomery.jobcorps.gov
Program (s) Available:
Carpentry: Job Corps has been awarded funds under the American Recovery and Reinvestment Act (ARRA) of 2009 to be used for construction, rehabilitation and acquisition, as well as operations needs. Since the act was signed into law one year ago, Job Corps has implemented "green" student training programs and commenced construction projects on more than 65 centers across the nation.
Electrical: Job Corps has been awarded funds under the American Recovery and Reinvestment Act (ARRA) of 2009 to be used for construction, rehabilitation and acquisition, as well as operations needs. Since the act was signed into law one year ago, Job Corps has implemented "green" student training programs and commenced construction projects on more than 65 centers across the nation.
Facilities Maintenance: Job Corps has been awarded funds under the American Recovery and Reinvestment Act (ARRA) of 2009 to be used for construction, rehabilitation and acquisition, as well as operations needs. Since the act was signed into law one year ago, Job

Corps has implemented "green" student training programs and commenced construction projects on more than 65 centers across the nation.

Company Name: **Northwest-Shoals Community College**:
Website: www.nwscc.edu
Program (s) Available
Hazardous Waste Operations and Emergency Response Waste Site Refresher: Participants must complete the eight-hour course no more than one year from the date of the original class and take the refresher each additional year to maintain the certification. All major topics covered in the original training will be reviewed. In addition, new regulations and environmental laws pertinent to the hazardous materials filed will be introduced. All persons attending this class must bring a copy of their original training certificate to this class.
Energy Management Technology Short-Term Certificate: The Energy Management certificate is offered to students in Heating and Air Conditioning, Industrial Electricity, and Industrial Electronics and in-field personnel who have a high school diploma or GED. This certificate would enable a student to enhance his/her career potential in the area of energy control and use technology.
Environmental, Health and Safety Technician Short-Term Certificate: This short-term certificate is designed to prepare students for employment as Environmental, Health and Safety Technicians.
Water and Wastewater Management and Technology Short-Term Certificate: This short-term certificate is designed to prepare students for employment in positions related to water and wastewater.

Company Name: **Professional Home Inspection Institute**
Website: http://www.weatherizationcourse.com/web/index.php?siteid=141
Program (s) Available:
Weatherization and Insulation Remediation: The lessons presented in Weatherization & Insulation Remediation Course will give you the training you need to provide weatherization and insulation remediation for homeowners as they seek to improve energy efficiency of their home.
Manufactured Home Weatherization Course: This course covers the possible weatherization measures that are proven to reduce energy loss.
Residential Appliance Efficiency Course: In this course, you will learn about the ENERGY STAR program and EnergyGuide labels as well as residential systems and home appliances that present opportunities for energy savings.
Energy Audit Diagnostics Course: This course will teach you the energy audit process with the procedures and testing protocols used in energy auditing and diagnostic testing.

Company Name: **Southface Energy Institute**   Website: www.sothface.org
Program (s) Available:
Certified Home Energy Rater (authorized to administer the Home Energy Rating System (HERS)): This training includes RESNET National Certification written exam (including exam fees). Taking this course is the first step toward becoming a Certified Home Energy Rater authorized to administer the Home Energy Rating System (HERS) developed by the Residential Energy Services Network (RESNET). As a Certified Home Energy Rater, you will be able to produce energy rating reports that will help home buyers and homeowners qualify for financing incentives through a variety of private and government loan programs.
EarthCraft House Builder Training: In this eight-hour course, builders, architects and project managers are trained on building science basics and methods of applying high performance and environmentally-friendly construction techniques to new homes. The course emphasizes cost-effective ways to improve the energy efficiency, indoor air quality, comfort and durability of

homes. Participants also learn how the EarthCraft certification process works and get valuable information on effectively marketing the advantages of EarthCraft certification to their prospective buyers.

EarthCraft Renovation Training: In this 7-½-hour course, renovators, contractors, architects and project managers learn how to apply high performance construction techniques to renovation and remodeling projects. Participants learn how to improve the energy efficiency, indoor air quality and durability of an existing house. The course also covers the EarthCraft Renovation participation and certification process.

EarthCraft Realtor Training: This 3-½-hour course trains realtors on building science basics, what makes an EarthCraft House, mortgage incentives for energy efficient building, details and benefits of the EarthCraft House program and how to successfully market an EarthCraft home.

LEED Green Associate: The one-day LEED Green Associate Exam Preparation Course includes a complete review of the LEED rating systems and core concepts of green building, and goes through sample exam questions, worksheets and strategies for passing the exam. The LEED Green Associate credential can stand alone, or it can also serve as the entry point to becoming a LEED Accredited Professional (LEED AP).

LEED Accredited Professional for Building Design and Construction: Southface offers the LEED BD & C (Building Design & Construction) Exam Preparation Course, a comprehensive one-day training that prepares a student to become a LEED AP for Building Design and Construction. The course begins with a complete review of the green building credits in the BD & C Reference Guide, then goes through online templates, sample exam questions and strategies for passing the exam. You must have passed the LEED Green Associate exam, or have previous LEED project experience before taking this or any other LEED AP exam.

Green Home Design & Construction: The LEED Implementation Process Southface's LEED for Homes 300-level workshop is intended to help residential design and construction professionals who are involved in implementing the LEED for Homes Rating System, or who are pursuing the Green Building Certification Institute's LEED AP+ (Tier II) credential in residential design and construction to apply their green building knowledge to real-life situations. The workshop walks participants through the phases of a typical LEED for Homes project using case study examples and implementation strategies throughout to reinforce learning. Students must be familiar with both the LEED for Homes Rating System (January 2008 with Errata and Clarifications) and the LEED for Homes Reference Guide (v2008 or v2009) to take this course.

LEED Overview Training: Southface has a LEED Overview Training describing the processes for becoming a Green Associate or Accredited Professional and the benefits of having employees with these designations on your staff. Southface provides a variety of custom training programs and can help you to outline and address your specific training needs in the timeframe required.

BPI'S BUILDING ANALYST PROFESSIONAL: This three-day training is designed to introduce the knowledge and skills necessary to achieve the BPI Certified Building Analyst 1 certification. Basic building science concepts, home assessment and improvement concepts, and the use of diagnostic equipment (including combustion safety testing) will be presented. To achieve Building Analyst 1 Professional designation, a student must receive a passing score on the BPI Building Analyst written and field exams. Southface also offers field exams, which can be scheduled separately for an additional fee.

Home Performance Concepts: Home Performance Concepts is the morning module of the Home Performance with ENERGY STAR® training. Sales and business development professionals is encouraged to attend this half-day session, which presents a special focus on the sales, marketing and administrative requirements of the Home Performance with ENERGY STAR program.

Home Performance with ENERGY STAR: The Home Performance with ENERGY STAR® training presents an overview of the systems approach to home assessments and improvements. It also instructs contractors on HPwES program requirements. All contractors participating in the Georgia Power and Southface Home Performance with ENERGY STAR programs are required to complete this one-day training.

New Crew Basics: This course equips new personnel with the basic knowledge and skills necessary to fulfill weatherization job responsibilities. It provides an overview of basic building science principles such as thermal performance, and teaches students the basic principles and techniques of weatherization, including tools of the trade such as pressure diagnostics.

Lead Safe Weatherization Practices: This course teaches safe weatherization techniques that should be used in buildings that contain lead paint. Training is based on the highly regarded curriculum developed by Montana State University, which satisfies all Department of Energy and Occupational Safety and Health Administration requirements.

Whole House Weatherization Training: This course teaches current testing and weatherization techniques used in "Whole House Weatherization." Topics include basic pressure diagnostics, the use of digital manometers with blower doors, zonal pressure, combustion appliance evaluation and worst case draft testing.

Weatherization Continuous Improvement Training Series: The Weatherization Continuous Improvement Training Series are classes that allow current service providers to refine their basic skill levels with advanced training. Courses in this training track include:
Advanced Pressure Diagnostics: This course trains service providers how to operate a blower door, seal air leaks, calculate fresh air requirements and building tightness and test duct work. It provides hands-on training for each of these tasks.
Mobile Home Weatherization Training: This course explains the basics of mobile home construction, air sealing, air quality heating systems and ductwork, and shows service providers how to properly insulate walls, ceilings and floors, as well as how to solve moisture problems in a mobile home.

Lead-Based PAINT SAFETY: This one-day class on lead paint safety for RRP (Renovation, Repair and Painting) is suitable training for the Initial Renovator Course as well as the Refresher Course for individuals licensed as lead abatement supervisors, and for organizations licensed as lead abatement firms. The class is taught by Southface, an EPA-accredited RRP training provider.

High Performance Building – Design: The full-day High Performance Building: Design workshop focuses on strategies for new building design and major energy upgrades to existing facilities, including an overview of the major market drivers for energy efficiency such as Leadership in Energy and Environmental Design (LEED), ENERGY STAR, the 2030 Climate Challenge and the ASHRAE Energy Design Guides. The following Continuing Education Units (CEUs) are available for this training: AIA, GBCI, CSI, ICC and the Alabama State Board of HVAC Contractors.

High Performance Building - Commissioning, Operations & Maintenance: Learn how to implement simple low-cost/no-cost measures, commissioning and retro-commissioning, and cost-effective energy upgrades to reduce energy and save money. Other topics covered include: base-lining and evaluating energy performance, maintenance strategies, occupant education, and interpreting utility data. The High Performance Building: Commissioning, Operations & Maintenance Workshop is designed to work in conjunction with the High Performance Building: Design Workshop. Both workshops are full-day trainings and are offered together on successive days. The following Continuing Education Units (CEUs) are available for this training: AIA, GBCI, CSI, ICC and the Alabama State Board of HVAC Contractors.

Residential Energy Code: The Residential Energy Code Workshop consists of a three-hour, in-class training and a three-hour in-field training, including a diagnostic testing demonstration. Attendees will learn basic building science and how it informs the requirements of the IECC; the basic structure of the 2006 IECC; terminology; which buildings are required to comply with the

code; compliance pathways builders can use to meet the requirements in the 2006 IECC; mandatory requirements of the energy code; and major changes in the 2009 IECC. The following Continuing Education Units (CEUs) are available for this training: AIA, GBCI, BPI, CSI, ICC and the Alabama State Board of HVAC Contractors.

Commercial Energy Code: Reduce operating costs, add value to construction projects, and improve the environment by constructing energy efficient buildings. Learn how to implement ASHRAE 90.1-2007, the most current ASHRAE standard and the minimum energy standard accepted by the USGBC's Leadership in Energy and Environmental Design (LEED) green building certification program. The following Continuing Education Units (CEUs) are available for this training: AIA, GBCI, CSI, ICC and the Alabama State Board of HVAC Contractors.

Company Name: University of Alabama in Huntsville
Website: http://uahcmer.com/atn/lean-training-implementation/lean-enterprise-certificate-series/

Program (s) Available

Lean Enterprise Certificate Series: Lean Enterprise is a systematic approach to creating a culture of empowering employees at all levels to identify and eliminate waste using continuous improvement techniques. Benefits to participants: Introduce and implement lean concepts to your plant; Gain the knowledge to identify and eliminate waste; Participate in hands-on simulations to maximize your understanding of lean concepts; and Participants will receive a certificate of completion.

Company Name: University of South Alabama
Website: www.sothalabama.edu

Program (s) Available:

Hazardous Materials Technician Training: This course is designed for technicians who must take aggressive actions to stop a spill or leak. This 40-hour course includes the following areas: Hazmat Management System, Health and Safety, Hazwoper Response Levels, Toxicology, Personal Protective Equipment, Respiratory Protection, Chemical Protection, Site Management and Control, Identifying the Problem, Hazard and Risk Assessment, Monitoring, Information Management/Resource Coordination, Implementing Response Objectives, DOT Hazard Classes, Decontamination, Incident Command System and NIMS, and Terminating the Incident.

Company Name: US EPA
Website: www.energystar.gov

Program (s) Available:

ENERGY STAR Training: ENERGY STAR offers free online training to help you improve the energy performance of your organization. No travel, no lost time out of the office, and no cost — EPA makes it easy to get the information you need today. Join your colleagues to better understand how EPA can help you lower operating costs, improve your energy management program, and expand your professional development.

Company Name: USGBC of Alabama
Website: http://www.usgbcofal.org/

Program (s) Available:

Lunch-N-Learn: Monthly events held in five regions of the state that give insight on various sustainability topics, such as: Water Efficient Fixtures & Green Plumbing Practices, Energy Efficient Glazings, Chemical- free Water Treatments, LED lighting options in Green Building Projects, And Permeable Interlocking Concrete Pavers.

Green Research in Alabama

Green Research in Alabama

Research is continuously being conducted throughout the state of Alabama to promote and enhance sustainability. Below are some of the various programs conducted in Alabama, listed by focus.

Research Focus: Air
Project: Spatial Variability and Functioning using Sky Arrow Research Description: Performed in conjunction with The Bondville Intensive for developing and validating scaling combined carbon/water fluxes from the leaf-scale to regional-scale in the maize/soy agroecosystem. Website: www.ei.ua.edu/research/
Project: Cost Effective Approaches to Reducing Greenhouse Gas Emissions through Energy Efficiency, Clean Energy, and Corp Greenhouse Gas Management **Website:** www.ei.ua.edu/research/
Project: Atmospheric Monitoring Component of Gulf Coast Carbon Capture/Sequestration Project **Website:** www.ei.ua.edu/research/
Project: Mast Cell Mediated Cardiac Effects of Particulate Matter Research Description: The overall objective of this project is to elucidate the mechanisms responsible for the relationship between particulate matter (PM) exposure and untoward cardiovascular events. Towards this end the following the overall hypothesis will be tested: the greater incidence of adverse cardiovascular events associated with increased exposure to PM involves cardiac mast cell degranulation which in turn causes extracellular matrix degradation, ventricular dilatation and reduced cardiac function. **Website:** http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7158
Project: Interaction of Ecosystems, Fires, Air Quality and Climate Change in the Southeast **Research Description:** The objectives of this research are: (1) integrate process-based ecosystem, fire emissions, air quality, and regional climate models to systematically understand the complex interaction of these components in the Southeast in a climate change setting; (2) evaluate the integrated modeling system with state fire statistics, ground and satellite observations for the present and understand better the effects of fire emissions on air quality in the Southeast; (3) propagate and calculate the sensitivities of the modeling system to major inputs, and to use those sensitivities to quantify uncertainties in the system results; and (4) assess the impact of regional climate and land use changes and fire management on ecosystems and fire emissions and the consequent effects on air quality in the Southeast. Further, assess the impact of changing aerosol concentrations as a result of fire emissions and other sources on regional climate. **Website:** http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7507
Project: A Numerical Study of the Effects of Large Eddies on Trace Gas Measurements and Photochemistry in the Convective Boundary Layer Research Description: It is the purpose of this investigation to examine turbulent chemical interaction in the convective boundary specifically related to isoprene/NO ozone chemistry. First, the large scale coherent eddies in the convective boundary layer can lead to chemical structures due to incomplete averaging of the turbulent medium. This can adversely affect interpretation of observations and can potentially lead to misunderstanding of the chemical pathways. This project will attempt to use coupled Large Eddy Simulation (LES) /chemical models to define appropriate averages and in the absence of complete averaging ascribe error bars to the concentration measurements. Second, it is hypothesized that the fast chemistry associated with soprene/NO interaction coupled with the large coherent eddies in the deep convective boundary layer can produce different ozone levels if average concentration are used versus explicit treatment of the corresponding concentration fluctuations associated with the large eddies. **Website:** http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/707
Project: Exploration of uncertainty in the simulation of power plant plume chemistry Research Description: The objectives of this research include all of the following. (A) Performance evaluation and process analysis of three leading chemical mechanisms (RADM2, CB-IV, SAPRC), and, investigation of the role of mixing, biogenic emissions and dry deposition, in the simulation of rural PPP chemistry ; (B) Integrated

assessment of the research results, aimed at recommendation of improvements in the simulation of PPP chemistry in operational air quality simulation models (OAQMs).
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/954/report/0

Project: Southeast Regional Carbon Sequestration Partnership
Research Description: SECARB will accomplish its research objectives by defining similarities in the 11 state region (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia); characterizing the region relative to sources, sinks, transport, sequestration options, and existing and future infrastructure requirements; identifying and addressing issues for technology deployment; developing public involvement and education mechanisms; identifying the most promising capture, sequestration, and transport options; and developing action plans for implementation and technology validation. SECARB has identified three target areas for geologic sequestration projects that involve CO2 storage in saline formations, oil and natural gas reservoirs, and deep unmineable coal seams.
Website: http://www.secarbon.org/secarbprogrambackground.html

Research Focus: Biomass

Project: Allocation of Biomass Derived Products for Optimal Economic and Environmental Performance
Research Description: The research project involves developing a framework to help decision makers in determining the optimal processing routes in the field of biorefining, which is the conversion of various forms of biomass into high-value final products. The vast range of possible products from biorefining results in a high level of complexity and a need for a systematic approach to formulate a production strategy needed to maximize value while minimizing environmental impact. The framework will determine the products and amounts needed to attain optimal economic performance as well as level of environmental impact for profitable production routes using the EPA WAR algorithm. The objective of this work is to develop a flexible decision making framework for the allocation of biomass into value-added products through the use of a holistic problem solving approach.
Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8233

Focus: Climate

Project: Collaborative Research: Predicting Effects of Climate Warming on Stream Ecosystems Using Metabolic Theory and Iceland's Unique Geothermal Environment
Research Description: This study will take advantage of a unique geothermally-active watershed in Iceland that contains a steep gradient of stream temperatures and very little difference in solute chemistry. Using a landscape gradient study of temperature-acclimated streams, streamside manipulations, and an ecosystem-scale experiment, this study will quantify the effects of warming on critical ecosystem processes (ecosystem metabolism and nutrient cycling) and the flow of energy and elements through stream food webs.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0949774

Research Focus: Conservation

Project: Restoring and Managing Longleaf Pine Ecosystems
Research Description: Longleaf pine ecosystems once dominated up to 90 million acres in the southeastern United States. The 3 million acres of remaining longleaf pine ecosystems are refuges for hundreds of threatened and endangered plants and animals. Restoring longleaf pine ecosystems across its range is critical for the long-term survival of these threatened and endangered species. The objective of this study is to provide knowledge and strategies for restoring, managing, and sustaining longleaf pine ecosystems in the southeastern United States.
Website: http://www.srs.fs.usda.gov/science/documents/Final%20Threats%20Charter.pdf

Project: Conservation of a Florida Carnivorous Plant: Godfrey's Butterwort, Pinguicula ionantha
Research Description: The objective of this research project is to study Pinguicula ionantha R.K. Godfrey (Lentibulariaceae), a recently described species endemic to a 25-mile radius area in the panhandle of Florida with the goal of its conservation. P. ionantha primarily occupies the transition zone between flatwood and cypress stringer habitats. Although there have been limited studies on some aspects of P. ionantha biology, no demographic information is available. Because of its shrinking population size, P. ionantha was listed as threatened by the U.S. Fish and Wildlife Service on July 12, 1993, and is currently listed as Florida State endangered. Without population demographic information and knowledge of the effects of prescribed fire on P. ionantha, the long-term viability of this threatened plant cannot be ensured.
Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7412

Project: Restoring and Managing Longleaf Pine Ecosystems
Research Description: Longleaf pine ecosystems once dominated up to 90 million acres in the southeastern

United States. The 3 million acres of remaining longleaf pine ecosystems are refuges for hundreds of threatened and endangered plants and animals. Restoring longleaf pine ecosystems across its range is critical for the long-term survival of these threatened and endangered species. The objective of this study is to provide knowledge and strategies for restoring, managing, and sustaining longleaf pine ecosystems in the southeastern United States.

Website: http://www.srs.fs.usda.gov/science/documents/Final%20Threats%20Charter.pdf

Research Focus: Ecology

Project: Bridging Science With Management: Optimizing Habitat Quality for Black Bears on a Landscape Level by Manipulating Spatio-Temporal Parameters of Clearcuts

Research Description: The objectives of this research project are to: (1) improve our understanding of how clearcuts affect habitat quality for black bears (Ursus americanus) in the Southern Appalachians; and (2) use this information to develop optimization models that can be used to design landscapes that maximize habitat quality for black bears by manipulating when and where future clearcuts are implemented.

Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/6851

Research Focus: Environment

Project: The Fate, Transport, and Microbial Effects of Veterinary Antimicrobials in the Environment

Research Description: The main purpose of this research is to advance the current state of knowledge on veterinary antimicrobial fate and transport processes in soils. The specific questions that will be answered through research are: Question 1: What is the mobility and fate of selected individual antimicrobials in selected aquaculture soils from Alabama? Question 2: How does one antimicrobial affect the fate and transport of another antimicrobial? Question 3: What is the effect of individual antimicrobials and antimicrobial mixtures on the structure of microbial communities in selected soils?

Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8228

Research Focus: Ecosystem Protection

Project: Effects of Nutrient Enrichment and Large Predator Removal on Seagrass Nursery Habitats: An Experimental Assessment

Research Description: Nutrient enrichment and overfishing are two of the most common man-induced perturbations of coastal systems. Eutrophication can produce many undesirable effects in coastal systems. Among them is a decline in submerged aquatic vegetation (SAV) through increased light attenuation and algal overgrowth of SAV leaves, which may outstrip the ability of their grazers to control them. Alternatively, reductions in the abundance and composition of predator populations can also produce profound effects in aquatic systems. A review of predator/prey interactions in SAV systems leads us to hypothesize that losses of top predators could also lead to the disappearance of SAV. Mechanistically, researchers expect that removing top predators would result in the following sequence of events: 1) increased small fish densities, with a subsequent decrease in their prey (i.e. epibenthic grazers such as amphipods and snails); 2) increased fouling on SAV after decreases in grazer populations; and 3) loss of macrophytes due to overgrowth by algal epiphytes. Therefore, the predicted effects of eliminating top consumers are identical to those of eutrophication: namely, a shift from a system dominated by rooted macrophytes to a plankton-dominated system. This "top down" alternative to the "bottom up" nutrient enrichment hypothesis could account for reductions in SAV biomass in heavily fished areas, but to date remains untested.

Website: http://cfpub1.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/896

Research Focus: Energy

Project: American Energy Security Study

Research Description: The American Energy Security Study presents a comprehensive plan for United States energy security through the production of ultra-clean liquid transportation fuels from domestic resources, and sets an aggressive timeline for achieving energy independence by 2030.

Project: Collaborative Research: SHINE--Observations and Modeling of Energetic Particles Associated with Corotating Interaction Regions During Solar Cycles 23 and 24

Research Description: This collaborative research team will investigate the evolution of energy spectra, time-intensity profiles, and charged particle flows along and across the interplanetary magnetic field in co-rotating interaction regions (CIRs) observed during solar cycles 22 and 23. They will use measurements of energetic particles, magnetic fields, and solar wind plasma obtained by the ACE, Wind, and STEREO spacecraft to study these CIR events. This team will also develop a new theoretical model, based on their existing 'Particle Acceleration and Transport in the Heliosphere' (PATH) numerical code, in order to study the time-dependent

acceleration and transport of particles associated with CIRs, as well as to probe the 3D structure of CIRs and the evolution of magnetic connections between an observer at Earth and remote CIR locations beyond Earth orbit.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0962658

Project: Collaborative Research: Investigating and Improving the Production of Butanol by C. Pasteurianum for the Value-Added Conversion of Biodiesel-Derived Crude Glycerol
Research Description: The goal of this research is to quantify metabolism and tolerance in Clostridium pasteurianum and to engineer this bacterium to improve the value-added conversion of biodiesel-derived crude glycerol using anaerobic fermentation. This project will focus on fundamental research to understand and improve the metabolic pathways that control glycerol utilization and substrate formation from both extracellular and intracellular approaches. The proposed research has three objectives. The first objective is to elucidate the cellular response of C. pasteurianum to both substrate and product toxicity. The second objective is to evaluate cell membrane structure and stability in response to increasing concentrations of substrate impurities and butanol. And the third objective is to metabolically engineer C. pasteurianum to increase butanol production.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0966846

Research Focus: Environmental Protection

Project: Improved Space-Time Capabilities for the Visualization and Analysis of Multisource Disparate Data
Research Description: This project will improve the capabilities for spatial and temporal integration of disparate (e.g., cross-media, multiscale, multisource) data within visualization and analysis tools and will provide a framework to merge and extend GIS and visualization capabilities. It will also investigate data structures for adaptive gridding, and provide a framework to build improved capabilities for dynamic exploration of large, distributed data archives. These capabilities will be tested through two specific applications: visualization and analysis of multisource data from the SOS Nashville Field Measurement Study, and visualization and validation of the multiple resolution output from the Plume-in-Grid emission/dispersion model. Delivered results will include interoperable software components for improved integration of disparate data within standalone and distributed Problem-Solving Environments, as well as specific tools to meet the needs of the two testbed projects.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/713

Research Focus: Green Construction

Project: Collaborative Research: Geopolymeric Nanocomposite, A Next Generation Material For Infrastructure Sustainability
Research Description: The major objective of this study is to develop an inexpensive, ecologically sound, high-performance, cementlike construction material, geopolymeric hybrid composite through nanoengineering the fly ash particles. This new material consists of fly ash based geopolymer matrix and carbon nanotubes (CNTs). This research will be conducted through the close collaboration between two major research universities in Alabama, the University of Alabama and Auburn University. Auburn University will focus on the development of microwave irradiation method. The University of Alabama will manufacture and characterize the proposed new materials.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1000491

Research Focus: Hazardous Waste

Project: Soil Sampling in South Alabama Oil Fields
Research Description: The objective of this research is to test contaminated soils from Alabama oil fields to find good candidate sites for clean-up by the method of agglomeration-flotation. Samples from contaminated sites will be cleaned in the laboratory to determine the effects of soil type, oil type and weathering on the effectiveness of the agglomeration-flotation.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5922

Project: New Insoluble supports for Protein Immobilization for Use in Metalloprotein Affinity Metal Chromatography
Research Description: The purpose of this research is to identify alternative procedures for activating hydrophobic polymers such that 1) proteins (most notably transferrin) can be covalently attached in high yield without appreciably affecting the metal binding properties of the biomolecule. 2) The polymer does not possess metal-binding capacity, and 3) The expenses of producing the activated support is minimized. The synthesis, evaluation and optimization of these materials should lead to the development of new Metalloprotein Affinity Metal Chromatography (NAMC) media that can be used in practical scale remediation applications for the recovery and/or removal of metals from contaminated water.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5940

Project: Soil Remediation with Ultra-High-Efficiency Hydrocyclones

Research Description: The objective of this project is to produce a clarified water stream with no soil particles larger than 5 microns using a hydrocyclone. This is so that the stream can be recycled in the agglomeration-flotation soil remediation process. Also, a concentrated stream with 50 wt % soil needs to be produced so that the remediated soil can be returned to the ground.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5923

Project: Subsurface Contamination Site characterization Via a Computer-Aided Visual Tool (continuation of previous project)
Research Description: In response to increasing costs of groundwater remediation and more stringent environmental regulations regarding groundwater pollution, we propose to investigate another way of reducing the remediation costs under existing remediation technologies through better characterization of contamination sites. The main objective is to develop a computer-aided visual tool for effectively characterizing groundwater remediation sites by estimating important unknown parameters such as hydraulic conductivity and hydrodynamic dispersivity.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5913

Project: New Insoluble supports for Protein Immobilization for Use in Metalloprotein Affinity Metal Chromatography
Research Description: The goal of the first year of the project was to identify the best matrix and protein immobilization chemistry for use in metalloprotein affinity metal chromatography (MAMC). In year two, a micro-pilot plant consisting of a column of the metalloprotein transferrin immobilization to the best matrix identified in year one was to be constructed and evaluated during six months of continuous operation of selectively removing an actinide from dilute aqueous solution.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5915

Project: Waste Minimization in the Magnetic Tape Industry: Waterborne Coating Formulations for Magnetic Tape Manufacture
Research Description: This project has been supported by the Gulf Coast Hazardous Substance Research Center for over 2 years. Most objectives for developing a waterborne coating process for video tape (with Co-modified, g-Fe203 pigment) have been met: a formulation was identified and optimized; laboratory samples with good physical and magnetic properties were made; the technology was demonstrated at an industrial pilot plant; an economic evaluation showed potential for cost savings; an environmental evaluation confirmed; a virtually complete elimination of pollution; and the technology has been transferred through industrial sponsor's meetings, professional society meetings, and publications in journals. The Environmental Protection Agency is now funding research for a 3-year, multi-investigator project to expand pollution prevention research for magnetic tape manufacture. A specific tape product (Graham Magnetic's Reel-to-Reel line) will be developed and demonstrated at Graham's pilot plant. New barium ferrite pigments will be used in a waterborne formulation. Solventless, electron beam, or UV cured formulations will also be investigated.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/1163

Project: Soil Remediation by Agglomeration with Petroleum Coke
Research Description: This project proposes to use petroleum coke to remediate soil heavily contaminated with crude oil or other high molecular weight hydrocarbons. This project will treat oily soil with finely divided petroleum coke. The bridging liquid (oil) will be supplied by the contaminated soil. The agglomerated fine coke and contaminant oil will be floated and removed leaving an oil-free soil.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/1162

Project: Recovery of Dilute Phosphoric Acid in Waste Streams Using Waste Gas Ammonia: The Regenerative MAP/DAP Process
Research Description: This research addresses the following areas: using dilute phosphoric acid solutions typical of those making up the majority of toxic releases, involving removal of toxic metal contaminants from waste phosphoric acid streams using membrane separation techniques, involving separation of MAP/DAP from the dilute product stream using the technique of atomized spray drying, improving MAP/DAP crystal properties, and showing the commercial viability of this process in the Gulf Coast States with particular focus in Alabama.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/1161

Project: Surfactant Enhanced Photo-oxidation of Wastewaters
Research Description: In preliminary experiments, low concentrations of non-ionic surfactants (Brij-35) were found to result in an increase in decomposition of pinacyanol chloride. It is planned to study a set of hydrophobic aromatic pollutants consisting of benzene, chlorobenzene, phenol, anthracene, 2-chlorophenol,

pentachlorophenol, benzoic acid, pyridine, Indigo Blue, and Erichrome Red in the presence of different surfactants to determine which pollutants are solubilized by the surfactant aggregates and for which solubilization results in enhanced photodecomposition. The extent of photodecomposition will be determined by extraction with CH_2C_{12} from the aqueous dispersion followed by analysis by UV-vis, fluorescence and LC as appropriate.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5891

Project: Stationary Power Generation Via Solid Oxide Fuel Cells: A Response to Pollution and Global Warming
Research Description: This proposal addresses an emerging technology that will significantly alter the entire infrastructure of power generation in the United States or even the World, while using underutilized high-energy fuel sources including those derived from waste. The purpose of the proposed research is to improve upon the state-of-the-art technology for non-polluting, solid oxide fuel cells in order to facilitate their commercialization.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5887

Project: Sequestration of Subsurface Elemental Mercury (Hg0)
Research Description: The primary goal of this proposal is to develop an improved understanding and predictive capability for the in situ abiotic immobilization of subsurface elemental mercury (Hg0) using sulfide minerals. Specific objectives are to 1) elucidate the fundamental thermodynamic and kinetic parameters that control the partitioning (uptake and release) of Hg to these materials; 2) investigate the behavior of these materials under more complex hydrodynamic (i.e., flow-through) and environmental conditions, including the long-term stability of the products; 3) probe the immobilized Hg with state-of-the-art environmental spectroscopic techniques to determine the mechanism(s) responsible for immobilization; and 4) validate our results with materials from contaminated sites.
Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7446

Project: Investigation of the Entrapment and Surfactant Enhanced Recovery of Nonaqueous Phase Liquids in Heterogeneous Sandy Media
Research Description: The remediation of aquifers by conventional pump-and-treat technologies is often an inefficient and costly undertaking, particularly when nonaqueous phase liquids (NAPLs) are present. The failure of this technique can be attributed, in large part, to the low aqueous solubilities of most NAPLs and their relatively slow rates of mass transfer into the aqueous phase. To overcome such limitations, surfactants have been proposed as a means for enhancing the performance of pump-and-treat systems based on their ability to increase the aqueous solubility of hydrophobic organic compounds via micellar solubilization and to mobilize entrapped NAPLs due to interfacial tension reductions. Although laboratory studies have demonstrated the capacity of surfactants to recover NAPLs from porous media, field studies conducted to date have achieved mixed results. To facilitate more effective transfer of surfactant enhanced aquifer remediation (SEAR) technologies from the laboratory to the field, this research will: (a) investigate the influence of scale and formation heterogeneity on the entrapment and surfactant-enhanced recovery of NAPLs in two-phase aquifer systems, and (b) refine and validate numerical simulators which can be used for the design and prediction of SEAR performance at the field scale. To accomplish these objectives the project has been divided into the following four tasks: (1) measurement of fundamental parameters needed to characterize NAPL solubilization and mobilization; (2) refinement and adaptation of mathematical models to describe SEAR in 2-dimensional domains; (3) assessment of NAPL infiltration and entrapment in 2-dimensional aquifer systems of varying scale and heterogeneity; and (4) evaluation of SEAR for NAPL recovery in heterogeneous 2-dimensional aquifer systems.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/682

Project: Environmental Decay of Pathogens
Research Description: The objective of this research project was to develop input parameters for modeling fate and transport of pathogenic microorganisms to assess the health risk of sewage contamination, especially from separate sewer overflow.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/6436

Research Focus: Land

Project: Alternative Treatment Systems
Website: www.ei.ua.edu/research/

Project: Alabama Mesonet (Hydrometeorological Network)
Research Description: Alabama A&M University (AAMU) operates this network of 11 combination meteorological and soil stations (8 in Alabama) and 10 soil profile only stations (all in Alabama). The combination stations are included within the Department of Agriculture (USDA)/ Natural Resources Conservation Service (NRCS) Soil Climate Analysis Network (SCAN). SCAN provides hourly observations of air temperature, relative

humidity, wind speed, wind direction, solar radiation, precipitation, barometric pressure, snow water content, snow depth, soil temperature, and soil moisture.
Website: http://wx.aamu.edu/ALMNet.php

Project: Response of Forest Herpetofaunal Communities to Thinning and Prescribed Burning in Mixed Pine-Hardwood Forests in the William B. Bankhead National Forest, Alabama
Research Description: This project examines forest management practices (prescribed burning and tree thinning) upon forest herpetofaunal communities. Results from this study will allow forest managers to address factors that affect herpetofauna in combination with forest health goals. Experimental design for this project will consist of a two-way factorial randomized complete block design consisting of six forest treatments replicated four times across the landscape. Forest treatments will include three thinning levels (no thin, 11 m2ha-1 residual basal area, and 17 m2ha-1 residual basal area) and two burn treatments (no burn, burn). Drift fences with funnel and pitfall traps, coverboards, and artificial pools will be used to monitor herpetofauna at each treatment plot. Habitat characteristics will be determined at each treatment plot using line-transect surveys. Air and soil temperature will be monitored with HOBO© dataloggers, while soil moisture will be monitored with a digital soil probe during sampling periods.
Website: http://cfpub1.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7586

Project: Relationships Between Herpetofaunal Community Structure and Varying Levels of Overstory Tree Retention in Northern Alabama
Research Description: The objective of this research project is to examine the relationship between silvicultural techniques, particularly shelterwood cuts with varying levels of basal area retention, and the community structure of amphibians and reptiles in the Cumberland Plateau of northern Alabama. This research project will provide both a theoretical framework furthering our understanding of factors affecting the distribution and abundance of these organisms, and applicable data that may be used to assist forest managers in sustaining these communities.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/6684

Project: Breeding Ecology Response of Songbirds to Forest Disturbance
Research Description: This research is based on the theory that forest disturbances such as prescribed burning and canopy thinning mimic natural habitat disturbances and will alter resource abundance and availability. Research techniques will include breeding bird surveys, territory mapping, radio tracking, nest monitoring, arthropod sampling, and habitat surveys. Two Neotropical migratory species, the hooded warbler (Wilsonia citrina) and the worm-eating warbler (Helmitheros vermivorus), will be used as focal species. Experimental design consists of a before-and-after control-impact (BACI) randomized complete block design with two factors – three thinning levels (no thin, 11 m2 ha-1 residual basal area (BA), and 17 m2 ha-1 residual BA) and two burn treatments (no burn and burn). Each treatment will be replicated three times. The experiment will be conducted at the Bankhead National Forest in northwestern Alabama. It is my hope that the results of this research will aid forest resource managers in understanding how forest disturbance affects bird populations.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8146

Project: Mapping Cogongrass on Alabama Rights-of-way
Research Description: Two studies examined an integrated approach to cogongrass control on right-of-ways with herbicides and the planting of aggressive replacement species. There studies were the Loxley amd Malbis experiments.
Website: http://www.cogongrass.org/aldotreport.pdf

Research Focus: Multidisciplinary

Project: Modeling Metals in Desulphurization Scrubber Blowdown (Johnson, Southern Company)
Website: www.ei.ua.edu/research/

Project: Task 1 Instrument Aircraft Upgrade and Scaling Improvements for Water/CO2 Flux in Bondville (Bondville-Bottom Up Intensive Study)
Research Description: The Bondville Intensive has focused on developing and validating scaling the combined carbon/water fluxes from the leaf-scale to regional-scale in the maize/soy agro-ecosystem. Flux aircraft, remote sensing aircraft, several satellite image packages, and many on the ground measurements are coordinated during the growing season. Scaling methodologies from tower to aircraft have been developed. Up-scaling with models (ALEXI) is being performed. Heat flux modeling, validating with aircraft and towers, is being performed. Remote sensing products and techniques for modeling canopy structure leaf-level gas exchange are being developed and validated.

Website: www.ei.ua.edu/research/

Project: Development of Techniques for Assimilating GOES Satellite Data into Regional-Scale Photochemical Models

Research Description: The purpose of this proposal is to improve the fidelity of the physical atmosphere in photochemical modeling systems, specifically Models-3. This is accomplished by enlisting methods of satellite remote sensing to reduce the uncertainty in the cloud and soil-moisture information which meteorological models pass to their photochemical counterparts. The factors forming the basis for the proposal include the following. Among the largest sources of uncertainty in regional photochemical modeling is the specification of clouds and soil moisture. Clouds dominate the availability of actinic flux, control the distribution of surface insolation, and govern the variations in surface temperatures. Soil-moisture availability feeds back to significantly affect the partitioning of sensible and latent heat flux, which also influences the magnitude of surface temperatures. Surface temperatures, in turn, affect the variations in biogenic emission rates, soil-moisture availability, and regional mixing heights. Meteorological models predict clouds but only in a highly parameterized manner, causing model estimates of spatial distributions and radiative characteristics to be subject to considerable error. In recent years progress has been made in controlling model error through assimilation of wind and temperature observations, but corresponding progress has been lacking in assimilating cloud and soil-moisture data.

Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/391

Project: Assessment of Meteorological, Seasonal, and Land Management Influences on Spatial Represenativeness and Ecosystem-Level Scaling of CO2 Fluxes Using UA Sky Arrow ERA Aircraft (Assessment of Spatial CO2 Flux in the Midwest using a Flux Aircraft)

Research Description: The University of Alabama and NOAA are using UA's Sky Arrow Flux aircraft to perform evaluations of spatial flux in Midwestern landuses (maize, soy, and forests). Two sites are currently being investigated: Bondville (Champaign, IL: maize/Soy) and Columbia, MO (mixed hardwoods and Agriculture). In particular, fluxes and associated footprints are measured during the growing season. A new methodology for calculating fluxes by land-use (in addition to traditional averaging length methods) has been developing and is being evaluated under a variety of conditions and constraints. This flux fragment method (FFM) is being used to investigate fluxes in highly heterogeneous landscapes with individual land use characteristic lengths being on the order of 0.3km. The aircraft is being operated in full collaboration with local Ameriflux tower PIs.

Website: www.ei.ua.edu/research/

Project: GK-12 Sustainable Energy Systems

Research Description: The two main goals of the project are to increase the professional caliber of STEM (Science, Technology, Engineering, and Mathematics) graduates from the University and to provide resources for the State of Alabama High School Engineering Academies.

Website: www.ei.ua.edu/research/

Project: Airborne Measurement of Land-Surface Energy, Water, and Carbon Fluxes over Heterogeneous Systems

Research Description: The goal of this project is for UA Scientists and USDA's Agricultural Research Service to coordinate and execute a series of airborne flux measurement campaigns. The approach is to use the resulting large-scale flux datasets to contrain/validate ALEXI model estimates and improve embedding algorithms.

Website: www.ei.ua.edu/research/

Project: Biofiltration Media Evaluation

Research Description: Treatment efficiency of bioretention for a wide variety of pollutants found in urban stormwater runoff.

Website: www.ei.ua.edu/research/

Project: Environmental Contamination Sensor Development & Evaluations Associated with Natural Disasters

Research Description: Center for Optical Sensors and Spectroscopies (COSS)

Website: www.ei.ua.edu/research/

Project: MSP START in Nanotechnology, Biotechnology, and Sensor Technology

Research Description: The Mathematics and Science Partnership (MSP) program is intended to increase the academic achievement of students in mathematics and science by enhancing the content knowledge and teaching skills of classroom teachers. Nanotechnology is the engineering of functional systems at the molecular scale.

Website: www.ei.ua.edu/research/

Project: Supplemental Funding for Optical Sensors and Spectroscopies Development

Research Description: Program promotes the optical sensing and spectroscopy research on environmental, biomedical, and national security issues through collaborative use of resources and expertise among the member universities, government and industrial laboratories, and improve sensor techniques using recently developed revolutionary laser and spectroscopic technologies.
Website: www.ei.ua.edu/research/

Project: National Demonstration of Advanced Drainage Concepts Using Green Solutions for CSO Control
Research Description: Kansas City demonstration project on the use of "green infrastructure" to minimize combined sewer overflows using a variety of integrated practices and modeling approaches.
Website: www.ei.ua.edu/research/

Project: Alabama RII Nanotechnology Partnership Program
Research Description: The RII program promises to advance technology important to national security and provide research and education experiences for a diverse group of students, postdoctoral scholars, high school teachers and institutions in the state. Nanotechnology is the engineering of functional molecular scale systems.
Website: www.ei.ua.edu/research/

Project: City of Tuscaloosa BioGas Feasibility Study
Research Description: This study analyses the feasibility and potential production of biogas and considers the risk on its inputs.
Website: www.ei.ua.edu/research/

Project: Collaborative Research: Experimental Studies to Reveal Boundary Layer Control Shark Skin
Research Description: Discovering background information and using hypothesized shark scale information to theorize scale utilized mechanisms in reducing the likelihood of bondary layer separation.
Website: www.ei.ua.edu/research/

Project: Educational Workshops in Collaboration with Green Composites: RII/Enhancing Alabama Research Capacity in Nano Bio
Website: www.ei.ua.edu/research/

Project: Research Experience for Undergraduates and High School Students in NanoGeoPolymers
Research Description: Research Experience for Undergraduates (REU) is sponsored by the National Science Foundation and the University of Alabama and the American Recovery & Reinvestment Act of 2009.
Website: www.ei.ua.edu/research/

Project: Center for Hurricane Intensity and Landfall Investigation
Research Description: The goal of the Center for Hurricane Intensity and Landfall Investigation (CHILI) is to advance understanding of the physical processes involved in hurricane landfall and to assist National Oceanic and Atmospheric Administration (NOAA) in improving hurricane landfall forecasting. In order to achieve these goals, the center utilizes elaborate data collection facilities as well as a state-of-the-art high performance compute cluster (HPCC). In close collaboration with NOAA´s Environmental Modeling Center (EMC), CHILI will use its collected data to validate and test the Nation´s operational hurricane model, the H-WRF, to be run on the HPCC. Data is collected via a mesonet of stationary weather stations, as well as intricate sensors observing ocean currents and waves from the bottom of the ocean. These Acoustic Wave and Current Sensors (AWACs) are deployed in the Gulf of Mexico south of Mobile Bay at the beginning of each hurricane season and retrieved when the season ends in collaboration with NOAA´s Atlantic Oceanographic and Meteorological Laboratory (AOML). Mesonet sites are selected in a joint effort with the Mobile Weather Forecast Office (WFO) of the National Weather Service (NWS).
Website: http://chiliweb.southalabama.edu/

Project: Synthesis and Application of a New Class of Stabilized Nanoscale Iron Particles for Rapid Destruction of Chlorinated Hydrocarbons in Soil and Groundwater
Research Description: The overall goal of this research is to develop a cost-effective, in-situ remediation technology that employs a new class of highly dispersive iron-based nanoparticles for the rapid destruction of chlorinated hydrocarbons in soil and groundwater. The specific objectives are to: 1) synthesize a new class of stabilized iron-based nanoparticles using low-cost and "green" stabilizers such as starches and celluloses; 2) test the effectiveness of the stabilized nanoparticles for dechlorination of select contaminants (TCE and PCBs) in soil and groundwater; and 3) test the feasibility of an in-situ remediation process that is based on the nanoparticles.
Website: http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7549

Project: Sensors and Sensor Networks for Biological and Environmental Applications (Scott)
Research Description: This research activity seeks to advance fundamental knowledge in new technologies for

sensors and sensor networks, and in the use of sensor data in control and decision-making for biological and environmental purposes.
Website: www.ei.ua.edu/research/

Project: A Novel Ion Exchange Process for Selective Removal of As(V) and Enhanced Stability of Process Residuals
Research Description: This research addresses the urgent technology need for cost-effective arsenic (As) removal in small drinking water systems and for minimizing the environmental impacts of process waste residuals. The overall objective of this project is to develop an innovative, selective ion exchange (IX) process that: 1) removes As(V) more cost-effectively than current IX processes; and 2) minimizes the volume and As-leachability of process waste residuals. The specific research goals are: (1) to prepare and characterize a new class of IX materials, referred to as polymeric ligand exchangers (PLEs), for highly selective removal of As(V); and (2) to develop an engineered approach to reuse the spent regenerant and to minimize the volume and As-leachability of process waste residuals.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/6282

Research Focus: Pollution

Project: Gulf Oil Spill: Impact of Oil and Methane on Microbes
Research Description: The purpose of this research is to examine the impacts of the Deepwater Horizon oil spill on microbes in the waters and sediments near the BP spill site. This research is essential to assessing how massive amounts of oil will affect the health of the Gulf of Mexico in both the short- and long-term.
Website: http://earthsky.org/water/mandy-joye-on-the-gulf-oil-spill-one-year-later

Project: RAPID: Accelerating biodegradation of hydrocarbons from the Deepwater Horizon Oil Spill in the Gulf of Mexico with Naturally Occurring Marine Substrates
Research Description: The primary goal of this proposal is to determine means of enhancing rates of biodegradation of the hydrocarbons in the coastal zone of the Northern Gulf of Mexico resulting from the catastrophic Deepwater Horizon oil spill. The scope and impact of this ongoing oil spill disaster are of unprecedented scale and information on key environmental data is critically needed as quickly as possible. The objectives of this research include (1) identify sources of endogenous organic matter in the affected areas that accelerate biodegradation rates, (2) identify the composition and genomic potential of the indigenous microbial consortium to promote polycyclic aromatic hydrocarbons (PAH) degradation and to undergo horizontal gene transfer off PAH genes, and (3) examine changes in rate processes and composition of the microbial consortium as the oil is weathered over the course of a year.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1042743

Project: RAPID: Resolving higher trophic-level change within the northern Gulf of Mexico ecosystem as a consequence of the Deepwater Horizon oil spill
Research Description: This project will focus on characterizing ecosystem-level changes to the pelagic system of the northern Gulf of Mexico. This effort will specifically contribute a temporal component to a separately funded spatial component. The group will employ a trophic assessment using both gut contents and Carbon/Nitrogen stable isotope ratios of pelagic filter-feeding invertebrates (jellyfish) and vertebrates (planktivorous fish). These will be compared to SI and gut content information collected over the previous two years in the spill-impacted area east and west of the Mississippi River.
Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1043413

Research Focus: Pollution Prevention

Project: Solvent-less, Electron Beam-Cured Vinyl Ether Coating Formulations for Flexible Magnetic Media Manufacture
Research Description: The objective of the research program was to provide new tape and floppy disk manufacturing processes that prevent air pollution. The approach was to replace the organic solvents used in the coating process with a mixture of liquid vinyl ether monomers. The monomers served as the solvent to disperse the magnetic pigments and dissolved any other ingredients, rendering fluidity and coatability to the formulation. Upon electron beam irradiation, the monomers went into a cationic polymerization to give a solid binder with the requisite mechanical properties.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/357

Project: Investigation of Room Temperature Ionic Liquids as Environmentally Benign Solvents for Industrial Separations (TSE99-A)
Research Description: The work in this research will generate new data leading to the development of a

fundamental scientific-engineering knowledge base in RTIL properties (with particular emphasis on their use in separations), a prerequisite to the development of pollution prevention technologies using RTIL. The major long range goal of this project was to understand the physical, chemical, and solvating properties of RTIL from the perspective of enabling the successful replacement of conventional solvent methodologies based on VOCs.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/782

Project: Pretreatment of Agricultural Residues Using Aqueous Ammonia for Fractionation and High Yield Saccharification
Research Description: The objective of this project is to develop a pretreatment process suitable for enzymatic conversion of agricultural residues into fermentable sugars. The proposed process uses aqueous ammonia (a non-polluting substance) as the pretreatment. Use of ammonia offers significant economic and environmental merits since it is easily recycled and leaves no residual effect on the environment. The proposed pretreatment is a part of the integral biomass-to-fuels process that does not generate net CO_2 (a green energy process). It is a pretreatment method of our own invention. When it is incorporated into the current biomass saccharification processes, it can accomplish a near complete fractionation of biomass into the three major constituents (pentosans, cellulose, and lignin).
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/7088

Project: Place-Based Green Building: Integrating Local Environmental and Planning Analysis into Green Building Guidelines
Research Description: This project will develop a model for place-based green building guidelines based on an analysis of local environmental, social, and land use conditions. The ultimate goal of this project is to develop a methodology and model for placing green buildings within their local context that can be transferred to other communities throughout the world. It will provide the basis for making objective decisions about where financial investments in green buildings will have the most environmental impact.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8605

Project: A Bio-Diesel Baja Vehicle and Student Competition
Research Description: The SAE Mini Baja® competition is an extremely popular design competition for students in engineering programs around the world. The competition focuses on the design of an off-road vehicle for performance and cost-of-production. The objective of the proposed effort is to convert a vehicle created for the SAE Mini Baja® competition to a bio-diesel vehicle. Through the conversion, the rules for a new competition will be created, resembling the SAE Mini Baja®, but focusing on vehicle performance and the production bio-derived diesel fuels, employing the carbon cycle to produce sustainable automotive propulsion.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8094

Research Focus: Sustainable Environment

Project: Membrane-Based Nanostructured Metals for Reductive Degradation of Hazardous Organics at Room Temperature
Research Description: The overall objective of this proposal is the development and fundamental understanding of reductive dechlorination of selected classes of hazardous organics by immobilized nanosized metal particles (single and bimetallic systems) in ordered membrane domains. This integrated research will examine nanoparticle synthesis in a membrane domain, the role of metal surface area and surface sites, the potential role of ordered nanometal domains in membranes, membrane partitioning and reaction kinetics with the main emphasis on obtaining highly enhanced dechlorination rates, and selectivity from dilute aqueous solutions. The overall hypothesis to be tested is that nanosized (< 50 nm) zero-valent metal domains can be created in an ordered membrane matrix by the use of novel, polypeptide-based biomolecules with helix-coil forming ability or by di-block copolymers.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/2172

Research Focus: Waste

Project: Subsurface Contamination Site Characterization via a Computer-Aided Visual Tool
Research Description: In response to increasing costs of groundwater remediation and more stringent environmental regulations regarding groundwater pollution, we propose to investigate another way of reducing the remediation costs under existing remediation technologies through better characterization of contamination sites. The main objective is to develop a computer-aided visual tool for effectively characterizing groundwater remediation sites by estimating important unknown parameters such as hydraulic **conductivity and hydrodynamic dispersivity.**
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/5934

Research Focus: Waste Reduction

Project: Polymer-Based Aqueous Biphasic Extraction Technology for Reaction Engineering of the Alkaline Paper Pulping Process

Research Description: The objectives of this project are to utilize environmentally benign polymer-based separations of reaction products during the pulping reactions and thus, reduce the consumption of chemical feedstock and the extent of the reaction to only that required to release and solubilize the lignins from the pulp. Waste of reagents through further hydrolysis and sulfonation of already solubilized lignins would be avoided leading to the production of a lower degree of sulfonation in the lignin byproducts and thereby reducing the scale and energy demands of the recausticizing recycle.

Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/965

Project: Solvent Properties of Ionic Liquids: Enabling the Assessment of Ionic Liquids for Clean, Environmentally Benign Technologies

Research Description: The overall goals of this research are to develop and elaborate the classification of ILs in order to compare and contrast different ILs, to benchmark performance, and to discover new applications and uses of ILs. In addition to the core scientific information to be developed, this program of research will provide an educational aspect that will provide information to train researchers about the scope, potential, and pitfalls of ILs, most importantly that ILs can be utilized as much more than just non-volatile solvents.

Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/6919

Project: Manufacturing IT Center

Research Description: The MITC brings together core competencies in the areas of component based development, enterprise integration, domain engineering, large scale project management, information systems design, intelligent systems, internet, intranet and e-business, data mining, data warehousing, and manufacturing systems. MITC uses research to find out how manufacturing organizations use information technology (computers, networks, information systems, data, algorithms, and decision support) to make their processes more effective?

Website: http://cba.ua.edu/mis/research/mitc

Research Focus: Water

Project: Identification and Treatment of Emerging Contaminants in Wet Weather Flows

Research Description: This research addresses emerging contaminants that traditionally have not been considered contaminants. This knowledge about many chemical and microbial constituents is available through improved analytical techniques and sampling. What remains unknown is the threat that these emerging contaminants pose to human health and the environment. Emerging contaminants are widely varied, and may include pharmaceuticals and endocrine disruptors, where improper disposal or overuse has resulted in measurable levels in the environment.

Website: www.ei.ua.edu/research/

Project: Phase II NPDES Stormwater Technology Transfer

Research Description: Under the Clean Water Act (CWA), point source discharges to "Waters of the United States" require National Pollution Discharge Elimination System (NPDES) permits. To address the nationwide problem of stormwater pollution, Congress broadened the CWA definition of "point source" in 1987 to include industrial stormwater discharges and municipal separate storm sewer systems. This 1987 expansion was promulgated in two phases: Phase I and Phase II. Phase I required that all municipalities of 100,000 persons or more, industrial dischargers, and construction sites of 5 acres or more have NPDES permits for their stormwater discharges. Phase I permits were issued in much of the U.S. in 1991. Phase II required that all municipalities, industrial dischargers, construction sites of 1 acre or more, and other large property owners (such as school districts) have NPDES permits for their stormwater discharges. Phase II rules came into effect in 2003.

Website: www.ei.ua.edu/research/

Project: Developing Local Stormwater Indicator Monitoring Program to Demonstrate Environmental Results

Research Description: EPA Office of Wastewater Management 104(b)3 grant; The monitoring study designs cover a range from characterizing the quality of stormwater to developing a paired watershed study that breaks down the larger issue of protecting water quality into manageable components.

Website: www.ei.ua.edu/research/

Project: Chamber Project

Research Description: EPA Office of Wastewater Management 104(b)3 grant; The monitoring study designs cover a range from characterizing the quality of stormwater to developing a paired watershed study that breaks

down the larger issue of protecting water quality into manageable components.
Website: www.ei.ua.edu/research/

Project: COSS Program; Center for Optical Sensors and Spectroscopies
Research Description: COSS is to promote optical sensing and spectroscopy research on environmental, biomedical, and national security issues through collaborative use of resources and expertise among the member universities, government and industrial laboratories, and improve sensor techniques using recently developed revolutionary laser and spectroscopic technologies.
Website: www.ei.ua.edu/research/

Project: Measuring the Performance of the Upflow Filter Installed at the Tuscaloosa City Hall
Research Description: Full scale evaluation of an UPFLOW filter-a catch basin insert for the treatment of stormwater at critical source areas.
Website: www.ei.ua.edu/research/

Project: Evaluation of Inlet Treatment Device, an EPA SBIR Phase 2 Demonstration Project with US Infrastructure
Website: www.ei.ua.edu/research/

Project: Techniques for Identifying/Correcting Inappropriate Discharges
Research Description: EPA Office of Wastewater Management 104(b)3 grant
Website: www.ei.ua.edu/research/

Project: Alabama Highway Drainage Conservation Design Practices
Research Description: The objective of this project is to show how a common AL DOT design and maintenance practice, the use of grass drainage swales, can help meet the requirements of the new Phase II Stormwater Regulations.
Website: www.ei.ua.edu/research/

Project: NPDES Stormwater Phase II Technology Transfer
Research Description: Under the Clean Water Act (CWA), point source discharges to "Waters of the United States" require National Pollution Discharge Elimination System (NPDES) permits. To address the nationwide problem of stormwater pollution, Congress broadened the CWA definition of "point source" in 1987 to include industrial stormwater discharges and municipal separate storm sewer systems. This 1987 expansion was promulgated in two phases: Phase I and Phase II. Phase I required that all municipalities of 100,000 persons or more, industrial dischargers, and construction sites of 5 acres or more have NPDES permits for their stormwater discharges. Phase I permits were issued in much of the U.S. in 1991. Phase II required that all municipalities, industrial dischargers, construction sites of 1 acre or more, and other large property owners (such as school districts) have NPDES permits for their stormwater discharges. Phase II rules came into effect in 2003.
Website: www.ei.ua.edu/research/

Project: PnET and SWAT Coupling (Durrans, DOE)
Research Description: Research focused on statistical analyses of hydrologic and environmental data, especially precipitation and streamflow. Potential water resources were also investigated with associated with climate change.
Website: www.ei.ua.edu/research/

Project: IGERT: Freshwater Ecosystems and Landscape Interactions in Contrasting Climates
Research Description: IGERT (Integrative Graduate Education Research Training), a program in aquatic ecology, hydrology, and geochemistry. Students will study freshwater ecosystems in areas of different climates, Alabama and New Mexico and will compare contrast research results in the two completely different environments.
Website: www.ei.ua.edu/research/

Project: Desalination and Demineralization with Solar Evaporation Array (SEA)
Research Description: This research examines the Solar Evaporation Array (SEA) panel, which is a self-contained desalination and water-purification apparatus powered by the sun. The objective is to bring ready, inexpensive access to pure water. Existing water purification methods either cannot remove dissolved minerals and salts, or else are too expensive to be used for small applications. The aim is to develop SEA panels as a way of making potable, irrigable water for a much lower cost per liter than existing methods. Also, the aim is to reduce and possibly eliminate brine pollution from the desalination process.
Website: http://cfpub.epa.gov/ncer_abstacts/index.cfm/fuseaction/display.abstractDetail/abstract/8845

Project: Effects of Urbanization on Sub-Basins in the Wheeler Lake Watershed

Research Description: The objective of this study is to examine the effects of urbanization on aquatic and riparian ecosystems in North Alabama. The study area consists of two adjacent sub-basins within the Wheeler Lake Watershed with drainage systems that serve as tributaries to the Tennessee River. The research will involve (1) measurement of water quality indicator parameters including heavy metals, nutrients, and other parameters such as turbidity, dissolved oxygen, chlorophyll and fecal coliform (2) measurement of past pollutants, such as the organo-chlorine compound, DDT (3) relating observed trends in pollution to changes in landuse/landcover (4) monitoring the trends in water quality by watershed, location and season and (6) use of the Better Assessment Science Integrating Point & Non-point Sources (BASINS) and the Soil and Water Assessment Tool (SWAT) model to better assess environmental conditions in both watersheds.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8224

Project: Modeling Mussel and Fish Assemblage Composition Across an Urban-rural Gradient to Determine the Relationship
Research Description: The research goal is to model the difference in mussel and fish assemblages across an urban-rural gradient and determine the relationship between urbanization-related environmental stressors and community measures of mussels and fish. The proposed study could be important to the understanding of the relative effect of factors within an environmentally complex urbanization gradient upon aquatic ecosystems, including thresholds of response for organisms and the composition of communities in areas of intermediate disturbance. This project has the potential for community outreach to educate land managers and the public on how their decisions and practices can affect aquatic ecosystems.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/8513

Project: Genomic Database for Cryptosporidium spp.
Research Description: Using molecular techniques, researchers plan to construct gDNA libraries for various isolates and species of Cryptosporidium. In total, about 12 isolates of C. parvum and perhaps 8-10 other species of the genus will be included. These libraries will be made accessible through the American Type Culture Collection. These libraries should be useful to investigators who plan to design genetic probes for environmental testing. The advantage of these libraries will be to: 1) allow investigators to sequence and study any region of the genome of their choice without having to rely on previously published sequences from other researchers; 2) allow investigators to develop specific, rather than random, primers for developing PCR based diagnostic tests; and 3) to archive the DNA of various isolates and species in a manner where information can be retrieved in perpetuity.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/834

Project: Green Advantage
Research Description: This research has two primary thrusts: (1) to explore geochemical and biological aspects of Hg cycling and contamination in selected watersheds in the Mobile- Alabama River System (MARS); and (2) to lay the groundwork for remedial policies through a social science-based process of social impact assessment and public involvement. Specific objectives are to: (i) improve our understanding of Hg biogeochemistry and its accumulation in biota within the MARS; (ii) use this information to help predict the potential for Hg bioaccumulation in areas with similar geochemical and geographical features; (iii) inform and involve key stakeholder groups regarding the science of Hg contamination and its human implications; and (iv) lay the groundwork for public understanding and support of possible remedial measures.
Website: http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/589

Project: Magnitude and Frequency of Floods for Urban Streams in Alabama
Research Description: The objective of this project is to develop improved methods and equations for estimating the magnitude and frequency of floods for urban streams in Alabama having the 1.5-, 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals. These methods and equations will be documented in a Scientific Investigations Report (SIR) as well as the flood-frequencies and annual peaks at gaging stations in Alabama.
Website: http://al.water.usgs.gov/projects/Urban.html

Project: Flood Depth Frequency
Research Description: The approach to determine flood depths for hydraulic design and for floodplain mapping typically is to determine flood-frequency discharges by the best available methods and to use an open channel hydraulic model to obtain flood elevations, flow distributions, and velocities. Although these data are essential for many bridge and culvert design applications, this is an expensive approach because of the necessary data. In cases where flood management and planning requires only a flood elevation an alternative approach is to estimate flood depths directly without determining discharge or applying a hydraulic model. The objective of this

project is to develop improved methods and equations for estimating flood-depth frequency for streams in Alabama. The end product of the flood-depth frequency study will be a USGS Scientific Investigations Report describing development and use of traditional regression methods for estimating flood depths for streams with recur-rence intervals ranging from 1.5- to 100- years throughout Alabama.
Website: http://al.water.usgs.gov/projects/FloodDepthFrequency.html

Project: Bridge Site Hydraulic Studies
Research Description: The USGS has a cooperative program with the Alabama Department of Transportation in the area of bridge site hydrologic and hydraulic investigations. These hydrologic and hydraulic investigations have been conducted for both bridge replacement projects and projects involving the construction of new highways across flood plains. These studies incorporate the latest scientific methods for the computation of flood frequency and hydraulic modeling (both one and two dimensional models) at bridge sites.
Website: http://al.water.usgs.gov/projects/Bridge-FloodStudies.html

Project: Catoma Creek
Research Description: The future flooding potential of Catoma Creek is of great interest to the City of Montgomery and local residents. The objective of this study is to re-define the high-water (flood) profiles for a 15 mile reach of Catoma Creek. This reach extends from Norman Bridge Road downstream to the confluence with the Alabama River. For this reach, revised flood profiles will be developed for the 10-, 50-, 100-, and 500- year floods using hydrologic and hydraulic models. Prior to the development of theses profiles, the hydraulic model will be calibrated to match the March 17, 1990 flood in order to give the model credibility and applicability to other flooding scenarios. The purpose of this study is to provide the community with a tool that could be used for future planning and design purposes.
Website: http://pubs.usgs.gov/sir/2008/5171/

Project: Assessment of Benthic Invertebrate Community Health in the Autauga Creek watershed, Autauga County, Alabama
Research Description: The proposed study will evaluate the benthic-invertebrate community over a wider area of the watershed as well as an overall assessment of water-quality field parameters throughout the watershed. By sampling the main stem of Autauga Creek as well as Bridge Creek, the largest tributary to Autauga Creek, it may be possible to more accurately determine where the predominant impacts to the creek are originating.
Website: http://al.water.usgs.gov/projects/AutaugaCreek.html

Project: Occurrence of Tetrachloroethylene in Shallow Groundwater and Surface Water near the Capitol City Plume Site, Montgomery, Alabama
Research Description: Tetrachloroethylene (PCE) was detected in very low concentrations in samples collected by the U.S. Geological Survey from Cypress Creek, a small creek presumed to be hydraulically downgradient from the plume, in summer 2006. Previous studies of the area by other sources have identified other contaminants as well. The objective of this investigation is to determine contaminant concentrations in shallow groundwater and surface water near the known plume location. Data gathered during this investigation will provide additional information about the possible transport of plume contaminants to local surface water.
Website: http://al.water.usgs.gov/projects/CapitolCityPlume.html

Project: Estimation of Long-term Reservoir Sedimentation in Lake Tuscaloosa, Tuscaloosa County, Alabama
Research Description: In the past, the effect of mining operations on water quality and sedimentation in Lake Tuscaloosa was a major concern. While the mining issues are still a concern, sediment yield caused by other fast-changing land uses, including shoreline and near shoreline development, has also raised concern. The objective of this project is to advance the understanding of how suspended-sediment loads are affected by hydrologic processes and land use and to furnish data and information that contributes to the protection of a major water supply reservoir and ecosystem.
Website: http://al.water.usgs.gov/projects/ReservoirSedimentation.html

Project: Assessment of Future Water Availability in the Major River Basins of Alabama
Research Description: The Office of Water Resources (OWR) in the Alabama Department of Economic and Community Affairs is charged in §Section 9-10B-1, et.seq. of the Alabama Water Resources Act to, among other things, assess the state's water resources including estimating the water use and the amount of water available in the 11 major river basins of Alabama. Each of these basins is in need of long-term hydrologic tools that can be used for assessing water availability under a variety of different conditions, including, climate extremes, water-use, and land-use changes. The U.S. Geological Survey (USGS) and OWR are working together to develop a water availability modeling toolbox that will be useful in the planning and decision-making process.

Website: http://al.water.usgs.gov/projects/WaterAvailability.html

Project: Pesticide Occurrence in Ground Water in Areas of Intense Agriculture in Alabama

Research Description: The U.S. Geological Survey (USGS), in cooperation with the Pesticide Management Branch, is evaluating the occurrence of agricultural pesticides in ground water in three areas of intensive agriculture in Alabama: the Tennessee River Valley, the Wiregrass region in southeastern Alabama, and the coastal region of Baldwin County, Alabama. Ground-water wells will be selected for sampling through evaluation of existing ground-water quality and well construction data, and land use practices. Shallow wells in or adjacent to row crop areas will be targeted.

Website: http://al.water.usgs.gov/projects/Pesticide.html

Project: Coastal Plain Culvert Study

Research Description: The proposed investigation is a 5-year study that targets 8-10 small streams in the Coastal Plain physiographic province of Alabama, beginning in the Federal Fiscal Year 2010 (October 1, 2009). The study will include 4 years of data collection that encompass pre-construction, construction, first-year post-construction, and second-year post-construction phases of box culvert installation at the selected stream sites. The final year will focus on data analysis and report writing. The objectives of this project are to (1) assess the degree and extent of changes in geomorphic conditions, suspended sediment concentrations, turbidity, and benthic macroinvertebrate populations in selected small streams after box culvert installation and (2) identify any significant relationships between observed changes in geomorphology and benthic macroinvertebrate populations. Baseline conditions will be established for each stream and any observed post-construction physical and ecological impacts of the culvert will be documented.

Website: http://al.water.usgs.gov/projects/CoastalPlainCulvertStudy.html

Project: Water Use in the Tennessee Valley Region of Alabama

Research Description: Every 5 years since 1950, the USGS has conducted inventories of water use in the United States. In 1996, 2001, and 2007 the USGS, in cooperation with OWR, compiled water-use data for Alabama for 1995, 2000, and 2005 respectively. The Alabama data were aggregated with data for the rest of the United States and included in a report on water use in the Nation. A separate report published in 2009 summarizes 2005 water-use information in more detail for the State of Alabama. For 2010, the joint OWR and USGS water-use study proposes to complete integration of the 2005 water-use data, surface-water and ground-water availability analyses, and future water demand projections for the Tennessee River watershed in Alabama. An electronically-published scientific investigations report presenting the Tennessee River watershed results will be produced.

Website: http://al.water.usgs.gov/projects/TennesseeValley.html

Project: National Water-Quality Assessment (NAWQA) Projects in Alabama

Research Description: The long-term goals of this research are to describe the status and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources, and to provide a sound, scientific understanding of the primary factors affecting the quality of these resources.

Website: http://water.usgs.gov/nawqa/index.html

Project: Collaborative Research: Groundwater Discharge, Benthic Coupling and Microalgal Community Structure in as Shallow Coastal Lagoon

Research Description: This project will to investigate the link between submarine groundwater discharge (SGD) and microalgal dynamics in Little Lagoon, Alabama, a model system for such a study. In contrast to most near-shore environments, it is fully accessible; has no riverine inputs; and is large enough to display ecological diversity (c. 14x 0.75 km) yet small enough to be comprehensively sampled on appropriate temporal and spatial scales. The PIs have previously demonstrated that the lagoon is a hot-spot for toxic blooms of the diatom Pseudo-nitzchia spp that are correlated with discharge from the surficial aquifer. This project will use state-of-the-art techniques to assess variability in SGD, the dependence of benthic nutrient fluxes on microphytobenthos (MPB) abundance and productivity, and the response of the phytoplankton to nutrient enrichment and dilution.

Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0962008

Project: Collaborative research: Defining ecosystem heterotrophic response to nutrient concentrations and ratios

Research Description: In this study, laboratory incubations, streamside channels and whole-stream nutrient additions will be used to determine the concentrations and ratios of nitrogen and phosphorus that elicit ecosystem changes. Knowledge of these threshold concentrations and ratios can guide management of aquatic ecosystems to maintain water quality for wildlife conservation and human utilization. Study findings can aid predictions of how excess nutrients affect the fate of detrital carbon in streams, which is relevant to global carbon budgets.

Website: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0918904
Project: Construction of the Mobile Harbor Turning Basin, Mobile County, AL   **Website:** http://www.sam.usace.army.mil/pd/Document/EA-MobileHarborTurningBasin.pdf
Research Focus: Waterway
Project: Ophelia Within-Banks Disposal Area at River Mile 329, Black Warrior River, Tuscaloosa County, Alabama   **Website:** http://www.sam.usace.army.mil/pd/Document/OpheliaEADRAFT.pdf
Project: Bevill Cross Current Project, Tennessee-Tombigbee Waterway, Pickens County, Alabama   **Website:** http://www.sam.usace.army.mil/pd/Document/Signed_Bevill_FONSI_and_EA.pdf
Project: Dredged Material for the Bayou Coden Navigation Project, Mobile County, Alabama   **Website:** http://www.sam.usace.army.mil/pd/Document/Bayou%20Coden%20EA%202009%20(2).pdf
Project: Small Boat Access Channels in the Alabama River, Alabama   **Research Description:** The US Army Corps of Engineers is examining water quality recertification of operation and maintenance of federal navigation project and small boat access channels on the Alabama-Coosa River system.   **Website:** http://www.sam.usace.army.mil/pd/document/ALRiv_SBAC_EA2009.pdf
Project: Operation and Maintenance of the Gulf Intracoastal Waterway Federal Navigation Project, Mobile and Baldwin Counties, Alabama   **Research Description:** The proposed action would involve maintenance dredging and disposal operations for the Gulf Intracoastal Waterway in the State of Alabama.   **Website:** http://www.sam.usace.army.mil/pd/EAs/Draft_EA_GIWW_AL.pdf
Project: Maintenance and Disposal of Dredged Material for the Bon Secour River Navigation Project, Baldwin County, Alabama   Research Description: The purpose of this Environmental Assessment is to determine whether or not the proposed action has the potential for creating significant impacts to the environment and would thereby warrant a more detailed study of possible impacts, mitigation, and alternative courses of action.   **Website:** http://www.sam.usace.army.mil/pd/Document/Draft-EA_Sep2007Maintenance.pdf
Project: The Release of Triploid Grass Carp for Hydrilla Management, Walter F. George Lake, Alabama and Georgia   **Research Description:** The purpose of this Environmental Assessment is to evaluate the environmental effects that would result within Walter F. George Lake and contiguous upstream and downstream waterbodies from the release of triploid grass carp (Ctenopharyngodon   idella) to assist in the management of the exotic invasive submersed aquatic plant hydrilla (Hydrilla verticillata).   **Website:** http://www.sam.usace.army.mil/pd/Document/FinalEATriploidGrassCar%20ReleaseJun07.pdf

Appendices

Appendix A

United States 2010 EPI Framework			
Objectives	**Policy Categories**	**Indicators**	**Target**
Environmental Health (50%)	Environmental burden of disease (25%)	Environmental burden of disease (25%)	10 DALYs per 1,000 population
	Air pollution (effects on humans) (12.5%)	Indoor air pollution* (6.3%)	0% of population exposed
		Outdoor air pollution* (6.3%)	<= 20 ug/m3
	Water (effects on humans) (12.5%)	Access to water* (6.3%)	100% of population with access
		Access to sanitation* (6.3%)	100% of population with access
Ecosystem Vitality (50%)	Air Pollution (effects on ecosystem) (4.2%)	Sulfur dioxide emissions per populated land area (2.1%)	<= 0.01 Gg/sq km
		Nitrogen oxides emissions per populated land area* (0.7%)	<= 0.01 Gg/sq km
		Non-methane volatile organic compound emissions per populated land area* (0.7%)	<= 0.01 Gg/sq km
		Ecosystem ozone* (0.7%)	0 ppb exceedance above 3000 AOT40. AOT40 is cumulative exceedance above 40 ppb during daylight summer hours
	Water (effects on ecosystem) (4.2%)	Water quality index (2.1%)	Dissolved oxygen: 9.5mg/l (Temp<20ºC), 6mg /l (Temp>=20ºC); pH: 6.5 - 9mg/l; Conductivity: 500µS; Total Nitrogen: 1mg/l; Total phosphorus: 0.05mg/l; Ammonia: 0.05mg/l
		Water stress index* (1.0%)	0% territory under water stress
		Water scarcity index* (1.0%)	0% water overuse
	Biodiversity & Habitat (4.2%)	Biome protection (2.1%)	>= 10% weighted average of biomes protected
		Marine protection* (1.0%)	>= 10% of country's exclusive economic zone protected
		Critical habitat protection* (1.0%)	100% of critical habitats protected
	Forestry (4.2%)	Growing stock change* (2.1%)	ratio of growing stock in time2 to time1 >=1
		Forest cover change* (2.1%)	no decline in forest cover
	Fisheries* (4.2%)	Marine tropic index (2.1%)	no decline
		Trawling intensity (2.1%)	0% of exclusive economic zone traweled
	Agriculture (4.2%)	Agricultural water intensity* (0.8%)	<= 10% of all water resources
		Agricultural subsidies (1.3%)	0 subsidies
		Pesticide regulation (2.1%)	22 points
	Climate Change (25%)	Greenhouse gas emissions per capita (including land use emissions) (12.5%)	2.5 Mt CO_2 eq. (Estimated value associated with 50% reduction in global GHG emissions by 2050, against 1990 levels)
		CO2 emissions per electricity generation (6.3%)	0 g CO_2 per kWh
		Industrial greenhouse gas emissions intensity (6.3%)	36.3 tons of CO2 per $mill (USD, 2005, PPP) of industrial GDP (Estimated value associated with 50% reduction in global GHG emissions by 2050, against 1990 levels)
*Averaged around if missing data or not applicable to country.			
Source: http://ciesin.columbia.edu/repository/epi/data/2006EPI_MainReport.pdf			

Appendix B

NAICS Codes & Industry Sectors Selected for Green Survey	
NAICS Codes (3-digit codes)	**Sector**
111 - Crop Production	Agriculture, Forestry, Fishing and Hunting
112 - Animal Production	Agriculture, Forestry, Fishing and Hunting
113 - Forestry and Logging	Agriculture, Forestry, Fishing and Hunting
114 - Fishing, Hunting and Trapping	Agriculture, Forestry, Fishing and Hunting
115 - Support Activities for Agriculture and Forestry	Agriculture, Forestry, Fishing and Hunting
212 - Mining (except Oil and Gas)	Mining, Quarrying, and Oil and Gas Extraction
213 - Support Activities for Mining	Mining, Quarrying, and Oil and Gas Extraction
221 - Utilities	Utilities
236 - Construction of Buildings	Construction
237 - Heavy and Civil Engineering Construction	Construction
238 - Specialty Trade Contractors	Construction
311 - Food Manufacturing	Manufacturing
321 - Wood Product Manufacturing	Manufacturing
322 - Paper Manufacturing	Manufacturing
323 - Printing and Related Support Activities	Manufacturing
324 - Petroleum and Coal Products Manufacturing	Manufacturing
325 - Chemical Manufacturing	Manufacturing
326 - Plastics and Rubber Products Manufacturing	Manufacturing
327 - Nonmetallic Mineral Product Manufacturing	Manufacturing
331 - Primary Metal Manufacturing	Manufacturing
332 - Fabricated Metal Product Manufacturing	Manufacturing
333 - Machinery Manufacturing	Manufacturing
334 - Computer and Electronic Product Manufacturing	Manufacturing
335 - Electrical Equipment, Appliance and Component Manufacturing	Manufacturing
336 - Transportation	Manufacturing
339 - Miscellaneous Manufacturing	Manufacturing
423 - Merchant Wholesalers, Durable Goods	Wholesale Trade
425 - Wholesale Electronic Markets, Agents and Brokers	Wholesale Trade
441 - Motor Vehicle and Parts Dealers	Retail Trade
443 - Electronics and Appliance Stores	Retail Trade
444 - Building Material, Garden Equipment and Supplies Dealers	Retail Trade
454 - Nonstore Retailers	Retail Trade
522 - Credit Intermediation and Related Activities	Finance and Insurance
523 - Securities, Commodity Contracts and Other Financial Investments and Related Activities	Finance and Insurance
531 - Real Estate	Real Estate and Rental and Leasing
541 - Professional, Scientific and Technical Services	Professional, Scientific and Technical Services
551 - Management of Companies and Enterprises	Management of Companies and Enterprises
561 - Administrative and Support Services	Administrative and Support, Waste Management
562 - Waste Management and Remediation Services	56 - Administrative and Support, Waste
811 - Repair and Maintenance	Other Services (except Public Administration)
813 - Religious, Grantmaking Civic, Professional and Similar Organizations	Other Services (except Public Administration)
924 - Administration of Environmental Quality Programs	Public Administration
925 - Administration of Housing Programs, Urban Planning and Community Development	Public Administration
926 - Administration of Economic Programs	Public Administration

Appendix C

Alabama Green Survey Results: Currently Green-Filled Positions By Industry

Currently Green-Filled Positions by Industry Sector													
	Alabama Workforce Development Regions												
Industry	1	2	3	4	5	6	7	8	9	10	Other	Total	% of Green-Filled Positions
Utilities	0	6	0	5	6	0	0	0	0	634	0	651	22.9%
Printing and Related Support Activities	0	69	45	69	75	16	0	197	1	20	0	492	17.3%
Wholesale Trade	3	82	1	85	29	3	74	30	52	16	60	435	15.3%
Construction	0	61	14	59	12	0	6	3	127	16	0	298	10.5%
Manufacturing	0	29	8	147	7	0	0	0	3	1	25	220	7.7%
Agriculture, Forestry, Fishing and Hunting	2	88	9	6	15	0	0	4	58	5	0	187	6.6%
Professional & Technical Services	2	38	1	91	4	0	3	5	0	0	23	167	5.9%
Retail Trade	52	35	6	8	4	0	0	17	3	0	0	125	4.4%
Administrative & Waste Services	0	18	0	10	0	0	23	26	15	16	0	108	3.8%
Other Services, except Public Administration	0	0	0	54	8	0	0	0	7	0	2	71	2.5%
Finance & Insurance	0	15	0	0	5	0	0	0	0	0	0	20	0.7%
Public Administration	0	0	0	0	0	0	20	0	0	0	0	20	0.7%
Management of Companies and Enterprises	0	0	0	0	0	0	0	0	17	0	2	19	0.7%
Real Estate, Rental & Leasing	0	0	0	18	0	0	0	0	0	0	0	18	0.6%
Nondurable Goods Manufacturing	0	0	0	0	0	0	0	0	10	0	0	10	0.4%
Mining	0	0	0	0	0	0	0	0	0	3	0	3	0.1%
Total Jobs	59	441	84	552	165	19	126	282	293	711	112	2,844	100%
Currently Green-Filled Positions	2.1%	15.5%	3.0%	19.4%	5.8%	0.7%	4.4%	9.9%	10.3%	25.0%	3.9%	100.0%	

Appendix D

Alabama Green Survey Results

Summary Chart of Total Green Occupations by Industry

Industry	Value
Mining	3
Real Estate, Rental & Leasing	18
Management of Companies & Enterprises	19
Public Administration	20
Finance & Insurance	20
Other Services, except Public Administration	71
Administrative & Waste Services	108
Retail Trade	125
Professional & Technical Services	167
Agriculture, Forestry, Fishing & Hunting	187
Construction	298
Wholesale Trade	435
Utilities	651
Manufacturing	722

Appendix E

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
111011	Chief Executives	24
111021	General and Operations Managers	38
112021	Marketing Managers	5
112022	Sales Managers	7
112031	Public Relations Managers	1
113011	Administrative Services Managers	3
113021	Computer and Inforomation Systems Managers	1
113031	Financial Managers	10
113041	Compensation and Benefits Managers	1
113049	Human Resources Managers, All Other	2
113051	Industrial Production Managers	1
113061	Purchasing Managers	1
113071	Transportation, Storage, and Distribution Managers	5
119021	Construction Managers	9
119041	Engineering Managers	1
119121	Natural Sciences Manager	2
131021	Purchasing Agents and Buyers, Farm Products	1
131023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	1
131041	Compliance Officers, Except Agriculture, Construction, Health and Safety, and Transportation	1
131072	Compensation, Benefits, and Job Analysis Specialists	1
131073	Training and Development Specialists	20
131111	Management Anaylysts	1
131199	Business Operations Specialists, All Other	1
132011	Accountants and Auditors	16
132061	Financial Examiners	5
151031	Computer Software Engineers Applications	2
151071	Network and Computer Systems Administrators	2
171011	Architects, Except Landscape and Naval	12
171012	Landscape Architects	1
172051	Civil Engineers	5
172071	Electrical Engineers	74
172081	Environmental Engineers	16
172112	Industrial Engineers	1
172131	Materials Engineers	2

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
172141	Mechanical Engineers	13
172161	Nuclear Engineers	48
173011	Architectural and Civil Drafters	16
173012	Electrical and Electronics Drafters	1
173013	Mechanical Drafters	6
173022	Civil Engineering Technicians	6
173023	Electrical and Electronic Engineering Technicians	1
173025	Environmental Engineering Technicians	2
173031	Surveying and Mapping Technicians	2
191023	Zoologists and Wildlife Biologists	1
191029	Biological Scientists, All Other	2
191032	Foresters	17
192031	Chemists	2
192041	Environmental Scientists and Specialists, Including Health	8
192042	Geoscientists, Except Hydrologists and Geographers	9
194021	Biological Technicians	1
194031	Chemical Technicians	31
194091	Environmental Science and Protection Technicians, Including Health	2
194093	Forest and Conservation Technicians	11
231011	Lawyers	2
232011	Paralegals and Legal Assistants	1
271025	Interior Designers	1
273031	Public Relations Specialists	1
273042	Technical Writers	1
292011	Medical and Clinic LabTechnologist	3
299011	Occupational Health and Safety Specialists	4
299012	Occupational Health and Safety Technicians	30
339032	Security Guards	155
352021	Food Preparation Workers	3
371011	First-Line Supervisors/Managers of Housekeeping and Janitorial Workers	5
371012	First-Line Supervisors/Managers of Landscaping, Lawn Service and Groundskeeping Workers	5
372011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	19
372012	Maids and Housekeeping Cleaners	7
372021	Pest Control Workers	27
373011	Landscaping and Groundskeeping Workers	47

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
373012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	1
373013	Tree Trimmers and Pruners	5
392011	Animal Trainers	1
411011	First-Line Supervisors/Managers of Retail Sales Workers	1
411012	First-Line Supervisors/Managers of Non-Retail Sales Workers	5
412011	Cashiers	10
412021	Counter and Rental Clerks	10
412031	Retail Salespersons	58
413099	Sales Representatives, Services, All Other	2
414011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	28
414012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	46
419021	Real Estate Brokers	4
419099	Sales and Related Workers, All Other	1
431011	First-Line Supervisors/Managers of Office and Administrative Support Workers	13
433021	Billing and Posting Clerks and Machine Operators	3
433031	Bookkeepng, Accountng, and Auditing Clerks	14
433051	Payroll and Timekeeping Clerks	2
433071	Tellers	2
434051	Customer Service Representatives	21
434141	New Accounts Clerks	15
434161	Human Resources Assistants, Except Payroll and Timekeeping	2
434171	Receptionists Information Clerks	7
435071	Shipping, Receiving and Traffic Clerks	15
435081	Stock Clerks and Order Fillers	36
435111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	1
436011	Executive Secretaries and Administrative Assistants	11
436014	Secretaries, Except Legal, Medical, and Executive	32
439021	Data Entry Keyers	3
439061	Office Clerks General	95
451011	First-Line Supervisors/Managers of Farming, Fishing, anf Forestry Workers	4
452091	Agricultural Equipment Operators	10
452092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	28
452093	Farmworkers Farm and Ranch Animals	6
453021	Hunters and Trappers	5
454011	Forest and Conservation Workers	85

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
454022	Logging Equipment Operators	20
471011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	9
472031	Carpenters	4
472061	Construction Laborers	18
472071	Paving, Surfacing and Tamping Equipment Operators	7
472073	Operating Engineers and Other Construction Equipment Operators	5
472111	Electricians	86
472121	Glaziers	2
472131	Insulation Workers, Floor, Ceiling, and Wall	7
472181	Roofers	6
472211	Sheet Metal Workers	25
473013	Helpers-Electricians	3
474011	Construction and Building Inspector	1
474021	Elevator Installers and Repairers	47
474041	Hazardous Materials Removal Workers	4
474071	Septic Tank Servicers and Sewer Pipe Cleaners	22
475021	Earth Drillers Except Oil and Gas	3
491011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	7
492095	Electrical and Electronics Repairers	114
492097	Electronic Home Entertainment Equipment Installers and Repairers	1
492098	Security and Fire Alarm Systems Installers	3
493021	Automotive Body and Related Repairers	2
493023	Automotive Service Technicians and Mechanics	3
493042	Mobile Heavy Equipment Mechanics, Except Engines	3
493093	Tire Repairers and Changers	2
499012	Control and Valve Installers and Repairers, Except Mechanical Door	2
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	53
499041	Industrial Machinery Mechanics	57
499042	Maintenance and Repair Workers General	1
499042	Maintenance and Repair Workers, General	16
499094	Locksmiths and Safe Repairers	5
499098	Helpers - Installation, Maintenance, and Repair Workers	3
511011	First-Line Supervisors/Managers of Production and Operating Workers	27
512022	Electrical and Electronic Equipment Assemblers	10
512041	Structural Metal Fabricators and Fitters	5

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
512091	Fiberglass Laminators and Fabricators	5
512092	Team Assemblers	98
514011	Computer-Controlled Machine Tool Operators, Metal and Plastic	5
514021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	14
514023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	2
514034	Lathe and Turning Machine Tool Setters, Operators and Tenders, Metal and Plastic	26
514051	Metal-Refining Furnace Operators and Tenders	2
514072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	13
514081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	10
514121	Welders, Cutters, Solderers, and Brazers	3
514122	Welding, Soldering and Brazing Machine Setters, Operators and Tenders	11
516091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	43
517011	Cabinetmakers and Bench Carpenters	3
517041	Sawing Machine Setters, Operators, and Tenders, Wood	2
517042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	10
518011	Nuclear Power Reactor Operators	31
518012	Power Distributors and Dispatchers	65
518031	Water and Liquid Waste Treatment Plant and System Operators	16
519011	Chemical Equip Operators and Tenders	24
519012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	6
519021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	1
519032	Cutting and Slicing Machine Setters, Operators, and Tenders	2
519061	Inspectors, Testers, Sorters, Samplers, and Weighers	4
519082	Medical Appliance Technicians	47
519195	Molders, Shapers, and Casters, Except Metal and Plastic	1
519196	Paper Goods Machine Setters, Operators, and Tenders	55
519197	Tire Builders	30
519198	Helpers-Production Workers	79
531021	First-Line Supervisors/Managers of Helpers, Labororers, and Material Movers, Hand	18

Alabama Green Survey Results

Currently Green–Filled Jobs by Standard Occupational Code (SOC)

SOC Code	SOC Title	Currently Green-Filled Positions
531031	First-Line Supervisors/Managers of Transpertation and Material-Moving Machine and Vehicle Operators	4
533021	Bus Drivers Transit and Intercity	7
533031	Driver/Sales Workers	9
533032	Truck Drivers, Heavy and Tractor-Trailer	39
533033	Truck Drivers, Light, or Delivery Services	25
536021	Parking Lot Attendants	10
537021	Crane and Tower Operators	5
537032	Excavating and Loadng Machine and Dragline Operators	2
537051	Industrial Truck and Tractor Operators	10
537061	Cleaners of Vehicles and Equipment	39
537062	Laborers and Freight, Stock and Material Movers, Hand	112
537081	Refuse and Recyclable Material Collectors	27
537121	Tank Car, Truck, and Ship Loaders	1

Appendix F

Methodology for Green Job Estimates and Projections

Estimated Green Jobs by Industry

When the survey was conducted the firms were not stratified by size class, so there was not a way to assign a weight to firms in each class. As a result of this oversight, analysts had to make a decision on the most accurate manner to estimate the number of green jobs for the total workforce. The decision was made to break down the firms into small and large firms, because of the differences in staffing patterns for these types of firms. Small firms had fewer than 100 employees and large firms had more than 100 employees. The data from all the responding companies in the survey was broken down into total employment for each industry sector by North American Industry Classification System (NAICS) code, and then totaled by the two firm sizes (example 1). *Survey employment* is the total number employed in those companies selected for the sample by respective industry. *Total NAICS employment* is the total employment of the universe for that industry. Green estimates were calculated by dividing *total NAICS employment* (11,439) by *survey employment* (2,816) and then multiplying *total green jobs* (61) resulting in *estimated green jobs* (248). The *estimated green jobs* of the large and small firms were then summed to get the industry total. In order to get the projected green jobs, the growth rates from the 2008-2018 Industry projections were applied to the respective industries where green jobs occurred. The same method was used for both statewide and regional estimates.

Example 1

Industry	Company Size	Total NAICS Employment	Survey Employment	Total Green Jobs	Estimated Green Jobs
Construction	Small	11,439	2,816	61	248
	Large	2,576	1,391	0	0
	Total	14,015	4,207	61	248

Estimated Green Occupations

As with the industry projections, analysts had to derive another method of estimating green jobs by occupation since the firms in the sample were not stratified by size class and given a weight. The method for the occupational estimates used the industry coefficients for each occupation. First the green occupations were broken down into the industries they coincided with. For example, the occupation entitled Office Clerks General contained green activities in the following NAICS industries: 236-Construction of Buildings, 238-Speciality Trade Contractors, 325-Chemical Manufacturing, 332-Fabricated Metal Product Manufacturing, 423-Merchant

Wholesalers, Durable Goods, and 561-Administrative Support Services (example 2). Then the same method used for the industry estimate was applied to each of the NAICS codes (*Total NAICS Employment* divided by *Survey Employment*). The coefficient from that computation (*Industry Coefficient*) was then multiplied by the survey responses of green occupational employment by respective industry (*Green Occupational Employment in Industry*). Finally all the estimated green employment for all of the NAICS codes which the occupation had green activity in was summed to get the estimated green employment for that occupation. To project green employment for each occupation, the growth rates in the 2008-2018 occupational projections were applied to the estimated green occupational employment to calculate the total projected green employment by occupation.

Example 2

3-Digit NAICS Code	Total NAICS Employment	Survey Employment	Industry Coefficient
236	3360	1113	3.018867925
238	8939	2569	3.479564033
325	3344	1662	2.012033694
332	6664	2634	2.529992407
423	5680	1608	3.532338308
561	19314	7515	2.57005988

Office Clerks General (SOC 439061)			
Industries	Coefficient	Green Occupational Employment in Industry	Estimated Green Occupational Employment in Industry
236	3.018867925	1	3
238	3.479564033	3	10
325	2.012033694	4	8
332	2.529992407	5	13
423	3.532338308	11	39
561	2.57005988	2	5
Total		26	78

Appendix G

Skills Methodology – Part 1

Using the Alabama green survey results administered in 2009, 180 occupations were reported as green occupations. The occupations were grouped using the Standard Occupational Classification (SOC) Manual (2004 publication, Bureau of Labor Statistics). To be consistent and as accurate as possible the Occupational Information Network (O*NET) Analyst Skill Ratings was used to determine skill gap analysis. The U.S. Department of Labor developed O*NET to provide information for 965 occupations.

Under a contractual agreement, the Human Resources Research Organization (HumRRO) facilitated for the National Center O*NET Development the O*NET Analyst Occupational Skills Rating study. HumRRO collected information/data from targeted job incumbents, occupational experts and occupation analysts. Job incumbents assigned a rating for each skill category within a particular occupation using two criterion: 1) degree of <u>importance</u> and 2) <u>level</u> needed to execute the duties of the job. Utilization of the level ratings (i.e., degree or level of a particular skill needed in a given occupation) provided by the O*NET database is the focus of this analysis.

Based on the O*NET database, 35 skills were grouped into one of seven skill categories: 1) Complex Problem Solving; 2) Content; 3) Process; 4) Resource Management; 5) Social; 6) Systems; and 7) Technical. To determine the overall occupational skills transferability of potential displaced workers compared to those occupations identified as green occupations from the 2009 green survey, four components were used in this study:

1. The Standard Occupation Classification System (SOC): This system is utilized by federal and state agencies to classify workers into 840 detailed occupational categories. This system ensures that occupational titles and definitions are standardized across the nation with the purpose to collect and analyze the occupational information.

2. Occupational Information Network (O*NET): The core of this system is the O*NET database, which contains specific descriptors on hundreds of detailed occupations. The O*NET database version 16.0, released for publication in July 2011, was utilized in this report.

3. Alabama Green Survey: The Alabama Green Survey was administered and completed in the fall of 2009. The results from this survey are utilized in this green skills analysis.

4. Alabama 2008-2018 Occupational Projections: The Alabama Labor Market Information Division produces projected employment by occupation and industry for the State and Workforce Development regions. For the purpose of this analysis, Alabama Declining Occupational Projections for reporting period of 2008 through 2018 were utilized. Declining occupations were selected based on two variables: 1.) net drop in employment over the reporting period; and, 2.) percentage drop in employment over the reporting period. The assumption presented is that potential displaced workers are represented as

those occupations declining as a result of economic conditions within Alabama, technological advancements, terminations or lay-offs, and natural disasters.

The strata identified for the skills analysis consisted of:

1. 181 occupations were identified from the Alabama Green Survey as green jobs. The information for these occupations was extracted from the O*NET version 16.0 database, along with their corresponding skills level ratings. Four occupations were excluded from this analysis. Based on O*NET standards, the rating of an item for a particular occupation is suppressed or "not available" if the occupation's level of precision does not meet the minimum standards (Willison & Tsacoumis, 2010). This resulted in 177 occupations used for this study.

2. Then, the 177 occupations identified from the Alabama Green Survey as green jobs, excluding the four occupations referenced in the step above were divided into Standard Occupational Classification (SOC) minor groups adapted from the 2004 SOC Code Manual and reported coding structure.

3. The project team clustered the 177 green occupations into 61 green SOC groups.

4. Subsequently, 30 occupations were identified from Alabama Occupational Projections as declining occupations for reporting period of 2008-2018. The information for these occupations was extracted from the O*NET version 16.0 database along with their corresponding skills level ratings.

5. Then, the 30 declining occupations were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure.

6. The project team clustered the 30 declining occupations into 16 declining SOC groups.

Data example:

SOC Code	SOC Title	Minor SOC Code	Minor SOC Group
111011	Chief Executives	111000	Top Executives
111021	General and Operations Managers	111000	Top Executives
112021	Marketing Managers	112000	Advertising, Marketing, Promotions, Public Relations & Sales Managers

The data analysis approach was based on quantitative analysis methodology consisting of the following process:

1. 181 occupations identified from the Alabama Green Survey as green jobs were extracted using Standard Occupational Classification (SOC) codes from the O*NET version 16.0 database. Other content extracted in correlation with the 177 occupations included:
   a. Element ID
   b. Element Name
   c. Scale: Level (LV) only
   d. Data Value for Level only
   e. Other result variables: Standard Error; Lower CI Bound; Upper CI Bound; Recommended Suppression; Relevancy; Date Update; Domain Source

2. 177 occupations identified from the Alabama Green Survey as green jobs were sorted and grouped by element names and score rating results. An element name is identified as the skill name.
   a. The skill names were grouped into the applicable skill domain categories, resulting from 35 identifiable skill names to seven skill content domains listed in the methodology introduction.
   b. Level ratings were collected from the O*NET Analyst Occupational Skills Rating study using a scale of 0 (lowest) to 7 (highest) score range. Adapting the same standardized scoring methodology from O*NET, the data values were converted from a point scale of 0 to 7 to a percent range of 0 to 100 (Willison & Tsacoumis, 2010).
   c. After the skill names were grouped according to their skill content domain categories, the standardized scores were totaled using the level rating scales for each respective SOC group.
      Formula Example:
      For SOC Code 111011 (Minor SOC 111000) under Systems Skills Ratings: Judgment and Decision Making (**77**) + Systems Analysis (**69**) + Systems Evaluations (**69**) = Systems Skills Rating Total (**215**)

Data example:

SOC Code	SOC Title	Minor SOC Code	Minor SOC Group	Systems Skills (Ratings)			
				Judgment and Decision Making (Skill Name)	Systems Analysis (Skill Name)	Systems Evaluation (Skill Name)	Total
111011	Chief Executives	111000	Top Executives	77	69	69	215
111021	General and Operations Managers	111000	Top Executives	42	40	38	120
112021	Marketing Managers	112000	Advertising, Marketing, Promotions, Public Relations & Sales Managers	50	46	48	144

d. The Standard Occupational Classification (SOC) group scores for each skill name category were totaled for an overall 'Systems Skills' skill content domain score (Total Rating **479).**

Skill Content Domain:				Systems Skills (Total Ratings)			
SOC Code	SOC Title	Minor SOC Code	Minor SOC Group	Judgment and Decision Making (Skill Name)	Systems Analysis (Skill Name)	Systems Evaluation (Skill Name)	Total
111011	Chief Executives	111000	Top Executives	77	69	69	215
111021	General and Operations Managers	111000	Top Executives	42	40	38	120
112021	Marketing Managers	112000	Advertising, Marketing, Promotions, Public Relations & Sales Managers	50	46	48	144
Overall Skill Content Domain Total				169	155	155	479

e. After adding each skill name to get an overall skill content domain score, the percent share of each skill content domain category was calculated by dividing the skill Content Domain Rating by the sum of each skill content domain rating. **Formula Example**: Percent share of Systems Skill Domain = Systems Skill Rating Total (**479**)/Sum of Total Skills Content Domain Categories (**2,854**)

Data example:

Skill Content Domain Categories	Rating Totals	% of Total
Complex Problem Solving Skills	97	3.4%
Content Skills	325	11.4%
Process Skill	400	14.0%
Resource Management Skills	550	19.3%
Social Skills	625	21.9%
Systems Skills	479	16.8%
Technical Skills	378	13.2%
Total	**2,854**	**100.0%**

3. The same steps identified for steps (1.) through (2.) under the data analysis approach section were used to identify the percent share of each total skill content domain score for declining occupations as well.

Appendix H

Skills Methodology – Part 2

The same skills methodology for data acquisition and strata identification used in Appendix G was the basis for the study in Appendix H. The difference lies in the data analysis approach of measuring the skill content domain scores and reporting structure. Consequently, for the beginning stages of this analysis please refer to Appendix G.

The data analysis approach used was based on quantitative analysis methodology consisting of the following process:

1. 181 occupations identified from the Alabama Green Survey as green jobs were extracted using SOC codes from the O*NET version 16.0 database. Other content extracted in correlation with 177 occupations included:
   a. Element ID
   b. Element Name
   c. Scale: Level (LV) only
   d. Data Value for Level only
   e. Other result variables: Standard Error; Lower CI Bound; Upper CI Bound; Recommended Suppression; Relevancy; Date Update; Domain Source

2. 177 occupations identified from the Alabama Green Survey as green jobs were sorted and grouped by element names and score rating results. The element name is identified as the skill name.
   a. The skill names were grouped into the applicable skill domain categories, resulting from 35 identifiable skill names to seven skill content domains listed in the methodology introduction.
   b. Level ratings were collected from the O*NET Analyst Occupational Skills Rating study using a scale of 0(lowest) to 7(highest) score range. Adapting the same standardized scoring methodology from O*NET, the data values were converted from a point scale of 0 to 7 to a percent range of 0 to 100 (Willison & Tsacoumis, 2010).
   c. After the skills names were grouped according to their skill content domains, an average score was calculated from the standardize scores for each Standard Occupational Classification (SOC) group by the specific skill content domain.

3. Standardize scores were classified into five categories (i.e., Very Low, Low, Medium, High and Very High). The project team assessed how to determine the appropriate score ranges based on the percent scale of 0 to 100, frequency of average scores within a specific skill content domain and relationship of variables identified based on standard of error and standard deviation. The score ranges were established based on the intervals of 20.4 and color-coded accordingly.

4. The same steps identified for steps (1.) through (3.) in this Appendix were completed for the declining occupations as well.

5. The project team defined the scoring benchmarks for each score category (i.e., Very Low, Low, Medium, High and Very High) to determine what constitutes a passable average score of a Declining Standard Occupational Classification (SOC) to a green SOC Group. The scoring methodology consisted of:

   a. For the particular skill content domain, if the declining SOC group score fell into the same score range as the green SOC group score, the declining SOC group score passed that particular skill content domain required to transition to that particular green SOC group.
   b. For the particular skill content domain, if the declining SOC group score fell one level above the green SOC group score range, the declining SOC group score passed that particular skill content domain required to transition to that particular green SOC group.
   c. For the particular skill content domain, if the declining SOC group score fell one or more levels below the green SOC group score range, the declining SOC group score failed that particular skill content domain required to transition to that particular green SOC group.
   d. Exclusions: If the skill content domain score both have a value of '0' for a specific green SOC group and declining SOC group, transferability of the specific skill application is not required in order to perform in the respective green and declining SOC groups.

Detailed Scoring Methodology Table

	Declining SOC Groups Skill Transferability					
	No Skill		**Very Low Skill**		**Low Skill**	
Avg. Percent Range	0		1.0 - 20.4		20.5 - 40.4	
	Score	**Transferability**	**Score**	**Transferability**	**Score**	**Transferability**
	No Knowledge	Not Required	No Knowledge	Not Required	No Knowledge	Not Required
	Very Low	Fail	Very Low	Pass	Very Low	Pass
Green SOC Groups Skill Transferability	Low	Fail	Low	Fail	Low	Pass
	Medium	Fail	Medium	Fail	Medium	Fail
	High	Fail	High	Fail	High	Fail
	Very High	Fail	Very High	Fail	Very High	Fail

	Declining SOC Groups Skill Transferability					
	Medium Skill		**High Skill**		**Very High Skill**	
Avg. Percent Range	40.5 - 60.4		60.5 - 80.4		80.5 - 100.0	
	Score	**Transferability**	**Score**	**Transferability**	**Score**	**Transferability**
	No Knowledge	Not Required	No Knowledge	Not Required	No Knowledge	Not Required
	Very Low	Fail	Very Low	Fail	Very Low	Fail
Green SOC Groups Skill Transferability	Low	Pass	Low	Fail	Low	Fail
	Medium	Pass	Medium	Pass	Medium	Fail
	High	Fail	High	Pass	High	Pass
	Very High	Fail	Very High	Fail	Very High	Pass

6. After comparing the declining group scores to the green group scores, and determining the individual passing scores, the project team the overall passable (transference) of a declining SOC group to a green SOC group. The result of that analysis determined that each declining SOC group must pass seven of the ten green SOC group skill content domains in order to easily transition to a green occupation. Overall skill transferability is identified for each declining SOC group on Appendix I.

Data example:

Declining SOC Group: Vehicle & Mobile Equipment Mechanics, Installers & Repairers	Complex Problem Solving Skills		Content Skills	
Average Percent Score	35.0		27.2	
Green SOC Group	Score	Transferability	Score	Transferability
Advertising, Marketing, Promotions, Public	49.3	Fail	41.9	Fail
Agricultural Workers	23.0	Pass	18.5	Pass
Animal Care and Service Workers	31.0	Pass	27.3	Pass
Architects, Surveyors & Cartographers	50.0	Fail	47.1	Fail
Art and Design Workers	40.0	Pass	36.2	Pass
Assemblers & Fabricators	25.0	Pass	21.3	Pass
Building Cleaning & Pest Control Workers	16.7	Pass	16.2	Pass
Business Operations Specialists	41.3	Fail	42.9	Fail
Communications Equipment Operators	0.0	Not Required	0.0	Not Required

For example, workers with the experience in the declining SOC group labeled, 'Vehicle and Mobile Equipment Mechanics, Installers and Repairers,' possess the skill set of *Complex Problem Solving Skills* to enable them to transition to occupations in the green SOC groups of, 'Agricultural Workers,' 'Animal Care and Service Workers,' 'Art and Design Workers,' and 'Assemblers & Fabricators' if measuring job transference on *Complex Problem Solving Skills* alone.

However, for the same declining SOC Group labeled 'Vehicle and Mobile Equipment Mechanics, Installers and Repairers,' workers do not possess the needed skill set of *Content Skills* as that of the green SOC groups labeled, 'Advertising, Marketing, Promotions, Public Relations and Sales Managers,' 'Architects, Surveyors and Cartographers,' and 'Business Operations Specialists' if measuring job transference on *Content Skills* alone. Additionally, for the same declining SOC group, 'Vehicle and Mobile Equipment Mechanics, Installers and Repairers,' the skill set of *Content Skills* is not a required skill set needed for the green SOC group of Communications Equipment Operators.

Based on the scoring methodology overall, 'Vehicle and Mobile Equipment Mechanics, Installers, and Repairers,' possess the skills to transfer into seven of the ten green SOC groups with little additional training. (See chart on following page.)

Data example:

Vehicle & Mobile Equipment Mechanics, Installers & Repairers Green SOC Group	Complex Problem Solving Skills Transferability	Content Skills Transferability	Process Skills Transferability	Management Skills Transferability	Social Skills Transferability	Systems Skills Transferability	Technical Skills Transferability	Total Transferability
Advertising, Marketing, Promotions, Public Relations & Sales Managers	Fail	Fail	Fail	Fail	Fail	Fail	Pass	❌
Agricultural Workers	Pass	Pass	Pass	Pass	Pass	Pass	Pass	✅
Animal Care and Service Workers	Pass	Pass	Pass	Fail	Pass	Pass	Pass	✅
Architects, Surveyors & Cartographers	Fail	Fail	Fail	Fail	Fail	Fail	Pass	❌
Art and Design Workers	Pass	Pass	Pass	Fail	Pass	Pass	Pass	✅
Assemblers & Fabricators	Pass	Pass	Pass	Pass	Pass	Pass	Pass	✅
Building Cleaning & Pest Control Workers	Pass	Pass	Pass	Pass	Pass	Pass	Pass	✅
Business Operations Specialists	Fail	Fail	Fail	Fail	Pass	Fail	Pass	❌
Communications Equipment Operators	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	❌
Computer Specialists	Fail	Fail	Fail	Fail	Pass	Fail	Pass	❌
Construction and Extraction Occupations	Pass	Pass	Pass	Fail	Pass	Pass	Pass	✅
Construction Trades Workers	Pass	Pass	Pass	Pass	Pass	Pass	Pass	✅

Note:
1. 180 occupations identified from the Alabama Green Survey as green jobs were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure. These occupations were classified into 61 Green SOC groups.
2. 30 declining occupations identified from Alabama 2008-2018 Occupational Projections were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure. These occupations were classified into 16 Declining SOC groups.

Vehicle & Mobile Equipment Mechanics, Installers & Repairers Green SOC Group	Total Transferability
Advertising, Marketing, Promotions, Public Relations & Sales Managers	❌
Agricultural Workers	✅
Animal Care and Service Workers	✅
Architects, Surveyors & Cartographers	❌
Art and Design Workers	✅
Assemblers & Fabricators	✅
Building Cleaning & Pest Control Workers	✅
Business Operations Specialists	❌
Communications Equipment Operators	❌
Computer Specialists	❌
Construction and Extraction Occupations	✅
Construction Trades Workers	✅

Appendix I

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

2009 Green Survey Occupations	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
Legend — ❌ Not Transferable, ✅ Transferable	Agricultural Workers	Assemblers & Fabricators	Communications Equipment Operators	Financial Specialists
Advertising, Marketing, Promotions, Public Relations & Sales Managers	❌	❌	❌	❌
Agricultural Workers	✅	✅	✅	✅
Animal Care and Service Workers	❌	✅	❌	✅
Architects, Surveyors & Cartographers	❌	❌	❌	❌
Art and Design Workers	❌	✅	❌	✅
Assemblers & Fabricators	❌	✅	✅	✅
Building Cleaning & Pest Control Workers	✅	✅	✅	✅
Business Operations Specialists	❌	❌	❌	❌
Communications Equipment Operators	❌	❌	❌	❌
Computer Specialists	❌	❌	❌	❌
Construction and Extraction Occupations	❌	✅	❌	✅
Construction Trades Workers	❌	✅	✅	✅
Cooks & Food Preparation Workers	✅	✅	✅	✅
Drafters, Engineering & Mapping Technicians	❌	❌	❌	✅
Electrical & Electronic Equipment Mechanics, Installers & Repairers	❌	✅	❌	✅
Engineers	❌	❌	❌	❌
Extraction Workers	✅	✅	✅	✅
Financial Clerks	❌	✅	✅	✅
Financial Specialists	❌	❌	❌	❌
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	❌	❌	❌	❌
First-Line Supervisors/Managers of Production and Operating Workers	❌	❌	❌	✅
Fishing and Hunting Workers	✅	✅	✅	✅
Forest, Conservation, and Logging Workers	❌	✅	✅	✅
Grounds Maintenance Workers	✅	✅	✅	✅
Health Technologists & Technicians	❌	✅	✅	✅
Helpers, Contruction Trades	✅	✅	✅	✅
Information and Record Clerks	❌	✅	✅	✅
Lawyers, Judges & Related Workers	❌	❌	❌	❌

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

2009 Green Survey Occupations	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
Legend — Not Transferable (red); Transferable (green)	**Agricultural Workers**	**Assemblers & Fabricators**	**Communications Equipment Operators**	**Financial Specialists**
Life, Physical & Social Science Technicians	❌	❌	❌	✅
Material Moving Workers	✅	✅	✅	✅
Material Recording, Scheduling, Dispatching, and Distributing Workers	❌	✅	✅	✅
Media & Communication Workers	❌	✅	✅	✅
Metal Workers & Plastic Workers	✅	✅	✅	✅
Motor Vehicle Operators	❌	✅	✅	✅
Office and Administrative Support Occupations	❌	❌	❌	❌
Operations Specialties Managers	❌	❌	❌	❌
Other Construction and Related Workers	❌	✅	❌	✅
Other Healthcare Practitioners & Technical Occupations	❌	❌	❌	❌
Other Installation, Maintenance & Repair Occupations	❌	✅	❌	✅
Other Management Occupations	❌	❌	❌	❌
Other Office and Administrative Support Workers	❌	✅	✅	✅
Other Production Occupations	❌	✅	✅	✅
Other Protective Service Workers	✅	✅	✅	✅
Other Sales and Related Workers	❌	✅	✅	✅
Other Transportation Workers	✅	✅	✅	✅
Physical Scientists	❌	❌	❌	❌
Plant & System Operators	❌	✅	✅	✅
Printing Workers	❌	❌	❌	❌
Retail Sales Workers	❌	✅	✅	✅
Sales Representatives, Wholesale and Manufacturing	❌	✅	❌	✅
Secretaries and Administrative Assistants	❌	✅	❌	✅
Supervisors, Building & Grounds Cleaning & Maintenance Workers	❌	✅	❌	✅
Supervisors, Farming, Fishing, and Forestry Workers	❌	❌	❌	❌
Supervisors, Sales Workers	❌	❌	❌	❌
Supervisors, Transportation & Material Moving Workers	❌	❌	❌	✅
Textile, Apparel & Furnishings Workers	❌	✅	✅	✅
Top Executives	❌	❌	❌	❌
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	❌	✅	❌	✅
Woodworkers	✅	✅	✅	✅

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

2009 Green Survey Occupations	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
	Fishing and Hunting Workers	Information and Record Clerks	Material Moving Workers	Material Recording, Scheduling, Dispatching, and Distributing Workers
Advertising, Marketing, Promotions, Public Relations & Sales Managers	✗	✗	✗	✗
Agricultural Workers	✓	✓	✓	✓
Animal Care and Service Workers	✗	✓	✗	✓
Architects, Surveyors & Cartographers	✗	✗	✗	✗
Art and Design Workers	✗	✓	✗	✓
Assemblers & Fabricators	✓	✓	✗	✓
Building Cleaning & Pest Control Workers	✓	✓	✓	✓
Business Operations Specialists	✗	✗	✗	✗
Communications Equipment Operators	✗	✗	✗	✗
Computer Specialists	✗	✗	✗	✗
Construction and Extraction Occupations	✗	✓	✗	✓
Construction Trades Workers	✓	✓	✗	✓
Cooks & Food Preparation Workers	✓	✓	✓	✓
Drafters, Engineering & Mapping Technicians	✗	✗	✗	✗
Electrical & Electronic Equipment Mechanics, Installers & Repairers	✗	✓	✗	✓
Engineers	✗	✗	✗	✗
Extraction Workers	✓	✓	✗	✓
Financial Clerks	✓	✓	✗	✓
Financial Specialists	✗	✗	✗	✗
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	✗	✗	✗	✗
First-Line Supervisors/Managers of Production and Operating Workers	✗	✗	✗	✗
Fishing and Hunting Workers	✓	✓	✓	✓
Forest, Conservation, and Logging Workers	✓	✓	✗	✓
Grounds Maintenance Workers	✓	✓	✗	✓
Health Technologists & Technicians	✓	✓	✗	✓
Helpers, Contruction Trades	✓	✓	✓	✓
Information and Record Clerks	✓	✓	✗	✓
Lawyers, Judges & Related Workers	✗	✗	✗	✗

Legend
- ✗ Not Transferable
- ✓ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

2009 Green Survey Occupations	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
	Fishing and Hunting Workers	Information and Record Clerks	Material Moving Workers	Material Recording, Scheduling, Dispatching, and Distributing Workers
Life, Physical & Social Science Technicians	✗	✗	✗	✗
Material Moving Workers	✓	✓	✓	✓
Material Recording, Scheduling, Dispatching, and Distributing Workers	✓	✓	✗	✓
Media & Communication Workers	✓	✓	✗	✓
Metal Workers & Plastic Workers	✓	✓	✗	✓
Motor Vehicle Operators	✓	✓	✗	✓
Office and Administrative Support Occupations	✗	✗	✗	✗
Operations Specialties Managers	✗	✗	✗	✗
Other Construction and Related Workers	✗	✓	✗	✓
Other Healthcare Practitioners & Technical Occupations	✗	✗	✗	✗
Other Installation, Maintenance & Repair Occupations	✗	✓	✗	✓
Other Management Occupations	✗	✗	✗	✗
Other Office and Administrative Support Workers	✓	✓	✗	✓
Other Production Occupations	✓	✓	✗	✓
Other Protective Service Workers	✓	✓	✓	✓
Other Sales and Related Workers	✓	✓	✗	✓
Other Transportation Workers	✓	✓	✗	✓
Physical Scientists	✗	✗	✗	✗
Plant & System Operators	✓	✓	✗	✓
Printing Workers	✗	✗	✗	✗
Retail Sales Workers	✓	✓	✗	✓
Sales Representatives, Wholesale and Manufacturing	✗	✓	✗	✓
Secretaries and Administrative Assistants	✗	✓	✗	✓
Supervisors, Building & Grounds Cleaning & Maintenance Workers	✗	✓	✗	✓
Supervisors, Farming, Fishing, and Forestry Workers	✗	✗	✗	✗
Supervisors, Sales Workers	✗	✗	✗	✗
Supervisors, Transportation & Material Moving Workers	✗	✗	✗	✗
Textile, Apparel & Furnishings Workers	✓	✓	✗	✓
Top Executives	✗	✗	✗	✗
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	✗	✓	✗	✓
Woodworkers	✓	✓	✗	✓

Legend
- ✗ Not Transferable
- ✓ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

2009 Green Survey Occupations	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
	Metal Workers & Plastic Workers	Other Management Occupations	Other Office and Administrative Support Workers	Other Production Occupations
Advertising, Marketing, Promotions, Public Relations & Sales Managers	❌	❌	❌	❌
Agricultural Workers	✅	✅	✅	✅
Animal Care and Service Workers	❌	✅	✅	❌
Architects, Surveyors & Cartographers	❌	❌	❌	❌
Art and Design Workers	❌	✅	✅	❌
Assemblers & Fabricators	✅	✅	✅	✅
Building Cleaning & Pest Control Workers	✅	✅	✅	✅
Business Operations Specialists	❌	❌	❌	❌
Communications Equipment Operators	❌	❌	❌	❌
Computer Specialists	❌	❌	❌	❌
Construction and Extraction Occupations	❌	✅	✅	❌
Construction Trades Workers	✅	✅	✅	✅
Cooks & Food Preparation Workers	✅	✅	✅	✅
Drafters, Engineering & Mapping Technicians	❌	✅	❌	❌
Electrical & Electronic Equipment Mechanics, Installers & Repairers	❌	✅	✅	❌
Engineers	❌	❌	❌	❌
Extraction Workers	✅	✅	✅	✅
Financial Clerks	✅	✅	✅	✅
Financial Specialists	❌	❌	❌	❌
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	❌	❌	❌	❌
First-Line Supervisors/Managers of Production and Operating Workers	❌	✅	❌	❌
Fishing and Hunting Workers	✅	✅	✅	✅
Forest, Conservation, and Logging Workers	✅	✅	✅	✅
Grounds Maintenance Workers	✅	✅	✅	✅
Health Technologists & Technicians	✅	✅	✅	❌
Helpers, Contruction Trades	✅	✅	✅	✅
Information and Record Clerks	✅	✅	✅	✅
Lawyers, Judges & Related Workers	❌	❌	❌	❌

Legend
❌ Not Transferable
✅ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

Legend	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
❌ Not Transferable ✅ Transferable **2009 Green Survey Occupations**	**Metal Workers & Plastic Workers**	**Other Management Occupations**	**Other Office and Administrative Support Workers**	**Other Production Occupations**
Life, Physical & Social Science Technicians	❌	✅	❌	❌
Material Moving Workers	✅	✅	✅	✅
Material Recording, Scheduling, Dispatching, and Distributing Workers	✅	✅	✅	✅
Media & Communication Workers	✅	✅	✅	❌
Metal Workers & Plastic Workers	✅	✅	✅	✅
Motor Vehicle Operators	✅	✅	✅	✅
Office and Administrative Support Occupations	❌	✅	❌	❌
Operations Specialties Managers	❌	❌	❌	❌
Other Construction and Related Workers	❌	✅	✅	❌
Other Healthcare Practitioners & Technical Occupations	❌	✅	❌	❌
Other Installation, Maintenance & Repair Occupations	✅	✅	✅	❌
Other Management Occupations	❌	❌	❌	❌
Other Office and Administrative Support Workers	✅	✅	✅	✅
Other Production Occupations	✅	✅	✅	❌
Other Protective Service Workers	✅	✅	✅	✅
Other Sales and Related Workers	✅	✅	✅	❌
Other Transportation Workers	✅	✅	✅	✅
Physical Scientists	❌	❌	❌	❌
Plant & System Operators	✅	✅	✅	❌
Printing Workers	❌	❌	❌	❌
Retail Sales Workers	✅	✅	✅	✅
Sales Representatives, Wholesale and Manufacturing	✅	✅	✅	❌
Secretaries and Administrative Assistants	❌	✅	✅	❌
Supervisors, Building & Grounds Cleaning & Maintenance Workers	❌	✅	✅	❌
Supervisors, Farming, Fishing, and Forestry Workers	❌	✅	❌	❌
Supervisors, Sales Workers	❌	✅	❌	❌
Supervisors, Transportation & Material Moving Workers	❌	✅	❌	❌
Textile, Apparel & Furnishings Workers	✅	✅	✅	❌
Top Executives	❌	❌	❌	❌
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	❌	✅	✅	❌
Woodworkers	✅	✅	✅	✅

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

	Legend		Declining SOC Groups Based on 2008 -0218 Occupation Projections			
	⊗ Not Transferable					Vehicle & Mobile Equipment
	✓ Transferable		Plant & System Operators	Printing Workers	Textile, Apparel & Furnishings Workers	Mechanics, Installers & Repairers
2009 Green Survey Occupations						
Advertising, Marketing, Promotions, Public Relations & Sales Managers			⊗	⊗	⊗	⊗
Agricultural Workers			✓	✓	✓	✓
Animal Care and Service Workers			✓	✓	⊗	✓
Architects, Surveyors & Cartographers			⊗	⊗	⊗	⊗
Art and Design Workers			✓	✓	⊗	✓
Assemblers & Fabricators			✓	✓	✓	✓
Building Cleaning & Pest Control Workers			✓	✓	✓	✓
Business Operations Specialists			⊗	⊗	⊗	⊗
Communications Equipment Operators			⊗	⊗	⊗	⊗
Computer Specialists			⊗	⊗	⊗	⊗
Construction and Extraction Occupations			✓	✓	⊗	✓
Construction Trades Workers			✓	✓	✓	✓
Cooks & Food Preparation Workers			✓	✓	✓	✓
Drafters, Engineering & Mapping Technicians			✓	⊗	⊗	✓
Electrical & Electronic Equipment Mechanics, Installers & Repairers			✓	✓	⊗	✓
Engineers			⊗	⊗	⊗	⊗
Extraction Workers			✓	✓	✓	✓
Financial Clerks			✓	✓	✓	✓
Financial Specialists			⊗	⊗	⊗	⊗
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers			⊗	⊗	⊗	⊗
First-Line Supervisors/Managers of Production and Operating Workers			✓	⊗	⊗	✓
Fishing and Hunting Workers			✓	✓	✓	✓
Forest, Conservation, and Logging Workers			✓	✓	✓	✓
Grounds Maintenance Workers			✓	✓	✓	✓
Health Technologists & Technicians			✓	✓	⊗	✓
Helpers, Contruction Trades			✓	✓	✓	✓
Information and Record Clerks			✓	✓	✓	✓
Lawyers, Judges & Related Workers			⊗	⊗	⊗	⊗

Transferability Table of Declining SOC Groups to Green SOC Groups Based on Skills

	Declining SOC Groups Based on 2008 -0218 Occupation Projections			
Legend — ✗ Not Transferable, ✓ Transferable / **2009 Green Survey Occupations**	**Plant & System Operators**	**Printing Workers**	**Textile, Apparel & Furnishings Workers**	**Vehicle & Mobile Equipment Mechanics, Installers & Repairers**
Life, Physical & Social Science Technicians	✓	✓	✗	✓
Material Moving Workers	✓	✓	✓	✓
Material Recording, Scheduling, Dispatching, and Distributing Workers	✓	✓	✓	✓
Media & Communication Workers	✓	✓	✗	✓
Metal Workers & Plastic Workers	✓	✓	✓	✓
Motor Vehicle Operators	✓	✓	✓	✓
Office and Administrative Support Occupations	✗	✗	✗	✗
Operations Specialties Managers	✗	✗	✗	✗
Other Construction and Related Workers	✓	✓	✗	✓
Other Healthcare Practitioners & Technical Occupations	✗	✗	✗	✗
Other Installation, Maintenance & Repair Occupations	✓	✓	✗	✓
Other Management Occupations	✗	✗	✗	✗
Other Office and Administrative Support Workers	✓	✓	✓	✓
Other Production Occupations	✓	✓	✗	✓
Other Protective Service Workers	✓	✓	✓	✓
Other Sales and Related Workers	✓	✓	✗	✓
Other Transportation Workers	✓	✓	✓	✓
Physical Scientists	✗	✗	✗	✗
Plant & System Operators	✓	✓	✗	✓
Printing Workers	✗	✗	✗	✗
Retail Sales Workers	✓	✓	✓	✓
Sales Representatives, Wholesale and Manufacturing	✓	✓	✗	✓
Secretaries and Administrative Assistants	✓	✓	✗	✓
Supervisors, Building & Grounds Cleaning & Maintenance Workers	✓	✓	✗	✓
Supervisors, Farming, Fishing, and Forestry Workers	✗	✗	✗	✗
Supervisors, Sales Workers	✗	✗	✗	✗
Supervisors, Transportation & Material Moving Workers	✓	✗	✗	✓
Textile, Apparel & Furnishings Workers	✓	✓	✗	✓
Top Executives	✗	✗	✗	✗
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	✓	✓	✗	✓
Woodworkers	✓	✓	✓	✓

Appendix J

Skill Domain Definitions adapted from O*NET Analyst Occupational Skill Ratings: Procedures are listed below.

Content Skills — Background structures needed to work with and acquire more specific skills in a variety of different domains

- o *Reading Comprehension* — Understanding written sentences and paragraphs in work related documents.

- o *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.

- o *Writing* — Communicating effectively in writing as appropriate for the needs of the audience.

- o *Speaking* — Talking to others to convey information effectively.

- o *Mathematics* — Using mathematics to solve problems.

- o *Science* — Using scientific rules and methods to solve problems.

Process Skills — Procedures that contribute to the more rapid acquisition of and skill across a variety of domains

- *o Critical Thinking* — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

- o *Active Learning* — Understanding the implications of new information for both current and future problem-solving and decision-making.

- o *Learning Strategies* — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

- o *Monitoring* — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.

Social Skills — Developed capacities used to work with people to achieve goals

- o *Social Perceptiveness* — Being aware of others' reactions and understanding why they react as they do.

- o *Coordination* — Adjusting actions in relation to others' actions.

- o *Persuasion* — Persuading others to change their minds or behavior.

- o *Negotiation* — Bringing others together and trying to reconcile differences.

o *Instructing* — Teaching others how to do something.

o *Service Orientation* — Actively looking for ways to help people.

Complex Problem Solving Skills — Developed capacities used to solve novel, ill-defined problems in complex, real-world settings

o *Complex Problem Solving* — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Technical Skills — Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems

o *Operations Analysis* — Analyzing needs and product requirements to create a design.

o *Technology Design* — Generating or adapting equipment and technology to serve user needs.

o *Equipment Selection* — Determining the kind of tools and equipment needed to do a job.

o *Installation* — Installing equipment, machines, wiring, or programs to meet specifications
.
o *Programming* — Writing computer programs for various purposes.

o *Operation Monitoring* — Watching gauges, dials, or other indicators to make sure a machine is working properly.

o *Operation and Control* — Controlling operations of equipment or systems.

o *Equipment Maintenance* — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.

o *Troubleshooting* — Determining causes of operating errors and deciding what to do about it.

o Repairing — Repairing machines or systems using the needed tools.

o *Quality Control Analysis* — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.

Systems Skills — Developed capacities used to understand, monitor, and improve sociotechnical systems

o *Judgment and Decision Making* — Considering the relative costs and benefits of

potential actions to choose the most appropriate one.

o *Systems Analysis* — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.

o *Systems Evaluation* — Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

Resource Management Skills — Developed capacities used to allocate resources efficiently

o *Time Management* — Managing one's own time and the time of others.

o *Management of Financial Resources* — Determining how money will be spent to get the work done, and accounting for these expenditures.

o *Management of Material Resources* — Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.

o *Management of Personnel Resources* — Motivating, developing, and directing people as they work, identifying the best people for the job.

Appendix K

Knowledge Methodology – Part 1

Under a contractual agreement, the Human Resources Research Organization (HumRRO) facilitated for the National Center O*NET Development the O*NET Analyst Occupational Skills Rating study. HumRRO collected information/data from targeted job incumbents, occupational experts and occupation analysts. Job incumbents assigned a rating for each knowledge category within a particular occupation using two criterion: 1.) degree of <u>importance</u> and 2.) <u>level</u> needed to execute their duties. For the purposes of the Alabama green study, the utilization of level ratings (i.e., degree or level of a particular knowledge needed in the given occupation) provided by the O*NET database is the focus of this analysis.

The knowledge concentrations used throughout this study were adopted using O*NET knowledge domains. The knowledge domain categories were grouped from 32 identifiable knowledge names to ten categories: 1.) Arts and Humanities; 2.) Business and Management; 3.) Communications; 4.) Education and Training; 5.) Engineering and Technology; 6.) Health Services; 7.) Law and Public Safety; 8.) Manufacturing and Production; 9.) Mathematics and Science; and, 10.) Transportation.

To determine the overall occupational knowledge transferability of potential displaced workers compared to those occupations identified as green occupations from the 2009 green survey, four components were used in this study:

1. The Standard Occupation Classification System (SOC): This system is utilized by federal and state agencies to classify workers into 840 detailed occupational categories. This system ensures that occupational titles and definitions are standardized across the nation with the purpose to collect and analyze the occupational information.

2. Occupational Information Network (O*NET): The core of this system is the O*NET database, which contains specific descriptors on hundreds of detailed occupations. The O*NET database version 16.0, released for publication in July 2011, was utilized in this report.

3. Alabama Green Survey: The Alabama Green Survey was administered and completed in the fall of 2009. The results from this survey are utilized in this green knowledge analysis.

4. Alabama 2008-2018 Occupational Projections: The Alabama Labor Market Information Division produces projected employment by occupation and industry for the State and Workforce Development regions. For the purpose of this analysis, Alabama Declining Occupational Projections for reporting period of 2008 through 2018 were utilized. Declining occupations were selected based on two variables: 1.) net drop in employment

over the reporting period; and, 2.) percentage drop in employment over the reporting period. The assumption presented is that potential displaced workers are represented as those occupations declining as a result of economic conditions within Alabama, technological advancements, terminations or lay-offs, and natural disasters.

The strata identified for the skills and knowledge analysis consisted of:

1. 181 occupations were identified from the Alabama Green Survey as green jobs. The information for these occupations was extracted from the O*NET version 16.0 database along with their corresponding knowledge level ratings. Four occupations were excluded from the analysis. Based on O*NET standards, the rating of an item for a particular occupation is suppressed or "not available" if the occupation's level of precision does not meet the minimum standards (Willison & Tsacoumis, 2010). This resulted in 177 occupations used for this study.

2. Then, the 177 occupations identified from the Alabama Green Survey as green jobs, excluding the four occupations referenced in the step above were divided into Standard Occupational Classification (SOC) minor groups adapted from the 2004 SOC Code Manual and reported coding structure.

3. The project team clustered the 177 green occupations into 61 green SOC groups.

4. Subsequently, 30 occupations were identified from Alabama Occupational Projections as declining occupations for reporting period of 2008-2018. The information for these occupations was extracted from the O*NET version 16.0 database along with their corresponding knowledge level ratings.

5. Then, the 30 declining occupations were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure.

6. The project team clustered the 30 declining occupations into 16 declining SOC groups.

Data example:

SOC Code	SOC Title	Minor SOC Code	Minor SOC Group
111011	Chief Executives	111000	Top Executives
111021	General and Operations Managers	111000	Top Executives
112021	Marketing Managers	112000	Advertising, Marketing, Promotions, Public Relations & Sales Managers

The data analysis approach was based on quantitative analysis methodology consisting of the following process:

1. 181 occupations identified from the Alabama Green Survey as green jobs were extracted using Standard Occupational Classification (SOC) codes from the O*NET version 16.0 database. Other content extracted in correlation with the 177 occupations included:
   a. Element ID
   b. Element Name
   c. Scale: Level (LV) only
   d. Data Value for Level only
   e. Other result variables: Standard Error; Lower CI Bound; Upper CI Bound; Recommended Suppression; Relevancy; Date Update; Domain Source

2. 177 occupations identified from the Alabama Green Survey as green jobs were sorted and grouped by element names and score rating results. An element name is identified as the knowledge name.
   a. The knowledge names were grouped into the applicable knowledge domain categories, resulting from 32 identifiable knowledge names to ten knowledge content domains listed in the methodology introduction.
   b. Level ratings were collected from the O*NET Analyst Occupational Skills Rating study using a scale of 0 (lowest) to 7 (highest) score range. Adapting the same standardized scoring methodology from O*NET, the data values were converted from a point scale of 0 to 7 to a percent range of 0 to 100 (Willison & Tsacoumis, 2010).
   c. After the knowledge names were grouped according to their knowledge content domain categories, the standardized scores were totaled using the level rating scales for each respective SOC group.
   Formula Example:
   For SOC Code 111011(Minor SOC 111000) under Communications Ratings: Communication & Media (**23**) + Telecommunications (**0**) = Communication Rating Total (**23**)

Data example:

SOC Code	SOC Title	Minor SOC Code	Minor SOC Group Title	Communications & Media (Knowledge Name)	Telecommunications (Knowledge Name)	Total
			Communications (Ratings)			
111011	Chief Executives	111000	Top Executives	23	0	23
111021	General and Operations Managers	111000	Top Executives	27	15	42
112021	Marketing Managers	112000	Advertising, Marketing, Promotions, Public Relations & Sales Managers	44	6	50

d. The Standard Occupational Classification (SOC) group scores for each knowledge name category were totaled for an overall 'Communications' knowledge content domain score (Total Rating **115).**

Knowledge Content Domain:				Communications (Total Ratings)		
SOC Code	SOC Title	Minor SOC Code	Minor SOC Title	Communications & Media (Knowledge Name)	Telecommunications (Knowledge Name)	Total
111011	Chief Executives	111000	Top Executives	23	0	**23**
111021	General and Operation Managers	111000	Top Executives	27	15	**42**
112021	Marketing Managers	112000	Advertising Marketing, Promotions, Public Relations & Sales Managers	44	6	**50**
Overall Knowledge Content Domain Total				**94**	**21**	**115**

e. After adding each knowledge name to get an overall knowledge content domain score, the percent share of each knowledge content domain category was calculated by dividing the knowledge Content Domain Rating by the sum of each knowledge content domain rating.
Formula Example: Percent share of Communication Knowledge Domain = Communications Rating Total (**115**)/Sum of Total Knowledge Content Domain Categories (**3,484**)

Data example:

Knowledge Content Domain Categories	Rating Totals	% of Total
Manufacturing & Production	799	22.9%
Mathematics & Science	650	18.7%
Arts & Humanities	525	15.1%
Law & Public Safety	500	14.4%
Business & Management	350	10.0%
Health Services	250	7.2%
Engineering & Technology	135	3.9%
Communications	115	3.3%
Transportation	85	2.4%
Education & Training	75	2.2%
Total	**3,484**	**100.0%**

3. The same steps identified for steps (1.) through (2.) under the data analysis approach section were used to identify the percent share of each total knowledge content domain score for declining occupations as well.

Knowledge Methodology – Part 2

The same knowledge methodology for data acquisition and strata identification used in Appendix K was the basis for the analysis in Appendix L. The difference lies in the data analysis approach of measuring the knowledge content domain scores and reporting structure. Consequently, for the beginning stages of this analysis please refer to Appendix K.

The data analysis approach used for this part of the study was based on quantitative analysis methodology consisting of the following process:

1. 181 occupations identified from the Alabama Green Survey as green jobs were extracted using SOC codes from the O*NET version 16.0 database. Other content extracted in correlation with 177 occupations included:
    a. Element ID
    b. Element Name
    c. Scale: Level (LV) only
    d. Data Value for Level only
    e. Other result variables: Standard Error; Lower CI Bound; Upper CI Bound; Recommended Suppression; Relevancy; Date Update; Domain Source

2. 177 occupations identified from the Alabama Green Survey as green jobs were sorted and grouped by element names and score rating results. The element name was identified as the knowledge name.
    a. The knowledge names were grouped into the applicable knowledge domain categories, resulting from 32 identifiable knowledge names to 10 knowledge content domains listed in the methodology introduction.
    b. Level ratings were collected from the O*NET Analyst Occupational Skills Rating study using a scale of 0 (lowest) to 7 (highest) score range. Adapting the same standardized scoring methodology from O*NET, the data values were converted from a point scale of 0 to 7 to a percent range of 0 to 100 (Willison & Tsacoumis, 2010).
    c. After the knowledge elements were grouped according to their knowledge content domains, an average score was calculated from the standardized scores by specific knowledge content domain for each Standard Occupational Classification (SOC) group.

3. Standardized scores were classified into five categories (i.e., Very Low, Low, Medium, High and Very High). The project team assessed a method to determine the appropriate score ranges based on the percent scale of 0 to 100, frequency of score averages within a specific knowledge content domain and relationship of variables identified based on

standard of error and standard deviation. The score ranges were established based on the intervals of 20.4 and color-coded accordingly.

4. The same steps identified for steps (1.) through (3.) in this Appendix were completed for the declining occupations as well.

5. The project team defined the scoring benchmarks for each score category (i.e., Very Low, Low, Medium, High and Very High) to determine what constitutes a passable average score of a Declining Standard Occupational Classification (SOC) group to a green SOC Group. The scoring methodology consisted of:

   a. For the particular knowledge content domain, if the declining SOC group score fell into the same score range as the green SOC group score, the declining SOC group score passed that particular knowledge content domain required to transition to that specific green SOC group.
   b. For the particular knowledge content domain, if the declining SOC group score fell one level above the green SOC group score range, the declining SOC group score passed that particular knowledge content domain required to transition to that specific green SOC group.
   c. For the particular knowledge content domain, if the declining SOC group score fell one or more levels below the green SOC group score range, the declining SOC group score failed that particular knowledge content domain required to transition to that specific green SOC group.
   d. Exclusions: If the knowledge content domain score both have a value of '0' for a specific green SOC group and declining SOC group, transferability of the specific knowledge application is not required in order to perform in the respective green and declining SOC groups.

Detailed Scoring Methodology Table

	Declining SOC Groups Knowledge Transferability					
	No Knowledge		**Very Low Knowledge**		**Low Knowledge**	
Avg. Percent Range	0		1.0 - 20.4		20.5 - 40.4	
	Score	**Transferability**	**Score**	**Transferability**	**Score**	**Transferability**
Green SOC Groups Knowledge Transferability	No Knowledge	Not Required	No Knowledge	Not Required	No Knowledge	Not Required
	Very Low	Fail	Very Low	Pass	Very Low	Pass
	Low	Fail	Low	Fail	Low	Pass
	Medium	Fail	Medium	Fail	Medium	Fail
	High	Fail	High	Fail	High	Fail
	Very High	Fail	Very High	Fail	Very High	Fail

	Declining SOC Groups Knowledge Transferability					
	Medium Knowledge		**High Knowledge**		**Very High Knowledge**	
Avg. Percent Range	40.5 - 60.4		60.5 - 80.4		80.5 - 100.0	
	Score	**Transferability**	**Score**	**Transferability**	**Score**	**Transferability**
	No Knowledge	Not Required	No Knowledge	Not Required	No Knowledge	Not Required
Green SOC Groups	Very Low	Fail	Very Low	Fail	Very Low	Fail
Knowledge	Low	Pass	Low	Fail	Low	Fail
Transferability	Medium	Pass	Medium	Pass	Medium	Fail
	High	Fail	High	Pass	High	Pass
	Very High	Fail	Very High	Fail	Very High	Pass

6. After comparing the declining group scores to the green group scores, and determining the individual passing scores, the project team determined the overall passable (transference) of a declining SOC group to a green SOC group. The result of that analysis determined that each declining SOC group must pass seven of the ten green SOC group knowledge content domains in order to easily transition into a green occupation. Overall knowledge transferability is identified for each declining SOC group on Appendix M.

Data example:

Declining SOC Group: Vehicle & Mobile Equipment Mechanics, Installers & Repairers	Arts and Humanities		Business and Management	
Average Percent Score	4.6		17.0	
Green SOC Groups	**Score**	**Transferability**	**Score**	**Transferability**
Advertising, Marketing, Promotions, Public Relations & Sales Managers	15.3	Pass	58.9	Fail
Agricultural Workers	5.9	Pass	16.3	Pass
Animal Care & Service Workers	7.0	Pass	35.3	Fail
Architects, Surveyors & Cartographers	36.7	Pass	52.7	Fail
Art and Design Workers	34.0	Pass	49.0	Fail
Assemblers & Fabricators	4.8	Pass	8.3	Pass
Building Cleaning & Pest Control Workers	5.4	Pass	20.1	Pass
Business Operations Specialists	13.1	Pass	42.0	Fail

Reported as declining occupations in Alabama, workers classified as 'Vehicle and Mobile Equipment Mechanics, Installers and Repairers' possess the needed education and training in the knowledge area of A*rts and Humanities* to transition to occupations in the green SOC groups of 'Advertising, Marketing, Promotions, Public Relations and Sales Managers,' 'Agriculture Workers,' and 'Animal Care and Service Workers,' if measuring job transference is based on *Arts and Humanities* alone.

For the same declining SOC Group, workers do not possess the needed knowledge discipline of *Business and Management* to easily transfer to green SOC groups labeled 'Advertising, Marketing, Promotions, Public Relations and Sales Managers', 'Animal Care and Service Workers' and 'Architects, Surveyors and Cartographers if measuring job transference is based on *Business Management* alone.

Overall, 'Vehicle and Mobile Equipment Mechanics, Installers and Repairers' can easily obtain employment in green occupations of 'Agriculture Workers', 'Animal Care and Service Workers', 'Assemblers and Fabricators', 'Building Cleaning and Pest Control Workers' and 'Construction Trade Workers.' (Please refer to the data example on the following page.)

Data example:

Vehicle & Mobile Equipment Mechanics, Installers & Repairers Green SOC Group	Arts and Humanities Transferability	Business and Management Transferability	Communications Transferability	Education and Training Transferability	Engineering and Technology Transferability	Health Services Transferability	Law and Public Safety Transferability	Manufacturing and Production Transferability	Mathematics and Science Transferability	Transportation Transferability	Total Transferability
Advertising, Marketing, Promotions, Public Relations & Sales Managers	Pass	Fail	Fail	Fail	Pass	Fail	Pass	Pass	Pass	Pass	❌
Agricultural Workers	Pass	Pass	Pass	Pass	Pass	Not Required	Pass	Fail	Pass	Pass	🟢
Animal Care & Service Workers	Pass	Fail	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	🟢
Architects, Surveyors & Cartographers	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Fail	Pass	❌
Art and Design Workers	Fail	Fail	Pass	Pass	Fail	Fail	Fail	Pass	Fail	Pass	❌
Assemblers & Fabricators	Pass	Pass	Not Required	Pass	Pass	Not Required	Pass	Pass	Pass	Pass	🟢
Building Cleaning & Pest Control Workers	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	Pass	🟢
Business Operations Specialists	Pass	Fail	Pass	Fail	Pass	Fail	Fail	Pass	Pass	Pass	❌
Computer Specialists	Pass	Fail	Fail	Fail	Pass	Not Required	Fail	Pass	Pass	Not Required	❌
Construction & Extraction Occupations	Pass	Fail	Pass	Pass	Fail	Fail	Fail	Pass	Fail	Pass	❌
Construction Trades Workers	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	Pass	🟢

Note:

3. 181 occupations identified from the Alabama Green Survey as green jobs were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure. These occupations were classified into 61 Green SOC groups.

4. 30 declining occupations identified from Alabama 2008-2018 Occupational Projections were divided into Minor SOC groups adapted from the 2004 SOC Code Manual and reported coding structure. These occupations were classified into 16 Declining SOC groups.

Vehicle & Mobile Equipment Mechanics, Installers & Repairers Green SOC Group	Total Transferability
Advertising, Marketing, Promotions, Public Relations & Sales Managers	❌
Agricultural Workers	🟢
Animal Care & Service Workers	🟢
Architects, Surveyors & Cartographers	❌
Art and Design Workers	❌
Assemblers & Fabricators	🟢
Building Cleaning & Pest Control Workers	🟢
Business Operations Specialists	❌
Computer Specialists	❌
Construction & Extraction Occupations	❌
Construction Trades Workers	🟢
Cooks & Food Preparation Workers	🟢
Drafters, Engineering & Mapping Technicians	🟢

Appendix M

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
2009 Green Survey Groups	**Agricultural Workers**	**Assemblers & Fabricators**	**Communications Equipment Operators**	**Financial Specialists**
Advertising, Marketing, Promotions, Public Relations & Sales Managers	⊗	⊗	⊗	⊗
Agricultural Workers	✓	⊗	⊗	⊗
Animal Care & Service Workers	⊗	⊗	⊗	⊗
Architects, Surveyors & Cartographers	⊗	⊗	⊗	⊗
Art and Design Workers	⊗	⊗	⊗	⊗
Assemblers & Fabricators	⊗	⊗	⊗	⊗
Building Cleaning & Pest Control Workers	⊗	⊗	⊗	⊗
Business Operations Specialists	⊗	⊗	⊗	⊗
Computer Specialists	⊗	⊗	⊗	⊗
Construction & Extraction Occupations	⊗	⊗	⊗	⊗
Construction Trades Workers	⊗	⊗	⊗	⊗
Cooks & Food Preparation Workers	✓	⊗	✓	⊗
Drafters, Engineering & Mapping Technicians	⊗	⊗	⊗	⊗
Electrical & Electronic Equipment Mechanics, Installers & Repairers	⊗	⊗	⊗	⊗
Engineers	⊗	⊗	⊗	⊗
Extraction Workers	⊗	⊗	⊗	⊗
Financial Clerks	⊗	⊗	✓	⊗
Financial Specialists	⊗	⊗	⊗	⊗
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	⊗	⊗	⊗	⊗
First-Line Supervisors/Managers of Production and Operating Workers	⊗	⊗	⊗	⊗
Fishing and Hunting Workers	✓	⊗	⊗	⊗
Forest, Conservation, and Logging Workers	⊗	⊗	⊗	⊗
Grounds Maintenance Workers	⊗	⊗	⊗	⊗
Health Technologists & Technicians	⊗	⊗	⊗	⊗
Helpers, Contruction Trades	⊗	⊗	⊗	⊗
Information and Record Clerks	⊗	⊗	✓	⊗
Lawyers, Judges & Related Workers	⊗	⊗	⊗	⊗

Legend:
⊗ Not Transferable
✓ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

Legend
- ❌ Not Transferable
- ✅ Transferable

2009 Green Survey Groups	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
	Agricultural Workers	Assemblers & Fabricators	Communications Equipment Operators	Financial Specialists
Legal Support Workers	❌	❌	❌	❌
Life Scientists	❌	❌	❌	❌
Life, Physical & Social Science Technicians	❌	❌	❌	❌
Material Moving Workers	❌	❌	❌	❌
Material Recording, Scheduling, Dispatching, and Distributing Workers	❌	❌	✅	❌
Media & Communication Workers	❌	❌	❌	❌
Metal Workers & Plastic Workers	❌	❌	❌	❌
Motor Vehicle Operators	❌	❌	❌	❌
Office and Administrative Support Occupations	❌	❌	❌	❌
Operations Specialties Managers	❌	❌	❌	❌
Other Construction and Related Workers	❌	❌	❌	❌
Other Healthcare Practitioners & Technical Occupations	❌	❌	❌	❌
Other Installation, Maintenance & Repair Occupations	❌	❌	❌	❌
Other Management Occupations	❌	❌	❌	❌
Other Office and Administrative Support Workers	❌	❌	✅	❌
Other Production Occupations	✅	❌	❌	❌
Other Protective Service Workers	✅	❌	❌	❌
Other Sales and Related Workers	❌	❌	❌	❌
Other Transportation Workers	❌	❌	❌	❌
Physical Scientists	❌	❌	❌	❌
Plant & System Operators	❌	❌	❌	❌
Printing Workers	❌	❌	❌	❌
Retail Sales Workers	❌	❌	✅	❌
Sales Representatives, Wholesale and Manufacturing	❌	❌	❌	❌
Secretaries and Administrative Assistants	❌	❌	✅	❌
Supervisors, Building & Grounds Cleaning & Maintenance Workers	❌	❌	❌	❌
Supervisors, Farming, Fishing, and Forestry Workers	❌	❌	❌	❌
Supervisors, Sales Workers	❌	❌	❌	❌
Supervisors, Transportation & Material Moving Workers	❌	❌	❌	❌
Textile, Apparel & Furnishings Workers	❌	❌	❌	❌
Top Executives	❌	❌	❌	❌
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	❌	❌	❌	❌
Woodworkers	✅	❌	❌	❌

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

2009 Green Survey Groups	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
	Fishing & Hunting Workers	Information & Record Clerks	Material Moving Workers	Material Recording, Scheduling, Dispatching, & Distributing Workers
Advertising, Marketing, Promotions, Public Relations & Sales Managers	❌	❌	❌	❌
Agricultural Workers	✅	❌	✅	✅
Animal Care & Service Workers	✅	✅	✅	❌
Architects, Surveyors & Cartographers	❌	❌	❌	❌
Art and Design Workers	❌	❌	❌	❌
Assemblers & Fabricators	❌	❌	✅	❌
Building Cleaning & Pest Control Workers	✅	❌	✅	❌
Business Operations Specialists	❌	❌	❌	❌
Computer Specialists	❌	❌	❌	❌
Construction & Extraction Occupations	❌	❌	❌	❌
Construction Trades Workers	✅	❌	❌	❌
Cooks & Food Preparation Workers	✅	✅	✅	✅
Drafters, Engineering & Mapping Technicians	❌	❌	❌	❌
Electrical & Electronic Equipment Mechanics, Installers & Repairers	❌	❌	❌	❌
Engineers	❌	❌	❌	❌
Extraction Workers	✅	❌	❌	❌
Financial Clerks	❌	✅	✅	❌
Financial Specialists	✅	❌	❌	❌
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	❌	❌	❌	❌
First-Line Supervisors/Managers of Production and Operating Workers	✅	❌	❌	❌
Fishing and Hunting Workers	✅	❌	❌	✅
Forest, Conservation, and Logging Workers	✅	❌	❌	❌
Grounds Maintenance Workers	✅	✅	✅	✅
Health Technologists & Technicians	❌	❌	❌	❌
Helpers, Contruction Trades	✅	❌	✅	❌
Information and Record Clerks	✅	✅	✅	❌
Lawyers, Judges & Related Workers	❌	❌	❌	❌

Legend:
- ❌ Not Transferable
- ✅ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

Legend	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
✗ Not Transferable / ✓ Transferable	Fishing & Hunting Workers	Information & Record Clerks	Material Moving Workers	Material Recording, Scheduling, Dispatching, & Distributing Workers
2009 Green Survey Groups				
Legal Support Workers	✓	✗	✗	✗
Life Scientists	✗	✗	✗	✗
Life, Physical & Social Science Technicians	✓	✗	✗	✗
Material Moving Workers	✓	✗	✗	✗
Material Recording, Scheduling, Dispatching, and Distributing Workers	✓	✓	✓	✓
Media & Communication Workers	✗	✗	✗	✗
Metal Workers & Plastic Workers	✓	✗	✓	✗
Motor Vehicle Operators	✓	✓	✓	✓
Office and Administrative Support Occupations	✗	✗	✗	✗
Operations Specialties Managers	✗	✗	✗	✗
Other Construction and Related Workers	✗	✗	✗	✗
Other Healthcare Practitioners & Technical Occupations	✗	✗	✗	✗
Other Installation, Maintenance & Repair Occupations	✗	✗	✗	✗
Other Management Occupations	✗	✗	✗	✗
Other Office and Administrative Support Workers	✓	✓	✓	✓
Other Production Occupations	✓	✗	✓	✓
Other Protective Service Workers	✓	✗	✓	✓
Other Sales and Related Workers	✗	✗	✗	✗
Other Transportation Workers	✓	✗	✓	✗
Physical Scientists	✗	✗	✗	✗
Plant & System Operators	✗	✗	✗	✗
Printing Workers	✗	✗	✗	✗
Retail Sales Workers	✓	✓	✓	✓
Sales Representatives, Wholesale and Manufacturing	✓	✗	✗	✓
Secretaries and Administrative Assistants	✗	✓	✓	✗
Supervisors, Building & Grounds Cleaning & Maintenance Workers	✗	✗	✗	✗
Supervisors, Farming, Fishing, and Forestry Workers	✗	✗	✗	✗
Supervisors, Sales Workers	✗	✗	✗	✗
Supervisors, Transportation & Material Moving Workers	✓	✗	✗	✗
Textile, Apparel & Furnishings Workers	✗	✗	✓	✗
Top Executives	✗	✗	✗	✗
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	✓	✗	✓	✗
Woodworkers	✓	✗	✗	✗

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

2009 Green Survey Groups	Metal Workers & Plastic Workers	Other Management	Other Office & Administrative Support Workers	Other Production Workers
Declining SOC Groups based on 2008 - 2018 Occupation Projections				
Advertising, Marketing, Promotions, Public Relations & Sales Managers	✗	✗	✗	✗
Agricultural Workers	✓	✗	✓	✓
Animal Care & Service Workers	✗	✓	✓	✓
Architects, Surveyors & Cartographers	✗	✗	✗	✗
Art and Design Workers	✗	✓	✗	✗
Assemblers & Fabricators	✗	✗	✓	✓
Building Cleaning & Pest Control Workers	✗	✓	✓	✓
Business Operations Specialists	✗	✓	✗	✗
Computer Specialists	✗	✗	✗	✗
Construction & Extraction Occupations	✗	✓	✗	✗
Construction Trades Workers	✗	✓	✓	✗
Cooks & Food Preparation Workers	✓	✗	✓	✓
Drafters, Engineering & Mapping Technicians	✗	✓	✗	✗
Electrical & Electronic Equipment Mechanics, Installers & Repairers	✗	✓	✗	✗
Engineers	✗	✓	✗	✗
Extraction Workers	✗	✗	✗	✗
Financial Clerks	✗	✗	✓	✓
Financial Specialists	✗	✓	✓	✗
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	✗	✓	✗	✗
First-Line Supervisors/Managers of Production and Operating Workers	✗	✗	✗	✗
Fishing and Hunting Workers	✗	✓	✓	✓
Forest, Conservation, and Logging Workers	✗	✓	✗	✗
Grounds Maintenance Workers	✗	✗	✓	✓
Health Technologists & Technicians	✗	✓	✗	✗
Helpers, Contruction Trades	✗	✗	✓	✓
Information and Record Clerks	✗	✓	✓	✓
Lawyers, Judges & Related Workers	✗	✓	✗	✗

Legend
- ✗ Not Transferable
- ✓ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

2009 Green Survey Groups	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
Legend — ❌ Not Transferable, ✅ Transferable	Metal Workers & Plastic Workers	Other Management	Other Office & Administrative Support Workers	Other Production Workers
Legal Support Workers	❌	✅	❌	❌
Life Scientists	❌	✅	❌	❌
Life, Physical & Social Science Technicians	❌	✅	❌	❌
Material Moving Workers	❌	✅	✅	❌
Material Recording, Scheduling, Dispatching, and Distributing Workers	✅	❌	✅	✅
Media & Communication Workers	❌	❌	❌	❌
Metal Workers & Plastic Workers	❌	❌	✅	✅
Motor Vehicle Operators	✅	✅	✅	✅
Office and Administrative Support Occupations	❌	✅	❌	❌
Operations Specialties Managers	❌	✅	❌	❌
Other Construction and Related Workers	❌	✅	❌	❌
Other Healthcare Practitioners & Technical Occupations	❌	❌	❌	❌
Other Installation, Maintenance & Repair Occupations	❌	✅	❌	❌
Other Management Occupations	❌	✅	❌	❌
Other Office and Administrative Support Workers	❌	✅	✅	✅
Other Production Occupations	✅	❌	✅	✅
Other Protective Service Workers	✅	❌	✅	✅
Other Sales and Related Workers	❌	✅	❌	❌
Other Transportation Workers	❌	✅	✅	✅
Physical Scientists	❌	✅	❌	❌
Plant & System Operators	❌	❌	❌	❌
Printing Workers	❌	❌	❌	❌
Retail Sales Workers	✅	✅	✅	✅
Sales Representatives, Wholesale and Manufacturing	❌	❌	❌	✅
Secretaries and Administrative Assistants	❌	❌	✅	✅
Supervisors, Building & Grounds Cleaning & Maintenance Workers	❌	✅	❌	❌
Supervisors, Farming, Fishing, and Forestry Workers	❌	❌	❌	❌
Supervisors, Sales Workers	❌	✅	❌	❌
Supervisors, Transportation & Material Moving Workers	❌	✅	❌	❌
Textile, Apparel & Furnishings Workers	❌	❌	✅	✅
Top Executives	❌	❌	❌	❌
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	❌	❌	✅	✅
Woodworkers	❌	❌	❌	❌

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

2009 Green Survey Groups	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
	Plant & System Operators	Printing Workers	Textile, Apparel & Furnishings Workers	Vehicle & Mobile Equipment Mechanics, Installers & Repairers
Advertising, Marketing, Promotions, Public Relations & Sales Managers	✗	✗	✗	✗
Agricultural Workers	✓	✓	✓	✓
Animal Care & Service Workers	✓	✓	✓	✓
Architects, Surveyors & Cartographers	✗	✗	✗	✗
Art and Design Workers	✗	✗	✗	✗
Assemblers & Fabricators	✓	✓	✓	✓
Building Cleaning & Pest Control Workers	✓	✓	✓	✓
Business Operations Specialists	✓	✗	✗	✗
Computer Specialists	✗	✗	✗	✗
Construction & Extraction Occupations	✓	✗	✗	✗
Construction Trades Workers	✓	✗	✓	✓
Cooks & Food Preparation Workers	✓	✓	✓	✓
Drafters, Engineering & Mapping Technicians	✓	✗	✗	✓
Electrical & Electronic Equipment Mechanics, Installers & Repairers	✗	✗	✗	✗
Engineers	✗	✗	✗	✗
Extraction Workers	✓	✗	✗	✓
Financial Clerks	✓	✓	✓	✓
Financial Specialists	✓	✗	✓	✓
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	✗	✗	✗	✗
First-Line Supervisors/Managers of Production and Operating Workers	✓	✗	✗	✗
Fishing and Hunting Workers	✓	✗	✓	✓
Forest, Conservation, and Logging Workers	✓	✗	✗	✓
Grounds Maintenance Workers	✓	✓	✓	✓
Health Technologists & Technicians	✓	✗	✗	✗
Helpers, Contruction Trades	✓	✓	✓	✓
Information and Record Clerks	✓	✓	✓	✓
Lawyers, Judges & Related Workers	✓	✗	✗	✗

Legend:
✗ Not Transferable
✓ Transferable

Transferability Table of Declining SOC Groups to Green SOC Groups based on Knowledge

2009 Green Survey Groups	Declining SOC Groups based on 2008 - 2018 Occupation Projections			
Legend — ✗ Not Transferable, ✓ Transferable	**Plant & System Operators**	**Printing Workers**	**Textile, Apparel & Furnishings Workers**	**Vehicle & Mobile Equipment Mechanics, Installers & Repairers**
Legal Support Workers	✓	✗	✗	✗
Life Scientists	✓	✗	✗	✗
Life, Physical & Social Science Technicians	✓	✗	✗	✗
Material Moving Workers	✓	✗	✓	✓
Material Recording, Scheduling, Dispatching, and Distributing Workers	✓	✓	✓	✓
Media & Communication Workers	✗	✗	✗	✗
Metal Workers & Plastic Workers	✓	✓	✓	✓
Motor Vehicle Operators	✓	✓	✓	✓
Office and Administrative Support Occupations	✓	✗	✗	✗
Operations Specialties Managers	✓	✗	✗	✗
Other Construction and Related Workers	✓	✗	✗	✗
Other Healthcare Practitioners & Technical Occupations	✗	✗	✗	✗
Other Installation, Maintenance & Repair Occupations	✓	✗	✗	✓
Other Management Occupations	✗	✗	✗	✗
Other Office and Administrative Support Workers	✓	✓	✓	✓
Other Production Occupations	✓	✓	✓	✓
Other Protective Service Workers	✓	✓	✓	✓
Other Sales and Related Workers	✓	✗	✗	✓
Other Transportation Workers	✓	✓	✓	✓
Physical Scientists	✓	✗	✗	✗
Plant & System Operators	✗	✗	✗	✗
Printing Workers	✗	✗	✗	✗
Retail Sales Workers	✓	✓	✓	✓
Sales Representatives, Wholesale and Manufacturing	✓	✗	✗	✓
Secretaries and Administrative Assistants	✓	✓	✓	✓
Supervisors, Building & Grounds Cleaning & Maintenance Workers	✓	✗	✗	✗
Supervisors, Farming, Fishing, and Forestry Workers	✗	✗	✗	✗
Supervisors, Sales Workers	✓	✗	✗	✗
Supervisors, Transportation & Material Moving Workers	✓	✗	✗	✗
Textile, Apparel & Furnishings Workers	✓	✓	✓	✓
Top Executives	✗	✗	✗	✗
Vehicle & Mobile Equipment Mechanics, Installers & Repairers	✓	✓	✓	✓
Woodworkers	✓	✗	✗	✓

Appendix N

Knowledge Domain Definitions adapted from O*NET Analyst Occupational Skill Ratings: Procedures are listed below.

Business and Management — Knowledge of principles and facts related to business administration and accounting, human and material resource management in organizations, sales and marketing, economics, and office information and organizing systems.

> o *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.

> o *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.

> o *Economics and Accounting* — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.

> o *Sales and Marketing* — Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.

> o *Customer and Personal Service* — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.

> o *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.

Manufacturing and Production — Knowledge of principles and facts related to the production, processing, storage, and distribution of manufactured and agricultural goods

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

> o *Food Production* — Knowledge of techniques and equipment for planting, growing, and harvesting food products (both plant and animal) for consumption, including storage/handling techniques.

Engineering and Technology — Knowledge of the design, development, and application of technology for specific purposes.

> o *Computers and Electronics* — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

> o *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.

o *Design* — Knowledge of design techniques, tools, and principals involved in production of precision technical plans, blueprints, drawings, and models.

o *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.

o *Mechanical* — Knowledge of machines and tools, including their designs, uses, repair and maintenance.

Mathematics and Science — Knowledge of the history, theories, methods, and applications of the physical, biological, social, mathematical, and geography.

o *Mathematics* — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

o *Physics* — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.

o *Chemistry* — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.

o *Biology* — Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.

o *Psychology* — Knowledge of human behavior and performance; individual differences in ability, personality, and interests; learning and motivation; psychological research methods; and the assessment and treatment of behavioral and affective disorders.

o *Sociology and Anthropology* — Knowledge of group behavior and dynamics, societal trends and influences, human migrations, ethnicity, cultures and their history and origins.

o *Geography* — Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.

Health Services — Knowledge of principles and facts regarding diagnosing, curing, and preventing disease, and improving and preserving physical and mental health and well-being.

o *Medicine and Dentistry* — Knowledge of the information and techniques needed to diagnose and treat human injuries, diseases, and deformities. This includes symptoms, treatment alternatives, drug properties and interactions, and preventive health-care measures.

o *Therapy and Counseling* — Knowledge of principles, methods, and procedures for diagnosis, treatment, and rehabilitation of physical and mental dysfunctions, and for career counseling and guidance.

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.

Arts and Humanities — Knowledge of facts and principles related to the branches of learning concerned with human thought, language, and the arts.

> o *English Language* — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

> o *Foreign Language* — Knowledge of the structure and content of a foreign (non-English) language including the meaning and spelling of words, rules of composition and grammar, and pronunciation.

> o *Fine Arts* — Knowledge of the theory and techniques required to compose, produce, and perform works of music, dance, visual arts, drama, and sculpture.

> o *History and Archeology* — Knowledge of historical events and their causes, indicators, and effects on civilizations and cultures.

> o *Philosophy and Theology* — Knowledge of different philosophical systems and religions. This includes their basic principles, values, ethics, ways of thinking, customs, practices, and their impact on human culture.

Law and Public Safety — Knowledge of regulations and methods for maintaining people and property free from danger, injury, or damage; the rules of public conduct established and enforced by legislation, and the political process establishing such rules.

> o *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.

> o *Law and Government* — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.

Communications — Knowledge of the science and art of delivering information.

> o *Telecommunications* — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.

> o *Communications and Media* — Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.

Transportation — Knowledge of principles and methods for moving people or goods by air, rail, sea, or road, including the relative costs and benefits.

Appendix O

Alabama Green Survey Questionnaire

1	Is this "BUSINESS NAME" at "BUSINESS ADDRESS"?	Yes : No :
2	And is this a/an "INDUSTRY" assignment description correct?	Yes : No :
2b	If 'No', what is the correct industry?	Industry name (assign new code):
3	How many full and part-time employees excluding contractors are employed at this site or statewide within your organization?	Sum of Current Employment : (Interviewer uses benchmark employment to compare)
3b	According to our records, there seems to have been a significant change in employment numbers since last year. Can you tell me why?	Reason for change in employment:
4	Site or Statewide? (from Question 3)	Statewide : Site :
5	Are you currently hiring?	Yes : No :
6	Does your organization have any special industry certifications that are associated with any "green-related" business activities (i.e., LEED, Certified Organic, etc)?	Yes : No : List certifications: Count Samples with LEED Employee(s) : Count Samples with LEED Building(s) :
7	Does your firm conduct "green-related" business activities that produce goods or provide services? Explain the five core areas and give examples (i.e., RE-TEE-PEE - makes toilet paper out of 75% recycled materials).	Yes : No : **Producing renewable energy** Description of green activities Sum of Current Employment : Number of Current Green Vacancies Yes : No : **Increasing energy efficiency** Description of green activities Sum of Current Employment : Number of Current Green Vacancies Yes : No : **Clean transportation and fuels** Description of green activities Sum of Current Employment :

		Number of Current Green Vacancies Yes : No :
		Agriculture and natural resource conservation Description of green activities Sum of Current Employment : Number of Current Green Vacancies Yes : No :
		Pollution prevention and environmental cleanup Description of green activities Sum of Current Employment : Number of Current Green Vacancies Yes : No :
		Research and Consulting Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
8	Do any of your employees spend 50% or more of their time engaged in green related activities? Give examples of five core areas (i.e., Sun Chips - the people who work on maintaining the solar panels).	Yes : No :
		Producing renewable energy Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
		Increasing energy efficiency Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
		Clean transportation and fuels Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
		Agriculture and natural resource conservation Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
		Pollution prevention and environmental cleanup Description of green activities

		Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
		Research and Consulting Description of green activities Sum of Current Employment : Number of Current Green Vacancies - Yes : No :
9	Do you currently have any open-for-hire positions at this location? Are your job openings listed online, and up-to-date?	Yes : No : (General, not green related question. Only appears if answer "Yes" to Question #6) Yes : No :
10	Did you have any open-for-hire positions on the last day of June 2009? Do you have a website?	Yes: No: (General, not green related question. Only appears if answer "No" to Question #6) Count of Samples with Website :
11	Job Type	Full Time : Part Time :
12	Job Status	Permanent : Temporary :
13	Position Type	**Currently Filled Green Position :** Number of Employees Producing renewable energy : Number of Employees Increasing energy efficiency : Number of Employees Clean transportation and fuels : Number of Employees Agriculture and natural resource conservation : Number of Employees Pollution prevention and environmental cleanup : Number of Employees Research and Consulting : **Number of Employees Green Job Vacancy :** Number of Employees Producing renewable energy : Number of Employees Increasing energy efficiency : Number of Employees Clean transportation and fuels : Number of Employees Agriculture and natural resource conservation : Number of Employees Pollution prevention and environmental cleanup : Number of Employees Research and Consulting : **General Job Vacancy :**
14	How long has this position been vacant?	Question applicable and only shows when job is marked as a

		Green Job Vacancy or General Job Vacancy position type. **Green Job Vacancy** Less than 30 days : 30-59 days : 60+ days : Always hiring : Not specified : **General Job Vacancy** Less than 30 days : 30-59 days : 60+ days : Always hiring : Not specified :
15	What minimum education level is required?	No education required : High school or GED : Vocational or technical training : Associate's degree : Bachelor's degree : Advanced degree : Not specified :
16	Is a license or certification required?	Yes : No :
17	How much work experience do you require?	No experience required : Less than 1 year required 1 – 2 years required 3 – 4 years required Over 5 years required Not specified
18	What benefits are offered for this position?	Health Insurance/Vision-Dental : Yes : No : Paid sick leave : Yes : No : Paid vacation : Yes : No : Retirement savings plan or pension : Yes : No : No benefits offered : Yes : Not specified : Yes :

19	If any of your employees need to upgrade their skills, where would you send them?	In-House Training : College or University : Commercial Training Provider : Other : Don't Know : Not Applicable :
20	How will employment at this site change over the next six months?	Will definitely increase : Will probably increase : Will stay the same : Will probably decrease : Will definitely decrease : Don't know :
21	Would your company be interested in receiving more information from the Alabama Development Office about how to incorporate green initiatives into your business plan?	Yes : No :
22	Would you like your company name to appear in the state of Alabama's publication of green companies?	Yes : No :
23	For state verification purposes, may I please have your name and job title? This will be kept confidential and will only be provided to the Department of Industrial Relations.	Respondent First Name: Respondent Last Name: Respondent Job Title:
24	Please verify your phone number. If your area code is outside of Alabama, please explain why this is an out of state number.	Respondent phone number and extension: Reason outside of Alabama:

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