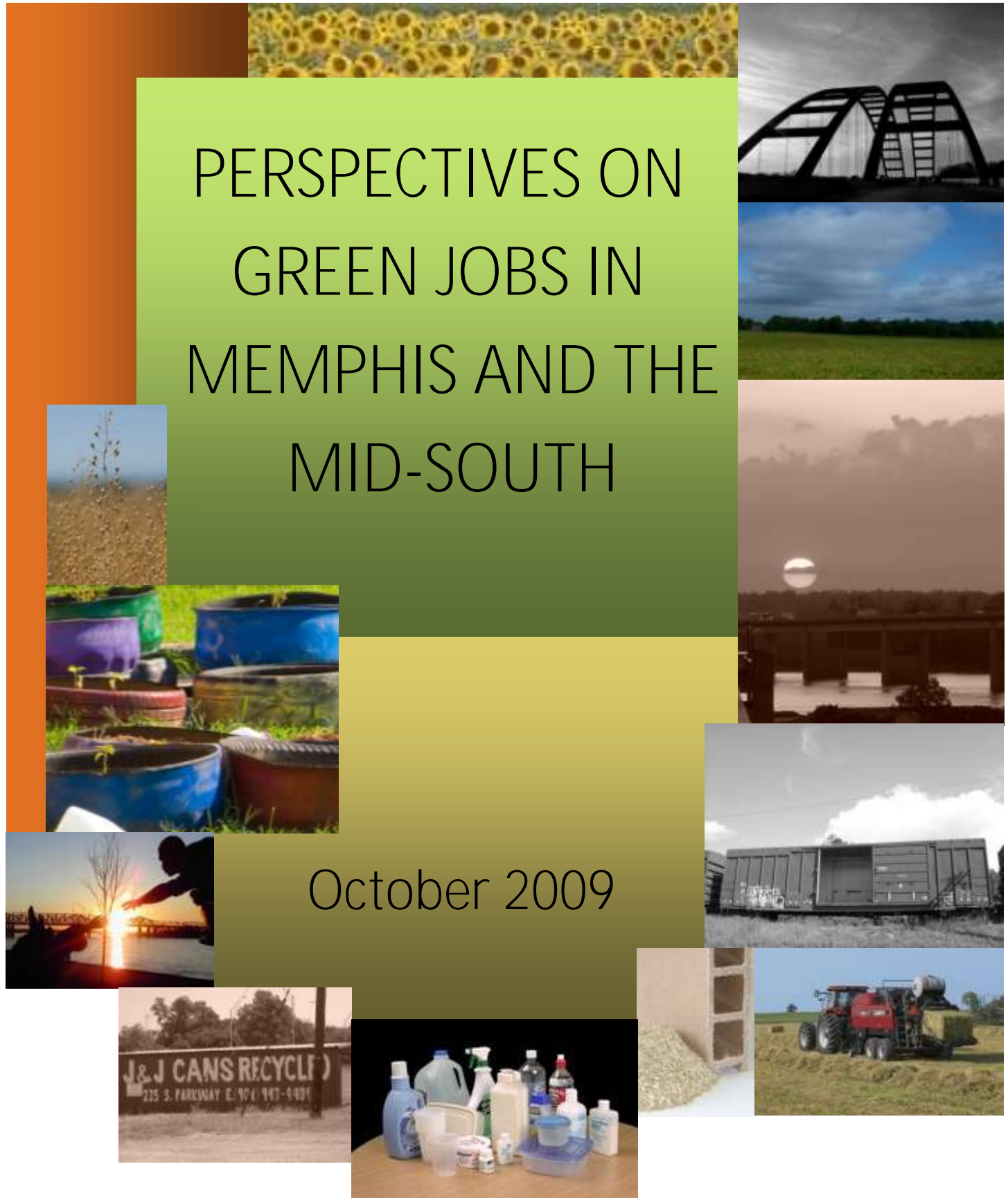


# PERSPECTIVES ON GREEN JOBS IN MEMPHIS AND THE MID-SOUTH

October 2009



*A project of*



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In the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> Century, the world economy changed as a result of the Industrial Revolution which mechanized work and relied on coal and oil to power its machinery.

In the 21<sup>st</sup> Century, we are experiencing an Eco-Industrial Revolution whose magnitude to change the economic landscape surpasses the previous era's. The Mid-South has a pivotal and unique role to play because the region houses all the essential components – land, labor and logistics – to create jobs and reinvigorate both the rural and urban economies using natural resources and existing infrastructure.

The green economy is a major new industry driven by macroforces including: global climate change, population growth, concerns about water shortages, pollution, and waste remediation. The green economy refers to the development of clean, green products, energy efficiency technology.

The global green economy is currently estimated as a \$140 billion industry, and countries around the world have committed more than \$200 billion in recent stimulus spending to promote energy efficiency and use of renewable resources.

The green economy invites a return to the roots of our country through strong agricultural, manufacturing and innovative economies which have prospered for the past 400 years.

The green economy in the Mid-South is a return to the hardworking ethos of the American farmer and the urban industrial base which supplies the country with food, fuel and products. Greening the economy means being good stewards of the land and preserving its bounty for future generations, and securing training and employment for workers across a range of industries.

Building a clean energy economy using renewable resources and strategies for energy efficiency is a thoughtful solution **to America's economic and environmental concerns.** The Mid-South Mississippi Delta region has the building blocks for a thriving biobased economy that will grow over the next two decades because of our regional assets in diverse agriculture, transitional manufacturing potential, logistics and distribution capacity and workforce development in renewable energy technology to train thousands of workers.

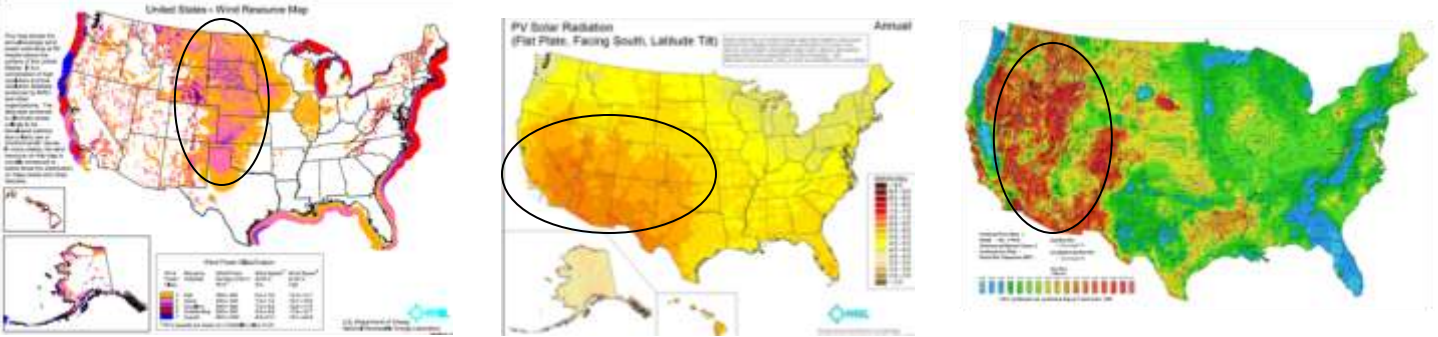
### Key Concepts for the Mid-South Regional Green/Bioeconomy

1. Biomass is the Mid-South's **renewable energy resource.** Regional assets, like the regional landscape, workforce development opportunities, and transitional manufacturing and logistics and distribution capabilities can create sustainable, high-quality jobs.
2. The global green economy is growing rapidly. There are opportunities for both small and big businesses in both rural and urban areas in this sector. In the next decade, the green economy can bring 25,000 new jobs to the region and more than \$8 billion to the economy.
3. Workforce development is a key component for success. Employers need help connecting with skilled and reliable workers as well as with green business incentives.
4. **This economic development strategy is essentially "greening the supply chain" from the farm to the factory,** making locally-grown and produced biobased products and utilizing sustainability principles in building and design.

## Regional Strategic Advantages in the United States:

Each region of the United States has a specific strategic advantage in renewable energy. Identifying and capitalizing on the natural renewable energy resources positions these regions for success in the green economy.

Figure 1: Renewable Energy Resources in the United States

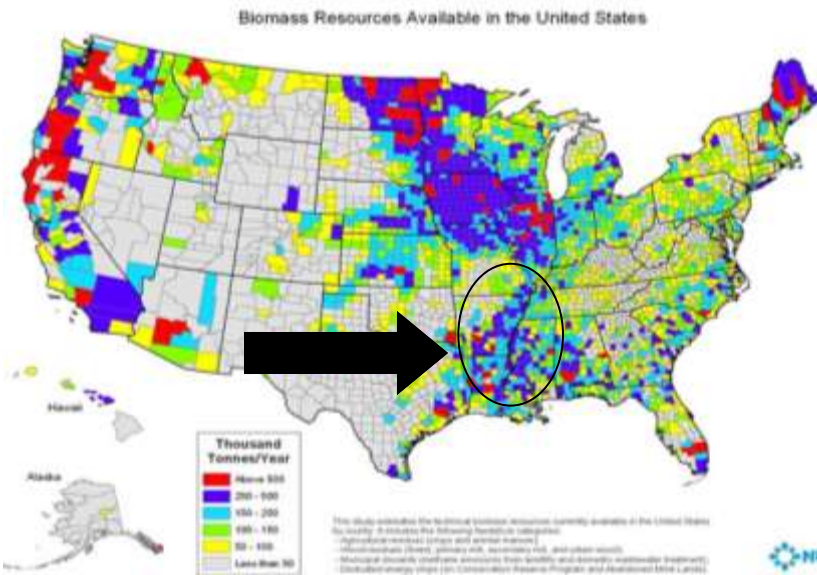


The Southwestern states receive the most direct and greatest amount of sunlight, making this region ideal for harvesting power through solar panels.

Wind resources are strongest in the Great Plains and Northern states. Wind turbine manufacturing is a growing industry, and training in wind farm technologies is emerging as a new field of study. While there is ample wind to harness, the issue of power transmission remains to be solved.

Many Western states have vast geothermal resources as well. Energy from algae may be a possibility in the future, but presently commercialization of this industry is conservatively ten years from deployment.

Figure 2: The renewable energy source in the Mid-South and Mississippi Delta is in biomass.



Of all the renewable energy sources (solar, wind, geothermal), only biomass has the diversity to become an energy supply, a food source and a source of raw materials for products.

According to a recent study by Battelle, The Memphis Bioworks Foundation and BioDimensions, *“Among renewable resource options, biomass stands out as the most flexible resource for economic development, as it can be used to generate energy (heat and electricity) and serve as a sustainable and adaptable feedstock for downstream processing to produce liquid transportation fuels, chemicals and materials. For those regions, such as the Mid-South and Mississippi Delta Region, that are rich in biomass, the future holds a significant opportunity for economic development and growth built around a new biomass production and processing industry.”*

What is BIOMASS? Biomass refers to all parts of living plant material, like field crops and trees in the forest. All parts of the plant matter can have useful functions, including the stalks, the seeds and the residues, in making food, fuel and products. The cheapest and lowest-value usage of biomass is combustion—burning plant material for heat and energy. There are many more high-value uses for biomass, however. There are vast agricultural opportunities in the Mississippi Delta for making biobased products like biofuels, green chemicals, biobased materials like plastics and lubricants, and health and nutrition products.

## Regional Opportunities for Biobased Products



Biobased products are ones made from plant sources rather than petroleum sources. The Mid-South has the opportunity to grow feedstocks – plant material that can be refined and used to make useful products – and create viable economic pathways in agriculture, manufacturing and logistics/distribution. A study of 98 counties in five states surrounding Memphis shows the potential for the green economy in the Mississippi Delta, including:

- \* An \$8 billion biofuels and biobased products economy in the Memphis region which does not affect the food and feed chain
- \* More than 25,000 jobs in the next decade and more than 50,000 within the next two decades in the bio-processing supply chain in both rural and urban areas
- \* Increased biodiversity and new crops which lessen the environmental impact of modern farming by reducing the need for synthetic fertilizers, agricultural chemicals and water
- \* Decreased greenhouse gas emissions
- \* Increased air quality, sustainable raw materials and improved national security

The Mid-South Bioeconomy can bring more than 25,000 jobs to the region in the next decade and over \$8 billion in revenue.

Even through tough economic times, the green economy has continued to expand worldwide.

The green economy is a multi-billion dollar economy internationally, encompassing a vast range of occupations, industries and opportunities. Energy security has been a key driver of the clean economy, given the instability of oil prices and the conflict-prone regions which are the primary petroleum sources. In July this year, the director of the United Nations **Environment Programme, Achim Steiner, discussed the global economic revenue from the green economy:** “A greening of the global economy was underway before the economic crisis and the more than \$3 trillion-worth of stimuli packages. This has been in part driven by the existing carbon markets; the need to combat climate change and the urgency of energy security. Mr Steiner pointed to UNEP’s recent Sustainable Energy Finance Initiative global trends report that shows that in 2008 investment in renewables was \$155 billion, compared with investment in new fossil fuel generation of \$110 billion - **the first time ever.**”

Amid the current economic recession, the cleantech/clean energy economy continued to grow. According to the **New York Times in early 2009,** “The single bright spot was investment in clean-energy technologies. Investors put \$4.1 billion into 277 clean-tech start-ups in 2008, 52 percent more than they invested the year before. Seven of the top 10 biggest deals of the year were in this sector.”

**The Pew Charitable trust found that “the number of jobs in America’s clean energy economy grew nearly two and a half times faster than overall jobs between 1998 and 2007.” They define clean energy as the following:** A clean energy economy generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.

## Beyond Jobs: Energy Independence

In 2007, the United States Congress passed the Energy Independence and Security Act which does the following:

*Move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, and to improve the energy performance of the Federal Government, and for other purposes.*

General Wesley Clark who serves as the Chairman for Growth Energy, an organization dedicated to America's energy independence, recently said that. "Nothing is more important in this time of economic turmoil than creating American jobs that reduce greenhouse gas emissions and help secure our energy independence."

Memphis' own Fred Smith echoed these sentiments as well: "The U.S.'s continued reliance on imported petroleum constitutes, after terrorism, the largest national security risk in front of the U.S. People forget that \$147 a-barrel-oil lit the match that set (the housing slump) off." It is clear that the problems of dependence on foreign oil, a shaken economy with climbing unemployment rates and environmental concerns must be addressed in the near future.

## The Regional Strategy for a Green, Biobased Economy in the Mid-South

### **Immediate: Retrofit and Upgrade Memphis Infrastructure**

The cleanest and greenest energy is the energy that is saved and not used. Energy audits, weatherization and retrofitting of private and public buildings should take top priority. Retrofitting and upgrading existing structures is a long-term investment that will yield returns for many years. Utility-related savings grow over time, with an impressive return on a minimal investment. Existing manufacturing and warehouse infrastructure also needs auditing and upgrading. Memphis can become a world-class transitional manufacturing center for biobased products grown in the region.

### **Intermediate: Making Connections Between Workers, Workforce Development and Education, Employers and Business Incentives**

Programs in Renewable Energy Technology can train and retrain a cohort of new workers in the Mid-South. Training in transitional manufacturing, bioprocessing and management at the vocational and community college level will help prepare the regional workforce in the Mid-South for careers in the emerging green economy.

### **Long-Term: Identifying the Regional Strategic Advantage**

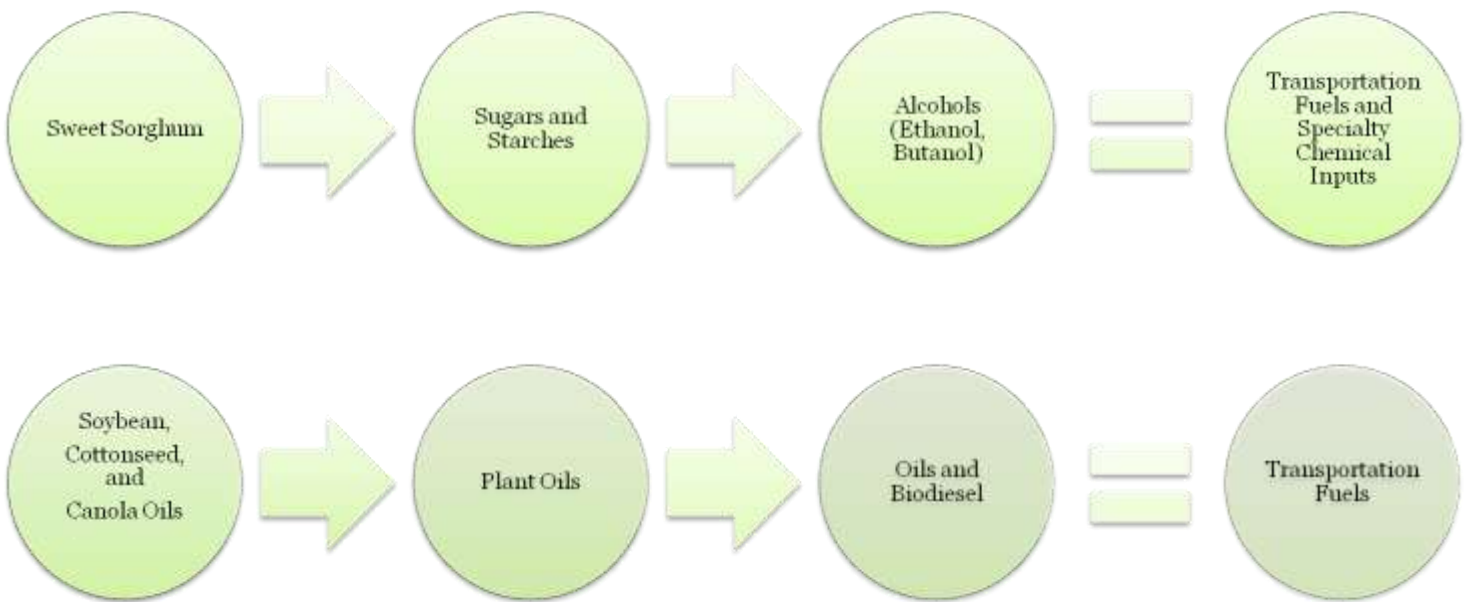
Communities with thriving green economies have done one key thing well: identify their regional strategic advantage in renewable energy assets.

In the Mid-South, the regional strategic advantage is in biomass. Biomass is a collective term referring to "renewable organic matter such as agricultural crops and residue, wood and wood waste, animal waste, aquatic plants and organic components of municipal and industrial wastes." Across the Mississippi Delta – with Memphis as the hub – the alluvial plains serve as one enormous solar panel, capturing the sun's light and energy and converts it through photosynthesis to grow a diverse array of crops.

## The Life Cycle of Biobased Products: Sources, Processing and End Products

Biobased products start as plants, like sweet sorghum, soybeans, canola and sunflowers. Grown in fields, these row crops are harvested and their components transformed through processes like crushing (for oilseeds) to refine the raw material. The plant residue, like stalks and leaves, can be used as well. The high-value material like oil that is derived from plants can be used to produce fuel and products that many people are familiar with, like plastics and fibers for things like car parts, lubricants, and fuels.

Figure 3: Plants to Products



### Sweet Sorghum:

A new energy crop for the Mid-South

**According to Ceres, a leading bioindustry organization,** “Sorghum requires 4 times less water than sugarcane (and) needs less fertilizer, grows rapidly and is easy to plant. This provides a competitive, and often lower, cost for total fermentable sugars — a key consideration in ethanol or other biofuel production.”

**25Farmer Network:** Local farmers growing the crops of the future in West Tennessee

The *25Farmer Network* is pilot program started in 2008 that has brought together a group of West Tennessee farmers assembled to grow new crops, participate in value-added processing, and partner with companies producing biofuels and biobased products. Memphis Bioworks Foundation and BioDimensions are currently working to expand this network into the surrounding region as a key component toward developing a strong regional bio-economy.

Sweet Sorghum, Whiteville, TN

# The Biobased Economy in the Mid-South and Mississippi Delta

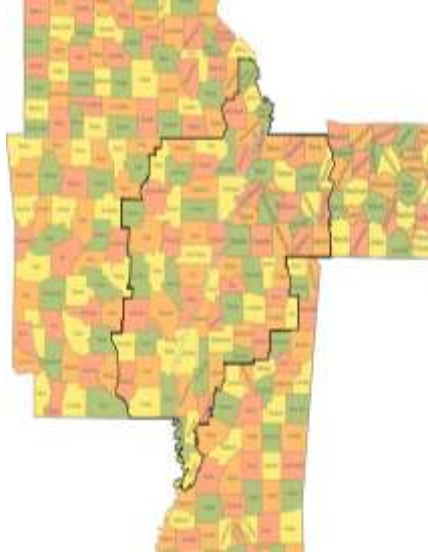
## STEP 1

Farmers grow crops (like miscanthus, sunflowers, sweet sorghum and rapeseed) in rural areas of the Mid-South and Mississippi Delta.



## STEP 2

Regional decentralized processing facilities convert raw materials into transportable forms, like liquids and fuels.



The Mid-South Mississippi Delta can support upwards of 200 such facilities over the next two decades, creating 50,000 new jobs and bringing more than \$8 billion to the local economy.

## STEP 3

Processed materials (like liquids) are brought to centralized manufacturing hubs and made into products like nutraceuticals, biobased plastics, and food products.



Achieving success in a regional bioeconomy and greening the supply chain requires several important steps:

Decentralized workforce development programs throughout Shelby County in partnership with existing programs of excellence in the region to train skilled and reliable workers for jobs in bioprocessing and manufacturing.

Eco-entrepreneurs and green venture capital funds and incentives for small and big businesses to establish pilot sites and upgrade existing infrastructure in both urban and rural areas in the region.

Points of entry for consumers to buy locally grown and made products, including marketing, retail and services.

## STEP 4

These products supply the needs of the Mid-South and Mississippi Delta region, creating value-added products, jobs in small businesses and large manufacturing operations, and supplying the rest of the country and the rest of the world with goods grown, made and produced locally with our superior regional logistics and distribution.



The pioneering efforts of George Washington Carver in creating biobased products from peanuts and sweet potatoes are evidence that this biobased strategy for the Mid-South harkens back to wisdom and established knowledge that agriculture is a way forward for all people in the South.



*“I believe the Great Creator has put ores and oil on this earth to give us a **breathing spell**...As we exhaust them, we must be prepared to fall back on **our farms, which are God’s true storehouse** and can never be exhausted. For we can learn to synthesize materials for every human need from the things that grow.”*



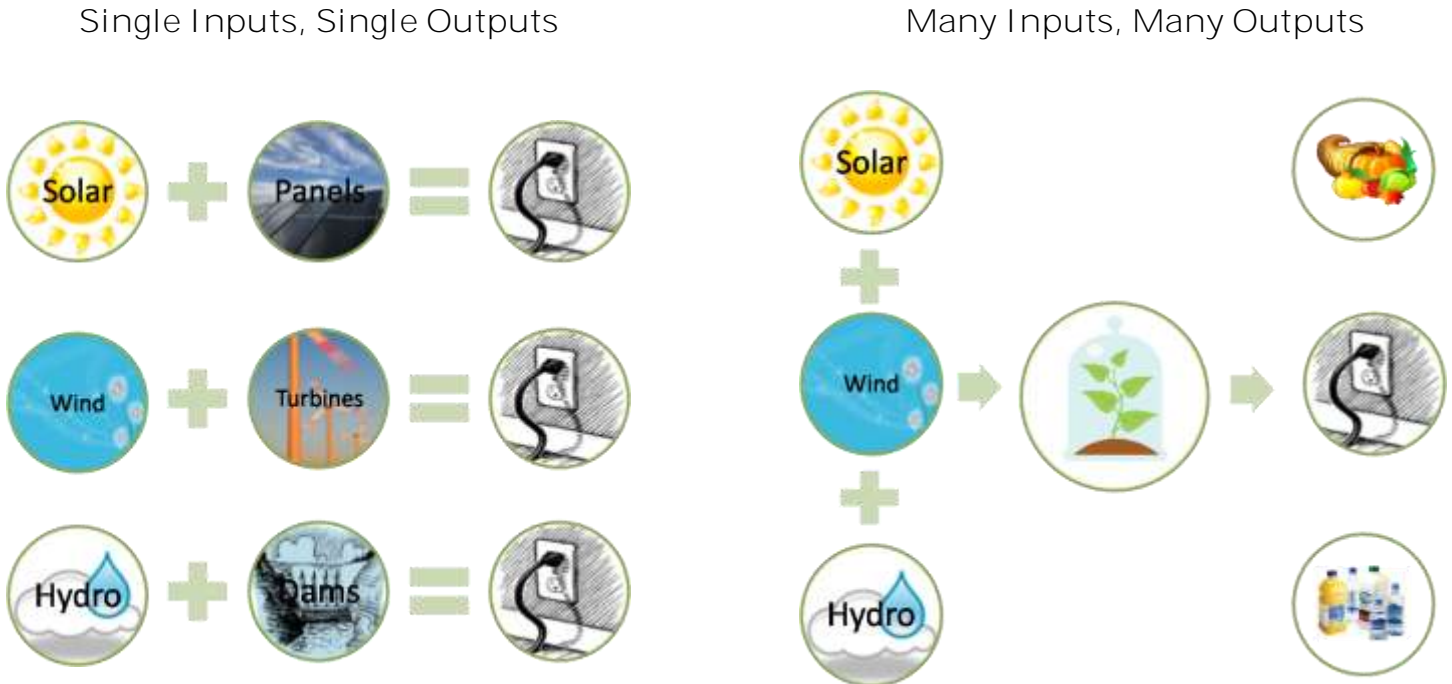
Oil from sunflowers can be used to make agrichemicals, adhesives, plastics, fabric softeners, lubricants and biodiesel. The climate in the Mid-South is ideal for growing this crop, and a growing number of local farmers are testing this commodity for yields and potential applications.



## Biomass Diversity

Whereas other renewable energy sources like solar, wind and hydro can only be used to create electricity, biomass has the potential for creating not only renewable energy, but liquid fuels, biobased products as well as food.

Figure 4: Inputs and Outputs



## Strategic Recommendations

- \* Pursue near-term opportunities in the emerging regional green economy. These include residential and commercial weatherization upgrades and retrofits to increase energy efficiency and decrease energy-related costs. Toxic site remediation, including brownfields and superfund sites, vacant lots and urban pollution is also a key component to readying the environment for a thriving green economy.
- \* Expand workforce development programs in renewable energy technology and transitional manufacturing. Career pipelines in primary and secondary education can ready a skilled and reliable workforce ready to lead in the local green economy.
- \* Establish an office of sustainability to coordinate local and regional green efforts. This office will serve as a clearinghouse for events, education, incentives and programs in the community.
- \* Incentivize small and large green businesses. Seed funds and investment capital are needed in the region to grow the green economy, including regional bioprocessing and urban infrastructure.

## What are green jobs?

Green jobs in Memphis and the Mississippi Delta are rooted in a biobased economy and promote the highest value for workers, wages and products. Additionally, the timeline for building the green economy is immediate and long-term.

In the short term, green jobs can put people to work in environmentally-responsible occupations that benefit local communities – jobs like energy audits and weatherization, brownfield remediation and manufacturing infrastructure upgrades and retrofits – and that promote economic self-sufficiency and community well-being. The long-term strategy is to green the supply chain from the field to the factory in the Mississippi Delta, creating value-added products which revitalize agriculture, manufacturing, business and distribution by creating career pathways and stable jobs in the bioeconomy.

Green jobs exist in small businesses as well as large industries, utilizing our regional strategic advantages of diverse agriculture, transitional manufacturing and superior logistic and distribution capabilities. Green jobs in Memphis and the Mississippi Delta are rooted in a biobased economy and promote the highest value for workers, wages and products.

The White house definition states that: *"Green jobs are jobs that provide products and services which use renewable energy resources, reduce pollution, conserve energy and natural resources and reconstitute waste."* Industry and occupations in the green economy vary by region due to the differences in renewable energy assets – like wind, solar and biomass – that are found across the United States.

## A green job in the Mid-South is one that:

- \* Maximizes near-term and long-term opportunities based on the regional strategic advantages of land, labor and logistics;
- \* **Utilizes the region's renewable energy resource** – biomass – to create high-value products and drive an ecologically-responsible service industry;
- \* Trains workers in entry-level through advanced-degree occupations through regional workforce development programs in renewable energy technology;
- \* Supports eco-entrepreneurs, innovators and investors with government and business incentives;
- \* Promotes adaptive reuse of both rural and urban structures;
- \* Improves environmental quality of natural resources, like air, water and land;
- \* Increases energy efficiency in homes and businesses;
- \* Reduces the carbon footprint of the regional supply chain.

**Bioeconomy:** the economic activity derived from scientific and research activity focused on understanding mechanisms and processes at the genetic and molecular levels and its application to industrial process.

**Cleantech:** knowledge-based products or services that improve operational performance, productivity, or efficiency while reducing costs, inputs, energy consumption, waste or pollution.

**Green-collar jobs:** blue-collar jobs in green industries which provide entry-level work to people with employment challenges.

Research from the Pew Center also identifies five occupational job categories in the green economy:

- \* Clean energy jobs, businesses and investments in the production, transmission, storage of renewable energy sources.
- \* Energy efficiency jobs and businesses help people reduce energy consumption.
- \* Environmentally friendly production includes greening the supply chain, from transportation, manufacturing, construction, agriculture, energy production and materials.
- \* Conservation and pollution mitigation includes remediation and preservation of natural resources, like water, land and air.
- \* Training and support for the cleantech economy is an essential component for developing a reliable and skilled workforce across the spectrum of job opportunities ranging from entry-level to advanced degrees.

The following table shows entry points into the green economy in low, medium and high barrier-to-entry industries. Many people in Shelby County and the Mississippi Delta are eligible for training in low barrier-to-entry jobs, and many already have the skills and experience to gain employment in low or medium barrier-to-entry jobs. Additionally, these are not static categories. Additionally, with experience and increased education and training, workers can gain employment in higher-paying and higher-skilled jobs.

The Mid-South region notably has difficulty in retaining workers in the “creative class.” Because the green economy incorporates jobs for people with advanced degrees, there is a greater likelihood that these workers will keep their talent and assets local as employment in the bioeconomy increases.

Figure 5:  
Education and employment in low, medium and high barriers to entry occupations

Barriers to Entry	Education Level	Industry/Work	Average Annual Salary	Classification
Low	High School up to 2-Year Degree	<b>“Green Collar Jobs”</b> Home energy audits Solar Panel Installation	\$17,958 - \$24,726	<b>“Green collar jobs”</b> (Blue collar jobs in green industries)
Medium	2-Year Degree Certification Special/unique skill set	Biofuels plant manager	\$31,238	<b>“Knowledge economy”</b>
High	4-Year Degree PhD MBA	Organic chemistry <b>“green chemistry”</b>	\$47,373 - \$58,786	<b>“Creative class”</b>

## Green Jobs Principles

In addition to the core definition, there are three themes that comprise green jobs. The following ideas describe important aspects of the green economy:

### Labor practices and standards

- \* Provide wages that promote economic self-sufficiency
- \* Require a unique skill set
- \* Hire locally for employment
- \* Employ people with high barriers to entry, like those with prior convictions, low educational attainment levels, prolonged experience of poverty and isolated communities.

### Regional economic factors

- \* Are place-based, meaning they exist in rural, suburban and urban areas
- \* Promote a triple bottom line (people, planet and profit)
- \* Create pathways out of poverty through job training and career ladders

### Environmental consideration and renewable energy assets

- \* Utilize local and regional assets, like people, technology, existing infrastructure and renewable energy sources
- \* Improve or remediate environmental quality

## Labor Practices and Standards

Proponents of the green economy feel that jobs in green businesses and industries should promote economic self-sufficiency, or the ability for an individual to support him or herself (and a family) on the salary they earn at work. **Alternately, this concept is worded as “living wage” or “family-supporting” jobs.**

## Barriers to Entry

This idea is embedded in the labor practices and standards component of green jobs because of its conceptual proximity to the goal of poverty reduction through increased employment in segments of society currently and historically beset by structural and social obstacles that decrease labor participation. Simply put, people who have had trouble finding and keeping jobs in the traditional economy should not be excluded from the workforce in the emerging green economy. Individuals with high barriers to entry into the workforce are those with any or all of the following qualities: History of incarceration; Poverty status; Low educational attainment; Out of the labor force for a long time; and/or Geographically isolated. These qualities are not mutually exclusive and it is likely that an individual may have multiple barriers to employment.

### Green Jobs vs. Green-Collar Jobs

Jobs in the green economy which are particularly suited for workers with little experience and low levels of education – those in the low-barriers-to-entry category – are also called green collar jobs. All green jobs are not green-collar jobs, however. Workers in medium- to high-barrier-to-entry occupations are also needed and valued in the green economy. Researchers, technicians and managers, for example, reflect the pool of workers with four-year, graduate and professional degrees whose skills are essential. Eco-entrepreneurs with access to venture capital play an important role in seeding new green businesses and incubating ideas.

## Environmental considerations

Green jobs by definition must contribute to the improvement or remediation of the environment. Cleanup of hazardous sites, home improvements that improve energy efficiency, reforestation and recycling are some examples of green work. Farming, whether on a large or small scale, also can be considered green, especially when it contributes to a local food opportunity, or using plants as an energy source or to create products as a replacement for petroleum.



The U.S. Conference of Mayors lists the following as sectors of the green economy:

- \* Renewable Power Generation
- \* Agriculture and Forestry
- \* Construction & Systems Installation
- \* Manufacturing
- \* Equipment Dealers & Wholesalers
- \* Engineering, Legal, Research & Consulting
- \* Government Administration

## Measuring green job creation

We measure job creation and workforce characteristics, like wages and benefits and economic impact with the following criteria:

- \* New or existing businesses or designated divisions manufacturing products utilizing a high percentage of renewable raw materials (versus extracted raw materials, decrease the use of chemicals in agriculture production, or uniquely encourage local production/consumption), introducing substantially cleaner manufacturing processes (enzymes vs. acid), or manufacturing that substantially reduces emissions, water or energy use, or a manufacturing a product that is utilized in renewable energy or related markets (solar panels) as its primary business.
- \* A business or a designated division that utilizes a renewable product (solar panels, bio-based cleaners, soy ink) as its primary business and requires a special or unique skill set.
- \* A business or dedicated division that derives its primary income by collecting and/or recycling any product/residue that would otherwise enter the landfill or wastewater systems and/or add value to said product.
- \* A business or dedicated division that derives its primary income from services that include environmental remediation, non-toxic processes, energy efficiency – clean up messes or provide services that supplant.
- \* Businesses that introduce cleaner technologies (composting) as an integral part of their mission.
- \* Derives its primary income from providing services toward environmental remediation, increasing energy efficiency, and the development of green lots/spaces.
- \* Businesses that provide unique transportation solutions or reduce emissions.

In the report, “Green Collar Jobs,” researcher Raquel Pinderhughes outlines twenty-two types of green industries:

Figure 6: Pinderhughes categories of green occupations

Bicycle repair and bike delivery services	Car and truck mechanic jobs, production jobs, and gas station jobs related to biodiesel, vegetable oil and other alternative fuels
Energy retrofits to increase energy efficiency and conservation	Food production using organic and sustainably grown agricultural products
Furniture making from environmentally certified and recycled wood	Green building
Green waste composting on a large scale	Hauling and reuse construction and demolition materials and debris (C & D)
Hazardous materials cleanup	Green (sustainable) landscaping
Manufacturing jobs related to large scale production of green products and technologies (biobased products, solar panels)	Materials reuse/producing products made from recycled non-toxic materials
Non-toxic household cleaning in residential and commercial buildings	Parks and open space maintenance and expansion
Printing with non-toxic inks and dyes and recycled paper	Public transit jobs related to driving
Recycling	Solar installation and maintenance
Tree cutting and pruning	Peri-urban and urban agriculture
Retrofits to increase water efficiency and conservation	Whole home performance



## Adaptive Reuse and Green Building

As the Memphis region confronts the challenge of growth, especially in suburban areas, developers and entrepreneurs are increasingly turning to the sustainability principle of adaptive reuse.

Adaptive reuse is utilizing existing structures—residential, commercial and industrial—rather than building new ones. Many older buildings are energy inefficient, but still have historic value and useful longevity. Rather than tearing down old structures, architects and planners are repurposing existing buildings by making improvements that increase energy efficiency, preserve aesthetic value and render the structures useful. The principle of adaptive reuse preserves the existing environment since new ground is not broken while employing workers to make structural upgrades.

LEED (Leadership in Energy and Environmental Design) certification is also a means by which businesses can become greener. LEED is a nationwide building standard created by the U.S. Green Building Council. LEED is a ratings system for new and existing buildings and for upgrades and retrofits to residential and commercial buildings. Buildings can be rated as Certified, Silver, Gold and Platinum with each successive level requiring a greater investment in design sustainability in the areas of sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation and design process. LEED has standardized green building codes for construction across the country.

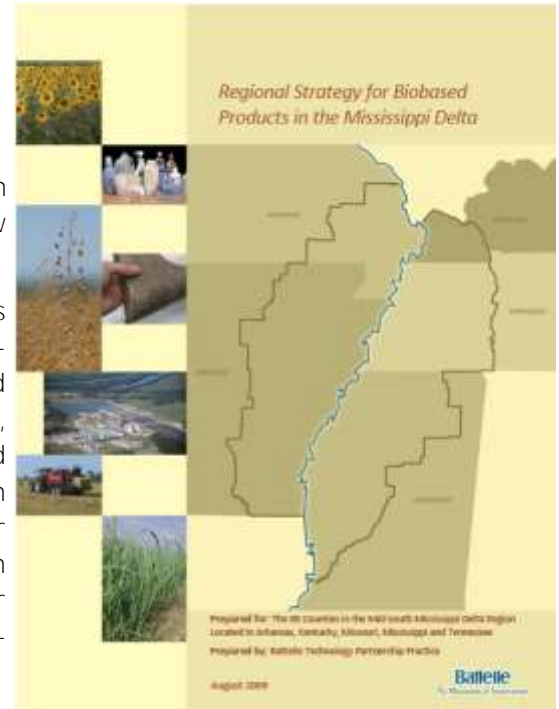
## Greening the Delta Supply Chain:

### The Regional Strategy for Biobased Products in the Mississippi Delta

Over the next decade, green jobs in biomass industries in the Mid-South and Mississippi Delta region have the potential of creating 25,000 new jobs.

The green supply chain starts in the fields of the Delta region where crops can be grown by farmers for food, fuel and products. Using the sustainability principle of adaptive reuse, existing infrastructure can be modernized to function as bioprocessing facilities for the crops, employing technicians, operators and managers. The materials will then need to be transported throughout the region to manufacturing and distribution centers which can be shipped throughout the country and the world, or kept at home for local use. Small businesses in niche industries can supply the region with local food, products and services. Existing businesses can become greener through retrofitting and upgrading buildings and employing green strategies like recycling and energy conservation.

Memphis and Mississippi Delta have the potential of becoming the nation's greenest region. **Accomplishing this will require a comprehensive strategy that involves workforce development and education in renewable energy technologies and transitional manufacturing, support for eco-entrepreneurs and a regional green infrastructure.**



## Sustainable Shelby: A Future of Choice, Not Chance

This project is a a Shelby County Government initiative that aggregates community priorities about sustainable growth and development. Founded in 2008 by Shelby County Mayor AC Wharton, this program has developed a set of community-ratified goals in the following areas: Building Codes; Environment and Natural Resources; Land Use and Development; Public Buildings and Purchasing Policies; and Transportation and Traffic.

Each committee enumerated specific recommendations which were then prioritized for implementation.



## BRIDGES USA: A community leader in green building, workforce development and environmental sustainability

The core mission of BRIDGES USA is to build a community of leaders to address racial, economic, educational and environmental justice in the Mid-South. Their facility, described as a **juxtaposition of “functionality and pedagogy” exemplifies sustainable design. The O2E program—Ordinary to Extraordinary—is a regional best practice in environmental sustainability giving participants the opportunity to consider their own environmental impact and tangible ways to make a difference in the community.**



Photo Credit: BRIDGES USA

## Survey Framework

In 2007, Dr. Raquel Pinderhughes provided an assessment of the green business community in Berkeley and Oakland, California. This study provided a framework for evaluating green businesses in Shelby County. While the economies and industries in Shelby County and the Bay Area differ in significant ways like geography and demography, their green small businesses and industries also have many overlapping needs.

The purpose of this survey is to assess the current status of green businesses in the Mid-South and answer the following questions:

- \* How many green businesses exist in our community?
- \* Are jobs in the green economy good jobs?
- \* Are these jobs available for the current workforce in Shelby County?
- \* What do green businesses need to succeed?

Nearly 50 green businesses in Shelby County completed surveys about their company's needs and practices. Among the findings were:

- \* Respondents cover a broad range of businesses and industries
- \* Nearly two-thirds of respondents indicate that they provide unique services in our community
- \* Over half are private businesses serving residential customers employing fewer than five people
- \* Many businesses provide wages above the current living wage (\$12 without benefits)
- \* Most businesses provide on-the-job training
- \* Nearly half indicate that their employees need only a high school degree
- \* Nearly all respondents do not have a formal relationship with a workforce development agency in the community, and more than half report that they would like to have such a relationship.

Few respondents actually use federal or state incentives, and many are unaware of the incentives available for businesses in green industries.

Most jobs could be considered green jobs if they fulfill the basic requirements of providing economic self-sufficiency and environmental benefit. However, some jobs and businesses may be more naturally green than others. In quantifying green jobs, we utilized a list of twenty-two categories outlined in *Green Collar Jobs* as the basis of the business survey.

Most respondents were selected from participants in regional Green Business Expos and community forums, and others were selected from business databases based on the twenty-two green job categories.

The Pinderhughes green jobs assessment addressed the following questions:

- \* To what extent are **green collar jobs “good jobs”**?
- \* To what extent are green collar jobs suitable for workers with barriers to employment?
- \* Are women and men with barriers to employment interested in green collar jobs?
- \* To what extent are green business employers willing to hire workers with barriers to employment for green collar jobs in their firms?
- \* Are the sectors and businesses that provide workers with green collar jobs growing?
- \* What strategies and programs would be needed to grow the green business sector and increase green collar jobs?
- \* What strategies and programs would be needed for Memphis to ensure that workers

## Chart 1: Green business industries

The following chart lists the categories of businesses that participated in the green jobs survey in Shelby County. The **largest category of “Other” encompasses many kinds of businesses: Biodiesel manufacturing; Recycled products manufacturing; Residential, Commercial and Industrial Energy Audits; Local food growers; and Neighborhood cleanup.**

Which industry best describes your business?

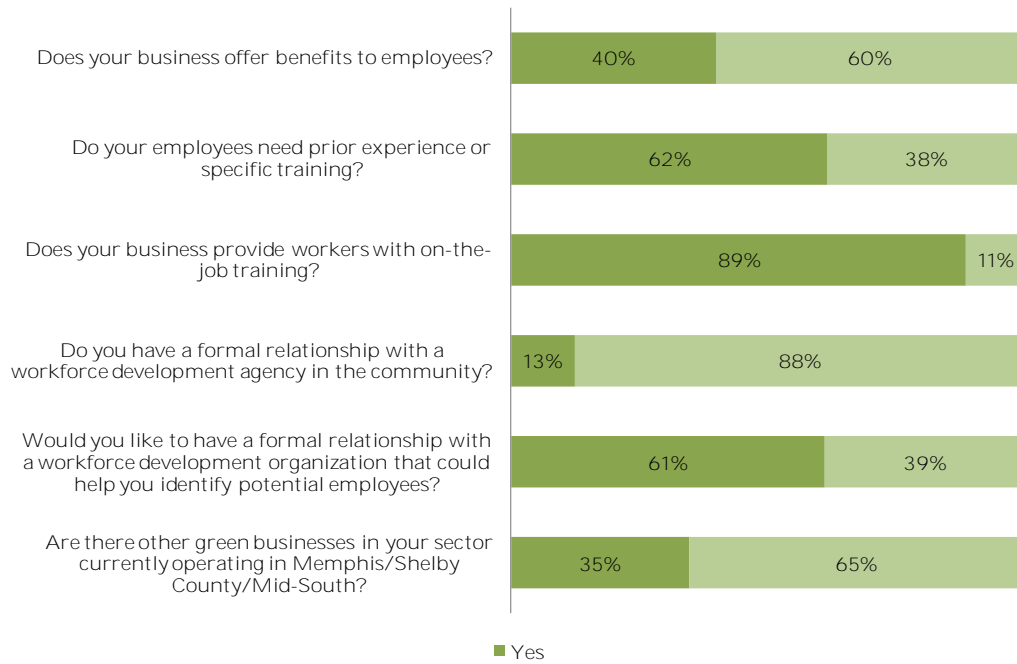


**“I started Midtown Logging and Lumber Company for two reasons. First, as a custom woodworker, I love to use native hardwoods in my work. Second, as a conservationist, I’m interested in seeing natural resources put to good use rather than waste.”**

Scott Banbury, Founder of Midtown Logging and Lumber

## Chart 2: Shelby County Green Business Survey Questions

Two-thirds of green businesses surveyed provide unique services in the Mid-South.



More than 3 in 4 green businesses surveyed do not have a formal working relationship with a workforce development agency.

Two in three green businesses would like to work more closely with workforce development and staffing agencies in Shelby County.

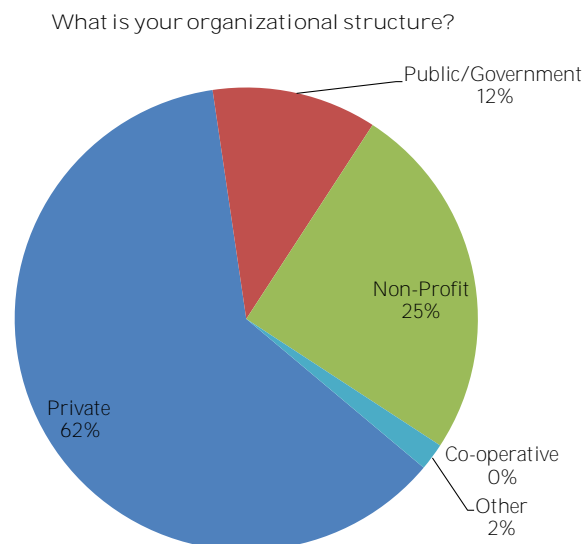
Nearly 9 in 10 green businesses surveyed provide on-the-job training for their employees.

Slightly more than half of the businesses surveyed require their employees to have some prior experience or training.

Slightly more than a third of green businesses surveyed provide benefits to their employees.

## Chart 3: Business Ownership

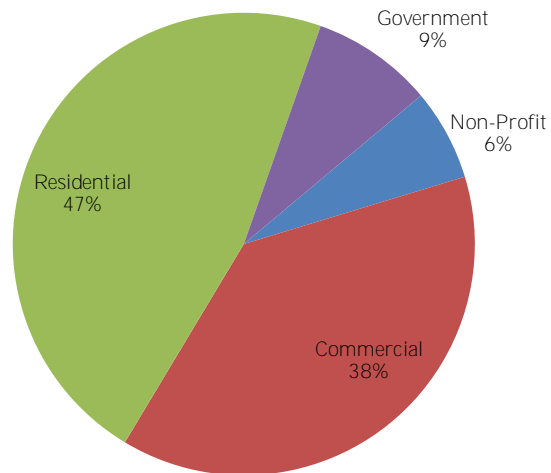
Over half of green businesses are privately owned. Green businesses and organizations in Shelby County are distributed between Private, Public and Non-Profit.



What is the primary client group served by your business?

Chart 4: Most green businesses provide residential services.

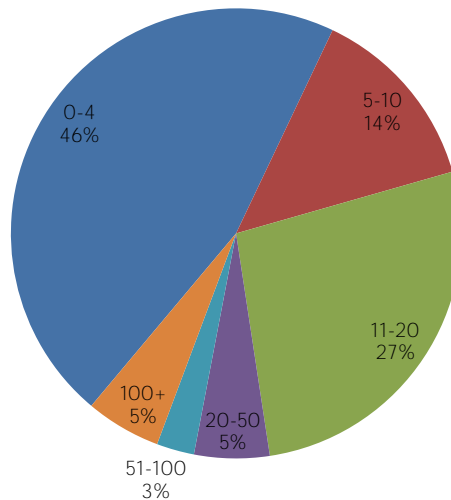
Commercial clients are the next largest group. Government and Non-profit clients comprise the smallest share of service provision.



How many people do you employ?

Chart 5: Most green businesses in Shelby County are small businesses employing four or fewer people.

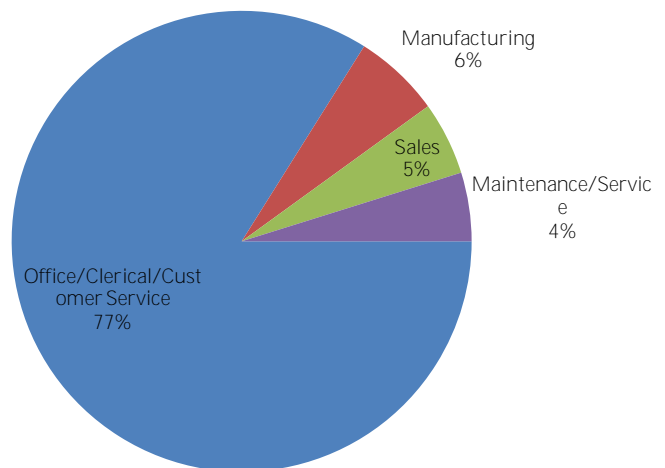
A third of businesses employ between five and fifteen people. Large businesses with many employees, i.e., those employing fifty or more workers, represent a small share of the respondents to this survey.



Of your total employees, how many are:

Chart 6: The vast majority of employees in green businesses serve as office or clerical staff.

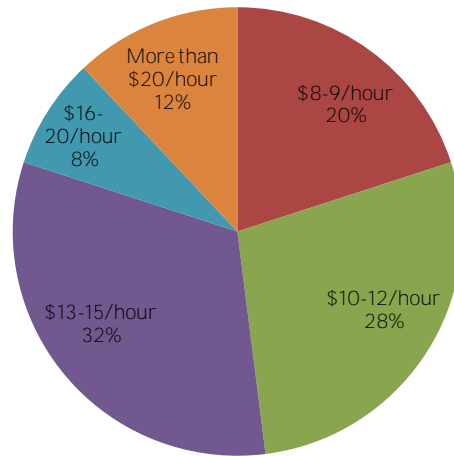
Roughly equal numbers of employees work in manufacturing, sales and maintenance or service.



### Chart 7: Green jobs in our community are good jobs.

Jobs in green businesses in Shelby County pay at or above prevailing wages.

Hourly Wage Range



Wages and income are connected to community well-being. Income is also correlated with education. Many green jobs in the Mid-South provide family-supporting wages, and many educational institutions are adding coursework and degree programs in green industries. While green jobs at present represent a small share of the overall Mid-South economy, those that do exist are quality jobs, and the green jobs small business sector is likely to grow in the next few years. By increasing educational opportunities for people in the Mid-South pursuing careers in green jobs, in the next few years we can have a trained and reliable workforce .

What level of education do you prefer your employees possess?

### Chart 8: Most respondents have green-collar jobs available for employees in Shelby County.

Nearly half of employers who responded to this survey prefer that their employees have a high school diploma or general equivalency degree. Roughly 1 in 4 employers prefer that their employees hold a four-year degree.

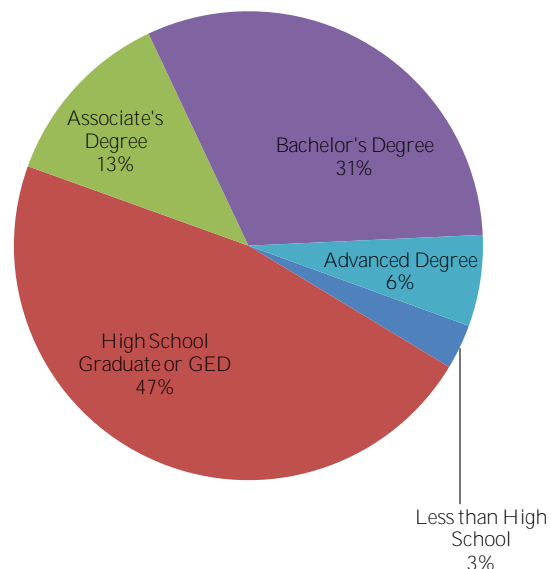


Chart 9: A third of working-age people in Shelby County currently have enough education to gain employment in green-collar jobs.

However, a fundamental disconnect still exists between potential workers and employers. Finding solutions for connecting employers with workers remains one of the biggest challenges in the Mid-South.

Educational Attainment by Age Group in Shelby County (ACS 2005-2007)

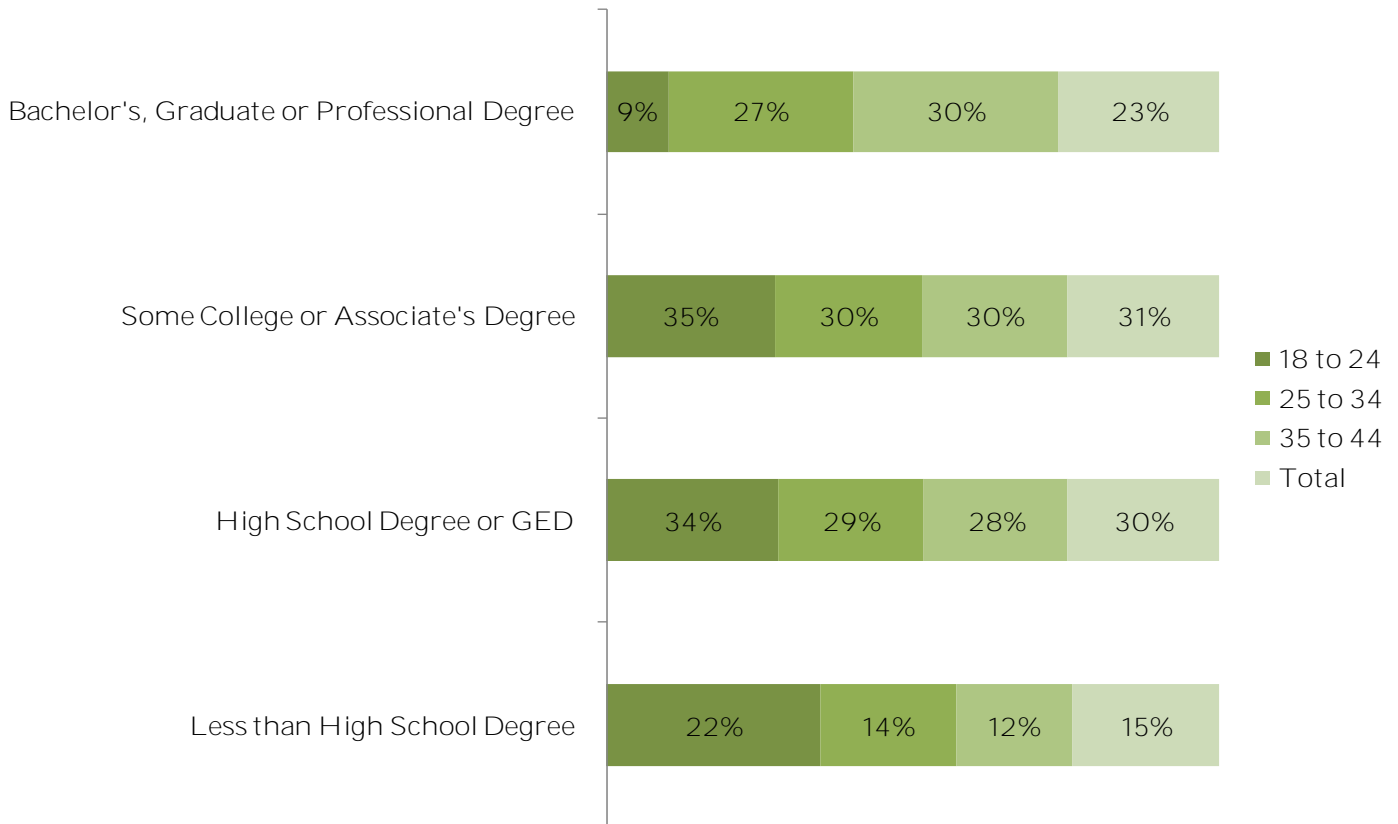
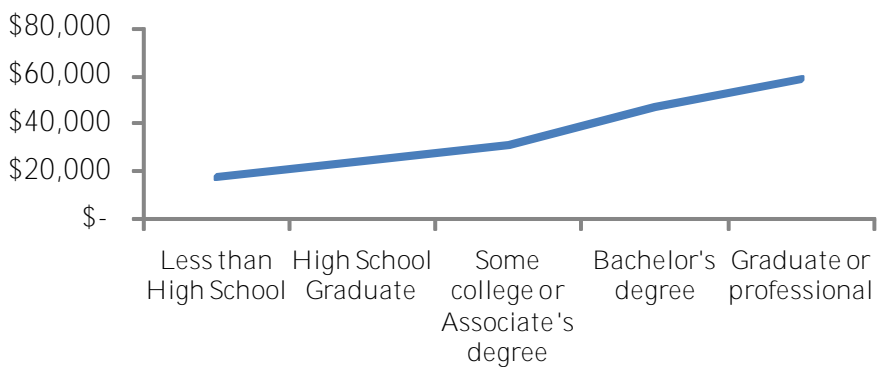


Chart 10: Income is strongly associated with educational attainment.

People who have completed more years of schooling have correspondingly higher annual incomes. A person with less than a high school education can expect to earn an annual income on par with national poverty rates. In Shelby County, about 1 in 5 people fit this description. By completing high school, a **person's annual income increases to** above the poverty level. About 1 in 3 Shelby County residents fall into this category. With some college or an **Associate's degree, a worker in Shelby County makes twice the amount as s/eh would with less than a high school degree.**

Income increases with educational attainment (Shelby County, ACS 2005-2007)

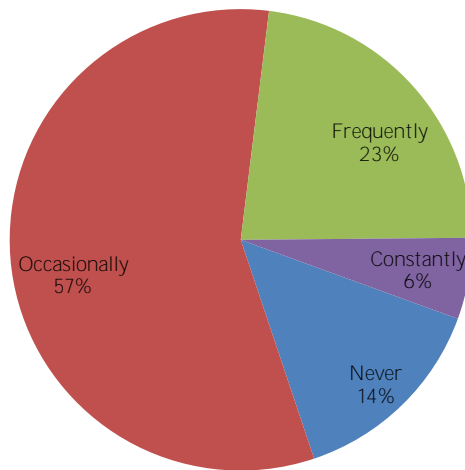


Many educational opportunities in green programs and renewable energy technologies on the horizon in the Mid-South offer vocational or Community College training that would lift workers out of poverty.

### Chart 11: More than half of respondents reported that they occasionally have difficulty finding qualified workers.

More than a quarter of green businesses regularly have trouble finding qualified workers for their green businesses. Green business employers who never have trouble finding workers are in the minority. Connecting businesses with staffing and workforce development agencies is of considerable importance to creating a strong green business community.

How often do you have difficulty finding qualified workers?



### Chart 12: The vast majority of green businesses evaluate their employees through performance-based review.

For workers in the green-collar jobs, performance-based review is particularly important. Workers in low-barrier-to-entry jobs may have exceptional performance in their work duties but lack literacy skills essential to show proficiency in a paper-based assessment. Performance-based review allows the workers to demonstrate their work skills without being penalized for problems with literacy.

How are your employees evaluated?

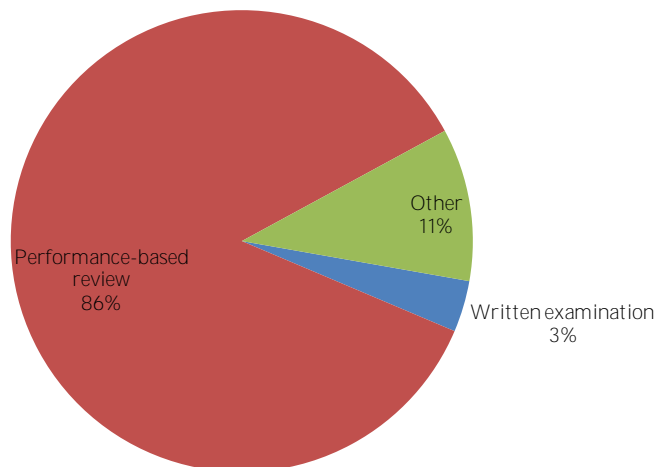
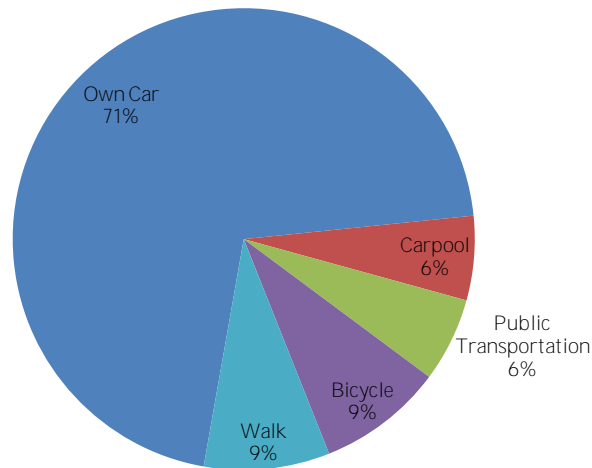


Chart 13: Most people who work in green industries in our community use their own car to get to work.

1 in 5 travels by bike or by walking to work. A smaller share of workers use public transportation or carpool to get to work.

How do your employees travel to/from work?



Presently in the Mid-South, private transportation is nearly essential for commuting to work. Workers in the green economy, especially those in the green-collar economy, would be well-served with an energy efficient and accessible public transportation system. The Greater Memphis Greenline is slated to encircle Memphis, providing trails for bike commuters. A light rail system has been proposed, and all of the MATA buses run on a biodiesel blend. However, in spite of the green progress made in transportation options in the Mid-South, private vehicles remain the primary means of getting to and from work.



Margot McNeely, Founder of Project Green Fork, with Clovernook cups at Sustainable Technology Awareness Day at The University of Memphis

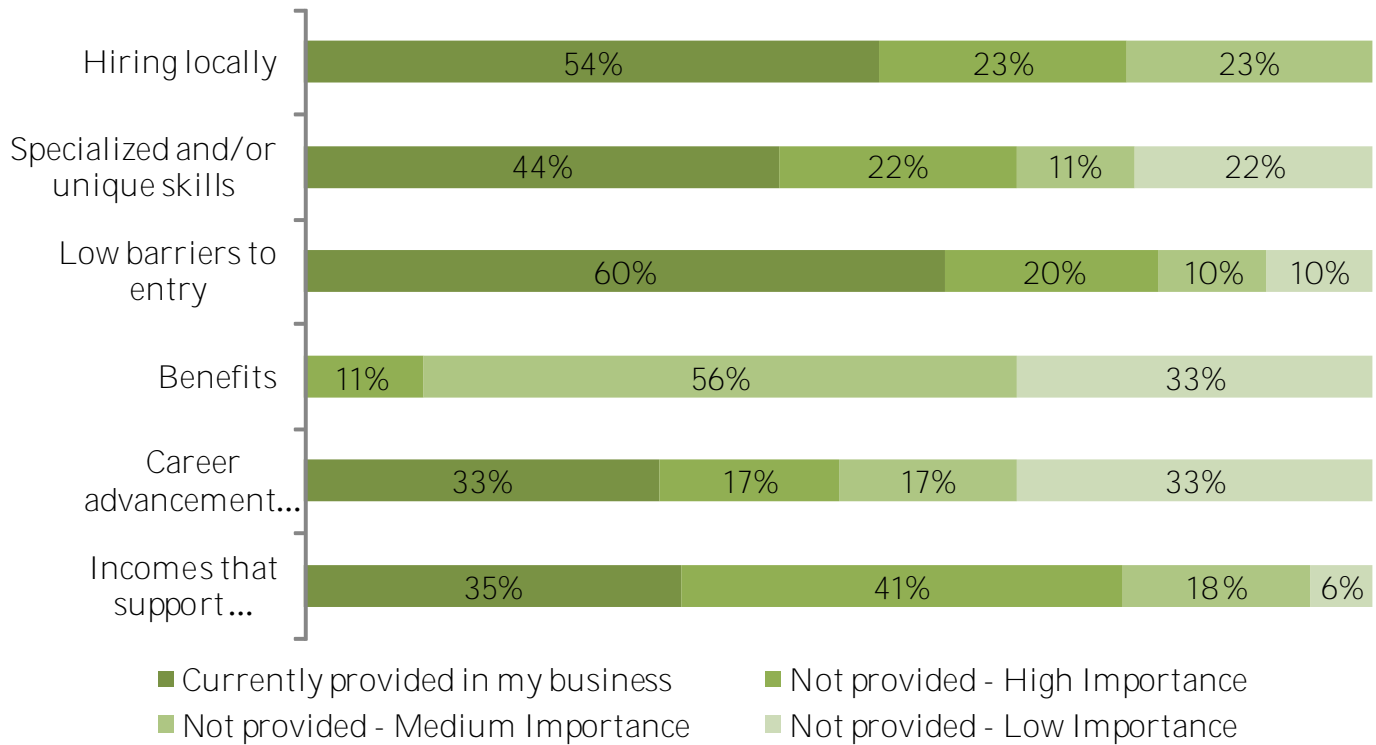


Another example of the green economy in the Mid-South is the Clovernook Center for the Blind and Visually Impaired. Clovernook employs people with visual limitations to assemble biodegradable paper products. The disposable coffee cups produced at their warehouse decompose in a month and thus decrease the amount of waste produced, and the workers are paid wages that are well-above minimum wage and are family-supporting.

## Chart 14: Local green businesses share many priorities.

Half of respondents currently hire locally, require specialized and/or unique skills and provide jobs with low barriers to entry. A third of respondents currently have career advancement opportunities for their employees and provide incomes that support economic self-sufficiency.

The following are a list of characteristics of green jobs.  
Please rate their importance to your business.



## Existing businesses going greener

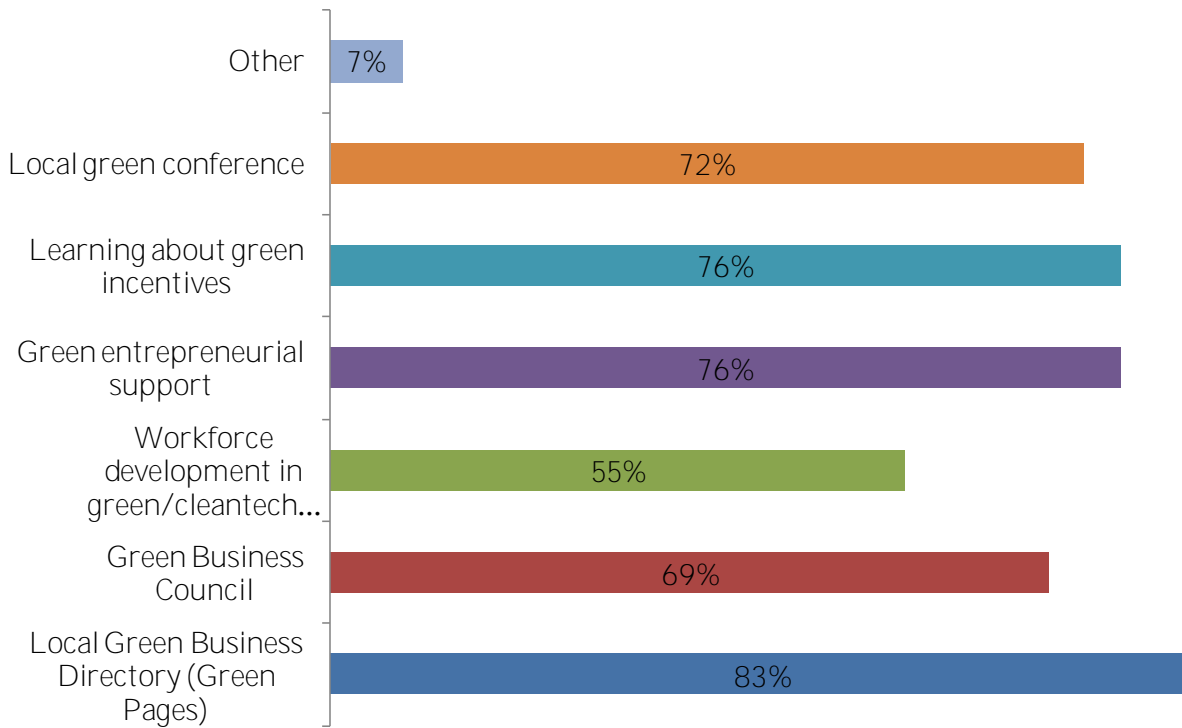
Most existing businesses, nearly regardless of their purpose, can become greener and more environmentally-friendly. A local example of greening existing businesses is the work of Project Green Fork which assists restaurants in becoming more environmentally friendly. Among their guidelines are the following:

- \* Complete MLGW audit and take necessary steps to reduce energy and water consumption
- \* Have sustainable products in place
- \* Set-up recycling program
- \* Kitchen composting
- \* Replace toxic cleaners with non-toxic cleaners
- \* Pollution Prevention



Chart 15: Local green businesses desire further assistance in developing the green economy in the Mid-South. Among the helpful strategies presented, 4 of 5 respondents would find a green business directory helpful. More than two-thirds would participate in a green business council, and 3 in 4 would like more information about green business incentives.

Looking to the future of green businesses in our community, please indicate any or all of the following endeavors that you think would be useful in promoting and/or supporting existing and emerging businesses.



### Key Findings

- \* Green businesses already play a key role in the local economy. They provide quality employment for many types of workers from a variety of educational backgrounds.
- \* Local small green businesses have room to grow. There is a rich market for unique services and products that offer sustainable solutions and purchasing options.
- \* Existing businesses that do not consider themselves to be inherently green can become greener by making environmentally friendly choices about food packaging and recycling.
- \* Businesses would benefit from a centralized coordination of incentives and resources pertaining to energy efficiency and renewable energy options. This centralized coordination would increase public visibility of services and products offered by local green businesses as well.

The downtown Memphis Farmers Market is one of several local farmers markets in the Mid-South. More than 60 vendors sell locally-grown and made products every Saturday from April through October. Since 2006, the number of vendors has doubled and the economic impact on the community is estimated at \$4.5 million. The Agricenter and the Botanic Gardens also host farmers markets.



Co-Authored with Dr. David Ciscel (Christian Brothers University), Dr. Douglas Campbell (The University of Memphis) and Frank Burhart (City of Memphis, Housing and Community Development)

Home improvements geared toward increased energy efficiency can benefit low-income residents of Shelby County by decreasing the cost of utilities. This research shows policymakers and residents the priority areas of weatherization, the potential employment gains and future economic benefits from upgrading older homes in high-poverty areas.

Weatherization is the process of making buildings and structures more energy efficient and reducing energy consumption. The process of weatherizing homes is not new; however, it has recently received much attention and funding through the American Recovery and Reinvestment Act of 2009 (a.k.a. the federal stimulus package) under the Obama administration. Shelby County will likely receive an increase in funding for weatherization for making improvements to the homes in our community that are the least energy efficient and whose occupants are most in need of economic relief from the unaffordably high cost of utility bills.

Before the actual weatherization work actually begins on a home, an energy audit needs to be completed. A certified energy auditor first evaluates the efficiency of the home by checking windows, doors, insulation and attics. The auditor generates a list of recommended upgrades, and contractors are called to complete the work. In many cases, once the weatherization work is done, the story is finished. However, in order to measure the full economic impact of the weatherization, it is important to track the increased efficiency of the home by recording the utility bills before and after the weatherization work was completed.

### Energy auditing and weatherization are Green Jobs

Completing energy audits and weatherization work is considered a green job because it decreases energy consumption and creates employment for local workers. Inherent in the definition of green jobs is the payment of wages that promote economic self-sufficiency for work that benefits both the environment and local communities. In granting contracts for weatherization in Shelby County, these principles will ensure that the weatherization work done in the community will comply with the prevailing definition of green collar jobs.

While there are no federal mandates for using these guidelines, the implicit aim of performing energy audits and weatherization is to reduce energy consumption, increase employment and alleviate the effects of poverty in communities most in need. The federal government has provided more funding than ever before to performing energy audits and weatherization upgrades. Each locality can decide where to spend the funding, and Shelby County has the opportunity to set a national precedent by adhering to the intent of this legislation and making every effort to ensure that those most in need are employed and the homes most in need are repaired.

Last year Shelby County received approximately \$2.5 million for weatherization, and Memphis contractors weatherized about 400 homes.

This year, poverty requirements expanded from 125% of the federal poverty level to 200% of the federal poverty level. For a family of four, this means an annual income of \$44,100.

The Low-Income Home Energy Assistance Program (LIHEAP) is a federal program that prioritizes weatherizing homes in economically distressed areas. According to LIHEAP, the maximum amount available for weatherizing homes is \$6,500.

### Both renters and homeowners are eligible for energy audits and weatherization.

In Memphis, the average winter utility bill is approximately \$344.97. Based on our research, this estimation varies widely in the city based on several demographic factors, including the age of the home, whether the home is rented or owned, and the median income of the district/jurisdiction in which the home is located.

Figure 7: Zip codes in Weatherization analysis

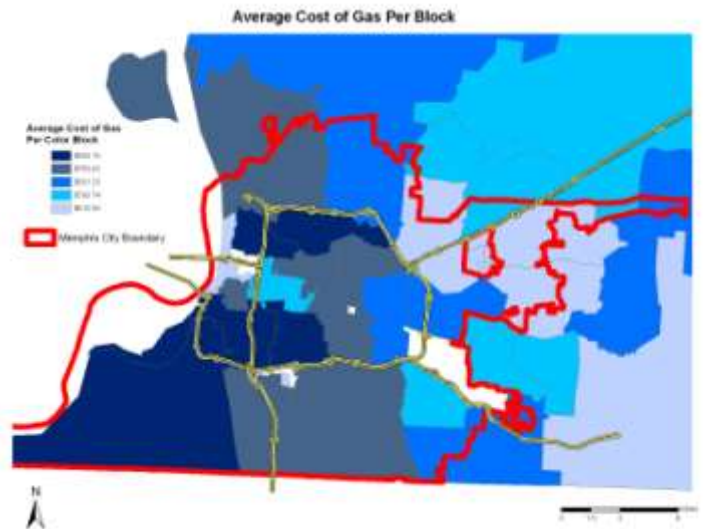
1	38107
	38106
	38108
	38114
	38109
2	38127
	38112
	38122
	38111
	38116
	38118
	38126
3	38053
	38128
	38117
	38120
	38141
	38125
	38028
	38104
4	38002
	38135
	38133
	38115
	38138
	38139
5	38134
	38016
	38018
	38017
	38131
	38103

According to Jerry Collins Jr., President and CEO of MLGW: "There's many houses, especially in low and middle-income neighborhoods, that are in deep need of improvement." Dottie Jones, director of Shelby County Division of Community Services, estimates that with the \$14.6 million in stimulus funding, approximately 2,000 homes can be audited and weatherized, a significant increase from the 300 homes receiving weatherization assistance annually at present (Memphis Business Journal).

Energy inefficient homes cost more to heat and cool. The cleanest energy is the energy not used, and making homes more weathertight both reduces consumption and decreases the cost of utilities. Low-income residents who are least able to afford expensive utility bills are often those paying the most.

Low-income families spend on average 17% of their annual income on energy as compared to middle and upper-income families who spend on average only 4% on energy (Weatherization Assistance Program). Shelby County is characterized by areas of concentrated poverty, where 20% or more of residents live below the federal poverty level. In some zip codes, 60% of residents have incomes below the federal poverty level.

Figure 8: Average cost of gas per block



Those who can least afford high utility rates in Shelby County are those who are paying the most.

For this analysis, zip codes in Shelby County are divided into five blocks; Block 1 is shaded darkest blue and Block 5 is shaded lightest blue. The darkest blue zip codes in Block 1 are those residents paying the most in utilities, and the lightest zip codes in Block 5 are those residents paying least. Residents in Blocks 1 and 2 are more likely to face poverty than in Blocks 3, 4 or 5 (See Table 1).

Each of the blocks has important characteristics which influence the cost of gas utilities. In Block 1, more than 4 in 5 residents live in a home built before 1970. In Block 2, nearly 3 in 4 residents live in a home built before 1970. In fact, the median year of home construction in Block 1 is 1947 and in Block 2 is 1953. Paradoxically, older homes in Shelby County tend to be smaller but less energy efficient, and larger homes are more energy efficient. Indeed, in Block 5, the median year of home construction is 1986.

The average cost of gas per square foot is inversely related to the size of the home. Residents living in larger homes pay less for gas utilities than do residents living in smaller homes. Renters pay more in utilities than do homeowners. In Blocks 1 and 2, more than 2 in 5 residents rent their home. The median household income in Blocks 1 and 2 is below the median income for Shelby County. Adjusted for inflation, in 2008 the poverty threshold for a family of four is \$21,138 (Department of Health and Human Services).

Several variables influence where weatherization efforts are localized in Shelby County, including the average square footage of residences, the age of the homes, the poverty status of residents, the percent of residences owned versus rented, and the average block income. To prioritize areas of weatherization, several key questions must be considered:

- \* Which homes are least efficient? Which residents would benefit most from weatherization?
- \* How many jobs will be created, and what areas of the county would benefit most from job creation?
- \* How will Shelby County benefit economically from weatherizing high-priority homes?

Given the federal weatherization guidelines, Blocks 1 and 2 have the largest share of the target population for home weatherization.

Figure 9: Factors affecting cost of utilities

	1	2	3	4	5
Cost of Gas per Block	\$0.70	\$0.57	\$0.47	\$0.41	\$0.38
Average Sq Feet per Color Block	1195	1389	1822	2354	1677
Average Cost of Gas per Color Block	\$833	\$753	\$831	\$794	\$612
Percent of Renters	40%	44%	24%	37%	31%
Percent of homes built before 1970	81%	71%	31%	20%	18%
Average Block Income	\$22,516	\$27,778	\$55,186	\$63,850	\$57,207
Average year built	1947	1953	1976	1974	1986

All MLGW customers are charged the same rate. The variations in cost of utilities are due in part to differences like the size and age of the home.

Residents in these areas pay the most in utilities largely due to the number of energy inefficient homes, i.e., those built before 1970. These two blocks have the largest share of residents with disabilities, the largest share of young children and elderly residents, and the greatest number of people living below the Federal Poverty Level.

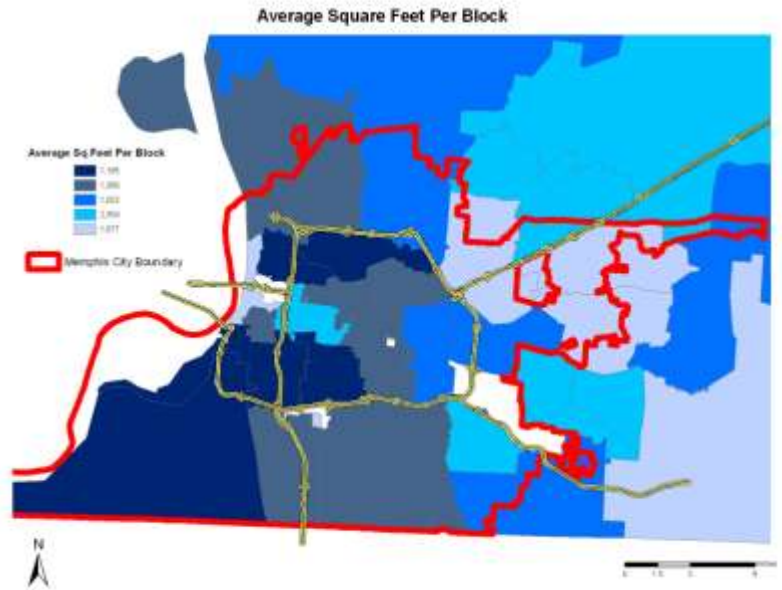
Figure 10: Demographic priority groups for federal weatherization funds

	1	2	3	4	5
Number of Homes to be weatherized	55,285	65,080	56,877	43,722	
Disability Status	27%	21%	16%	16%	12%
Under 5 Years	8%	9%	8%	7%	5%
62 and Over	15%	10%	13%	10%	10%
Percent of People in Poverty	31%	22%	8%	8%	5%

### KEY FINDING #1

Generally speaking, the cost of heating a home rises with the size of the home, but the smallest homes are also the most expensive (in absolute terms) to heat with gas. In Memphis, the smallest homes are **located in the city's center** which is characterized by high poverty rates.

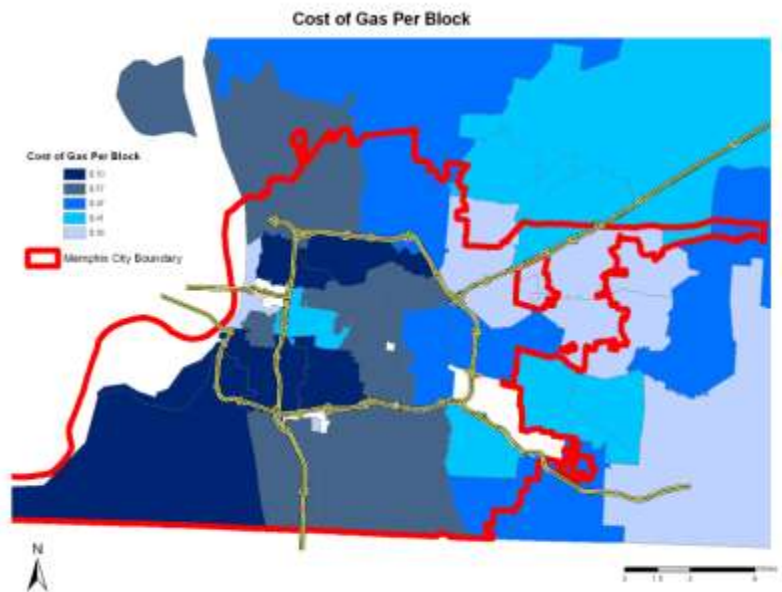
Figure 11: Average square foot per block



### KEY FINDING #2

Renters pay more to heat their homes than owners do. Areas with high percentages of rental property also have high per square foot gas costs and high absolute gas costs.

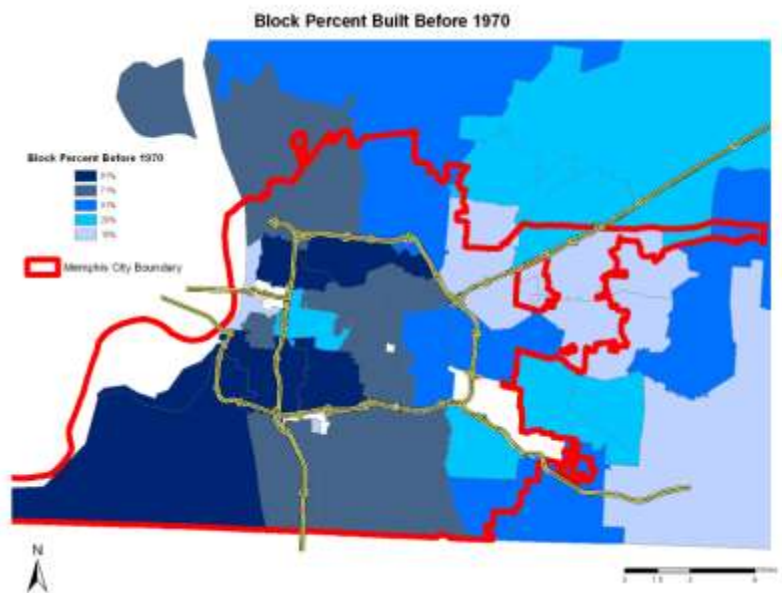
Figure 12: Cost of gas per block



### KEY FINDING #3

The most important factor in cost of heating a home is the age of the property. The greater the percentage of homes built before 1970, the higher the cost of gas per square foot and the higher the absolute cost of heating the home.

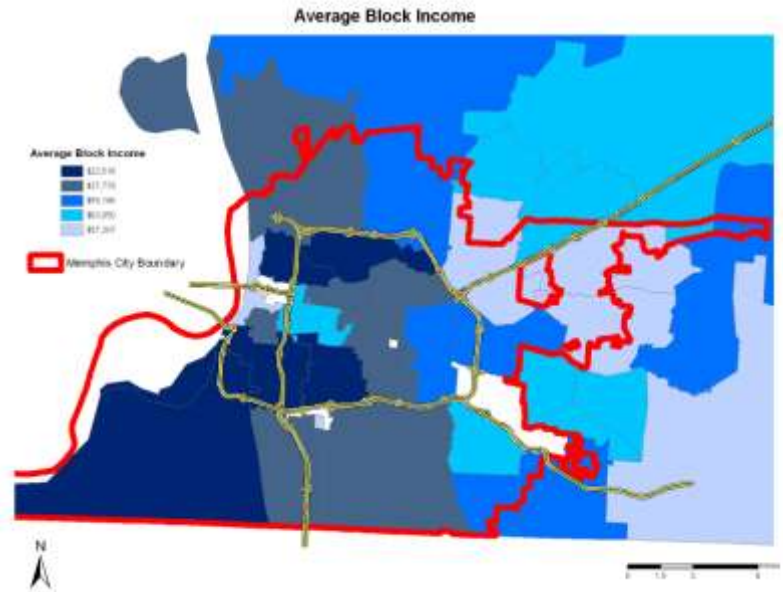
Figure 13: Block percent built before 1970



## KEY FINDING #4

Income parallels several other factors in this table. Low income indicates higher cost of gas (per square foot and absolutely), higher rental percentages, smaller homes, percent built before 1970. The lowest incomes in the community are located in Blocks 1 and 2.

Figure 14: Average block income



The need for weatherization-based “green collar jobs” is geographically centered where incomes are already lower and workers with “low barrier” entrance requirements already live. Based on a local survey of green businesses, one of the most important tenets of sustainable employment is hiring locally.

The weatherization jobs in Blocks 1 and 2 should be performed by residents living in those same areas. Training programs are needed in these areas of the County where many residents are geographically isolated from work and education opportunities.

## Community

The auditing and weatherization activities need to be done in the areas of the city with residents who need job training and work. Hiring local workers to improve the quality of homes will simultaneously increase annual savings, increase employment and income, and increase job skills and training for areas with high poverty rates and people with barriers to well-paying jobs.

*Note: Block 5 was used as the standard against which the energy efficiency gains in Blocks 1 through 4 were measured. The methodological assumption is that homes in Blocks 1 through 4 can be weatherized to the same efficiency as Block 5 where gas utility costs are lowest.*

## Implications For Weatherization in Blocks 1 and 2

Using Regional Input-Output Modeling Systems (RIMS) methodology, it is possible to estimate how many jobs will be created by block and by zip code in Shelby County. Nearly 18,000 jobs could be created in Blocks 1 and 2 in weatherization and energy auditing, more than half the number of jobs possible in Shelby County. In total, nearly 32,000 jobs could be created in Shelby County in home energy audits and weatherization.

Payback in years is shortest in Blocks 1 and 2. Demographically speaking, Blocks 1 and 2 share similar characteristics, and Blocks 3, 4 and 5 share demographic characteristics, which helps to explain why the payback time is longer in Blocks 3 and 4.

Most remarkable about the prospects of weatherization in Shelby County is the potential for savings on utility bills. In Blocks 1 and 2, pre-weatherization costs range between \$750 and \$830. Shelby County residents in these blocks can expect to save between \$250 and \$380 on their utility bills as a result of their homes becoming more energy efficient. Annually, this totals over \$48 million. Local utilities could expect to reduce the number of delinquent accounts - some \$12 to \$13 million left uncollected every year - if the least energy efficient homes were weatherized and the utility bills for the poorest residents were cut in third or half. Again, the greatest savings will be in Blocks 1 and 2.

## Potential Benefits from Weatherization

Block 1 contains a quarter of the jobs in weatherization in Shelby County. This block has the quickest payback timeline (17 years) and residents in this block will also experience the greatest reduction in home energy costs.

If every eligible home in Blocks 1 and 2 were audited and weatherized, more than 17,000 new jobs could be created. For every \$1 million invested in weatherization, 22 new jobs can be created. Shelby County will receive a fraction of Tennessee’s weatherization allocation through the federal stimulus bill, totaling \$99 million for the state. Funding is based on poverty rates, and approximately one-fifth of people facing poverty in Tennessee live in Shelby County. If Shelby County receives \$16 million in weatherization, more than 500 new jobs would be created.

Figure 15: Job creation and savings from weatherization

	1	2	3	4	5
Average number of jobs created	1609	1353	1379	1060	
Average percent of jobs created	25%	29%	26%	20%	
Payback in years	17	26	41	109	
Utilities Before Weatherization	\$833.18	\$753.43	\$831.23	\$793.74	\$612.50
Utilities After Weatherization	\$452.55	\$500.05	\$675.51	\$737.10	
Average Savings After Weatherization	\$380.63	\$253.38	\$155.72	\$56.64	

## Individual homes

Energy audits and weatherization can greatly benefit low-income residents in Shelby County by alleviating the burden of expensive utility bills and increasing home equity and value. Those who can least afford high home heating costs are those who are paying the most in our community and those who most need immediate relief of lower home energy costs.



For every \$1 million invested in weatherization, 22 jobs are created.

## Co-authored with Connie Binkowitz

Investing in a green economy can create jobs and promote smart business growth while addressing some of pressing environmental concerns. Yet it is important not to over-attribute responsibility to the green jobs movement for solving all the problems.

Green jobs are not a panacea, and they should not be credited or tasked with fixing every economic and environmental problem.

However, if we do invest in a strong green economy, we can expect to see ancillary benefits in our community. This section draws the connections between economic development in the green economy and improved societal conditions, such as: Increased health outcomes; Greater, more widespread employment; Higher educational attainment; Increased income; Reduced incarceration and crime rates.

## Social Snapshot of Shelby County

The health of Shelby County residents is directly tied to both the environment and the economy. Poor economic indicators yield poor health indicators, and the cost of poor health to the entire Shelby County community creates a pervasive financial burden that, with some planning and strategic intervention through green economic development, could be alleviated.

If we build a strong green economy in the Memphis region, what potential benefits could we see?

Many of the problems facing communities in the Mid-South are related to financial concerns, health problems, educational challenges and employment opportunities. Increasing the number of people completing high school and seeking higher education, increasing the number of people gainfully employed, and increasing the availability of healthy food and living options will greatly improve the economic and social prospects of the region.

Because the national and local green jobs strategy focuses on workforce development, we can anticipate that as more people enter the educational and employment pipeline these negative indicators will become less problematic over time. A realistic perspective of our people, our economy and our natural resources shows that all three are struggling right now.

The Memphis Metropolitan Statistical Area ranked number two in the country for violent crime in 2008. Memphis is the sixth worst city in the nation for asthma sufferers.

In 2007, Forbes ranked Memphis as the number one city in the country for obesity rates (34%).

In March 2009, Memphis ranked number 16 in the country in foreclosures.

In 2007, Shelby County had the highest bankruptcy rate of any county in the United States.

Diabetes and obesity rates are rising in Shelby County. People in the lowest income brackets are at least twice as likely to become diabetic as those in the highest.

Only 2 in 3 students graduate from high school in Memphis.

Nearly 4 in 5 students in the Memphis City school system are classified as Economically Disadvantaged, meaning they are eligible for Free or Reduced Price Lunches at school.

**The infant mortality rate in some zip codes in Memphis is the highest among the country's 60 largest cities.**

## The Social Determinants of Health

Economic development is directly tied to the social health of the community. The single factor most strongly associated with physical health is income. Health and wealth are intimately related.

**Income, education, zip code, employment status and race fall under what the World Health Organization calls the “social determinants of health.” Their definition is as follows:**

*The social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries.*

A recent report by The California Endowment and PolicyLink makes the connections between economic development and social conditions:

*We know that residents of low-income communities and communities of color suffer disproportionately from negative environmental factors: poor air quality; poorly maintained homes; lack of healthy food options; and the lack of clean, safe open spaces such as parks and playgrounds. Social, economic and service components – lack of access to good jobs, inadequate healthcare and other crucial services, and fractured social networks – also present obstacles.*

Figure 16: Health equity questions and solutions for the Mid-South

Problem	Conventional Questions	Health Equity Questions	What is the associated cost?	Jobs in the Green Economy Addressing Health Disparities
Community conditions that underlie healthy living vary by socioeconomic status	How can we promote healthy behavior?	How can we target dangerous conditions?	Debt, medical bills, uninsured population of environmental-related health conditions	Brownfield remediation Lead decontamination Biodiesel production (improving air quality)
Certain illnesses and disease disproportionately affect poor people and people of color (obesity, asthma)	How can we reduce disparities in the distribution of illness and disease?	How can we eliminate inequities in the distribution of resources and power that shape health outcomes?	\$28 million per year for asthma-related hospital visits	Decentralized training and educational facilities Community, business and government support for healthy food options in low-income communities

## Lead Contamination

According to the Environmental Protection Agency, lead contamination is a pressing problem for urban populations in the United States. Older homes – those built before 1978 – are more likely to contain lead-based paint. In urban areas, lead is likely to be found in paint, soil, and household dust. Exposure to lead paint is most deleterious in young children, but can affect adults as well. According to the EPA, the following health problems can be attributed to lead exposure:

- \* Damage to the brain and nervous system
- \* Behavior and learning problems, such as hyperactivity
- \* Slowed growth
- \* Hearing problems
- \* Headaches

The pervasiveness of lead contamination in Memphis is difficult to determine because only a fraction of the population has been tested for lead. A total of 6,489 children have been tested for lead exposure, a screening rate of 7.9%.

A and L Laboratories tested soil from a Grow Memphis garden plot for lead in February. When the results came back in late March, the soil tested at 70-300 lead parts per million (ppm). The Environmental Protection Agency recommends that children not be exposed to leaded soil above 400 ppm, but A&L Laboratories showed that lead soil levels above 10 ppm can be dangerous.

Phytoremediation means using plants to treat environmental problems. Chemicals and elements like lead, cadmium, arsenic and mercury can be extracted from the soil by natural means.

The United States Department of Agriculture is a leader in best practices and research in phytoremediation. According to **USDA researcher Leon Kochian**, “Contaminated soils and waters pose major environmental, agricultural, and human health problems worldwide. These problems may be partially solved by an emerging new technology—*phytoremediation*.”

Clean-up and revitalization of vacant industrial parcels is a key component of adaptive reuse.

Figure 17: Map of industrial parcels in Shelby County

(Courtesy of Housing and Community Development)



The city of Memphis and Shelby County have ample vacant industrial sites and warehouses that are under-utilized. In the emerging bioeconomy, these structures play an integral role in the transitional manufacturing, logistics and distribution industries.

Rural areas also have existing under-utilized infrastructure as well. According to the **Regional Strategy for Biobased Product in the Mississippi Delta**, “There is substantial existing infrastructure of farm-based tractor-trailer gravity-fed and dump trucks in the Delta region that could be used to haul crop residues for bioprocessing after grains have been harvested.”

## Case Study: Sow to Grow into the Community

The Sow to Grow program in Shelby County, TN trains presently incarcerated individuals in gardening skills. The inaugural class in Winter 2009 began with 49 students and graduated 26. Graduates of the program receive a certificate of completion and credit hours toward a degree at Southwest Tennessee Community College. The program begins with 16 weeks of classroom learning. A proprietary curriculum was developed by Dr. Chris Cooper through the Shelby County Agricultural Extension Agents with help from the Master Gardeners and Master Urban Foresters.



The program offers four tracks. In Track 1, students learn about soil preparation and testing, irrigation, harvesting, irrigation and saving seed. In Track 2, students learn about variety selection, landscape design, and native species. In Track 3, core curriculum focuses on soil preparation and tree planting and maintenance. Track 4 covers specialty fruits and nuts as well as insect and disease management, and pruning and training. These fungible skills can be leveraged once the individual has been released from the detention facility to gain employment in his community and/or continue learning about urban agriculture at the community college level.

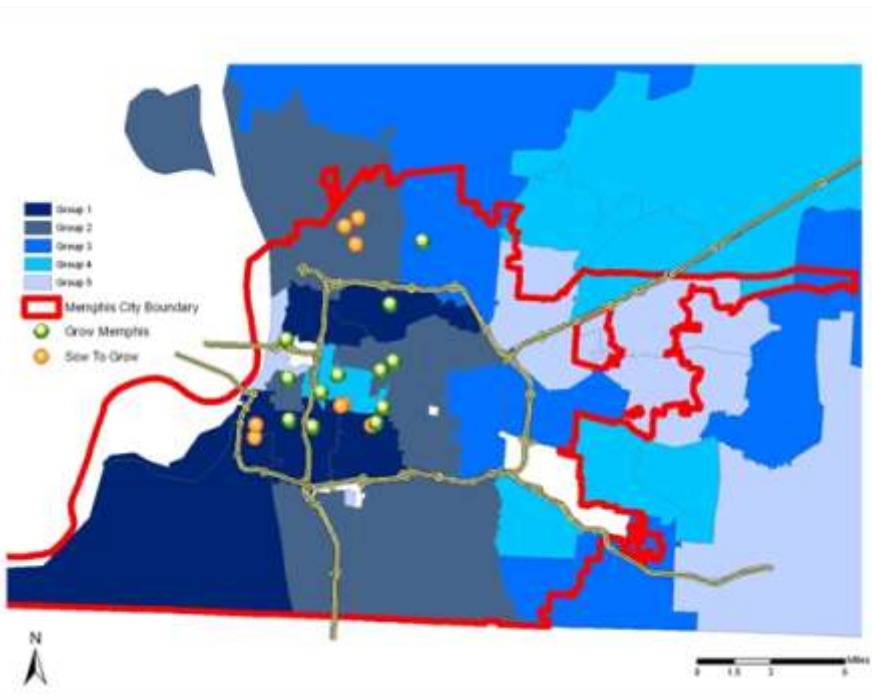
According to Dr. Cooper:

*“This program will give these young men an opportunity to receive training to the point to where they will be either productive employees or able to start their own small business in this rapidly growing green industry here in Shelby county. This program also gives these guys an opportunity to give back to the community. I am most proud of this program because we are making an impact by teaching a set of skills that these guys can learn and be able to use once they re-enter into society. For those who attended the classes from the beginning, they will be presented with a certificate that validates their time in the classroom.”*

Figure 18: Locations of Grow Memphis and Sow to Grow Gardens in Shelby County

Another gardening program in Shelby County is the Grow Memphis program administered through the Mid-South Peace and Justice Center. **Grow Memphis’ mission is to “create productive and educational urban community gardens that provide fresh healthy food for low-income areas, and empower people to develop and enhance their own communities. These Gardens will provide a local food source for those in need and will empower a future generation with the important knowledge of sustainability and our connection with the Earth and with the community. Community gardening is the tool for communities to address local issues and create opportunities.”**

These community-based and population-based approaches are growing evidence that the environment has an effect on the population, and that the people are having an effect on the environment. Community gardening gives young people exposure to career pathways in the biologic sciences and in business.



## Appendix I: Educational Pipeline and Workforce Development

The types of green jobs available to a region depend largely on the regional availability of renewable energy resources, biomass is the Mid-South's **strategic advantage. Workforce and economic development in green industries will succeed in** our region if we capitalize on natural resources.

The Mississippi Delta region has unemployment rates higher than the national average. Programs in renewable energy technology offer options for regional residents to gain meaningful, quality and lasting employment that will retain local talent and utilize local assets.

Figure 19: May 2009 Unemployment Rates (Source: TN Department of Labor)

U.S.	9.4%
TN	10.7%
Shelby County	9.6%
Memphis City	10.6%
Memphis MSA (Metropolitan Statistical Area)	9.7%

Programs in Renewable Energy Technology have both classroom and experiential learning opportunities so that students have theoretical and practical skills upon entry into the workforce.

Classroom-based knowledge is complemented by extensive experiential opportunities using oilseed crushers, processing unit operations, control systems, engines and other RET machinery. Safety training is also a priority.

Two elements have emerged as priorities for RET education in the Mid-South: connecting students with externships to learn firsthand the necessary processing skills; and collaboration and cooperation amongst regional educational institutions. In addition, local industry professionals have described the need for an industry-recognized certification of basic entry-level skills to confirm qualification of an individual to work in a technically sophisticated processing production facility. This pending certification would recognize employee on-the-job and computer-based training as an alternative to **an Associate's degree. Industry professionals in the region are actively cooperating with academics to develop this certification to streamline the process of moving students from the classroom into the workplace.**

These regional biobased opportunities fit well with the conventional definition of green jobs, i.e. that jobs be available for people with high barriers to entry into the workforce, make a positive impact on the environment, provide family-supporting wages and utilize the regional renewable energy source (biomass).

Figure 20: Coursework required for degrees in Renewable Energy Technology

Degree	Certificate of Proficiency	Technical Certificate	Associate of Applied Science
Number of coursework hours	12	31	63-65
Core Coursework (Additive)	Biofuels	English	Process Instrumentation
	Introduction to Renewable Energy	Algebra	Plant Sciences
	Technology	Computers	Chemistry
		Industrial Safety and Sanitation	Hydraulics
			Manufacturing Equipment Maintenance and Operation

## Programs of Excellence

### Programs of Excellence

#### Arkansas WIRED and ADTEC

The Arkansas Delta WIRED (Workforce Innovations in Regional Economic Development), or ADWIRED, program is a regional consortium of science and technology organizations whose goal is to promote economic development in renewable energy through entrepreneurship, education and business creation. Arkansas WIRED seeks to increase biofuels research and development capacity, create an engine test facility (beginning Fall 2009 at Mid-South Community College in West Memphis, Arkansas) and expand the advanced manufacturing support infrastructure.

ADTEC (Arkansas Delta Training and Education Consortium) is a U.S. Department of Labor-funded community college consortium comprised of five institutions (Mid-South Community College, Arkansas Northeastern College, East Arkansas Community College, Arkansas State University-Newport, and Phillips County Community College of the University of Arkansas System) dedicated to training a local workforce in renewable energy technologies and supporting regional economic development in the Mid-South. ADTEC stands out not only as a regional program of excellence, but a national **best practice in renewable energy technology programs. ADTEC's goal is to graduate 550 students in three years with the skills and training necessary to gain employment in regional occupations in the bioeconomy, including positions in biorefineries and processing facilities.**

CERETE (Center of Excellence in Renewable Energy Technology Education) is located within Phillips County Community College, which has three campuses in southeast Arkansas. This program has developed a Certificate of Proficiency, Technical Certificate and Associate of Applied Science in Renewable Energy Technologies focused on biodiesel and ethanol production.

#### West Tennessee Community Colleges

The ADTEC consortium has formed partnerships with community colleges in West Tennessee. Adoption of curriculum and career pathways in renewable energy technology is imminent, and post-secondary education leaders are forming strategic partnerships to use local and national best practices to develop programs for residents in West Tennessee.

#### University of Memphis Biofuels Energy and Sustainable Technology (BEST)

**The BEST program at the University of Memphis is training bachelor's and master's degree level students for careers in renewable energy technology through the Department of Mechanical Engineering. BEST has created a 60-gallon biofuels training and test facility with the capacity to power the University of Memphis campus fleet.**



Tennessee Technology Centers at Hohenwald has established a green curriculum for students to complete in three trimesters: The mission of the course is to educate the student with the basic knowledge and technical skills **necessary for success in today's growing "green" environment for employment in up** and coming green fields and industries. The objective of the 1296-hour course is to teach and provide a diverse range of green studies to expose students to green technologies in order that the successful student operate in a modern green environment and or business. The course is also designed for individuals who are seeking to upgrade or update existing green technology skills or gain certification.

High poverty rates in this region of the country are not simply a reflection of the economic hardships faced by many people in the U.S. during the current recession, but rather are representative of chronic and systemic economic distress. Clearly the educational and economic development opportunity of a new, green biobased economy could initiate a social transformation of the region. To address the generational poverty in Memphis and the Mid-South, a **comprehensive economic development strategy based on the region's strategic advantage in diverse biomass capacity and local processing** must be implemented. BioDimensions and the Memphis Bioworks Foundation, together with regional partners from 98 counties

in five states, have set forth this agenda. Educational institutions from high schools to technical centers to community colleges to universities must have an integrated approach in concert with agribusiness, private enterprise and public governments to address the endemic problems of low levels of education, low-wage work, monoculture farming, tepid support for small businesses and regional poverty.



Workforce development in renewable energy technologies involves classroom and textbook learning as well as hands-on experiential learning. Student competencies in RET programs cover a variety of skills, including:

- \* Advanced literacy, writing and critical thinking skills
- \* Life sciences skills and mathematics
- \* An overview of the renewable energy sector in the United States
- \* Regional renewable energy strengths
- \* An overview of the renewable energy sector in the United States
- \* The role of local, state and federal policy toward renewable energy

## Jobs for Graduates in Renewable Energy Technology

Staffing the processing and manufacturing facilities of the future requires a significant educational investment in the current and emerging workforce in the Mid-South. At present, there are not enough skilled and trained workers to support the needs of the emerging green economy in the region. Developing a skilled workforce is the path to economic development and regional prosperity.

The following table shows a list of occupations, educational requirements and projected salaries for a regional biobased processing facility. All the positions require some education, and all remuneration meets the standards of living wage requirements. The potential green jobs in manufacturing and processing are good jobs. *The agricultural resources in the Mississippi Delta would support the creation of approximately 200 such facilities.*

Figure 21: Staffing requirements for bioprocessing facility

(Source: Regional strategy for biobased products in the Mississippi Delta)

Position	Number	Degree	Salary, \$
Plant Manager	1	BA/BS Eng/Bus/Chem	125,000
Finance Manager	1	MBA/MA	100,000
Operations Manager	1	BS Engineer	100,000
Procurement & Logistics Mgr	1	Associate/BA/BS	60,000
QC/OA Manager	1	MS/BS Chemist	85,000
QC Technician	1	Associate/BS	41,600
Maintenance Manager	1	Associate	60,000
Maintenance Technicians	2	Diploma/Associate	41,600
Shift Operators	8	Diploma/Associate	33,280
Material Handlers	4	Diploma/Associate	33,280
Clerical Support	2	Diploma/Associate	33,280
Sales & Mkt.	1	BA/BS	100,000
Total Staff:	24	Total Payroll:	813,040



FutureFuel is an example of a successful regional bioprocessing facility. *FutureFuel Corp. was created in 2005 as a special purpose acquisition vehicle to acquire companies that we believe can make a notable impact in the biofuel and fuel industries. In the summer of 2006, we found just that in FutureFuel Chemical Company (formerly named “Eastman SE, Inc.”) near Batesville, Arkansas.*

(Source: FutureFuel website)

## Appendix II: Green incentives for businesses and homes

Green incentives exist to make homes and businesses more energy efficient, which both saves money and improves the quality of the environment. By conducting the green business survey in Shelby County we identified a major information gap regarding green incentives.

In order to utilize the available incentives, individuals and businesses must first know about them. However, knowledge alone of green incentives does not seem to be sufficient for implementation, as evidenced by the survey results which show that many businesses are familiar with incentives but do not use them. Information alone does not seem to be sufficient for businesses to capitalize on the incentives. Encouraging businesses and individuals to utilize green incentives should be supported through a community-wide policy. A coherent and comprehensive incentive information hub would greatly benefit not only the green business community in Shelby County, but all businesses and individuals desiring to upgrade their homes and offices to a higher level of eco-friendliness that also benefits their bottom line.

The Alliance to Save Energy, a coalition of business, government, environment and consumer leaders promoting clean and efficient energy usage, provides information about consumer tax credits under the American Recovery and Reinvestment Act of 2009 (ARRA) in the following categories:

- \* Hybrid and Diesel Vehicle Tax Credits
- \* Home Energy Efficiency Improvement Tax Credits
- \* Geothermal Heat Pumps, Solar Energy and Fuel Cells

In a New York Times interview, Alliance to Save Energy president Kateri Callahan clarified some of the new incentives for homeowners and businesses :

Consumers can get up to \$1,500 from the federal government for energy-efficient upgrades, worth 30% of the total cost of those upgrades.

Four types of upgrades are covered: Home-shell improvements; HVAC (home heating, ventilating and air-conditioning); renewable energy technology; and hybrid and diesel cars.

Energy efficiency investments do not have to be made immediately. Investments in home-shell improvements and HVAC are eligible so long as they are made before December 31, 2010. Renewable energy systems can be claimed through December 31, 2016. In other words, the government has not limited these credits only to those people who can presently afford them, but rather as an intermediate step to increasing home efficiency and use of renewable sources for consumers.

The Alliance to Save Energy differentiates between tax *credits* and tax *deductions*:

**To receive a tax credit, “You claim the credit on your federal income tax form at the end of the year. The credit then increases the tax refund you receive or decreases the amount you have to pay. Tax deductions – such as those for home mortgages and charitable giving – lower your taxable income. If you are in the highest 35-percent tax bracket, the income tax you pay is reduced by 35 percent of the value of a tax deduction. But a tax credit reduces your federal income tax by 100 percent of the amount of the credit.”**

The Tax Incentives Assistance Project lists the Internal Revenue Service forms available for download on their website and provides information for consumers, businesses, builders and manufacturers.

An alarmingly small number of businesses actually utilize the tax incentives available.

Some businesses are familiar with the incentives available, but do not use them.

A large share of the businesses are completely unfamiliar with the green incentives available.

Figure 22: Federal energy incentive familiarity

The survey of Mid-South green businesses shows the regional familiarity and usage of federal tax incentives. The majority of businesses are aware of the federal incentives available, but only a very few actually utilize them.

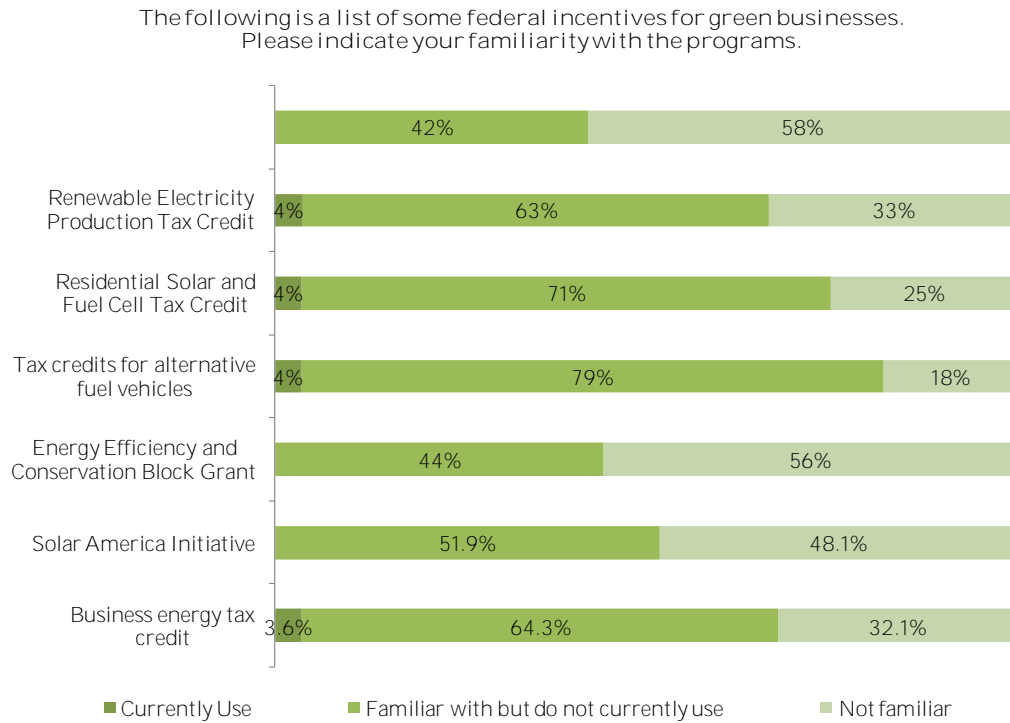


Figure 23: Tennessee energy incentive familiarity

The survey of Mid-South green businesses shows the regional familiarity and usage of state tax incentives. Once again, the majority of businesses are aware of the state incentives available, but only a very few actually utilize them.

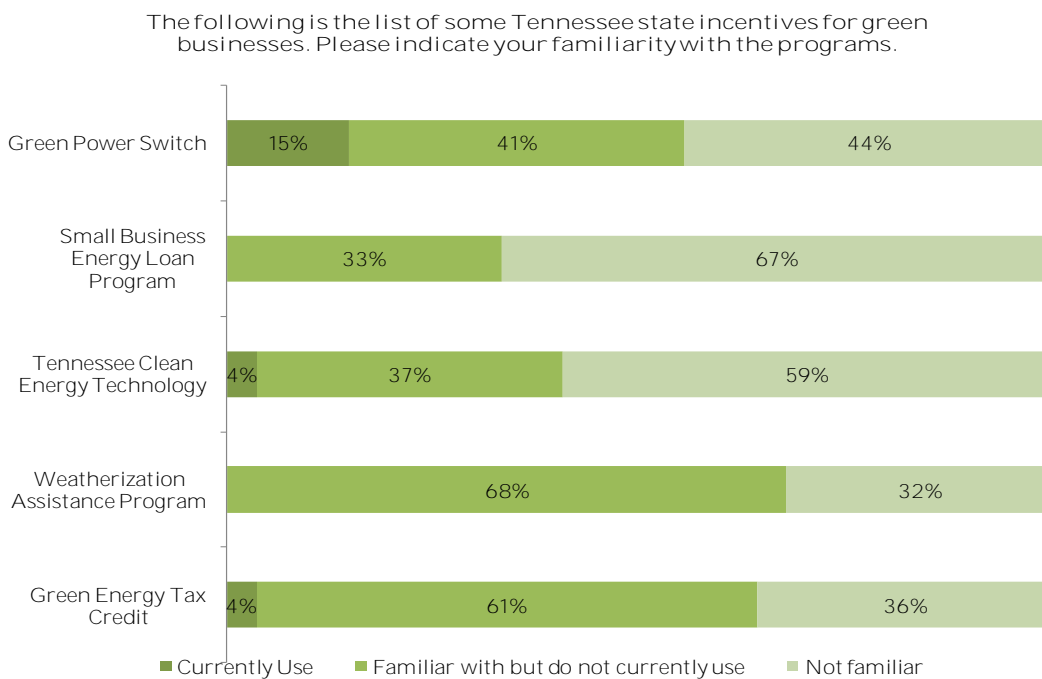


Figure 24: Federal, state and local energy incentives

The following chart shows federal, state and local incentives in renewable energy and energy efficiency. For more information, check the Database of State Incentives in Renewables and Efficiency (<http://www.dsireusa.org>).

Location	Incentive Type	Name	Eligible Technologies	Sectors	Amount
Tennessee Valley Authority	Production	Green Power Switch Generation Partners Program	Photovoltaics Wind	Commercial Residential	\$500 (residential only) plus \$0.15/kWh (residential/small-commercial) or \$0.20/kWh (commercial) for 10 years
Jackson Energy Authority	Utility Loan Program	Residential Heat Pump Loan Program	Heat Pumps	Residential	Up to ten years
Southwest Tennessee EMC	Utility Loan Program	Residential Heat Pump Loan Program	Heat Pumps	Residential	8.0% interest loan with 10 year payback
Jackson Energy Authority	Utility Rebate Program	Energy Efficient New Homes Program for Builders and Developers	Comprehensive Measures/Whole Building	Commercial Residential Construction Installer/ Contractor	\$40/ft <sup>2</sup>
Southwest Tennessee EMC	Utility Rebate Program	Residential Energy Efficiency Rebate Program	Water Heaters Comprehensive Measures/Whole Building	Residential	Electric Water Heater: \$100, with a bonus \$100 if new unit is replacing gas
	Property Tax Exemption	Wind Energy Systems Exemption	Wind	Commercial Industrial Utility	67% exemption
	State Grant Program	Tennessee Clean Energy Technology Grant	Solar Water Heat Photovoltaics Wind Solar Hybrid Lighting Fuel Cells using Renewable Fuels	Commercial Industrial	40% Maximum amount = \$75,000

Location	Name	Incentive Type	Eligible Technologies	Sectors	Amount
	State Biodiesel Infrastructure Grants	County and City owned vehicles	Fleets	City and County Government	Grant funding is available for up to 50% of total project costs, but not more than \$12,000 may be awarded per individual grant. Grants are limited to one per county and are available through June 2010.
	State Biofuels Infrastructure Grants	Transportation fuel providers	Fueling facilities (storage tanks and fuel pumps)	Public-Private partnerships	TDOT administers the Biofuel Green Island Corridor Grant Project, to provide financial assistance to help pay the capital costs of purchasing, preparing, and installing fuel storage tanks and fuel pumps for biofuels at private sector fuel stations.
	State Alternative Fuels Innovation Grants	Local governments Public universities	Eligible projects include covering the incremental fuel costs, engine maintenance, conversion or installation of infrastructure, and promotional materials.		
	Agricultural Feedstock Processing Demonstration Loan Program		Eligible facilities include those that process more than 200,000 bushels each year.		Up to \$500,000

Location	Name	Incentive Type	Eligible Technologies	Sectors	Amount
	Biodiesel Production Incentive	Biodiesel manufacturers	Each manufacturer is eligible to receive incentives for producing up to 10 million gallons of biodiesel annually.	Industry	The Tennessee biodiesel manufacturers' incentive fund provides \$0.20 per gallon of biodiesel fuel produced and sold to Tennessee companies.
Shelby County	Environmentally Sustainable building Practices	Green Business Practices	Payment-in-Lieu of Taxes (PILOT)	Commercial Industrial City and County Government	Varies by program plan
Shelby County	Prisoner Re-Entry Program	Prison to Work Pipeline		Commercial Industrial	Increased yearly tax exemption for hiring and retaining ex-offenders
Federal	Business and Employer Hiring Incentives	Work Opportunity Tax Credit	Tax Credit	Commercial Business	\$2,400 for each new adult hire; \$1,200 for each new summer youth hire, \$4,800 for each new disabled veteran hire, and \$9,000 for each new long-term family assistance recipient hired over a two-year period.
TVA	Energy Right e-Valuation	In-home energy evaluation		Residential	<a href="http://www.energyright.com/savingenergy/evaluation.htm">http://www.energyright.com/savingenergy/evaluation.htm</a>

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