Chapter 3.10: Energy Element

3.10.1: OVERVIEW

The Energy Element includes information about energy use, available energy sources ,and recommendations to help Charleston County become more energy independent. Energy independence is vitally important for national security and economic stability because of our reliance on imported fuel ~~imported from other nations~~ and sources of energy that have become increasingly scarce and costly to obtain. Ways to achieve energy independence include:

- ~~Conserving Energy~~ Conservation;
- ~~Using Energy Efficiently~~ Efficiency;
- Utilizing Renewable and Alternative Energy Sources; and
- Utilizing Local Resources.

Energy ~~has always played~~ plays an important role in the development of civilization. For centuries, the primary source of energy came from human labor, domesticated animals, and biomass (wood related products). However, the primary source of energy over the past 150 years has increasingly shifted to fossil fuels. This shift has brought unprecedented growth and prosperity, changing every facet of human endeavor including transportation, medicine, agriculture, etc. In all levels of government, especially at a local level, energy consumption and conservation is a growing concern as demand is predicted to exceed the supply of accessible and inexpensive fossil fuels in the coming years. Integration of sustainable development into the comprehensive planning process at the local level is vital to achieving sensible growth in South Carolina.

When energy expenses are reduced, there is more disposable income to spend on other priorities. Reducing energy use and investing in efficiency measures keeps more dollars circulating in the local economy as well. Energy efficiency, demand-side management, and conservation need to be promoted, publicized, and encouraged. Conserving energy and using energy efficiently is far easier and less costly than developing new energy sources,~~. Improving the County's energy efficiency~~ and is the first and most important step toward adopting renewable energy and developing resilient communities. Energy efficiency allows us to do the same things we are doing today while consuming less energy. Examples include energy efficient appliances, construction and development techniques, and fuel efficient vehicles. By improving our energy efficiency, we reduce the size and cost of renewable and alternative energy systems needed to power our homes and businesses. Conservation saves energy by changing attitudes and behavior to stop wasteful activities. The Energy Element underscores the significance of energy through a detailed analysis of energy use and its sources and presents a series of strategies to promote alternative sources and conservation measures that can benefit our communities. The Energy Element is vital in this Plan as it both "sets the stage" and "reinforces" the concepts of ~~nearly all the~~ most other Elements in the Plan.

Purpose and Intent

The purpose and intent of the Energy Element is to promote ~~educate our population about the steps that need to be taken to prepare for a new style of living through~~ conservation and renewable energy. Additionally, Charleston County intends to lead by example ~~and facilitate such behavior~~. The strategies for energy conservation and renewability will aid in maintaining the character of scenic Charleston County without hindering business and employment growth of future generations.

3.10.2: BACKGROUND AND INVENTORY OF EXISTING CONDITIONS

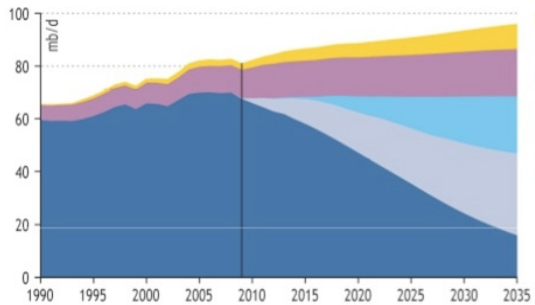
In order to understand the significance of energy at the local level it is important to understand energy consumption and available sources at all levels. This section provides detailed information about global, national, state, and county energy consumption~~ that will help in understanding Charleston County's energy needs~~. This will ~~also provide the basis to~~ help guide the County to be more energy independent in the future.

Energy is the vital force powering business, manufacturing, and the transportation of goods and services ~~to serve world economies~~. Energy supply and demand plays a vital role in our national security and the economy ~~economic output of our nation~~. In 2007, the U.S. Energy Information Administration (EIA) reported that the U.S. spends over $1.2 trillion annually on energy, which was 8.8 percent of ~~our~~ Gross Domestic Product (nominal GDP). Additionally, in 2009, the EIA reported that the U.S. consumes 94.6 quadrillion British Thermal Units (BTUs) annually. On a per capita basis, U.S. citizens use an average of 308 million BTUs annually as compared to the 152 million BTUs utilized annually by European citizens. In order to understand energy consumption and the ~~evolving~~ dynamic energy crisis, it is important to recognize that the era of abundant and inexpensive energy is coming to an end due to exponentially growing demand and the increased difficulty in finding and extracting the finite resources of fossil fuels.

The United States accounts for five~~5~~ percent of the world's population yet consumes 25 percent of the global oil production, the majority of which is imported from other nations.

In November 2010, the International Energy Agency (IEA) released a report indicating that conventional world oil production peaked in 2006 and was not expected to increase based upon known oil production data, yet the demand for oil is expected to increase. Peak Oil is the point in time that the world's oil production rate will reach a maximum and then decline because it is a finite resource. It is in this decline that the costs and energy required to extract or develop oil from unconventional methods approaches the amount of energy produced. This is known as Energy Returned on Energy Invested (EROEI). When the ratio of usable acquired energy to energy expended is one or lower, the source has lost its ability to be used as a primary source. All potential forms of energy must be evaluated for their individual EROEI. For example, wind power has a ratio of 18:1 and solar photovoltaic (solar panels) has a ratio of approximately 7:1. Early oil extraction ratios had an EROEI of 100:1, current oil extraction ratios range between 4:1 and 18:1. This means that for decades, one~~1~~ barrel of oil (in energy) was required to extract 100 barrels, while current production from tar sands yields only four~~4~~ barrels of oil

Figure 3.10.1: World Oil Production



- Unconventional Oil
- Natural Gas Liquids
- Crude Oil: Fields Yet to Be Found
- Crude Oil: Fields Yet to Be Developed
- Crude Oil: Current Producing Fields

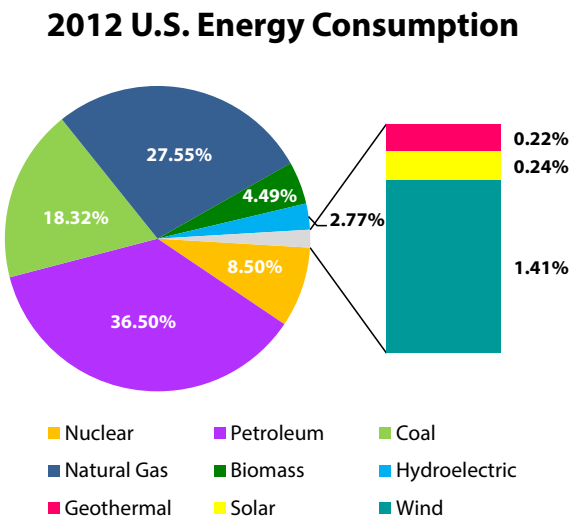
Source: International Energy Agency, 2010.

per barrel of equivalent energy. EROEI ratios for all finite (non renewable) resources will eventually follow a similar trend.

All economic activity requires energy. According to the EIA, as of 2009 roughly 37 percent of America's total energy demands and approximately 94 percent of the fuel we use for transportation is met by petroleum (crude oil and its multifarious derivatives). Petrochemicals are key components to all aspects of life including transportation, agriculture, modern medicine, water distribution, economic growth and national defense. For instance, a refrigerator, which is designed to preserve food grown and ~~distributed with fossil fuel-based fertilizers and transportation fuel~~ transported in fossil fuel-powered vehicles is primarily manufactured in fossil fuel-powered plants. It is then distributed using ~~oil~~hydrocarbon-powered transportation networks and usually run on electricity, which most often comes from natural gas or coal. The gas and coal requires oil-based machinery to mine and transport. Like oil, natural gas and coal are finite resources that ~~will~~ are likely to "peak" in the future as well.

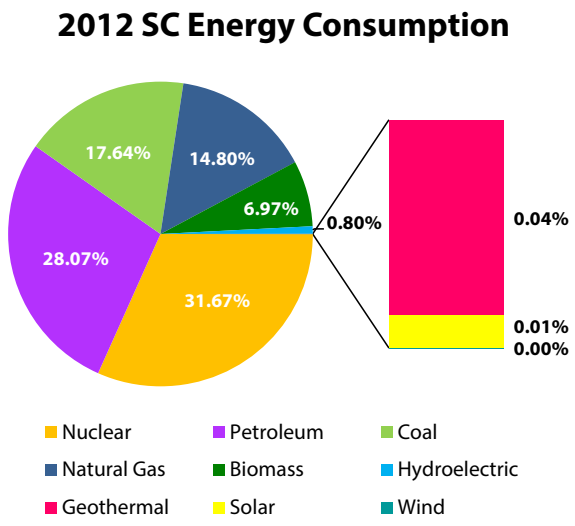
According to the United Nations Population Division, the world population reached 7 billion people in October of 2011 and is expected to exceed 9 billion people before 2050. As seen in *Figure 3.10.2*, i~~I~~n ~~2008~~2012 approximately ~~84%~~ 82 percent of the U.S. energy consumption came from fossil fuels (petroleum, natural gas, and coal). Of that, about ~~37.5%~~ 37 percent was provided by petroleum, ~~24%~~28 percent from natural gas and ~~22.5%~~18 percent came from coal. Renewable resources provided the remaining 18 percent: n~~N~~uclear-derived electric power provided ~~8.5%~~nine percent of the nation's energy; biomass served four percent; hydroelectric powered three percent; and ~~3.5%~~ two percent came from alternative energy sources (geothermal, solar, and wind power).

Figure 3.10.2: U.S. Energy Consumption



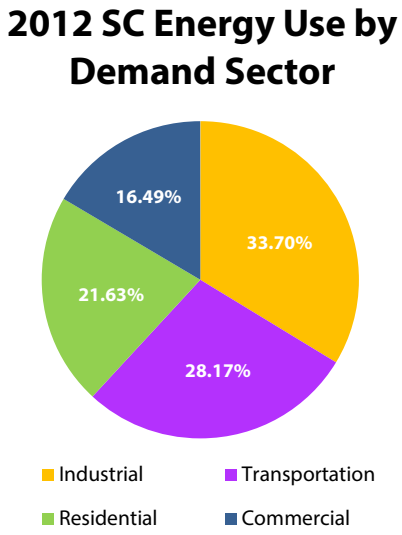
Sources: U.S. Energy Information Administration (EIA) and Department of Energy (DOE), 2012.

Figure 3.10.3: SC Energy Consumption



Sources: U.S. Energy Information Administration (EIA) and Department of Energy (DOE), 2012.

Figure 3.10.4: SC Energy Demand



Sources: U.S. Energy Information Administration (EIA) and Department of Energy (DOE), 2012.

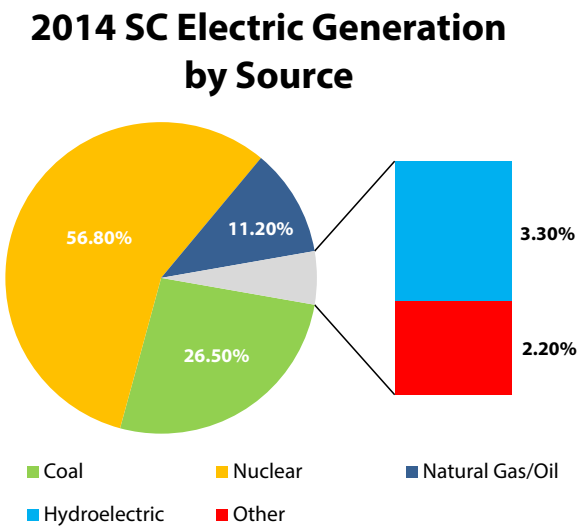
According to 2010 U.S. Census data, South Carolina had a population of approximately 4.6 million people. Between 2000 and 2030, South Carolina's population is projected by the Census Bureau to increase 28.3 percent, adding over one million people to the state. As seen in *Figure 3.10.3*, ~~In 2008~~ in 2012, ~~70.3~~approximately 61 percent of South Carolina's energy consumption came from fossil fuels (petroleum, natural gas, and coal), which is below the national average, as shown in the ~~2008~~2012 U.S. Energy Consumption chart (*Figure 3.10.2*). Of that, ~~30~~28 percent was provided by petroleum, ~~24.5~~18 percent was provided by coal (although there are no coal mines in South Carolina) and ~~9.7~~15 percent was provided by natural gas. Nuclear electric power provided ~~29.8~~32 percent of South Carolina's energy. This is over three times the national average for this source due to the number of nuclear power plants in the state. Alternative energy sources (geotherman, solar, and wind power) accounted for ~~5.9~~seven percent of the state's energy consumption.

In ~~2009~~2012, the industrial sector in South Carolina accounted for the largest portion of the state's energy consumption by demand at ~~32.6~~approximately 34 percent (*Figure 3.10.4*). This was followed by transportation at ~~28.9~~28 percent, residential at ~~22.3~~22 percent, and commercial at ~~16.2~~16 percent.

In 2010, South Carolina was ranked sixth highest in electricity use per capita in the nation with a consumption of 82,809 million kWh per capita, according to the California Energy Commission, which used data from the U.S. Energy Information Administration and U.S. Census Bureau American FactFinder. This high ranking can be primarily attributed to high electricity use associated with air conditioning. According to the EIA, South Carolina ranked ~~thirteen~~13th highest in the nation in total net electricity generation in 2011. Sixty-one percent (61%) of South Carolina residents use electricity as their primary energy source compared to 32.5 percent national use. ~~In 2009~~As seen in *Figure 3.10.5*, as of March 2014 South Carolina electricity generation came from nuclear (~~52~~57 percent), coal (~~34~~27 percent), natural gas (~~10~~11 percent), hydroelectric (~~2~~three percent), ~~petroleum (0.5 percent), other renewables (2 percent),~~ and other miscellaneous sources and technologies including wind, solar, biomass and petroleum (~~0.1~~ two percent).

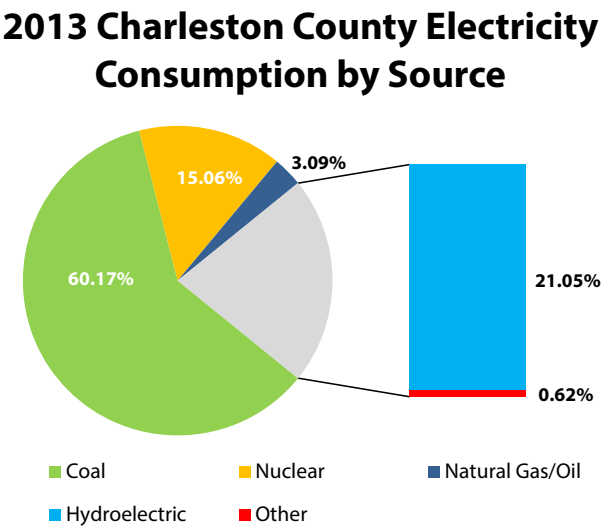
According to the ~~2010~~ 2012 data from the U.S. Census Bureau, Charleston County has a population of ~~350,200~~365,162 people. As seen in *Figure 3.10.6*, ~~In 2010~~ in 2013, coal and nuclear power provided over ~~94~~75 percent of the County's electric energy. Coal accounted for ~~71.7~~60 percent and nuclear power provided ~~22.6~~15 percent of the County's electric energy. Proportionally, the County uses approximately twice the coal and ~~half~~

FIGURE 3.10.5: SC ELECTRICITY GENERATION



Note: 'Other' includes wind, solar, biomass, and petroleum.
Sources: U.S. Energy Information Administration (EIA) and Department of Energy (DOE), 2014.

FIGURE 3.10.6: CHARLESTON COUNTY ELECTRICITY CONSUMPTION



Note: 'Other' includes wind, solar, biomass, and petroleum.
Sources: South Carolina Electric and Gas (SCE&G), Berkeley Electric Cooperative (BEC) and Santee Cooper, 2013.

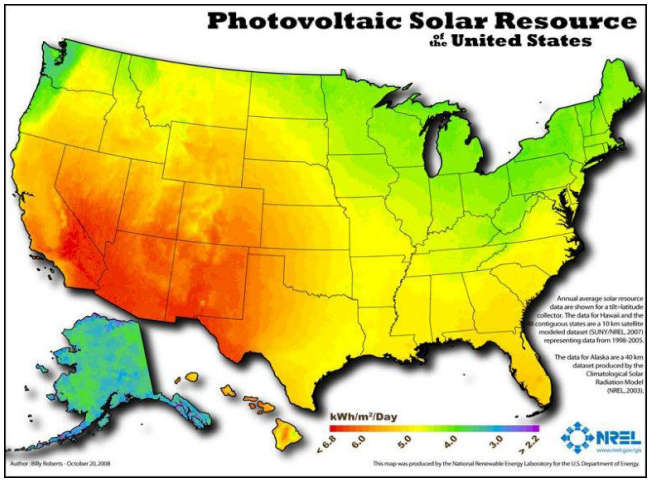
a third of the nuclear power as compared to electricity generation energy sources for other areas of the state. This can be attributed to the location of coal burning and nuclear power plants statewide and the method of electricity transmission. Hydroelectric power provided ~~4.6~~ approximately 21 percent and natural gas/oil provided ~~1.5~~three percent of the County's electric energy consumption. Approximately ~~0.5~~one percent came from other sources such as wind, solar, ~~and~~ biomass, and petroleum.

A. Alternative Energy

The following is a discussion of alternative energy sources and their current and/or potential use in Charleston County and South Carolina:

- **Nuclear energy** is America's largest source of clean-air and carbon-free electricity, producing no greenhouse gases or air pollutants. Nuclear energy contributes 30 percent of the total energy consumption in the state. South Carolina is among the top nuclear power producers in the United States with four active reactors, which accounted for ~~51.6~~57 percent of South Carolina's electricity generation ~~in 2009~~as of March 2014. With seven nuclear plants, South Carolina is ranked third in the nation for installed nuclear power.
- **Solar energy** requires no additional fuel to run and is pollution-free. Photovoltaic systems and solar thermal power systems convert sunlight into energy. Photovoltaic (PV) cells absorb sunlight and convert it directly to electricity. There are three types of proven solar thermal power systems on the market, but they have limited use: the central receiver solar collector (a.k.a. power tower), the parabolic reflector, and parabolic trough system. PV solar energy has been in use for decades but manufacturing costs have prevented it from becoming a major source of energy in the past. However, recent improvements in manufacturing and technology have dramatically reduced the costs and improved the efficiency of PV solar panels. According to the U.S. Department of Energy (USDOE), the cost to install solar power in the United States fell by ~~seventeen~~17 percent in 2010 from 2009 and by an additional 11 percent within the first six months of 2011. Demand for solar power has increased 30 percent per annum over the past 15 years with over 7.3 GW of PV installations globally. The Department of Energy's supports development of low-cost, high-efficiency PV technologies through the SunShot Initiative, which seeks to make solar electricity cost-competitive with other sources of energy by 2020. ~~Solar America Initiative states that PV will become a competitive source of electricity by 2015.~~ Currently, there is only about one~~1~~ MW of

MAP 3.10.1: SOLAR ENERGY RESOURCE MAP

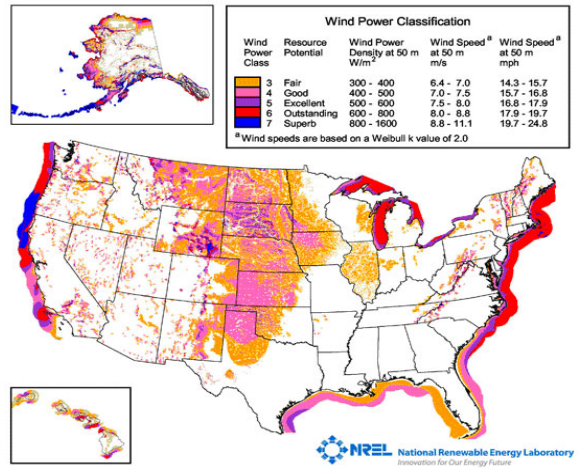


Source: National Renewable Energy Laboratory (NREL), 2010.

installed solar energy capacity in South Carolina. In 2010, IMO USA Corp. unveiled the state's single largest solar tracker solar panel located in Summerville, SC. The solar panel generates 22 kW, enough to power almost four homes. The ~~completed~~ assembly plant for the Boeing Company in North Charleston~~, which will have~~has a rooftop solar farm installation, ~~will be~~which is the sixth largest solar farm in the United States and the largest in the southeast.

- **Biomass energy** and biofuels are energy sources from organic matter. They involve releasing the chemical energy stored in organic matter including trees, farm crops, manure, plants, and landfill gas. These materials are either burned directly to produce heat or refined to create fuels like ethanol and biodiesel. Biofuel can be used by itself or blended with traditional diesel fuel to fuel vehicles and equipment that have been modified to accept biofuel. There are currently several facilities in South Carolina that manufacture biofuel with one facility operating in North Charleston.
- **Hydroelectricity** is created when water from a river or stream flows through a turbine, which operates an electric generator. These plants have been in use in the U.S. since the late 1800s. In 1900, hydroelectricity comprised 57 percent of the electricity generated in the U.S; currently, hydroelectricity comprises 11 percent of the electricity generated in the nation and ~~2.3~~three percent of the electricity generated in South Carolina. Researchers are working on advanced turbine technologies that will maximize the use of hydropower while minimizing adverse environmental effects.
- **Geothermal energy** is the heat from the earth, both clean and sustainable. Geothermal heat pumps are among the most efficient and comfortable heat-

Map 3.10.2: Wind Energy Resource Map



Sources: U.S. Department of Energy (DOE) and National Renewable Energy Laboratory (NREL), 2010.

ing and cooling technologies available, requiring no supplemental heat source because of the moderate temperature of the ground even in winter. Geothermal heat pumps are used in South Carolina for residential and commercial purposes. These pumps require only the Earth's moderate, relatively constant ground temperatures to provide heating and cooling year round.

- **Wind power** has emerged as the world's fastest growing renewable energy market. The Department of Energy estimates that 20 percent of our national energy demand can be met with wind power by 2030. An estimated 1-5 GW of electricity from offshore wind can be produced in South Carolina alone, according to the Department of Energy. A 2009 study by Clemson University, Santee Cooper, Coastal Carolina University, and the South Carolina Energy Office determined that offshore wind resources in South Carolina could generate enough electricity to power one million homes more cost-effectively, due to the presence of sustained wind speeds of 12.5 miles per hour or more. In 2013, SCE&G and Clemson University partnered to dedicate a state-of-the-art wind turbine drivetrain test facility, named SCE&G Energy Innovation Center, in Charleston. The test facility is capable of full-scale highly accelerated mechanical and electrical testing of advanced drivetrain systems for wind turbines in the 7.5 to 15 megawatt range. ~~Additionally, Clemson University's wind turbine drive train testing facility located in North Charleston is expected to be completed in 2012. This will be the world's largest testing facility and will be capable of advance, full-scale high speed testing in the 7.5 to 15 megawatt range.~~ South Carolina meets three important cost drivers for developing offshore wind farms: strong winds in shallow waters, access to commercial port facilities, and a large coastal demand. Building upon the offshore wind industry in South Carolina would offer economic development as the manufacturing of wind turbines and associated components could generate up to 20,000 jobs in the state.

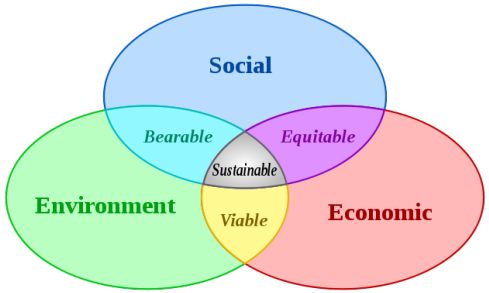
B. Land Use

According to 2010 Census data approximately ~~13~~8 percent (~~350,000~~350,209) of the state's population resides in Charleston County. Charleston County is 1,358 square miles in size, with approximately 358 square miles of water and 1,000 square miles of land and marsh. Preservation of the County's natural resources and rural areas is one of the main goals of this Plan. One way the County protects these resources is through the Greenbelt Program, which aims to preserve 30 percent of the land in the County. Of the 669,440 acres of land within the County, 161,348 acres were under some sort of public private sector protection before the Greenbelt

Plan started in 2006. In order to achieve 30 percent open space, the County set a target of acquiring 40,000 additional acres through the Greenbelt Program. As of March 2014, 19,908 acres of land have been protected through the Greenbelt Program. Another effective tool the County uses to protect open space is its Urban Growth Boundary Line (UGB). The area included within the UGB is considered urban/suburban and is designated for higher intensity infill development with homes, businesses, and industries that are contiguous to or near existing development to prevent premature and costly over extension of public services such as water and sewer. Everything outside of the UGB is considered rural, designated for less intense purposes such as agriculture, forestry, open space and preservation.

In 1987, the World Commission on Environment and Development (the Brundtland Commission) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This is achieved by balancing social, economic, and environmental objectives or needs (*Figure 3.10.7*).

Figure 3.10.7: Sustainable Development



Source: World Conservation Union, 2006.

By promoting mixed use development within the ~~urban areas~~ Urban/Suburban Area and preserving land outside the Urban Growth Boundary for other activities such as agriculture, recreation, and open space, we begin to achieve sustainable development. Compact mixed use development within the ~~urban areas~~Urban/Suburban Area requires less infrastructure (roads, water, sewer, etc.) because most of the required services already exist or are located nearby. This type of development generally uses less energy to install, maintain, and use while promoting alternative forms of transportation such as walking, biking, and mass transportation. Less intense modes of transportation are conducive to lowering energy and infrastructure costs and preserving the rural landscape. Planning and Zoning techniques such as an Urban Growth Boundary, Infill Development, Transit Oriented Development, and Form Based Code development can all be used to help promote sustainable development.

C. Transportation

Driving habits are a direct result of development patterns. The national transportation sector accounts~~s~~ed for 28.5 percent of total energy use in 2009. Nationally, the average vehicle miles traveled (VMT) increased by ~~151~~ 150 percent from approximately 2 trillion VMT in 1970 ~~1971~~ to approximately 5 trillion VMT in 2007 ~~2001~~, while population only increased by ~~30~~ 50 percent from approximately 200 million people to 300 million people, according to the US Department of Transportation and US Census Bureau. Therefore, the increase in VMT is attributed primarily to auto-oriented development. According to the ~~2000 Census~~American Community Survey, 2007-2011 Five Year Estimates, the average travel time to work in Charleston County was ~~23~~22 minutes with ~~76.6%~~ nearly 79 percent of the population commuting alone by car, truck, or van. To assist in reducing vehicle miles traveled by single occupancy vehicles, the BCDCOG has initiated a travel demand management program which includes the promotion of Trident Rideshare, a free and convenient web-based service that connects commuters looking to share cars, bicycles, taxis, and transit or walking trips in Berkeley, Charleston, and Dorchester Counties. Public transit in Charleston County is offered through the Charleston Area Regional Transportation Authority (CARTA) for the ~~urban areas~~Urban/Suburban Area and Tri-County Link for the ~~rural areas~~Rural Area. CARTA is composed of 115 buses for transit in the Charleston area including 14 trolleys, 27 express buses, and neighborhood buses. Recently, CARTA upgraded its fleet by replacing outdated buses that only met the 1994 standards for exhausts and emissions with 11 buses that meet 2004 Air Standards.

Ways to reduce VMT include: improved interconnectivity with existing and proposed roadways and rethinking community design so that it is easier and safer to bike, walk, or use public transit. Charleston County transportation plans therefore no longer focus solely on roadway solutions. In the quest for an improved quality of life, Charleston County supports promoting livable communities with Complete Streets Policies that accommodate all modes of transportation including pedestrians and bicyclists. Besides reducing costs, the advantages of these latter modes of transportation include improved public health and environmental benefits from reduced air and noise pollution and improved water quality from fewer parking lots.

Over the next 25 years, the most growth in Charleston County is projected to occur within the Urban Growth Boundary (UGB). Future neighborhoods in these areas should be planned in close proximity to transit facilities with options that encourage future development of a mixed use land use pattern. In some areas of Charleston County, roadway capac-

ity improvements on major thoroughfares help to relieve the congestion on existing roadway corridors. An example of regional traffic congestion is the Interstate 26 corridor. This corridor serves as the region's spine and in several areas, such as near the Charleston International Airport and through the Neck area northwest of downtown Charleston, existing development constrains future expansions of the roadway. Moving forward, it is important to more efficiently utilize existing transportation corridors for all modes of transportation. Transit options currently being considered for the area's major transportation corridors include the following:

- **Commuter Rail Service** refers to passenger trains operated on main line railroad tracks to carry riders to and from city centers. Commuter rail lines normally extend an average of 10 to 50 miles from their downtown terminus. The primary purpose for commuter rail in the Charleston region would be to improve overall capacity along the congested transportation network adjacent to the rail corridors, particularly during peak travel hours. Many of the primary roadway corridors connecting Summerville, Goose Creek and the northern sections of North Charleston to the Neck area and the Charleston peninsula are currently operating at a Level of Service (LOS) of F, or will be by 2035. LOS describes the effectiveness of infrastructure regarding traffic flow and safe driving conditions with F being the lowest category. Because there is limited right of way available for additional roadway improvements within the Neck Area and along the Interstate 26 corridor, the Charleston region has begun to take a look at reviving passenger rail travel along this corridor through a variety of means.
- **Light Rail Service** provides more frequent service than commuter rail with a shorter space between stops (approximately ~~1~~one mile apart in suburban areas and ~~½~~one half mile within urbanized areas). The primary purpose for light rail service in the Charleston region would be to improve capacity along the congested transportation network adjacent to the rail corridors, particularly during peak travel hours.
- **Bus Rapid Transit (BRT)** is similar to Light Rail in that it provides relatively high speed, high frequency service from dedicated stops along a fixed route. The ~~biggest~~ differences~~s~~ between the two are in the type of vehicle used and in the ability to utilize ~~and enhance~~ existing roadway facilities as part of a BRT system instead of requiring new rail lines. There are several options for transit providers in designing a BRT system that balance cost constraints with the ability to provide high-speed service.
- **Electric and Partially-Electric Vehicles** provide an emerging alternative source of powering vehicles. These cleaner, domestically-fueled vehicles offer environmental, economic, and national security benefits to our county and nation. According the U.S. Environmental Protection Agency (EPA), Electric vehicles can reduce emissions between 30 percent and 60 percent over traditionally-fueled vehicles depending on the source of generation. A study performed by the Pacific Northwest Laboratory found that our nation has enough off-peak electricity to power 73 percent of our nation's passenger and light duty truck fleet. That means if we limit our charging to off-peak hours and implement smart charging during peak hours, electric vehicles should not strain our electric grid at all. Already, South Carolina is leading the way with electrical vehicle (EV) charging stations. The South Carolina non-profit, Plug In Carolina, predicts at least 100 EV charging stations in ten South Carolina cities will be operational by the end of 2011. With these 100 EV stations, South Carolina will have one of the largest deployments per capita in the United States.

In the future, high-technology transportation equipment will result in usable advance information available to motorists. For example, Intelligent Transportation Systems (ITS) along major corridors will save time and energy costs by alerting travelers to alternate routes when main thoroughfares become congested.

D. Landfill/Recycling

Landfill gas emitted by the nation's 750 landfills has the potential to power three million homes if captured and converted into pure methane gas. Nationwide there are 518 operational methane capture projects and 520 candidate landfills that could remove and purify landfill gas into clean methane gas. South Carolina has 11 operational methane capture projects and seven~~7~~ candidate landfills including the Bees Ferry Landfill, which was opened in 1977 in the St. Andrews area of Charleston County. A portion of the site was formerly an unlined municipal solid waste landfill that closed in 2006. This closed portion of the landfill has approximately 2.9 million tons of waste in place and is recognized as a potential methane capture project. The current 80-acre lined municipal solid waste site at the Bees Ferry Landfill was opened in 2006 and is also recognized as a potential methane capture project. With a life expectancy of approximately 30 years, this site had approximately 575,000 tons of waste in place as of July 2010.

The recycling of household and commercial waste is much more energy efficient than disposing solid waste and producing new materials. The process of supplying recycled materials uses less energy than supplying virgin materials to industry. Additional savings are gained in the manufacturing process itself, which

recyclables have already undergone. In addition to recycling white goods, scrap metal, and tires that are collected at Bees Ferry Landfill, Charleston County has a voluntary curbside recycling collection program for the more populated areas of the County and numerous drop sites throughout the County for collecting the following:

- Glass bottles and jars;
- Aluminum;
- Steel cans;
- Aerosols;
- Plastics 1 - 7 (except plastic bags, plastic wrap, expanded polystyrene); and
- Paper, paperboard and cardboard.

The Bees Ferry Landfill also houses a 40 acre Compost Facility, where yard waste that is brought to the facility is composted. The compost is then sold to customers for $10 a ton or $2 a bag. The landfill also has a paint remix program which offers customers the opportunity to buy paint for $4 for a five-gallon bucket at the Bees Ferry Landfill Convenience Center.

E. Building Codes

Currently, Charleston County enforces the *International Building Code* (IBC) and the *International Residential Code* (IRC) of 2006 as adopted by the State of South Carolina. The exception to the IBC is that the State does not adhere to the ~~e~~Energy ~~e~~Element within the IBC, but rather a second document known as the *International Energy Conservation Code* (IECC) of 2009. ~~2006. By 2012, the State is scheduled to draft a new IECC for the counties to enforce.~~ Charleston County encourages developers and homeowners alike to build based upon Leadership in Energy and Environmental Design (LEED), which is the most well known green building rating system. South Carolina was ranked sixth in 2010 for LEED-certified buildings from the U.S. Green Building Council. However, LEED certification is voluntary.

F. County Facilities & Fleet

The County currently has 710 active vehicles in its fleet with an average age of 5.2 years. The County has 107 vehicles that fall into the class of truck with an average age of 6.9 years old, 22 ambulances with an average of 3.9 years old, 6 hybrid vehicles with an average of 4.4 years old, 319 vehicles in the car class with an average age of 4.7 years old, 207 vehicles of the pickup truck type with an average age of 5.4 years old, and 49 vehicles of the van class with an average age of 7.3 years old. As a whole, the County's fleet of vehicles has an average age of 5.2 years.

Charleston County is providing leadership in the production of sustainable energy in the region. In 2011, the County installed a solar power system on the roof of the Sheriff Al Cannon Detention Center. Power generated by the ~~solar power~~ system is fed directly into the building power system and used as it is produced to offset energy ~~usage~~ from the power company. Because the power generated is fed directly into the power system, an energy storage system is not required, further reducing the effect on the environment, as batteries require replacement and disposal. In addition, the County's ~~plans to open a new building to house the~~ Consolidated ~~Dispatch~~9-1-1 Center and Emergency Operations Center was ~~The building will be~~ designed to achieve the LEED silver certification by collecting rainwater, planting water efficient landscaping and using recycled materials.

Charleston County has ~~130~~142 facilities encompassing approximately ~~2.7~~2.8 million square feet. The Charleston County Facilities Department has adopted the Charleston County Energy Conservation Program, which has resulted in reduced electrical consumption through conservation measures such as installing programmable thermostats, automatic switches, and energy efficient fixtures. The County reduced electrical consumption by 9.3 percent in FY 10 based on an FY 08 baseline, resulting in a savings of over $200,000. In FY 11, the County saved over $500,000 from the FY 08 baseline by utilizing energy conservation and efficiency measures.

G. Workforce/Affordable Housing

~~There are approximately 2.1 million housing units in South Carolina; almost 12 percent, or about 175,000 dwelling units, of these dwelling units are located in Charleston County. The lack of affordable workforce housing is felt beyond working families. High housing costs force families to move further from their place of work to afford housing making them more susceptible to the impacts of increased fuel costs and cities become ever more sprawling, leading to increases in traffic congestion, air pollution, and road maintenance costs that negatively affect the quality of life for all residents in the community. The families in need of workforce housing do not fall neatly into a single narrow income category. Employees in some industries (e.g. retail sales, food service, tourism) are likely to be in the lower income ranges. Jobs with education or training requirements, such as teachers, police officers, nurses, etc., may fall into the middle income brackets but often find it difficult to afford homes in the community where they work. The Housing Affordability Assessment conducted by the Charleston Metro Chamber of Commerce in 2007 revealed that over 77,000 existing households, or one-third of the population in the region, pay more than they can afford for housing. With high cost housing relative to wages, many households are overstretched paying 50 percent or more of their annual household income on monthly mortgage or rent payments. The State of South Carolina's median house income in 2008 was $44,695 with 15.7 percent of the population below poverty level. Charleston County had a median household income of $50,213with 15.4 percent of the popula-~~

~~tion below poverty level.~~

~~Another important factor to take into account is that in Charleston County, 49% of homes were built prior to 1980. It is these homes that are affected the most from rising energy costs because they are often poorly insulated and severely leaky, consequently making them expensive to heat and cool.~~

~~Current incentives to promote ownership or occupancy of workforce/affordable housing in Charleston County are included in the ***Zoning and Land Development Regulations Ordinance***, which allows for density bonuses above the maximum allowable density through the Planned Development rezoning process as well as flexible density, intensity and dimensional standards for affordable housing subdivisions.~~

Housing is affordable when no more than 30 percent of monthly income is spent on housing costs (mortgage, rent, insurance, HOA fees, etc.) according to the United States Department of Housing and Urban Development. As illustrated in the Housing Element, housing costs in Charleston County are very high and wages have not kept pace with national averages. Many of the more affordable homes are often not very energy efficient, meaning residents have higher utility costs. Additionally, many of the more affordable homes are located far from employment centers, requiring residents to drive long distances to and from their jobs. This results in increased vehicle miles travled (VMTs) and higher energy costs for both residents and local governments.

H. Food

In the United States, the average unit of food is transported almost 1,500 miles before it is consumed. In addition, one calorie of food produced requires ten calories of fossil fuels. This not only makes food more expensive for consumers, but also consumes an enormous amount of energy resources.

In September 2008, the Palmetto Agribusiness Council released a report, "The Economic Impact of the Agribusiness Industry in South Carolina," which showed that the agriculture and forestry industry is the largest economic cluster in South Carolina, with a direct and indirect impact of almost $33.9 billion per year and nearly 200,000 jobs. The availability of locally grown products affords our state and county the ability to provide food that is more fresh, costs less to transport, and reduces energy costs.

The County encourages agricultural uses through the goals and strategies of this Plan, the requirements of the *Zoning & Land Development Regulations Ordinance*, and through the Greenbelt Program, which has protected approximately 4,400 acres of farmland to date.

Other efforts to promote local living include two strong privately funded campaigns: the Lowcountry Local First campaign, which is part of the Business Alliance for Local Living Economics (BALLE) and Buy Local, a grassroots campaign to think, buy, and be local. The Buy Local campaign focuses on the need to recirculate more money in our community to promote a strong local economy, to support and strengthen locally-owned, independent businesses and local jobs, to preserve and enhance our unique neighborhoods, and to establish economic justice in all communities.

Other local opportunities include Community Supported Agriculture (CSA), a program that provides a direct connection between the farmer and the consumer, the Sustainable Seafood Initiative, a program designed to promote the use of local and sustainable seafood in South Carolina's restaurants, and GrowFood Carolina, a program that provides distribution and marketing services for small- and mid-sized farms.

I. Education

South Carolina has a very high illiteracy rate. Twenty-five percent (25%) of adults fall in a level 1 category, in that they cannot read a simple story to a child or fill out a job application. Thirty-one percent (31%) of adults fall in a level 2 category, in that they cannot perform higher level reading and problem-solving skills. South Carolina has the fourth highest percentage (56 percent) of adults that fall within the level 1 or 2 categories. In Charleston County, approximately 25 percent of adults experience extreme literacy issues. ~~More than 30,000 adults in Charleston County do not have high school~~

~~credentials and 10,000 have less than a ninth grade education~~. If residents do not have basic reading and comprehension skills, the concept, implementation, and benefits of energy efficiency are much more difficult to convey and understand.

~~Education is positively correlated with income. As noted earlier in this section, Charleston County's average disposable income of $40,698 is greater than that of the state as a whole, but still below the national average. Lower income means South Carolinians are more susceptible to the adverse affects of increases in energy prices. A lower disposable income impacts the ability of residents to purchase more expensive energy efficient appliances and energy saving household upgrades.~~

3.10.3: ENERGY ELEMENT GOAL

Promote use of alternative energy sources and energy conservation measures that benefit our communities.

Energy Element Needs

Energy Element needs include, but are not limited to, the following:

- Promoting conservation of resources;
- Investing in renewable energies;
- Educating the public on alternative energy sources and energy conservation; and
- Encouraging public and private partnerships to facilitate alternative energy sources and energy conservation.

3.10.4: ENERGY ELEMENT STRATEGIES AND TIME FRAMES

The following strategic actions should be undertaken by Charleston County and cooperating agencies in support of the Energy Element Goal and the other elements of this Plan. These implementation strategies will be reviewed a minimum of every five years and updated every ten years from the date of adoption of this Plan.

ES 1. Support recommendations of other elements in this Plan that reduce energy demand and promote energy efficiency by adopting policies and regulations that encourage more efficient and cost-effective uses of existing energy sources. [Combined with ES 22]

ES 2. Facilitate educational outreach, training, and technical assistance to promote energy efficiency and the use of alternative energy sources.

ES 3. Utilize existing state, federal, and non-profit resources such as the South Carolina Energy Office and ENERGY STAR to promote energy efficiency and renewable energy sources.

ES 4. Conduct an energy audit for all County facilities (existing, undergoing renovation, and under design) and implement the recommended cost effective improvements.

ES 5. Evaluate all County operations to promote energy efficiency and reduce energy consumption.

ES 6. Convert the County fleet to more fuel-efficient vehicles over time.

ES 7. Evaluate the impact on vehicle miles traveled (VMTs) for both County residents and employees. Consider performing a cost/benefit analysis of having County facilities and services in centralized areas as compared to having more satellite facilities to bring services closer to residents.

ES 8. Expand the provision of online services, where practical, to reduce or eliminate the need for the public to travel to County facilities.

ES 9. Develop a County policy on telecommuting ~~policy for County employees~~ when it is a viable management work option to reduce VMTs by employees commuting to and from work.

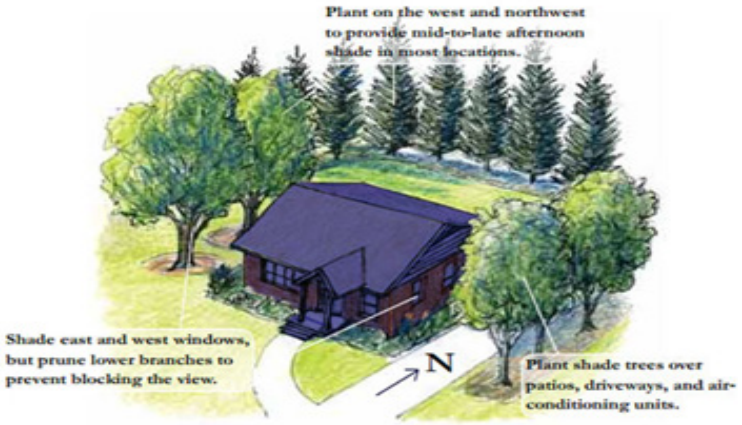
ES 10. Provide support facilities at County buildings to promote walking and cycling to work. Support facilities may include, but are not limited to, bike racks, lockers, changing areas, and showers.

ES 11. Streamline and reduce government barriers to facilitate green building design.

ES 12. Adopt a voluntary approach to promoting green building code standards.

ES 13. Adopt a voluntary approach to promoting sustainable landscaping that aids in energy conservation such as strategically planting trees around buildings and parking lots for shade and as windbreaks to help reduce cooling and heating costs.

ES 14. Support weatherization programs, such as the Weatherization Assistance Program offered throughout the U.S. Department of Energy, and local agencies who are implementing these programs. Weatherization techniques such as those listed below can lower utility bills in



3.10.4: ENERGY ELEMENT STRATEGIES AND TIME FRAMES CONTINUED

existing older homes and in new construction:

- Adding insulation to attics/walls;
- Weather stripping doors and windows; and
- Using insulating foam on pipes and electric outlets.

ES 15. Analyze development regulations to remove any unnecessary regulatory barriers that deter local renewable energy generation.

ES 16. Provide standards for solar collectors and wind generators as accessory uses in the ***Zoning and Land Development Regulations Ordinance***.

ES 17. Monitor state and federal legislation that promotes energy efficiency and renewable or alternative energy sources such as net metering legislation that would allow those that produce alternative energy (e.g. wind and solar) to sell excess generated electricity back to the grid.

ES 18. Support individuals, farmers, and organizations involved with local food production and implement the strategies developed by the Charleston County Council Agriculture Issues Advisory Committee to promote agriculture in the area. Examples include but are not limited to supporting the following:

- Agricultural education (all levels);
- Food to School programs;
- Agri-business incentives;
- Local farmers markets;
- Community gardens; and
- Food Co-ops.

ES 19. ~~Monitor and support planning efforts that are exploring~~ Explore the feasibility of commuter rail service, light rail service, and bus rapid transit service within the Urban/Suburban A~~areas~~ of the County.

ES 20. Adopt land use regulations that allow clustered development, interconnectivity, and walkable communities at higher densities near accessible transportation corridors and nodes.

ES 21. Adopt land use regulations that allow the establishment of electric vehicle charging stations where feasible.

~~ES 22. Adopt policies and regulations that encourage more efficient and cost-effective use of existing energy sources.~~ [Combined with ES 1]

ES 22. Support tax incentives for properties that install/utilize alternative energy sources, such as solar power.

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