DATA SUPPLEMENT

ENERGY BY THE NUMBERS

THOMAS DAMASSA

SUMMARY: THE ENERGY CHALLENGE

Policymakers in the United States are facing significant energy challenges. Increasing demand for energy combined with concerns about energy security, fossil fuel price volatility, and the effects of global warming have many policymakers looking for ways to develop a cleaner, more efficient, and secure energy economy. Meeting future energy demands requires solutions that address these fundamental challenges, yet are regionally appropriate. Specific energy challenges for the Southeast can be broadly outlined by four factors:

- **High energy consumption.** The Southeast is a major consumer of energy, accounting for 20 percent of U.S. energy consumption. Per capita energy consumption is greater than that of most developed countries and more than four times the world average. Regional trends and actions are therefore critical nationally and internationally.
- **Population growth.** Population grew by 15 percent from 1997-2006 and is projected to grow an additional 35 percent by 2030, well above national average growth rates. Future population trends will likely be most relevant to economic sectors that account for a large portion of energy consumption and are directly influenced by individual behavior, such as electricity generation. Additional energy resources will likely be required to meet future consumption demands.
- **Continued reliance on fossil fuels.** Eighty percent of regional energy consumption is derived from fossil fuels, and fossil fuel consumption increased 14 percent between 1997 and 2006, compared to a national rate of 5 percent. A predominantly fossil-based energy mix exposes the region to energy price volatility and fails to take advantage of local energy sources.
- **Global warming.** The region is a significant contributor to global warming, producing 20 percent of U.S. greenhouse gas emissions. The effects of global warming could strain existing energy-relevant resources, presenting additional challenges to securing energy, and impact several Southeast industries. However, emission reduction activities can also help address a number of regional energy challenges.

Understanding these issues and related energy indicators (see Summary Table) can help ensure regional interests are represented in existing national energy and climate debates. Important areas where policymakers can take action include: stimulating investment in energy efficiency, developing renewable energy resources, and taking advantage of the co-benefits of efficient energy and water use. A set of 3 companion issue briefs explore these topics in greater detail and provide specific recommendations targeted at federal and state policymakers.

To access the Southeast Energy Opportunities series, see www.wri.org/publication/southeast-energy-policy.

WORLD RESOURCES INSTITUTE

10 G Street, NE Washington, DC 20002
Tel: 202-729-7600 Fax: 202-729-7610

www.wri.org

SUMMARY TABLE Major Energy Related Indicators for the Southeast and United States, 2006

	Southeast	U.S.
Energy consumption per capita (million Btu/person)	329	335
Energy consumption per GDP (thousand Btu/chained 2000 $US)	9.6	8.8
Electricity consumption per capita (kWh/person)	14,868	12,284
Average retail price of electricity — all sectors, 2008[a] (cents/kWh)	8.7	9.8
Population growth, 1997-2006 (% change)	15	10
Projected population growth, 2006-2030 (% change)	35	22
Fossil fuel consumption growth, 1997-2006 (% change)	14	5
Fossil fuel energy consumption[b] (% of total consumption)	80	85
Coal consumption per capita (million Btu/person)	81	75
Natural gas consumption per capita (million Btu/person)	48	74
Petroleum consumption per capita (million Btu/person)	125	135
Gasoline consumption per capita (gallons/person)	515	463
Vechicle miles traveled per capita (VMT/person)	11,692	10,089
Renewable energy consumption[c] (% of total consumption)	6	6
GHG emissions per capita, 2005 (metric tons CO_2e/person)	22	23
GHG emissions per GDP, 2005 (metric tons CO_2e/million chained 2000 $US)	635	636

Sources: EIA-SEDS, 2008; BEA, 2008; EIA, 2008. *Electric Power Monthly;* U.S. Census, 2008; Bureau of Transportation Statistics, 2008; CAIT-US, 2008.

Notes: All data are for 2006 unless otherwise noted. a) Data are averages for 2008; b) Percent totals were calculated excluding net interstate flows of electricity; c) Renewables include energy generated from hydroelectric and wood and waste sources, as well as solar, wind, and geothermal sources. Percent totals were calculated excluding net interstate flows of electricity.

For reference, 1 million Btu has the energy equivalent of approximately 8 gallons of gasoline; 1 billion Btu equals all the electricity that 300 households consume in one month (see http://www.eia.doe.gov/neic/infosheets/apples.html).

Introduction

The United States, as the world's largest consumer of energy,[1] faces significant challenges in its efforts to provide a reliable, affordable energy supply to its citizens and industries, while simultaneously managing economic, political, and environmental concerns. Each U.S. region faces unique energy challenges due to differences in natural resource availability, historical development patterns, and regulatory and legal structures, among other factors. Policymakers need robust, regionally specific data and information to develop comprehensive energy management plans.

Drawing primarily on data published by the U.S. Department of Energy's Energy Information Administration (EIA), this report presents a "snapshot" of regional energy-related statistics and trends. It also discusses important implications to help inform and provide context for the policy priorities noted in a series of companion reports on Southeast energy efficiency, renewable energy, and water and energy savings opportunities (see www.wri.org/publication/southeast-energy-policy). Additional information and resources for further analysis can be found in the notes section of this document.

Regional energy consumption and production trends are critical to understanding the causes and scope of the challenge and for establishing energy policy priorities moving forward. Analysis of the region can identify common challenges and opportunities. Regional actions can also provide models for energy solutions across states, counties, sectors, or industries that maximize efficiency and minimize costs. Therefore, in addition to policymakers, the information presented here is useful to businesses, nonprofit organizations, and other stakeholders identifying and implementing regional energy solutions.

Data Note: The regional statistics and trends presented here are aggregated principally from state-level data (for Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia). State-specific information is important because different geographical definitions of the Southeast—the inclusion or exclusion of particular states—may yield different analytical results. While state specifics are generally beyond the scope of this overview document, state data are available as part of an online tool that complements discussion in the Southeast Energy Opportunities series: see www.wri.org/publication/southeast-energy-policy.

The Southeast Energy Challenge

High Energy Consumption & Population Growth

- With a growing population, regional energy consumption trends are increasingly important nationally and internationally.
  - Historic growth in energy consumption has outpaced the national rate and is projected to continue to exceed the national rate through 2030. Increasing rates of per capita energy consumption would likely exacerbate the challenge.
  - Approximately 45 percent of energy consumed is for the generation of electricity. Addressing energy consumption in this sector will be critical to meeting the regional energy challenge.

The Southeast constitutes approximately one-fifth of the U.S. population and economy,[2] and consequently, ranks among the largest energy consumers in the world. On a per capita basis, energy consumption is approximately equal to the national average, which is twice that of many European countries and nearly six times greater than that of developing countries such as China (Table 1).

The Southeast is also more energy intensive—that is, consumes more energy per unit of economic output (gross domestic product or GDP)—than the national average (see Table 1). Energy intensity reflects energy efficiency and overall economic structure, including the extent to which an economy relies on imports and exports.[3] Countries or regions that are less efficient and/or have a greater amount of energy-intensive industries typically have higher levels of energy intensity. Since the overall composition of the regional economy is similar to that of the nation as a whole,[4] energy efficiency is likely to be the more important driver of this disparity. For an extended discussion of regional energy efficiency see companion issue brief, available at www.wri.org/publication/southeast-energy-policy.

Did you know?

- The Southeast accounted for 20 percent of total U.S. energy consumption in 2006.
- If the Southeast were a country, it would be the fifth largest energy consumer in the world.
- Energy consumption per person in the Southeast is approximately twice that of the European Union and Japan, and 4.5 times the world average.

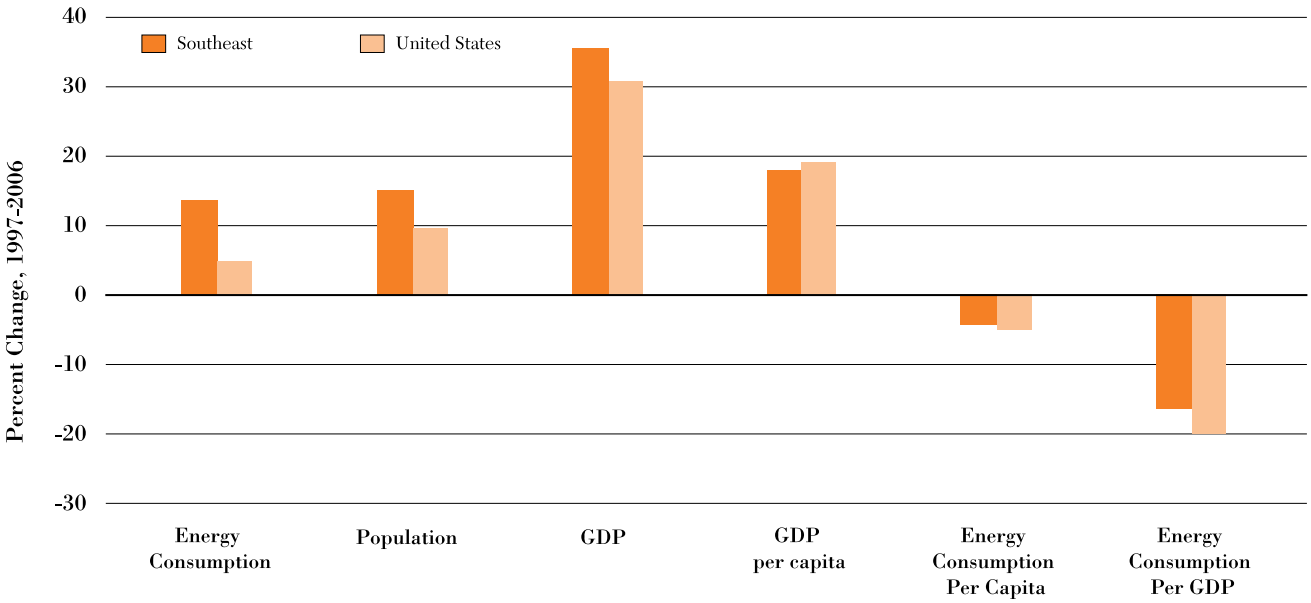
TABLE 1 Top 10 Global Consumers of Energy, 2006

Country	Total Primary Energy Consumption (Quadrillion Btu)	Percent of World Primary Energy Consumption (%)	Energy Consumption Per Capita (Million Btu/person)	Energy Consumption Per GDP (Thousand Btu/chained (2000) $US)
1. United States of America	100	21.1	335	8.8
2. China	74	15.6	56	13.8
3. Russia	30	6.4	214	18.8
4. Japan	23	4.8	179	6.5
SOUTHEAST	**20**	**4.3**	**329**	**9.6**
5. India	18	3.7	16	7.5
6. Germany	15	3.1	178	6.4
7. Canada	14	3.0	427	13.1
8. France	11	2.4	181	6.6
9. United Kingdom	10	2.1	162	5.2
10. Brazil	10	2.0	51	6.8
World Total	*472*	*100.0*	*72*	*8.9*

Sources: EIA-SEDS, 2008 (Southeast totals); EIA *International Energy Annual 2006* (country and world totals).

Notes: For reference, 1 million Btu has the energy equivalent of approximately 8 gallons of gasoline; 1 billion Btu equals all the electricity that 300 households consume in one month (see http://www.eia.doe.gov/neic/infosheets/apples.html). Primary energy is "energy in the form that it is first accounted for in a statistical energy balance, before any transformation to secondary or tertiary forms of energy. For example, coal can be converted to synthetic gas, which can be converted to electricity; in this example, coal is primary energy, synthetic gas is secondary energy, and electricity is tertiary energy" (EIA).

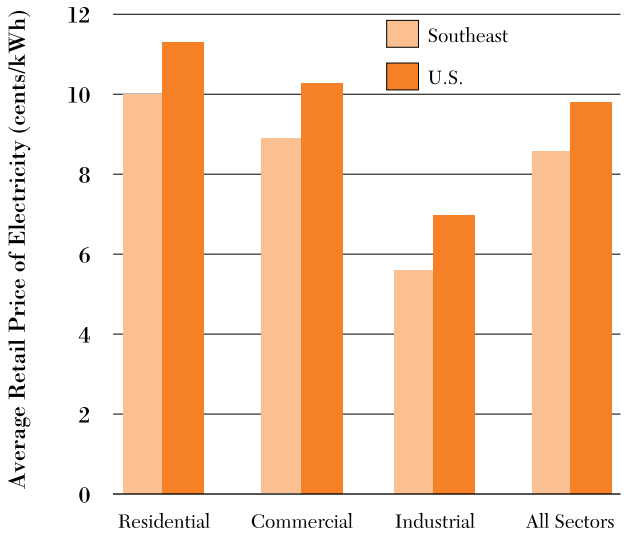
FIGURE 1 Trends in Southeast and U.S. Energy Consumption, Population, Gross Domestic Product, and Related Indicators, 1997-2006



Sources: EIA-SEDS, 2008: BEA, 2008; U.S. Census, 2008.
Notes: GDP is gross domestic (or regional) product.

Between 1997 and 2006,[5] the region's total energy consumption increased 13 percent, more than double the national rate of 5 percent over this time period. Growth in energy consumption is largely attributable to increases in population and economic activity, specifically growth in personal income or GDP per capita (populous, industrialized regions typically have greater energy demands). Regional growth in all of these variables was approximately equal to or exceeded the national rate during this time period (Figure 1). One contributing driver of these trends is the relatively low cost of energy consumption. For example, average electricity rates are below the national average in all major energy-consuming sectors (Figure 2). This driver also has implications for per capita energy consumption and energy consumption per GDP (energy intensity), indicators that demonstrated similar, but slower rates of decline than the national average from 1997-2006 (Figure 1). Due to these trends and other factors such as growth in personal income (GDP per capita; Figure 1) and land use patterns,[6] as of 2006, all Southeast states except Mississippi were among the top-25 consumers of energy, with both Florida and Georgia ranking in the top 10 (Table 2).

FIGURE 2 Average Southeast and U.S. Retail Electricity Prices by Sector, 2008



Source: EIA, 2008. *Electric Power Monthly.*

TABLE 2 Southeast Energy Consumption, 2006

State	Total Energy Consumption (Quadrillion Btu)	State Rank	Percent of U.S. Energy Consumption (%)	Energy Consumption Per Capita (Million Btu/ person)	State Rank	Energy Consumption Per GDP (Thousand Btu/chained (2000) $US)	State Rank
Florida	4.6	3	4.6	255	44	7.6	37
Georgia	3.1	9	3.2	337	26	9.6	25
North Carolina	2.7	12	2.7	300	38	8.1	32
Virginia	2.5	14	2.6	333	27	8.1	33
Tennessee	2.3	15	2.3	381	17	11.2	19
Alabama	2.1	16	2.2	466	7	15.9	8
South Carolina	1.7	22	1.7	394	15	13.7	13
Mississippi	1.2	28	1.2	419	12	17.3	6
SOUTHEAST	**20.3**	**N/A**	**20.4**	**329**	**N/A**	**9.6**	**N/A**
U.S. Total	*99.5*	*N/A*	*100.0*	*335*	*N/A*	*8.8*	*N/A*

Source: EIA-SEDS, 2008.
Notes: State rankings include the District of Columbia. GDP is gross domestic (or regional or state) product, as appropriate - the total value of goods and services produced by a state, region, or country. For reference, 1 million Btu has the energy equivalent of approximately 8 gallons of gasoline; 1 billion Btu equals all the electricity that 300 households consume in one month (see http://www.eia.doe.gov/neic/infosheets/apples.html).

According to U.S. Census data, the Southeast population is projected to increase 35 percent by 2030, compared to a national average of 22 percent.[7] Similarly, EIA projections suggest that population growth rates in the Southeast are likely to be among the highest nationally in coming years. As a result, total energy consumption is projected to increase (albeit more slowly than in the past) at rates above the national rate of 11 percent by 2030.[8] The EIA projects total energy consumption to increase by 12 percent in the "South Atlantic" region and 18 percent in the "East South Central" region (Note: these regional designations of the EIA are meant to be illustrative; together they include the states considered in this report, but also account for projected trends in neighboring states, including Kentucky, West Virginia, Maryland, and Delaware).[9] If the Southeast remains on a "business-as-usual" trajectory, it will likely continue to increase its share of domestic energy consumption relative to the rest of the country.

Regional energy consumption is now characterized—and will ultimately be determined—by trends in individual economic sectors. These trends are, again, largely influenced by population growth, but also depend highly on the composition of economic growth (for example, the relative contributions of 'heavy' industry, manufacturing, and services) and sectoral energy intensity (or efficiency). The challenge of meeting future energy needs will be particularly acute in those sectors projected to experience the largest increases in energy consumption. According to the EIA analysis, electricity generation, residential, and commercial sectors for the "South Atlantic" and "East South Central" regions (again, used as proxies for the Southeast) are projected to experience double-digit growth by 2030.[10] These sectors also have relatively high historic growth rates (Table 3), and they are not independent of one another; much of the electricity generated is used to power Southeast homes and businesses.

The adoption of new state or national energy policies and the impacts of other political or economic events (such as the current economic downturn) can certainly influence these projected trends. However, future rates of growth will still be especially critical in those sectors that already constitute a large portion of the regional economy, particularly electricity generation. As of 2006, electricity generation accounted for 45 percent of the total energy consumed in the Southeast (Table 3).

Masked by these regional and sectoral trends are the decisions of consumers. In aggregate, individual energy consumption plays a significant role in dictating broader trends, particularly in sectors such as electricity generation, transportation, and residential energy consumption.

TABLE 3 Southeast and U.S. Energy Consumption Trends by Sector

	Southeast					U.S.
	Total Energy Consumption by Sector (Quadrillion Btu)		% Total Energy Consumption	Trends, 1997–2006		Trends, 1997–2006
End-Use Sector	1997	2006	2006	Absolute Change (Quadrillion Btu)	% Change	% Change
Commercial	3.1	3.8	19	0.7	22.6	12.9
Industrial	5.8	5.6	27	-0.2	-4.0	-8.9
Residential	4.0	4.8	24	0.8	20.5	9.3
Transportation	5.0	6.1	30	1.1	21.6	16.4
TOTAL	**18.0**	**20.3**	**100**	**2.4**	**13.3**	**5.0**
Portion attributable to:						
Electricity Generation	7.8	9.1	45	1.2	15.8	13.0

Source: EIA-SEDS, 2008.
Notes: In this table, energy consumed for electricity generation is distributed to each of the end-use sectors listed above (commercial, industrial, residential, transportation). However, in the case of the residential and commercial sectors, the indirect consumption of energy for electricity likely constitutes the majority of sectoral energy consumption (as opposed to the direct consumption of energy). Therefore energy consumption totals and trends for electricity generation are listed separately below the "Southeast Total."

Did you know?

In 2006, total per capita electricity consumption in the Southeast was 21 percent higher than the national average,[11] largely as a result of electricity use in the residential sector, where, on a per capita basis, electricity consumption was nearly 40 percent higher than the national average.

Greater electricity consumption in the residential sector is at least partially attributable to the fact that the majority of households throughout the region use electricity as their primary energy source for home heating and cooling.[12] This is particularly relevant when considering the energy sources for electricity generation (see below) and creates a number of opportunities to efficiently address the Southeast energy challenge through policy solutions (see related issue briefs at www.wri.org/publication/southeast-energy-policy).

During the 1990s, total per capita energy consumption in the Southeast rose slightly faster than the national average. Beginning with the mild recession at the start of this decade, there has been an overall decline in both regional and national totals, though there is considerable variability annually (due to fluctuations in weather, the economy, and other factors) and state-to-state (due to different population development patterns, economic structures, and state energy policies; see Table 2). In absolute terms, total regional per capita energy consumption in 2006 was approximately equal to the national average,[13] but a return to the growth rates of the previous decade in per capita energy consumption would likely compound the effects of a growing population and exacerbate the region's energy challenge. In addition, while past trends demonstrate a general decline in energy intensity, there is considerable opportunity for efficiency gains in the Southeast (see Table 2) with notable economic and environmental benefits for the region (see Box 1 and companion issue briefs).

Continued Reliance on Fossil Fuels

- Southeast energy resource demands have implications for regional economic development and national energy security.
  - In all energy sectors, fossil fuels comprise the majority of regional energy sources. Reliance on fossil fuels increased from 1997–2006, largely as a result of energy consumption growth in the electricity generation and transportation sectors.
  - As a fossil-fuel-dependent region, the Southeast is exposed to energy price volatility and makes fewer investments in regional energy sources.

The data presented in the previous section inform two issues that are critical to future energy demand in the Southeast: the size and pace of energy consumption. Of particular relevance to questions regarding energy supply is the regional energy mix—the relative amount of energy derived from different sources. As of 2006, the Southeast relied on fossil fuel sources

BOX 1 Southeast Energy Policy Solutions Preview

Electricity generation is the largest energy consuming sector in the Southeast. Energy efficiency and improved water management can help meet energy needs and reduce energy costs while advancing economic development goals and protecting water resources. Policymakers can find and adopt solutions that capture these opportunities.

With prompt policy action, the Southeast can…

…mitigate most of its expected increase in electric power demand through 2015 by improving energy efficiency.

…reduce electricity consumption by 110,000 to 140,000 GWh by 2015—equal to the power from approximately 30–40 coal-fired power plants.

…ensure that increased power production does not threaten regional water supplies.

For more information, see the following companion reports at www.wri.org/publication/southeast-energy-policy:

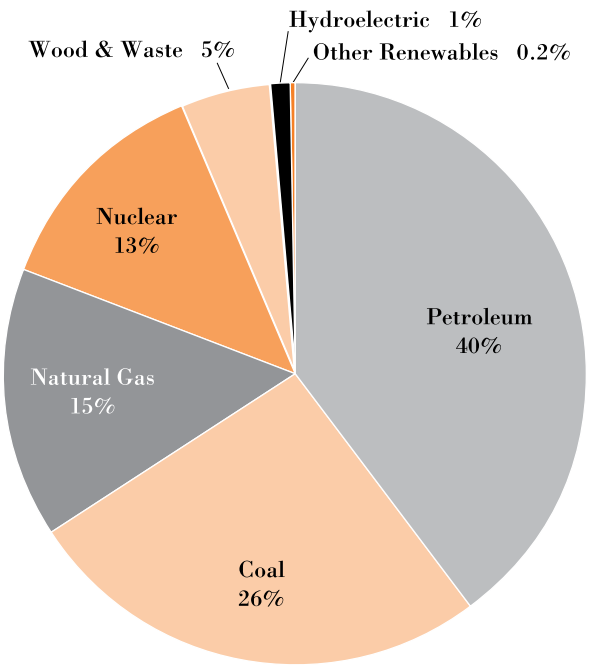
- *Power of Efficiency*
- *Water and Watts*

for approximately 80 percent of its total energy consumption (Figure 3), a total that is similar to, but slightly below, the national average of 85 percent (the regional fuel mix is comprised of larger contributions from coal and nuclear sources and a smaller percentage of natural gas than the national average).[14] Coal is consumed mostly for electricity generation, petroleum for transportation, and natural gas for electricity generation and industry (Figure 4).

In the Southeast from 1997 to 2006, total fossil fuel consumption increased approximately 14 percent, outpacing the national average rate of 5 percent growth. Southeast consumption of fossil fuels also exceeded the less than 1 percent growth in regional non-fossil energy sources (nuclear, hydroelectric, wood/waste, solar, wind, and geothermal sources). The increase in total fossil fuel consumption was primarily caused by growth in the consumption of petroleum in the transportation sector and natural gas in the electricity generation sector (Figure 5).

If trends in the region's current mix of fuel sources were to continue, it would likely become increasingly difficult and costly to adapt and/or change direction later. Though fossil fuels have met energy demand since the Industrial Revolution, they increasingly offer difficult economic and environmental trade-offs.

FIGURE 3 Southeast Energy Consumption by Fuel, 2006



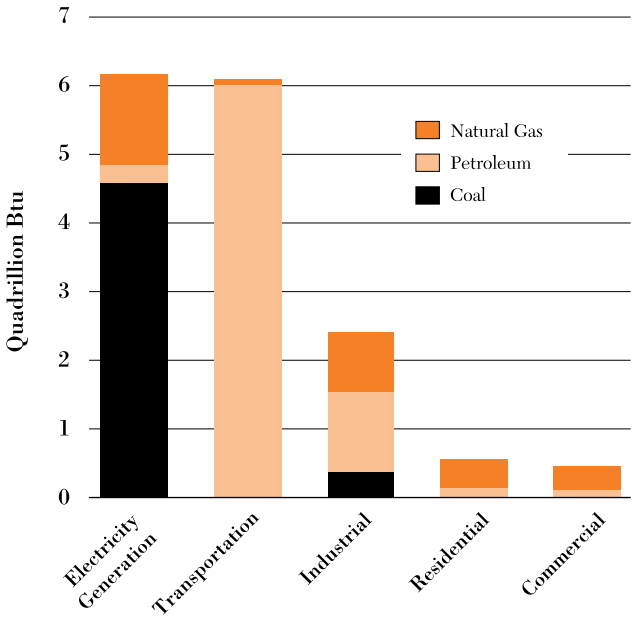
Source: EIA-SEDS. 2008.
Notes: Other renewables includes geothermal, wind, photovoltaic, and solar thermal energy sources, all of which are used exclusively for the generation of electricity. Totals do not include net interstate flow of electricity (i.e., electricity imported or exported between states). Totals may not add to 100% due to rounding.

Petroleum and Natural Gas

As of 2006, the Southeast comprised 19 percent of total U.S. petroleum consumption. The majority of that petroleum is consumed in the transportation sector (Figure 4). In the Southeast transportation sector, energy consumption increased 22 percent between 1997 and 2006, compared to 16 percent growth nationally.

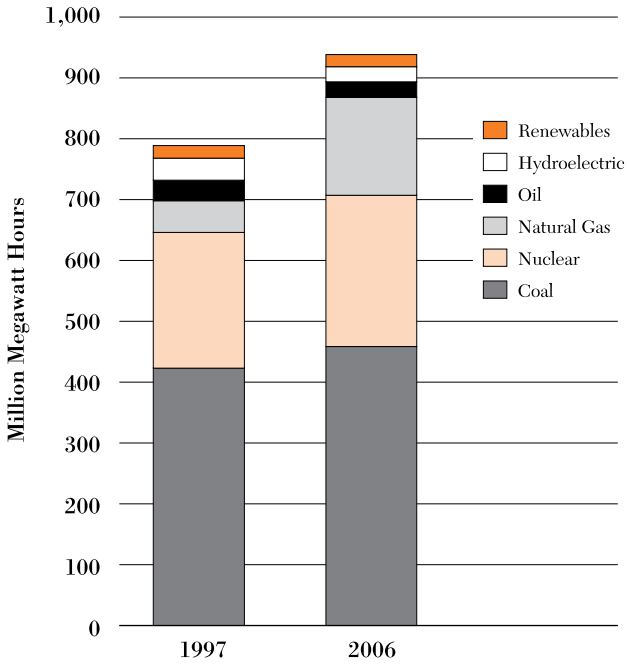
This trend is largely due to increases in regional population, as demonstrated by an increase in regional vehicle miles traveled (VMT).[15] However, Southeast VMT per capita is also increasing faster than national rates. This indicates that not only are a greater number of individuals driving, but also that those individuals are driving more. As a result, annual per capita gasoline consumption in the Southeast was 11 percent (approximately 50 gallons) higher than the national average in 2006.[16] In turn, one contributing factor to increasing VMT per capita is likely local land-use decisions and suburban sprawl,

FIGURE 4 Southeast Fossil Fuel Consumption by Sector, 2006



Source: EIA-SEDS, 2008.
Notes: Total fossil fuel consumption equals approximately 16 quadrillion Btu. For reference, 1 million Btu has the energy equivalent of approximately 8 gallons of gasoline; 1 billion Btu equals all the electricity that 300 households consume in one month (see http://www.eia.doe.gov/neic/infosheets/apples.html).

FIGURE 5 Southeast Electricity Generation by Source, 1997 and 2006



Source: EIA-SEDS, 2008.
Notes: Electricity generated from pumped storage is excluded. Electricity imported and exported between states is also excluded.

which includes automobile-dependent land use patterns that are not well-suited for walking, bicycling, and mass transit.[17]

Likewise, in 2006, the Southeast accounted for 13 percent of total U.S. natural gas consumption, up from 10 percent in 1997. This growth was largely driven by increased use of natural gas for the generation of electricity, particularly in Florida and Alabama.[18]

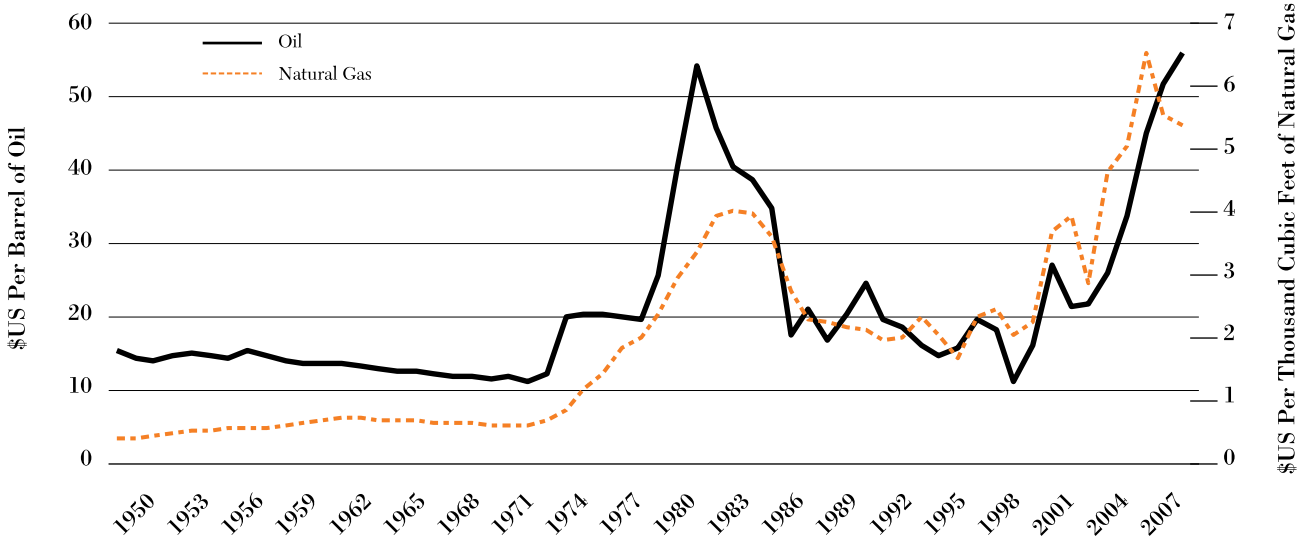
Regional trends toward a greater reliance on and consumption of petroleum and, to a lesser extent, natural gas have implications for long-term energy sustainability, the availability of adequate, reliable, and affordable energy supplies,[19] and the environment. Specifically, both fuels are subject to distribution disruptions—for example, Hurricanes Ike and Gustav resulted in below-average operational capacity for the Colonial Pipeline, creating gasoline shortages in some Southeast states[20]—as well as long-term price increases and volatility (Figure 6), including recent price peaks in 2008.[21] The consumption of petroleum and natural gas also contribute to global warming (see next section).

It is also worth noting that because approximately 60 percent of all petroleum and 16 percent of natural gas consumed in the United States is currently imported,[22] with the total amount of national imports generally rising,[23] there are additional geopolitical implications associated with the consumption of petroleum and natural gas (discussions of which are beyond the scope of this report). While specific import figures for the region are difficult to track due to the complexities of U.S. fossil fuel production, trade, and distribution networks, the consumption statistics and trends noted above make it clear that the region plays a significant role in national import trends.

Coal

In 2006, the Southeast accounted for 22 percent of U.S. coal consumption, with seven of eight states (led by Georgia, Alabama, and North Carolina) among the top 20 consumers of coal in the United States (Mississippi was the 34th largest coal consumer). Nearly all coal (92 percent) is consumed for electricity generation (Figure 4). Total energy consumption in the electricity generation sector increased 16 percent between

FIGURE 6 Fossil Fuel Prices, 1950-2007



Source: EIA Annual Energy Review (2008), tables 5.18 and 6.7.
Notes: This figure is meant to be representative. Actual fuel prices may vary between Petroleum Administration for Defense (PAD) Districts, regions, and states. Oil prices are average U.S. crude oil domestic first purchase prices; natural gas prices are wellhead prices. Price data are annual averages and reported in real dollars. Graph excludes 2008 values (price peaks mentioned in the text) due to a lack of comparable data.

1997 and 2006 (this is comparable to, though greater than, the national growth rate of 13 percent). As a result, the Southeast continues to rely heavily on coal.

Coal consumption can create health risks associated with air quality (for example, ozone, particulate matter, and smog),[24] as well as damage to water and land resources.[25] It produces greenhouse gas emissions, which cause global warming (see below), and these emissions may be subject to future costs that are not currently accounted for in energy markets.

Although the United States has a relatively abundant supply of coal, the Southeast's portion is limited.[26] With 1 percent of U.S. coal reserves, Alabama has the greatest total of all Southeast states examined here, while Virginia and Tennessee have even smaller amounts of proven reserves (note, the regional definition used for this analysis does not include coal-rich states such as Kentucky and West Virginia).[27]

Coal (and more generally fossil fuel) consumption therefore has implications for regional economic development. As fossil fuels are being brought into the region to sustain growing energy consumption, Southeast dollars are being sent out (Table 4). For example, transportation costs for coal can constitute as much as one-third of the total delivered costs (costs which are ultimately passed to consumers).[28] If fossil fuel energy demand continues to exceed regional supply, policies that move towards a more efficient energy delivery system (including fewer transmission and distribution losses from the electric grid) will be particularly relevant to the region. Meanwhile, cost-effective energy efficiency and locally available, "homegrown" renewable energy resources exist for the region and have yet to be fully accessed (see Box 2 and companion issue briefs).

Global Warming

- The Southeast is a major contributor to global warming, which can exacerbate regional energy challenges.
  - GHG emissions from energy consumption comprise 90 percent of the Southeast's emissions profile.
  - Regional growth in GHG emissions is outpacing national rates. However, this affords the Southeast with a number of low-cost emission reduction opportunities.

Consideration of the environmental impacts of energy use is also relevant to ensuring sustainable and cost-effective solutions to the regional energy challenge. The burning of

TABLE 4 Annual Coal Import Expenditures, 2005

State	Million $US
Georgia	$1,636
North Carolina	$1,361
Florida	$1,166
Tennessee	$810
South Carolina	$553
Alabama	$920
Mississippi	$233
Virginia	N/A

Source: Union of Concerned Scientists (UCS), 2008.

Notes: Adapted from figure 2 in "The Southeastern United States Can Benefit from a National Renewable Electricity Standard," created using data from EIA and FERC. Data were not available for Virginia.

fossil fuels—which constitute 80 percent of Southeast energy sources—and other activities cause emissions of greenhouse gases (GHGs) such as carbon dioxide (CO_2), though the amount of CO_2 produced per unit of fuel varies (coal has a greater carbon content than petroleum and natural gas).[29] The buildup of greenhouse gases from human activities in the atmosphere contributes to global warming, which is already causing observable changes to the Earth's climate system.[30]

In 2005—the latest year for which data are available—the Southeast accounted for approximately 20 percent of national GHG emissions and approximately 4 percent of global GHG emissions (excluding emissions from or sequestered by forests).[31] Energy use is the largest driver of GHG emissions, primarily the burning of fossil fuels in the electricity generation, transportation, and industrial sectors (Figure 7).

Although non-energy sectors are beyond the scope of this study, GHG emissions from these sources are also important. Agriculture, industrial processes such as the manufacture of semiconductors and cement, and residential and industrial waste contribute—in aggregate—about 10 percent of total regional GHG emissions (Figure 7). In addition, the principal greenhouse gases emitted from these sectors include methane (CH_4), which, notably, can also be used to provide energy,[32] nitrous oxide (N_2O), and so-called "F-gases" (HFCs, PFCs, SF_6). These gases comprise a small portion of the absolute amount of emissions but have a relative global warming effect per molecule (global warming potential) that is considerably greater than that of CO_2.[33]

The most recent estimates of the Southeast's total GHG emissions—including emissions from both energy and non-energy sectors—are presented for each state in Table 5.

BOX 2 Southeast Energy Policy Solutions Preview

As described in the issue brief *Local Clean Power*, the Southeast harnesses only about one-fifth of its renewable energy potential. Diversifying the regional energy "portfolio" with renewable energy helps meet future energy demand with local resources, reduces fossil fuel imports and regional exposure to fossil fuel price volatility, improves energy security, and mitigates the region's contribution to global warming and other environmental impacts.

With the right set of policies and incentives…

…the Southeast can generate more than 350,000 GWh of renewable electricity if states take advantage of locally available resources

…each Southeast state can meet at least 10 percent of its projected electric power needs in 2015 with renewable energy resources

…each Southeast state can generate 20–30 percent of its electric power with renewable energy by 2025

For more information, see the following companion report at www.wri.org/publication/southeast-energy-policy:

- *Local Clean Power*

Did you know?

- If the Southeast were its own country, it would be the sixth largest emitter of GHGs in the world.[34]
- The region's share of GHG emissions is rapidly increasing as GHG emissions growth outpaces the national average (Figure 8).
- As of 2005, six Southeast states were among the top 25 GHG-emitting states, with Florida ranking as the fifth largest GHG emitter nationally.
- In 2005, the Southeast's energy-related GHG emission total was larger than that of Mexico and Canada combined.

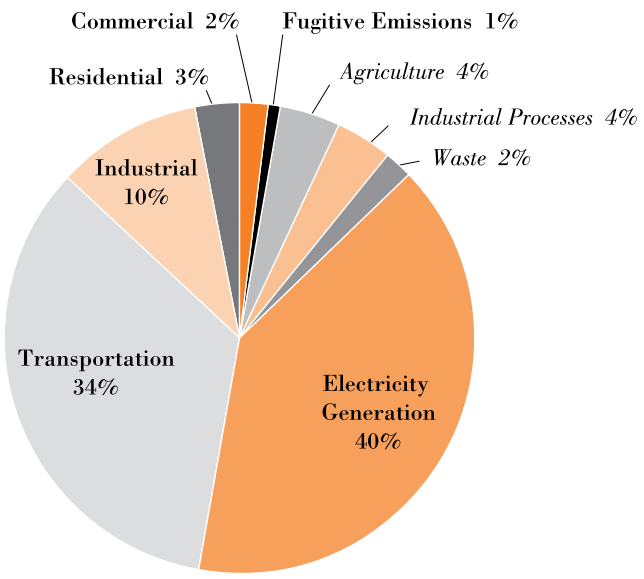
WRI's Climate Analysis Indicators Tool

Policymakers and others looking to assess regional and state sources, amounts, and types of energy- or non-energy-related GHGs can turn to WRI's Climate Analysis Indicators Tool (CAIT).

CAIT offers a one-stop source for free state-level GHG data, as well as powerful charting and graphing capabilities necessary for framing many climate policy discussions.

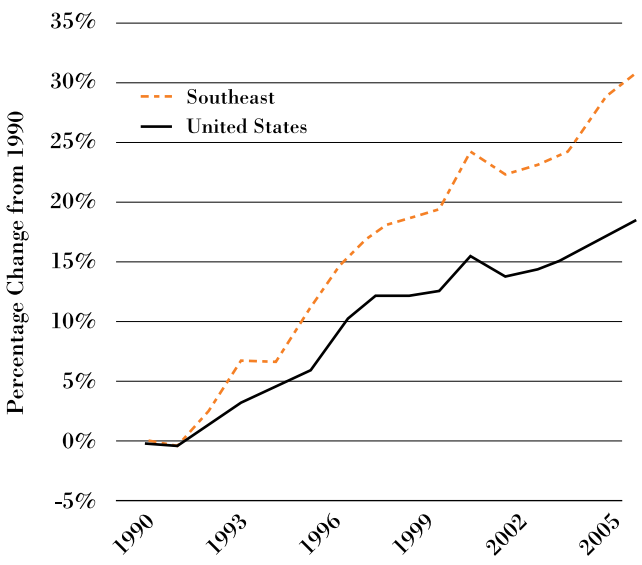
Access Energy and Climate Data for Southeast States at http://cait.wri.org/cait-us.php and http://www.wri.org/publication/southeast-energy-policy.

FIGURE 7 Southeast GHG Emissions by Economic Sector, 2005



Source: CAIT-US, 2008.
Notes: Industrial, residential, and commercial sector totals include only emissions from the direct combustion of fossil fuels. GHG emissions from or sequestered by forests are excluded. Non-energy sectors in italics.

FIGURE 8 GHG Emissions, 1990-2005



Source: CAIT-US, 2008.
Notes: Totals do not include emissions from land-use change and forestry or fugitive emissions from the extraction and distribution of petroleum and natural gas.

Global warming impacts in the Southeast

Global warming and associated impacts such as warmer summer temperatures, sea-level rise and coastline erosion, vegetation migration, forest fires, and the increased frequency and intensity of severe weather events are particularly relevant to the Southeast.[35] These effects could create resource and economic challenges for several Southeast industries, including forestry (and the paper products industry), health care, agriculture, and tourism.[36] Together, these industries contribute approximately 11 percent of regional gross domestic product.[37] The effects of global warming may also compound future energy security challenges, especially if increasing energy demand strains existing capacity. For example: public consumption and electricity generation could compete for scarce water resources; sea level could encroach on existing energy infrastructure; and changes in vegetation type or prevalence could limit available biomass resources.

To avoid the most dangerous effects of global warming, scientists warn that immediate reductions in GHG emissions are needed.[38] Fortunately, recent analysis demonstrates the Southeast has some of the least-cost options available for GHG reductions within the United States.[39] Some Southeast states have organized advisory groups or other bodies to assess viable and state-appropriate emission-reduction solutions. These include:

- *Virginia Governor's Commission on Climate Change* (http://www.deq.virginia.gov/info/climatechange.html)
- *North Carolina Legislative Commission on Climate Change* (http://www.ncleg.net/gascripts/DocumentSites/browseDocSite.asp?nID=14)
- *North Carolina Climate Action Plan Advisory Group* (http://www.ncclimatechange.us/)
- *Florida Energy & Climate Commission* (http://www.myfloridaclimate.com/env/home/climate_quick_links/florida_energy_climate_commission)
- *Florida Governor's Action Team on Energy and Climate Change* (http://www.flclimatechange.us/)
- *South Carolina Climate, Energy, and Commerce Advisory Committee* (http://www.scclimatechange.us/)

TABLE 5 Southeast State GHG Emissions, 2005

State	GHG Emissions ($MtCO_2e$)	State Rank	% of U.S. GHGs	GHG Emissions Per Capita (tCO_2e/person)	State Rank	GHG Emissions Per GDP (tCO_2e/million chained (2000) $US)	State Rank
Florida	291	5	4.2	16.4	42	494	42
Georgia	202	11	2.9	22.2	31	627	31
North Carolina	176	12	2.6	20.3	33	570	33
Alabama	166	15	2.4	36.6	13	1,260	13
Virginia	148	16	2.1	19.6	35	480	35
Tennessee	146	17	2.1	24.3	24	725	24
South Carolina	98	28	1.4	23.1	28	801	28
Mississippi	77	33	1.1	26.5	21	1,125	21
SOUTHEAST	**1,304**	**N/A**	**18.8**	**21.5**	**N/A**	**635**	**N/A**
U.S. Total	*6,929*	*N/A*	*100.0*	*23.4*	*N/A*	*636*	*N/A*

Source: CAIT-US, 2008.
Notes: $MtCO_2e$ is million metric tons (tonnes) of carbon dioxide equivalent. State rankings include the District of Columbia. GDP is gross domestic (or regional or state) product, as appropriate - the total value of goods and services produced by a state, region, or country. Totals do not include emissions from land-use change and forestry or fugitive emissions from the extraction and distribution of petroleum and natural gas.

Conclusions

This report briefly reviews the Southeast energy profile, including major trends and drivers, places the region in a national context, and frames the scope of regional energy challenges. It also addresses some of the inherent tradeoffs in energy sources, particularly fossil fuels, and highlights some possible implications specific to the Southeast. Relevant regional trends include:

- The rate of growth in energy consumption is projected to exceed the national rate for decades to come.
- An increase in per capita energy consumption and/or energy use inefficiencies would likely exacerbate energy challenges due to anticipated population growth.
- Continued reliance on fossil fuels, particularly for electricity generation, exposes the region to price volatility and reduces investments in regionally available energy sources.
- Potential impacts from global warming are significant for Southeast energy security and key industries.

Understanding energy sources and systems is critical to finding solutions that meet future energy needs while fostering a sound economy and healthy environment. The policy recommendations put forth in companion issue briefs (see www.wri.org/publication/southeast-energy-policy) are first steps—not "silver bullets"—toward addressing the Southeast energy challenge. However, they afford significant opportunities for policymakers to stimulate the local economy, help to mitigate global warming, and ease the shift to a low-carbon economy.

Acknowledgments

The author is grateful for the comments and insights from several external reviewers, including: Dave Guernsey, Julia Miller, John Morrill, Denise Sheehan, Rodney Sobin, and John Wilson. The author also thanks the following colleagues at WRI for contributing their insights to earlier drafts: Pankaj Bhatia, Amy Cassara, Stephanie Hanson, Tim Herzog, John Larsen, Eliot Metzger, Polly Ghazi, Samantha Putt del Pino, and Janet Ranganathan. In addition, the author is especially grateful for the research and production support from Hyacinth Billings, Jennie Hommel, Robyn Liska, Bob Livernash, and Maggie Powell, who helped complete this publication.

About the Author

Thomas Damassa is an Associate in WRI's Climate and Energy Program.

SOUTHEAST ENERGY ISSUE BRIEF SERIES

The World Resources Institute (WRI)—together with the Southeast Energy Efficiency Alliance (SEEA), Southern Alliance for Clean Energy (SACE), and Southface—compiled high-level overviews of regional opportunities to enhance energy efficiency, develop renewable electric power resources, and manage water-energy relationships. These briefs and supplemental state-level data are available at: www.wri.org/publication/southeast-energy-policy.

We would like to thank the following organizations who have provided financial support for our work in the Southeast:

Emily Hall Tremaine Foundation
Energy Foundation
Oak Foundation
Robertson Foundation
Southern Energy Efficiency Center
Turner Foundation
U.K. Global Opportunities Fund
U.S. Department of Energy
WestWind Foundation

Notes

1. Energy Information Administration (EIA). 2008. *International Energy Annual 2006 – Table E.1.* Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/iea/wecbtu.html.
2. Population data source: U.S. Census Bureau, Population Division (U.S. Census). 2008. "Time Series of Intercensal State Population Estimates: April 1, 1990 to April 1, 2000" & "Annual Estimates of the Population for the United States, Regions, and States and for Puerto Rico: April 1, 2000 to July 1, 2007." Washington, DC: U.S. Census Bureau. Available online: http://www.census.gov/. Economic data source: Bureau of Economic Analysis (BEA). 2008. "Gross Domestic Product by State." Washington, DC: U.S. Department of Commerce. Available online: http://bea.gov/.
3. Baumert, K., T. Herzog, and J. Pershing. 2005. *Navigating the Numbers: Greenhouse Gas Data and International Climate Policy*. Washington, DC: World Resources Institute. Available online: http://www.wri.org/publication/navigating-the-numbers.
4. Percent contributions of approximately 20 private sector industry categorizations and government were made for 2007 for the Southeast and United States using data sourced from the BEA: Bureau of Economic Analysis (BEA). 2008. "Gross Domestic Product by State." Washington, DC: U.S. Department of Commerce. Available online: http://bea.gov/.
5. The year 1997 was chosen as the start year for trend analysis because it is the first year in which the Bureau of Economic Analysis (BEA) adopted the North American Industry Classification System (NAICS), a change from previous years. The BEA cautions against interpreting trends across the 1996-1997 discontinuity (for more information, see http://bea.gov/regional/gsp/). The year 2006 was selected as the end year for this analysis because it is the most recent year of comprehensive energy data available through the Energy Information Administration State Energy Data System (EIA-SEDS; see http://www.eia.doe.gov/emeu/states/_seds.html). For consistency, we have adopted this time period for all trend analysis throughout the report.
6. Other drivers also include technology developments and state energy policies and incentive structures.
7. U.S. Census Bureau, Population Division. 2005. "Interim State Population Projections, Table 1: Interim Projections: Ranking of Census 2000 and Projected 2030 State Population and Change: 2000 to 2030." Available online at: http://www.census.gov/population/www/projections/projectionsagesex.html. Percent increases are calculated relative to 2006 population estimates.
8. Energy Information Administration (EIA). 2009. *Annual Energy Outlook 2009 Early Release – "Regional Energy Consumption and Prices by Sector."* Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/oiaf/aeo/index.html.
9. Energy Information Administration (EIA). 2009. *Annual Energy Outlook 2009 Early Release – "Regional Energy Consumption and Prices by Sector."* Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/oiaf/aeo/index.html. For a map of the EIA's AEO regions, see http://www.eia.doe.gov/oiaf/aeo/supplement/supmap.pdf.
10. Energy Information Administration (EIA). 2009. *Annual Energy Outlook 2009 Early Release – "Regional Energy Consumption and Prices by Sector."* Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/oiaf/aeo/index.html. Industrial energy use is expected to remain relatively constant or decline through 2030. Transportation energy consumption is projected to increase approximately 14 percent in the South Atlantic region and 5 percent in the East South Central Region.
11. Readers should note that while per capita electricity consumption in the Southeast is higher than the national average, *total* per capita energy consumption in the Southeast is slightly lower than the national average (see Table 2). This is largely a result of per capita energy consumption variability between sectors. For example, while Southeast per capita energy consumption is higher than the national average in the electricity generation, transportation, and residential energy sectors, it is lower than the national average in the industrial sector.
12. Energy Information Administration (EIA). 2009. "State Energy Profiles." Washington, DC: U.S. Department of Energy. Available online at: http://tonto.eia.doe.gov/state/. According to EIA data, approximately 30 percent of U.S. households, on average, use electricity for home heating/cooling. In the Southeast, this percentage varies from a low of 38 percent in Georgia to a high of 87 percent in Florida.

13. Energy Information Administration (EIA). 2008. "State Energy Data System (SEDS)." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/states/_seds.html.
14. Calculated percent totals of energy consumption by fuel exclude net interstate flows of electricity (regional electricity imports or exports). This is done throughout the report as summing state-level data would create "double counting" as electricity is transferred between Southeast states. However, according to 2006 EIA estimates, only Alabama and South Carolina are net exporters of electricity; all other Southeast states meet in-state demand by importing electricity.
15. VMT data source: Bureau of Transportation Statistics. 2008. "Federal Highway Administration: Highway Statistics." Washington, DC: U.S. Department of Transportation. Available online: http://www.fhwa.dot.gov/.
16. Includes gasoline sold in the transportation sector only.
17. Suburban sprawl is a challenge endemic to many cities and states of a certain age. In the Southeast, "about 12 million acres are projected to be lost to urbanization between 1992 and 2020 and another 19 million acres between 2020 and 2040, continuing trends observed in the 1990s." From Wear, D. N., D. R. Carter, and J. Prestemon. 2007. *The U.S. South's timber sector in 2005: a prospective analysis of recent change*. Gen. Tech. Rep. SRS-99. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station.
18. Energy Information Administration (EIA). 2008. "State Energy Data System (SEDS)." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/states/_seds.html.
19. For an involved discussion of energy security, see Staley, B. C., S. Ladislaw, K. Zyla, and J. Goodward. 2009. *Evaluating the Energy Security Implications of a Carbon-Constrained U.S. Economy*. Washington, DC: World Resources Institute & Center for Strategic & International Studies. Available online: http://www.wri.org/publication/energy-security-implications-carbon-constrained-us-economy.
20. For example: Mufson, Steven. 2008. "Gas Shortage in the South Creates Panic, Long Lines," *The Washington Post*, September 26, 2008. Available online: http://www.washingtonpost.com/wp-dyn/content/article/2008/09/25/AR2008092504159.html; Drash, Wayne. 2008. "Atlanta gas crunch: 'We've got no gas here'," *CNN.com*, September 22, 2008. Available online: http://www.cnn.com/2008/LIVING/wayoflife/09/22/atlanta.gas.crunch/index.html.
21. Energy Information Administration (EIA). "Petroleum Navigator – Spot Prices." Washington, DC: U.S. Department of Energy. Available online: http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_a.htm.
22. The majority of petroleum imports are from Canada (18 percent), Mexico (11 percent), Saudi Arabia (11 percent), Venezuela (10 percent), and Nigeria (8 percent). Source: Energy Information Administration (EIA). 2008. "Energy in Brief – How dependent are we on foreign oil?" Washington, DC: U.S. Department of Energy. Available online: http://tonto.eia.doe.gov/energy_in_brief/foreign_oil_dependence.cfm. Data represent gross imports (as opposed to net imports), excluding U.S. petroleum exports. The majority of natural gas imports are from Canada (86 percent) and Trinidad (9 percent). Source: Energy Information Administration (EIA), Office of Oil and Gas. 2009. U.S. Natural Gas Imports and Exports: 2007. Washington, DC: U.S. Department of Energy. Available online at: http://www.eia.doe.gov/pub/oil_gas/natural_gas/feature_articles/2009/ngimpexp/ngimpexp.pdf.
23. Energy Information Administration (EIA). 2009. "Petroleum Navigator – U.S. Petroleum Imports by Country" & "Natural Gas Navigator – U.S. Natural Gas Imports by Country." Washington, DC: U.S. Department of Energy. Available online: http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_a.htm; http://tonto.eia.doe.gov/dnav/ng/ng_move_impc_s1_a.htm.
24. For example: Union of Concerned Scientists (UCS). 2008. "Environmental impacts of coal power." Available online: http://www.ucsusa.org/clean_energy/coalvswind/c02c.html. Also see references therein.
25. For example: Dewan, Shaila. 2008. "Tennessee Ash Flood Larger Than Initial Estimate," *New York Times*, December 12, 2007. Available online at: http://www.nytimes.com/2008/12/27/us/27sludge.html.
26. As a result, according to statistics from the Bureau of Economic Analysis (BEA), production of fossil fuels generated approximately 0.2 percent of regional gross domestic product (GDP). This total includes state GDP from mining and oil and gas extraction industries.
27. Energy Information Administration (EIA). 2008. *Annual Coal Report 2007* – "Table 15. Recoverable Coal Reserves at Producing Mines, Estimated Recoverable Reserves, and Demonstrated Reserve Base by Mining Method." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html.
28. For example, South Carolina has recently faced challenges from the rising costs of coal transportation. With the anticipated increases in rail rates, an additional $100 million is expected to be charged to consumers. See press release at: http://www.sc.gov/NewsCenter/ORS/prors3232009.htm.
29. The carbon content of a unit of natural gas (14.4 metric tons carbon per TJ) is less than that of coal (25.4 metric tons carbon per TJ) or petroleum (19.9 metric tons of carbon per TJ). See http://bioenergy.ornl.gov/papers/misc/energy_conv.html.
30. Intergovernmental Panel on Climate Change (IPCC). 2007. Summary for Policymakers. In S. Solomon et al., eds. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment report of the Intergovernmental Panel on Climate Change.* Cambridge, U.K., and New York, NY: Cambridge University Press.
31. Climate Analysis Indicators Tool (CAIT). 2008. Washington, DC: World Resources Institute. Available online: http://cait.wri.org.
32. The recovery of methane emitted from landfills, sewage treatment plants, and food processing and animal agriculture operations can reduce methane emissions and be used as an energy source, in some instances replacing the need for fossil fuels.
33. CH_4 has a global warming potential (GWP) index value of 21, or 21 times the GWP of CO_2 (which is defined as having a GWP of 1). N_2O has a GWP of 310 and the F-gases have GWPs ranging from 140 to 23,900, assuming 100-year time horizons. Source: Intergovernmental Panel on Climate Change (IPCC). 1996. *Climate Change 1995: The Science of Climate Change.* J.T. Houghton et al., eds. Cambridge, U.K.: Cambridge University Press.
34. Country and regional GHG totals are 2005 estimates and exclude emissions from land-use change and forestry. The Southeast would rank sixth after China, the United States, Russia, India, and Japan.
35. Burkett, V. et al. 2001. "Potential Consequences of Climate Variability and Change for the Southeastern United States." In *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change.* Washington, DC: U.S. Global Change Research Program.

36. Ruth, M., D. Coelho, and D. Karetnikov. 2007. *The U.S. Economic Impacts of Climate Change and the Costs of Inaction – Regional Highlight: Southeast*. College Park, Maryland: Center for Integrative Environmental Research. Available online: http://www.cier.umd.edu/documents/Southeast-Economic%20Impacts%20of%20Climate%20Change.pdf.

37. Calculated using data from the Bureau of Economic Analysis (BEA). 2008. "Gross Domestic Product by State." Washington, DC: U.S. Department of Commerce. Available online: http://bea.gov/. Totals are approximate and include real GDP generated from the following industry categories: Agriculture, forestry, fishing, and hunting; health care and social assistance; arts, entertainment, and recreation; accommodation and food services.

38. Intergovernmental Panel on Climate Change (IPCC). 2007. Summary for Policymakers. In S. Solomon et al., eds. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment report of the Intergovernmental Panel on Climate Change.* Cambridge, U.K., and New York, NY: Cambridge University Press.

39. McKinsey & Company. 2009. "The scale of the challenge: U.S. GHG reductions in a global context." From a presentation given by Jeremy Oppenheim, Director, at the symposium *U.S. Climate Action: A global economic perspective*. March 3, 2009.

Figure and Table Citations

Bureau of Economic Analysis (BEA). 2008. "Gross Domestic Product by State." Washington, DC: U.S. Department of Commerce. Available online: http://bea.gov/.

Bureau of Transportation Statistics. 2008. "Federal Highway Administration: Highway Statistics." Washington, DC: U.S. Department of Transportation. Available online: http://www.fhwa.dot.gov/.

Climate Analysis Indicators Tool – US (CAIT-US). 2008. CAIT-US version 3.0. Washington, DC: World Resources Institute. Available online: http://cait.wri.org/cait-us.php.

Energy Information Administration (EIA). 2008. *Annual Energy Review* – "Tables 5.18 and 6.7." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/aer/contents.html.

Energy Information Administration (EIA). 2008. *Electric Power Monthly* – "Table 5.6.B. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through December 2008 and 2007." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html.

Energy Information Administration (EIA). 2008. *International Energy Annual 2006.* Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/iea/contents.html.

Energy Information Administration State Energy Data System (EIA-SEDS). 2008. "State Energy Consumption, Price, and Expenditure Estimates." Washington, DC: U.S. Department of Energy. Available online: http://www.eia.doe.gov/emeu/states/_seds.html.

Union of Concerned Scientists (UCS). 2008. *The Southeastern United States Can Benefit from a National Renewable Electricity Standard*. Cambridge, MA; Washington, DC; Berkeley, CA: UCS. Available online: http://www.ucsusa.org/assets/documents/clean_energy/hr969_southeast.pdf.

U.S. Census Bureau, Population Division (U.S. Census). 2008. "Time Series of Intercensal State Population Estimates: April 1, 1990 to April 1, 2000" & "Annual Estimates of the Population for the United States, Regions, and States and for Puerto Rico: April 1, 2000 to July 1, 2007." Washington, DC: U.S. Census Bureau. Available online: http://www.census.gov/.

ABOUT WRI

The World Resources Institute is an environmental think tank that goes beyond research to create practical ways to protect the Earth and improve people's lives. Our mission is to move human society to live in ways that protect Earth's environment for current and future generations.

Our programs meet global challenges by using knowledge to catalyze public and private action:

- *To reverse damage to ecosystems.* We protect the capacity of ecosystems to sustain life and prosperity.
- *To expand participation in environmental decisions*. We collaborate with partners worldwide to increase people's access to information and influence over decisions about natural resources.
- *To avert dangerous climate change*. We promote public and private action to ensure a safe climate and sound world economy.
- *To increase prosperity while improving the environment*. We challenge the private sector to grow by improving environmental and community well-being.

In all of our policy research and work with institutions, WRI tries to build bridges between ideas and actions, meshing the insights of scientific research, economic and institutional analyses, and practical experiences with the need for open and participatory decision-making. www.wri.org

ISBN 978-1-56973-723-1