

Getting Greener

Progressive Environmental Ideas
for the American South

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for the Center for a Better South

Better South Press
CHARLESTON
2007

Better South Press
An imprint of United Writers Press, Inc.
A project of the Center for a Better South
P.O. Box 22261
Charleston, S.C. 29413
www.bettersouth.org

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ISBN-13: 978-1-934216-40-8

ISBN: 1-934216-40-2

Library of Congress Control Number: 2007933573

Printed and bound in the United States of America.

*Also from the
Center for a Better South*



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BETTER POWER

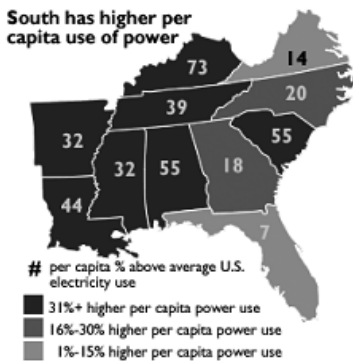
Improving efficiency and using renewable energy

The number one priority for future energy planning in the South is to become more energy efficient. By emphasizing efficiency, shifting to renewable power supplies and promoting fairness through proven strategies, Southerners can reduce pollution and monthly power bills while maintaining a strong economy.

Background: Southern states use more electric power

Southern states use much more electricity per capita than other states. This is partly because of the region's hot, muggy summers, but it also flows from differences in state policies, practices and economies. For instance, Kentucky homes and businesses use 73 percent more electricity per capita than the national average,

but Floridians use only 7 percent more. The chart to the left highlights Southern power consumption per capita, according to 2003 U.S. Department of Energy figures.¹



Interestingly, Southern states make up seven of the top 10 average per-capita electricity-

using states, as highlighted in Appendix 2. While Wyoming residents use more electricity per capita than any other state's residents, Kentucky comes in second with 20,701 kilowatt hours per person, according to 2003 figures.² Closely following are Alabama (3rd), South Carolina (4th), Louisiana (5th) and Tennessee (6th). The top 10 electricity using states per capita is rounded out by Arkansas (9th) and Mississippi (10th).

The South's power hungry relationship is even stronger for in-home electricity use. Southern states make up 11 of the top 12

Home electricity use by month			
Rank	State	Monthly avg kWhrs	% above US avg
1	Tennessee	1,332	42%
2	Alabama	1,281	37%
3	Louisiana	1,257	34%
4	Mississippi	1,244	33%
5	South Carolina	1,229	31%
6	Virginia	1,225	31%
7	Texas	1,195	27%
8	Kentucky	1,194	27%
9	Florida	1,193	27%
10	Georgia	1,148	27%
11	North Carolina	1,147	22%
12	Arkansas	1,132	21%
	US average	938	

SOURCE: U.S. Department of Energy.

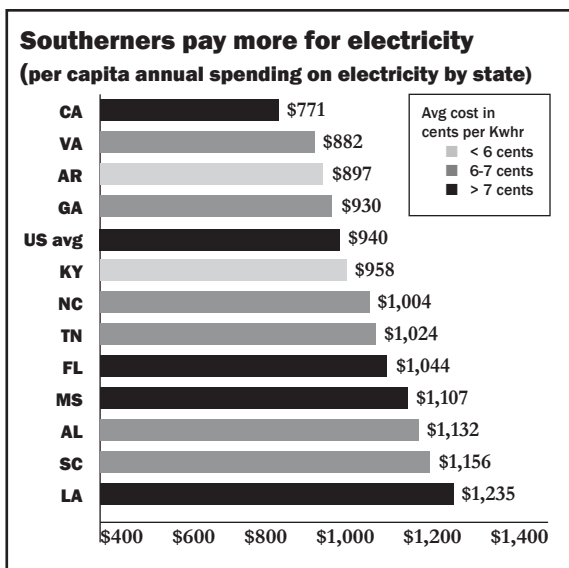
states for average residential electricity use, as shown in the chart at left taken from U.S. Energy Information Agency data.³

One reason Southerners use more electricity appears to be because Southern power generally is cheaper per kilowatt hour. But does this really mean lower electricity bills? Kentucky has the cheapest electricity in the nation, at 4.6 cents per kilowatt-hour.⁴ Most Southern

states fall between 6 and 7 cents per kWhr, with only Florida exceeding the national average of 7.6 cents.

But because Southerners use so much more electricity, they actually pay more per capita for electricity

than people in most states. The chart at right highlights how Southerners tend to pay more, even though people in many states have a lower average cost per kilowatt hour. (See also in Appendix 3).



These per capita electricity costs, which include business electricity uses, also often include high residential electricity bills. For instance, Southern states make up eight of the top eleven highest monthly residential electricity bill states, as shown in the chart on the next page.⁵ Every Southern state except Kentucky has a higher-than average monthly electricity bill.

As a comparison, even though Californians pay almost double per kilowatt hour what most Southerners pay, they pay much less per capita on average for electricity. Residential customers

Top 20 residential electricity bills			
Rank	State	Rate in cents/ kWhr	Avg. monthly bill
1	HI	20.7	\$138.16
2	TX	10.93	\$130.64
3	FL	9.62	\$114.75
4	LA	8.87	\$111.53
5	CT	13.64	\$109.82
6	MS	8.71	\$108.37
7	SC	8.67	\$106.58
8	AL	8.00	\$102.41
9	VA	8.16	\$99.96
10	NC	8.65	\$99.25
11	GA	8.64	\$99.22
12	NY	15.72	\$97.55
13	NV	10.2	\$96.15
14	MD	8.46	\$94.74
15	TN	6.98	\$93.04
16	DE	9.01	\$92.35
17	AZ	8.86	\$91.69
18	AR	8.00	\$90.61
19	AK	13.3	\$88.99
20	OK	7.95	\$88.90
US average		9.45	\$88.60

pay about 20 percent below the national average per month.⁶ California shows what a forward-thinking energy policy can do over time: for 30 years, it has implemented efficiency programs that gradually lowered usage relative to average states. Meanwhile, the economy boomed. Even though various factors caused overall electric rates to rise, California consumers have paid less overall every month because residents

and businesses use much less energy. As a bonus, California produces dramatically less power plant pollution and has developed a leading renewable energy industry.

Bottom line: Not everything coming out of California is bad. While Southern states are sometimes reluctant to copy Western or Northern states, the potential benefits of developing

effective, comprehensive energy efficiency programs are huge:

The potential for Southerners to save a lot of money on power costs is dramatic because they haven't adopted many of the energy efficiency programs that are commonplace in other states.

consumers can spend less on direct energy costs and simultaneously avoid indirect health and environmental costs. Furthermore, the potential to reduce spending on utilities and to cut pollution in Southern states is enormous because they have not adopted many of the energy efficiency programs or implemented

them as broadly as other states.

An energy fund to help the public

One of the best ways to develop a system that causes less damage to health and the environment is for states to reinvest a small portion of monthly utility bills into a new public fund. Known as a “Public Benefits Fund” or “PBF,” this public policy tool serves as an economic driver that rewards energy efficiencies and provides renewable energy incentives.



Recommendation 5: Each Southern state should create a Public Benefits Fund that invests 2 percent to 3 percent of utility bill charges into strategies that boost energy efficiency, generate more renewable energy and provide low-income energy assistance.



A PBF is a sensible way to fund energy improvements because it creates a positive relationship between power generation and some of its costs. Today, many of the real costs of power plant pollution are felt elsewhere. Hospital emergency rooms, for example, deal every day with the health impacts of pollution. Similarly, farmers, foresters and commercial fishermen realize lower yields and production because of environmental impacts from pollution that stems from power plants. Funding cleaner power by reinvesting a small portion of utility bills in better solutions “internalizes” the cost of improvement to those who use the most power, rather than offloading their costs on the general taxpayer.

How a Public Benefits Fund works

In 1980, North Carolina created a “Systems Benefit Charge,” dedicating a tiny percentage of electric bills to an award-winning non-profit corporation that helps industries and homeowners find ways to use less energy. Since then, 24 states have expanded on this idea, re-investing up to 3 percent of energy charges in reducing future energy needs and providing cleaner power.⁷ But none of these states are Southern states. While other states are investing in solutions that avoid the cost of new power plants and their related pollution, Southern states are largely missing out on this key tool for improvement.

For Southern states to achieve the wide-ranging energy benefits they’re missing, each Southern state should build on the movement started in North Carolina and expanded by other states. States should consider setting aside 2 percent to 3 percent of rates for a Public Benefits Fund with a strong, broad legislative mandate to:

- Maximize energy savings through efficiency programs;
- Develop sustainable, non-polluting energy generation;
- Help low-income residents lower their bills and gain long-term cost savings through weatherization and efficient appliances; and
- Push the envelope on researching improvements in efficiency and renewable technology.

Expert staff members also should frequently evaluate and guide programs based on cost-effectiveness for consumers and the potential to shift appliance, building, and energy generation markets towards environmental sustainability.

PBF programs should consider investments in the following four policy areas, to create a cleaner, more equitable future power system.

A. Efficiency programs: The most cost-effective PBF investment

The first priority for PBF funding is investment in energy efficiency programs. The potential for efficiency programs to improve the South's energy future dramatically is suggested by a recent analysis of power company plans to build more

than 150 new U.S. coal-fired energy plants, 26 of which would be located in the South. If built, the new power plants would

**The choice is clear:
Instead of building
more power plants
that will pollute the air
and water, we spend
the same amount of
money to cut power
consumption and get
rid of the need for the
new power plants.**

cost \$137 billion.⁸ These costs would be “recovered,” plus profit, from residents and businesses in the form of higher utility bills. *But an investment in efficiency equal to the construction cost of these plants could cut U.S. power demand by almost 20 percent, completely avoiding the need for the power plants and the costly related fuel and pollution.*⁹

Let’s repeat that: If states required ratepayer investment in more efficient energy (through Public Benefits Funds, for example) instead of having companies spend the same billions on new coal-fired power plants, power demand would drop 20 percent, which would wipe out the need for the new plants, as well as costly fuel, pollution and harmful health impacts. A recent Florida-specific study reinforced this point, finding that “energy efficiency policies alone, such as efficient windows, compact fluorescent light bulbs, and Energy Star[®] appliances, can almost offset the future growth in electric demand.”¹⁰

Efficiency programs are the most cost-effective way to reduce the need for electricity now and in the future. For instance, California recently expanded efficiency efforts by \$2 billion. This investment

Wisconsin estimates that every \$1 directed to its Public Benefits Fund saves \$6 for the public.

is estimated to avoid \$5 billion in energy costs, partly by avoiding the need to build three new power plants in the next three years. These energy use reductions are happening in a state that has already

reduced per capita electricity use to about half that of Southern states! Wisconsin estimates that every \$1 directed to its public benefits fund saves \$6 for the public.¹¹

PBF-funded efficiency programs often give consumers rebates if they choose very energy efficient appliances, such as air conditioners, refrigerators and furnaces. The rebates cover the difference in cost between a regular appliance and the more energy efficient one. They serve as incentives to help new efficient appliances come into the marketplace. PBF programs can also pay for energy audits for businesses, industrial efficiency improvements or even research to develop more efficient processes.

In 2002, appliance rebate programs in several Northeastern states helped more than half of new air conditioner consumers buy high-efficiency Energy Star[®] units.¹² Estimated economic benefits from these programs ranged between double and eight times the money invested. But in the Southeast where electricity use is highest, the overall market share of Energy Star[®] appliances is about 50 percent lower than in the Northeast. A key reason is the lack of the kind of cost-effective rebate programs funded through Public Benefits Funds.

B. Renewable energy: Using PBFs to shift the power market to sustainable solutions

Many state PBF programs invest in renewable energy (Renewable energy is discussed further later in this chapter). For instance, they may provide rebates to help install solar energy on homes, businesses or government buildings. California recently targeted a major share of these funds to new home builders so that 50 percent of new homes will be built with solar electric power within the next 10 years. Some developers have already built “zero energy home” communities in which each house produces about the same amount of electricity that it uses. In these

developments, homeowners are essentially using their mortgages and utility bills to buy energy independence for themselves and for the state. The efficiency and solar energy built into these homes will not be subject to inflation and won't produce any pollution. Connecticut, New Jersey, Delaware, Montana, Oregon and Wisconsin also use PBFs to invest in renewable power generation.

C. Low-income assistance

PBF-funded low-income assistance programs often simply reduce bills for low-income residents. Other programs give low-income residents lower energy bills over the long-term by helping to pay for weatherization and more efficient appliances.

Southern states should do more to expand weatherization programs like Alabama and Florida have.

Weatherization programs pay for services such as weather-stripping and insulation. Since low-income families spend an average of 14 percent of their incomes on energy costs (compared to 3.5 percent for the average household), any resulting lower utility bills could be a major ongoing financial assistance with no ongoing public cost.¹³ Weatherization also improves heating and cooling, a particular benefit during very hot and cold weather for children and elderly individuals. These programs are a win-win for low-income residents and for all residents because they also lead to reduced pollution and reduced need for new power plants.

The federal government gives every state a small and fluctuating yearly grant to weatherize low-income housing. For instance, Arkansas weatherizes about 1,200 homes per year with its federal

grant, out of an estimated 178,000 eligible homes.¹⁴ At this rate, this cost-saving program will take about 150 years to weatherize every eligible home!

Several states have added state funds to the federal funds to help more low-income families weatherize housing and buy efficient refrigerators and lighting. Florida and Alabama are the only Southern states with a dedicated state revenue stream to expand the federal weatherization program.¹⁵

Every Southern state should dedicate PBF funds to reach all eligible households that want weatherization and efficient appliance services.

D. Research

PBF-funded research programs promote scientific and applied research into efficiency and renewable energy. PBF-funded research has helped develop numerous efficiency strategies that particularly benefit industry—and eventually all consumers—since they do not have to finance as many power plants.

For instance, California's research program developed coolers for its chicken and other agricultural processors that use 69 percent less electricity and 28 percent less natural gas.¹⁶ It developed insulated roof tiles for flat roofs with built-in solar electric cells that generate power, extend roof life, and significantly reduce air conditioning loss.¹⁷ The roof tiles have become a new business generating over \$10 million per year.¹⁸ It recently developed a better process for turning landfill gas into electricity that also reduces the volume of the landfill, potentially extending its life by 20 years.¹⁹ It is currently working on more efficient

air conditioners tailored to the California climate, and a zero-emission gas-fired small power plant.²⁰

These kinds of advances create immediate financial benefits for in-state businesses and residents, and grow new industries.

If the South adopted basic appliance energy efficiency standards, they would reduce electricity demand the equivalent of the amount of energy produced in 10 new power plants.

Southern states should invest in developing similar advances based around the Southern climate, industries and area needs. Southern states should use public research, funded by a small charge on utility bills, to put themselves in the driver's seat regarding energy advances, rather than waiting for discoveries oriented towards other state's economies to "trickle down."

Appliance standards generate savings

While programs under the Public Benefits Funds should push the envelope on efficiency by offering incentives for consumers to adopt state-of-the-art technology, state governments can adopt a parallel strategy to achieve more energy efficiencies by setting a basic floor on energy efficiency for appliances. Basic efficiency standards protect consumers from outdated technology that causes excessive pollution and energy use. Simply setting these standards will reduce electricity demand in the South by an amount equal to the energy produced by ten new power plants.²¹



Recommendation 6: Adopt energy-efficient appliance standards so consumers aren't forced to buy outdated technology.



Potential Energy Savings	
Appliance type	Savings in Southern states (in \$millions)
Water coolers (bottle type)	40
Commercial Boilers	131
Commercial food warming cabinets	40
Compact audio players	340
DVD players	38
Power company transformers (liquid immersed)	1320
Power company transformers (dry-type)	89
Light fixtures (metal halide)	1656
Pool heaters	216
Hot tubs	10
Home furnaces/boilers	1717
Pool pumps	192
AC power adapters (i.e. for cell phones, etc)	737
Incandescent reflector lamps	933
Walk-in refrigerators & freezers	575
TOTAL	\$8.0 billion

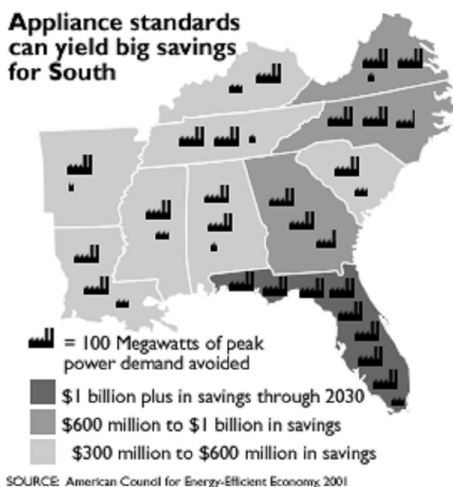
Historically, state governments around the country set the first minimum energy efficiency standards for appliances, such as refrigerators and heat pumps.²² Manufacturers then became concerned that they would have to meet multiple state standards, so the federal government stepped in and consolidated existing standards in a series of laws signed by Presidents Reagan, George H.W. Bush and George W. Bush.²³ These federally-enacted standards set a basic floor of efficiency for certain appliances. They will save consumers an estimated \$250 billion in

reduced energy costs by 2020.²⁴ This process has repeated itself several times, with states first regulating new types of appliances, and the federal government later adopting national standards to ensure uniformity.

The next round of cost-effective appliance efficiency standards, covering 15 products, are ready for state adoption.²⁵ They cover the products outlined in the chart at left. Savings are through 2030.²⁶

Big savings for Southern states

Implementing these standards will save \$4.50 in energy costs for every dollar of increased consumer cost.²⁷ Nationwide adoption would reduce global warming emissions by an amount equal to eliminating eight million automobiles.²⁸



Adoption of these standards would help in each Southern state in a variety of ways, as shown in the chart to the right and outlined in more detail in Appendix 4.²⁹ Several states would avoid peak power demand for upwards of 300 megawatts, which can result in cost savings in the hundreds of millions by 2030. For Florida,

the result would be even more dramatic, with 857 megawatts of peak power demand avoided—a \$2 billion savings over the next 23 years.

By adopting standards on 15 kinds of equipment, Southern states would save as much energy as 10 average power plants produce.

By simply adopting minimum standards for these 15 types of equipment, Southern states would avoid the need for approximately 2,900 megawatts less power generating capacity at peak times, such as summer

afternoons when the grid is most strained. This amount is equal to the output of about 10 average power plants.

Southern states would also save approximately \$8 billion over a 22-year period between implementation in 2008 and 2030.

Southern states should implement these standards immediately to achieve major savings and focus research at their universities, funded through the Public Benefits Fund outlined above, to continue development of new, more efficient appliance standards in all sectors of the economy.

A safe, sustainable energy path

While reducing power use through efficiencies presents the easiest short-term gains for the environment and consumer pocketbooks, only creating long-term replacements for fossil-fueled power plants will put the country and region on a safe, sustainable path.

While the Public Benefits Fund is one way to replace fossil fuels, another necessary step is to require utility companies to buy an increasing share of their power from renewable sources, such as wind, geothermal, wave power, landfill gas and solar energy. This is called a Renewable Energy Standard (RES).



Recommendation 7: Southern states should set a “Renewable Energy Standard” that requires utilities to get an increasing share of energy from renewable sources.



About half of all states, home to more than 150 million people, have already have implemented RES programs.³⁰ These programs use the pooled buying power of millions of utility customers to create a rising market for diverse renewable energy sources.

Under this approach, private and public utilities use their expertise to locate and develop the most cost-effective sources. Existing RES programs often require utilities to increase the share of renewable energy they buy by about 1 percent per year, with target amounts of anywhere from 10 percent to 30 percent by 2015 or 2020. Many programs have special targets for distributed solar electric generation and some count efficiency program energy savings as “renewable” watts. Many programs require utilities that don’t meet a target to pay into a fund for developing renewable energy, or to buy Renewable Energy Credits (REC) from people or companies that do develop new renewable power sources.

It is not only large urban states that have enacted RES programs. Vermont (the most rural state in the continental U.S.) has required that all increased power generation sold through utilities between 2005 and 2012 be generated through renewable sources. Maine has the highest RES standard—30 percent now, with an additional 10 percent renewable generation by 2017. RES programs in Texas, Nevada and Iowa are already more than six years old.

No Southern states have adopted Renewable Energy Standards.

But in the American South, only the city of Jacksonville, Florida, has established a Renewable Energy Standard.

Jacksonville's city-owned utility is an example of how local government can take the lead when it controls a publicly-owned utility. In 1999, the City committed itself to generating a rising share of its power from renewable resources. As part of this effort, Jacksonville became the only city in the nation to install solar electric panels on every high school in the utility's territory. It currently helps residents and businesses pay to install and maintain solar hot water heaters.

Despite the fact that the South is clinging to outmoded ways of generating power, alternatives are rich for exploitation throughout the region.

While other states are using market forces to find ways to generate cleaner energy that doesn't cause global warming or deplete resources for future generations, the South is generally clinging to outmoded ways of generating power.

This reluctance is not for lack of renewable energy resources. For instance:

Requirements would work. A North Carolina state-funded study recently projected that if the state requires 5 percent of all electricity to come from renewable energy sources over the next 10 years, it would provide a reliable power supply and cost ratepayers less than building new coal and nuclear power plants. The study further found that a combination of renewables and energy efficiency “could reasonably be expected to produce total electric cost savings for consumers of about half a billion dollars over 20 years.”³¹ The study also found that up to 14 percent of N.C. power needs could be met through efficiency programs for less than 5 cents per kilowatt hour.³²

Similarly, a detailed 2007 study of renewable energy and efficiency in Florida found that Florida could reduce fossil-fuel generated electricity demand by 45 percent within the next 15 years.³³ Renewable energy sources account for two-thirds of this

Great possibility: Put windmills on top of oil and gas platforms in the Gulf of Mexico to generate power.

total, and could help bring total electricity consumption below current levels in 15 years, even with population growth.³⁴

Wind power is doable. Recent offshore windmapping suggests that about 150 gigawatts to 200 gigawatts of energy capacity could be established from winds off the Southeastern shore of the United States.³⁵ Building only 20 percent of this capacity would generate approximately 105,000 gigawatt-hours of electricity, or a little more than the total amount of electricity used in South Carolina during a year.³⁶ According to one wind

energy company, Louisiana has the best offshore wind resources in the United States, plus more than 5,000 oil and gas platforms already offshore, some of which could be used to mount windmills.³⁷

Biogas offers opportunities. In North Carolina alone, potential electricity from biogas from animal waste, at 25 percent conversion, has been estimated at 3,000 gigawatt-hours.³⁸ A recent study specifically looking at waste from hog farms estimated that using existing technology to generate electricity from North Carolina hog waste would provide enough power for 90,000 homes annually.³⁹

Solar power can be big. A Florida study has estimated that solar electricity generation and solar hot water heaters could cut the need for new power plant capacity by 124 megawatts—the equivalent of powering about 124,000 homes. Recent estimates in connection with development of a Georgia State Energy Plan suggest that solar electric power could provide up to 200 megawatts in Georgia.⁴⁰ The document notes that this estimate excludes the generally less expensive option of solar hot water heating.⁴¹

Biomass: The University of Georgia estimated in 2003 that, while Georgia technically could supply 12 percent of its electric capacity from biomass, a much smaller, but still significant 672 megawatts could be generated by easily-available biomass.⁴²

Between the energy efficiency measures suggested throughout this book and the undeveloped potential for renewable energy production in the South, RES standards could drive a significant shift in the profile of Southern power generation.

Local governments can get into the act too

Local governments across the South can emulate Jacksonville, Florida's effort to get greener by investing in renewable energy. But they can do much more. Every local government could improve energy efficiency at its own facilities and in its local community, and could purchase renewably-generated energy. Local governments can purchase only efficient and alternative-fuel vehicles, including garbage trucks, transit buses, and school buses. Local governments could adopt green building codes (Chapter 5) and global warming plans (Chapter 1), and implement growth management and transportation planning practices that allow residents energy-efficient public transit and non-motorized transit options.

Also, many local governments directly manage a publicly-owned utility. These cities could move ahead of state utility regulation by establishing their own Public Benefits Fund with incentives for resident individuals and businesses to invest in efficiency and renewable energy. They could also set their own Renewable Energy Standard.

Finally, as this book goes to press, the city of Cambridge, Massachusetts is putting the power of local government behind improved commercial and residential energy efficiency in an unprecedented way. It has developed a \$70-million, multi-year plan to reduce community-wide energy use by 10 percent overall and 14 percent on-peak.⁴³ About half of the city's 23,000 buildings will receive detailed energy audits, and residents and businesses will be eligible for loans from a city fund to make energy efficiency building retrofits.⁴⁴ The city estimates that meeting energy demand through these improvements will cost about one-third of the amount of meeting that demand through a new power plant, while also reducing pollution.⁴⁵

Conclusion: South's energy policies need to mature

As the South grows and changes, its energy policy should also mature. Modern economies increasingly place value on exactly the resources degraded by our current power generation system—clean air and water and a healthy environment for children, workers and seniors. As the global economy develops, clean energy solutions will be in increasing demand. Many states, including in some cases Southern states, have tested proven ways to reduce pollution, avoid the need for so much power generation and to shift generation to renewable technologies. Southern communities and states should adopt these policies, adapting them for specific needs, and build on them to become clean energy leaders.

Talking points

- Southern states are power hungry—Southerners have a higher per capita use of electrical power than people in any other region.
- While Southern power rates are relatively low compared to the rest of the country, Southerners pay more in per capita annual spending on power than most other Americans—because they use so much more electricity.
- Because the cost of power has been relatively inexpensive, Southern states haven't pushed to generate energy savings. In fact, they've been clinging to outmoded ways of generating power. Now is the time for the South's energy policies to mature.

- But if states would focus on reducing energy consumption, such as by adopting stronger appliance efficiency standards, residents would save money and cut pollution. Adopting such standards in the South would save as much energy as that supplied by 10 average power plants.
- Additionally, states could focus on new strategies to save energy. One example is the use of a Public Benefits Fund, which would allow states to pool a small portion of consumer utility bills into a fund to reward energy efficiencies, generate more renewable energy and provide low-income energy assistance.
- States could also emphasize renewable energy by requiring utilities to get an increasing share of its energy from renewable sources.
- Such renewable energy requirements would work in the South, which generally hasn't tapped into major resources of wind, solar and other types of renewable energy. By using these sources of energy, the South wouldn't have to build as many power plants, which would cut future pollution in a big way.
- Like state governments, local governments can get into the act by adopting energy standards and efficiencies, and by focusing on renewable energy strategies.

Endnotes

¹ From: Table F11, http://www.eia.doe.gov/emen/states/sep_fuel/html/fuel_es.html. Also, "U.S. Per Capita Electricity Use By State in 2003," California Energy Commission, www.energy.ca.gov/electricity/us_percapita_electricity_2003.html.

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¹⁹ Ibid.

²⁰ Ibid.

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²² Ibid., iii.

²³ Ibid.

²⁴ Ibid., 4.

²⁵ Ibid.

²⁶ Ibid., 5.

²⁷ Ibid.

²⁸ Ibid., see individual benefits charts for each southern state.

²⁹ DSIRE webpage.

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³¹ North Carolina Sustainable Energy Association at <http://www.wncgbc.org/pdf/Renewable%20E%20&%20Efficiency%20Tax%20Credits%20NC%20&%20US.pdf>, accessed January 4, 2007.

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³³ Ibid.

³⁴ E-mail interview with Nick Rigas, Director, South Carolina Institute For Energy Studies, Clemson University, Clemson, SC. 10/19/06.

³⁵ See 2005 South Carolina Energy Statistical Profile, page xii, accessed at http://www.energy.sc.gov/Public%20Info/public_info_index.htm. North Carolina uses about twice this much electricity, according to “Annual Report of the North Carolina Utilities Commission,” (July 2005), p. 1.

³⁶ “Louisiana Offshore Wind Energy,” Herman J. Schellstede, Wind Energy Systems Technologies, 2005, Power Point presentation at http://www.enrg.lsu.edu/conferences/altenergy2005/Herman_Schellstede.ppt#1.

³⁷ “Animal and Poultry Waste-to-Energy,” Leonard S. Bull, Ph.D., P.A.S. Professor of Animal Science and Associate Director Animal and Poultry Waste Management Center, NC State University, 2002.

³⁸ “Hog farms seen as energy source; Study: N.C. waste could produce enough power for 90,000 homes,” by Mark Schreiner, StarNewsOnline, December 21, 2006, accessed February 4, 2007 at StarNewsOnline.com.

³⁹ “Governor’s Energy Policy Council Staff Research Brief: Meeting Future Electricity Demand,” p. 2, accessed at http://www.georgiaenergyplan.org/suppmat/Meeting_Future_Electricity_Demand.pdf. Undated, and without a named author, but prepared after Dec. 4, 2006.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² “Cambridge sets \$70m energy initiative,” by Thomas C. Palmer, Jr., Boston Globe, March 29, 2007, accessed at http://www.boston.com/business/globe/articles/2007/03/29/cambridge_sets_70m_energy_initiative/.

⁴³ Ibid.

⁴⁴ Ibid.