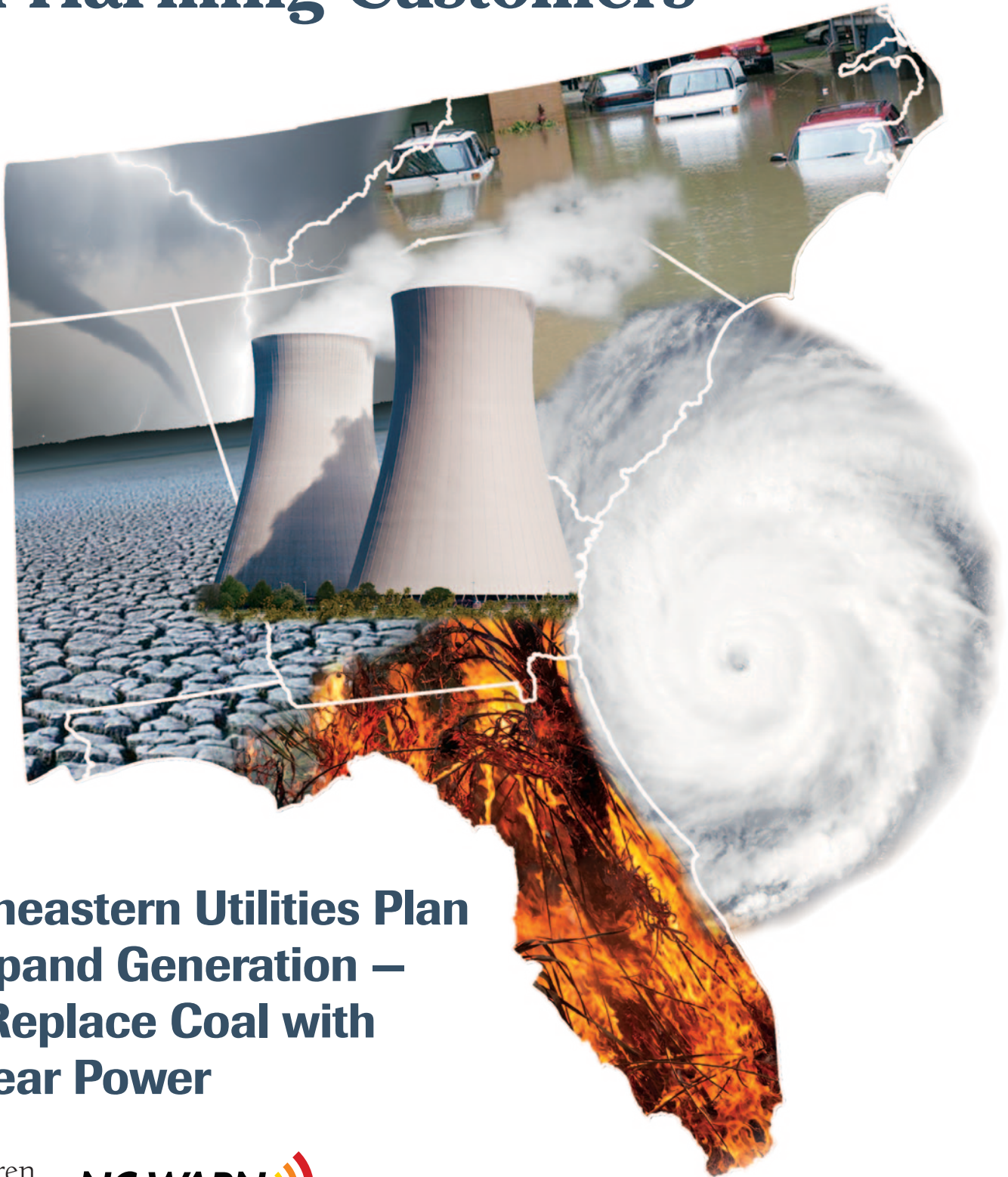


New Nuclear Power is Ruining Climate Protection Efforts and Harming Customers



**Southeastern Utilities Plan
to Expand Generation –
Not Replace Coal with
Nuclear Power**

Jim Warren
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NC WARN 

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Dedicated to Dr. John Blackburn, 1929–2011

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NC WARN: Waste Awareness & Reduction Network is a member-based nonprofit tackling the accelerating crisis posed by climate change — along with the various risks of nuclear power — by watch-dogging utility practices and working for a swift North Carolina transition to energy efficiency and clean power generation. In partnership with other citizen groups, NC WARN uses sound scientific research to inform and involve the public in key decisions regarding their wellbeing.

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Southeastern Utilities Plan to Expand Generation — Not Replace Coal with Nuclear Power

Summary

A race between two powerful global forces is nearing a critical juncture. Climate change, which is increasingly devastating humans and other life across the planet, is within a very few years of passing irreversible tipping points. Meanwhile, a climate-protecting clean energy revolution is escalating in many parts of the world.

Five large corporate utilities in the southeastern United States could prove pivotal to avoiding runaway climate change toward what NASA climatologist James Hansen calls a planet for which human life is not adapted.

Since 2005, prodigious public relations campaigns have promoted those utilities' commitment to lead the way to a "low carbon" future by building more nuclear power plants.

But instead of *replacing* their coal-burning plants with nuclear power, the Southeast Five plan to keep operating most or all of their coal plants indefinitely, while *adding* more nuclear (and fossil fuel) plants so they can expand electricity sales both within and outside the region. This business model is based largely on the delusion that the U.S. economy will someday return to the unsustainable growth that created the combined economic-ecological predicament we now face.

The long-sought U.S. nuclear "renaissance" is now in shambles. Even the Southeast Five would have cancelled their problem-ridden projects except that, in recent years, state governments have forced customers to absorb the enormous financial risks. These captive customers must buy electricity from corporate monopolies that are protected from competition.

Outside the Southeast, states and utilities are avoiding what Moody's analysts call "a bet the farm risk" posed by nuclear projects that private investors will not support. More than 20 states are adopting energy-saving programs along with cogeneration, solar and wind power, all of which are either less expensive than, or cost-competitive with, new nuclear generation. Those efforts are creating thousands of jobs, keeping power bills in check and cutting greenhouse emissions.

In the Southeast, however, utilities are not only evading — but actively blocking — the advances in those resources that are so abundant across the region; the same efficiency programs and renewable power that would speed the phase-out of carbon-belching coal boilers also dampen the need for expensive new nuclear plants.

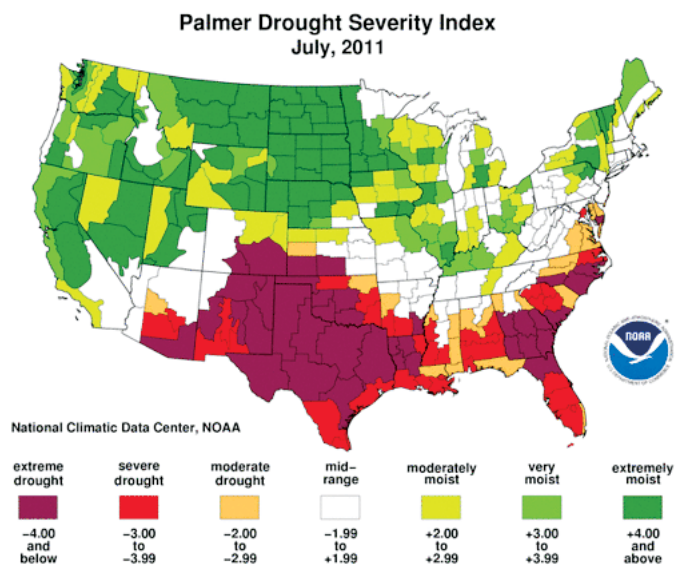


Image courtesy of NOAA

Multiple extreme weather events — including record floods in the Midwest, along with droughts, heat waves and wildfires across the South — are severely straining local, state and federal economies.

Giant centralized power companies could be driven to extinction by falling prices and growing markets for rooftop solar leasing companies — and recently, residential scale wind. Even the Southeast Five cannot entirely impede such distributed generation. But the climate clock is ticking faster and chaotic changes are accelerating.

Contrary to the utilities' public relations claims, electricity demand in the Southeast has been flat or falling for years — despite population growth. Industry analysts predict that demand is likely to decrease further due to long-term economic restructuring and the adoption of energy conservation and efficiency in homes and businesses (which is gradually occurring despite the utilities). Ironically, nuclear construction would cause demand to fall further as customers respond to soaring rates.

Even if new nuclear generation were planned to replace coal, most of the proposed projects are taking nearly 20 years to complete (if any are finished at all), while climatologists warn that global reduction of carbon emissions must begin immediately to prevent global warming from becoming self-sustaining.

Even if humanity quickly begins to reduce emissions, we still face decades of worsening climate conditions due to the past years of carbon pollution already in the atmosphere and oceans. That period of time will fully challenge our economic and social systems with chaotic

weather and wildfires, and with increasing degradation of our water and food supplies, all of which amplify global conflicts and suffering.

The poor are being hurt first and the most, but no one will escape these challenges.

The Southeast still has a window of opportunity — closing rapidly — to join the shift to a clean energy economy that creates jobs and protects power bills. This would allow the region to join the growing international efforts to avert the worst effects of climate disruption, thus providing a positive “tipping point” toward stabilization of our climate and economies.

By contrast, a continued pursuit of new nuclear plants, while not closing coal power plants, could harm local and state economies and exacerbate the climate crisis instead of helping to mitigate it.

The Nuclear Paradox: In order to close coal-fired power plants and slow global climate change, we must stop southeastern utilities from trying to build nuclear power plants.



Introduction

In the captive Southeast, closing coal requires stopping new nuclear projects

Despite major psychological denial and a deliberate obfuscation campaign fueled by the energy industry, the U.S. public is slowly beginning to realize that climate change is no longer hypothetical, but a widely-measured planetary transition that is well underway and worsening at a disturbing pace. Gradually, climate disruption has become utterly blatant as chaotic weather, crop failures and ocean changes are increasingly harming people, plants and animals across the planet — and challenging our vital social and economic structures.¹

Some leading experts warn that if annual greenhouse emissions continue rising for another three or four years, global warming is likely to move past irreversible tipping points due to various feedback mechanisms that are already occurring.²

In addition to the critical need for near-term emission reductions, NASA's James Hansen and others insist that *all* global coal combustion must be phased out by 2030. In the U.S., coal-fired electricity represents roughly 40% of greenhouse gas emissions.

Meanwhile, a belated but escalating transition to an energy future based on wiser usage of power tapped from the sun and wind is underway in many parts of the world, a conversion that is encouraging and vastly superior economically to carbon-based and nuclear generation. But because of the ticking climate clock, the shift must happen much more quickly.

Not surprisingly, the nuclear power industry — mostly the same corporations that brought us the carbon crisis — has led reasonable people to wonder if building more nuclear capacity is a lesser evil that represents the only path forward. Consequently the U.S. is now in year seven of an extraordinary public relations offensive calling for a “renaissance” based on nuclear power’s lower carbon pollution as compared to electricity generation from coal.

But nuclear power’s long-running struggle to become economically competitive, including inherent technical complexities, has remained an intractable obstacle. Experimental and complex plant designs are proving far more challenging to finalize, much less license and construct, than pro-nuclear enthusiasts will admit.

Those financial challenges, largely based on the need to moderate catastrophic risks to public safety and property, have caused the U.S. revival to contract — not expand — over the past several years.

“...the overwhelming majority of the world’s climate change scientists [have] shown that rapid global warming is real, because of humans. It is dangerous to our health, our food supply, our cities and our national security — in short, our future.”

— William H. Schlesinger, President of the Cary Institute of Ecosystem Studies³



Photo courtesy of Associated Press

Scientists say global warming is making a range of weather extremes worse. Storm surge from Hurricane Irene broke new inlets across Hatteras Island in late August and caused over \$100 million in crop damage in North Carolina alone.

In February 2011, well before the Fukushima disaster, former Nuclear Regulatory Commission member Peter Bradford wrote that the so-called U.S. nuclear renaissance is “in shambles.” His point was that most of the U.S. nuclear projects announced earlier with great fanfare had already been sidelined due to design complexities and soaring cost estimates that leave the new models unable to compete economically against other technologies — at least in states where customers can choose their electricity provider.⁴

Most U.S. power companies have backed away from nuclear projects due to the enormous financial risks. Many are pursuing paths that are better for their corporate stability and for our climate, health and economy.

Now, the U.S. nuclear revival is mainly consigned to a few southeastern states where electricity providers enjoy monopoly service areas and, more importantly, where their corporate influence led to recent Construction Work in Progress (CWIP) legislation that shifts the prodigious financial risks to their customers. Under CWIP, customers pay for the construction of the nuclear plants decades before they produce power — with automatic annual rate increases — even if the projects are abandoned in midstream.

“...we have to get legislation in North Carolina that allows us to track CWIP similar to legislation that we have in South Carolina. That’s a key before we’ll move forward.”

— Jim Rogers, Duke Energy CEO⁵

Based on public statements by CEOs such as Duke Energy’s Jim Rogers, who has gained only partial CWIP legislation in North Carolina, it is clear that without full-blown public backing — including taxpayer insurance and, in some cases, federal loans and guarantees — the nuclear revival would already

reside only in the memories of those who attempted to benefit from it.⁶

Despite their persistent claims of unfettered annual demand growth, southeastern utilities have mostly experienced flat or falling demand for many years. National projections for future demand are down not only due to the current recession, but because of long-term economic restructuring, a belated mainstreaming of energy conservation and efficiency, and other forces not yet understood by the power companies.⁷

Earlier studies have demonstrated theoretically that, instead of helping with climate change, trying to build new nuclear plants is actually squandering humanity’s chances to avert the worst effects by diverting billions of dollars and precious years in the wrong direction.⁸

To fortify those findings, this report addresses the actual practices in the Southeast, a region that ranks high in coal-fired electricity, low in energy efficiency and conservation, and where most of the remaining U.S. nuclear licensing and construction projects are targeted.

It relies on data filed with regulators by the five utilities still attempting to lead a U.S. nuclear revival. The Southeast Five include Duke Energy Carolinas, Florida Power & Light, Georgia Power (a subsidiary of Southern Company), South Carolina Electric & Gas, and Progress Energy. [Note: Progress Energy maintains two separate service areas, one in Florida and one that includes parts of both Carolinas.]

This report focuses special attention on Duke Energy for several reasons, including CEO Jim Rogers’ international stature in insisting he understands the challenges and opportunities posed by climate change, energy efficiency and renewable power. Also, Duke Energy is in the process of acquiring Progress Energy, which would make Duke the largest electric utility in the nation, if not the world.

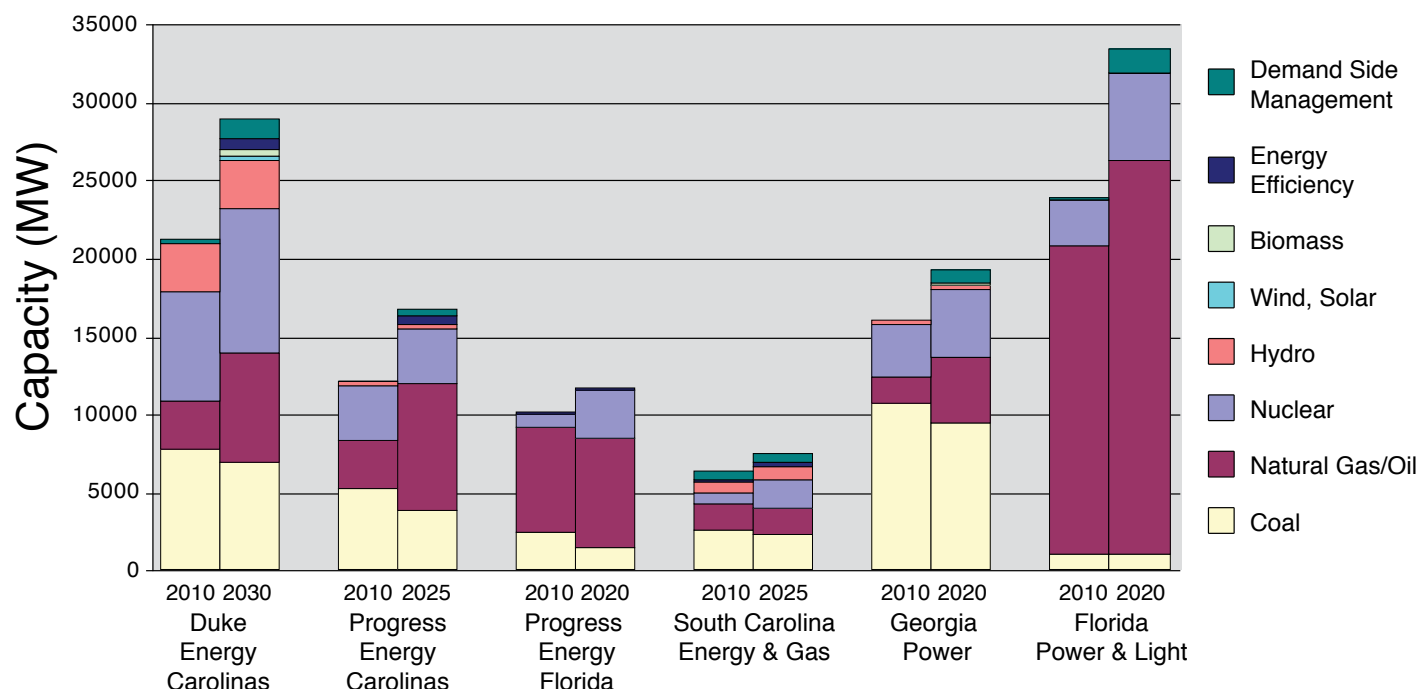


Figure 1: “Southeast Five” Electricity Resources

Each of the Southeast Five utilities project significant growth in their overall generation capacity over the course of their planning horizons despite national long-term trends of falling electricity demand. This growth in capacity is mostly due to an increase of construction of nuclear and natural gas plants. The Southeast Five claim that this new nuclear capacity is being developed in order to close coal-fired plants — thereby reducing greenhouse gas emissions. The graph above shows the reduction of coal generating capacity, but because only smaller, little-used units are being retired, the actual reduction in electricity generated by coal is very small (e.g. 3.5% for Duke Energy as described on p. 8). Note: Purchased power is not included. The graph does include nuclear projects that Florida Power & Light and Progress Energy Florida hope to bring online after their 2020 planning horizons.⁹

The Southeast Five plan to *add* nuclear without replacing coal

The five southeastern utilities purporting to lead a U.S. nuclear revival do not plan to reduce carbon emissions by replacing their lucrative coal-burning fleets with new nuclear units.

The Southeast Five intend to increase sales — including to other regions — by adding large amounts of generation capacity from nuclear, natural gas and biomass. Duke Energy is even building a large coal-fired plant in North Carolina, as well as one in Indiana, neither with any prospect of carbon capture.

An analysis of long-term supply and demand forecasts filed by the Southeast Five indicates that each power company hopes to add new nuclear generation while continuing to use its large and lucrative coal-burning plants indefinitely (see Figure 1). Despite a deceptive public relations campaign touting “clean coal,” there is no viable prospect for any of those coal-fired units to ever capture carbon emissions.¹⁰

■ **Duke Energy Carolinas** plans to add 7,723 megawatts (MW) of generation capacity by 2030, a net addition of 36.5%, while continuing to use its large coal-fired units. Over 2,200 MW would come from two Westinghouse AP1000 nuclear units at Duke’s proposed Lee Nuclear Station. Because Duke’s sales have been

relatively flat since long before the recession, CEO Jim Rogers continues to pursue an aggressive program to expand sales inside Duke's service area (for example, by recruiting energy intensive but low job-creating data centers), and even by recruiting entire cities and other large customers outside its area.¹¹

■ **Georgia Power**, part of Southern Company, plans to increase its generating capacity by a net 3,282 MW by 2020. If successful, its nuclear capacity would grow by 1,007 MW based on Georgia Power's ownership share of two AP1000 units now in a pre-licensing construction phase at its Plant Vogtle site. The company plans to close old, small coal units that represent 11.6% of its coal fleet's 10,690 MW capacity.

■ **South Carolina Electric & Gas** plans to increase generating capacity by a net 1,128 MW from 2010 to 2025. Of the new capacity, 1,228 MW would come from new nuclear generation based on SCE&G's 55% ownership of two new AP1000 units that are also in pre-licensing construction at the V.C. Summer plant. Meanwhile, SCE&G projects to close 300 MW of older coal units.

■ **Florida Power & Light** plans to increase generating capacity by an ambitious 9,510 MW, including over 5,000 MW of natural gas units. If completed, two new AP1000s at

Turkey Point would contribute more than 2,200 MW of new capacity (the opening date is now projected to be after the 2020 planning horizon). FP&L does not project any coal closures at this time.

■ **Progress Energy Florida** plans to increase its generating capacity by a net 1,545 MW by 2020, bringing two new AP1000 reactors online, totaling 2,210 MW, at the Levy County site. That project is now delayed until after the 2020 planning horizon. PEF plans to retire two older coal-fired units totaling 869 MW, or about 38% of its coal capacity. However, those retirements could well be reversed for any of three reasons:

1. if delays and uncertainty continue with the company's proposed nuclear project (recently a Florida regulator indicated that the project has been set back to a 2027 opening),¹²
2. if CEO Bill Johnson repeats his recent announcement that in the Carolinas, he will alternatively burn coal and natural gas depending on contemporaneous prices, as noted below,
3. if Progress Energy adopts, as expected, the expansionist business model of Duke Energy, which is in the process of acquiring Progress Energy.

Public Relations Vs. Data

In recent years, Duke Energy and others advanced "green" public relations strategies by agreeing to retire some old coal-fired units. Little mention was made of the fact that those very small units are rarely used, have been fully depreciated (are no longer profitable) and do not meet clean air standards. As shown in Appendix 1, some of those units are not being operated at all.

In both its 2010 Integrated Resource Plan and numerous public statements, Duke Energy Carolinas superficially appears to substantially reduce its overall dependence on coal over time.

Duke is actually substituting a new 835 megawatt (MW) Cliffside coal unit, which would be used basically "around the clock," for 18 rarely used units with capacity totaling 1,600 MW. Twelve of those units are under 100 MW in capacity; four units were not used at all in the year ending May 31, 2011.

Duke Energy Carolinas' planned reliance on coal power in 2030 will remain at 96% of the 2010 level.¹³

■ **Progress Energy Carolinas** has basically suspended licensing efforts to add two nuclear units at its Shearon Harris plant, although it still projects the possibility of adding 550 MW of nuclear generation to its fleet — presumably from acquiring a share of a Duke or SCE&G project. PEC plans to retire 1,488 MW of coal units, although two of the coal facilities will be converted to natural gas and will have a greater capacity than the company’s total coal retirements. PEC plans to increase capacity by a total of 4,615 MW by 2025 (38.2%) by relying on 5,060 MW of new natural gas generation.

None of the Southeast Five’s planning documents indicate an intention to close coal units in years following their current planning horizons.

In fact, Progress Energy CEO Bill Johnson, who has been tapped to head Duke Energy after a merger expected to be completed late in 2011, announced in August that the Progress Energy Carolinas sector of the merged corporation will increasingly rely on natural gas if downward price trends continue. However, he will protect his option to burn more coal by “play[ing] to the fuel markets as prices change.”

By doing so, he would keep a large excess of generation assets in the rate base, then use the units most profitable in a given time period and/or sell excess power outside the region.¹⁴

If approved by regulators, this business model will allow a combined Progress-Duke Energy to add tens of billions of dollars to its rate base, thus increase rates to customers, and keep all its still-profitable coal units operational and in the rate structure while adding redundant nuclear and natural gas generation.

Progress Energy CEO Bill Johnson, who plans to soon head Duke Energy, calls himself an “unabashed advocate” of nuclear and coal power.¹⁵

In southern states with “regulated” monopoly markets, retiring fully depreciated generation facilities and adding billions of dollars worth of new capacity makes business sense for the utilities that hope to maximize profits. Such capital investments — plus a guaranteed rate of return — form the basis for electricity rates paid by residential and business customers. Therefore, building expensive power plants and maximizing electricity sales boosts revenues.

Adding nuclear reactors at roughly \$10–12 billion per unit is part of a southeastern utility business plan that could increase rates by 50–100%, if not more, especially because older generation assets have been largely depreciated, thus carry less weight in the ratemaking formulation process.¹⁶

New nuclear generation is likely to cost at least twice the average cost of generation

Natural Gas Is Not Clean

As nuclear power has become progressively more financially risky, utilities such as Progress Energy are hedging their bets toward natural gas instead of efficiency, cogeneration, solar and wind. Long called a “cleaner fuel,” natural gas has recently experienced downward price trends due to a rapid increase in supply.

A mining technique that releases natural gas from shale formations, “fracking,” is highly controversial due largely to groundwater contamination and its huge usage of fresh surface water.

In addition, the long held claim that electricity generation from natural gas produces only half the amount of greenhouse gases as coal is now being challenged. Researchers at Cornell University found that leaking methane at various steps of the fuel’s life cycle — when extracted via hydraulic fracturing — leads to greenhouse gas emissions at least 20% greater than coal-fired electricity over a 20-year horizon.¹⁷

from currently operating baseload fleets, which will drive overall rates much higher.¹⁸

These corporations want to have their coal and nuclear too — to extract decades of profits from their large coal burners while expanding sales and rate bases as much as possible. But that approach is not helping create a low-carbon future or protecting customers from soaring power bills.

Utilities are impeding advances in efficiency, solar and wind

In this sun- and wind-rich region, the Southeast Five are offsetting the important carbon reduction gains made by others.

Not only are the Southeast Five shunning development of abundant, clean energy and efficiency resources that could speed the phase-out of carbon-belching coal boilers, at least some are actively blocking advances by clean energy businesses and advocates. That’s because the growth of clean energy would further dampen the need for billions of public dollars to be risked on new nuclear plants.

As southern utilities simultaneously developed talking points and license applications to build nuclear plants during 2005–2006, they openly dismissed energy efficiency and renewables. But in response to public demands for energy-saving programs and truly clean power, Duke Energy and others began a long-term public relations offensive claiming to support energy efficiency, solar and wind even while insisting quietly (for example, in arguments to the N.C. Utilities Commission) that the public will not bother to save energy, and that solar and wind are only part-time curiosities.

Global trends provide hope for the overall shift to clean, safe electricity production, with a recent United Nations study showing that 80% of world electricity needs could be met with renewable energy by 2050.²⁰ Many U.S. states and other countries are successfully increasing the use of renewables, energy efficiency and cogeneration (also called combined heat and power), retiring coal and avoiding new nuclear construction.²¹

However, none of the Southeast Five plan to use more than a minuscule amount of energy efficiency, cogeneration, or clean renewable generation. Figure 2 illustrates the percentage of total generation that would be generated by solar and wind, as well as energy efficiency, by the end of each utility’s planning horizon (the year each corporation chooses for its supply-demand planning).

In North Carolina, Duke and Progress agreed to a 2007 renewable energy and energy efficiency portfolio standard (REPS), but negotiated a backroom deal that married the bill to pro-nuclear Construction Work in Progress (CWIP) legislation.

Despite millions of ratepayer dollars spent each year on “green” image advertising, neither Progress nor Duke plans to do more than a very small amount of energy-saving or renewables in their service areas in

Utility, End of Planning Horizon	% of Total Generation Capacity	
	Wind & Solar	Energy Efficiency
Duke Energy Carolinas, 2030	0.77%	2.19%
Progress Energy Carolinas, 2025	0.59%	3.58%*
Progress Energy Florida, 2020	0.00%	0.71%
SCE&G, 2025	0.00%	5.09%
Georgia Power, 2020	0.00%	0.00%
Florida Power and Light, 2020	0.15%	0.00%

* mostly from transmission upgrades (see page 11)

Figure 2: The Southeast Five’s Commitment to Efficiency and Renewables

The Southeast Five commit to adopt meager wind and solar capacity, if at all. For utilities reporting only general plans for “renewables,” no credit is given for solar or wind development.¹⁹

Controlling The Decisions

It surprised no one that the Florida Public Service Commission jettisoned rules that would have required two utilities to more aggressively encourage energy conservation...

Utilities were unenthusiastic, and the notoriously utility-friendly PSC is not an agency eager to upset the status quo...

A brief era of independence was quickly ended last year when state lawmakers dumped Gov. Charlie Crist-appointed PSC members who dared to reject rate hikes...

...the PSC has been averse to promoting change, though conservation ultimately is far less expensive than building more power plants.... A key step to getting power companies to more aggressively embrace conservation is to devise a rate structure that rewards companies that save power.

—The *Tampa Tribune* editorial board, August 2011²²

the Carolinas — only enough to justify their statements that “efficiency and solar can be part of the mix, but they just aren’t enough. We must have low-carbon nuclear power too.”

Progress and Duke in North Carolina have done pilot energy efficiency programs that proved popular, but they are keeping them at small scales. In CWIP-free Ohio, Duke Energy achieved triple the state energy efficiency requirement in its first year — with a very modest investment — by helping customers save nearly 1.5% of power sales.²³ But in the Carolinas, Duke says it can achieve only about 2% over 20 years.

Progress Energy Carolinas pushed its “smart grid” upgrades as an energy efficiency measure and, although modernizing the electricity grid does add some efficiency to overall operations, it does little to cut end-use demand (also, all utilities are going through this costly process but not included as efficiency). The hundreds of millions of dollars Progress spent was passed on to residential ratepayers by the N.C. Utilities Commission, and conveniently met most of the energy efficiency requirement in the 2007 REPS bill.²⁴

A May report by national experts in energy efficiency supports critics who claim the 2007 REPS bill in North Carolina merely provides cover so the utilities can insist they support clean energy as they pursue nuclear projects that are more lucrative. The

American Council for an Energy-Efficient Economy reports that 16 states are on track, or close, to meeting energy saving goals. It also highlights the Duke and Progress strategy: “While its policy has been in place for over two years, North Carolina has not recorded energy efficiency savings and is thus not included in this tally.”²⁵

While using ratepayer money to promote their green credentials, the two N.C.-based utilities, which plan to soon become the largest single U.S. power company, have aggressively opposed efforts by a diverse coalition of over 40 nonprofits to establish a statewide efficiency program not controlled by the utilities.²⁶

Even the industry’s key trade group, the Electric Power Research Institute, did a 2010 analysis concluding that new nuclear power and “clean coal” would not reduce emissions but reduction targets could be achieved with efficiency and renewables.²⁷

One peculiar utility claim is that because rates are now low in the Southeast, energy efficiency programs will not succeed as they do in other states. Their model is to lock in soaring rates as they build plants, double power bills, then watch customers cut energy usage as the new plants export power to other areas.

Meanwhile, the Southeast Five dismiss renewable energy as a serious alternative.



Photo courtesy of The Wind Ninja

Offshore wind could power much of the eastern U.S. and create thousands of jobs, but the Southeast Five are impeding its development because this growth industry helps eliminate the need for nuclear projects.

“And we know there’s no wind in North Carolina... because you can’t make the economics work here.”

—Duke Energy CEO Jim Rogers, March 15, 2011²⁸

The wind-power industry is convinced otherwise. Roughly 3,000 megawatts (MW) of wind power is being actively considered or developed near North Carolina’s coast and off-shore. A 300 MW land-based project near Elizabeth City set for completion in 2012 will be the Southeast’s first commercial-scale project and one of the largest wind farms in the nation. In all, developers are already exploring the possibility of building 900 MW of capacity in eastern North Carolina, and 2,000 more offshore.²⁹



With backing by Honeywell, WindTronics’ home-sized wind turbines are being installed in the \$10-12 thousand range.

According to their Integrated Resource Plans and testimony, it appears that N.C.-headquartered Progress Energy and Duke Energy both plan to watch all that power be exported north.

In contrast to Rogers’ statement, wind power is being delivered to customers at 3.5 to 4.5 cents per kilowatt-hour by Duke Energy Renewables in Texas, a price many times lower than new nuclear power could ever achieve.³⁰

North Carolina has the largest off-shore wind capacity on the East coast, an amount the Department of Energy says could theoretically supply all the state’s electricity needs.³¹ UNC-CH researchers in 2009 said “North Carolina is well-positioned to develop utility-scale wind energy production, and should pursue it aggressively.”³²

While other countries and private corporations are rapidly increasing off-shore wind generation, the price for U.S. projects remains uncertain. Proposed projects off Rhode Island and Massachusetts are estimated to cost about 24 cents and 19 cents per kilowatt-hour, respectively.³³

Those prices are in the range of what new nuclear would cost (without even considering billions in taxpayer subsidies for nuclear power). Most of the Southeast Five have sufficient clout to ensure legislative and regulatory support for wind energy if they chose to take the clean energy approach.*

Regarding solar power

In North Carolina, Duke and Progress are using the 2007 REPS requirements as a cap for solar generation — not as a starting point to help build up the industry as intended. The utilities largely met the miniscule requirement that two-tenths of total generation come from solar power early on, and have no intentions of going further. Consequently, some major solar installers are looking to other states for business.

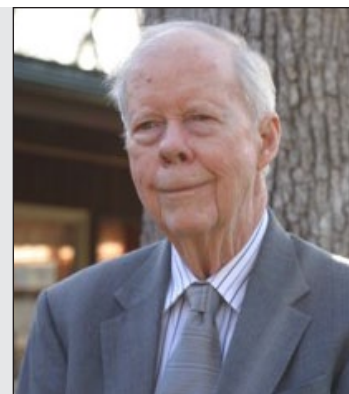
Solar installers complain that Duke Energy has turned down a host of competitively priced proposals, and that Progress Energy generally considers only small-scale projects to meet its 0.2% solar requirement.³⁴

In addition, solar companies say they have been hurt because Duke Energy is meeting its REPS obligation by developing its own projects and buying power from a single large solar site. “Duke left out contractors

* As this report was being finalized, Duke Energy filed its 2011 IRP, which will be reviewed by the N.C. Utilities Commission, NC WARN and others. In it, Duke projects to increase wind power capacity to 411 MW by 2031 but to use it only to contribute 62 MW of peak power. During testimony at the NCUC on September 20, 2011, CEOs Rogers and Johnson indicated no plans for their companies to exceed the 2007 REPS requirement.

“With practical increases in energy efficiency and renewables, less and less baseload would be needed, especially since it is now clear that solar and wind power can work in combination to replace traditional baseload generation.”³⁸

—Dr. John O. Blackburn, former chancellor and emeritus chairman of economics, Duke University



and private investors who could have expanded the industry.”³⁵ Solar companies have reportedly complained they cannot get a foothold in other monopoly-utility states in the Southeast.³⁶

A central mantra by Southeast utilities is that solar and wind power are not dependable. By contrast, a 2010 study by the late John Blackburn, an energy economist and former Duke University chancellor and chair of economics, showed that across North Carolina, “intermittent solar and wind energy, especially when generated at dispersed sites, could generate 75% of total electricity needs rather than be relegated to auxiliary use.”³⁷

Neither Duke Energy nor Progress Energy have produced any data contradicting Dr. Blackburn. In fact, the nation’s leading energy regulator agrees that using solar and wind in combination should eliminate the need for construction of traditional “baseload” generating plants, and speed the transition to renewable power:

“I think baseload capacity is going to become an anachronism... We may not need any [new coal or nuclear plants] ever.” —John Welington, Chair, Federal Energy Regulatory Commission³⁹

Another utility talking point is to claim solar and wind are too expensive by comparing them only with costs of generation from plants built decades ago — not the much higher costs of power that would be generated by new plants. In fact, new nuclear electricity is likely to cost twice the current average kilowatt-hour rates in some states, while solar photovoltaic prices are already falling below those levels when both nuclear and solar are compared net of public subsidies.⁴⁰

Calling nuclear power “a climate protection loser,” energy expert Amory Lovins emphasizes that energy efficiency, wind (at least on-shore) and cogeneration are all carbon-free resources that “cost at least one-third

less than nuclear power per kilowatt-hour, so they save more carbon per dollar” and are far more quickly deployed. Many efficiency measures beat the price of new nuclear power by ten-fold.⁴¹

With solar and wind power growing in use while prices continue to fall, and because short- and long-term projections show electricity usage



Photo courtesy of Sierra Pacific Home & Comfort, Inc.

Large amounts of private capital are now bolstering companies installing solar photovoltaic systems on rooftops with no up-front costs to customers.

decreasing, the Southeast has a perfect window of opportunity to shift to practical, bill-saving energy efficiency programs and clean generation along with the thousands of jobs they bring.

For that to happen, the utilities' business model — and control over crucial public decisions — must change.

Exaggerated demand

Based on the utilities' own historical demand data, the Southeast Five cannot justify new nuclear plants. Skyrocketing rates to build multi-billion dollar nuclear projects would cause demand to fall even more.

For years prior to the 2008 recession, southern power companies seared into the public mind the notion that electricity demand was experiencing unfettered growth. More recently, their nuclear industry allies have joined them in insisting such a growth model is destined to return and extend far into the future. Public officials have adopted the "2% per year" growth mantra with little

question, while echoing utility arguments for building more coal and nuclear plants "so we can keep the lights on."⁴²

Over the decades, utilities have regularly exaggerated growth projections, which became a key factor in the cancellation of more than 90 U.S. nuclear projects in the 1970s and '80s, but which nevertheless led to a Southeast regional over-building of baseload generation capacity for which demand has never caught up.

In North Carolina, the utilities' demand growth claims are belied by their Integrated Resource Plans (IRPs) filed with the N.C. Utilities Commission. Both Duke Energy and Progress Energy have experienced very low or even falling growth in demand for many years despite a growing population. Industrial demand plummeted in the previous decade due in part to manufacturing outsourcing and other corporate restructuring. Duke's total retail sales fell nearly 3 percent between 2000 and 2009, according to its IRP filed in September 2010.⁴³

And despite years of low growth, long-term decline in the national and state economies, and a certainty that soaring power bills caused by construction of new nuclear plants would result in what industry insiders refer to as "demand destruction" — where customers cut usage as power gets more expensive — all the Southeast Five curiously projected in their 2010 IRPs the resumption of vigorous growth far into the future. (Since filing its 2010 IRP, Duke Carolinas conceded that demand growth will remain flat through 2015.)⁴⁴

Figure 3: Demand Destruction Due to Rate Hikes

This document from Duke Energy Carolinas' 2009 rate case indicates that rising rates lead to falling demand and contradicts the company's ambitious growth projections in the long-term planning documents.⁴⁶

EXHIBIT D	
STATEMENT REGARDING PROBABLE EFFECT OF PROPOSED RATES ON PEAK DEMANDS AND SALES	
The following forecast from the Spring 2009 Forecast incorporates the effect of the expected rate increase on forecasted peaks and sales. Overall we expect the effect to be small.	
The Company estimates that the kilowatt-hours which will be used by our North Carolina Retail customers during the ensuing one year and the following five years are as follows:	
NC Retail GWH	
2009	54,027
2010	53,575
2011	54,073
2012	54,682
2013	53,973
2014	53,986
This statement is being furnished pursuant to G.S. 62-155(e).	

Some utilities even encourage customers to waste power. In 2008 the NC Utilities Commission sided with NC WARN by ordering both Progress Energy and Duke Energy to stop coaxing more customers into an energy-wasting "level billing" program, but unfortunately allowed them to retain thousands of customers already using the plans. In July 2010, the commission rejected Duke Energy's appeal of an order requiring Duke to track the impacts of energy-wasting programs.⁴⁵



Jim Rogers' Leadership

The prominent Duke Energy CEO who insists he understands climate change is building two large coal-power plants without any prospect of capturing carbon emissions. Both plants are multi-billion dollar projects that Duke plans to operate for many decades.

While touting new nuclear power as the only “carbon free” option that’s viable in the South, Rogers also plans to keep using his profitable coal fleet indefinitely.

The Duke CEO boasts of being a leader in renewable energy:⁴⁷ “...we’ve invested \$1.7 billion to build 1,000 MW of wind...”⁴⁸ And in fact, it’s true. But he is doing so only in states with competitive electricity markets. In the monopolized Carolinas, Duke Energy and Progress Energy are both disregarding abundant solar, wind and cogeneration resources while actively impeding their advances — even though they are all cheaper than new nuclear, or will be long before new nuclear plants could come on line.

Year after year, wind and solar prices fall, while new nuclear prices continue to increase.

Rogers is also aggressively seeking to expand electricity sales outside Duke’s territory in a scheme that would force current customers to subsidize new ones; Duke is appealing the N.C. Utilities Commission’s denial of that expansion plan.⁴⁹ Rogers’ contradictions also came to light during a March hearing before the N.C. Utilities Commission, where Duke sought approval to spend \$267 million more in planning costs for its Lee Nuclear Station. Vice president Janice Hager admitted under cross-examination that the company intends to boost traditional generation capacity by one-third by 2030, while avoiding North Carolina’s leading off-shore wind capacity⁵⁰ and restricting solar development to two-tenths of one percent of overall 2020 generation levels — the minimum required in the 2007 REPS legislation. As explained in a little-noticed loophole, that percentage would fall in subsequent years if overall generation grows.⁵¹

“We do not have any additional [solar generation by 2030] reflected in our IRP based on its cost,” she replied under cross examination, ignoring the fact that solar is already competitive with new nuclear power and is likely to continue dropping in price.

In July 2011 Duke Energy filed for its second general rate increase since the beginning of 2010, which would bring total residential rate increases since 2009 to 25% before the company even begins recovering nuclear costs or completes the Cliffside coal plant. The impact of demand destruction, more formally known as demand elasticity, was demonstrated in Duke’s previous rate case in 2009, where the utility’s own (quietly filed) documents projected that the rate increase being sought would cause projected demand growth to level off and then begin falling (see Figure 3).⁵²

A riveting Associated Press report reveals that even the power industry concedes that Americans are beginning to save electricity over the long term. “Over the next 10 years,

[residential] demand is expected to decline by about 0.5 percent a year, according to the Electric Power Research Institute, a nonprofit group funded by the utility industry.”⁵³

Numerous other factors are likely to maintain downward pressure on electricity demand, thus eliminating the need to gamble on nuclear projects:

- the long-running restructuring to a smaller U.S. economy, a process well under way
- the development of smart grids and electric cars, which will reduce the need for new plants by balancing baseload demand between night and day
- a new federal light bulb rule, which alone is expected to eliminate the need for 30 large power plants nationwide⁵⁴

- continuing growth of investments in residential-scale solar and wind power — with little or no up-front costs to customers⁵⁵
- increasing public awareness about the direct link between climate change and energy usage

Charging captive customers for new plants; selling power to other regions

Federal documents show that at least some of the Southeast Five plan to grossly overbuild generation capacity so they can expand sales, including in regions with higher rates, while forcing their current customers to bear the financial and safety risks of new nuclear reactors and waste storage pools.

In its 2006 summary report, the North American Electric Reliability Corporation (NERC), using data from a consortium of

“The ‘fix’ that utilities and the nuclear industry have proposed for the negative impact on utility cash flow and its attendant effect on credit ratings is to implement substantial advanced charges to rate-payers during construction of the plant.”

—Former Iowa Utility Commission official Craig Severance⁵⁶

southeastern utilities, concluded that “...if all of the proposed capacity [in the Southeast sub-region] is built, installed generation could exceed forecast peak demand by more than 63,000 MW in 2015 [roughly equal to an excess of 50 to 60 nuclear or large coal plants]. This is significantly more than the generation capability needed for reliability/adequacy in the region.”

As shown in that report, utilities in the Southeast were poised to sell power across the country, but over the following several years, most of the expected coal and nuclear expansions were canceled or significantly delayed.⁵⁷

However, there still remains a large amount of excess capacity in the region. In its 2011 Summer Reliability Assessment, NERC shows reserve margins (generation capacity above expected peak demand) in the Southeast between 20–47%, much higher than the 17% recommended for the reliability level needed when one of a utility’s large baseload units is not operating. Having unneeded and expensive generating units remain idle is simply wasteful to customers but lucrative to power companies that base their kilowatt-hour prices on the amount they have invested in generation and transmission assets.⁵⁸

Although the overbuilding of generation assets is prohibited by state statutes, Duke Energy Carolinas already maintains a large oversupply of baseload, or so-called ‘round the clock power. For much of each year, usually the spring and fall, several of Duke’s largest coal units are either shut down or “spinning” — a standby condition where



Photo courtesy of SCANA

Moody’s downgraded SCE&G’s credit rating in September because of likely cost overruns, “rate fatigue” and/or abandonment of the V.C. Summer nuclear project, which the analysts noted could harm South Carolina’s economy. The NRC has allowed SCE&G to begin “limited” construction – including welding the containment dome – on the two new AP1000 nuclear units even while the design is still changing and before a license is issued.

Heat Waves & No Relief

One irony of the energy-climate debate is the opinion, often voiced during the summer, that as global warming advances, large baseload power plants will be essential for indoor air conditioning. In fact, the Achilles' heel of the nuclear revival is increasing droughts and heat waves since the 1990s, which are repeatedly challenging freshwater supplies for cities — and power plants — across the South.

The big utilities have already begun experiencing heat-related outages at coal and nuclear units in the region⁶¹ although not yet at the scale suffered in France during the 2003 heat wave, which shut down multiple nuclear plants and killed 35,000 people.⁶²

Further reliance on large, centralized power plants that each use more water than most southern cities means operating such plants would increasingly clash with vital public needs.

Indeed the Southeast is leading a U.S. revival — one that abandons a chance to restore our economy through the transition to clean energy.

coal is burning and emissions are going out the smokestack but no power is generated. According to Duke's own projections, even in 2025 the company's 2011 baseload fleet would provide excess load for more than 50% of the hours in a year.⁵⁹

Meanwhile, in recent years Duke has made deals to sell thousands of megawatts of power outside its service area, and it continues to aggressively recruit large outside customers including entire cities such as Jacksonville, Florida.⁶⁰

After the N.C. Utilities Commission ruled against one such deal involving Orangeburg, SC, Duke and the city appealed the decision to federal regulators. But later, the N.C. Commission approved a much larger outside sales deal to a group of South Carolina electric cooperatives.

Duke is also aggressively recruiting electricity-intensive data centers to relocate within its service area using the lure of presently low rates, even though rates will soar under Duke's business plan, as noted above.

“Ready to go” generation, 16 years and running

Even if they were replacing coal, only two nuclear projects have any chance of being licensed and completed in fewer than 16 years, start to finish.

Instead of additional second-tier projects being currently developed, most projects announced earlier have been sidelined, including Progress Energy's Shearon Harris 2 & 3 in North Carolina, after millions of ratepayer dollars were invested.

The Westinghouse-Toshiba AP1000, the plant sought by all Southeast Five power companies, was declared a “certified design” by the U.S. Nuclear Regulatory Commission (NRC) in late 2005. But after 19 serial versions of the 8,000-page Design Control Document, internal and outside experts continue finding major design problems. Thus six years later, and despite prodigious pressure from the industry, the NRC still has not certified that any of the Southeast reactors can be licensed for construction and operation.

In addition to those long-running design challenges, officials from the NRC and utilities have publicly affirmed that the March 2011 nuclear disaster at Fukushima will require substantial engineering and regulatory changes at operating U.S. nuclear plants. The AP1000 is based on most of the same technical and regulatory principles as the operating plants. However, NRC staff handling the AP1000 certification say that so far, they have no orders to incorporate lessons learned from Fukushima, even though the NRC's 90-day report by an “A-Team” of experts recommended a considerable number of safety changes based on the

longstanding need to evaluate the impacts of accidents that are considered “beyond the design basis.”⁶³

The industry is quite openly demanding that the NRC ignore all the experts’ concerns, that the agency cannot order changes until Fukushima is studied for years to come, and that the NRC must sign off on the AP1000 design certification. This would allow advanced construction to begin first at Georgia Power’s Vogtle project, then at SCE&G’s V.C. Summer plant.

Consequently, the NRC apparently plans to allow Georgia Power and its lead contractor, the Shaw Group, to attempt major design changes, based on the Task Force warnings, after construction begins. This is the same process that led to the delays and cost overruns that caused more than 90 U.S. nuclear projects to fail in midstream during the 1970s and ’80s.

“Companies that build new nuclear plants will see marked increases in their business and operating risks because of the size and complexity of these projects, the extended time they take to build, and their uncertain final cost and cost recoveries.”

—*Nuclear Engineering International*, August 22, 2008⁶⁴

Serious construction problems are already emerging. In June a Georgia Public Service Commission engineer warned of delays and cost increases at the Vogtle project caused by extensive production and quality assurance problems at the Shaw Group’s facility where AP1000 components are being fabricated. By that time, Shaw and subcontractors had already suffered three stop-work orders, and the NRC had aborted a planned three-day inspection due to the wide-ranging problems.⁶⁵

NRC faces certain lawsuits if it certifies the AP1000 without openly resolving the host of design and operational challenges needed to meet safety regulations including the National Environmental Policy Act.

Westinghouse insists that lessons learned during construction at Vogtle and Summer will allow subsequent construction projects to be completed on shorter timelines. The fact that this same company announced, with much acclaim, that the AP1000 was “pre-certified” and ready for licensing in 2005 engenders skepticism about construction bravado. Appendix 2 shows the most recent projected opening dates for nuclear projects by the Southeast Five that remain viable.

Even if they were replacing coal, at such a pace, new nuclear plants would be too little, too late to help slow climate change.



Photo courtesy of Associated Press

The Fort Calhoun nuclear plant in Nebraska and the overflowing Missouri River. In July the NRC’s Fukushima Task Force warned that the agency must finally begin considering natural and man-made accidents that exceed those that U.S. plants were designed to survive.

Nuclear gamble could fail catastrophically

A continued pursuit of new U.S. nuclear plants instead of a genuine carbon reduction strategy could lead to amplified greenhouse gas emissions, as failing nuclear projects lead to increased reliance on carbon-based fuels (if clean-energy projects continue to be stifled).

A coal and nuclear path could cause supply shortages during droughts and heat waves — since both rely on vast supplies of cooling water.

As a factor in slowing the U.S. revival, cost uncertainty on its own has so far been the major issue in competitive states. However, the southeastern nuclear utilities actually profit from construction cost overruns as long as they maintain control over legislatures and utility commissions who will pass the cost of mistakes along to captive customer bases through CWIP. Similarly, numerous engineering and construction contractors boost their profits on “change orders” that cause delays and ballooning costs.

It is hard to imagine that Duke Energy can win state approval for its Lee Nuclear Station project if the N.C. Utilities Commission upholds the long held “least cost” standard. In August the N.C. Commission limited Duke Energy’s request for funds for developing the Lee Nuclear Station to a maintenance

level cap of \$120 million for an undefined period. CEO Rogers had insisted he could proceed with the project only if he gained “tracking CWIP” (Super-CWIP) so the Commission slashed his request.

The U.S. nuclear revival has been slowed largely due to the multi-faceted questions about who pays if projects fail outright during construction; with billions in expenses accumulating from the outset and much of the cost being front-loaded, just the financing of a construction loan becomes a major risk factor. Hence, utility officials have insisted they must have federal taxpayer loans and/or state ratepayer prepayment in order to limit the risks of collapse.

That fear is well-founded.

Poor decisions by power companies and rate commissions caused over 90 nuclear projects to fail in the U.S. in the 1970s and 80s — which Forbes Magazine labeled “the worst managerial disaster in business history.”⁶⁶

Now, uncertainties with designs, manufacturing, climate factors, world security, a fast-shifting energy market, and economic restructuring all pose additional risks of project collapse.⁶⁷ Construction complexities are more than hypothetical. The highly-lauded French nuclear industry is mired in two construction projects that are years behind schedule and billions over budget.⁶⁸

What About China?

In some developing countries, overall carbon emissions are likely to continue rising for a while as they build their economies; per capita greenhouse emissions remain many times lower than those in the U.S.

After more than 100 years of high carbon emissions, the United States must do its part to bring down global emissions regardless of what others accomplish. As for China’s oft-cited appetite for coal and nuclear power: China is a controlled economy not dependent upon a reasonable return on nuclear power investments. It is also leading the world in developing renewable energy.

Because it is also suffering increased impacts of climate change, we must hope that China will hasten the replacement of coal with renewables; indeed, there are signs that this is underway. Because the U.S. has been such a big carbon polluter for so many decades, every region of the nation must contribute to solutions.

At Duke Energy's coal-gasification construction project in Edwardsport, Indiana, the utility is haunted by a billion-dollar-plus cost overrun and dispute with lead contractor Bechtel that has been more than "a huge and embarrassing problem," according to the *Indianapolis Star*. A persistent corruption scandal and federal investigation involving top state regulators and Duke officials, including CEO Rogers, are raising doubts about the plant's completion.⁶⁹

Inevitable changes in designs and regulations due to the Fukushima tragedy will drive up complexities and costs, and very possibly terminate construction of the AP1000. The same now appears to apply to an emerging story about U.S. plants being inadequately protected from earthquakes. By the time design changes required due to those related problems are clear, the Southeast Five might have wasted even more years and tens of billions of public dollars in a direction that protects neither our climate nor our economies.

As noted above, many U.S. utilities — those in competitive markets — have already determined that they would rather sit back and observe others attempt to revive nuclear power.

No time to waste on nuclear pretense

Chaotic weather extremes and a host of other climate-related tragedies are now providing a constant refutation against the corporate-funded confusionists still working to thwart action on what Dr. R.K. Pachauri, head of the Intergovernmental Panel on Climate Change, calls "an existential threat to civilization."⁷⁰

The United States must begin closing coal-fired power plants and stop wasting precious time and resources on the pretense that new nuclear power will somehow avert climate and economic chaos.

For people following the science and world events, climate change is moving from emergency toward desperation — very close to becoming self-sustaining. As noted above, even if we quickly begin reducing annual greenhouse gas emissions, humanity likely faces several decades of worsening conditions due to past carbon pollution. Such a multi-faceted challenge could well surpass our societal and economic capacity to survive in a progressively chaotic world. And while climate disasters disproportionately impact the poor, an injustice imposed on those producing the least carbon emissions, no one will have guaranteed refuge.⁷¹

Although the U.S. news media continues to downplay the connection between chaotic weather and global warming, increasing numbers of scientists are speaking out.

"Scientists used to say, cautiously, that extreme events were 'consistent' with the predictions. Now we can make the statement that particular events would not have happened the same way without global warming."

—Kevin Trenberth, head of climate analysis, National Center for Atmospheric Research⁷²

Amplifying the challenge is the fact that unexpectedly extreme climate changes could become even more abrupt.⁷³

In August, the World Bank reported that global food stocks are "alarmingly low" as prices continue to rise and amplify conflicts; serial droughts are worsening the problem. Species migration to cooler latitudes and altitudes is happening much faster than was measured less than a decade ago, a problem "already affect[ing] the entire planet's wildlife," according to a prominent researcher.⁷⁴

Repeated climate disasters are already hammering the insurance industry and U.S. federal emergency coffers with multi-billion dollar bills. State and local economies are being hit by tornadoes, floods and wildfires, while droughts are moving farmland toward becoming deserts. The 2010 drought has cost Texas over \$5 billion already, with no end in sight.⁷⁵

Ironically the U.S. Southeast, a region being tormented by such haywire weather, is amplifying the accelerating crisis instead of mitigating it. The continued pursuit of new nuclear power plants in this region could ensure that the world moves past the “point of no return,” where climate change becomes self-sustaining — beyond any hope for human intervention.

The Southeast Five have already wasted six precious years attempting a nuclear revival that seems destined to fail and, moreover, is not even planned to help stabilize our climate by replacing coal. During that time the scientific case for climate action has become obvious.

It remains tragic that southeastern power companies have made no more than a feint toward helping people save energy — the fastest, cheapest way to close coal plants — while pursuing massive nuclear projects.

If the Southeast would stop hampering climate protection efforts — and instead use our abundant resources and human capital to help — we could well provide a positive “tipping point” in the global campaign to stabilize the climate. Jim Rogers and other utility executives could turn their enormous resources toward replacing coal with a clean energy economy. Doing so would boost the burgeoning public campaign to

“... without broad and cooperative action, irreversible tipping points could occur with perhaps sudden and abrupt shocks to communities and countries.”

– United Nations official Achim Steiner, 20 July 2011⁷⁶

slow global warming, adapt for changes already in the pipeline, and help the millions of people already being devastated by climate changes.

Technologically and economically the Southeast is ready to make such a shift. The main barriers are twentieth-century business models and the massive influence the Southeast Five wield over various levels of government.

There are reasons to hope for a course correction. The continuing nuclear design problems and risks of project collapse are just as real as the advances in distributed solar, wind and efficiency-conservation. Hopefully, some among the Southeast Five CEOs are business-savvy enough to realize that by turning away from new nuclear power they can avoid bankruptcy and become champions of a clean energy economy.

Within the context of an ominous long-term economic outlook, we must hope that wiser corporate heads will avoid pitting themselves against a public that will revolt against continuing nuclear rate hikes and demand genuine action to help slow climate disruption.

Here in the Southeast we are living with the nuclear paradox: We could close all the coal plants if we *stop trying* to build nuclear power plants. We have a moral obligation to work honestly and cooperatively on this enormous challenge.

Notes

1. Oxfam International. "Climate Alarm." 25 November 2007. 18 February 2008. <http://www.oxfam.org/sites/www.oxfam.org/files/climate%20alarm.pdf>. "The number of annual climate disasters quadrupled between 1987 and 2007, and 325 million people are being seriously affected each year by climate change."

Annan, Kofi. "Human Impact Report: Climate Change, The Anatomy of A Silent Crisis." *The Global Humanitarian Forum*, p. 11. 12 July 2009. 16 March 2010. <http://www.ghf-ge.org/human-impact-report.pdf>. "Application of this proportion projects that more than 300,000 die due to climate change every year—roughly equivalent to having an Indian Ocean tsunami annually... Over 90 percent of the death toll relates to gradual onset of climate change which means deterioration in environmental quality, such as reduction in arable land, desertification and sea level rise, associated with climate change. As for the number of seriously affected, the basis for the estimations of deaths is negative health outcomes."

2. Hansen, James E. "Is There Still Time to Avoid 'Dangerous Anthropogenic Interference' with Global Climate?" 6 December 2005. 2 August 2011. http://www.columbia.edu/~jeh1/2005/Keeling_20051206.pdf. Dr. Hansen first made reference to the 2015 tipping point in a presentation to the American Geophysical Union in 2005 ("The grim 'business-as usual' climate change is avoided in an alternative scenario in which growth of greenhouse gas emissions is slowed in the first quarter of this century, primarily via concerted improvements in energy efficiency and a parallel reduction of non-CO₂ climate forcings, and then reduced via advanced energy technologies that yield a cleaner atmosphere as well as a stable climate.... Action must be prompt, otherwise CO₂-producing infrastructure that may be built within a decade will make it impractical to keep further global warming under 1°C."). Dr. Hansen, confirmed his continued belief that failing to meet the 2015 juncture "will be disastrous" with the author in person in Chapel Hill, North Carolina in February 2010.

Hansen, James E. *PBS Frontline*. 24 April 2007. 2 August 2011. <http://www.pbs.org/wgbh/pages/frontline/hotpolitics/interviews/hansen.html>. James Hansen, Director of NASA's Goddard Institute for Space Studies, has expressed many times the importance of starting global carbon emissions downward by 2015. In an interview with PBS in 2007, Dr. Hansen states, "we have to make some choices pretty soon, because if we don't, then we are going to create a different planet. It's going to be a situation that's out of our control." Dr. Hansen's warning is in accord with calculations by the Intergovernmental Panel on Climate Change and public statements by IPCC head Dr. R.K. Pachauri.

3. Schlesinger, William H. "Global warming is real – despite e-mail hoax." *Poughkeepsie Journal*. 20 December 2009. 7 September 2011. http://www.ecostudies.org/ecofocus/Schlesinger_12_09.pdf
4. Bradford, Peter. North Carolina Utilities Commission testimony in the Matter of Duke Energy Carolinas, LLC Application for Approval of Decision to Incur Nuclear Generation Project Development Costs. Docket E-7 Sub 819 Volume 1, pp. 68-71. 15 March 2011. 1 July 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=JBAAAA59011B&parm3=000125794>. "One of the primary reasons is the cost increases; EIA recently increased its estimate of the cost of new reactors by 37% just during 2010" stated Mr. Bradford. "The companies across the country that were thought to be well on their way to building new nuclear reactors in 2008 are reevaluating that commitment in the face of declining demand, rising cost estimate, reduced cost estimates for alternatives, the absence of a federal policy requiring reduced green house gas emissions and the absence of additional federal subsidies for new reactors, especially loan guarantees."
5. Rogers, Jim. North Carolina Utilities Commission testimony in the Matter of Duke Energy Carolinas, LLC Application for Approval of Decision to Incur Nuclear Generation Project Development Costs. Docket E-7 Sub 819 Volume 1, pp. 162. 15 March 2011. 1 July 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=JBAAAA59011B&parm3=000125794>.
6. The utilities falsely claim customers will save money due to CWIP legislation that requires customers to begin paying for new nuclear plants years before they are completed; they claim this will reduce the price of the new plant. But that is because rate hikes occurring years before plant completion would not be counted as part of the price tag. Economists such as the late Dr. John Blackburn emphasize that all early investments through rate hikes must be considered part of the total price tag.
7. Downey, John. "Duke Energy sees lower residential use—is it a trend?" *The Triangle Business Journal*. 3 May 2011. 10 May 2011. http://www.bizjournals.com/triangle/news/2011/05/03/duke-energy-sees-lower-residential-use.html?ed=2011-05-03&s=article_du&ana=e_du_pap. "In 2009, U.S. demand for power nationwide dropped from the year before for the first time since the end of World War II. And Progress Energy CEO Bill Johnson pointed out in an interview with the Associated Press last week that it did not recover in 2010. Overall demand nationwide was down 4 percent for the year from 2009."
8. Makhijani, Arjun. "Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy." *The Institute for Energy and Environmental Research*, p.191. 5 November 2010. 8 July 2011. <http://www.ieer.org/carbonfree/CarbonFreeNuclear-Free.pdf>. "If nuclear power is used as a principal element of future electricity generation worldwide, a very large number of reactors would have to be built in the coming decades. [IEER] has estimated that for nuclear power to contribute about 20 percent of the global electricity supply by mid-century, about 1,000 reactors of 1,000 megawatts each would

have to be built. For nuclear power to play a role comparable to coal today—about half of total generation—2,500 reactors would have to be built in the same time. This is a rate of one reactor every six days.”

Union of Concerned Scientists. “Nuclear Power and Global Warming.” March 2007. 29 July 2011. http://www.ucsusa.org/assets/documents/nuclear_power/npp.pdf

Lovins, Amory & Imran Sheikh & Alex Markevich. “Forget Nuclear.” Rocky Mountain Institute. May 2008. 5 May 2008. http://www.rmi.org/rmi/Library/E08-04_ForgetNuclear.

Massachusetts Institute of Technology. “The Future of Nuclear Power.” 2003. 29 July 2011. <http://web.mit.edu/nuclearpower/pdf/nuclearpower-summary.pdf>

Ferguson, Charles D. “Nuclear Energy: Balancing Benefits and Risks.” Council on Foreign Relations. April 2007. 29 July 2011. <http://www.cfr.org/united-states/nuclear-energy/p13104>.

9. The nuclear capacity depicted for Georgia Power and SCE&G in this figure includes only the portion of nuclear projects to be owned by the utility.

Data adapted from Southeast utility company long term planning documents: “The Duke Energy Carolinas Integrated Resource Plan (Annual Report),” Duke Energy Carolinas, Inc, 1 September 2010; “2011 Integrated Resource Plan,” South Carolina Electric and Gas Company, April 2011; “Georgia Power Company 2010 Integrated Resource Plan,” Georgia Power Company, January 2010; “Ten Year Power Plant Site Plan,” Florida Power and Light Company, April 2011; “Progress Energy Florida, Inc. Ten Year Site Plan,” Progress Energy Florida, Inc, April 2011; “Progress Energy Carolinas Integrated Resource Plan,” Progress Energy Carolinas, Inc., 13 September 2010.

Additional resources include: North Carolina Utilities Commission testimony in the Matter of Duke Energy Carolinas, LLC Application for Approval of Decision to Incur Nuclear Generation Project Development Costs. Docket E-7 Sub 819 Volume 1, pp. 68. 15 March 2011. 1 July 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=JBAAAA59011B&parm3=000125794>; Florida Power and Light Company. “Project Overview - Clean and Safe Nuclear Power at Turkey Point.” 10 June 2011. <http://www.fpl.com/environment/nuclear/tp.shtml>; Progress Energy, Inc. “Nuclear Construction.” 10 June 2011. <https://www.progress-energy.com/company/electricity-system/power-plants/nuclear-construction.page>.

10. Wald, Matthew L. & John M. Broder. “Utility shelves ambitious plan to limit carbon.” *The New York Times*. 13 July 2011. 27 July 2011. <http://www.nytimes.com/2011/07/14/business/energy-environment/utility-shelves-plan-to-capture-carbon-dioxide.html>. “A major American utility is shelving the nation’s most prominent effort to capture carbon dioxide from an existing coal-burning power plant, dealing a severe blow to efforts to rein in emissions responsible for global warming.”

11. Downey, John. “Regulators defend Duke contract decision.” *The Charlotte Business Journal*. 17 July 2009. 19 July 2009. http://charlotte.bizjournals.com/charlotte/blog/power_city/2009/07/regulators_defend_duke_contract_decision.html. “If Orangeburg wins the appeal [to the Federal Energy Regulatory Commission], Duke will be free to compete more aggressively for wholesale customers — something the utility has announced it wants to do.” Duke is still appealing an adverse ruling by the NCUC that would limit its ability to contract with outside customers at rates preferable to those charged to present customers within the service area.
12. Penn, Ivan. ‘Progress Energy’s plan for oft-delayed Levy County nuclear plant under fire.’ *St. Petersburg Times*. 14 August 2011. 17 August 2011. <http://www.tampabay.com/news/business/energy/progress-energys-plan-for-oft-delayed-levy-county-nuclear-plant-under-fire/1185702>.
13. Duke Energy Carolinas Summary of Monthly Fuel Report. North Carolina Utilities Commission Docket E-7 Sub 981 Schedule 10 pp. 1-6. 13 July 2011. 23 August 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=VAAAAA10211B&parm3=000134991>. Calculation: (total net generation from coal plants to be retired) / (total net generation from all coal plants) * 100 = percentage of electricity from coal generated June 2010 — May 2011 by plants Duke will retire.
14. Murawski, John. “Progress Energy phases in natural gas.” *The News and Observer*. 3 August 2011. 3 August 2011. <http://www.newsobserver.com/2011/08/03/1386815/progress-phases-in-natural-gas.html>
15. Downey, John. “CEOs: Coal plants important to Duke Energy’s future.” *The Charlotte Business Journal*. 8 July 2011. 14 July 2011. http://www.bizjournals.com/charlotte/blog/power_city/2011/07/CEOs-coal-plants-important-to-duke-energy.html?ed=2011-07-11&s=article_du&ana=e_du_pub&page=all
16. On July 1, 2011 Duke Energy filed a request for an overall rate hike of 15% for approximately \$4.8 billion in capital costs — not yet including millions being expended on the Lee Nuclear project. Although other factors make the correlation less than entirely linear, a similar rate hike, based on capital investments, for two units at the Lee Station totaling \$20 billion would bring Duke’s rates to at least 80% above 2009 levels. Additional capital projects underway or planned would likely push rate hikes from 2009 to more than 100%.
17. Howarth, Robert & Renee Santoro & Anthony Ingraffea. “Methane and the greenhouse-gas footprint of natural gas from shale formations.” Cornell University. 13 March 2011. 5 August 2011. <http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf>.
18. Blackburn, John & Sam Cunningham. “Solar and Nuclear Costs — The Historic Crossover.” NC WARN, p. 8. July 2010. http://www.ncwarn.org/wp-content/uploads/2010/07/NCW-SolarReport_final1.pdf. “Studies which showed expected electricity costs of 7 cents per kilowatt-hour have been updated to show nuclear electricity costs exceeding 18 cents per kilowatt-hour. Transmission and distribution costs would raise the delivered costs to residential customers to 22 cents

per kilowatt-hour. This is twice the price North Carolina residential customers now pay to the big utilities.”

19. Data adapted from Southeast utility company long term planning documents: “The Duke Energy Carolinas Integrated Resource Plan (Annual Report).” Duke Energy Carolinas, Inc. 1 September 2010; “2011 Integrated Resource Plan.” South Carolina Electric and Gas Company. April 2011; “Georgia Power Company 2010 Integrated Resource Plan.” Georgia Power Company. January 2010; “Ten Year Power Plant Site Plan.” Florida Power and Light Company. April 2011; “Progress Energy Florida, Inc. Ten Year Site Plan.” Progress Energy Florida, Inc. April 2011; “Progress Energy Carolinas Integrated Resource Plan.” Progress Energy Carolinas, Inc. 13 September 2010

Additional resources include: North Carolina Utilities Commission testimony in the Matter of Duke Energy Carolinas, LLC Application for Approval of Decision to Incur Nuclear Generation Project Development Costs. Docket E-7 Sub 819 Volume 1, pp. 68. 15 March 2011. 1 July 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=JBAAAA59011B&parm3=000125794>

20. The Intergovernmental Panel on Climate Change (IPCC). “Special Report Renewable Energy Sources.” 9 May 2011. 29 June 2011. http://www.unep.org/pdf/SRREN_FD_SPM_approved_plenary_v_03_final.pdf.
21. A searchable database on each state’s policies and incentives promoting renewable technology and energy efficiency is maintained by North Carolina State University. North Carolina State University. “Database of State Incentives for Renewables & Efficiency.” <http://www.dsireusa.org/>
22. “Cutting Florida’s electric bills.” *The Tampa Tribune*. 1 August 2011. 4 August 2011. <http://www2.tbo.com/news/opinion/2011/aug/01/meopino1-cutting-floridas-electric-bills-ar-247360/>.
23. The Public Utilities Commission of Ohio. Annual Energy Efficiency Status Report of Duke Energy Ohio, Inc. Case No. 11-1311-EL- EEO. 15 March 2011. 15 August 2011. <http://dis.puc.state.oh.us/DocumentRecord.aspx?DocID=354a1b85-e27d-406b-9c02-109ef2750347>.
24. Progress Energy Carolinas, Inc.; Carolina Power and Light Company, DBA. Proposed Distribution System Demand Response Program. North Carolina Utilities Commission Docket E-2 Sub 926. 29 April 2008. 20 August 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/fldrdocs.ndm/INPUT?compdesc=PROGRESS%20ENERGY%20CAROLINAS%2C%20INC.%3B%20CAROLINA%20POWER%20%26%20LIGHT%20COMPANY%2C%20DBA&numret=001&comptype=E&docknumb=2&suffix1=&subNumb=926&suffix2=&parm1=000128708>.

Progress Energy Carolinas Inc.; Carolina Power and Light Company, DBA. Application for Approval of DSM and Energy Efficiency Cost Recovery Rider. North Carolina Utilities Commission Docket E-2 Sub 931. 6 May 2008. 20 August 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/fldrdocs.ndm/INPUT?compdesc=PROGRESS%20ENERGY%20>

[CAROLINAS%2C%20INC.%3B%20CAROLINA%20POWER%20%26%20LIGHT%20COMPANY%2C%20DBA&numret=001&comptype=E&docknumb=2&suffix1=&subNumb=931&suffix2=&parm1=000128827](http://ncuc.commerce.state.nc.us/cgi-bin/fldrdocs.ndm/INPUT?compdesc=PROGRESS%20ENERGY%20CAROLINAS%2C%20INC.%3B%20CAROLINA%20POWER%20%26%20LIGHT%20COMPANY%2C%20DBA&numret=001&comptype=E&docknumb=2&suffix1=&subNumb=931&suffix2=&parm1=000128827)

25. American Council for an Energy-Efficient Economy. “State Energy Efficiency Resource Standard (EERS) Activity.” June 2011. 21 June 2011. http://aceee.org/files/pdf/fact-sheet/State%20EERS%20Summary%20June%202011_2.pdf.
26. After watching the NC SAVE\$ Energy bill gain momentum and several key legislative sponsors, in June 2009 Duke and Progress flexed their legislative muscle by using 18 lobbyists to kill the bill in one day, according to several legislators; NC WARN is a founding member of the NC SAVE\$ alliance.
27. Clayton, Mark. “Germany To Phase Out Nuclear Power; U.S. Could Do Same.” *Christian Science Monitor*. 8 June 2011. 9 June 2011. <http://www.commondreams.org/headline/2011/06/08>
28. Rogers, Jim. Docket E-7 Sub 819 Volume 1, pp. 175-6.
29. Murawski, John. “Wind energy gains in N.C.” *The News and Observer*. 27 April 2011. 29 June 2011. <http://www.newsobserver.com/2011/04/27/1156244/wind-energy-gains-in-nc.html#ixzz1LyYARpxr>.
30. Downey, John. “Duke Energy’s wind contract in Texas totals \$820 million.” *Charlotte Business Journal*. 26 August 2011. 31 August 2011. <http://www.bizjournals.com/charlotte/print-edition/2011/08/26/dukes-wind-contract-in-texas-totals.html>.
31. Musial, Walter & Bonnie Ram. “Large-Scale Offshore Wind Power in the United States.” Department of Energy National Renewable Energy Laboratory. September 2010. 29 June 2011. <http://www.nrel.gov/docs/fy10osti/40745.pdf>.
32. Tursi, Frank. “Rush to Tap Wind is Just Beginning Off N.C. Coast.” *State of the Coast Report*. North Carolina Coastal Federation, p. 4. 2011. 29 June 2011. <http://www.nccoast.org/Newsroom/images-pdfs/socreports/2011SOC.pdf>.
33. The North Carolina Coastal Federation. “2011 State of the Coast Report.” June 2011. 29 June 2011. <http://www.nc-coast.org/Newsroom/images-pdfs/socreports/2011SOC.pdf>.
34. Downey, John & Susan Stabley. “Duke Energy’s solar effort clouding growth?” *The Charlotte Business Journal*. 28 May 2010, p. 1.
35. Henderson, Bruce. “Critics see Duke Energy as block to solar growth.” *The News and Observer*. 22 June 2011. 23 June 2011. <http://www.newsobserver.com/2011/06/22/1291777/critics-see-duke-energy-as-block.html#ixzz1Q21MIRfJ>.
36. Public Service Commission State of Georgia. Direct Testimony of Lee J. Peterson and James B. Marlow Re: Georgia Power Company’s Application for Approval of its 2010 Integrated Resource Plan. Docket No. 31081. 7 May 2010. 18 August 2011. <http://www.psc.state.ga.us/facts/docftp.asp?txtdocname=129142>
37. Blackburn, John. “Matching Utility Loads with Solar and Wind Power in North Carolina Dealing with Intermittent Electricity Sources.” Institute for Energy and Environmental Research. March 2010. 18 July 2011. <http://www.ieer.org/reports/NC-Wind-Solar.pdf>
38. *ibid*.

39. Clayton, Mark. "Germany To Phase Out Nuclear Power; U.S. Could Do Same."
40. Blackburn, John & Sam Cunningham. "Solar and Nuclear Costs—The Historic Crossover." "Studies which showed expected electricity costs of 7 cents per kilowatt-hour have been updated to show nuclear electricity costs exceeding 18 cents per kilowatt-hour. Transmission and distribution costs would raise the delivered costs to residential customers to 22 cents per kilowatt-hour. This is twice the price North Carolina residential customers now pay to the big utilities."
41. Lovins, Amory & Imran Sheikh & Alex Markevich. "Forget Nuclear."
42. NC WARN. "Utility Forecasts Contradict Pervasive PR: Arguments for new nuclear, coal plants ignore years of flat growth, rising rates, and a restructured economic future." 9 December 2010. 12 August 2011. <http://www.ncwarn.org/2010/12/nc-warn-challenges-duke-progress-pr-growth-claims/>
43. Henderson, Bruce. "Duke Energy files for hefty 15% rate increase." *The Charlotte Observer*. 2 July 2011. 13 July 2011. <http://www.newsobserver.com/2011/07/02/1315713/duke-energy-pay-15-more.html>
44. Henderson, Bruce. "Duke Energy revenues rise 7%." *The News & Observer*. 3 August 2011. 4B+. "Duke doesn't expect sales to rebound to pre-recession strength until 2015, [CEO Jim Rogers] said."
45. NC WARN. "Duke Ordered to Track Energy-wasting Programs; Utilities Commission sides with NC WARN, allies." 15 July 2010. <http://www.ncwarn.org/wp-content/uploads/2011/08/NR-7-15-10-DIPS-order-vs-Duke.doc>
46. Duke Energy. Application of Duke Energy Carolinas, LLC for Adjustment of Rates and Charges Applicable to Electric Service in North Carolina. Docket E-7 Sub 909, p. 195. 2 June 2009. 22 September 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=EAAAAA45190B&parm3=000130688>
47. Duke Energy, Inc. "Renewable Energy." August 2011. <http://www.duke-energy.com/environment/renewable-energy.asp>
48. Rogers, Jim. Docket E-7 Sub 819 Volume 1, pp. 175-6
49. Downey, John. "Regulators defend Duke contract decision." "The [N.C.] commission has said it needs to have that authority over Duke's rates to make sure the utility's retail customers don't pay extra to subsidize the wholesale contracts."
50. Musial, Walter & Bonnie Ram. "Large-Scale Offshore Wind Power in the United States."
51. General Assembly of North Carolina. Senate Bill 3. Session Law 2007-397, p. 3. www.ncleg.net/Sessions/2007/Bills/Senate/PDF/S3v6.pdf. In a little-noticed loophole in that bill, after 2021 the percentage requirement for renewables and efficiency would gradually decrease in succeeding years based on the utilities' plans.
52. Duke Energy. Application of Duke Energy Carolinas, LLC for Adjustment of Rates and Charges Applicable to Electric Service in North Carolina. Docket E-7 Sub 909, p. 195. 2 June 2009. 22 September 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=EAAAAA45190B&parm3=000130688>
53. Fahey, Jonathan., "Shocker: Power demand from U.S. homes is falling." The Associated Press. 7 September 2011. 16 September 2011. <http://news.yahoo.com/shocker-power-demand-us-homes-falling-170634147.html>
54. Natural Resources Defense Council. "The New Efficient Light Bulbs." 7 March 2011. 28 July 2011. <http://www.nrdc.org/energy/lightbulbs/>
55. Rauber, Paul. "Solar's Moment in the Sun." Sierra. September/October 2011. 30 August 2011. <http://www.sierraclub.org/sierra/201109/solar.aspx>
56. Severance, Craig A. "Business Risks and Costs of New Nuclear Power." 29 December 2008. 2 January 2009. <http://www.nirs.org/neconomics/nuclearcosts2009.pdf>
57. North American Electric Reliability Corporation. "2006 Long-Term Reliability Assessment." p. 93. October 2006. 20 July 2011. <http://www.nerc.com/files/LTRA2006.pdf>
58. North American Electric Reliability Corporation. "2011 Summer Reliability Assessment." Although the NERC measurements do not directly correlate with the five utilities that are the subject of this report the numbers demonstrate that a large regional overcapacity exists. Note also that in a related utility entity (regional reliability council), SERC, in July 2010 projected a 27.5% reserve margin in Southeast and overcapacity for the foreseeable future.

SERC Reliability Corporation. "Information Summary July 2010." p. 7-8. 20 July 2011. www.serc1.org/Documents/SERC/SERC%20Publications/Information%20Summary/2010%20Information%20Summary%20Brochure%20%28July%202010%29.pdf
59. NC WARN. "Large Power Plants Sit Idle in North Carolina While Duke Wants to Raise Rates to Build New Ones." 16 February 2011. <http://www.ncwarn.org/2011/02/large-power-plants-sit-idle-in-north-carolina-while-duke-wants-to-raise-rates-to-build-new-ones/>
60. Rogers, Jim. Docket E-7 Sub 819 Volume 1, p. 115
61. "Browns Ferry Unit 2 reactor shut down." Times Daily. 17 August 2011. 26 August 2011. <http://www.timesdaily.com/article/20070817/NEWS/708170327?Title=Browns-Ferry-Unit-2-reactor-shut-down>. "We've had a historic drought and extreme heat and you get warm temperatures on the river when you combine the two," TVA spokesman Terry Johnson said. He also noted that the plant's discharge permit mandates action be taken when the water temperature averages 90 degree or higher during a 24-hour period.
62. Larsen, Janet. "Record Heat Wave in Europe Takes 35,000 Lives: Far Greater Losses May Lie Ahead." Plan B Updates. Earth Policy Institute. 9 October 2003. 20 August 2011. http://www.earth-policy.org/plan_b_updates/2003/update29.
63. Meeting of the U.S. Nuclear Regulatory Commission to review submittal of AP1000 DCD Revision 19. NRC Headquarters; Rockville, MD. 30 June 2011

64. Kidd, Steve. "Escalating costs of the new build: what does it mean?" *NEI Magazine*. 22 August 2008. 8 August 2011. <http://www.neimagazine.com/story.asp?storyCode=2050690>
65. Jacobs, William R. Direct Testimony and Exhibits in the Matter of Georgia Power Company's Fourth Semi-Annual Vogtle Construction Monitoring Report. Georgia Public Service Commission Docket 29849. 9 June 2011
66. Nuclear Regulatory Commission. "Information Digest, 2010–2011." NUREG-1350, Volume 22, Appendix C: Cancelled U.S. Nuclear Power Reactors. August 2010. 20 July 2011. <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/appc.xls>
67. "2008 World Nuclear Industry Status Report." *Bulletin of Atomic Scientists*. 16 September 2008. 8 August 2011. <http://www.thebulletin.org/web-edition/reports/2008-world-nuclear-industry-status-report/2008-world-nuclear-industry-status-rep>. The September 2008 World Nuclear Industry Status Report stated that "two thirds of the under-construction units have encountered significant construction delays, pushing back officially announced start-up dates."
68. Mason, Rowena. "EDF's reputation faces risk of meltdown." *The Telegraph*. 25 July 2011. 1 August 2011. <http://www.telegraph.co.uk/finance/newsbysector/energy/8658298/EDFs-reputation-faces-risk-of-meltdown.html>
69. Russell, John. "More Duke e-mails raise questions." *The Indianapolis Star*. 8 March 2011. 10 March 2011. <http://www.indystar.com/article/20110308/BUSINESS/103080322/More-Duke-e-mails-raise-questions-about-utility-s-conduct?odyssey=tab%7Ctopnews%7Ctext%7CIndyStar.com>
70. Pascual, Carlos & Strobe Talbott. "7 Years to Climate Midnight." The Brookings Institute. 28 August 2008. 17 January 2009. http://www.brookings.edu/opinions/2008/0828_climate_talbott.aspx
71. Dyer, Gwynne. *Climate Wars: The Fight for Survival as the World Overheats*. Scribe Publications: Carlton North, Australia (2010). From this award-winning British columnist, tough but important reading for those wanting clarity about the climate challenge.

McKibben, Bill. *Eaarth: Making a Life on a Tough New Planet*. Times Books: April 2010

Parenti, Christian. *Tropic of Chaos: Climate Change and the New Geography of Violence*. Nation Books: June 2011

Orr, David. *Down to the Wire: Confronting Climate Collapse*. Oxford University Press: New York (2009)

Gilding, Paul. *The Great Disruption: Why the Climate Crisis Will Bring On the End of Shopping and the Birth of a New World*. Bloomsbury Press: New York (2011)
72. Carey, John. "Storm Warnings: Extreme Weather Is a Product of Climate Change." *Scientific American*. 28 June 2011. 30 June 2011. <http://www.scientificamerican.com/article.cfm?id=extreme-weather-caused-by-climate-change>
73. Schmid, Randolph E. "Hot Nights are Dangerous." The Associated Press. 21 July 2011. 25 July 2011. <http://www.usnews.com/science/articles/2011/07/21/hot-nights>
74. Borenstein, Seth. "Animals fleeing north from global warming." The Associated Press. 19 August 2011. 22 August 2011. <http://www.news.com.au/technology/sci-tech/meet-the-critters-running-away-from-global-warming/story-fn5fsgyc-1226118077644#ixzz1VInxpuFs>
75. The Associated Press. "Texas Ag Losses Forecast At Record \$5.2 Billion." National Public Radio. 17 August 2011. 2 September 2011. <http://www.npr.org/templates/story/story.php?storyId=139712460>

Netburn, Deborah. "Hurricane Irene is the 10th billion-dollar disaster this year." *The Los Angeles Times*. 30 August 2011. 1 September 2011. <http://latimesblogs.latimes.com/nation-now/2011/08/hurricane-irene-is-the-tenth-billion-dollar-disaster-this-year.html>
76. Steiner, Achim. UN Security Council Debate on the impact of climate change on maintaining peace and security. 20 July 2011. 1 August 2011. <http://www.unep.org/newscentre/default.aspx?DocumentID=2646&ArticleID=8817>

Appendix 1: Southeast Five Projected Coal Plant Closures

Utility & Project	Capacity	Commercial Operation Date (first unit) & Age	Unit Capacity Factor*
Duke Energy Carolinas¹			
Lee Steam Station [†] Units 1-3	370 MW Unit 1: 100 MW Unit 2: 100 MW Unit 3: 170 MW	1951 • 60 years	Unit 1: 23.37% Unit 2: 24.58% Unit 3: 32.04%
Cliffside Steam Station Units 1-4	198 MW Unit 1: 38 MW Unit 2: 38 MW Unit 3: 61 MW Unit 4: 61 MW	1940 • 71 years	Unit 1: 0.00% Unit 2: 0.00% Unit 3: 0.00% Unit 4: 0.00%
Buck Steam Station Units 3-6	369 MW Unit 3: 38 MW Unit 4: 75 MW Unit 5: 128 MW Unit 6: 128 MW	1926 • 85 years	Unit 3: 6.70% Unit 4: 7.71% Unit 5: 39.26% Unit 6: 36.90%
Dan River Steam Station Units 1-3	276 MW Unit 1: 67 MW Unit 2: 67 MW Unit 3: 142 MW	1949 • 62 years	Unit 1: 14.81% Unit 2: 15.23% Unit 3: 24.20%
Riverbend Steam Station Units 4-7	454 MW Unit 4: 94 MW Unit 5: 94 MW Unit 6: 133 MW Unit 7: 133 MW	1929 • 82 years	Unit 4: 22.91% Unit 5: 23.24 % Unit 6: 30.42% Unit 7: 31.13%
* percent of time unit is generating electricity, June 2010 – May 2011 [†] will be converted to 370 MW of natural gas generation			

Although these southeastern utilities plan to close some older coal-fired power plants, they are closing only those that are little-used and not in compliance with air quality standards. Plant closures between 2011 and 2030 for Duke Energy Carolinas, for instance, only amounts to a 3.6% reduction of electricity generated from coal. The other utilities do not make publicly available the information necessary for calculating how much coal generation they are reducing. SCE&G projects 300 MW of coal plant closures but does not specify which plants it would close. Florida Power & Light does not project any coal closures.

1. "The Duke Energy Carolinas Integrated Resource Plan (Annual Report)." Duke Energy Carolinas, Inc. 1 September 2010. 8 June 2011. http://www.energy.sc.gov/publications/2010_Duke_Energy_Carolinas_Integrated_Resource_Plan.pdf | Duke Energy, Inc. "Franchised Electric Utilities: Coal-Fired." 22 June 2011. <http://www.duke-energy.com/power-plants/coal-fired.asp> | Duke Energy Carolinas Summary of Monthly Fuel Report. North Carolina Utilities Commission Docket E-7 Sub 981 Schedule 10 pp. 1-6. 13 July 2011. 23 August 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=VAAAAA10211B&parm3=000134991>

Appendix 1 continued

Utility & Project	Capacity	Commercial Operation Date (first unit) & Age	Capacity Replaced by Natural Gas
Progress Energy Carolinas²			
Lee Plant Units 1-3	417 MW Unit 1: 80 MW Unit 2: 80 MW Unit 3: 257 MW	1951 • 60 years	950 MW
Sutton Plant Units 1-3	616 MW Unit 1: 98 MW Unit 2: 107 MW Unit 3: 411 MW	1954 • 57 years	620 MW
Weatherspoon Plant Units 1-3	177 MW Unit 1: 49 MW Unit 2: 49 MW Unit 3: 79 MW	1949 • 62 years	N/A
Cape Fear Plant Units 5-6	323 MW Unit 5: 148 MW Unit 6: 175 MW	1929 • 82 years	N/A
Progress Energy Florida³			
Crystal River Energy Complex Units 1-2	869 MW	1966 • 45 years	N/A
Georgia Power⁴			
Plant McDonough Units 1-2	517 MW	1951 • 60 years	N/A
Plant Mitchell Unit 3	155 MW	1964 • 47 years	N/A
Plant Harllee Branch Unit 1-2	569 MW	1961 • 50 years	N/A

2. "Progress Energy Carolinas Integrated Resource Plan." Progress Energy Carolinas, Inc. 13 September 2010. 8 June 2011. http://www.energy.sc.gov/publications/PEC_IRP_2010.pdf. | Progress Energy, Inc. "Steam (Coal/Oil)." 22 June 2011. <https://www.progress-energy.com/company/electricity-system/power-plants/steam.page> | Progress Energy, Inc. "Press Release: Progress Energy Carolinas to retire coal power plant ahead of schedule." 1 April 2011. 22 June 2011. <https://www.progress-energy.com/company/media-room/news-archive/press-release.page?title=Progress+Energy+Carolinas+to+retire+coal+power+plant+ahead+of+schedule&pubdate=04-01-2011> | Progress Energy, Inc. "Press Release: Progress Energy Carolinas files plan to build gas-fueled plant near Wilmington." 18 December 2009. 22 June 2011. <https://www.progress-energy.com/company/media-room/news-archive/press-release.page?title=Progress+Energy+Carolinas+files+plan+to+build+gas-fueled+plant+near+Wilmington&pubdate=12-18-2009>
3. "Progress Energy Florida, Inc. Ten Year Site Plan." Progress Energy Florida, Inc. April 2011. 8 June 2011. <http://www.psc.state.fl.us/library/filings/11/02134-11/02134-11.pdf> | Progress Energy, Inc. "Air and Water Resources." 22 June 2011. <https://www.progress-energy.com/commitment/environment/what-we-are-doing/airandwater.page> | Source Watch. "Crystal River Energy Complex." 21 April 2011. 22 June 2011. http://www.sourcewatch.org/index.php?title=Crystal_River_Energy_Complex
4. "Georgia Power Company 2010 Integrated Resource Plan." Georgia Power Company. January 2010. 8 June 2011 | Source Watch. "McDonough Steam Generating Plant." 21 April 2011. 22 June 2011. http://www.sourcewatch.org/index.php?title=McDonough_Steam_Generating_Plant | Source Watch. "Mitchell Steam Generating Plant (Georgia)." 17 March 2011. 22 June 2011. http://www.sourcewatch.org/index.php?title=Mitchell_Steam_Generating_Plant_%28Georgia%29 | Georgia Power Company. "Company seeks decertification for Plant Branch units 1 and 2." The Citizen News. March 2011. 22 June 2011. <http://www.georgiapower.com/news/citizen/201103/decertification.shtml>

Appendix 2: Southeast Five Projected New Nuclear Plants

Utility & Project Location	Nuclear Plant	Planning Start Date	Latest Projected Completion Date	Latest Estimated Project Duration
Duke Energy Carolinas Cherokee County, SC	William States Lee Units 1 & 2	2005 ¹	2023 ²	18 years
Progress Energy Carolinas Wake County, NC	Shearon Harris Units 2 & 3	August 2005 ³	Indefinitely on hold	
Progress Energy Florida Levy County, FL	Levy County Units 1 & 2	January 2006 ⁴	2022 ⁵	16 years
South Carolina Electric & Gas Fairfield County, SC	Virgil C. Summer Units 2 & 3	September 2005 ⁴	Unit 2: 2016 Unit 3: 2019 ⁶	14 years
Georgia Power Burke County, GA	Vogtle Units 3 & 4	September 2005 ⁴	Unit 3: 2016 Unit 4: 2017 ⁷	12 years
Florida Power & Light Homestead, FL	Turkey Point Units 6 & 7	2007 ⁸	Unit 6: 2022 Unit 7: 2023 ⁸	16 years

1. "Annual Report of the North Carolina Utilities Commission." The North Carolina Utilities Commission, p. 16-18. 30 November 2010. <http://www.ncuc.net/reports/2010ElectricReport.pdf>
2. North Carolina Utilities Commission testimony in the Matter of Duke Energy Carolinas, LLC Application for Approval of Decision to Incur Nuclear Generation Project Development Costs. Docket E-7 Sub 819 Volume 1, pp. 68. 15 March 2011. 1 July 2011. <http://ncuc.commerce.state.nc.us/cgi-bin/webview/senddoc.pgm?dispfmt=&itype=Q&authorization=&parm2=JBAAAA59011B&parm3=000125794>
3. Progress Energy, Inc. "Press Release: Progress Energy Carolinas announces site for potential new nuclear plant in North Carolina." 23 January 2006. 5 July 2011. <https://www.progress-energy.com/company/media-room/news-archive/press-release.page?title=Progress+Energy+Carolinas+announces+site+for+potential+new+nuclear+plant+in+North+Carolina&pubdate=01-23-2006>
4. United States Nuclear Regulatory Commission. "Location of Projected New Nuclear Power Reactors." 24 March 2011. 2 June 2011. <http://www.nrc.gov/reactors/new-reactors/col/new-reactor-map.html>. Estimated planning start date an average of 30 months before application submission (based on stated time range of Duke and FP&L projects)
5. "Progress Energy Florida, Inc. Ten Year Site Plan." Progress Energy Florida, Inc., p. 3-7 to 3-15.
6. "2011 Integrated Resource Plan." South Carolina Electric and Gas Company, p. 24-25.
7. "Georgia Power Company 2010 Integrated Resource Plan." Georgia Power Company, p. 1-6 to 1-7.
8. Florida Power and Light Company. "Project Overview — Clean and Safe Nuclear Power at Turkey Point." 10 June 2011. 5 July 2011. <http://www.fpl.com/environment/nuclear/tp.shtml>

Related Publications by NC WARN

Too Much Baseload, February 2011 (Report filed with the North Carolina Utilities Commission)

Solar and Nuclear Costs—The Historic Crossover: Solar energy is now the better buy, by John Blackburn, July 2010

Matching Utility Loads with Solar and Wind Power in North Carolina—Dealing with Intermittent Electricity Sources, by John Blackburn, March 2010
(Published by Institute for Energy and Environmental Research)

North Carolina's Energy Future: Data shows we can close power plants instead of building new ones, by John Blackburn and John Runkle, March 2009



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