North Carolina's Energy Future

Data shows we can close power plants instead of building new ones

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SUMMARY

Electricity rates for most North Carolina customers will increase dramatically if new coal-fired and nuclear power plants are successfully completed by Duke Energy and Progress Energy. Our analysis of recent filings by both companies shows that even with a growing population, North Carolina can eliminate the need to risk $35–40 billion on new plants. This can be accomplished through modest increases in energy efficiency, cogeneration and renewable power sources, and if necessary, by using a large oversupply of electricity in the Southeast. This approach will generate thousands of jobs statewide and allow retirement of over one-quarter of the existing coal generation capacity — the equivalent of 7 to 9 sizeable plants. Doing so would help the state become a leader in the critical task of reducing greenhouse gas emissions. To that end, several conditions already in place remove the need for Duke Energy's Cliffside coal-fired unit now under construction.

Electricity from new nuclear plants will cost three to five times as much as the power now being generated by Duke Energy and Progress Energy. Even the lower end of that range is much more costly than energy-saving programs, and the nuclear price tag makes all forms of renewable energy attractive in North Carolina, especially because many of them enjoy declining costs.

Upcoming carbon regulation will also drive up the price of coal-fired power, giving even more impetus to efficiency programs and new renewable energy.

Duke Energy and Progress Energy can avoid the risks of new power plants by doing just four things:

1. Stop impeding progress toward real energy efficiency. Through proven programs growing at a modest pace, efficiency can be increased at least 1% per year through 2023. Twenty other U.S. utilities and municipalities have already achieved at least this much.
2. Bring on renewable energy as required by the 2007 Energy Bill, Senate Bill 3. At least 7.5% of electricity from new renewable sources is well within reach, especially as prices for solar equipment continue declining and as North Carolina joins other mid-Atlantic states in developing its large wind energy potential.
3. Make modest increases in load control programs to soften demand peaks.
4. Add some cogeneration ("Combined Heat and Power"), a proven resource that is largely untapped in North Carolina.

This report shows that, based on the utilities' numbers and the modest changes noted above, electricity demand can be reduced by up to 3,700 Megawatts (MW) within 15 years, avoiding the need for any new plants and allowing retirement of many coal-fired units.

The utilities' record on energy efficiency remains very weak; both forecast only minuscule efficiency savings over the next 15 years. By contrast, an independently-administered efficiency program such as the NC SAVE$ ENERGY proposal would avoid the utilities' conflict of interest between building expensive power plants — upon which profits are based — and selling less electricity.

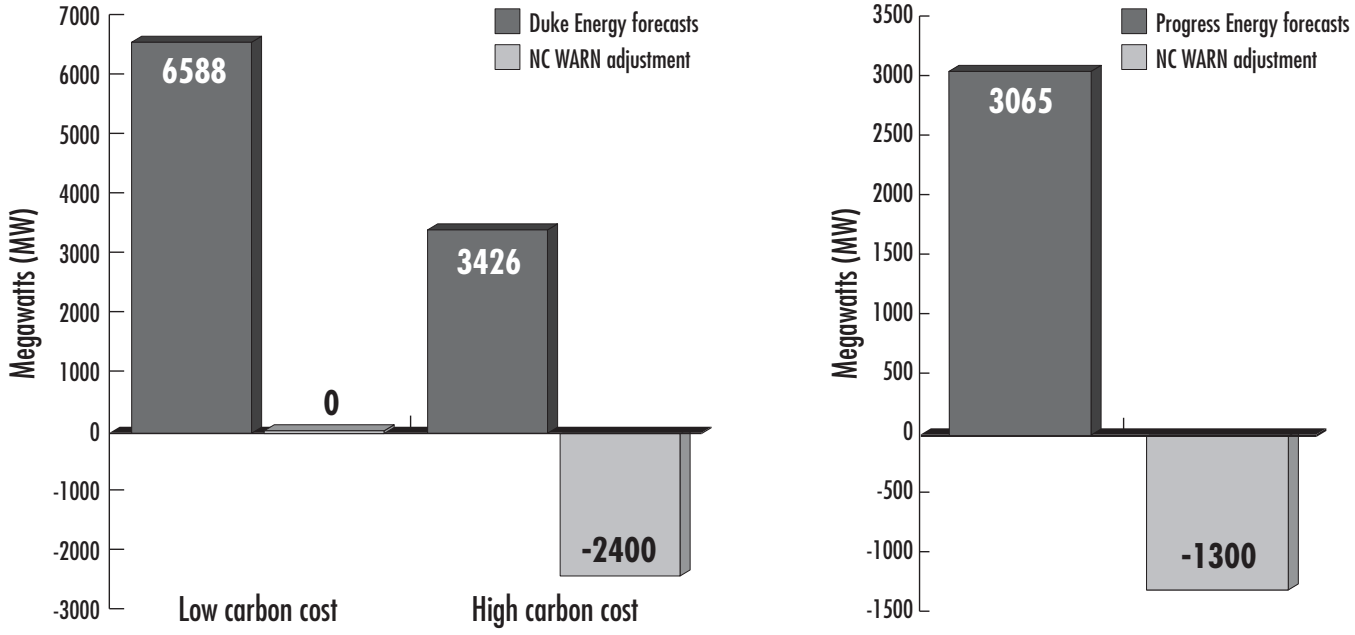
Southeastern industry data shows that regional utilities are seeking to build the equivalent of around 50 large coal or nuclear plants in excess of regional electricity needs so they can increase sales of power outside the region.

Already, Duke Energy is seeking to sell electricity to at least nine cities and other large customers outside its service area, whose total usage exceeds the 800 MW capacity Duke Energy is building at its controversial Cliffside coal-fired plant. Also, reducing Duke Energy's excessive reserve margins to the level used by Progress Energy would, on its own, negate the need for the Cliffside unit.

If nuclear plant cost estimates continue rising, power bills could easily double by the time they are built. New nuclear reactors are likely to cost $8–12 billion each if they are ever completed. In the 1980s, dozens were cancelled during construction, and now, serious delays and design problems have emerged. This could leave customers with large rate hikes for abandoned projects, since under the 2007 N.C. Energy Bill, corporate stockholder risks are largely shifted to ratepayers. In early 2008, Wall Street lenders insisted they will not finance new plants without 100% loan guarantees by taxpayers.

State law requires protection of customers against the overbuilding of power plants. One reason the new plants are being proposed is that the utilities have considerable influence in state legislatures and Congress.

The public is gradually realizing that we must use energy wisely — and must require bold leadership by elected officials. Building large new power plants is simply too financially risky for North Carolina, especially when there are viable and economically superior alternatives.



Modest increases in energy efficiency, cogeneration, and renewable power would allow retirement of up to nine sizeable coal-fired power plants in the Carolinas within 15 years.

WHY LOOK CLOSELY AT OUR ENERGY CHOICES?

Progress Energy and Duke Energy insist that large, expensive nuclear and coal-fired power plants must be built over the next decade to handle growth in North Carolina's electricity demand.

Progress Energy is proposing two new reactors at the Shearon Harris nuclear plant near Raleigh, while Duke Energy wants to build two reactors in Gaffney, South Carolina, not far from Charlotte.[1] If completed, each of the four reactors will cost ratepayers in North and South Carolina between $8 and 12 billion.[2] Duke Energy is building a large coal-burning plant at Cliffside, scheduled to open in 2012, with costs currently estimated at $2.4 billion.

In addition to those direct costs, both coal and nuclear generated electricity have multiple external costs to our economy, health and environment that necessitate a closer look at an alternative energy future.

The purported need for these large "baseload" generating plants — units that generally operate 70–90% of the time — is based on the utilities' 15-year projected demand for electricity as shown in their annual Integrated Resource Plans (IRPs) filed with the North Carolina Utilities Commission.[3] Although these plans are beginning to reflect some modest efficiency gains made by customers, and some developments of new renewable energy sources as required by the 2007 renewable and efficiency portfolio legislation, they still rely heavily on construction of new plants.

This paper, based on the IRPs, examines the demand forecasts, then provides an alternative approach that is viable and financially prudent, eliminates the need for all new plants, and allows for early retirement of up to nine existing, moderate-sized coal-fired plants in North Carolina.

HOW WOULD RATEPAYERS BE IMPACTED BY NEW POWER PLANTS?

Electricity from new nuclear plants will cost three to five times as much as the electricity now being generated by Duke Energy and Progress Energy.[4] The utilities have not said what the new plants, and the power they produce, will cost, so we must rely on estimates from industry observers. The plants themselves are likely to cost $8 billion to $12 billion each. The energy they produce will cost 13–24 cents per kilowatt hour (kWh), *at the plant site, before distribution costs*, as compared with present system costs in the range of 4–5 cents per kWh.[5]

Once the new nuclear electricity reaches consumers, it will be averaged in with cheaper electricity from existing plants, but will still raise rates by half — if projects stay on schedule. Note that Progress Energy has already applied for a 31% rate increase in Florida; part of that is to pay in advance for nuclear costs.

This new nuclear electricity is much more costly than saving energy through efficiency programs, which cost in the range of 2–6 cents per kWh. It also makes all forms of renewable energy attractive in North Carolina, especially when growing markets are bringing down costs.

The average residential electricity bill in North Carolina is currently $100 per month, with larger homes generally using more electricity than smaller ones. If the proposed coal and nuclear plants are built, electricity rates will increase dramatically. Sufficient information is available to conclude that Progress Energy rates would rise by at least half, or an average of $50 each month, for each residence.[6]

This assumes that the current cost estimates for the new nuclear plants will not escalate as they have done over the last four years

even while new units remain on the drawing board. If that happens, home electricity bills could easily double.

WHY BUILD NEW POWER PLANTS?

The utilities maintain that these baseload plants are needed to meet an increasing demand for electricity. As shown below, even their own numbers don't support this claim when cheaper efficiency measures are figured in, and when renewable energy is introduced in accordance with the 2007 state energy legislation.

The North Carolina rate structure is such that utilities make much more money from constructing and operating power plants than they can from energy efficiency; obviously this condition needs to be changed. As it is, not only do they benefit from maximizing electricity sales, they are guaranteed a profit on the amount of plant costs put into the rate base.[7] For Duke Energy, return on equity is 11% and its overall rate of return is 8.57%, set on December 20, 2007. For Progress Energy, return on equity is 12.75% and overall rate of return is 10.45%, set on August 5, 1988.

> As the adage goes, "If all you have is a hammer, everything looks like a nail." The utilities know how to operate power plants; that is what they have done for the last century.

They have little experience with solar energy or wind farms, although Duke Energy is now operating wind farms in other states. The record of both on energy efficiency is very weak. Duke Energy spun off its solar energy subsidiary in 2002 just before the solar industry began to take off.[8] Progress Energy lost $150 million in its SRS Energy Services, its national energy efficiency subsidiary, even as other utilities and statewide efficiency programs prospered.

WHY IS OVERBUILDING ALLOWED?

The N.C. Public Utilities Act explains that State policy is to achieve the "least cost mix of generation and demand-reduction measures which is achievable, including consideration of appropriate rewards to utilities for efficiency and conservation which decrease utility bills."[9]

Thirty years of utility case law clearly states that one of the primary purposes of the Public Utilities Act is to protect customers against overbuilding new baseload plants.[10]

Why hasn't this occurred? Why are we even considering new power plants? Isn't it more cost-effective to encourage energy efficiency and renewable energy sources over new generating plants? Shouldn't we at least try to save energy before risking billions on new plants?

> "This risky overbuilding couldn't survive in the free marketplace. It's happening because Duke, Progress, and other Southeastern power companies enjoy compliant state legislatures and monopoly service areas."
>
> *—Jim Warren*
> *Executive Director of NC WARN*

One reason is that the utilities are active politically. The regulatory agencies, such as the N.C. Utilities Commission and the U.S. Nuclear Regulatory Commission, are heavily pressured to allow the utilities to build more plants. That's because lobbying efforts have given the utilities considerable political influence in state legislatures and in Congress, allowing them to maximize profits at the expense of ratepayers. A report released in February found that executives of Duke Energy and the company's political action committee gave a combined $744,512 to state level candidates in North Carolina and their party committees between January 2005 and November 2008, a period when numerous decisions regarding our energy future were being made.[11]

IS DEMAND REALLY GROWING ALONG WITH POPULATION?

For many years, electricity demand grew more rapidly than the economy and much more rapidly than the population. Those days ended ten years ago in North Carolina. Overall sales by the utilities are also fairly flat. Utility Commission reports show sales figures for the past ten years; Progress Energy's actual increase outside of wholesale sales has been .67% annually, with Duke Energy slightly higher at .84%.[12]

In each successive Integrated Resource Plan, Duke Energy and Progress Energy have shown lower growth in peak electricity demand than had been predicted. Nevertheless, in the 2008 IRP, both utilities forecast a growth rate of 1.5% annually. Not only do these forecasts remain higher than recent growth rates, they ignore the present, protracted recession.

That modest demand growth can now be met — indeed, more than met — with annual increases in energy efficiency and renewable energy, so that some existing coal plants can be shut down (see Tables 4 and 6).[13]

Regional industry data also prove new plants are not needed. Reporting by the SERC Reliability Corporation, an industry consortium, shows that Southeastern utilities plan to overbuild generation capacity — with customers paying up front — so they can increase sales of power outside the region. The excess electricity supply by 2017 is projected to be far above regional demand, the equivalent of around 50 large coal or nuclear plants.[14]

In addition, Duke Energy is currently seeking permission to sell more electricity and is soliciting at least nine cities and other large customers outside its service area for wholesale contracts.[15] Existing ratepayers would subsidize these new power sales by paying for the new plants needed to meet that demand. If approved by the N.C. Utilities Commission, this deal would add customers whose electricity usage exceeds the 800 MW capacity Duke Energy says it must build at the Cliffside coal-fired plant.

Meanwhile, existing excess regional capacity gives Duke Energy and Progress Energy the opportunity to purchase power from other utilities to meet peak demand as needed short-term, or in longer term contracts.

Far from encouraging demand reductions, Progress Energy and Duke Energy both operate sales programs that actually promote the use of more, often unneeded, electrical services. One example is a levelized billing plan that allows customers to pay the same amount each month, no matter how much is used.[16]

Another practice that artificially implies the need to add generation capacity is for a utility to maintain high "reserve margins," which is excess capacity that might be needed in case of a temporary loss of operation at an existing power plant. Duke Energy's reserve margin is much higher than the other utilities in North Carolina, and reducing it to the level used by Progress Energy would — on its own — negate the need for the Cliffside plant.[17]

WHAT ARE THE RISKS FOR RATEPAYERS?

Session Law 2007-397, often referred to as Senate Bill 3, is the controversial rewrite of State energy policy in 2007.[18] The utilities pushed for and won provisions that make it easier for them to finance new baseload plants in exchange for a requirement that a percentage of generation come from renewables and efficiency.

The Renewable Energy and Energy Efficiency Portfolio Standard (REPS) requires the public

utilities to provide up to 12.5% by 2021 of their retail electricity sales from "new renewable energy" resources. That definition includes solar and wind, but also electricity generated by combusting landfill gas and waste from both hog and chicken farms. The energy efficiency portion of the REPS requires a modest amount of efficiency to be added. For now, each utility is restricted to meeting no more than 25% of its REPS requirement with energy efficiency. By 2021, the utilities are allowed to achieve 40% of the total 12.5% REPS with efficiency.

Senate Bill 3 allows the utilities to recover from customers the development costs for proposed nuclear facilities, even if they choose not to begin construction. The cost of borrowing money is at least one-third of the total plant cost, and if construction begins, financing costs could be charged to customers before plants are put on line. During the multi-year project period, customers would gradually become obligated to pay actual construction costs if the Utilities Commission deems them to be prudent.

In addition to the current, unprecedented cost estimates noted earlier for designing and constructing nuclear power plants, there are serious risks that plant costs will escalate to a point where construction projects, which could last 15 years or longer, could fail.

In October, 2008, Standard & Poor's Ratings Services released a report, "Construction Costs to Soar for New U.S. Nuclear Power Plants," which warns that multiple factors — including shortfalls of materials and skilled labor, along with inexperience with new technology — make construction uncertainties the overriding risk for new U.S. nuclear power plants.

These problems are already occurring in Finland, where a new plant under construction by French-owned AREVA, Inc. is three years behind schedule and 50% over budget. In the 1980s, dozens of U.S. nuclear plants were cancelled during construction. Between them, Duke Energy and Progress Energy (then called Carolina Power & Light), cancelled nine units that were underway.[19]

Similar problems in the present day could leave North Carolina customers with large rate hikes for abandoned projects, since corporate stockholder risks have largely been shifted to ratepayers.

Contrary to persistent claims by nuclear industry officials and supporters, the designs of the new nuclear reactors have not been fully reviewed nor certified by the U.S. Nuclear Regulatory Commission.[20] In June of 2008, the NRC withdrew its timetable to certify the Westinghouse AP1000 reactor — chosen by both Duke Energy and Progress Energy — due to ongoing design problems with major components and operating systems. Most new plant proposals are already facing unique, site-specific problems.

Earlier this year, industry lobbyists failed in a vigorous attempt to include $50 billion in 100% loan guarantees in the Federal Stimulus Act of 2009. Even before the present financial

"Because of this flurry of activity, we now find ourselves again making some of the same mistakes of the past. One of the challenges in the 1960s, 70s, and 80s was that applicants, vendors and the regulator were attempting to do everything — designs, site/environmental issues, and applications — all at once. [With new rules], the idea was that utilities could get a plant design completed and certified and a site reviewed first.... But almost no one is following that ideal process...."

— NRC Commissioner Gregory B. Jaczko, February 12, 2009

crisis, Wall Street lenders emphasized that they would not finance new plants without 100% loan guarantees by taxpayers.

The nuclear industry relies heavily on Federal subsidies such as a production tax credit and other tax breaks, the Price-Anderson Act (capping the liability for accidents), and the proposed but increasingly unlikely repository for used reactor fuel at Yucca Mountain, Nevada.

Additional unknowns regarding both new and operating coal-burning power plants include the likelihood of climate legislation that raises the cost of carbon emissions, and proposals to ban mountaintop removal of coal, both of which will increase operating costs for electricity generated by burning coal. The cost of coal fuel is already leading to rate increases in Florida.

WHAT ARE THE OTHER IMPACTS FROM NEW PLANTS?

In addition to direct financial risks, there are numerous additional factors that create serious doubts about the future of coal and nuclear power.[21]

Coal-fired plants produce hazards throughout their cycle, beginning with the devastating mountaintop removal in surface mining. Their smokestacks are the leading source of greenhouse gas emissions in the United States, emitting millions of tons of carbon dioxide annually, along with sulfur dioxide, nitrous oxides, mercury and a host of other hazardous substances. Toxic fly ash is stored in slurry ponds such as the recent one in Kingston, Tennessee that destroyed hundreds of acres of farmland, homes and streams.

For nuclear plants, there are considerable amounts of radioactive waste produced throughout the fuel cycle from mining uranium, fuel enrichment and fabrication, spent nuclear fuel assemblies, and the decommissioning of facilities. The long-term solution to the waste, beyond the obvious one of not producing it in the first place, has not been solved. Despite decades of effort and billions of dollars invested, the proposed Yucca Mountain repository has been removed from the Obama administration's budget for the Department of Energy, leaving the considerable risks of spent fuel storage in place at each of the nation's nuclear power stations.

Nuclear plants emit radioactivity during their normal operations; this source term allows radioactive materials to be released into the environment. According to various studies by the national laboratories, accidental releases due to problems with reactors or waste cooling pools could be devastating to large areas, and nuclear plants are recognized to be potential targets by domestic or foreign terrorists.

Both coal-fired and nuclear power plants use very large amounts of fresh water. The nuclear reactors proposed at Shearon Harris would each consume up to 60 million gallons per day from the Cape Fear River, more than is used by the City of Raleigh.[22] Coal plants discharge heated water and slurry runoff into rivers and streams. As shown increasingly in recent years, in times of drought and higher air temperatures, some of these plants will need to be shut down or operated at reduced power.

HOW CAN WE ELIMINATE THE NEED FOR NEW PLANTS?

Implementing energy efficiency measures, such as in buildings, appliances and lighting, is widely recognized to be much cheaper than creating new generating capacity. This has been documented in North Carolina by several studies, showing that energy use can be reduced by 15–19% at costs lower than five

or six cents per kilowatt hour. Much larger efficiency gains are cost-effective when compared with costs of expensive new plants. In addition, smart grid advances funded by the Obama administration will reduce the amount of energy wasted between point of generation and end users.

New York and Maryland are setting out to reduce electricity use by 15% in a very few years. The Texas Utilities Commission is considering a consultant's report showing a 23% reduction in electricity use through efficiency. Even California, which already has the lowest use of electricity per customer in the nation, is seeking an increase in efficiency.

Data from Duke Energy's own experts weaken the case for new plants. During Utilities Commission hearings, Duke Energy's expert witness admitted under cross examination that 10% energy efficiency is a reasonable 10-year goal.[23] A separate $170,000 study for Duke Energy says 19%.[24] These savings are available at a cost of six cents or less per kilowatt hour.

A goal of 10% energy efficiency over the next 10 years is readily achievable. The N.C. Public Staff says the top 20 utilities and municipalities average 11%, and most of them expect to gain far more savings as programs grow.

However, in North Carolina, both Duke Energy and Progress Energy have proposed Demand Side Management and efficiency programs that have been criticized by a broad range of public interest groups and others for costing too much and doing very little.[25]

North Carolina utilities can eliminate the need for any new power plants by stepping up their efficiency programs and bringing on new renewable sources at a faster pace. In addition, Duke Energy can retire old plants that they have already scheduled to close down plus several other plants, totaling at least 2,400 MW (Table 4), and Progress Energy can close existing plants generating 1,300 MW (Table 6). This can be achieved by doing just four things:

1. Real work on efficiency gains at a modest but steady pace. Utility customers can meet a goal of 1% per year each year through 2023. Twenty other utilities and municipalities in the U.S. have already done this and more. Many states rely on an independently administered program to conduct their energy efficiency programs, such as the NC SAVE$ ENERGY program proposed in North Carolina.[26]
2. Bring on renewable energy as required by the 2007 Energy Bill, to at least 7.5% of electricity from new renewable sources. North Carolina's electricity is already 4% renewable, so adding new renewable sources would bring the total beyond the 10% used in our analysis.
3. Increase slightly the utility load control and DSM programs to lower peak demand. If used wisely, these programs can shift or eliminate peak demand so that fewer power plants are needed.
4. Add some modest cogeneration (or "Combined Heat and Power") capacity among their customers. This is a proven, in-place resource that is largely untapped in North Carolina.[27]

The total reduction of 3,700 MW equates to over one-fourth of coal-fired generation capacity in the combined service areas of Duke Energy and Progress Energy in the Carolinas — or 7–9 average-sized coal-fired units — that could be retired despite population growth. This would help North Carolina take a leading role in the urgent challenge to reduce greenhouse gas emissions.

CAN ENERGY EFFICIENCY MEASURES REALLY WORK?

The extra work on efficiency should be done because it is much cheaper than new plants, not because state law requires a modest amount.

Increasing energy efficiency in buildings, appliances and lighting is widely recognized to be cheaper than new generating capacity. This has been documented in North Carolina by several studies, which show that energy use can be reduced by 15–19% at costs lower than five cents per kWh. The potential was further affirmed in the GDS Associates report, made in conjunction with the LaCapra REPS study in December 2006 for the North Carolina General Assembly.[28] That study showed the possibility of reducing electricity demand in North Carolina by 14% over a 10-year period at costs of five cents per kWh or less.

An alternative to utility-run efficiency programs, NC SAVE$ ENERGY, is an initiative by a growing number of organizations to create a statewide, independent energy efficiency program. The goal is to keep savings on energy bills in the hands of residential customers, with an emphasis on serving those who can least afford rising energy costs. Its 10-year goal of 10% energy efficiency is well within reach.

An independently-administered efficiency program would be able to focus on saving energy while avoiding the utilities' conflict of interest between building expensive power plants upon which profits are based and selling less electricity. Many states are successfully using similar models, and stimulus package funds should also accelerate energy efficiency and boost the NC SAVE$ ENERGY program.

The 2007 LaCapra study assessed new renewable resources potential and found that the practical potential in North Carolina was in the range of 1,867–3,512 MW primarily for biomass, hydro-power and on-shore wind, with smaller contributions from landfill gas, poultry litter and hog waste.[29]

That study did not include the contributions of off-shore wind and solar photovoltaics because it concluded that the potential for these were not limited by practical considerations but rather by the current levels of installed costs. Since that report was completed, however, the use of renewable technologies has continued to grow and prices have continued to fall across the nation, so meeting the 10% renewable part of the REPS standard in North Carolina will become easier. One example is that the large amount of off-shore wind energy potential is now being developed by several other mid-Atlantic states.

Green power options for utilities have grown significantly while the cost per kWh produced continues to decrease.[30] Solar photovoltaic generation, for example, is moving from off-grid applications to more widespread grid-connected residential, commercial and utility-scale projects, with resulting economies of scale. Nationwide, the costs of many renewable technologies are now competitive with current electric rates, especially if compared to the installed costs of new nuclear plants.

MUST WE RELY ON THE UTILITIES' FORECASTS?

NC WARN has attached tables to this paper showing that electricity demand, even using the utilities' numbers, does not require new plant construction. Our conclusion is that for both Progress Energy and Duke Energy, existing plants can be shut down.

The figures in Tables 1 and 3 are taken directly from Duke Energy's 2008 Integrated Resource Plan; there are two scenarios, one with a low cost for carbon emissions and the other with

a high cost of carbon emissions.[31] The utilities' IRPs present their operations in both North and South Carolina, and power generated for their own retail sales as well as for the many smaller systems they serve as wholesale suppliers. The North Carolina municipal and cooperative systems have their own requirements for efficiency and renewables. The IRPs do not provide separate figures for North Carolina. Energy efficiency and renewable power will benefit all customers in both states.

NC WARN then takes those figures and in Tables 2 and 4, makes a series of reasonable, cost-effective adjustments. Similarly for Progress Energy, the figures in Table 5 are taken from its 2008 Integrated Resource Plan, and NC WARN makes the same adjustments in Table 6.

Using Table 1 as an example, Duke Energy's 2008 IRP forecasts its growth in peak demand, which is used because it is the time, normally on the hottest summer days, when the utility needs more electricity supply to meet customers' needs. Duke Energy uses a scenario in which there remains a low cost for carbon emissions, allowing maximum but unlikely growth in demand. This forecast is based on past trends, such as the decline in industrial use and decline of the textile industry, and estimates of population growth. To some degree, the forecast also builds in the impacts of new technologies and appliances on demand, and factors such as increasing house sizes, although that trend has already begun to reverse itself.

For each of the four years shown, Duke Energy then shows demand reduced by a small amount of projected efficiency savings, and then by load management and demand-side management programs. Renewable energy resources are removed at this point because the utility sees them as distinctly different from traditional power plants.

Between 2010 and 2025, Duke Energy forecasts its peak demand to increase from 18,730 MW to 23,547 MW, an increase of 4,817 MW or an increase of demand of 25% over the 15-year period.

During this same time period, Duke Energy projects energy efficiency gains of only 787 MW, or just .2% per year, for a cumulative total over the 15 years of 3.3%. Similarly it projects an increase in renewable energy of 631 MW, or a cumulative total over the 15 years of only 2.5%. Its load control and DSM programs are flat and only reduce peak demand by 4%.

To meet this demand, Duke Energy starts with its existing plants, with a decline over the 15-year period as old, inefficient (and fully depreciated, contributing nothing to the rate base) coal plants are shut down. It then adds a minimal amount of purchases from other utilities or merchant plants, and no cogeneration.

Primarily, Duke Energy relies on the supply side solution of building new plants, forecasting that 6,588 MW of new plants will be needed by 2025, one-third more than its present capacity.[32] In addition to the baseload coal-fired and nuclear plants, new plants will likely include natural gas-fired plants used primarily for peak and intermediate loads.

Duke Energy's reserves are then calculated by subtracting the peak load from the total capacity, and the reserve margin is the percentage of excess capacity the utility has in reserve.[33]

WHAT IS NC WARN'S ALTERNATE SCENARIO?

In Table 2, NC WARN uses Duke Energy's same numbers for growth in summer peak demand.[34] We first eliminate the wholesale sales by Duke Energy outside of its service area. Then, we reduce the demand by significant energy efficiency gains (1% a year as a goal), more renewable energy sources and a slight increase in load control, an important resource for which Duke Energy has charged customers millions over the years but has rarely used.[35]

On the supply side, with only a modest increase of in purchases from other utilities and a modest, but steady increase, in cogeneration, Duke Energy can keep a healthy reserve margin and at the same time avoid risking any of the 6,588 MW worth of new generation it currently is proposing, including the Cliffside plant now under construction.[36]

If the cost of carbon increases following federal legislation, as shown in Duke Energy's scenario in Table 3, the company projects a much slower growth in demand. As a result, with the same NC WARN adjustments, many additional plants can be closed.

Progress Energy's forecast in Table 5 also depends heavily on new plant construction, with 3,065 MW needed by 2020 to meet Progress Energy's expected demand. After the NC WARN projections in Table 6, Progress Energy can eliminate the need to build any new plants and by 2020 can close 1,300 MW of existing coal-fired plants.

CONCLUSION

Building large new power plants is simply too financially risky for North Carolina, especially when there are viable and economically superior alternatives. In addition, they are entirely the wrong direction — too much money and too much time — for helping cut greenhouse gases in accord with the urgent warnings by the international climate science community. ■

As demonstrated, a series of reasonable adjustments to the demand forecasts, with a slightly greater reliance on renewable energy and energy efficiency, will eliminate the need for new and expensive generating plants and allow for the retirement of existing coal-fired units.

TABLES

1: DUKE ENERGY 2008 IRP — LOW CARBON EMISSIONS COST[1]

	Summer Peak Demand (MW)			
	2010	2015	2020	2025
Demand before adjustments	18730	20471	21951	23547
less new efficiency gains	– 109	– 438	– 760	– 787
Demand as reduced	18621	20033	21191	22760
less new renewable energy	0	– 161	– 481	– 631
less new load control	– 898	– 1016	– 1016	– 1016
Remaining peak load	17723	18856	19694	21113
	To Meet Demand			
Existing plants	20045	18778	18512	18512
existing purchase contracts	690	72	72	72
new plants (includes uprates)	9	3575	5324	6588
Total capacity[2]	20744	22425	23908	25172
New cogeneration	0	0	0	0
New total capacity	20744	22425	23908	25172
Reserves (MW)	3021	3569	4214	4059
Reserve %	17%	19%	21%	19%

[1] Duke Energy scenario for low costs for carbon emissions (assumes no climate change legislation), using data from 2008 IRP. In accordance with Duke Energy's IRP, it includes entire system (both NC and SC). All customers benefit from efficiency programs which are cheaper than any new capacity.

[2] Renewables are treated herein as demand reduction rather than as capacity addition.

2: NC WARN ALTERNATIVE — LOW CARBON EMISSIONS COST[1]

	Summer Peak Demand (MW)			
	2010	2015	2020	2025
Demand before adjustments	18730	20471	21951	23547
less new wholesale sales[2]		– 600	– 600	– 600
less new efficiency gains[3]	– 187	– 1198	– 2297	– 3498
Demand as reduced	18543	19273	19654	20049
less new renewable energy[4]	– 1334	– 1965	– 2195	– 2355
less new load control[5]	– 898	– 1110	– 1136	– 1219
Remaining peak load	16311	16198	16323	16475
	To Meet Demand			
Existing plants	18898	17631	17365	17365
purchase contracts[6]	690	690	690	690
new plants[7]	0	0	0	0
Total capacity[8]	19588	18321	18055	18055
Add new cogeneration	0	300	500	800
New total capacity	19588	18621	18555	18855
Reserves (MW)	3277	2423	2232	2380
Reserve %	20%	15%	14%	14%

[1] All customers benefit from efficiency programs which are cheaper than any new capacity. NC wholesale sales are to municipal and coop systems which are subject to REPS requirements.

[2] Does not add 600 MW for new wholesale customers outside of the service area.

[3] Starting in 2010, realizes a 1% reduction in demand through efficiency programs, which accumulates at an additional 1% each year. Reduction in 2025 peak demand is 3498 MW as compared with Duke's 787 MW.

[4] Takes existing renewable capacity of 1,147 MW with annual increase to 10%.

[5] Takes Duke's load control of 1,016 MW by 2011 and increases it annually in proportion to projected demand growth.

[6] Continues existing wholesale purchases of 690 MW.

[7] No new plants are needed.

[8] Renewables are treated as a demand reduction rather than as capacity addition.

TABLES, cont.

3: DUKE ENERGY 2008 IRP — HIGH CARBON EMISSIONS COST[1]

	Summer Peak Demand (MW)			
	2010	2015	2020	2025
Demand before adjustments	18730	19646	20191	21018
less new efficiency gains	– 109	– 438	– 760	– 787
Demand as reduced	18621	19208	19431	20231
less new renewable energy	0	– 161	– 481	– 631
less new load control	– 898	– 1016	– 1016	– 1016
Remaining peak load	17723	18031	17934	18584
	To Meet Demand			
Existing plants	20045	18778	18512	18512
existing purchase contracts	690	72	72	72
new plants (includes uprates)	9	2309	3426	3426
Total capacity[2]	20744	21159	22010	22010
New cogeneration	0	0	0	0
New total capacity	20744	21159	22010	22010
Reserves (MW)	3021	3128	4076	3426
Reserve %	17%	17%	23%	18%

[1] Duke Energy scenario for high costs for carbon emissions (assumes climate change legislation), using data from 2008 IRP. Note significantly lower demand by 2025. In accordance with Duke Energy's IRP, it includes entire system (both NC and SC). All customers benefit from efficiency programs which are cheaper than any new capacity.

[2] Renewables are treated herein as demand reduction rather than as capacity addition.

4: NC WARN ALTERNATIVE — HIGH CARBON EMISSIONS COST[1]

	Summer Peak Demand (MW)			
	2010	2015	2020	2025
Demand before adjustments	18730	19646	20191	21018
less new wholesale sales[2]	– 600	– 600	– 600	– 600
less new efficiency gains[3]	– 187	– 1150	– 2113	– 3122
Demand as reduced	17943	17896	17478	17296
less renewable energy[4]	– 1334	– 1734	– 2019	– 2102
less new load control[5]	– 898	– 1016	– 1044	–1087
Remaining peak load	15711	15146	14415	14107
	To Meet Demand			
Existing plants	18898	17631	17365	17365
purchase contracts[6]	690	690	690	690
new plants[7]	0	0	0	0
Total capacity[8]	19588	18321	18055	18055
Add new cogeneration	0	300	500	800
Close existing plants[9]	– 800	– 800	– 1700	– 2400
New total capacity	18788	17821	16855	16455
Reserves (MW)	3077	2675	2440	2348
Reserve %	20%	18%	17%	17%

[1] All customers benefit from efficiency programs which are cheaper than any new capacity. NC wholesale sales are to municipal and coop systems which are subject to REPS requirements.

[2] Does not add 600 MW for new wholesale customers outside of the service area.

[3] Starting in 2010, realizes a 1% reduction in demand through efficiency programs, which accumulates at an additional 1% each year. Reduction in 2025 peak demand is 3498 MW as compared with Duke's 787 MW.

[4] Takes existing renewable capacity of 1,147 MW with annual increase to 10%.

[5] Takes Duke's load control of 1,016 MW by 2011 and increases it annually in proportion to projected demand growth.

[6] Continues existing wholesale purchases of 690 MW.

[7] No new plants are needed.

[8] Renewables are treated as a demand reduction rather than as capacity addition.

[9] Duke Energy can close down existing plants and still retain a potentially excessive reserve margin.

TABLES, cont.

5: PROGRESS ENERGY 2008 IRP[1]

	Summer Peak Demand (MW)			
	2010	2015	2020	2023
Demand before adjustments[2]	12972	14032	15043	15722
less new efficiency gains	– 23	– 221	– 436	– 505
Demand as reduced	12949	13811	14607	15217
less new renewable energy	– 25	– 98	– 102	– 103
less new load control	– 543	– 943	– 1065	– 1079
less cogeneration[3]	– 179	– 179	– 179	– 179
Remaining peak load	12202	12591	13261	13856
	To Meet Demand			
Existing plants	12587	12586	12586	12586
purchase contracts	1203	1067	1067	1067
new plants[4]	0	726	3065	3065
Total capacity[5]	13790	14379	16718	16718
Reserves (MW)	1588	1788	3457	2862
Reserve %	13%	14%	26%	21%

[1] In its 2008 IRP, Progress Energy presents only one scenario. It also includes NC and SC jurisdictions.

[2] Demand includes firm sales.

[3] Unlike Duke Energy, Progress Energy has existing cogeneration.

[4] Assumes two new nuclear reactors by 2020, causing high reserves.

[5] Renewables are treated herein as demand reduction rather than as capacity addition.

6: NC WARN ALTERNATIVE to PROGRESS ENERGY

	Summer Peak Demand (MW)			
	2010	2015	2020	2023
Demand before adjustments[1]	12972	14032	15043	15722
less new efficiency gains[2]	– 128	– 815	– 1564	– 1951
Demand as reduced	12844	13217	13479	13771
less renewable energy[3]	– 250	– 587	– 1494	– 1562
less load control	– 543	– 943	– 1065	– 1079
less existing cogeneration	– 179	– 179	– 179	– 179
Remaining peak load	11872	11508	10741	10951
	To Meet Demand			
Existing plants	12362	12361	12361	12361
purchase contracts	1203	1067	1067	1067
new plants[4]	0	0	0	0
Total capacity[5]	13565	13428	13428	13428
add new cogeneration	25	150	400	500
close existing plants[6]	0	– 500	– 1300	– 1300
New total capacity	13590	13078	12528	12628
Reserves (MW)	1718	1570	1787	1677
Reserve %	14%	14%	17%	15%

[1] Demand includes firm sales.

[2] Starting in 2010, realizes a 1% reduction in demand through efficiency programs, which accumulates at an additional 1% per year.

[3] Takes existing renewable capacity of 225 MW with annual increase to 10%.

[4] No new plants are needed.

[5] Renewables are herein treated as demand reduction rather than as capacity addition.

[6] Progress can shut down existing plants and still maintain an adequate reserve margin.

NOTES

[1] Progress Energy has proposed two nuclear reactors at the Shearon Harris plant in Wake County; Duke Energy has proposed two new reactors at the Lee Nuclear Station in Gaffney, South Carolina, and a new coal unit at the Cliffside plant in Cleveland and Rutherford Counties. The Cliffside coal plant currently has an estimated cost of $2.4 billion, including financing, for a net of 600 MW. Progress Energy's current estimate for the two Harris units is $9.3 billion, excluding financing and cost escalation, and Duke Energy's current estimate for both of the Lee units is $11 billion, also without financing or escalation. Financing could easily increase the nuclear costs by more than 50%. Current cost estimates nationally are much higher, in the $11–12 billion range with financing, for a new nuclear unit. *USA Today* August 23, 2008: estimates by both the Nuclear Energy Institute and the Union of Concerned Scientists.

[2] Note that the North Carolina retail ratepayers pay only for the North Carolina jurisdictional allocation, i.e., the demand for North Carolina customers. For Duke Energy it is approximately 70%; for Progress Energy it is 72%.

[3] NCUC Docket E-100 Sub 118. All dockets are available at www.NCUC.net, "docket information", then "docket search".

[4] "Business Risks & Costs of New Nuclear Power," by Craig A. Severance. http://climateprogress.org/wpcontent/uploads/2009/01/nuclearcosts2009.pdf. This recent study demonstrates that generation costs for a new nuclear power plant in the range of 25–30 cents per kWh by the time it would come online is likely. Mr. Severance is formerly with the Iowa State Commerce Commission.

[5] Cost estimates are also derived from Progress Energy's announced Florida plants, from a discussion of nuclear plant costs in *The Wall Street Journal*, May 12, 2008 and from an analysis by Craig A. Severance, *Business Risks and Costs of New Nuclear Power*. In our analysis, Severance' kWh cost figures are revised downward to account for the allowable rates of return for Duke and Progress, which are lower than those used by Severance. The 13 cents figure is from the investment firm Lazard, *Levelized Costs of Energy Analysis–Version 2.0*, June 2008.

[6] Progress Energy plans two reactors with a capacity of 2,170 MW. These will produce about 16 billion kWh per year. In 2021, Progress expects to generate 77 billion kWh in 2021. Average in 16 billion kWh of new, expensive electricity at 13 cents with "old" capacity at 4.5 cents, resulting in a 40% increase. Rate increases already announced bring that to 50%. Duke Energy's rate increase cannot be similarly calculated because, although they have announced two new reactors, only one is included in the IRP.

[7] Rate base is the value of property upon which a utility is permitted to earn a specified rate of return as established by the N.C. Utilities Commission in a rate case. The rate base generally represents the value of property used by the utility in providing service. As a general rule, the greater the value of the rate base through construction and plant, the greater the profit that can be made. Much of the operating costs, such as fuel costs, are included in rates through annual riders, rather than through the rate of return.

[8] Duke Solar was spun off from Duke Energy in 2002, becoming Solargenix. Solargenix, based in Morrisville, N.C., now has projects nationwide, including utility-scale plants. www.buildinggreen.com/auth/article.cfm?filename=130512a.xml

[9] G.S. 622(3a). See www.ncga.net for existing statutes, session laws and recent legislative actions.

[10] *State ex. rel Utils. Comm'n v. High Rock Lake Ass'n*, 37 NC App. 138, 245 S.E.2d 787, cert. denied, 295 N.C. 646, 248 S.E.2d 257 (1978).

[11] "Duke Energy: The Power of Green in North Carolina," available at www.stopcliffside.org/news.php?extend.60.3

[12] "Quarterly Review: Selected Financial and Operational Data", prepared by Operations Division, N.C. Utilities Commission. See www.ncuc.net, "activities", then "other activities."

[13] NCUC Docket E-100, Sub 118 (2008 Integrated Resource Plans).

[14] SERC Reliability Corporation, "Information Summary," July 2008; available at www.serc1.org/Documents/SERC/SERC%20Publications/. By 2017, SERC projects regional demand for electricity in the Southeast at 230,000 MW, but total supply at 320,000 MW.

[15] NCUC Docket No. E-7, Sub 858 (Orangeburg); Testimony of Duke Energy witness Svrcek.

[16] NCUC Docket Nos. E-7, Sub 710, and E-2, Sub 847 (Levelized billing). See also www.newsobserver.com/business/story/1000991.html

[17] NCUC Docket No. E-100 Sub 118 (IRPs)

[18] See www.ncga.net for existing statutes and bills.

[19] The Shearon Harris plant is the national example of rising costs and abandoned construction. In the late 1970s, when it was first proposed, four nuclear units were expected to cost $1 billion. By the time it came on line in May 1987, the present unit cost $4.2 billion, and the others were abandoned.

[20] Commissioner Gregory B. Jaczko, "New Opportunities to Invest in Nuclear Safety," February 12, 2009. Excerpt: "Because of this flurry of activity, we now find ourselves again making some of the same mistakes of the past. One of the challenges in the 1960s, 70s, and 80s was that applicants, vendors and the regulators were attempting to do everything — designs, site/environmental issues, and applications — all at once. By developing Part 52,

the Commission created a more predictable application process that allowed utilities to go through those steps sequentially. The idea was that utilities could get a plant design completed and certified and a site reviewed first. They could then submit an application that simply references an already certified design and an approved early site permit. But almost no one is following that ideal process. Instead, we are once again doing everything in parallel. We have received 17 applications before designs are complete and certified. We have approved three early site permits, but for sites where utilities have not yet decided to move forward aggressively. All of this is certainly allowed under our regulations, but I do not believe it is the most efficient or predictable path forward."

[21] "Why a Future for the Nuclear Industry is Risky," by Peter Bradford and David Schlissel; www.iccr.org/news/press_releases/pdf%20files/risky_Jan07.pdf. Mr. Bradford is the former Chair of the New York Public Service Commission, and the former Chair of the Maine Public Service Commission; Mr. Schlissel is a researcher at Synapse Energy Economics, Inc.

[22] "Nuclear Plant's Hurdles are High," The Fayetteville Observer, September 25, 2005. Quoting a Progress Energy spokesman: "Kimble said a nuclear power plant requires 30 million to 60 million gallons of water a day to cool water heated in the plant's reactors." These figures have also been confirmed at meetings between the NRC and Progress Energy.

[23] NCUC Docket No. E-7, Sub 831 (Save-a-Watt). September 29, 2008 testimony of Duke witness Cicchetti.

[24] Forefront Economics, Inc., and others, "Duke Energy Carolinas DSM Action Plan: North Carolina Report," August 2007. Available in NCUC Docket No. E-7, Sub 831 (Save-a-Watt), Exhibit 1 to Testimony of Duke witness Stevie, filed April 4, 2008.

[25] Duke Energy Save-a-Watt in NCUC Docket No. E-7, Sub 831; Progress Energy DSM/EE Rider in NCUC Docket No. E-2, Sub 931. Neither of the programs has been approved by the NC Utilities Commission as of March 2009.

[26] For more information on NC SAVE$ ENERGY, go to www.ncsavesenergy.org.

[27] Cogeneration has been recently referred to as "combined heat and power," by which process heat is also used to produce electricity.

[28] La Capra Associates, Inc., "Analysis of Renewable Portfolio Standard for the State of North Carolina: Technical Report, Prepared for North Carolina Commission," December 2006; and GDS Associates, "Achievable Electricity Savings Potential for the State of North Carolina," October 20, 2006. Studies and further discussion of renewable energy are available at www.ncuc.net/reps/reps.htm.

[29] La Capra Associates, Inc., "Analysis of Renewable Portfolio Standard for the State of North Carolina: Technical Report, Prepared for North Carolina Commission," December 2006. Available with other reports on REPS at www.ncuc.net/reps/reps.htm [also in endnote 29 of original paper].

[30] Bird et al., "Green Power Marketing in the United States: A Status Report" (11th Edition), NREL Technical Report NREL/TP-6A2-44094; October 2008. Available at www.nrel.gov/docs/fy09osti/44094.pdf. See also NREL Office of Energy Analysis market study at www.nrel.gov/analysis/.

[31] It should be noted that the peak demand in the high carbon emission cost forecast is significantly lower than the demand for the low cost scenario. As utility rates go up, Duke Energy realizes that energy usage will decline.

[32] The new plants proposed by Duke Energy are a mix of combined cycle and combustion turbines, using natural gas, and the nuclear units. See Duke Energy 2008 IRP in NCUC Docket No. E-100, Sub 118.

[33] Duke Energy's proposed reserve margins are substantially higher than Progress Energy's and other utilities in the Southeast.

[34] Critics have raised issues about the accuracy of the forecast, primarily that it relies on past growth in demand over an extended period, rather than on a realistic look at what has occurred in the past five years. It also discounts trends in increasing efficiency across the board.

[35] NCUC Docket No. E-7, Sub 831 (Save-a-Watt). See Attorney General's brief on October 7, 2008 on the Industrial Load Curtailment Program.

[36] NCUC Docket No. E-7, Sub 790 (Cliffside). The Cliffside coal plant received its certificate of public convenience and necessity from the N.C. Utilities Commission on March 21, 2007. The Commission's approval of the 800 MW Unit 6 required Duke Energy to close down its existing Units 1–4 and place significant pollution control equipment on Unit 5. As stated in its cost estimate report, filed February 27, 2009, the project is currently only 29% complete, although construction is only 12% complete. The date it is expected to be placed in service has been delayed until 2012. Currently the air quality permit for the Cliffside plant is being challenged in the NC Office of Administrative Hearings (OAH cases 08 EHR 0771, 0779, 0835 and 0836) by 16 different environmental and river groups. The lack of analysis of mercury is being challenged in the Western District Federal Court; the case is *Southern Alliance for Clean Energy et al. v. Duke Energy*, Civil Action No. 1:08-CV-00318 (filed July 14, 2008). On February 12, 2009, thirty health and environmental groups petitioned the US Environmental Protection Agency to object to the Title V renewal permit.