PUBLIC VERSION

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

	)	
In the Matter of Investigation of Integrated	)	DOCKET NO. E-100
Resource Planning in North Carolina - 2009	)	SUB 124

DIRECT TESTIMONY OF JOHN D. WILSON ON BEHALF OF ENVIRONMENTAL DEFENSE FUND, THE SIERRA CLUB, SOUTHERN ALLIANCE FOR CLEAN ENERGY AND THE SOUTHERN ENVIRONMENTAL LAW CENTER

PUBLIC VERSION

FEBRUARY 19, 2010

PUBLIC VERSION

List of Exhibits

Q. PLEASE STATE YOUR NAME, POSITION, AND BUSINESS ADDRESS.

A. My name is John D. Wilson. I am Director of Research for Southern Alliance for Clean Energy ("SACE"), and my business address is 1810 16th Street, NW, 3rd Floor, Washington, DC 20009.

Q. PLEASE STATE BRIEFLY YOUR EDUCATION, BACKGROUND AND EXPERIENCE.

A. I graduated from Rice University in 1990 with a Bachelor of Arts degree in physics and history. I received a Masters in Public Policy Degree from the John F. Kennedy School of Government at Harvard University in 1992 with an emphasis in energy and environmental policy and economic and analytic methods. Since 1992, I have worked in the private, non-profit and public sectors on a wide range of public policy issues, usually related to energy, environmental and planning topics.

I became the Director of Research for SACE in 2007. I am the senior staff member responsible for our energy efficiency program advocacy, as well as being responsible for work in other program areas.

I have testified before the North Carolina Utilities Commission (Docket E-7 Sub 831) and before the South Carolina Public Service Commission (Dockets 2007-358-E and 2009-226-E). I have testified and presented before the Florida Public Service Commission (including Dockets 080407 – 080413) and presented to the Board of the Tennessee Valley Authority regarding energy efficiency and renewable energy.

I have also testified before the legislatures of Florida, North Carolina and Texas, the Texas Natural Resource Conservation Commission, and the U.S. Environmental Protection Agency on numerous occasions. I have participated in North Carolina Climate Action Plan Advisory Group and the South Carolina Climate, Energy & Commerce

Advisory Committee as an alternate for Dr. Stephen A. Smith, Executive Director of SACE. I have also served as a member of various technical work groups dealing with energy supply and efficiency issues. I have served on numerous state and local government advisory committees dealing with environmental regulation and local planning issues in Texas. I have been an invited speaker to a wide variety of academic, industry and government conferences on a number of energy, environmental and planning related topics.

A copy of my resume is attached as Wilson Exhibit 1.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of SACE, Environmental Defense Fund ("EDF"), North Carolina Sierra Club ("NCSC"), and the Southern Environmental Law Center ("SELC") (collectively, the "Environmental Intervenors").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present my evaluation of the Integrated Resource Plans ("IRPs" or "resource plans") filed by Duke Energy Carolinas ("Duke ") and Progress Energy Carolinas ("Progress").[1] Specifically, I focus on whether Duke and Progress adequately incorporate energy efficiency[2] resources into their IRPs.

[1] Although the IRP of Dominion North Carolina Power ("Dominion") is also at issue in this docket, my testimony focuses on the Duke and Progress IRPs because they are the major utilities in the state.

[2] I note that throughout my testimony, I generally refer to energy efficiency as a general term encompassing demand response and energy conservation programs, as well as using the term "demand-side resources" to refer to energy efficiency as North Carolina rules require it to be considered in resource planning.

Q. WHAT IS THE BASIS FOR YOUR TESTIMONY?

A. In preparing my testimony, I evaluated the resource plans and REPS Compliance Plans reports of Duke[3] and Progress,[4] as well as those utilities' responses to data requests.[5] My review focused on the 2009 plan submissions, but also included review of material submitted for the 2008 docket to confirm my conclusions.

Q. WHAT IS THE PURPOSE OF ELECTRIC UTILITY RESOURCE PLANNING?

A. As the Commission recognized in its October 16, 2009 Order in this docket, the Integrated Resource Planning process is intended to identify the least cost electric utility resource options, consistent with adequate, reliable service and other legal obligations. In selecting resource options, utilities must consider demand-side options such as conservation, efficiency and load management, as well as supply-side resources.

Q. WHAT ARE YOUR OVERALL CONCLUSIONS?

A. North Carolina's electric utilities are offering substantial energy efficiency programs for the first time. For 2010, the utilities forecast reducing system sales by 0.3% through energy efficiency programs.

While these efforts are a good start, energy efficiency is still treated as a second-class resource by North Carolina utilities. Even as North Carolina utilities have given greater consideration to energy efficiency in selecting near-term resource options, they

---

[3] The Duke Energy Carolinas Integrated Resource Plan (Annual Report) Rev 1 (Jan. 11, 2010) ("Duke IRP").

[4] Progress Energy Carolinas Integrated Resource Plan (Sept. 1, 2009) ("Progress IRP")..

[5] For comparative purposes, I also reviewed the plans or reports of Dominion North Carolina Power ("Dominion"), EnergyUnited Electric Membership Corporation ("EnergyUnited"), North Carolina Electric Membership Corporation ("NCEMC"), Haywood Electric Membership Corporation ("Haywood"), Piedmont Electric Membership Corporation ("Piedmont"), Rutherford Electric Membership Corporation ("Rutherford"), and the utilities represented by GreenCo Solutions.

are not making long-term resource decisions with full consideration of energy efficiency. The forecasts of energy efficiency during the 15-year resource planning horizon are based on a process which fails to consider potential demand-side resource options on an equivalent basis to supply-side resource options. As a result, the IRP process conducted by North Carolina utilities does not result in the "least-cost mix of resource options." In fact, utilities are only forecasting cumulative energy savings of 3.1% over the next fifteen years, which is less than the two-year goals of some leading utilities.

North Carolina utilities should evaluate demand-side resources on an equivalent basis to supply-side resources, considering a comprehensive set of options and evaluating them in a systematic basis, particularly over the long term.

Q. PLEASE DESCRIBE THE INTEGRATED RESOURCE PLANNING REQUIREMENTS IN NORTH CAROLINA RELATED TO ENERGY EFFICIENCY.

A. N.C. Gen. Stat. § 62-2(3a) establishes a state policy that utility resources include "use of the entire spectrum of demand-side options, including but not limited to conservation, load management and efficiency programs." The statute also requires energy planning to result in "the least cost mix of generation and demand-reduction measures which is achievable . . . ." Consistent with this policy, the Commission is required to "develop, publicize and keep current an analysis of the long-range needs" for electricity in the state, and to consider this analysis in ruling upon an application for construction of a new power plant. N.C. Gen. Stat. § 62-110.1.

Commission Rule R8-60 requires each utility to file a biennial report of its integrated resource planning process, with updates filed in the off years. Commission Rules R8-60 and R8-61 provide a framework for the evaluation of energy efficiency in each utility's IRP.

- Rule R8-60(c)(1) requires each utility to offer a 15-year forecast of demand-side resources.
- Rule R8-60(c)(2) and (f) requires each utility to conduct a "comprehensive analysis" of demand-side resource options. Rule R8-60(i)(6) further requires each utility to "provide the results of its overall assessment of existing and potential demand-side management programs, including a descriptive summary of each analysis performed or used by the utility in the assessment" as well as "general information on any changes to the methods and assumptions used in the assessment . . ." Among the specific requirements of this rule is the direction to discuss programs "evaluated but rejected" by the utility.
- Rule R8-60(g) requires each utility to "consider and compare . . . both demand-side and supply side [resource options] to determine an integrated resource plan that offers the least cost combination (on a long-term basis) of reliable resource options and combinations of resource options to serve its system needs." Rule R8-60(i)(8) requires the utility to describe and summarize "its analyses of potential resource options and combinations of resource options performed by it . . . to determine its integrated resource plan."

Commission Rule R8-67 requires a REPS compliance plan and compliance report to be filed with the utility's IRP.

I. Overview of Energy Efficiency Benefits and Role in Resource Planning

Q. PLEASE DESCRIBE THE BENEFITS OF ENERGY EFFICIENCY PROGRAMS.

A. Utility-led energy efficiency programs are the least-cost energy resource from a system perspective. Unlike supply-side resources, addressing system needs with energy efficiency resources provide net utility bill reductions to consumers.

Energy efficiency provides both energy-related and capacity-related benefits. The *National Action Plan for Energy Efficiency* ("NAPEE"),[6] a consensus report of leading regulatory, utility and advocacy experts, reports that the benefits of energy efficiency also include environmental quality improvements (particularly air quality, water supply and reductions in greenhouse gas emissions), energy market price reductions (e.g., lower wholesale costs of natural gas), lower portfolio risk (a hedging or insurance value against price spikes), local and in-state economic development and jobs, and low-income population assistance.

A recent report summarizes the benefits of energy efficiency well:

> Energy efficiency offers a vast, low-cost energy resource for the U.S. economy – but only if the nation can craft a comprehensive and innovative approach to unlock it . . . If executed at scale, a holistic approach would yield gross energy savings worth more than $1.2 trillion, well above the $520 billion needed through 2020 for upfront investment in efficiency measures . . . Such a program is estimated to reduce end-use energy consumption in 2020 by 9.1 quadrillion BTUs, roughly 23 percent of projected demand, potential abating up to 1.1 gigatons of greenhouse gases annually.[7]

[6] *National Action Plan for Energy Efficiency,* US Department of Energy and Environmental Protection Agency (July 2006).

[7] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, July 2009.

Each of these numbers tells a rich story in itself. Saving the national economy $1.2 trillion frees up capital and gives greater budget flexibility to ratepayers. If we fail to pursue available savings aggressively, we will instead build expensive, unnecessary power plants. Efficiency also helps reduce the impact of energy price spikes on the bottom line or family budget – a tool that helps prevent account defaults and even business closures.

Spending $520 billion to achieve those savings will also create jobs. Today, nearly 2 million jobs are "supported by efficiency-related investments," according to a study by the American Council for an Energy-Efficient Economy ("ACEEE").[8]

The prospect of using cost-effective energy efficiency measures to cut electricity demand by 23 percent represents a transformative opportunity. Those states and utilities leading the country with strong programs are experiencing fundamental shifts in load growth and characteristics.[9]

Finally, energy efficiency's potential to abate up to 1.1 gigatons of greenhouse gases annually will allow utilities and their customers to avoid the very significant cost of compliance with impending greenhouse gas regulations. The North Carolina Climate Action Plan Advisory Group found that energy efficiency programs at a "top ten states" investment level would reduce North Carolina greenhouse gas emissions by 12 million

[8] Ehrhardt-Martinez, K. and J.A. Laitner, "The Size of the U.S. Energy Efficiency Market," American Council for an Energy-Efficient Economy, Report E083, May 2008.

[9] Kushler, M., et al., "Meeting Aggressive New State Goals for Utility-Sector Energy Efficiency: Examining Key Factors Associated with High Savings," American Council for an Energy-Efficient Economy, Report U091, March 2009.

metric tons in 2020, accounting for roughly 10% of all potential mitigation measure savings.[10]

Q. DOES ENERGY EFFICIENCY REDUCE CUSTOMER ENERGY BILLS?

A. Yes. A frequent, but misplaced, criticism about energy efficiency programs is that they have an adverse effect on some or even all customers. In fact, historical evidence and utility rate simulations show precisely the opposite – that customer energy bills are reduced over the long term by aggressive energy efficiency programs. ***Customer savings occur even though rates may increase slightly, even at aggressive levels of energy efficiency***, as demonstrated in a recent study by Lawrence Berkeley National Laboratory ("LBNL").[11] In Wilson Exhibit 2, I have summarized LBNL's findings relating rate increases of less than ½ cent per kilowatt hour to ***net customer bill savings of up to 6%***.

State program impacts also demonstrate that energy efficiency programs do not automatically drive rates upward. This is illustrated in Wilson Exhibit 3, a comparison of rate and energy efficiency trends of Iowa to North Carolina.

Q. HOW DOES NORTH CAROLINA COMPARE TO OTHER STATES ON ENERGY EFFICIENCY?

A. North Carolina trails far behind the top-performing states. According to "The 2009 State Energy Efficiency Scorecard," North Carolina ranks 26th overall on energy efficiency and 26th on its utility and public benefits programs and policies. In 2007, North Carolina's annual savings from energy efficiency programs were 40th in the country, less than 0.01%

---

[10] North Carolina Climate Action Plan Advisory Group, "Recommended Mitigation Options for Controlling Greenhouse Gas Emissions," North Carolina Department of Environment and Natural Resources, October 2008.

[11] Cappers et al., "Financial Analysis of Incentive Mechanisms to Promote Energy Efficiency: Case Study of a Prototypical Southwest Utility," LBNL-1598E, March 2009.

of retail sales.[12] To put this in perspective, LBNL estimated that energy efficiency programs resulted in savings equivalent to 0.34% of total national retail electricity sales in 2008, an average dragged down due to about half of the states (including North Carolina) reporting insignificant energy savings.[13] North Carolina can and should do better.

Q. ARE STATES WITH LEADING ENERGY EFFICIENCY PROGRAMS THOSE WITH HIGH ELECTRIC RATES?

A. No, several states with electricity rates comparable to, even lower than, North Carolina have demonstrated much higher rates of energy savings. This is illustrated in Wilson Exhibit 4, which presents a comparison of average state electricity rates to annual energy savings reported by energy efficiency programs. Low electricity rates are simply ***not*** a barrier to investment in energy efficiency.

An ACEEE report reached the same conclusion: although the relationship between higher rates and higher energy efficiency savings is "intuitively logical," the actual "magnitude of the relationship is slight."[14] While low rates are not a barrier to energy efficiency, Wilson Exhibit 5 describes a number of well-recognized barriers that must be addressed through sound policies and best practice program design.

Q. WHAT IS NEEDED TO PROVIDE THE BENEFITS OF ENERGY EFFICIENCY TO CUSTOMERS IN NORTH CAROLINA?

A. The NAPEE report, a widely accepted strategy to take action on energy efficiency, makes the following five recommendations:

---

[12] American Council for an Energy-Efficient Economy (ACEEE), "The 2009 State Energy Efficiency Scorecard," Report Number E097, October 2009.

[13] Barbose, G., C. Goldman and J. Schlegel, "The Shifting Landscape of Ratepayer-Funded Energy Efficiency in the U.S.," Lawrence Berkeley National Laboratory, LBNL-2258E, October 2009.

[14] Kushler (2009).

1. Recognize energy efficiency as a high-priority energy resource.
2. Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.
3. Broadly communicate the benefits of and opportunities for energy efficiency.
4. Promote sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective.
5. Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.

The NAPEE report identified two challenges to incorporating energy efficiency into resource planning: "determining the value of energy efficiency in the resource planning," and "setting energy efficiency targets and allocating budgets, which are guided by resource planning, as well as regulatory and policy decisions."

Q. ARE NORTH CAROLINA UTILITIES EFFECTIVELY IMPLEMENTING THE NAPEE RECOMMENDATIONS ?

A. Duke and Progress are investing in energy efficiency at meaningful levels in the near-term, and all three investor-owned utilities have committed to sustain meaningful energy efficiency programs. With these large-scale utility efficiency programs, North Carolina is stepping forward as the energy efficiency leader in the Southeast.

Nevertheless, energy efficiency remains confined to a second-class status in the Duke and Progress resource plans. The IRPs neither "recognize energy efficiency as a high-priority energy resource" nor have they made "a strong, long-term commitment to implement cost-effective energy efficiency as a resource." Duke and Progress must improve their resource planning practices to fulfill the NAPEE recommendations.

On a more positive note, recent decisions by the Commission to approve new rate structures for Duke and Progress are consistent with the NAPEE recommendations to "promote sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective" and to "align utility incentives with the delivery of cost-effective energy efficiency and modify[ing] ratemaking practices to promote energy efficiency investments."[15]

Q. HOW SHOULD THE BENEFITS OF ENERGY EFFICIENCY BE REFLECTED IN RESOURCE PLANNING?

A. Utilities and states use a variety of methods to ensure that the benefits of energy efficiency are reflected in the resource planning process. As the NAPEE report points out, there are "no standard approaches on how to appropriately quantify and incorporate [the] benefits [of energy efficiency] into utility resource planning." One challenge to standardization is that some planners consider only the simplest energy and capacity related benefits of energy efficiency, while others consider a wider range of benefits, such as those summarized from the NAPEE report earlier in my testimony.

The role of energy efficiency in a utility resource plan is often quantified through either a performance targets or a program budget. North Carolina rules call for these targets or budgets to be established in a least-cost integrated resource planning process, with further consideration in other regulatory proceedings. Alternatives to use of a resource planning process to establish energy efficiency targets or budgets include public

[15] With the exception of non-intervenor NCSC, the organizations that I am testifying on behalf of supported the approved Duke Energy save-a-watt cost recovery mechanism. However, we opposed the lack of a performance-based incentive mechanism and the overall incentive level in the approved Progress Energy cost recovery mechanism.

goods funding budgets, market-based resource allocation, and resource loading order considerations.

Some states use public goods-funded charges to deliver energy efficiency, through either a utility or, more often, a third party administrator. Changes in funding levels are the primary drivers of program impact, and the forecast impacts of this spending are reflected in the resource plans of utilities as an input.

Another approach is to evaluate energy efficiency as a market resource rather than using a cost-effectiveness test approach. This can be quite literal, in the sense that the deregulated New England region includes demand-side resources in an annual capacity "market." A market resource approach to energy efficiency requires a rigorous evaluation, measurement and verification process.[16] Or it may be a portfolio modeling exercise, such as that used in the Pacific Northwest, in which supply-and-demand-side resources compete with each other in an optimization model that both allocates and schedules resources to reduce both energy cost and energy price risk.[17]

Placing energy efficiency programs first in the "loading order" is another alternative. California's principal energy agencies adopted a loading order in the *2003 Energy Action Plan* as a foundation for policies and decisions. The "loading order calls for (1) decreasing electricity consumption by increasing energy efficiency and conservation, (2) reducing demand during peak periods through demand response and (3) meeting new generation needs first with renewable and distributed generation and then

[16] ISO New England Inc., "ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources Manual M-MVDR," October 1, 2007.

[17] Northwest Power and Conservation Council, "Chapter 9: Developing a Resource Strategy," *Sixth Northwest Power Plan*, January 2010.

with clean fossil-fueled generation." This approach has turned out to be quite successful due to strong regulatory oversight.

While it is not a "loading order" in the sense used in California, Commission Rule R8-61(b)(13) requires utilities to demonstrate that energy efficiency measures and other resources "would not establish or maintain a more cost-effective and reliable generation system" prior to being certified to construct a generating facility. Rather, the practice in North Carolina is to look to the resource plan for evidence that alternatives to new generation have already been considered and rejected in a methodical process. For this reason, it is critical for North Carolina to ensure that a comprehensive analysis of energy efficiency resource opportunities is a foundation for a least cost strategy to provide reliable electric utility service.

The diversity of policies that are used to reflect the benefits of energy efficiency in resource planning is a result of the substantial differences between demand-side and supply-side energy efficiency resources, as described in Wilson Exhibit 5.

Q. PLEASE DESCRIBE HOW ENERGY EFFICIENCY SHOULD BE INCORPORATED INTO A LEAST COST INTEGRATED RESOURCE PLANNING PROCESS.

A. There are two common approaches to ensure that energy efficiency is fully utilized in a least cost integrated resource planning process. States or utilities may either determine the potential for energy efficiency in a utility's service territory, or they may set a performance target, which may be revisited based on experience.

In many circumstances, a "bottom-up" efficiency potential study is the basis for determining how much energy efficiency should be included in resource plans. Often, this process is a result of a utility or state authority policy to achieve "all cost-effective energy efficiency." Iowa, Colorado, California and Florida are among the states that use this approach. This is also the approach favored by NAPEE in its "Guide to Resource Planning with Energy Efficiency," (November 2007). Another approach to setting an energy efficiency target is to rely on industry experience to set energy efficiency goals. The Tennessee Valley Authority and Minnesota are examples of this approach. After energy efficiency goals are established, either by administrative direction or through legislation. a detailed efficiency study is typically commissioned. However, this study may differ from a "potential study" because of a strong focus on program scope, scale and design rather than on identifying a total potential.[18]

Q. WHAT ADDITIONAL BENEFITS COULD IMPROVED PLANNING PRACTICES OFFER?

A. Beyond long-term cost savings, an additional benefit of energy efficiency is a reduction in the risk of rate spikes driven by factors such as fuel costs, extreme weather events, or demand growth. Energy efficiency is a resource that delivers energy savings benefits to customers under virtually any scenario; while the benefits vary somewhat among different "futures" that may be studied, even if benefits are not twice the cost (a typical utility program estimate), the benefits still outweigh the costs. In contrast, an idled or underutilized power plant is a cost to the system that benefits no one.

Northwest Power and Conservation Council, the planning body for the Bonneville Power Administration, explicitly considers the "insurance" or "hedging" value of risk reduction due to energy efficiency in its formal planning process. The results of this

[18] Neither a potential study nor industry experience can provide a precise measure of "cost-effective energy efficiency" in the same way that a supply-side generation plan can anticipate generation capacity with reasonable accuracy. These methods may either under- or overstate the potential for energy efficiency to meet system resource needs in much the same way that a system load forecast is unable to provide an accurate prediction of future energy demand and use.

analysis are illustrated in Wilson Exhibit 6, an annotated version of a figure produced for the council's fifth plan.

The council has recently released the "Sixth Northwest Power Plan." The plan ***"seeks an electrical resource strategy that minimizes the expected cost and risk of the regional power system over the next 20 years. Across multiple scenarios considered in the development of the Sixth Power plan, one conclusion was constant: the most cost-effective and least risky resource for the region is improved efficiency of electricity use."***[19]

North Carolina utilities have not adopted resource planning practices that quantify the risk and cost implications of different choices. The current practice of using scenarios and sensitivities does provide some directional guidance on these topics; however, as some utilities are using only two resource options for energy efficiency (existing programs vs. no programs), it is not realistic to expect those analytic methods to offer even a directional estimate of the price spike risk of different resource mixes.

II. Adequacy of 15-year Demand-Side Resource Forecast

Q. PLEASE SUMMARIZE THE 15-YEAR FORECAST OF DEMAND-SIDE RESOURCES EXPECTED TO CONTRIBUTE TOWARDS SATISFACTION OF NATIVE LOAD REQUIREMENTS FOR EACH UTILITY.

A. As described earlier in my testimony, each utility is required to provide a 15-year forecast of demand-side resources which are expected to contribute towards satisfaction of native load requirements for each utility. A summary of demand-side resource plan data from seven North Carolina utilities is presented in Wilson Exhibit 7. I have included four

[19] Northwest Power and Conservation Council, *Sixth Northwest Power Plan*, pre-publication version, February 10, 2010.

cooperatives in addition to the three investor-owned utilities in this exhibit for comparative purposes.

For each utility, I calculated the forecast energy and capacity savings due to energy efficiency programs and summarized those results in terms of the percent impact.[20] I have also calculated a North Carolina total, weighted by in-state energy use for each investor-owned utility. In 2015, for example, forecast energy savings are 1.8% of annual energy, and forecast capacity savings are 6.9% of load.[21] However, after 2015, forecast energy efficiency program growth rates decline. This disturbing trend is one reason that I do not believe North Carolina utilities have demonstrated "a strong, long-term commitment to implement cost-effective energy efficiency as a resource," as recommended in the NAPEE report.

In comparison, at least twenty-three states have established targets, mandates or other forms of energy efficiency goals that exceed those indicated in the utility resource plans. As illustrated in Wilson Exhibit 8, North Carolina's forecast energy savings of 0.3% per year over the next decade is among the lowest in the country.

Q. HAS DUKE PROVIDED AN ADEQUATE AND ACCURATE 15-YEAR FORECAST OF PROGRAM IMPACTS?

A. In general, Duke's demand-side resource forecast demonstrates its commitment to ramp up its energy efficiency offerings in the Carolinas to levels that will make it a leader in the industry. The "High Case" included in Duke's resource plan is a reasonable

[20] In my evaluation of each utility, I have limited the peak load analysis to the summer peak. In some instances, the summer peak is less than the winter peak but limiting the analysis to summer peak provides a consistent framework in which to compare utilities.

[21] This result, incidentally, reflects the higher degree of utility interest in peak reduction than in energy savings, in spite of recent Commission action to authorize lost revenue recovery mechanisms.

representation of its commitments and aspirational goals included in the "modified save-a-watt" proposal approved by the Commission in Docket E-7, Sub 831.

However, there are two problems with Duke's forecast. First, the IRP includes descriptions of each program, but it does not describe the capacity, energy, number of customers and other required information for each program over the 15-year period. This information is likely available in other dockets, but not necessarily in a manner that corresponds to the assumptions used to develop this resource plan.

Second, there are important technical defects in the Duke forecast. Both the "Base Case" and the "High Case" appear to have been developed in a manner that does not reflect the program design principles and intent of the approved programs. I have calculated the annual incremental impact of Duke's forecast energy efficiency programs and presented those data in Figure 9A of Wilson Exhibit 9.

In the "Base Case," the annual program impacts peak in 2012, 2016 and 2020. It appears that this irregular trend in program development is due to the method by which the conservation impacts were assumed. According to Duke Witness McMurry, "The projected load impacts from the conservation programs were based upon three bundles of the save-a-watt portfolio of programs. This was accomplished by allowing a new bundle to enter every four years." McMurry Direct Testimony at 15. Each "new bundle" represents what amounts to an effective "restart" of program development. In my opinion, Duke's use of the "new bundle" approach understates the likely impact of its energy efficiency programs.

The trend illustrated for the "High Case" also illustrates an irregular, albeit less severe, pattern. There is a two-year dip in 2013-14, and an irregular increase in 2021.

In order to illustrate a more typical straight-line forecast of program development, I have created adjusted "base" and "high" cases as illustrated by the dashed lines in Figure 9A of Wilson Exhibit 9. I believe my adjusted cases are a more accurate forecast of energy savings from Duke's programs because there is no reason to believe that program performance will suddenly drop off and then pick back up on a four-year cycle. The adjustments I suggest smooth out the irregularities in the forecast program impacts without assuming a different level of effort.

In Table 9B of Wilson Exhibit 9, I provide the cumulative energy efficiency program impacts associated with Duke's cases and the adjusted cases. By 2024, the adjusted base case represents an increase of 73% over the Duke Energy base case. However, the adjustment for the high case represents an increase of only 5%.

Even with these adjustments, the high case falls slightly short of Duke's goals for its modified save-a-watt programs. Meeting the targets set out in the agreement approved by the Commission would result in about 6,784 GWh of energy savings by 2020, which is about 776 GWh more than the "High Case" as adjusted above.

It is not necessarily the case that Duke's resource plan should assume full achievement of the performance target established in the approved save-a-watt financial mechanism. As I discussed earlier in my testimony, the actual capacity of a demand-side resource is only discovered through effective program execution. Yet it should be noted that a resource plan which directs investment to energy efficiency should not also direct investment to supply-side resources to meet the same forecast energy demand. To the extent that Duke is uncertain that it will achieve its targets, its alternative plans should have a resource delivery schedule that is consistent with updated efficiency program impact forecasts.

Q. WHAT SPECIFIC RECOMMENDATIONS DO YOU HAVE REGARDING DUKE'S FORECAST OF PROGRAM IMPACTS?

A. I recommend that Duke should revise its resource plan to reflect a consistent trend in energy efficiency program growth consistent with available energy efficiency potential and opportunities for reasonable program growth. With these adjustments, I believe that the Duke resource plan would adequately reflect the terms of the approved save-a-watt program.

Q. HAS PROGRESS ENERGY PROVIDED AN ADEQUATE AND ACCURATE 15-YEAR FORECAST OF PROGRAM IMPACTS?

A. In general, the Progress resource plan provides a useful description of its energy efficiency offerings in the Carolinas. However, there are two problems with Progress's forecast.

First, as in Duke's plan, the Progress IRP includes descriptions of each program, but it does not describe the capacity, energy, number of customers and other required information for each program over the 15-year period. Second, the Progress plan includes confusing or inconsistent data describing the capacity and energy impacts of its demand-side resource forecast. According to Table 1 of the resource plan, Progress forecasts a system summer peak load of 12,731 MW without DSM and 12,230 MW with DSM in 2010. Thus, Table 1 suggests demand-side resources contribute a total of 501 MW in 2010.

According to the table on page E-5 of the Progress resource plan, new programs are expected to contribute 150 MW to meeting system summer peak demand in 2010.

According to the table on page E-8, existing demand-side resources contributed 883 MW (not specified as to summer or winter peak) in 2008. Based on the data in Table 1, however, it appears that Progress has only accounted for 351 MW of existing demand-side resources for 2010. The contribution of existing demand-side resources to summer system peak demand grows slightly to 360 MW, 366 MW and 373 MW in 2015, 2020, and 2024 respectively.

For this reason, I conclude that Appendix E is not clearly reconciled with Table 1 in presentation of demand-side resources.

I made certain assumptions regarding the data presented by Progress in order to estimate the total impact of energy efficiency programs on the Progress forecast. I assumed that the forecast of annual system energy in Table 1 is the "with" energy efficiency forecast. To calculate the "without" forecast, I adjusted this estimate using the energy savings forecast for new programs and the single-point estimate of energy savings attributed to one existing energy savings, as presented in Appendix E.

I was unable to be certain that my calculations are accurate for three reasons. First, although Appendix E specifies that the energy savings are forecast "at generator" for new programs, it is not clear whether these savings are directly comparable to the annual system energy as presented in Table 1. Second, I have assumed 100% of 2008 energy savings for the 2007 CFL Buy-Down Pilot in 2010 and 2015, then no energy savings thereafter. A better approach would be to use a program-specific forecast. Third, any other reasons that capacity forecasts in Appendix E are not reconciled with Table 1 likely apply to system energy forecasts as well.

Q. WHAT SPECIFIC RECOMMENDATIONS DO YOU HAVE REGARDING PROGRESS'S FORECAST OF PROGRAM IMPACTS?

A. I recommend that Progress should revise its resource plan to provide a clear "with" and "without" energy efficiency forecast that reconciles the information in Appendix E with Table 1.

Q. YOU MENTIONED THAT YOU REVIEWED THE DOMINION IRP FOR COMPARATIVE PURPOSES. DO YOU HAVE ANY COMMENTS ON DOMINION'S 15-YEAR FORECAST OF PROGRAM IMPACTS?

A. Yes. Dominion has not proposed to offer new demand-side resource programs in North Carolina. Its demand-side resource forecast is based on programs filed in Virginia on July 28, 2009 (over six months ago) and Dominion indicates that it "plans to file for NCUC approval of a portfolio of energy efficiency programs at the appropriate time." Dominion should file its proposed programs expeditiously so that its North Carolina customers may have access to the opportunity to save energy and lower their electric bills as early as practicable.

In general, the Dominion demand-side resource plan provides a useful description of energy efficiency programs it hopes to offer in Virginia and North Carolina. However, there are two problems with Dominion's forecast.

First, as with the Duke and Progress IRPs, although the Dominion resource plan includes descriptions and cost-effectiveness estimates for each program that it has proposed in Virginia, it does not describe the capacity, energy, number of customers and other required information for each program over the 15-year period, other than what appears to be cumulative impacts in 2024. This information is likely available in its Virginia program plans, but not necessarily in a manner that corresponds to the assumptions used to develop this resource plan.

Second, its demand-side resource plan appears to include a program that appears to be a supply-side resource program. Dominion's proposed Commercial Distributed Generation Program provides for customers to enroll with a contractor to install a generator on customer property that may be dispatched by Dominion for up to 120 hours of dispatch during the year. The proposed distributed generation program described by Dominion is more properly characterized as a supply-side resource since the contractor will be providing the resource as either "owned/leased generation capacity" or "firm purchased power arrangements," as described in Rule R8-60(c)(1).

Q. WHAT RECOMMENDATIONS DO YOU HAVE TO CORRECT SYSTEMATIC DEFICIENCIES IN THE UTILITIES' 15-YEAR FORECASTS OF ENERGY EFFICIENCY PROGRAM IMPACTS?

A. I recommend that the Commission direct the investor-owned utilities to describe the capacity, energy, number of customers and other required information for each program over the 15-year period. These elements of the annual plans and reports are described in Commission Rule R8-60(c)(1), (h) and (i). I found only a few, partial instances where these data were provided in the resource plans of the investor-owned utilities.

Descriptive data for demand-side resources are important in order for the Commission to determine whether demand-side resources are considered on an equal basis with supply-side resources. For example, Rule R8-60(i)(6)(i) and (ii) require each utility to provide "information for each resource" for "demand-side programs." This is similar to the language in Rule R8-60(i)(2)(i) and (ii) that requires each utility to provide data for "each listed unit" and "each listed generation addition."

In contrast to the full and orderly data describing existing and planned supply-side resources required by Rule R8-60, existing and planned demand-side resources are incompletely described and what data are made available are fragmentary and inconsistently treated. In addition to giving second-class treatment to demand-side resources, it is impossible to determine from these resource plans if they were developed using reasonable and internally consistent practices.

III. Adequacy of Analysis of Demand-Side Resource Options

Q. DID DUKE AND PROGRESS RELY UPON A COMPREHENSIVE ANALYSIS OF DEMAND-SIDE RESOURCE OPTIONS IN DEVELOPING THEIR RESOURCE PLANS?

A. No. Neither Duke nor Progress has performed a comprehensive analysis of demand-side resource options. Although Duke and Progress have each conducted some analysis of demand-side resource options, these analyses vary in their adequacy. Neither utility has performed a comprehensive energy efficiency potential study, as discussed earlier in my testimony. Notably, the entire analysis conducted by Progress is being treated as confidential and is not even mentioned in its resource plan.

Q. PLEASE DESCRIBE YOUR REVIEW OF THE DUKE AND PROGRESS ANALYSES OF DSM OPTIONS.

A. I reviewed each utility's plans and reports to determine whether they evaluated demand-side resource options as thoroughly as Rule R8-60(g) requires, while recognizing that the rule does not prescribe any single evaluation method. I expected to find that each utility clearly explained and justified its methods and assumptions, included a comprehensive scope of study, and had results that were either consistent with the results of similar studies for other states or utilities, or included an explanation of unusual circumstances that resulted in distinctive findings.

Q. HOW CAN YOU TELL WHETHER A UTILITY'S SCOPE OF STUDY IS COMPREHENSIVE?

A. There are several indicators of a comprehensive scope of study. One simple indicator is the number of efficiency measures considered.[22] For example, the study completed for Duke by Forefront Economics, Inc. ("Forefront"),[23] while a useful indication of energy efficiency opportunities, covers only 40 residential and 31 non-residential efficiency measures. In contrast, a recent assessment of energy efficiency potential for Florida (including Progress Energy Florida and six other utilities) included 276 unique measures: 70 residential, 92 commercial and 114 industrial measures.[24]

Another indicator is the degree to which all key areas of energy use are represented in the findings. For example, some efficiency studies have failed to consider energy savings opportunities from outdoor and street lighting, traffic signal, wastewater utility, and water supply utility end-use sectors, even though there are widely used energy efficiency measures applicable to these sectors.

Q. IS A NON-COMPREHENSIVE ENERGY EFFICIENCY STUDY ADEQUATE?

A. No, a non-comprehensive energy efficiency potential study can result in a substantial underestimate of energy efficiency potential. To demonstrate this point, I conducted a comparative analysis of the residential energy efficiency potential from three studies conducted for North Carolina: the 2007 Forefront study for Duke, a study by Appalachian State University ("ASU"), and a study by GDS Associates for this Commission. I adjusted the ASU and GDS study findings to correspond to the energy use

[22] It should be noted that while they are a useful indicator, measure counts may be misleading, since some may be overlapping technologies (e.g., LED and CFL lighting options).

[23] Forefront Economics, Inc., H. Gil Peach & Associates LLC, and PA Consulting Group, "Duke Energy Carolinas DSM Action Plan: North Carolina Report," prepared for Duke Energy Carolinas (August 2007) (hereinafter the "Forefront Study").

[24] Itron, Inc., "Technical Potential for Electric Energy and Peak Demand Savings in Florida," March 12, 2009.

of residential customers served by Duke in order to ensure that the comparison was on an equal scale.[25]

The similarity in the three studies' findings is striking at first glance. Forefront found 5,500 GWh potential at 6 c/kWh by 2026, GDS found 4,805 GWh potential at 5 c/kWh, and ASU found 5,241 GWh potential in its "moderate" scenario. However, at the measure level, the results are quite different. I summarized the cost-effective potential estimates from each study into thirty-one measure categories. Notably, only six of the thirty-one measure categories are represented in all three studies. I selected the maximum study result for each measure category and found that the estimated cost-effective energy efficiency potential approximately doubled to 11,934 GWh. This finding suggests that each of these studies may have missed approximately half of the cost-effective energy efficiency potential for residential customers in North Carolina.

The main reason that these studies appeared to miss large amounts of cost-effective energy efficiency potential is that they did not include a comprehensive scope of study. They may also have differed based on different assumptions about the cost of individual measures, customer adoption rates, or cost-effectiveness thresholds.

These are important factors, and can also skew the results of a potential study. For example, Florida utilities chose to exclude about four-fifths of otherwise achievable, cost-effective energy efficiency potential opportunities from their recommended goals because they felt that it was unfair for ratepayers to cross-subsidize each other to take steps that were in the customer's financial self-interest.[26] Mixing arguments about fairness and

[25] I have not conducted a similar analysis of the study performed for Progress because I would not be permitted to make these data public under the confidentiality agreement required by Progress.

[26] Florida Public Service Commission, Order No. PSC-09-0855-FOF-EG (Dec. 30, 2009).

program design with the question of whether or not energy efficiency potential exists can confuse the discussion about the opportunity to save energy at a lower long-term cost than to meet demand with supply-side resources.

Q. IS THERE AN ALTERNATIVE TO A COMPREHENSIVE ENERGY EFFICIENCY STUDY?

A. Another approach to setting an energy efficiency target is to rely on industry experience. Based on the perspective of highly regarded experts and the review of a number of programs, I recommend that utilities should be encouraged to strive to meet an annual energy savings goal of 1%. This goal is consistent with the actual achievements in leading states,[27] as eight states now exceed 0.8% in average savings as a percent of energy sales.[28] A large number of individual utilities have exceeded this threshold, including two in the Southeast.[29] Duke Energy adopted this goal in a non-binding agreement with a number of national energy efficiency advocacy organizations, and later formalized it as part of its modified save-a-watt proposal that has been approved by the Commission. Industry experience strongly suggests that an annual energy savings goal of 1% is a reasonable estimate of what an aggressive, cost-effective energy efficiency program can deliver.

A 1% annual energy savings goal is also consistent with the findings of a recent Georgia Tech meta-analysis of several potential studies, which found that ***"the***

[27] Kushler (2009).

[28] ACEEE (2009).

[29] Wilson, J., "Energy Efficiency Program Impacts and Policies in the Southeast," Southern Alliance for Clean Energy, May 2009.

achievable electric efficiency potential for the South ranges from 7.2 to 13.6% after 10 years.”[30]

Utilities that claim to have conducted a comprehensive analysis of energy efficiency program options and suggest a substantially lower (or higher) program scale should be expected to make a convincing case for unusual circumstances that resulted in distinctive findings. Comparing a utility’s assumptions and methods to that of other utilities is a recognized technique used by resource planning experts.[31]

Q. DID DUKE AND PROGRESS PERFORM COMPREHENSIVE ENERGY EFFICIENCY POTENTIAL STUDIES?

A. No, it does not appear that either utility’s study was comprehensive. I note that neither utility has filed its study in this docket. The Forefront study for Duke has been in public circulation since its completion. Progress disclosed in a prior proceeding that it had commissioned a market potential study, and provided a confidential copy in response to a data request.

The first problem with both studies is that their findings suggest a substantially lower achievable energy efficiency potential than similar studies at the national or regional level without describing any unusual circumstances that may explain the results. In my review of the available documentation, neither utility nor its consultants explored any possible reasons for the unusually low energy efficiency potential found in these two studies.

[30] Chandler, S. and M.A. Brown, “Meta-Review of Efficiency Potential Studies and Their Implications for the South,” Working Paper # 51 (August 2009).

[31] See, for example, testimony of Duke Energy Witness Riddle, p. 15.

Progress's potential study indicates that the findings . However, the results of that are not discussed in the report or any other material I had the opportunity to review.

Duke's potential study included only a brief comparison of its findings and recommendations to programs operated by utilities serving 500,000 to 2,000,000 customers. However, the comparison in Duke's study focuses on spending, not energy savings impacts. (The study indicates that the recommended spending levels are somewhat above average, but within the range of typical programs.) The Forefront study does compare its five-year potential of 1.9% energy savings to other utility DSM program savings, but the comparison is so cursory that the reported impact of 2.9% for other utility DSM programs is not clearly represented as to whether it refers to cumulative or annual program impacts.[32] Even though this average 2.9% impact is more than 50% higher than the recommended five-year program, the report does not provide any explanation for this substantial deviation, let alone justify a 1.9% five-year savings potential in comparison to the 7.2 to 13.6% ten year savings potential discussed above.

The lack of a comparison to findings by comparable utilities is of concern because the assumptions and methods selected may result in an inaccurate estimate of energy efficiency potential. For these studies to be considered credible and comprehensive, a thorough and convincing explanation for the unusually low potential estimates in these studies should be provided.

The second problem with both the Duke and Progress potential studies is that the measures studied exclude substantial energy savings opportunities. As discussed above,

[32] Forefront Study at 94.

the Duke study included too few measures to be considered comprehensive. For example, its residential sector analysis only identified two cost-effective measures, programmable thermostats and “set back HVAC,” omitting commonly considered measures such as heat pump upgrades.

The Progress study does include . However, the measure count is somewhat . For example, over the measures are

The measure list used by Progress Energy appears to I made a cursory comparison to the measure list for the Florida potential study conducted for Progress Energy Florida and other utilities. Among the residential measures not found in the North Carolina study are

The study also omits

Q. DID THE STUDIES ADDRESS ALL SECTORS AND MEASURES THAT WOULD YIELD SIGNIFICANT ENERGY SAVINGS?

A. No. I identified three substantial measures or practices that are missing from the Duke studies: a Home Energy Comparison Report, a building re/retro/commissioning program, and various energy recycling technologies, including combined heat and power. As described in Wilson Exhibits 10-12, these three energy efficiency measures or practices alone could double the energy savings impact forecast by North Carolina Utilities.

Furthermore, several end use sectors, including the transportation, communications and utilities sector, appear to be omitted from the Duke studies. This is a significant omission, as this sector has highly energy-intensive customer applications that likely have substantial opportunities for energy savings. In the Florida energy efficiency potential study, for example, the transportation, communications, and utilities end-use sector represented 7% of total retail electric sales.[33]

Q. DOES THE DUKE RESOURCE PLAN INCLUDE A COMPREHENSIVE ANALYSIS OF DEMAND-SIDE RESOURCE OPTIONS?

A. No, there are three important problems with its analysis of demand-side resource options. Although Duke did analyze more than one demand-side resource option, it did so without a comprehensive analysis of energy efficiency options. Furthermore, the linkage between its market potential study and the options it considered in its resource plan is not well explained. Finally, Duke failed to explain how it selected its preferred demand-side resource portfolio.

As discussed above, Duke's market potential study is not comprehensive. In my review the Duke IRP, there was not any other discussion or analysis that compensated for the shortcomings of the study. Duke's commitment to a long-term goal of 1% annual energy savings is not backed up by a comprehensive analysis of energy efficiency and other demand-side options in its resource plan.

Duke's resource plan did analyze two demand-side resource portfolios, a base case and a high case. In its base case, "conservation impacts were assumed 85% of the target impacts" from the approved save-a-watt portfolio of programs. In its high case, Duke analyzed the "full target impacts of the save-a-watt bundle of programs for the first five years and then increased the load impacts at 1% of retail sales every year after that

[33] Itron (2009).

until the load impacts reach the economic potential identified by the 2007 market potential study."[34]

Although Duke states that the high case scenario is capped by the "economic potential identified by the 2007 market potential study," the high case does not appear to reach this cap. In its high case, Duke estimates its conservation program load impacts to be 10,621 GWh in 2026. Duke IRP, Table 4.2. In contrast, the Forefront study found that the cost-effective potential for energy efficiency was about 13,200 GWh through 2026. There is no alternative explanation in the resource plan or testimony that explains why the high case was limited to 10,621 GWh in 2026.

Moreover, Duke's resource plan does not describe why the base case was selected. First of all, it is not clear that the high case was analyzed as a demand-side resource option. The high case appears to be one of the "sensitivities evaluated in each scenario" during the portfolio analysis. Duke IRP at 67. However, Duke concluded that "In every scenario and sensitivity, the portfolios with the new EE and DSM were lower cost than the portfolios with the existing EE and DSM." Thus, although the plan seemed to imply that the portfolio analysis would compare the base case and high case, the conclusion refers to a comparison between the "new" and "existing" EE and DSM. The term "new" appears to refer to the base case and not the high case since the "483 MW of new energy efficiency" in the selected portfolio (Duke IRP at 73) corresponds to the value in the base case (Duke IRP at 49). If the portfolio analysis included consideration of the high case, the results of such a sensitivity analysis do not appear to be included in the report.

[34] Duke IRP at 48.

Second, even if the high case was analyzed, the IRP does not explain why the base case was the preferred option.

If Duke had selected the high case for its resource plan, its supply-side resource plan would be adjusted to delay or avoid additional generation capacity. Duke should explain why it selected a particular demand-side resource option, just as it carefully explains why it selected a particular supply-side resource option.

Over the long-term, none of the demand-side resource options considered by Duke are likely to represent what would be suggested by a comprehensive analysis of energy efficiency potential. As indicated in Table 9B of Wilson Exhibit 9, the adjusted high case suggests that Duke Energy would achieve 5,286 GWh in energy savings after ten years, or about 5.3% cumulative energy savings impacts.

Even this adjusted high case estimate of 5.3% over ten years does not come close to fully utilizing the market potential of 7.2 to 13.6% suggested by the Georgia Tech study. Thus, in no respect is it reasonable to conclude that the Duke Energy resource plan relies upon a comprehensive analysis of demand-side resource options over the long term.

Q. WHAT STEPS SHOULD DUKE TAKE TO DEVELOP A COMPREHENSIVE ANALYSIS OF DEMAND SIDE OPTIONS?

A. Duke Energy should develop a comprehensive analysis of demand-side resource options, using one of the methods described above. It should correct the technical errors I have pointed out in my testimony to the extent that they remain relevant to a revised plan. It should develop several demand-side resource options for evaluation in its resource plan. It should evaluate each of those options in its resource plan until it determines that it has identified the maximum amount of cost-effective demand-side resources that are suitable to meet the various goals of a resource plan, as discussed earlier in my testimony.

The Duke resource plan would reduce annual energy use by 3.4% in 2024 (see Table 7B of Wilson Exhibit 7). If Duke were to adopt the suggested adjustments to its high case and incorporate those into its plan, it would reduce annual energy by 8.8% by 2024 (see Table 9B of Wilson Exhibit 9). Energy savings of 8.8% would be on the low end of the achievable potential range identified in the Georgia Tech study and would be consistent with a moderately aggressive long-term energy efficiency effort. Considering the goals and demonstrated energy savings of other utilities around the country, ***Duke Energy could consider resource plans with savings of up to 15% by 2024.***

Q. DOES THE PROGRESS ENERGY RESOURCE PLAN INCLUDE A COMPREHENSIVE ANALYSIS OF DEMAND-SIDE RESOURCE OPTIONS?

A. No. In fact, the Progress IRP fails to disclose and explain its analysis of demand-side resource options, as required by Commission Rule R8-60. The discussion of demand-side resources in Progress's resource plan is limited to its existing energy efficiency and demand response programs (including new programs). In both the 2008 and 2009 resource plans, Progress indicates that it "has not rejected any evaluated energy efficiency or demand side management resources since the last Resource Plan filing."

The existence of the potential study demonstrates that Progress has not accurately represented its evaluation process. This study is not mentioned in its resource plan or supporting testimony, and Progress has marked the entire study (rather than only those portions containing sensitive business information) confidential, making it impossible for interested parties to evaluate and comment on its scope and findings.

Rather than being driven by a "bottom-up" analysis of options, the scale of the Progress demand response and energy efficiency programs appear to be driven by a May 2007 goal to double "the amount of peak load reduction capability available through DSM and EE programs, about 1,000 megawatts (MW)." Progress IRP at 17. No basis for this goal is explained in the IRP. It is perhaps no coincidence that its year 15 portfolio would save almost exactly 1,000 MW, the amount of the goal announced by Progress in 2007. While the expansion of its program is laudable, Progress has not associated this target with a completion date nor an energy savings target.[35] It would be just as incomplete if Progress announced a supply-side resource development program without a timeline or anticipated level of resource use.

Progress does appear to be actively moving forward with its energy efficiency programs. According to Progress Witness Edge, Progress "is investigating the potential for new DSM/EE program opportunities on an on-going basis . . ." The company is seeking approval of new residential programs, and is considering "a residential behavioral change initiative and other DSM/EE research and development pilots." Direct Testimony of David Christian Edge at 8-9. These programs are also briefly described as "prospective program opportunities" in the resource plan. (p. E-5) While it is encouraging to learn that Progress is considering new unspecified programs, it is unclear whether their program development is informed by the type of comprehensive analysis required by Rule R8-60(g).

[35] In the testimony of Progress Energy Witness B. Mitchell Williams, he testified that PEC is "relying upon achieving a approximately 1,000 megawatt reduction in peak load by 2014" (transcript volume 4, p. 143, line 19); the 2009 IRP indicates 1,000 MW of peak load reduction would be achieved in 2019; and the potential study prepared by indicates that .

An examination of the potential study demonstrates that Progress has not fully disclosed in its IRP its consideration of energy efficiency resources. examples of programs that Progress has considered but did not discuss in its resource plan [1] is not included in any of the energy efficiency programs discussed in the Progress IRP. For example, Progress's Residential Home Energy Improvement Program does not include Neither does the Progress resource plan explain why Progress may have rejected an program.

Progress's potential study also recommends

The Progress resource plan does include the Commercial, Industrial, and Governmental (CIG) Energy Efficiency Program, which is "available to all CIG customers interested in improving the energy efficiency of their new construction projects or within their existing facilities." The program offers both prescriptive incentives that appear to cover a broad range of end-use categories as well as custom incentives available for "opportunities not covered by the prescriptive measures." However, during the first two months of the program, Progress reported only one transaction. If Progress is making effective use of the opportunities in the CIG sectors, it is not evident in either the resource plan or its supporting testimony.

Even if Progress had incorporated its potential study into its resource plan, the resource plan would still lack a comprehensive analysis of demand-side resource options. Furthermore, Progress appears to have considered only one alternative demand-side resource portfolio in its analysis. In contrast, there is an entire section of its report discussing "Screening of Generation Alternatives." These systematic shortcomings demonstrate that energy efficiency resources are a second-class resource in Progress's plan.

Q. WHAT STEPS SHOULD PROGRESS TAKE TO PROVIDE A COMPREHENSIVE ANALYSIS OF DEMAND SIDE OPTIONS?

A. Progress should publicly disclose those portions of its potential study that do not include sensitive business information, and any other related research or materials, and discuss the implications of its research in a revised resource plan. That plan should be based on a comprehensive analysis of demand-side resource options, using one of the methods described above. It should correct the technical errors I have pointed out in my testimony to the extent that they remain relevant to a revised plan. It should develop several demand-side resource options for evaluation in its resource plan. It should evaluate each of those options in its resource plan until it determines that it has identified the maximum amount of cost-effective demand-side resources that are suitable to meet the various goals of a resource plan, as discussed earlier in my testimony.

The Progress resource plan would reduce annual energy use by 2.7% in 2024 (see Table 7B of Wilson Exhibit 7). This forecast is far below the achievable potential range identified in the Georgia Tech study and does not appear to represent even the full amount of energy efficiency allowed for REPS compliance purposes. Considering the goals and demonstrated energy savings of other utilities around the country, ***Progress Energy could consider resource plans with savings of up to 15% by 2024***.

Q. DO YOU HAVE ANY OVERALL RECOMMENDATIONS FOR IMPROVING THE ANALYSIS OF DEMAND-SIDE RESOURCE OPTIONS IN DEVELOPING THE RESOURCE PLANS OF NORTH CAROLINA UTILITIES?

A. Yes. First, I recommend that the Commission reject the simplistic approach of offering only one or two options regarding demand-side resources and direct utilities to explain how it selected its preferred portfolio. The current treatment of demand-side resources is fundamentally inferior to the degree of variation and specificity allowed for supply-side resources. Among the best practices recommended in a Lawrence Berkeley National Laboratory review of resource planning practices in the West are that utilities should "construct candidate portfolios with the maximum achievable EE potential" and use a transparent process for "selecting the preferred portfolio."[36]

Second, the Commission should direct North Carolina utilities to adopt resource planning practices that include consideration of risks that can cause short-term rate spikes. As discussed above, this practice has been used by the Northwest Power and Conservation Council and helped utilities in that region reduce the risk of short-term rate increases. The current practice of using scenarios and sensitivities does provide some directional guidance on these topics; however, considering that some utilities are using only two resource options for energy efficiency (existing programs vs no programs), this practice is not useful in helping select lower-risk plans.

Third, in support of strong energy efficiency resource analysis and program development, I would also recommend the creation of a regional energy efficiency database and collaboration process. Three widely used models exist. The Northwest

[36] Barbose, G., "Valuing Energy Efficiency as a Hedge Against Carbon Regulatory Risk: Current Resource Planning Practices in the West," Lawrence Berkeley National Laboratory, EMP Group Meeting Presentation, September 21, 2007.

Power and Conservation Council's Regional Technical Forum is a regional advisory committee established to develop standards to verify and evaluate conservation savings; it is currently updating its measure database, which is available to the public. The California Energy Commission maintains the widely used Database for Energy Efficiency Resources (DEER). The New York State Energy Research and Development Authority (NYSERDA) maintains the widely-used Deemed Savings Database. These three existing energy efficiency databases and forums are widely utilized by consultants and utilities in other parts of the country for design and initial verification.

A useful starting point for a Southeast regional database would be the North Carolina Measures Database, prepared by Morgan Marketing Partners for several North Carolina utilities. I note that this database is not disclosed or discussed in any utility filing in this proceeding, even though it is an essential part of the analysis of potential demand-side resource programs. I learned of the existence of this database in the process of reviewing a Progress response to a data request. The database itself is considered confidential.

Establishing a regional energy efficiency database and collaboration process would be a useful step for three reasons. First, it would provide a process and repository for the development of authoritative regional energy efficiency performance benchmarking. Second, a regional energy efficiency database would also help to minimize overall program evaluation costs of utilities, thereby maximizing more of the program budget that could be directed towards incentives, generating greater energy savings and benefits to customers. Third, it would provide an opportunity for business and program partners to engage with utility and government staffs to improve and expand energy efficiency programs.

As noted above, the need for collaboration between utilities and their business and program partners is substantively different for demand-side resources than for supply-side resources. Many of the services provided by business and program partners are not designed to exclusively meet the utility's needs, but also designed to respond to diverse customer interests. Building a regional database and collaboration process creates the opportunity for effective dialogue through the process of ensuring performance accountability.

IV. Adequacy of Energy Efficiency Compliance Reporting

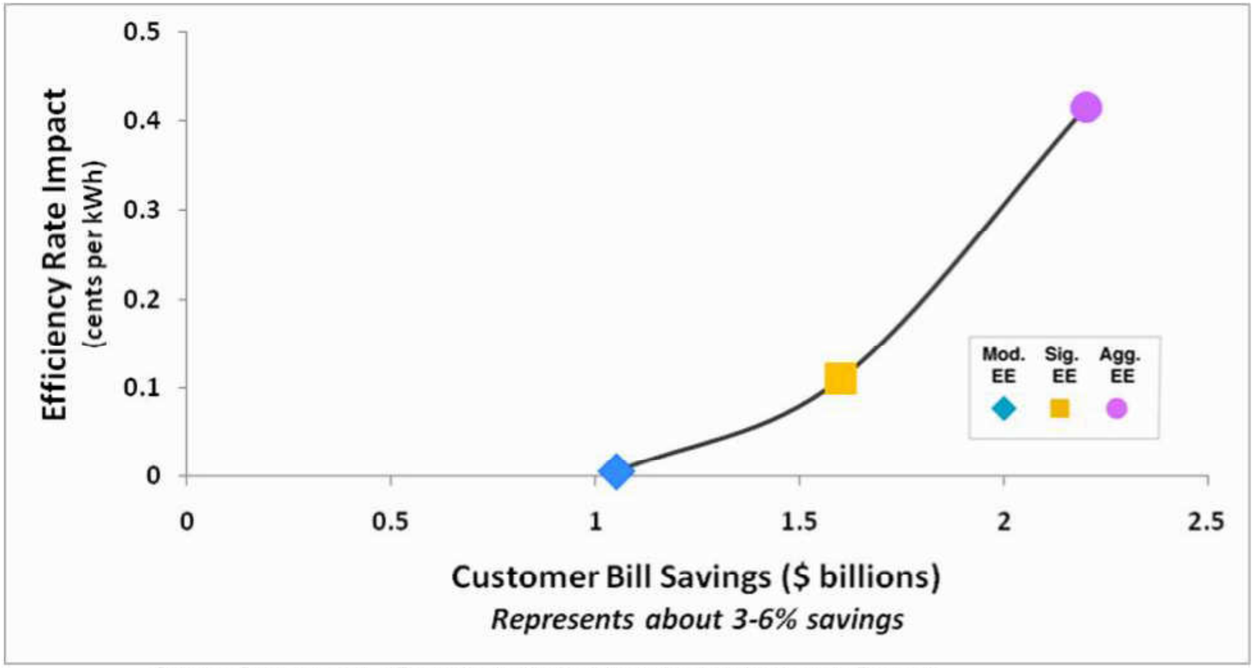
Q. ARE NORTH CAROLINA'S INVESTOR OWNED UTILITIES PROVIDING ADEQUATE REPORTING OF ENERGY EFFICIENCY IMPACTS FOR PURPOSES OF REPS COMPLIANCE?

A. Neither Progress nor Dominion submitted any documentation that indicates they intend to report energy efficiency impacts from 2007 or 2008 for purposes of REPS compliance. Duke commented regarding its interest in banking energy efficiency impacts beginning in 2008, but did not indicate what impacts occurred in 2008. This would only become a concern if the utilities submit five years worth of energy efficiency program results in a single filing to demonstrate REPS compliance for the 2012 compliance year. I do not have any reason to believe this will occur, but point out the lack of compliance filings to date in order to suggest that compliance filings should begin next year in order to avoid unnecessary challenges.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Wilson Exhibit 2: Net Customer Bill Savings *After* Considering Energy Efficiency Rate Impact



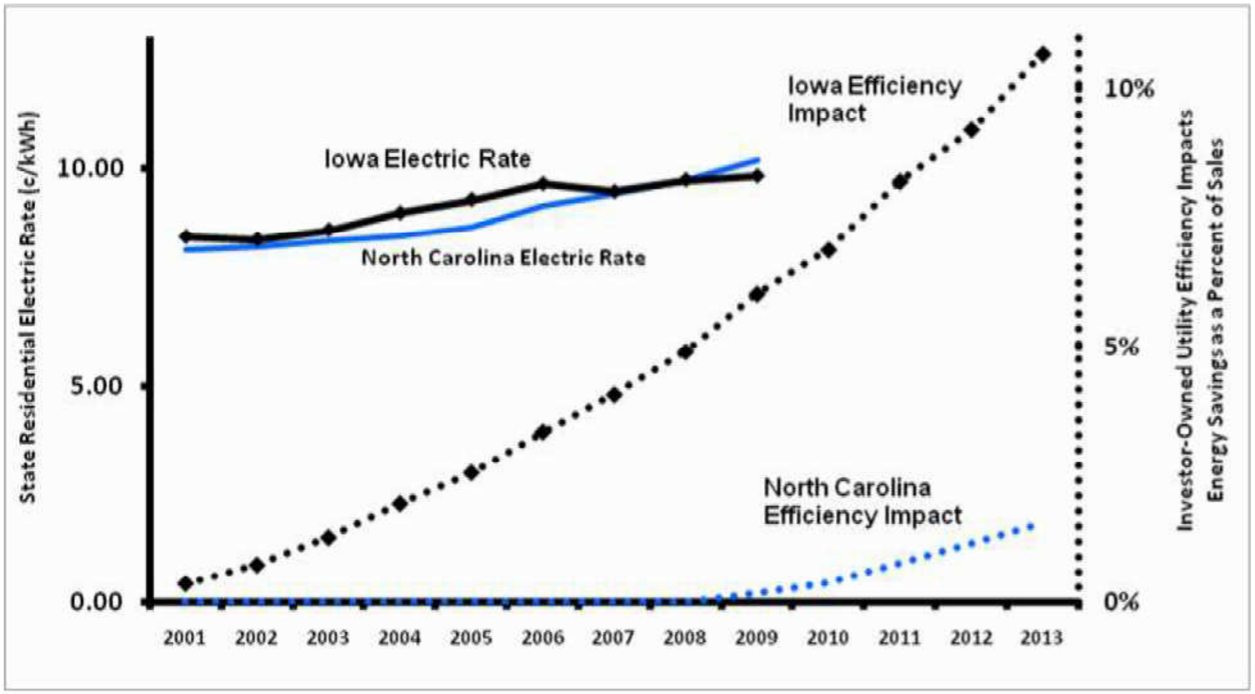
Source: Cappers et al., "Financial Analysis of Incentive Mechanisms to Promote Energy Efficiency: Case Study of a Prototypical Southwest Utility," LBNL-1598E (March 2009).

Wilson Exhibit 3: Comparison of Electric Rate and Efficiency Impacts, Iowa and North Carolina

Contrary to some claims, energy efficiency programs do not automatically drive rates upward. This exhibit, compares residential electric rate and energy efficiency program impacts for the state of Iowa to those of North Carolina.

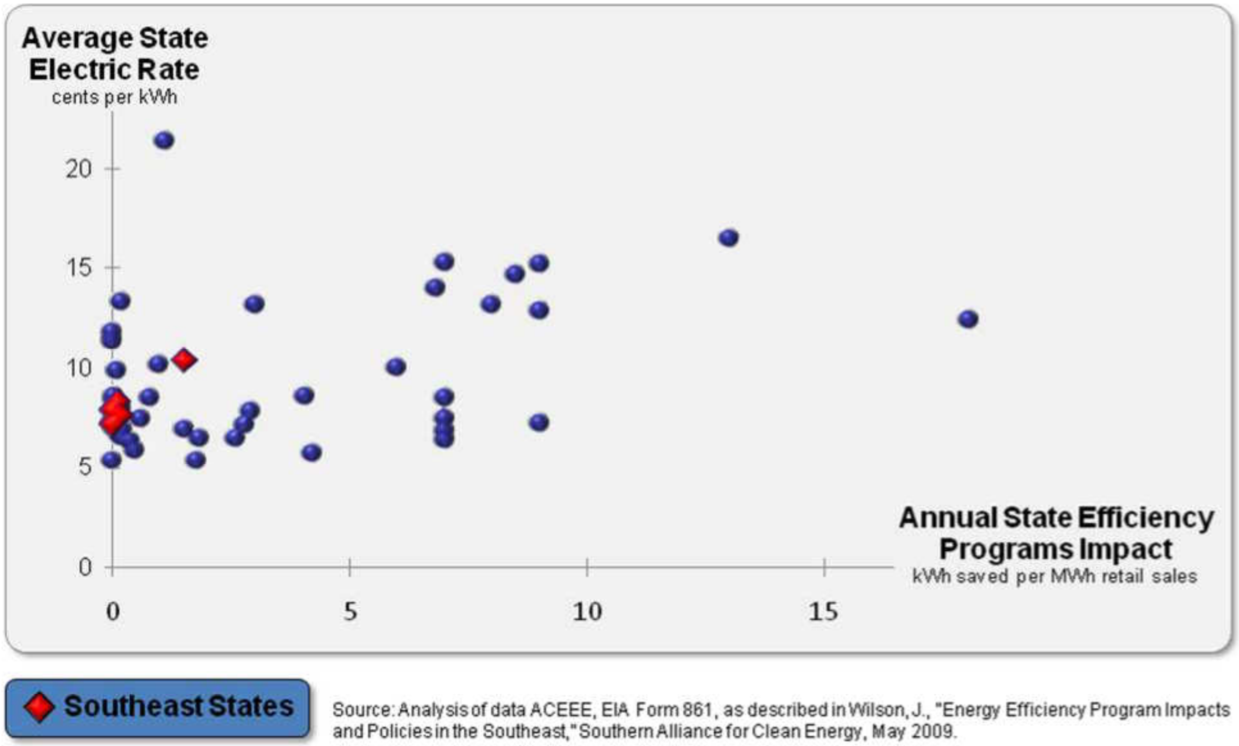
The past decade has seen North Carolina shift from a position of having lower rates than Iowa to having higher rates. Yet during this time period, North Carolina has had effectively no energy efficiency programs from an energy savings perspective, compared to Iowa energy savings programs which are expected to reach 6% cumulative savings over the same time period. This 6% energy savings has been achieved at a modest cost: since 2004, about 3.5% of Iowa utility retail sales revenue has been spent on energy efficiency and load management programs.

Of course, successful energy efficiency programs are only one of several reasons that Iowa has maintained (or improved on) rate parity with North Carolina while helping many of its customers save energy and cut bills. This result should be neither surprising nor controversial; as in North Carolina, Iowa utility-led energy efficiency programs are estimated to have benefits that are twice their cost.



Source: Analysis of data from Iowa Utilities Board, 2009 resource plans for North Carolina utilities, and the US Energy Information Administration.

Wilson Exhibit 4: Energy Efficiency Impacts Are Large in Some States Where Rates Are Comparable to the Southeast



Source: Analysis of data ACEEE, EIA Form 861, as described in Wilson, J., "Energy Efficiency Program Impacts and Policies in the Southeast," Southern Alliance for Clean Energy, May 2009.

Wilson Exhibit 5: Overcoming Unique Challenges to Energy Efficiency Resources

Energy efficiency resources are different because in three critical ways. Energy savings or conservation resources cannot be controlled or stored in the same way that conventional supply-side resources can be managed. Second, energy efficiency impacts cannot be measured in the same way that supply-side resources can be metered at the plant and customer site. Third, energy efficiency resources are typically delivered by a service provider network and customer base that is far more diverse and complex than the contractors who assist utilities in building and maintaining power plants. In a utility resource plan, these differences must be considered when assessing the uncertainties and risks associated with energy efficiency resources.

The uncertainties and risks of energy efficiency are associated with several "well-recognized barriers" responsible for the "current underinvestment in energy efficiency," including:

- Lack of information, awareness
- Lack of capital
- Utility financial regulation – disincentive to utility support
- Utility planning policy – energy efficiency not equal to supply resources
- Efficiency programs not up to date
- Transaction costs
- "Split-incentive" or "Principal-Agent" problem[1]

Leading energy efficiency programs address each of these customer and market barriers from the policy level all the way down to implementation – and back again.

One technique that leading energy efficiency programs use to address these barriers is to ramp up gradually over time as the program builds success in overcoming customer and market barriers such as lack of information. This delivery schedule is a marked contrast to that of conventional generation resources, which are typically delivered in large chunks on a particular capital improvement schedule. The ramp up approach is also needed because the actual capacity of a demand-side resource is only discovered through effective program execution – potential studies and industry experience are merely forecasts of actual program results.

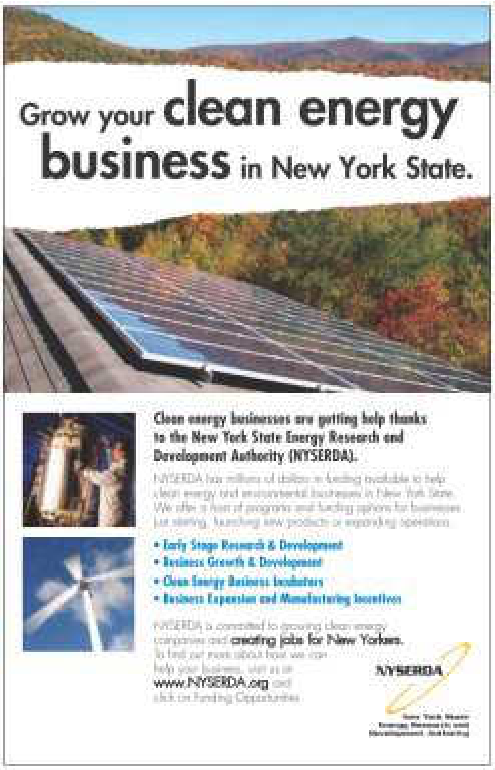
Energy efficiency resources are measured differently than supply-side resources. An extensive professional practice has developed with the goal of providing useful estimates of the value of energy efficiency. While a review of the field of measurement and verification techniques is beyond the scope of this exhibit, The National Action Plan's *Model Energy Efficiency Program Impact Evaluation Guide* (November 2007) describes this process in detail. The consolidation of evaluation, measurement and verification (EM&V) procedures into guides and manuals reflects the growing rigor and reliability of these tools. Although different approaches are used, these typically reflect different decisions regarding the balance to be struck between cost and level of detail in these measurements.

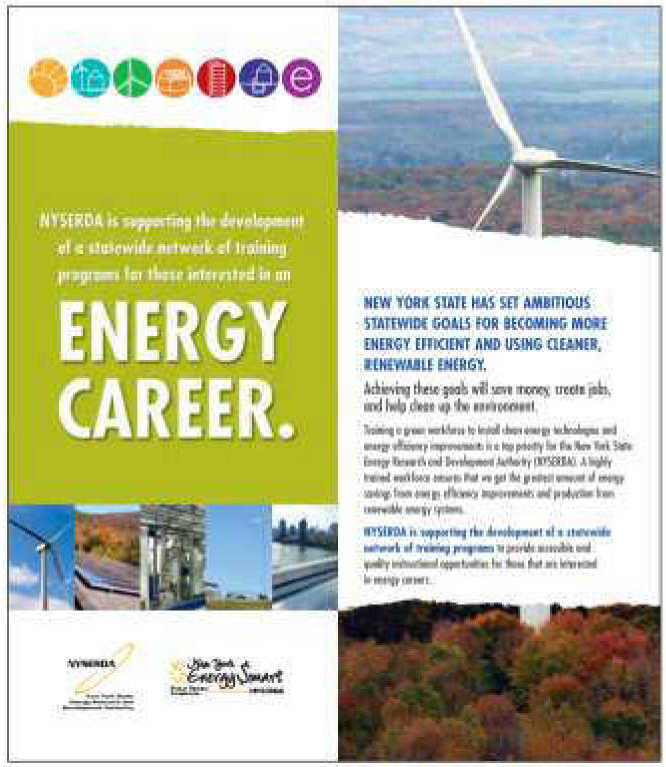
Bringing utility energy efficiency programs up to date requires an investment in training and resource acquisition by utilities, but it also requires convincing business partners in service provider networks to do the same. The fact that our organizations, as well as all southeastern utilities, routinely draw on consulting expertise from outside the region speaks directly to the overall shortage of energy efficiency leading companies with relevant experience in this region.

[1] National Action Plan for Energy Efficiency (2009).

Utilities with leading energy efficiency programs (e.g., Alliant Energy) as well as state administered programs (e.g., NYSERDA) offer business partner network benefits including marketing, technical, and trade show assistance – as well as a role in improving program design. [2] For example, NYSERDA has an extensive business and workforce development strategy, as illustrated below.

NYSERDA Business and Workforce Development Marketing Materials





Source: New York State Energy Research and Development Authority, *Annual Report 2008-2009*.

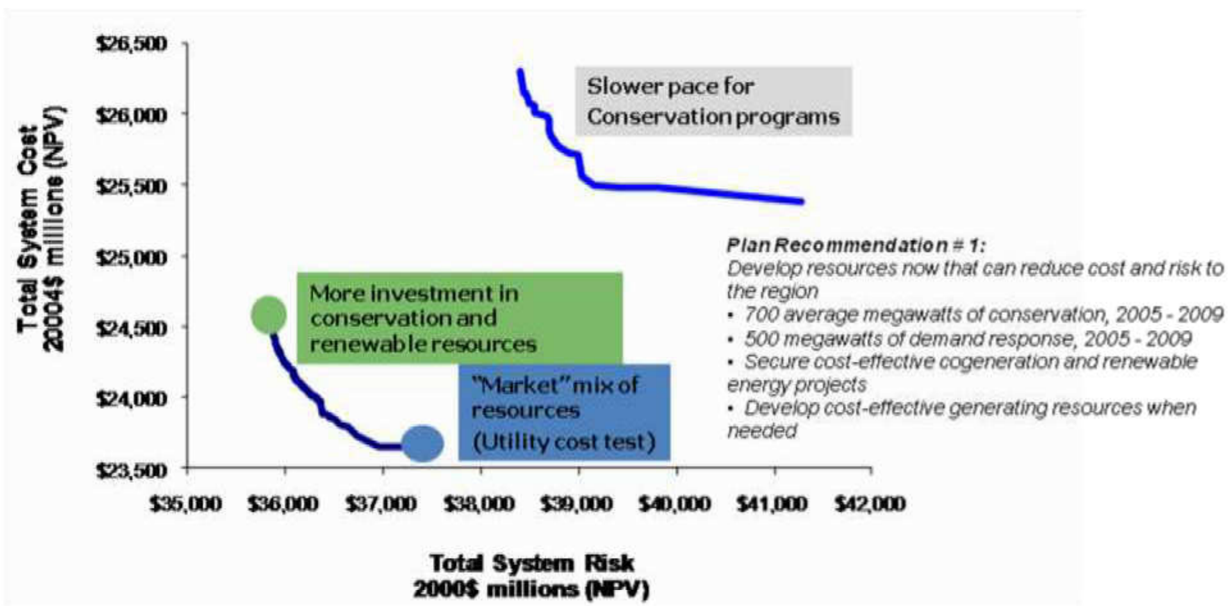
[2] Duke Energy has recently established a new stakeholder advisory group which will formally meet for the first time in March, 2010. I have accepted their invitation to participate and have participated in some preliminary activities. I am not aware that either Progress Energy or Dominion has established an ongoing stakeholder consultation process focused on their energy efficiency programs. Progress Energy does have a Community Energy Advisory Council in Western North Carolina, but this council meets infrequently and does not have an ongoing role in the development of energy efficiency programs.

Wilson Exhibit 6: Aggressive Energy Efficiency Programs Reduce Price Spike Risk

The Northwest Power and Conservation Council (NWPCC) considers a wide range of portfolio options in its resource plan analysis. Its resource portfolio planning analysis is a multi-variable sensitivity analysis which forecasts the cost and risk associated with the best combinations of various available resources. The portfolio option that offers the “least cost” is the one with the “market mix” of energy resources, what a typical least cost planning exercise might suggest.

However, by examining the price spike risk associated with each portfolio option, utilities in the region served by the Bonneville Power Administration (of which NWPCC is the statutory planning authority) determined that portfolio options with more conservation and renewable energy could cost up to 4% more, but would reduces system risk by up to 5%. The portfolio options selected by NWPCC in its last two planning cycles have a cost that was somewhat above the “market” mix in cost, with somewhat lower risk. The policy of the NWPCC is that the additional cost in the selected option represents a regional insurance hedge that is in the interests of customers concerned about the risk of price shocks.

Another aspect of the NWPCC analysis illustrated in this exhibit is the impact of a “slower pace” option for energy efficiency programs. With delayed implementation of energy efficiency, all of the portfolio options had both higher cost and higher risk than the “faster pace” option.



Source: The Fifth Northwest Electric Power and Conservation Plan, 2005

Wilson Exhibit 7: Utility Energy Efficiency Resources

Table 7A: Utility Load Forecasts

	Load Forecast without Energy Efficiency Programs								Load Forecast with Energy Efficiency Programs							
	Summer Capacity (MW)				Annual Energy (GWh)				Summer Capacity (MW)				Annual Energy (GWh)			
	2010	2015	2020	2024	2010	2015	2020	2024	2010	2015	2020	2024	2010	2015	2020	2024
Duke[1]	17,668	19,670	21,596	23,021	89,315	96,967	106,224	115,276	16,879	18,334	20,044	21,453	89,005	95,048	102,540	111,450
Progress[2]	12,731	14,624	15,808	16,840	66,243	72,481	78,783	84,385	12,230	13,581	14,381	15,240	66,137	71,581	77,108	82,140
Dominion	16,973	19,165	21,162	22,667	85,224	97,715	108,733	117,976	16,908	18,523	20,278	21,712	84,685	94,537	105,447	114,647
NCEMC	2,891	3,245	3,649	4,012	12,822	14,674	16,499	18,287	2,808	3,106	3,484	3,848	12,761	14,337	16,038	17,826
EnergyU.[3]	566	608	683	751	2,506	2,701	3,000	3,265	566	597	670	738	2,505	2,601	2,880	3,142
Piedmont[4]	127	239	152	163	542	596	649	695	127	239	152	163	538	580	629	675
Haywood[4]	57	61	65	69	322	344	366	386	57	61	65	69	320	331	350	369
NC Total[5]	27,791	31,450	34,305	36,710	139,914	153,379	168,004	181,708	26,721	29,433	31,761	34,000	139,515	150,655	163,231	176,326

(1) Duke Energy did not present system load without demand response programs. These values are calculated from the plan.
(2) Progress Energy did not present annual energy without energy efficiency programs. These values are calculated from the plan.
(3) I assumed that the “anticipated” programs referred to in Table 1.2 of the EnergyUnited plan are the two approved programs discussed briefly in the plan.
(4) Haywood and Piedmont did not provide a load forecast with energy efficiency programs or the data necessary to calculate such a forecast.
(5) The North Carolina Total is calculated using NC system percentages of 68% for Duke, 89% for Progress, and 5% for Dominion.

Table 7B: Utility Energy Efficiency Resource Forecast System Impacts

	Cumulative Energy Efficiency Program Impacts							
	Summer Capacity (MW)				Annual Energy (GWh)			
	2010	2015	2020	2024	2010	2015	2020	2024
Duke	4.7%	7.3%	7.7%	7.3%	0.3%	2.0%	3.6%	3.4%
Progress	4.1%	7.7%	9.9%	10.5%	0.2%	1.3%	2.2%	2.7%
Dominion	0.4%	3.5%	4.4%	4.4%	0.6%	3.4%	3.1%	2.9%
NCEMC	3.0%	4.5%	4.7%	4.3%	0.5%	2.4%	2.9%	2.6%
EnergyUnited	0.1%	1.8%	1.9%	1.8%	0.0%	3.8%	4.1%	3.9%
Piedmont	0.0%	0.0%	0.0%	0.0%	0.7%	2.8%	3.2%	3.0%
Haywood	0.0%	0.0%	0.0%	0.0%	0.6%	3.9%	4.6%	4.6%
Total	**4.0%**	**6.9%**	**8.0%**	**8.0%**	**0.3%**	**1.8%**	**2.9%**	**3.1%**

Wilson Exhibit 8: Annual Energy Savings Implied by 24 State Energy Efficiency Targets or Mandates

State	Implied Annual Energy Savings Goal	Date Established	Target End Date	Efficiency Goal Details
California	> 2.0 %	2004	2013	EE is first resource to meet future electric needs; All achievable efficiency potential
Connecticut	> 2.0 %	2007	2018	All achievable cost effective
Massachusetts	> 2.0 %	2008	n/a	All achievable cost effective
Rhode Island	> 2.0 %	2008	n/a	All achievable cost effective
Washington	> 2.0 %	2006	2025	All achievable cost effective
Arizona	2.0 %	2009	2020	20% by 2020
Illinois	2.0 %	2007	2015	2.0% per year
Maryland	2.0 %	2008	2015	Per capita energy use reduced 15%
Vermont	2.0 %	2008	2011	2.0% per year (contract goals)
New Jersey	≤2.0 %	2008	2020	20% of 2020 load
Iowa	1.5 %	2009	2010	1.5% per year
Minnesota	1.5 %	2007	2010	1.5% per year
New York	1.5 %	2008	2015	10.5% of 2015 load
Ohio	1.4 %	2008	2019	2.0% per year
Colorado	1.0 %	2007	2020	1.0% per year
Michigan	1.0 %	2008	2012	1.0% per year
New Mexico	1.0 %	2009	2020	Minimum 10% of 2005 load
Nevada	0.6 %	2005	n/a	0.6% of 2006 annually
Pennsylvania	0.6 %	2008	2013	3.0% of 2009-2010 load
Hawaii	0.5 %	2004	2020	0.4-0.6% per year
Texas	0.5 %	2007	2010	20% of load growth
Virginia	0.5 %	2007	2022	10% of 2006 load
Florida	0.4 %	2009	2019	3.6% by 2019
North Carolina	***0.3 %***	***2007***	***2018***	*Cumulative forecast of 2.9% energy savings: Wilson Exhibit 2*

Notes: The form of state energy efficiency targets, mandates, goals or resource standards vary. The "implied annual energy savings goal" is a point estimate reflecting the magnitude of annual energy savings due to typical or peak program year impacts. States which require all achievable energy efficiency

Wilson Exhibit 9: Duke Energy Efficiency Program Trend and Recommended Adjustment

Figure 9A: Annual Energy Efficiency Program Impacts and Recommended Impacts

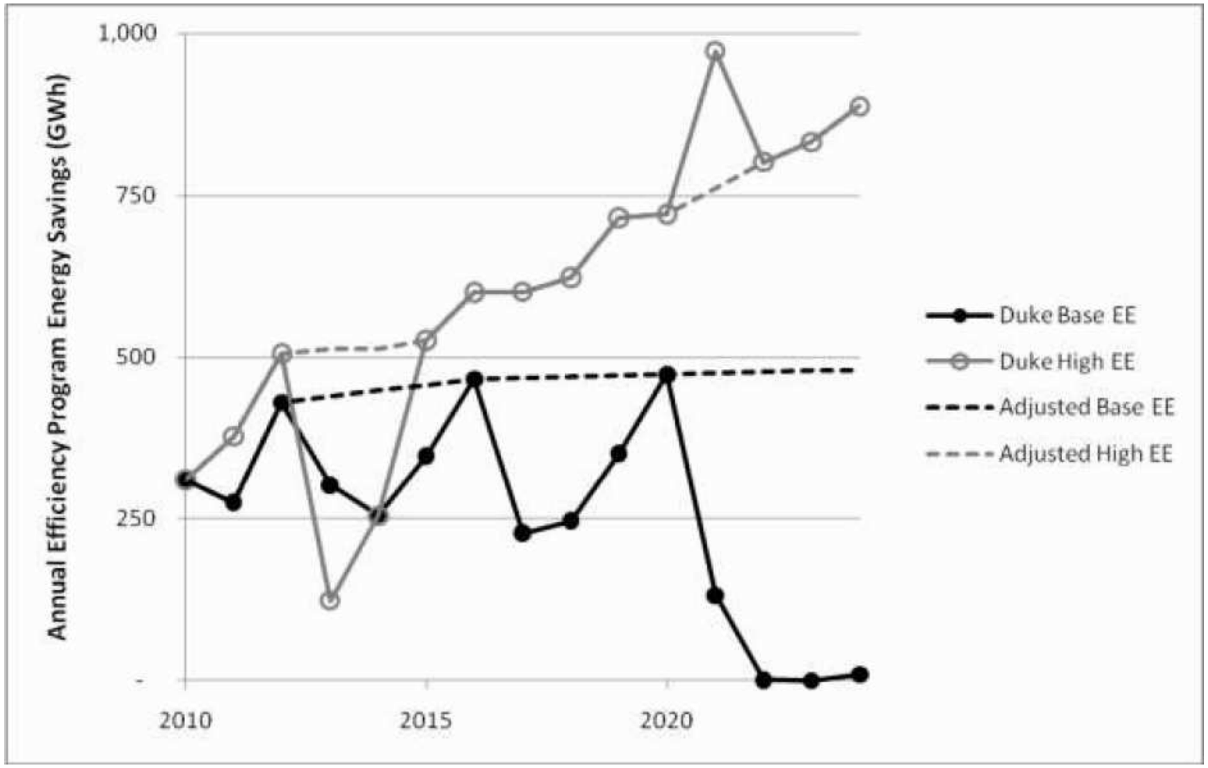


Table 8B: Cumulative Energy Efficiency Program Impacts and Recommended Impacts

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Duke Base EE	310	585	1,015	1,317	1,572	1,919	2,385	2,613	2,860	3,211	3,684	3,816	3,817	3,817	3,826
Adj. Base EE	310	585	1,015	1,454	1,902	2,359	2,825	3,293	3,762	4,234	4,707	5,181	5,658	6,136	6,616
Duke High EE	310	688	1,194	1,317	1,572	2,098	2,698	3,300	3,923	4,639	5,361	6,333	7,135	7,968	8,856
Adj. High EE	310	688	1,194	1,707	2,219	2,746	3,346	3,947	4,570	5,286	6,008	6,770	7,572	8,405	9,293

Wilson Exhibit 10: Home Energy Comparison Report

A home energy comparison report is a mailed or online tool that allows a residential customer to obtain a customized comparison of energy use with similar residences. Recent measurement and verification studies of similar programs indicate an opportunity for an almost immediate 2% residential energy savings, which in the case of Duke Energy or Progress Energy could represent a 1% system energy savings from just this single program.[3] Considering that these programs are available from established vendors, it is remarkable that these programs are not being deployed rapidly by every utility energy efficiency program.

---

[3] Even though this measure is not mentioned in its market potential study, I am aware that Duke Energy is currently considering developing a home energy comparison report program.

Wilson Exhibit 11: Building Re/Retro/Commissioning Program

Building commissioning is the systematic and documented process of ensuring that the owner's operational needs are met, building systems perform efficiently and building operators are properly trained during the period immediately following new construction. Building re-commissioning or retro-commissioning (generally, "commissioning") refers to the same practice on a periodic basis during the lifetime of the building. These programs are most often offered to commercial, government, and/or industrial buildings, although multifamily residential buildings may also be suitable properties.

The presence of building retrofit measures in a utility's energy efficiency portfolio should not be regarded as an adequate substitute for a commissioning program. For example, even though a number of building retrofit measures were included in the technical potential study conducted for Florida utilities, the technical potential of those measures represented less than 20% of the total potential energy savings that could be achieved in a commissioning program. This missed opportunity represents about 5% of statewide retail electricity sales.

The potential energy savings due to commission has reported over the past decade by organizations including the Energy Systems Laboratory of Texas A&M University, National Association of Energy Service Companies, and Energy Service Coalition. In particular, Lawrence Berkeley National Laboratories reports median whole-building energy savings of 16% for existing buildings and 13% for new construction.[4]

Based on the LBNL estimated savings potential and data presented in the Florida study, the statewide energy savings potential for commissioning in Florida is 9,785 GWh of annual energy savings. After adjusting for the technical potential associated with retrofit measures identified by the study consultant as being typical components of a building commissioning program, the technical potential of the remaining practices performed in a commissioning project is 8,105 GWh of energy savings.

The reason that retrofit measures alone fail to represent the full potential of building commissioning programs is that the programs emphasize improving the way that a building is used and operated. The ENERGY STAR Building Upgrade Manual identifies nine categories of "retrocommissioning opportunities commonly found during a building walk-through. Their presence indicates potential problems that can be identified and fixed through a retrocommissioning project:

- Systems that are inefficient due to simultaneous heating and cooling of the same air volume
- Repair or adjustment of economizers due to frozen dampers, broken or disconnected linkages, malfunctioning actuators and sensors, and improper control settings
- Pumps with throttled discharges
- Equipment or lighting that is on when it may not need to be
- Improper building pressurization due to doors that stand open or are difficult to get open
- Equipment or piping that is hot or cold when it should not be; unusual flow noises at valves or mechanical noises
- Short cycling of equipment

[4] Evan Mills, "Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions," Lawrence Berkeley National Laboratory, prepared for California Energy Commission and Public Interest Energy Research, July 2009.

- Variable-frequency drives that operate at unnecessarily high speeds, or at a constant speed even though the load being served should vary"5

The majority of the interventions listed are not typically captured in a "measures database."

The omission of this important demand-side resource cannot be justified by its novelty or obscurity. The widespread understanding of building commissioning is demonstrated by the recent release of the US EPA Rapid Deployment Energy Efficiency Toolkit, which "provides detailed program design and implementation guides for *10 broadly applicable energy efficiency programs*."(emphasis added) One of the ten programs cited is "Retro-commissioning" for "Commercial/Government/Schools."[6] A number of model utility commissioning programs were recognized by the American Council for an Energy-Efficient Economy in its 2008 "Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S" and could serve as models for North Carolina utilities.

Furthermore, in 2002 the national commissioning market was estimated to include annual retro-commissioning projects valued at $175 million and new commissioning projects valued at of $114 million. Notably, the potential market opportunity for retro-commissioning services is estimated to be nearly 50 to 100 times greater than new commissioning.[7]

Building commissioning programs are ideal for a utility energy efficiency program because the barriers to customer adoption tend to be awareness and technical expertise, rather than financial. The cost-effectiveness of commissioning is indicated by median costs with a payback time of 1.1 years and 4.2 years for existing and new buildings, respectively.[8]

---

[5] US Environmental Protection Agency, *Energy Star Building Upgrade Manual,* Office of Air and Radiation, 2008 Edition, p. 5-7.

[6] US Environmental Protection Agency, *Rapid Deployment Energy Efficiency Toolkit*, version dated May 20, 2009.

[7] FMI, "NEMI Retro-commissioning Existing Building Inventory," February 2002.

[8] Mills (2009).

Wilson Exhibit 12: Energy Recycling, Including Combined Heat and Power

Energy recycling technologies extract useful energy from what would otherwise be waste heat, and can be a highly cost effective means of producing energy. It is proven technology that is already widely adopted around the nation, and is applied in both new and existing facilities.

The most widely used form of energy recycling technology is combined heat and power (or CHP). Use of CHP technology increases the overall efficiency of fuel use by combining the electricity and thermal (heat) operations to meet the same demand rather than obtaining them from separate sources. North Carolina has over 1,500 MW of CHP systems installed at industrial, educational, government and other locations.[9]

Energy recycling, including combined heat and power (or co-generation), waste heat recovery, and other similar applications, are considered energy efficiency measures by North Carolina Utility Commission Rule R8-67,[10] provided that the measure uses waste heat to produce electricity or other useful energy, and results in less energy used. Many industries and commercial buildings produce significant amounts of waste heat that could be captured and transformed into useable, productive steam, heat, or cooling.

Energy recycling offers an opportunity to put currently wasted energy to work for our economy, and to spark new economic development opportunities in North Carolina. However, there remains some uncertainty regarding the market potential of energy recycling. According to a Duke University Study, the national impact of effective policies to promote energy recycling could reach $234 billion in new investments, creating nearly 1 million new jobs.[11] The most recent study of regional energy recycling potential is by the American Council for an Energy Efficient Economy (ACEEE), covering both North and South Carolina. For South Carolina, ACEEE estimated that utilization of CHP could result in an annual electricity savings of as much as 2,484 GWh by 2025.[12] Preliminary results for North Carolina indicate that an additional 1-4% of annual electric sales demand could be met through relatively straightforward adoption of highly cost-effective CHP systems.[13]

Utilities have shown reluctance to encourage energy recycling technologies. Yet utilities are best positioned to identify suitable locations for these technologies and assist in smooth implementation. Considering the scale and cost-effectiveness of these technologies, energy recycling surely qualifies as a demand-side resource that should be among the options considered in a utility resource plan.

---

[9] American Council for an Energy-Efficient Economy, "Energy Efficiency Opportunities in North Carolina: Draft Report Findings," presented to North Carolina Energy Policy Council (January 2010).

[10] Credit as an energy efficiency measure is available under the REPS only if the fuel is nonrenewable. Otherwise, the electricity generated is considered renewable energy.

[11] Center on Globalization, Governance and Competitiveness, Duke University, "Manufacturing Climate Solutions: Carbon Reducing Technologies and U.S. Jobs" (February 2009).

[12] American Council for an Energy-Efficient Economy, "South Carolina's Energy Future: Minding its Efficiency Resources"," Report E-99 (November 2009).

[13] See note 9. Note that the ACEEE study only considered "CHP thermal energy for boiler loads only and markets that employ the thermal energy for both boiler loads and air conditioning" using natural gas fuel. Other technologies, such as waste heat recovery microturbines, are applicable at a wider range of sites but are less well established in the market.