



June 30, 2004

The Honorable Bruce Duke  
Executive Director  
South Carolina Public Service Commission  
Post Office Drawer 11649  
Columbia, South Carolina 29211

Re: Progress Energy Carolinas' 2004 Resource Plan  
Docket No. 2003-214-E

Dear Mr. Duke:

Pursuant to Section 58-37-40 of the Code of Laws of South Carolina, Carolina Power & Light Company d/b/a Progress Energy Carolinas, Inc. hereby submits for filing an original and ten copies of its 2004 Resource Plan. We are also enclosing one extra copy to be stamped and returned.

Sincerely,

*Len S. Anthony (by dhs)*

Len S. Anthony  
Deputy General Counsel - Regulatory Affairs

Enclosures  
c: Mr. Mitchell M. Perkins, State Energy Office

55006

# Progress Energy Carolinas Resource Plan



South Carolina Public Service Commission  
Docket No. 2003-214-E  
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## **INTRODUCTION**

### ***OWNERSHIP***

Progress Energy Carolinas, Inc. (PEC) is a wholly owned subsidiary of Progress Energy, Inc. (Progress Energy), a registered holding company under the Public Utility Holding Company Act of 1935 (PUHCA), as amended. Progress Energy and its subsidiaries, including PEC, are subject to the regulatory provisions of the PUHCA. PEC is subject to the rules and regulations of the Federal Energy Regulatory Commission (FERC), the Public Service Commission of South Carolina (SCPSC) and the North Carolina Utilities Commission (NCUC).

### ***AREA OF SERVICE***

PEC distributes and sells electricity in 15 counties in northeastern South Carolina and 56 of the 100 counties in North Carolina. The territory served is an area of approximately 34,000 square miles, including an area in northeastern South Carolina, a substantial portion of the coastal plain of North Carolina extending to the Atlantic coast between the Pamlico River and the South Carolina border, the lower Piedmont section of North Carolina, and an area in western North Carolina in and around the city of Asheville. The estimated total population of the territory served is more than 4.0 million. As of December 31, 2003, PEC was providing electric services, retail and wholesale, to approximately 1.3 million customers. Major wholesale power sales customers include North Carolina Eastern Municipal Power Agency (Power Agency or NCEMPA) and North Carolina Electric Membership Corporation.

### ***TRANSMISSION / DISTRIBUTION***

As of December 31, 2003, PEC had approximately 6,000 circuit miles of transmission lines including about 300 miles of 500-kilovolt (kV) lines and about 3,000 miles of 230 kV lines. Total substation transformers in service had a capacity of approximately 47,500,000 kilovolt-ampere (kVA) in 2,411 transformers. PEC had distribution lines of approximately 45,000 circuit miles of overhead conductor and about 17,000 circuit miles of underground cable. Distribution line transformers numbered approximately 502,700 with an aggregate capacity of about 21,000,000 kVA.

### ***TOTAL CAPACITY RESOURCE***

PEC's eighteen generating plants represent a flexible mix of fossil, nuclear, hydroelectric, combustion turbines and combined cycle resources, with a current total summer generating capacity (including Power Agency's share) of 12,479 megawatts.

## **1. The demand and energy forecast for at least a 15-year period.**

### **Peak Load and Energy Forecast**

#### *Methodology*

PEC's forecasting processes have utilized econometric and statistical methods since the mid-70s. During this time enhancements have been made to the methodology as data and software have become more available and accessible. Enhancements have also been undertaken over time to meet the changing data needs of internal and external customers.

The System Peak Load Forecast is developed from the System Energy Forecast using a load factor approach. This load forecasting method couples the two forecasts directly, assuring consistency of assumptions and data. Class peak loads are developed from the class energy using individual class load factors. Peak load for the residential, commercial, and industrial classes are then adjusted for projected load management impacts. The individual loads for the retail classes, wholesale customers, NCEMPA, and Company Use are then totalized and adjusted for losses between generation and the customer meter to determine System Peak Load.

Wholesale sales and demands include a portion that will be provided by the Southeastern Power Administration (SEPA). NCEMPA sales and demands include power which will be provided under the joint ownership agreement with them.

#### *Assumptions*

Over the long term, growth in the standard of living, as reflected in personal income and Gross Domestic Product (GDP) per capita, is expected to slow modestly relative to recent history. The labor force can be predicted with some reliability because the working population for the early 21st century has already been born. Real dollar prices are used to enhance model reliability during periods of varying inflation. The forecast assumes that our customers will tend toward continuing energy efficiency in the future.

The forecast of system energy usage and peak load does not explicitly incorporate periodic expansions and contractions of business cycles, which are likely to occur from time to time during any long-range forecast period. While long-run economic trends exhibit considerable stability, short-run economic activity is subject to substantial variation. The exact nature, timing and magnitude of such short-term variations are unknown years in advance of their occurrence. The forecast, while it is a trended projection, nonetheless reflects the general long-run outcome of business cycles because actual historical data, which contain expansions and contractions, are used to develop the general relationships between economic activity and energy use. Weather normalized temperatures are assumed for the energy and system peak forecasts.

*Forecast*

The Company's Peak Load and Energy Forecast is given in the table below. This forecast is somewhat lower than the forecast filed with the SCPSC in June 2003 primarily due to the effects of the economic slowdown in the short-term and a slight lowering of longer-term economic growth expectations. The current forecast represents a growth rate of 1.7% across the forecast period, which reflects a slight reduction from the prior filing. Wholesale sales have become more uncertain due to the 1992 Energy Policy Act, subsequent FERC initiatives related to the wholesale market, the continuing evolution of the wholesale market and market conditions. As expectations for the various wholesale contracts change, those expectations are appropriately reflected in the wholesale forecast.

<b>ANNUAL PEAK LOAD and ENERGY FORECAST</b>		
	<b>System Peak Load (MW)</b>	<b>PEC System Energy (MWh)</b>
2004	11,343	60,770,482
2005	11,795	62,435,496
2006	11,771	63,426,347
2007	11,798	64,734,768
2008	12,077	66,240,697
2009	12,328	67,470,293
2010	12,531	68,499,972
2011	12,763	69,719,924
2012	12,986	70,895,882
2013	13,211	72,081,290
2014	13,445	73,305,991
2015	13,684	74,557,634
2016	13,931	75,833,602
2017	14,179	77,116,117
2018	14,425	78,387,624
2019	14,674	79,677,373

- 2. The supplier's or producer's program for meeting the requirements shown in its forecast in an economic and reliable manner, including both demand-side and supply-side options.**

See Appendices A and B.

**3. A brief description and summary of cost-benefit analysis, if available, of each option, which was considered, including those not selected.**

The utility industry continues to experience significant changes that challenge the planning process for providing the resources needed to meet growing electricity demands. Industry and environmental regulations plus competition in the wholesale power market are some of the issues that face utilities. In order to make sound resource planning decisions, it is necessary to assess the costs of future generation technologies. To conduct such an assessment, PEC develops a consistent and documented database of future technologies for use in the Company's planning studies.

In the most recent assessment, three major categories of technologies were analyzed. These included conventional generation technologies that utilize non-renewable resources, advanced generation technologies that are still being developed, and alternative technologies that utilize renewable sources of energy. Specifically, they were:

*Conventional Technologies*

- Pulverized Coal (PC)
  - Pulverized Coal, Sub-critical
  - Pulverized Coal, Super-critical
- Combustion Turbine (CT)
  - Aero-derivative, Non-augmented
  - Aero-derivative, Augmented
  - Nominal 80 MW frame
  - Nominal 170 MW frame, Non-augmented
- Combined Cycle (CC)

*Advanced Technologies*

- Atmospheric Fluidized Bed Combustion (AFBC)
- Coal Gasification/Combined Cycle (CGCC)
- Advanced Light Water Nuclear (ALWN)
- Fuel Cell (FC)

*Alternative Technologies*

- Municipal Solid Waste (MSW)
- Solar Photovoltaic (PV)
- Refuse Tires (TIRE)
- Wind
- Wood

Busbar costs allow for comparison of fixed and operating costs of all technologies over different operating levels. This analysis is done using the spreadsheet program COMPETE. It compares the long-term economics of future power plants and reports the



busbar costs by capacity factor. Data input to COMPETE for each technology includes fixed and variable O&M, fuel, construction costs, and the levelized fixed charge rate.

Except in cases where data specific to PEC and its service territory were obtained, the data presented are **generic** in nature and thus not site specific. The costs and operating parameters are adjusted to reflect installation in the southeastern United States. The operating characteristics are based on state-of-the-art designs, with some of the advanced and renewable resource technologies *not* being currently available commercially. The primary source of information in developing the database is the EPRI Technical Assessment Guide (TAG) database.

Appendix C provides the most current economic comparison of all technologies examined, regardless of their technical feasibility. Of the technologies evaluated and shown in Appendix C, not all are proven, mature, commercially available technologies. This is important to keep in mind when reviewing the data, as some of the options shown as low cost may not be commercially available or technically feasible as a generation option at this time, as is the case with CGCC. Also, the less mature a technology is, the more uncertain and less accurate its cost estimates may be.

Wind projects have high fixed costs but essentially no operating costs. Therefore, at high enough capacity factors they could become economically competitive with the lower-cost technologies identified. However, the geographic and atmospheric characteristics of the Carolinas limit the ability of wind projects to achieve those capacity factors in locations that are available for commercial operation. Because a wind project would not be expected to operate above 20-25% capacity factor in the Carolinas, it is not a viable alternative to the CC for intermediate duty. Further, because wind is not dispatchable, it is not a suitable alternative to the CT for peaking duty.

Similar to wind projects, solar photovoltaic (PV) projects are also technically constrained from achieving higher capacity factors. In the Carolinas, they would be expected to operate at approximately 20% capacity factor making them unsuitable for intermediate or higher duty cycles. At the lower capacity factors, they, like wind, are not dispatchable and therefore not technically suited to provide reliable peaking capacity. Aside from their technical limitations, PV projects are not economically competitive generation technologies as is apparent in Appendix C.

Although fuel cells appear to be competitive with the CC if projected cost reductions can be achieved, they are currently still in the demonstration stage. Fuel cells can be assembled building block style to produce varying quantities of electric generation. However, as currently designed, a sufficient number of fuel cells cannot be practically assembled to create a source of generation comparable to other existing bulk generation technologies, such as CC. Further development of this technology is needed before it becomes viable as a resource option.

Appendix D shows the technologies that are commercially available, cost effective, and technically feasible, making them viable generation alternatives in the Carolinas. This

graph illustrates that the combustion turbine (CT) is the most economical generation alternative for peaking duty cycles, and the combined-cycle (CC) is the preference for intermediate load operation. The busbar curves also indicate a potential for coal technologies to become cost competitive for base load operation at higher capacity factors. This relationship is dependent on fuel price and other cost assumptions over the long-term. Although spikes in natural gas prices have recently been experienced, such variances have historically been of a short-term nature and are not expected to continue over the long-term planning horizon. PEC will continue to monitor fuel price and other cost assumptions to ensure the Company plans for the most economical and reliable generation additions.

4. **The supplier's and producer's assumptions and conclusions with respect to the effect of the plan on the cost and reliability of energy service, and a description of the external, environmental and economic consequences of the plan to the extent practicable.**

#### **Effect of plan on cost of energy service**

The cost-effective generation alternatives from the busbar screening process (described in Section 3) are optimized with demand-side portfolios to formulate an optimal resource plan. The optimization program considers all possible future combinations of supply-side and demand-side alternatives that meet the company's reliability criteria. PEC's optimal Resource Plan continues to be a plan that provides low cost energy service. Future capacity additions included in this plan are consistent with previous plans and continue to include combustion turbine (CT) and combined-cycle (CC) capacity. The plan also includes a capacity uprate to Unit 2 of the Company's Brunswick Nuclear Plant.

Peaking resources such as combustion turbines are constructed and operated during peak load periods or emergency conditions. Combustion turbines have relatively low capital costs but higher operating costs than intermediate or base load generation, and are the most cost-effective new resource when a generator is needed to operate less than roughly 20% of the time. Combustion turbines can be started quickly in response to a sharp increase in customer demand and help supply power during cold winter mornings and hot summer afternoons. Combined-cycle units, which consist of combustion turbines equipped with heat recovery steam generators, are the most cost-effective new resource when a generator is needed to operate more than about 20% of the time and less than baseload operation. Combined-cycle units have higher capital costs than peaking units, but lower operating costs. The heat recovery steam generator utilizes the hot exhaust gases from the combustion turbines to produce steam and generate additional megawatt hours by a steam turbine generator. Because waste exhaust gases from the combustion turbines power the steam turbine, no additional fuel is used to produce electricity from the steam turbine generator. The efficient operation of the combined-cycle facility will burn less gas than a combustion turbine to produce a megawatt hour of generation, and will reduce generation produced by less efficient combustion turbines burning both gas and oil. These fuel savings will directly benefit ratepayers. Combined-cycle facilities take several hours to start up and bring to full power output. These facilities are best utilized to operate at higher capacity factors and to respond to more predictable system load patterns.

The Company's resource plan also includes 25 MW of additional baseload capacity as a result of planned modifications to uprate Unit 2 at the Brunswick Nuclear Plant. Baseload nuclear capacity is typically fully loaded due to its low operating cost, except during times of forced outage or refueling. This additional nuclear generation will offset higher cost fuel sources providing further benefits to ratepayers. The Company's resource plan consisting of additional nuclear capacity and new combustion turbine and

combined-cycle capacity, in addition to existing low-cost nuclear and coal facilities, will continue to provide reliable and cost-effective generation to serve customer energy needs.

### **Effect of plan on reliability of energy service**

The reliability of energy service is a primary input in the development of the Resource Plan. Utilities require a margin of generating capacity reserve available to the system in order to provide reliable service. Periodic scheduled outages are required to perform maintenance and inspections of generating plant equipment and to refuel nuclear plants. Unanticipated mechanical failures may occur at any given time, which may require shutdown of equipment to repair failed components. Adequate reserve capacity must be available to accommodate these unplanned outages and to compensate for higher than projected peak demand due to forecast uncertainty and weather extremes. In addition, some capacity must also be available as operating reserve to maintain the balance between supply and demand on a real-time basis.

The amount of generating reserve needed to maintain a reliable power supply is a function of the unique characteristics of a utility system including load shape, unit sizes, capacity mix, fuel supply, maintenance scheduling, unit availabilities, and the strength of the transmission interconnections with other utilities. There is no one standard measure of reliability that is appropriate for all systems since these characteristics are particular to each individual utility.

### ***Reliability Criteria***

PEC employs both deterministic and probabilistic reliability criteria in the resource planning process. The Company establishes a reserve criterion for planning purposes based on probabilistic assessments of generation reliability, industry practice, historical operating experience, and judgment.

PEC conducts multi-area probabilistic analyses to assess generation system reliability in order to capture the random nature of system behavior and to incorporate the capacity assistance available through interconnections with other utilities. Decision analysis techniques are also incorporated in the analysis to capture the uncertainty in system demand. Generation reliability depends on the strength of the interconnections, the generation reserves available from neighboring systems, and also the diversity in loads throughout the interconnected area. Thus, the interconnected system analysis shows the overall level of generation reliability and reflects the expected risk of capacity deficient conditions for supplying load.

A Loss-of-Load Expectation (LOLE) of one day in 10 years continues to be a widely accepted criterion for establishing system reliability. PEC uses a target reliability of one day in ten years LOLE for generation reliability assessments. LOLE can be viewed as the expected number of days that load will exceed available capacity. Thus, LOLE indicates the number of days that a capacity deficient condition would occur, resulting in the inability to supply some portion of customer demand. Results of the probabilistic

assessments are correlated to appropriate deterministic measures of reliability, such as capacity margin or reserve margin, for use as targets in developing the Resource Plan. However, the real measure of reliability is the loss of load expectation.

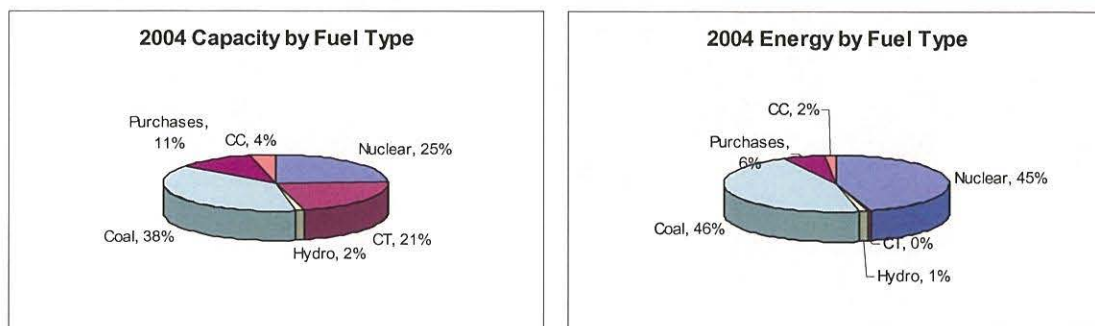
***Adequacy of Projected Reserves***

Reliability assessments have shown that reserves projected in PEC’s Resource Plan are appropriate for providing an adequate and reliable power supply. The Company’s Resource Plan reflects capacity margins in the range of approximately 12% to 15%, corresponding to reserve margins of approximately 13% to 18%. It should be noted that actual reserves as measured by megawatts of installed capacity continue to increase as load and the size of the system increase.

The reliability of PEC’s generating system has significantly improved over the past several years. The addition of smaller and highly reliable CT capacity increments to the company's resource mix improve the reliability and flexibility of the PEC fleet in responding to increased load requirements. Since 1996, PEC has added almost 3,300 MW of new combustion turbine and combined-cycle capacity to system resources, either through new construction or purchased power contracts. Shorter construction lead times for building new combustion turbine and combined-cycle power plants allow greater flexibility to respond to changes in capacity needs and thus reduce exposure to load uncertainty. The Company’s Resource Plan includes approximately 1,200 MW of additional new CT and CC capacity by 2010. Performance of PEC's existing nuclear and fossil fleet has greatly improved over the past few years, which has also significantly contributed to improved system reliability. The Company plans to add 25 MW of additional baseload capacity by 2005 as a result of planned modifications to uprate Brunswick Unit 2. All of these factors combine to ensure the Company’s ability to provide an adequate and reliable power supply.

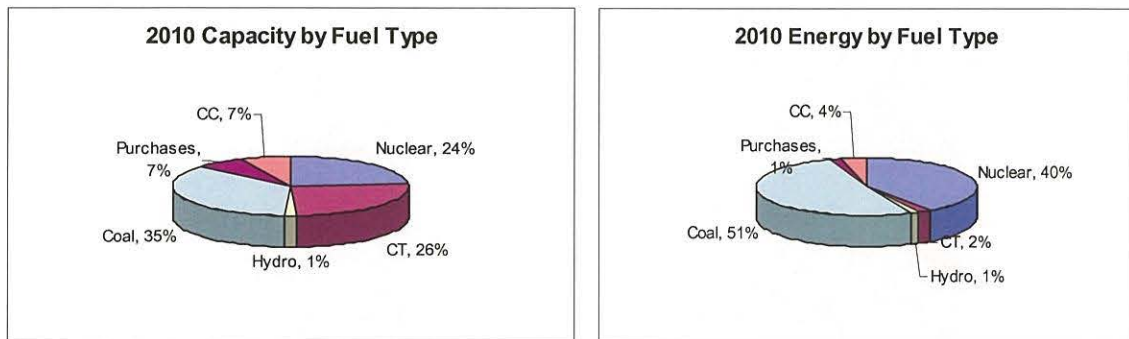
Figure 1 below shows PEC’s capacity (MW) and energy (MWh) by fuel type projected for 2004. Nuclear and coal generation currently make-up approximately 63% of total capacity resources, yet account for about 91% of total energy requirements. Gas and oil generation accounts for about 25% of total supply capacity, yet only 2% of total energy.

**Figure 1**



The Company's capacity and energy by fuel type projected for 2010 are shown in Figure 2 below. Gas and oil resources are projected to increase to about 33% of total supply capacity, while only serving about 6% of the total energy requirements. In 2010, nuclear and coal are projected to account for approximately 59% of total capacity resources and serve about 91% of total system energy requirements. Thus, even though new capacity consists primarily of CT and CC units fueled by natural gas and oil, nuclear and coal resources will still account for the largest share of system capacity (MW) and satisfy most of the system energy (MWh) requirements.

**Figure 2**



Based on PEC's forecasted load and resources in the current Resource Plan, LOLE is expected to be within the reliability target of one day in ten years. The resources including reserves in the current plan are expected to continue to provide a reliable power supply.

### **Environmental consequences of plan**

PEC's Resource Plan relies to a large extent on the use of gas-fired combustion turbines and combined-cycle units. These units are the most environmentally benign, economical, large-scale capacity additions available. The new, advanced designs of these technologies are more efficient (as measured by heat rate) than previous designs, resulting in a smaller impact on the environment. Combined-cycle generation, which utilizes the waste exhaust gases from the combustion turbines to produce additional electricity, is the cleanest and most efficient fossil-fueled generation currently available. The Plan also contains 25 MW of new nuclear capacity through the uprating of Brunswick Unit 2. These additions will provide a significant amount of energy with virtually no environmental impact.

**Appendix A**  
**Progress Energy - Carolinas**  
**2004 SC Resource Plan Filing (Summer)**

	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>
<b>GENERATION ADDITIONS</b>																
Brunswick NP Uprate		25														
Richmond CT				155												
Scrubber Derates			(14)	(27)	(44)	(32)			(5)	(16)						
Undesignated Capacity (1)					300	300	466	300	466	150	300	150	466	466		150
<b>INSTALLED GENERATION</b>																
Combustion Turbine	2,975	2,975	2,975	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130	3,130
Combined Cycle	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556
Fossil	5,285	5,285	5,271	5,244	5,200	5,168	5,168	5,168	5,163	5,147	5,147	5,147	5,147	5,147	5,147	5,147
Hydro	218	218	218	218	218	218	218	218	218	218	218	218	218	218	218	218
Nuclear	3,445	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470
Undesignated Capacity (1)					300	600	1,066	1,366	1,832	1,982	2,282	2,432	2,898	3,364	3,364	3,514
<b>PURCHASES &amp; OTHER RESOURCES</b>																
SEPA	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109
NUG QF - Cogen	321	321	321	98	98	98	98	98	98	68	68	68	68	68	68	68
NUG QF - Renewable	61	61	16	16	16	9										
AEP/Rockport 2	250	250	250	250	250	250										
Broad River CT	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804
<b>TOTAL SUPPLY RESOURCES</b>	<b>14,024</b>	<b>14,049</b>	<b>13,990</b>	<b>13,895</b>	<b>14,151</b>	<b>14,412</b>	<b>14,619</b>	<b>14,919</b>	<b>15,380</b>	<b>15,484</b>	<b>15,784</b>	<b>15,934</b>	<b>16,400</b>	<b>16,866</b>	<b>16,866</b>	<b>17,016</b>
<b>PEAK DEMAND</b>																
Retail	8,439	8,621	8,805	8,989	9,181	9,382	9,589	9,793	9,985	10,180	10,382	10,591	10,808	11,024	11,240	11,457
Wholesale	2,904	3,174	2,966	2,809	2,896	2,946	2,942	2,970	3,001	3,031	3,063	3,093	3,123	3,155	3,185	3,217
<b>SYSTEM PEAK LOAD</b>	<b>11,343</b>	<b>11,795</b>	<b>11,771</b>	<b>11,798</b>	<b>12,077</b>	<b>12,328</b>	<b>12,531</b>	<b>12,763</b>	<b>12,986</b>	<b>13,211</b>	<b>13,445</b>	<b>13,684</b>	<b>13,931</b>	<b>14,179</b>	<b>14,425</b>	<b>14,674</b>
Firm Sales	536	95	595	450	300	300	300	300	300	300	300	300	300	300	300	300
<b>FIRM OBLIGATION</b>	<b>11,879</b>	<b>11,890</b>	<b>12,366</b>	<b>12,248</b>	<b>12,377</b>	<b>12,628</b>	<b>12,831</b>	<b>13,063</b>	<b>13,286</b>	<b>13,511</b>	<b>13,745</b>	<b>13,984</b>	<b>14,231</b>	<b>14,479</b>	<b>14,725</b>	<b>14,974</b>
Large Load Curtailment	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317
Voltage Reduction	55	56	57	60	61	62	63	65	66	67	68	69	72	73	74	74
<b>TOTAL LOAD</b>	<b>12,251</b>	<b>12,263</b>	<b>12,740</b>	<b>12,625</b>	<b>12,755</b>	<b>13,007</b>	<b>13,211</b>	<b>13,445</b>	<b>13,669</b>	<b>13,895</b>	<b>14,130</b>	<b>14,370</b>	<b>14,620</b>	<b>14,869</b>	<b>15,116</b>	<b>15,365</b>
<b>RESERVES (2)</b>																
Capacity Margin (3)	15%	15%	12%	12%	13%	12%	12%	12%	14%	13%	13%	12%	13%	14%	13%	12%
Reserve Margin (4)	18%	18%	13%	13%	14%	14%	14%	14%	16%	15%	15%	14%	15%	16%	15%	14%
<b>PEC SYSTEM ENERGY (GWh)</b>	<b>60,770</b>	<b>62,435</b>	<b>63,426</b>	<b>64,735</b>	<b>66,241</b>	<b>67,470</b>	<b>68,500</b>	<b>69,720</b>	<b>70,896</b>	<b>72,081</b>	<b>73,306</b>	<b>74,558</b>	<b>75,834</b>	<b>77,116</b>	<b>78,388</b>	<b>79,677</b>

**Notes:**

- 1) For planning purposes only; does not indicate a commitment to type, amount or ownership
- 2) Reserves = Total Supply Resources - Firm Obligations
- 3) Capacity Margin = Reserves / Total Supply Resources \* 100
- 4) Reserve Margin = Reserves / Firm Obligations \* 100.

**Appendix B**  
**Progress Energy - Carolinas**  
**2004 SC Resource Plan Filing (Winter)**

	<u>04/05</u>	<u>05/06</u>	<u>06/07</u>	<u>07/08</u>	<u>08/09</u>	<u>09/10</u>	<u>10/11</u>	<u>11/12</u>	<u>12/13</u>	<u>13/14</u>	<u>14/15</u>	<u>15/16</u>	<u>16/17</u>	<u>17/18</u>	<u>18/19</u>
<b>GENERATION ADDITIONS</b>															
Brunswick NP Uprate		25													
Richmond CT				180											
Scrubber Derates		(7)	(7)	(71)	(22)	(10)		(5)	(16)						
Undesignated Capacity (1)					372	372	552	372	552	186	372	186	552	552	
<b>INSTALLED GENERATION</b>															
Combustion Turbine	3,474	3,474	3,474	3,654	3,654	3,654	3,654	3,654	3,654	3,654	3,654	3,654	3,654	3,654	3,654
Combined Cycle	648	648	648	648	648	648	648	648	648	648	648	648	648	648	648
Fossil	5,369	5,362	5,355	5,284	5,262	5,252	5,252	5,247	5,231	5,231	5,231	5,231	5,231	5,231	5,231
Hydro	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216
Nuclear	3,465	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490	3,490
Undesignated Capacity (1)					372	744	1,296	1,668	2,220	2,406	2,778	2,964	3,516	4,068	4,068
<b>PURCHASES &amp; OTHER RESOURCES</b>															
SEPA	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109
NUG QF - Cogen	323	323	100	100	100	100	100	100	68	68	68	68	68	68	68
NUG QF - Renewable	58	13	13	13	5										
AEP/Rockport 2	250	250	250	250	250										
Broad River CT	836	836	836	836	836	836	836	836	836	836	836	836	836	836	836
<b>TOTAL SUPPLY RESOURCES</b>	<b>14,748</b>	<b>14,721</b>	<b>14,491</b>	<b>14,600</b>	<b>14,942</b>	<b>15,049</b>	<b>15,601</b>	<b>15,968</b>	<b>16,472</b>	<b>16,658</b>	<b>17,030</b>	<b>17,216</b>	<b>17,768</b>	<b>18,320</b>	<b>18,320</b>
<b>PEAK DEMAND</b>															
Retail	7,706	7,877	8,066	8,230	8,415	8,596	8,780	8,956	9,131	9,316	9,506	9,701	9,899	10,092	10,288
Wholesale	2,910	2,697	2,532	2,619	2,660	2,661	2,687	2,712	2,739	2,764	2,790	2,817	2,842	2,871	2,898
<b>SYSTEM PEAK LOAD</b>	<b>10,616</b>	<b>10,574</b>	<b>10,598</b>	<b>10,849</b>	<b>11,075</b>	<b>11,257</b>	<b>11,467</b>	<b>11,668</b>	<b>11,870</b>	<b>12,080</b>	<b>12,296</b>	<b>12,518</b>	<b>12,741</b>	<b>12,963</b>	<b>13,186</b>
Firm Sales	95	595	535	300	300	300	300	300	300	300	300	300	300	300	300
<b>FIRM OBLIGATION</b>	<b>10,711</b>	<b>11,169</b>	<b>11,133</b>	<b>11,149</b>	<b>11,375</b>	<b>11,557</b>	<b>11,767</b>	<b>11,968</b>	<b>12,170</b>	<b>12,380</b>	<b>12,596</b>	<b>12,818</b>	<b>13,041</b>	<b>13,263</b>	<b>13,486</b>
Large Load Curtailment	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317
Voltage Reduction	176	180	184	187	192	195	199	205	208	213	216	221	225	230	234
<b>TOTAL LOAD</b>	<b>11,204</b>	<b>11,666</b>	<b>11,634</b>	<b>11,653</b>	<b>11,884</b>	<b>12,069</b>	<b>12,283</b>	<b>12,490</b>	<b>12,695</b>	<b>12,910</b>	<b>13,129</b>	<b>13,356</b>	<b>13,583</b>	<b>13,810</b>	<b>14,037</b>
<b>RESERVES (2)</b>															
Capacity Margin (3)	27%	24%	23%	24%	24%	23%	25%	25%	26%	26%	26%	26%	27%	28%	26%
Reserve Margin (4)	38%	32%	30%	31%	31%	30%	33%	33%	35%	35%	35%	34%	36%	38%	36%

**Notes:**

- 1) For planning purposes only; does not indicate a commitment to type, amount or ownership
- 2) Reserves = Total Supply Resources - Firm Obligations
- 3) Capacity Margin = Reserves / Total Supply Resources \* 100
- 4) Reserve Margin = Reserves / Firm Obligations \* 100.





Appendix D  
Levelized Busbar Cost for Viable Technologies  
*CAROLINAS*

