Supplemental Report on the NCTPC 2007-2017 Collaborative Transmission Plan

May 16, 2008

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I. Executive Summary

The report documenting the 2007-2017 Collaborative Transmission Plan (the "2007 Collaborative Transmission Plan" or the "2007 Plan") was published in January 2008.

As the 2007 Plan was being finalized, the need for two major upgrades to accommodate confirmed requests for service under the Open Access Transmission Tariff ("OATT") of Progress Energy Carolinas, Inc. ("Progress") was identified. Also, potential changes in the designated resources to meet the Progress West area load were submitted on the Duke Energy Carolinas ("Duke") and Progress Open Access Same-time Information Systems ("OASIS").

The purpose of this supplemental report to the 2007 Plan is two-fold:

1) to report on the two major upgrades needed to accommodate confirmed requests for service under the Progress OATT; and

2) to report on the transmission alternatives studied by the Planning Working Group ("PWG") to accommodate potential changes in the designated resources to supply the Progress West area load primarily through imports from and across Duke.

As a result of the analysis performed for the supplemental report to the 2007 Plan and the review of OATT studies performed by Progress for various interconnection service and transmission service requests, the PWG identified and the Oversight Steering Committee ("OSC") approved including the following two major upgrades in the 2007 Supplemental Plan:

1) Richmond-Fort Bragg Woodruff Street 230 kV line; and

2) Jacksonville Static VAR Compensator.

The updated major project listing (including projects costing $10 million or more) for the 2007 Supplemental Plan reflects these two additions in Appendix A of this report. Detailed project descriptions for these two new projects are listed in Appendix B.

The 2007 Plan published in January 2008 included seventeen major projects with a total estimated cost of $400 million. The 2007 Supplemental Plan includes eighteen major projects with a total estimated cost of $523 million.[1] The differences in the major projects between the 2007 Plan and the 2007 Supplemental Plan are that the 2007 Supplemental Plan (i) includes the two new major projects described above and (ii) removes the Marion-Whiteville 230kV project since the line was placed in-service in June 2007. The difference in the total estimated cost of the two Plans is primarily attributable to (i) the estimated

[1] The total estimated cost of the 2007 Supplemental Plan is based on the best available planning estimate of the cost for each of the major projects in the Plan. The estimated cost for each major project in the Plan is listed in Appendix A.

costs of $115 million for the two new major projects and (ii) the revised estimated costs for some of the other Progress projects. These revised estimates were available as Progress recently completed its near term project and budget review. Appendix C provides a detailed comparison of the 2006 Plan, the 2006 Supplemental Plan, the 2007 Plan and the 2007 Supplemental Plan.

The PWG also evaluated a number of transmission alternatives to accommodate potential changes in the designated resources to meet the Progress West area load. Based on this analysis, a new transmission source from the Duke control area to the Progress West control area is required to meet reliability needs while accommodating the potential changes in the designated resources. The next step is for Duke and Progress to continue the evaluation of the technical feasibility of transmission alternatives. Duke and Progress will keep the OSC and PWG apprised of the status of the evaluation and of additional studies performed to develop the preferred transmission solution.

II. Richmond-Fort Bragg Woodruff Street 230 kV Line

II.A. Need for New Line

In accordance with its OATT procedures, Progress published a Generator Interconnection Facilities Study Report on October 25, 2007 for interconnection requests 195 through 198 in its generation queue. The interconnection requests were for the addition of a total of 643 MW of combined cycle generation at the 230 kV bus of the Richmond Substation in the Progress East control area. The studies performed for these interconnection requests identified the need for a new Richmond-Fort Bragg Woodruff Street 230 kV line. The Generator System Impact Study Report and the Generator Interconnection Facilities Study Report for these requests are posted on the Progress Open Access Same-time Information System ("OASIS").

The 2007 Plan did not include the new Richmond-Fort Bragg Woodruff Street 230 kV line, because the results of the Generator Interconnection Facilities Study were not available until the studies for the 2007 Plan were near completion. The updated 2007 Plan includes the new Richmond-Fort Bragg Woodruff Street 230 kV line.

For the Richmond-Fort Bragg Woodruff Street 230 kV line, the planned in-service date is June 1, 2011 and the estimated cost is $85 million.

II.B. Impact on 1,200 MW Import Resource Supply Option

In addition, the study for the 2007 Plan included analysis of a 1,200 MW import from Duke to Progress East as a resource supply option. The conclusion of the analysis was that this transfer was achievable without any additional projects beyond those in the 2007 Plan. In order to determine the impact of the new generation at Richmond and the new Richmond-Fort Bragg Woodruff Street 230 kV line on the 1,200 MW resource supply option, the PWG reviewed the Facilities Study Report published by Progress on July 26, 2007 for transmission service request

OASIS #71196974. The Facilities Study Report for this transmission service request is posted on the Progress OASIS.

The Progress study for this OASIS request modeled an additional import from Duke to Progress East of 1,200 MW and included the new generation at Richmond and the new Richmond-Fort Bragg Woodruff Street 230 kV line. The results of the Progress study indicated that no thermal overloads occurred under this scenario. Therefore, the 1,200 MW transfer from Duke to Progress East was achievable without any additional projects beyond those in the 2007 Plan plus the new Richmond-Fort Bragg Woodruff Street 230 kV line.

III. Jacksonville Static VAR Compensator

In accordance with its OATT procedures, Progress published a Facilities Study Report on July 26, 2007 for transmission service request OASIS #71196974. The Progress study for this OASIS request modeled an additional import from Duke to Progress East of 1,200 MW and included the new generation at Richmond and the new Richmond-Fort Bragg Woodruff Street 230 kV line. The System Impact Study Report and Facilities Study Report for this request are posted on the Progress OASIS. The results of the studies indicated no significant thermal loading issues, but did indicate an issue with depressed post contingency voltage and prolonged voltage recovery in Progress East. This led to the identification of the need for a 300 MVAR Static VAR Compensator ("SVC") at the Jacksonville 230 kV Substation.

A stability study was performed at the 2012 summer peak load level with current and requested import obligations for Progress East. The cases assumed the outage of a large generator and simulated a normally cleared fault on various transmission facilities. The modeling of system loads were varied between two types: 1) a static load model; and 2) a composite load model of static and dynamic motor components. Since motors consume a very significant amount of the total energy in power systems, the dynamics associated with motors is usually considered important for simulation purposes. A composite load model comprised of static elements and motors often allows the best correlation of simulations and recorded events.

Therefore, dynamic analysis was performed modeling induction motor loads and then applying 3-phase faults on transmission lines in Progress East service territory. This analysis indicated that under certain faulted conditions that Progress East's transmission network along the coast of North Carolina would be unable to maintain adequate voltage support. A lack of voltage support in the coastal area means that voltage recovery following certain faults is inadequate to maintain proper voltage. As a result of this, the induction motor loads will be unable to return to normal operation and this portion of the Progress East system will experience voltage instability.

Installing a 300 MVAR SVC at the Jacksonville 230kV Substation provides enough dynamic reactive support to allow the motors to accelerate to normal speed and to allow voltage to quickly recover to a normal operating level. In

addition, the SVC will reduce area loss of load and improve overall stability of the area's transmission system.

The updated 2007 Plan includes the new 300 MVAR SVC at the Jacksonville 230 kV Substation. For the SVC, the planned in-service date is June 1, 2012, and the estimated cost is $30 million. Surveys by Progress of similar project lead-times indicate that the planned July 1, 2012 in-service date can be achieved.

IV. Progress West Imports

IV.A. Purpose of Study

Beginning in the 2010 timeframe, potential changes in the designated resources to supply the Progress West area load, primarily through imports from and across Duke, were submitted on the Duke and Progress OASIS. These requests were submitted as the 2007 Plan was being finalized. For the 2007 Supplemental Report, the PWG (i) assessed resource option scenarios for serving load in Progress West, (ii) identified problems, and (iii) developed and evaluated transmission alternatives.

IV.B. Case Development

The study years chosen for the Progress West import resource supply option scenarios were 2012 and 2016 summer and 2011-12 and 2015-16 winter.

The 2012 and 2016 summer base cases used to develop the 2007 Plan were adjusted to create new 2012 and 2016 summer study cases for the Progress West import resource supply option scenarios. The primary change from the base case to the resource supply option cases is a shift in the source area for imports to supply the Progress West area load. As shown in Table 1, the shift is from PJM as the source in the 2008 – 2009 time frame to Duke and CPLE as the proposed sources in later years.

The interchange in these cases was adjusted to reflect the imports from potential designated resources external to the Progress West control area. The scenarios were studied both with and without the Progress West Transmission Reliability Margin ("TRM") of 206 MW. Interchange tables for the scenarios studied are in Appendix D.

Table 1

Proposed Sources to Supply the Progress West Area Load						
Year	**PJM(AEP)**	**TVA**	**CPLE**	**Duke**	**SOCO**	**Total**
2008	250	1	136			387
2009	250	1	136	45		432
2010		1	300	295		596
2011		1	300	195	100	596
2012 - 2014		1	300	195		496
2015 - 2019		1	400	195		596

The 2011-12 and 2015-16 winter cases had to be fully developed using the internal detail from Duke's winter cases and Progress' winter cases, since no winter base cases were developed for analysis performed for the 2007 Plan.

IV.C. Transmission Alternatives Evaluated

The evaluation of future reliability issues related to the increased import of energy into Progress West indicates that a significant number of upgrades would be required. Duke's Caesar (Shiloh Tie – Pisgah Tie) 230 kV Line, Davidson River (North Greenville Tie – Pisgah Tie) 100 kV Line, London Creek (Peach Valley Tie – Riverview Tie) 230 kV Line, and the jointly owned Pisgah Tie (Duke) to Asheville (PEC) 230 kV line will require upgrades. These upgrades alone would be insufficient to ensure reliable service to Progress West when considering the possibility of common tower outages of lines in the western area of Duke and Progress West. Common tower outages in this region appear more likely than in other parts of the Duke and Progress service areas because of the terrain the lines are built on. Eliminating reliability issues with common tower outages would require additional upgrades to underlying 100 kV circuits in the Duke area.

Integrated solutions that eliminate the majority of the upgrades identified above were evaluated. Such potential solutions involve the construction of an additional strong source into Progress West service area. Several alternatives were evaluated which involved reconfiguration of existing lines to minimize use of new Rights-Of-Way ("ROW"). Developing completely new circuits using new ROW was also considered. The alternatives evaluated were:

1) Tiger-Campobello-Hendersonville-Asheville 230 kV: Rebuild Duke's 100 kV Harley and Hogback Lines (Tiger Tie to Hendersonville Tie) to 230 kV. Construction of a new 230 kV line from Hendersonville to Asheville (Progress). In addition to the new ROW, expanded ROW would be required for rebuild of the 100 kV section from the area near Tiger to Hendersonville.

2) South Mountain 500/230 kV Station & Construct New 230kV Line to Asheville: Construction of a new 500/230 kV station on Duke's South Mountain (McGuire Nuclear Station to Jocassee Hydro) 500 kV line. Construction of a new 230 kV line connecting the new 500/230 kV station on Duke's South Mountain to Asheville. Both a single circuit and double circuit configuration were examined.

3) South Mountain 500/230 kV Station, Rebuild Existing 100 kV Lines at 230 kV & Construct New 230kV Line from Hendersonville to Asheville: Construction of a new 500/230 kV station on Duke's South Mountain (McGuire Nuclear Station to Jocassee Hydro) 500 kV Line near Campobello. Rebuild of Duke's 100 kV Hogback Line (Campobello Tie area to Hendersonville Tie) to 230 kV. Construction of a new 230

kV line from Hendersonville to Asheville. In addition to the new ROW, expanded ROW would be required for rebuild of the 100 kV section from the Campobello area to Hendersonville.

4) Shiloh-Asheville 230 kV: Construction of a third circuit that would run on new ROW parallel to the existing Shiloh Tie (Duke)-Pisgah Tie (Duke)-Asheville (Progress) double circuit 230 kV lines.

5) McDowell-Black Mountain 230 kV: Construction of a new 230 kV line connecting McDowell Tie (Duke) to Black Mountain station (Progress). Rebuild Black Mountain station from 115 kV to 230 kV.

The 230 kV McDowell Tie to Black Mountain Station was the only alternative that was not a viable solution. Under these increased import scenarios, a McDowell to Black Mountain 230kV tie line did not provide adequate relief to transmission congestion or provide proper voltage support since McDowell is not a sufficiently strong source. Among the other alternatives, some had greater benefit than others, but all options show that a new source from Duke into Progress West could meet reliability requirements while accommodating the potential changes in the designated resources.

IV.D. Next Steps

The next step is for Duke and Progress to continue the evaluation of the technical feasibility of some of the more promising transmission alternatives. Duke and Progress will keep the OSC and PWG apprised of the status of the evaluation and of additional studies performed to develop the preferred transmission solution.

V. Updated 2007 Collaborative Transmission Plan

A summary of the changes to the original 2007 Collaborative Transmission Plan is listed below:

1) Richmond-Fort Bragg Woodruff Street 230 kV line; and

2) Jacksonville Static VAR Compensator.

A detailed description of the two new projects is provided in Appendix B.

The updated 2007 Collaborative Transmission Plan includes 18 projects with an estimated cost of $10 million or more each. These projects are listed in Appendix A. This list of major projects will continue to be modified on an ongoing basis as new improvements are identified through the NCTPC Process and projects are completed or eliminated from the list. The list provides the following information for each project:

1) Reliability Project: Description of the project.

2) Issue Resolved: Specific driver for project.

3) Status: Status of development of the project as described below:

   a. *In-Service* – Projects with this status are in-service.
   b. *Underway* – Projects with this status range from the Transmission Owner having some money in its current year budget for the project to the Transmission Owner having completed some construction activities for the project.
   c. *Planned* – Projects with this status do not have money in the Transmission Owner's current year budget; and the project is subject to change.
   d. *Deferred* – Projects with this status were identified in the 2006 Supplemental Report and have been deferred beyond the end of the planning horizon based on the 2007 Study results.

4) Transmission Owner: Responsible equipment owner designated to design and implement the project.

5) Projected In-Service Date: The date the project is expected to be placed in service.

6) Estimated Cost: The estimated cost is in nominal dollars which reflects the sum of the estimated annual cash flows over the expected development period for the specific project (typically 2 – 5 years), including direct costs, loadings and overheads; but not including AFUDC. Each year's cash flow is escalated to the year of the expenditures. The sum of the expected cash flows is the estimated cost.

7) Project lead time: Number of years needed to complete project. For projects with the status of Underway, the project lead time is the time remaining to complete construction of the project and place the project in-service.

Appendix C is a summary and comparison of the 2006 Plan, the 2006 Supplemental Plan, the 2007 Plan and the 2007 Supplemental Plan.