

# **Study of Resource Options for the Public Works Commission of Fayetteville, North Carolina**

**CP&L**

**May 9, 2000 (modified June 26, 2000)  
System Planning & Operations Department**

## **Purpose**

An agreement to perform a study outside of CP&L's OATT was made effective on March 15, 2000 with a signed agreement and deposit held by CP&L. The purpose of this study is to determine if the CP&L transmission system can accommodate various power supply options as provided by The Public Works Commission of Fayetteville, North Carolina (PWC or FayPWC).

## **Methodology**

The results were obtained using the Power Technologies Incorporated (PTI) PSS/E and MUST software. In assessing the different proposals, the configuration of the network resources for each proposal that would cause the most stress on the CP&L system were studied. The impacts on CP&L's system were then evaluated based on approved NERC, SERC, and CP&L Planning and Operating Standards.

## **Request**

The period of the study is July 1, 2004 through June 30, 2014. The information provided by FayPWC in their request document dated February 25, 2000 was utilized. The proposals in that document are restated below:

- A. Continuation of delivery of full requirements service from the CP&L system resources combined with the BWGP and SEPA resources. Transmission system requirements may include PWC's full load when the BWGP is not being dispatched. Network resources are expected to include up to 500 MW of CP&L system generation and 260 MW of BWGP output.
- B. Delivery of full requirements service from a new resource located on CP&L's 230 kV transmission system near the BWGP combined with BWGP, SEPA, and South Carolina Electric and Gas Company (SCE&G) system resources. The new resource is expected to be interconnected with CP&L at the BWGP bus. Up to 300 MW from the new resource, 260 MW from BWGP, and 400 MW from the SCE&G system may be utilized as network resources. Under this alternative, PWC's load will be incorporated into SCE&G's control area.
- C. Delivery of full requirements service from a new resource located on CP&L's 230 kV transmission system near the BWGP combined with BWGP, SEPA, and Virginia Electric and Power Company (Virginia Power) system resources. The new resource is expected to be interconnected with CP&L at the BWGP bus. Up to 300 MW from the new resource, 260 MW from BWGP, and 400 MW from the Virginia Power system may be utilized as network resources. Under this alternative, PWC's load will be incorporated into Virginia Power's control area.
- D. Delivery of full requirements service from a CP&L unit or units located at CP&L's new plant site in Richmond County combined with other CP&L system resource, the BWGP, and SEPA resources. Network resources are expected to include up to 300 MW from the Richmond County resource, 260 MW from BWGP, and 400 MW from CP&L system generation.

- E. Delivery of full requirements service from a new gas-fired resource located near Laurinburg combined with the BWGP and SEPA resources. The new resource near Laurinburg will be interconnected with CP&L's Laurinburg-Weatherspoon 230 kV transmission line. Network resources are expected to include up to 500 MW from the new resource and 260 MW from BWGP.
- F. Delivery of full requirements service from system resources of Virginia Power combined with the BWGP and SEPA resources. Virginia Power's system resources will be supplied over interconnections between CP&L and Virginia Power. Network resources are expected to include up to 500 MW of Virginia Power system generation and 260 MW of BWGP output. Under this alternative, PWC's load will be incorporated into Virginia Power's control area.
- G. Delivery of full requirements service from system resources of SCE&G combined with the BWGP and SEPA resources. SCE&G's system resources will be supplied over interconnections between CP&L and SCE&G. Network resources are expected to include up to 500 MW of SCE&G system generation and 260 MW of BWGP output. Under this alternative, PWC's load will be incorporated into SCE&G's control area.
- H. Delivery of full requirements service from system resources of South Carolina Public Service Authority (Santee Cooper or SCPSA) combined with the BWGP and SEPA resources. Santee Cooper's system resources will be supplied over interconnections between CP&L and Santee Cooper. Network resources are expected to include up to 500 MW of Santee Cooper system generation and 260 MW of BWGP output. Under this alternative, PWC's load will be incorporated into Santee Cooper's control area.
- I. Delivery of full requirements service from system resources of American Electric Power Company (AEP) combined with the BWGP and SEPA resources. AEP's system resources will be supplied over interconnections between CP&L and AEP. Network resources are expected to include up to 500 MW of AEP system generation and 260 MW of BWGP output. Under this alternative, PWC's load may be incorporated into AEP's control area.
- J. Additional study to analyze the connection of a new 500 MW resource at FayPWC's BWGP. The first 300 MW of this generation will be to serve FayPWC load with the remaining 200 MW sinking to the CP&L system.

### **Assumptions**

This analysis includes the impact of firm transactions from the known sources and sinks as well as any committed transmission system upgrades or the addition of generation that CP&L is currently aware of. This analysis does not include the impacts that any future transactions may have on the CP&L transmission system. Additionally, this analysis does not include the impact a future Regional Transmission Organization (RTO) may have.

This analysis focuses on the impacts to the CP&L system due to FayPWC's proposals of generation additions internal to the CP&L control area and proposals for importing power from control areas external to the CP&L system.

#### Generation Options

New generation resources were modeled as provided in the customer's letter to CP&L. New generators were operated at maximum output.

#### Purchase Options

To assist the customer in its evaluation of the various purchase options, the purchase analysis was divided into two steps. First, a test was performed to see if the CP&L system could support the amount necessary to cover the Customer's forecasted load with the assumption that Butler Warner Generation Plant is online at 260 MW. Second, the maximum amount of import was determined from each proposed interface.

### **Results**

The following are the results of CP&L's analysis of FayPWC options. If appropriate the explanation is categorized by the *generation addition* and *external purchase*. These results are not applicable for modification to the stated resource size, location, or schedule.

- A. CP&L 500 MW purchase; existing FayPWC resources.  
No problems identified.
- B. Install a new 300 MW unit at BWGP; SCE&G 400 MW purchase; existing FayPWC resources.  
*300 MW Unit at BWGP*  
In 2004 with this new generator online at 300 MW one of CP&L's Fayetteville 230/115 kV banks overloads to 103% under contingency.  
  
In 2006 CP&L's Weatherspoon – Delco 115 kV line overloads to 110% under contingency.  
  
*SCE&G 400 MW purchase*  
For the impact of the SCE&G purchase see the results for **G**.
- C. Install a new 300 MW unit at BWGP; Virginia Power 400 MW purchase; existing FayPWC resources.  
*300 MW Unit at BWGP*  
Same as described in **B**. above.  
  
*Virginia Power 400 MW purchase*  
For the impact of the Virginia Power purchase see the results for **F**.

- D. CP&L 400 MW purchase; existing CP&L 300 MW Richmond County CT; existing FayPWC resources  
No problems identified.
- E. Install a new 500 MW unit on CP&L's Laurinburg - Weatherspoon 230 kV line; existing FayPWC resources  
*500 MW unit on CP&L's Laurinburg-Weatherspoon 230 kV line*  
The unit was modeled as 500 MW at CP&L's Rowland 230 kV tap approximately midway on CP&L's Laurinburg - Weatherspoon 230 kV line. In 2004, the section of line between the Rowland 230 kV tap (assumed point of interconnection) and the Weatherspoon 230 kV terminal overloads to 110 % under contingency. Similar results will occur if the unit was tapped instead near Maxton, NC on the Laurinburg - Weatherspoon 230 kV line. In addition, stability study results found prolonged oscillations with magnitudes large enough to require the installation of power system stabilizers on the new units.
- F. Virginia Power 500 MW purchase.  
*Virginia Power 500 MW purchase*  
In 2004 no problems were found with a Virginia Power import of up to 223 MW. This import is the amount required to serve the FayPWC forecasted load with Butler Warner Generation Plant online at 260 MW.
- Additionally, no problems were found importing up to 483 MW from the Virginia Power interface, completely serving FayPWC load with BWGP at zero generation.
- G. SCE&G 500 MW purchase; existing FayPWC resources.  
*SCE&G 500 MW purchase*  
In 2004 no problems were found with a SCE&G import of up to 223 MW. This import is the amount required to serve the FayPWC forecasted load with Butler Warner Generation Plant online at 260 MW.
- Imports from the SCE&G interface are limited to a maximum value of 300 MW. CP&L's transfer capability reaches zero under contingency when imports exceed this amount.
- H. SCPSA 500 MW purchase; existing FayPWC resources.  
*SCPSA 500 MW purchase*  
In 2004 no problems were found with a SCPSA import of up to 223 MW. This import is the amount required to serve the FayPWC forecasted load with Butler Warner Generation Plant online at 260 MW.
- Additionally, no problems were found importing up to 483 MW from the SCPSA interface, completely serving FayPWC load with BWGP at zero generation.

I. AEP 500 MW purchase; existing FayPWC resources.

*AEP 500 MW purchase*

In 2004 no problems were found with an AEP import of up to 223 MW. This import is the amount required to serve the FayPWC forecasted load with Butler Warner Generation Plant online at 260 MW.

Imports from the AEP interface are limited to a maximum value of 450 MW. CP&L's transfer capability reaches zero under contingency when imports exceed this amount.

J. Install a new 500 MW resource at FayPWC's BWGP with 300 MW to serve FayPWC load and the remaining 200 MW to sink in the CP&L system

Additional loading occurs with the 200 MW transfer from BWGP to the CP&L system but no additional facilities are impacted.

In 2004 with either one of CP&L's Fayetteville 230/115 kV banks opened the remaining bank overloads an additional 3 % to 106%.

In 2006 with the Cumberland-Delco 230 kV line opened the Weatherspoon-Delco 115 kV line overloads an additional 1 % to 111 %.