

# **Cromby Units 1 and 2 and Eddystone Units 1 and 2**

## **Deactivation Study**

**Original Posting Date: March 2, 2010**

**Updated May 10, 2010**

### **General**

PJM received notice from Exelon Generation Company LLC (“Exelon”) of its intent to deactivate through retirement Units 1 and 2 at the Cromby Generating Station and Units 1 and 2 at the Eddystone Generating Station, effective May 31, 2011. Cromby Unit 1 has a net capacity of 144 MW, Cromby Unit 2 201 MW, Eddystone Unit 1 279 MW, and Eddystone Unit 2 309 MW.

PECO has provided updated expected completion dates for certain upgrades. This has affected the projected deactivation date for Cromby Unit 2 and Eddystone Unit 2.

### **Reliability Analysis Results**

PJM Transmission Planning and PECO performed an analysis of the 2011 transmission system with Cromby Unit 1 and Unit 2 and Eddystone Unit 1 and Unit 2 unavailable. Multiple reliability impacts were identified with all four units deactivated, including N-1-1 Thermal Violations, Generation Deliverability Violations, Common Mode N-1 Contingency Thermal Study Violations, Common Mode N-1 Contingency Voltage Study Violations, CETO Voltage Study Violations, N-1-1 Voltage Study Violations, and Short Circuit violations.

With the completion of the transmission system upgrades identified below as scheduled (Nos. 1 through 9), Cromby Unit 1 and Eddystone Unit 1 will not be needed for reliability and can be deactivated on the proposed date of May 31, 2011.

### **2011 PJM - PECO Load and Generator Deliverability, Short Circuit, Common Mode N-1, and N-1-1 Violations**

1. Overload of North Wales – Hartman 230 kV line for loss of Jarrett-Whitpain 230 kV line +Basecase [N-1-1]

Solution:

Reconductor North Wales – Hartman 230 kV line  
Cost Estimate: \$2.2 Million

Projected In-Service Date: Complete and in-service as of January 2010

2. Overload of Eddystone – Saville 138 kV line for loss of Macdade-Ridley-Morton 230 kV line + loss of Island Road-Eddystone 230 kV line [N-1-1]

Solution:

Replace terminal equipment at both Eddystone and Saville substations and replace underground cable portion of line

Cost Estimate: \$3.94 Million

Projected In-Service Date: May 27, 2011

3. Overload of Chichester – Linwood 230 kV line #1 for loss of Linwood-Chichester ‘220-43’ 230 kV line and Philips Island generation units [Generation Deliverability - single]

Solution:

Replace terminal equipment at Chichester substation

Cost Estimate: \$0.475 Million

Projected In-Service Date: May 27, 2011

4. Overload of Chichester – Linwood 230 kV line #2 for loss of Linwood-Chichester ‘220-39’ 230 kV line and Philips Island generation units [Generation Deliverability - single]

Solution:

Replace terminal equipment at Chichester substation

Cost Estimate: \$0.475 Million

Projected In-Service Date: May 27, 2011

5. Overload of Tunnel – Parrish 230 kV line for loss of New Freedom-East Windsor 500 kV line [Generation Deliverability - single]

Solution:

Replace terminal equipment at Parrish substation

Cost Estimate: \$0.15 Million

Projected In-Service Date: May 27, 2011

6. Overdutied circuit breaker #365 in Eddystone substation [short circuit]

Solution:

Upgrade 230 kV circuit breaker #365 in Eddystone substation  
Cost Estimate: \$0.125 Million  
Projected In-Service Date: May 31, 2011

7. Overdutied circuit breaker #785 in Eddystone substation [short circuit]

Solution:

Upgrade 230 kV circuit breaker #785 in Eddystone substation  
Cost Estimate: \$0.125 Million  
Projected In-Service Date: May 31, 2011

8. Overdutied circuit breaker #45 in Eddystone substation [short circuit]

Solution:

Upgrade / replace 230 kV circuit breaker #45 in Eddystone substation  
Cost Estimate: TBD – See note below  
Projected In-Service Date: May 27, 2011

Note: this circuit breaker will be the responsibility of Exelon Generation since it is on the generator side of the Point-of-Interconnection

9. Overdutied circuit breaker #35 in Eddystone substation [short circuit]

Solution:

Upgrade / replace 230 kV circuit breaker #35 in Eddystone substation  
Cost Estimate: TBD – See note below  
Projected In-Service Date: May 27, 2011

Note: this circuit breaker will be the responsibility of Exelon Generation since it is on the generator side of the Point-of-Interconnection

Since the completion of the next group of transmission system upgrades identified below (Nos. 10 through 15) will not occur until after May 31, 2011, Cromby Unit 2 will need to be operated for reliability reasons until these required upgrades are complete. Based upon the schedule for completion of these upgrades, it is expected that Cromby Unit 2 will be allowed to deactivate on December 31, 2011.

**2011 PJM - PECO Load and Generator Deliverability, Short Circuit, Common Mode N-1, and N-1-1 Violations**

10. Overload of Whitpain - Jarrett 230 kV line for loss of North Wales-Hartman 230 kV line + Basecase [N-1-1]

Solution:

Replace terminal equipment at Whitpain and Jarrett substations  
Cost Estimate: \$0.175 Million  
Projected In-Service Date: May 27, 2011

11. Overload of Hartman – Warrington 230 kV line for loss of Emilie-Neshaminy 138 kV line + loss of Jarrett-Whitpain 230 kV line [N-1-1]

Solution:

Replace terminal equipment at Hartman and Warrington substations  
Cost Estimate: \$0.375 Million  
Projected In-Service Date: May 27, 2011

12. Voltage violations at Perkiomen substation for various contingencies [N-1, N-1-1]

Solution:

Add circuit breakers to the Perkiomen – North Wales 138 kV line and Perkiomen – Cromby 138 kV line. Add 35 MVAR 138 kV capacitor bank at Perkiomen substation.  
Cost Estimate: \$3.9 Million  
Projected In-Service Date: August 01, 2011

13. Voltage violations at Heaton substation for various contingencies [N-1, N-1-1]

Solution:

Add second 230 / 138 kV transformer at Heaton substation. Add circuit breaker on the Heaton – North Wales 138 kV line. Add 35 MVAR 138 kV capacitor bank at Heaton substation.  
Cost Estimate: \$7.754 Million  
Projected In-Service Date: December 16, 2011

14. Voltage violations at Cromby substation for various contingencies [N-1, N-1-1]

Solution:

Replace 230 / 69 kV transformer #6 at Cromby substation with new higher – rated transformer. Add two 50 MVAR 230 capacitor banks at Cromby substation.

Cost Estimate: \$6.142 Million

Projected In-Service Date: December 31, 2011

15. Overload of Heaton – Jarrett 230 kV line for various contingencies [N-1, N-1-1]

Solution:

Replace terminal equipment at Heaton and Jarrett substations.

Cost Estimate: \$0.525 Million

Projected In-Service Date: May 27, 2011

Since the completion of the next group of transmission system upgrades identified below (Nos. 16 through 18) will not occur until after May 31, 2011, Eddystone Unit 2 will need to be operated for reliability reasons until these required upgrades are complete. Based upon the schedule for completion of these upgrades, it is expected that Eddystone Unit 2 will be allowed to deactivate on December 31, 2012.

**2011 PJM - PECO Load and Generator Deliverability, Short Circuit, Common Mode N-1, and N-1-1 Violations**

16. Overload on Chichester 230/138 kV transformer for loss of / loss of Macdade – Ridley – Morton 230 kV line + loss of Island Road – Eddystone 230 kV line [N-1-1]

Solution:

Add second 230 / 138 kV transformer in parallel with existing transformer at Chichester substation. Add 138 kV inductor in series with transformer pair.

Cost Estimate: \$5.908 Million

Projected In-Service Date: December 16, 2011

17. Overload on Chichester – Saville 138 kV line for loss of Macdade-Ridley-Morton 230 kV line + loss of Island Road-Eddystone 230 kV line [N-1-1, Generation Deliverability - single]

**Solution:**

Reconductor Chichester – Saville 138 kV line and replace terminal equipment at Chichester and Saville substations.

Cost Estimate: \$8.5 Million

Projected In-Service Date: December 31, 2012

18. Voltage violations at Eddystone 138 kV substation for various contingencies [N-1-1]

**Solution:**

Install 230 / 138 kV transformer in same position as former Eddystone #8 transformer, for use when Eddystone Unit 1 and Unit 2 are out of service.

Cost Estimate: \$3.6 Million

Projected In-Service Date: June 1, 2011