#Z2-108 – Meyersdale North 115kV

Generation Interconnection

General

The Interconnection Customer (IC) is proposing to install 18 MW Energy (0 MW Capacity) of batteries located in Somerset County, PA interconnecting into the Penelec area. This means that the full 18 MW generated by the battery can be curtailed should a system reliability constraint occur. The IC has proposed in-service date is for December 30, 2015. The IC has requested a backfeed date of August 31, 2015.

This Generation Interconnection Feasibility Study provides analysis results to aid the IC in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. If the IC elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Attachment Facilities

Since this is an uprate to an existing facility, no Attachment Facilities upgrades are required. The single line is shown below in **Figure 1**.

The IC is required to construct all connection facilities in accordance with the Penelec published standards.

Direct Connection

Since this is an uprate to an existing facility, no Direct Connection upgrades are required.

Non-Direct Connection

The total preliminary cost estimate for Non-Direct Connection work is given in the following tables below:

For Penelec building Direct Connection cost estimates:

Table 1. Non-Direct Connect Cost Estimate

Description	Total Cost	Tax	Total with Tax
Relaying setting changes	$5,000	$1,600	$6,600
Total	**$5,500**	**$1,600**	**$6,600**

Revenue Metering and SCADA Requirements

For PJM: IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

For Penelec: The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

http://www.firstenergycorp.com/feconnect
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Network Impacts

The Queue Project Z2-108 was studied as a 20.0 MW (0.0 MW Capacity) injection at the Meyersdale North 115 kV substation in the Penelec area. Project Z2-108 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project Z2-108 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis – 2018

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No violations were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No violations were identified.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue.)

No violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

PJM: Not required.

Penelec: No overloaded breakers were identified.

Light Load Analysis – 2018

Not required.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None.

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. ***Any potential problems identified below are likely to result in operational restrictions to the project under study.*** *The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.*

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified:

Item 1a. (PENELEC - PENELEC) The 26HOMER CT-26SHELOCTA 230 kV line (from bus 200767 to bus 200795 ckt 1) loads from 99.95% to 100.17% (**DC power flow**) of its emergency rating (917 MVA) for the single line contingency outage of 'B_LINE_SY_018'. This project contributes approximately 3.77 MW to the thermal violation.

CONTINGENCY 'B_LINE_SY_018' /* 3-TERMINAL LINE PERRY-AT-ERIE W 345 CK 1
DISCONNECT BRANCH FROM BUS 239036 TO BUS 238547 CKT 1 /* 02PERRY 345.00 02AT 345.00
DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345.00 02S8-ATT 345.00
DISCONNECT BRANCH FROM BUS 239082 TO BUS 238544 CKT 8 /* 02S8-ATT 345.00 02ASH_3 138.00
DISCONNECT BRANCH FROM BUS 238547 TO BUS 200599 CKT 1 /* 02AT 345.00 ERIE W 345.00

END

Item 1b. (PENELEC - PENELEC) The 26HOMER CT-26SHELOCTA 230 kV line (from bus 200767 to bus 200795 ckt 1) loads from 99.95% to 100.17% (**DC power flow**) of its emergency rating (917 MVA) for the single line contingency outage of 'B_LINE_SY_017'. This project contributes approximately 3.77 MW to the thermal violation.

CONTINGENCY 'B_LINE_SY_017' /* LINE 02AT TO ERIE W 345 CK 1
DISCONNECT BRANCH FROM BUS 238547 TO BUS 200599 CKT 1 /* 02AT 345.00 ERIE W 345.00
END

Item 1c. (PENELEC - PENELEC) The 26HOMER CT-26SHELOCTA 230 kV line (from bus 200767 to bus 200795 ckt 1) loads from 99.95% to 100.17% (**DC power flow**) of its emergency rating (917 MVA) for the single line contingency outage of 'DQE_163'. This project contributes approximately 3.77 MW to the thermal violation.

CONTINGENCY 'DQE_163' /* LINE ERIE W TO 02PERRY 345 CK 1
DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1
DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1
END

Item 1d. (PENELEC - PENELEC) The 26PENN-MAR-Y1-003 TAP 115 kV line (from bus 200747 to bus 913000 ckt 1) loads from 90.81% to 102.78% (**DC power flow**) of its emergency rating (167 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 20.0 MW to the thermal violation.

CONTINGENCY 'B_PN115-LX-#198_A' /* SOMERSET-ROCKWOOD & ROCKWOOD #1 XF
DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
END

Item 1e. (AP - AP) The 01GARRET-01ALBRIG 138 kV line (from bus 235469 to bus 235120 ckt 1) loads from 103.02% to 110.37% (**DC power flow**) of its emergency rating

(191 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 14.04 MW to the thermal violation.

```
CONTINGENCY 'B_PN115-LX-#198_A'                    /* SOMERSET-ROCKWOOD
& ROCKWOOD #1 XF
  DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
  DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
  END
```

Item 1f. (AP - AP) The 01GARRET 138/115 kV transformer (from bus 235470 to bus 235469 ckt 1) loads from 118.03% to 128.23% (**DC power flow**) of its emergency rating (196 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 19.99 MW to the thermal violation.

```
CONTINGENCY 'B_PN115-LX-#198_A'                    /* SOMERSET-ROCKWOOD
& ROCKWOOD #1 XF
  DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
  DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
  END
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Item 1g. (PENELEC - PENELEC) The Y1-003 TAP-26GARRETT 115 kV line (from bus 913000 to bus 200762 ckt 1) loads from 126.73% to 138.7% (**DC power flow**) of its emergency rating (167 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 20.0 MW to the thermal violation.

```
CONTINGENCY 'B_PN115-LX-#198_A'                    /* SOMERSET-ROCKWOOD
& ROCKWOOD #1 XF
  DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
  DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
  END
```

Item 1h. (PENELEC - PENELEC) The 26ROCKWOOD-26SOMERST 115 kV line (from bus 200746 to bus 200744 ckt 1) loads from 138.03% to 150.08% (**DC power flow**) of its emergency rating (166 MVA) for the single line contingency outage of 'B_PN115-XF-#95A'. This project contributes approximately 19.99 MW to the thermal violation.

```
CONTINGENCY 'B_PN115-XF-#95A'                      /* GARRETT 138-115 KV XF
  DISCONNECT BRANCH FROM BUS 235469 TO BUS 235470 CKT 1
  DISCONNECT BRANCH FROM BUS 235470 TO BUS 200762 CKT 1
```

END

Item 1i. (PENELEC - PENELEC) The 26ROCKWOOD-26SOMERST 115 kV line (from bus 200746 to bus 200744 ckt 1) loads from 138.03% to 150.08% (**DC power flow**) of its emergency rating (166 MVA) for the single line contingency outage of 'APS_B_G702'. This project contributes approximately 19.99 MW to the thermal violation.

CONTINGENCY 'APS_B_G702' / 200762 GARRETT 115 235470 01GARRET 115 1
OPEN BRANCH FROM BUS 200762 TO BUS 235470 CKT 1
END

Item 1j. (PENELEC - PENELEC) The 26ROCKWOOD-26SOMERST 115 kV line (from bus 200746 to bus 200744 ckt 1) loads from 138.03% to 150.08% (**DC power flow**) of its emergency rating (166 MVA) for the single line contingency outage of 'APS_B_G592'. This project contributes approximately 19.99 MW to the thermal violation.

CONTINGENCY 'APS_B_G592' / 235469 01GARRET 138 235470 01GARRET 115 1
OPEN BRANCH FROM BUS 235469 TO BUS 235470 CKT 1
END

Item 1k. (PENELEC - AP) The 26GARRETT-01GARRET 115 kV line (from bus 200762 to bus 235470 ckt 1) loads from 144.59% to 157.08% (**DC power flow**) of its emergency rating (160 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 19.99 MW to the thermal violation.

CONTINGENCY 'B_PN115-LX-#198_A' /* SOMERSET-ROCKWOOD & ROCKWOOD #1 XF
DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
END

Item 1l. (PENELEC - AP) The 26GARRETT-01GARRET 115 kV line (from bus 200762 to bus 235470 ckt 1) loads from 144.59% to 157.08% (**DC power flow**) of its emergency rating (160 MVA) for the single line contingency outage of 'B_PN115-LX-#198_A'. This project contributes approximately 19.99 MW to the thermal violation.

```
CONTINGENCY 'B_PN115-LX-#198_A'                    /* SOMERSET-ROCKWOOD
& ROCKWOOD #1 XF
  DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1
  DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1
  END
```