Generation Interconnection
Feasibility Study Report
For
Queue Position AA1-146
Nelson

February 2015

General

The Interconnection Customer (IC) is proposing to install a simple cycle generator located in Lee County, IL and has requested to be studied as a 190 MW Energy (157 MW Capacity) resource interconnecting into the ComEd area. The IC has proposed an in-service date of June 1, 2017.

Point of Interconnection

AA1-146 is interconnected with the ComEd transmission system as follows:

The new generator is proposed to be connected to the ComEd transmission system at TSS 155 Nelson by way of 94201 Line to the TSS942 Nelson Energy Center.

Network Impacts

The Queue Project AA1-146 was studied as a 190.0 MW (Capacity 157.0 MW) injection at the Nelson 345 kV substation in the ComEd area. Project AA1-146 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AA1-146 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)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

1. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 98.25% to 101.88% (**DC power flow**) of its emergency rating (1912 MVA) for the line fault with failed breaker contingency outage of '006-45-BT3-4__'. This project contributes approximately 69.49 MW to the thermal violation.

```
CONTINGENCY '006-45-BT3-4__'
 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1          / LEECO;BP 345 BYRON; B 345
 REMOVE UNIT 1 FROM BUS 274656                    / BYRON;1U 25
 END
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Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

2. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 96.55% to 100.19% (**DC power flow**) of its emergency rating (1912 MVA) for the line fault with failed breaker contingency outage of '006-45-BT3-7__'. This project contributes approximately 69.61 MW to the thermal violation.

```
CONTINGENCY '006-45-BT3-7__'
 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1          / LEECO;BP 345 BYRON; B 345
 TRIP BRANCH FROM BUS 270678 TO BUS 270679 CKT 1          / BYRON; B 345 BYRON; R 345
 END
```

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)

None

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any 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 Merchant Transmission Interconnection request.
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 will study all overload conditions associated with the overloaded element(s) identified.

1. (CE - CE) The NELSON ; B-WALTO; B 345 kV line (from bus 270828 to bus 270932 ckt 1) loads from 115.65% to 120.2% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of '345-L0627__B-R'. This project contributes approximately 69.49 MW to the thermal violation.

```
CONTINGENCY '345-L0627__B-R'
 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1          / LEECO;BP 345 BYRON; B 345
 END
```

2. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 120.7% to 125.25% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of '345-L0627__B-R'. This project contributes approximately 69.49 MW to the thermal violation.

```
CONTINGENCY '345-L0627__B-R'
 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1              / LEECO;BP 345 BYRON; B 345
 END
```

3. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 103.5% to 107.09% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 47.92 MW to the thermal violation.

4. (CE - CE) The LEE CO EC;BP-BYRON ; B 345 kV line (from bus 274768 to bus 270678 ckt 1) loads from 116.06% to 118.18% (**DC power flow**) of its emergency rating (1726 MVA) for the single line contingency outage of '345-L18402_B-R'. This project contributes approximately 81.31 MW to the thermal violation.

```
CONTINGENCY '345-L18402_B-R'
 TRIP BRANCH FROM BUS 270932 TO BUS 270730 CKT 1              / WALTO; B 345 ELECT; B 345
 END
```

5. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 109.23% to 109.69% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '345-L11212_B-S'. This project contributes approximately 13.43 MW to the thermal violation.

```
CONTINGENCY '345-L11212_B-S'
 TRIP BRANCH FROM BUS 270926 TO BUS 270704 CKT 1              / WILTO; B 345 LORET; B 345
 END
```

6. (MISO AMIL - AEP) The 7BUNSONVILLE-05EUGENE 345 kV line (from bus 348885 to bus 243221 ckt 1) loads from 128.91% to 129.74% (**DC power flow**) of its normal rating (822 MVA) for the single line contingency outage of '685_B2'. This project contributes approximately 15.22 MW to the thermal violation.

```
CONTINGENCY '685_B2'
 OPEN BRANCH FROM BUS 243213 TO BUS 346809 CKT 1              / 243213 05BREED 345 346809 7CASEY 345 1
 END
```

Light Load Analysis - 2018

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

1. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line:
The resolution for L15502 is to replace 345kV disconnect switches at TSS 111 Electric Junction terminal. Replace L15502 switch and L15502 Circuit Breaker switch. The preliminary estimate is $594,000. The project timeline is 18-24 months upon receipt of a signed ISA.

2. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line:
Same reinforcement as #1

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)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

None

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

One breaker (Nelson 15507) has been shown to be overdutied due to the addition of this project:

Bus Number	Bus Name	BREAKER	Rating Type	Breaker Capacity (Amps)	Duty Percent With AA1-146_ComEd	Duty Percent Without AA1-146_ComEd	Duty Percent Difference	Duty Amps With AA1-146_ComEd	Duty Amps Without AA1-146_ComEd	Notes
0	Nelson B4 138.kV	155 15507	S	38098	101.11%	98.64%	2.47%	38520.9	37580.4	New Over-duty

ComEd recently replaced 138kV 15518 breaker at Nelson at a cost of $1,500,000. The project timeline is 18-24 months upon receipt of a signed ISA

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined in System Impact Study phase