PJM Queue Position # S65 – Cambria
Generation Interconnection

The PJM Queue Position #S65 project was studied as an 85 MW (17 MW of capacity) wind facility with injection at two distinct interconnection points in Penelec system. Option #1 taps the Johnstown – Altoona 230 kV line, while Option #2 taps the Salix – Claysburg 115 kV line. This project was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Note the Warren-Falconer 115 kV line was modeled as normally open. Potential network impacts were as follows:

Direct Connection

Two interconnection points were considered. Option #1 proposes the project be connected at a new 230 kV 3-breaker ring bus constructed on the Johnstown-Altoona 230 kV line. See Figure #1.

Option #2 proposes the project be connected at a new 115 kV 3-breaker ring bus on the Salix-Claysburg 115 kV line. See Figure #2.

The proposed interconnection facility must be designed in accordance with the FirstEnergy "Requirements for Transmission Connected Facilities" document.

http://www.firstenergycorp.com/feconnect/Requirements_for_Transmission_Connected_Facilities.html

Below are conceptual estimates for the engineering/construction associated with Direct Connection requirements based upon similar projects that have been designed and/or constructed.

Option #1 – Johnstown-Altoona 230 kV line

Item	Description	Conceptual Cost Estimate
1	New 230 kV 3-breaker ring bus termination point at a new interconnection substation, approximately 15.5 miles east of Johnstown Substation and approximately 4.5 miles west of Bear Rock substation.	$3,080,000
2	New 230 kV loop from the Johnstown-Altoona 230 kV line into interconnection substation	$250,000
3	Transmission line extending from new interconnection substation to the generation plant, approximately 3.1 miles of 230 kV line.	$3,100,000 Line built, owned and maintained by FirstEnergy.
4	Relay and control work at remote terminals.	$910,000
5	Depending on the location of the interconnection substation, fiber optic cable may be required. This will be determined in the System Impact study phase.	To be determined in System Impact Study

Conceptual Estimate: **$7,340,000**
Estimated Lead Time: 2.0 years from signed ISA

Option #2 – Salix-Claysburg 115 kV line

Item	Description	Conceptual Cost Estimate
1	New 115 kV 3-breaker ring bus termination point at a new interconnection substation, approximately 3.5 miles east of Salix Substation and approximately 0.5 miles west of O18/R32 substation.	$2,763,000
2	New 115 kV loop from the Salix-Claysburg 115 kV line into interconnection substation	$250,000
3	Transmission line extending from new interconnection substation to the generation plant, approximately 1.26 miles of 115 kV line.	$630,000 Line built, owned and maintained by FirstEnergy
4	Relay and control work at remote terminals.	$500,000

Conceptual Estimate: **$4,143,000**
Estimated Lead Time: 2.0 years from signed ISA

Notes:

- Detailed Engineering & Construction Estimates TBD via Facility Study
- The above estimates do not include 1) tax gross-up, 2) property costs and site development up to rough grade which is to be provided by the developer, 3) interconnection metering and generation SCADA to be provided by the developer, 4) engineering and field activities for design review and commissioning of the developer's facilities, and 5) Real estate costs that may be required for right-of-way easements to extend the transmission line.

Total Cost Estimate Summary:

Total cost estimates include estimates based on this Generation Interconnection Feasibility Study. Cost estimates include Transmission Owner Direct Connection Facilities, Network Upgrades required to mitigate thermal overloads, and do not include Interconnection Customer Direct Connection facilities.

Option #1 – Johnstown-Altoona 230 kV line: **$25,540,000**

Option #2 – Salix-Claysburg 115 kV line: **$56,687,250**

OPTION#1 (Johnstown-Altoona 230 kV line)

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

None Identified.

Multiple Facility Contingency
(Double Circuit Tower Line, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

None 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)

1. The SEWARD-FLORENCE 115kV line loads from 123.1% to 126.1% (DC power flow) of its emergency rating (184MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11B). This project contributes approximately 5.6MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a line trap at Seward 115 kV substation (estimated cost approximately $115,000). It would also require the replacement/upgrade of a line trap and substation conductor at Florence 115 kV substation (estimated cost approximately $240,000)

2. The HOMER CT-SHELOCTA 230kV line loads from 102.67% to 105.80%(961.7 MVA, DC power flow) of its emergency rating (909MVA) for the tower line outage of the Dauphin-Hummelstown & Dauphin-Juniata 230 kV lines (17_PPL). This project contributes approximately 28.4MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of line trap and CT circuit at Homer City 230 kV substation (estimated cost approximately $265,000) and the reconductor of approximately 10.73 miles of 230 kV transmission line (estimated cost approximately $5,365,000).

3. The S44COP1-JUNIATA 230kV line loads from 106.58% to 109.33% (DC power flow) of its emergency rating (617MVA) for the tower line outage of the 220-90 & 91 230 kV lines (PE506). This project contributes approximately 17.0MW to the thermal violation. To mitigate this overload would require the reconductor/upgrade of approximately 23.64 miles of 230 kV transmission line between Juniata and the S44 Option 1 interconnection substation (estimated to cost approximately $11,820,000). It also requires the replacement/upgrade of a disconnect switch at Juniata substation (estimated to cost approximately $85,000).

4. The SHELOCTA-KEYSTONE 230kV line loads from 101.26% to 104.68% (DC power flow) of its emergency rating (854MVA) for the tower line outage of the Juniata-Lewistown & Juniata-Dauphin 230 kV lines (20PPL). This project contributes approximately 29.2MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a disconnect switch at Shelocta 230 kV substation (estimated cost approximately $85,000). It also requires the replacement/upgrade of a disconnect switch and CT circuit at Keystone 230 kV substation (estimated cost approximately $225,000).

Short Circuit

PJM analysis found no new breakers to be over-duty in First Energy's transmission area. The study also showed no significant fault current contribution to any breakers which have already been identified as over-duty. This study was performed on the 230kV and above system.

Further short circuit study will be conducted during the System Impact Study.

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.

As a result of the aggregate energy resources in the area, the following violations were identified:

5. The SEWARD-FLORENCE 115kV line loads from 178.6% to 183.6% (DC power flow) of its emergency rating (202MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 10.0MW to the thermal congestion.

6. The HOMER CT-SHELOCTA 230kV line loads from 135.94% to 139.42% (DC power flow) of its emergency rating (909 MVA) for the single line contingency outage of the Handsome Lake-Wayne 345 kV line (PN33A). This project contributes approximately 32.0MW to the thermal congestion.

7. The HOMER CT-SHELOCTA 230kV line loads from 129.0% to 133.0% (954.9MVA, DC power flow) of its normal rating (718MVA) for non-contingency condition. This project contributes approximately 28.4 MW to the thermal congestion.

8. The SHELOCTA-KEYSTONE 230kV line loads from 133.5% to 137.3% (DC power flow) of its emergency rating (854MVA) for the single line contingency outage of the Handsome Lake-Wayne 345 kV line (PN33A). This project contributes approximately 32.4MW to the thermal congestion.

9. The 01EDGEWT-01LOYALH 138kV line loads from 125.3% to 129.8% (DC power flow) of its emergency rating (129MVA) for the single line contingency outage of the Keystone-

Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 5.8MW to the thermal congestion.

10. The S44COP1-JUNIATA 230kV line loads from 124.8% to 128.2% (DC power flow) of its normal rating (499MVA) for non-contingency condition. This project contributes approximately 17.0MW to the thermal congestion.

11. The SHELOCTA-KEYSTONE 230kV line loads from 123.5% to 127.7% (DC power flow) of its normal rating (694MVA) for non-contingency condition. This project contributes approximately 29.1MW to the thermal congestion.

12. The FLORENCE-BLRSVL E 115kV line loads from 122.6% to 126.0% (DC power flow) of its emergency rating (294MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 10.0MW to the thermal congestion.

13. The SHADE GP-ROXBURY 115kV line loads from 120.1% to 123.8% (DC power flow) of its emergency rating (150MVA) for the single line contingency outage of the S44 – Juniata 230 kV line (PN29_WITH_S44OPT1B). This project contributes approximately 5.5MW to the thermal congestion.

14. The S44COP1-JUNIATA 230kV line loads from 118.7% to 121.5% (DC power flow) of its emergency rating (617MVA) for the single line contingency outage of the East-Towanda – P47 230 kV line (TWANDA_P47). This project contributes approximately 17.5MW to the thermal congestion.

15. The SEWARD-FLORENCE 115kV line loads from 118.9% to 122.0% (DC power flow) of its normal rating (181MVA) for non-contingency condition. This project contributes approximately 5.5MW to the thermal congestion.

16. The ALTOONA-RAYSTOWN 230kV line loads from 116.0% to 121.0% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 28.0MW to the thermal congestion.

17. The RAYSTOWN-LEWISTWN 230kV line loads from 113.1% to 118.2% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 28.4MW to the thermal congestion.

18. The LEWISTWN-S44COP1 230kV line loads from 110.1% to 113.5% (DC power flow) of its normal rating (499MVA) for non-contingency condition. This project contributes approximately 17.0MW to the thermal congestion.

19. The N39 C-ALTOONA 230kV line loads from 107.8% to 113.5% (DC power flow) of its normal rating (488MVA) for non-contingency condition. This project contributes approximately 27.9MW to the thermal congestion.

20. The LEWISTWN-S44COP1 230kV line loads from 106.6% to 109.5% (DC power flow) of its emergency rating (617MVA) for the single line contingency outage of the East-Towanda – P47 230 kV line (TWANDA_P47). This project contributes approximately 17.5MW to the thermal congestion.

21. The N39 C-ALTOONA 230kV line loads from 105.3% to 110.4% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Homer City-Watercure 345 kV line (PN18). This project contributes approximately 28.2MW to the thermal congestion.

22. The ALTOONA-RAYSTOWN 230kV line loads from 101.5% to 106.3% (DC power flow) of its normal rating (488MVA) for non-contingency condition. This project contributes approximately 23.4MW to the thermal congestion.

23. The KEYSTONE-KEYSTONE #4 230/500kV transformer loads from 100.3% to 103.9% (DC power flow) of its emergency rating (634MVA) for the single line contingency outage of the Keystone #3 500/230 kV transformer (PJM30). This project contributes approximately 22.8MW to the thermal congestion.

24. The RAYSTOWN-LEWISTWN 230kV line loads from 99.8% to 104.8% (DC power flow) of its normal rating (478MVA) for non-contingency condition. This project contributes approximately 23.6MW to the thermal congestion.

25. The KEYSTONE-KEYSTONE #3 230/500kV transformer loads from 99.2% to 102.8% (DC power flow) of its emergency rating (643MVA) for the single line contingency outage of the Keystone #3 500/230 kV transformer (PJM31). This project contributes approximately 22.9MW to the thermal congestion.

OPTION #2 (Salix-Claysburg 115 kV line)

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

None Identified

Multiple Facility Contingency
(Double Circuit Tower Line, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

1. The WESTFALL-TYRONE N 115kV line loads from 95.18% to 100.25% (124.3 MVA, DC power flow) of its emergency rating (124MVA) for the tower line outage of the 220-90 & 91 230 kV lines (PE506). This project contributes approximately 6.3MW to cause this thermal violation. To mitigate this overload would require the replacement/upgrade of substation conductor (estimated to cost approximately $125,000) at Westfall substation.

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)

2. The CLYSBURG-SUMMIT 115kV line loads from 185.64% to 206.56% (301 MVA, DC power flow) of its emergency rating (146MVA) for the tower line outage of the 220-90 & 91 230 kV lines (PE506). This project contributes approximately 30.5MW to the thermal violation. To mitigate this overload would require replacement/upgrade of two disconnect switches (estimated to cost approximately $80,000 each), a line/wave trap (estimated to cost approximately $115,000), and substation conductor (estimated to cost approximately $375,000) at Claysburg Substation and the replacement/upgrade of a disconnect switch (estimated to cost approximately $80,000), CT circuit (estimated to cost $125,000), line/wave trap (estimated to cost approximately $115,000), substation conductor (estimated to cost approximately $250,000), and circuit breaker (estimated to cost approximately $225,000) at Summit Substation and the construction of 12 miles of new 115 kV line (estimated to cost $6,000,000).

3. The O17-SOMERST 115kV line loads from 104.64% to 108.32% (162 MVA, DC power flow) of its emergency rating (150MVA) for the tower line outage of the Dauphin-Hummelstown & Dauphin-Juniata 230 kV lines (17_PPL). This project contributes approximately 5.5MW to the thermal violation. .To mitigate this overload would require the replacement of two disconnect switches (estimated to cost approximately $80,000 each) at Somerset substation and the upgrade/ reconductor of approximately 4 miles of 115 kV transmission line (estimated to cost approximately $1,100,000).

4. The GARRETT-01GARRET 115 kV line loads from 240.13% to 248.35% (310 MVA,DC power flow) of its emergency rating (125MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 10.3MW to the thermal violation. To mitigate this overload would

require the replacement of substation conductor (estimated to cost approximately $125,000), the replacement of a disconnect switch (estimated to cost approximately $80,000), and the replacement of two CT circuits (estimated to cost approximately $250,000) at Garrett substation. It also requires the reconductor of 1.9 miles of 115 kV transmission line between Garrett and Garrett Tap (estimated cost approximately $522,500).

5. The S11C-SEWARD 115kV line loads from 153.59% to 156.91% (250 MVA, DC power flow) of its emergency rating (159MVA) for the tower line outage of the Kempton – Bedington 500 kV lines (Kempt_Bed). This project contributes approximately 5.3MW to the thermal violation. . To mitigate this overload would require the replacement a disconnect switch (estimated to cost approximately $80,000), replacement/upgrade of line/wave trap (estimated to cost $115,000), and upgrade/replacement of substation conductor (estimated to cost $250,000) at Seward Substation and the upgrade/ reconductor of approximately 1.3 miles of 115 kV transmission line (estimated to cost approximately $357,500).

6. The HILLCLAY-HILLTOP 115kV line loads from 266.31% to 286.97% (513 MVA, DC power flow) of its emergency rating (179MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 37.0MW to the thermal violation. To mitigate this overload would require replacement/upgrade of a disconnect switch (estimated to cost approximately $80,000), a line/wave trap (estimated to cost approximately $115,000), substation conductor (estimated to cost approximately $375,000), CT circuit (estimated to cost $125,000), and circuit breaker (estimated to cost approximately $225,000) at Hilltop Substation and the construction of 5 miles of new 115 kV line (estimated to cost $2,500,000).

7. The ROCKWOOD-PENN-MAR 115kV line loads from 198.36% to 205.55% (293 MVA, DC power flow) of its emergency rating (143MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 10.3MW to the thermal violation. To mitigate this overload would require the replacement / upgrade of a disconnect switch (estimated to cost approximately $80,000) and substation conductor (estimated to cost approximately $250,000) at Rockwood substation. It also requires the replacement/upgrade of a CT circuit (estimated cost approximately $125,000), circuit breaker (estimated cost approximately $225,000), line/wave trap (estimated to cost approximately $115,000) and substation conductor (estimated to cost approximately $375,000) at Penn Marr Substation and the construction of 15 miles of new 115 kV line (estimated cost approximately $7,500,000).

8. The PENN-MAR-GARRETT 115kV line loads from 169.84% to 176.00% (DC power flow) of its emergency rating (167MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 10.3MW to the thermal violation. To mitigate this overload requires the replacement/upgrade of a line trap and substation conductor at Penn Mar 115 kV substation (estimated cost approximately $240,000). It also require the reconductor of approximately 14.95 miles of 115 kV transmission line (estimated cost approximately $4,111,250).

9. The TOWER 51-S11C 115kV line loads from 120.11% to 123.44% (DC power flow) of its emergency rating (159MVA) for the tower line outage of the Kempton – Bedington 500 kV lines (Kempt_Bed). This project contributes approximately 5.3MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a line trap, disconnect switch, and CT circuit at the Tower 51 115 kV substation (estimated cost approximately $320,000).

10. The HILLTOP-ROSEDALE 115kV line loads from 168.22% to 183.86% (DC power flow) of its emergency rating (179MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 28.0MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a line trap, two (2) disconnect switches, a CT circuit, circuit breaker, and substation conductor at Hilltop 115 kV substation (estimated cost approximately $875,000). It also requires the reconductor of approximately 1.54 miles of 115 kV transmission line (estimated cost approximately $423,500).

11. The ROSEDALE-COOPER 115kV line loads from 130.26% to 142.33% (DC power flow) of its emergency rating (180MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 21.7MW to the thermal violation. To mitigate this overload requires the replacement/upgrade of a line trap, CT circuit, and substation conductor at Cooper 115 kV substation (estimated cost approximately $365,000).

12. The COOPER-SEWARD 115kV line loads from 129.03% to 141.16% (DC power flow) of its emergency rating (184MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 22.3MW to the thermal violation. To mitigate this overload requires the replacement/upgrade of a line trap and substation conductor at Cooper 115 kV substation (estimated cost approximately $240,000).

13. The N33 C-01ALBRIG 138kV line loads from 111.26% to 114.29% (DC power flow) of its emergency rating (201MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11A). This project contributes approximately 6.1MW to the thermal violation. Reconductor the N33 (Afton) – Albright 138 kV circuit with 6.3 miles of 954 ACSR or equivalent. The estimated cost for this work is $1,575,000 in 2009 dollars.

14. The SEWARD-FLORENCE 115kV line loads from 112.11% to 128.47% (DC power flow) of its emergency rating (184MVA) for the tower line outage of the Homer City – Quemahoning 230 kV & Seward – Tower 51 115 kV lines(2PN_WITH_S11B). This project contributes approximately 9.9MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a line trap at Seward 115 kV substation (estimated cost approximately $115,000). It would also require the replacement/upgrade of a line trap and substation conductor at Florence 115 kV substation (estimated cost approximately $240,000).

15. The S44COP1-JUNIATA 230kV line loads from 106.58% to 108.31% (DC power flow) of its emergency rating (617MVA) for the tower line outage of the 220-90 & 91 230 kV lines (PE506). This project contributes approximately 10.6MW to the thermal violation. To mitigate this overload would require the reconductor/upgrade of approximately 23.64 miles of 230 kV transmission line between Juniata and the S44 Option 1 interconnection substation (estimated to cost approximately $11,820,000). It also requires the replacement/upgrade of a disconnect switch at Juniata substation (estimated to cost approximately $85,000).

16. The HOMER CT-SHELOCTA 230kV line loads from 102.67% to 105.64% (960.2 MVA, DC power flow) of its emergency rating (909MVA) for the tower line outage of the Dauphin-Hummelstown & Dauphin-Juniata 230 kV lines (17_PPL). This project contributes approximately 26.9MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of line trap, circuit breaker, and CT circuit at Homer City 230 kV substation (estimated cost approximately $690,000) and the reconductor of approximately 10.73 miles of 230 kV transmission line (estimated cost approximately $5,365,000).

17. The SHELOCTA-KEYSTONE 230kV line loads from 101.26% to 104.79% (DC power flow) of its emergency rating (854MVA) for the tower line outage of the Juniata-Lewistown & Juniata-Dauphin 230 kV lines(20PPL). This project contributes approximately 30.1MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a disconnect switch at Shelocta 230 kV substation (estimated cost approximately $85,000). It also requires the replacement/upgrade of a disconnect switch and CT circuit at Keystone 230 kV substation (estimated cost approximately $225,000).

18. The Hooversville – Tower 51 115 kV line loads from 143% to 147% (DC power flow) of its emergency rating (146 MVA) for the tower line outage of the Kempton – Bedington 500 kV lines (Kempt_Bed). This project contributes approximately 5 MW to the thermal violation. To mitigate this overload would require the replacement/upgrade of a line trap, circuit breaker, and CT circuit at Hooversville 115 kV substation (estimated cost approximately $465,000). It would also require the replacement/upgrade of a line trap, two (2) CT circuits, and a disconnect switch at Tower 51 115 kV substation and the reconductor of approximately 9.78 miles of 115 kV transmission line (estimated cost approximately $2,689,500).

Short Circuit

PJM analysis found no new breakers to be over-duty in First Energy's transmission area. The study also showed no significant fault current contribution to any breakers which have already been identified as over-duty. This study was performed on the 230kV and above system.

Further short circuit study will be conducted during the System Impact Study.

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.

As a result of the aggregate energy resources in the area, the following violations were identified:

19. The Q53TAP-WESTFALL 115kV line loads from 144.0% to 149.6% (DC power flow) of its emergency rating (179MVA) for the single line contingency outage of the Johnstown-N39 230 kV line (PN48B). This project contributes approximately 10.1MW to the thermal congestion.

20. The SUMMIT-Q53TAP 115kV line loads from 134.8% to 140.4% (DC power flow) of its emergency rating (179MVA) for the single line contingency outage of the Johnstown-N39 230 kV line (PN48B). This project contributes approximately 10.1MW to the thermal congestion.

21. The CLYSBURG-SUMMIT 115kV line loads from 245.9% to 290.5% (DC power flow) of its emergency rating (146MVA) for the single line for the single line contingency outage of the Salix-O18 115 kV line (O18_SINGLE_A). This project contributes approximately 65.0MW to the thermal congestion.

22. The WESTFALL-TYRONE N 115kV line loads from 129.1% to 136.1% (DC power flow) of its normal rating (90MVA) for non-contingency condition. This project contributes approximately 6.3MW to the thermal congestion.

23. The O17-SOMERST 115kV line loads from 135.9% to 140.7% (DC power flow) of its normal rating (115MVA) for non-contingency condition. This project contributes approximately 5.5MW to the thermal congestion.

24. The CLYSBURG-SUMMIT 115kV line loads from 215.6% to 240.0% (DC power flow) of its normal rating (125MVA) for non-contingency condition. This project contributes approximately 30.5MW to the thermal congestion.

25. The Q62OPT1-SNAKE SP 115kV line loads from 110.7% to 116.8% (DC power flow) of its normal rating (90MVA) for non-contingency condition. This project contributes approximately 5.5MW to the thermal congestion.

26. The Q53TAP-WESTFALL 115kV line loads from 119.0% to 124.9% (DC power flow) of its normal rating (165MVA) for non-contingency condition. This project contributes approximately 9.7MW to the thermal congestion.

27. The WESTFALL-TYRONE N 115kV line loads from 117.6% to 123.1% (DC power flow) of its emergency rating (124MVA) for the single line contingency outage of the Lewistown-

Raystown 230 kV line (PN38). This project contributes approximately 6.9MW to the thermal congestion.

28. The O17-SOMERST 115kV line loads from 112.8% to 116.9% (DC power flow) of its emergency rating (150MVA) for the single line contingency outage of the Westfall-Q53 115 kV line (WESTFALL_Q53). This project contributes approximately 6.1MW to the thermal congestion.

29. The SUMMIT-Q53TAP 115kV line loads from 109.0% to 114.9% (DC power flow) of its normal rating (165MVA) for non-contingency condition. This project contributes approximately 9.7MW to the thermal congestion.

30. The GARRETT-01GARRET 115kV line loads from 176.6% to 182.8% (DC power flow) of its normal rating (90MVA) for non-contingency condition. This project contributes approximately 5.6MW to the thermal congestion.

31. The Q62OPT1-SNAKE SP 115kV line loads from 104.3% to 116.1% (DC power flow) of its emergency rating (124MVA) for the single line for the single line contingency outage of the Salix-O18 115 kV line (O18_SINGLE_A). This project contributes approximately 14.7MW to the thermal congestion.

32. The S11C-SEWARD 115kV line loads from 186.5% to 190.6% (DC power flow) of its normal rating (130MVA) for non-contingency condition. This project contributes approximately 5.3MW to the thermal congestion.

33. The JOHNSTWN-N39 C 230kV line loads from 99.0% to 100.2% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 6.5MW to the thermal congestion.

34. The R56COP1-QUEMAHON 230kV line loads from 178.8% to 184.3% (DC power flow) of its emergency rating (263MVA) for the single line contingency outage of the Seward-S11 115 kV line (PENELEC_WITH_S11A). This project contributes approximately 14.6MW to the thermal congestion.

35. The GARRETT-01GARRET 115kV line loads from 149.9% to 154.5% (DC power flow) of its emergency rating (125MVA) for the single line contingency outage of the Handsome Lake-Wayne 345 kV line (PN33A). This project contributes approximately 5.8MW to the thermal congestion.

36. The R56COP1-QUEMAHON 230kV line loads from 155.6% to 160.8% (DC power flow) of its normal rating (232MVA) for non-contingency condition. This project contributes approximately 11.9MW to the thermal congestion.

37. The Q36-PHILIPSB 115kV line loads from 104.5% to 109.3% (DC power flow) of its emergency rating (146MVA) for the single line contingency outage of the Lewistown-

Raystown 230 kV line (PN38). This project contributes approximately 7.0MW to the thermal congestion.

38. The SEWARD-FLORENCE 115kV line loads from 178.6% to 184.8% (DC power flow) of its emergency rating (202MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 12.5MW to the thermal congestion.

39. The TOWER 51-S11C 115kV line loads from 145.6% to 149.6% (DC power flow) of its normal rating (130MVA) for non-contingency condition. This project contributes approximately 5.3MW to the thermal congestion.

40. The HOOVRSVL-R56COP1 230kV line loads from 146.2% to 151.7% (DC power flow) of its emergency rating (263MVA) for the single line contingency outage of the Seward-S11 115 kV line (PENELEC_WITH_S11A). This project contributes approximately 14.6MW to the thermal congestion.

41. The N33 C-01ALBRIG 138kV line loads from 127.0% to 129.6% (DC power flow) of its emergency rating (201MVA) for the single line contingency outage of the Ridgeley-S14 138 kV line (APS-SB-509_WITH_S14B). This project contributes approximately 5.3MW to the thermal congestion.

42. The HOOVRSVL-R56COP1 230kV line loads from 122.9% to 128.0% (DC power flow) of its normal rating (232MVA) for non-contingency condition. This project contributes approximately 11.9MW to the thermal congestion.

43. The ROCKWOOD-PENN-MAR 115kV line loads from 149.0% to 155.0% (DC power flow) of its emergency rating (143MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 8.5MW to the thermal congestion.

44. The ALTOONA-RAYSTOWN 230kV line loads from 101.5% to 103.6% (DC power flow) of its normal rating (488MVA) for non-contingency condition. This project contributes approximately 10.0MW to the thermal congestion.

45. The S44COP1-JUNIATA 230kV line loads from 124.8% to 126.9% (DC power flow) of its normal rating (499MVA) for non-contingency condition. This project contributes approximately 10.6MW to the thermal congestion.

46. The ALTOONA-RAYSTOWN 230kV line loads from 116.0% to 118.6% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 14.7MW to the thermal congestion.

47. The S44COP1-JUNIATA 230kV line loads from 118.4% to 120.2% (DC power flow) of its emergency rating (617MVA) for the single line contingency outage of the East-Towanda –

P47 230 kV line (TWANDA_P47). This project contributes approximately 11.2MW to the thermal congestion.

48. The ROCKWOOD-PENN-MAR 115kV line loads from 122.1% to 126.6% (DC power flow) of its normal rating (124MVA) for non-contingency condition. This project contributes approximately 5.6MW to the thermal congestion.

49. The RAYSTOWN-LEWISTWN 230kV line loads from 99.8% to 102.1% (DC power flow) of its normal rating (478MVA) for non-contingency condition. This project contributes approximately 10.7MW to the thermal congestion.

50. The PENN-MAR-GARRETT 115kV line loads from 117.3% to 121.7% (DC power flow) of its normal rating (129MVA) for non-contingency condition. This project contributes approximately 5.6MW to the thermal congestion.

51. The RAYSTOWN-LEWISTWN 230kV line loads from 113.1% to 115.9% (DC power flow) of its emergency rating (554MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 15.5MW to the thermal congestion.

52. The HOMER CT-SHELOCTA 230kV line loads from 135.9% to 139.2% (1265.6 MVA, DC power flow) of its emergency rating (909MVA) for the single line contingency outage of the Handsome Lake-Wayne 345 kV line (PN33A). This project contributes approximately 30.4MW to the thermal congestion.

53. The PENN-MAR-GARRETT 115kV line loads from 127.6% to 132.7% (DC power flow) of its emergency rating (167MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 8.5MW to the thermal congestion.

54. The SEWARD-FLORENCE 115kV line loads from 118.9% to 124.3% (DC power flow) of its normal rating (181MVA) for non-contingency condition. This project contributes approximately 9.8MW to the thermal congestion.

55. The HILLCLAY-HILLTOP 115kV line loads from 89.8% to 105.3% (DC power flow) of its normal rating (176MVA) for non-contingency condition. This project contributes approximately 27.3MW to the thermal congestion.

56. The 01EDGEWT-01LOYALH 138kV line loads from 125.3% to 132.0% (DC power flow) of its emergency rating (129MVA) for the single line contingency outage of the Keystone-Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 8.6MW to the thermal congestion.

57. The FLORENCE-BLRSVL E 115kV line loads from 122.6% to 126.9% (DC power flow) of its emergency rating (294MVA) for the single line contingency outage of the Keystone-

Shelocta-Homer City 230 kV circuit (PN41). This project contributes approximately 12.5MW to the thermal congestion.

58. The 01GARRET-N33 C 138kV line loads from 101.3% to 104.0% (DC power flow) of its emergency rating (201MVA) for the single line contingency outage of the Ridgeley-S14 138 kV line (APS-SB-509_WITH_S14B). This project contributes approximately 5.3MW to the thermal congestion.

59. The LEWISTWN-S44COP1 230kV line loads from 106.5% to 108.3% (DC power flow) of its emergency rating (617MVA) for the single line contingency outage of the Keystone-Airydale 500 kV line (PJM24B). This project contributes approximately 11.0MW to the thermal congestion.

60. The LEWISTWN-S44COP1 230kV line loads from 110.1% to 112.2% (DC power flow) of its normal rating (499MVA) for non-contingency condition. This project contributes approximately 10.6MW to the thermal congestion.

61. The SHELOCTA-KEYSTONE 230kV line loads from 133.5% to 137.4% (DC power flow) of its emergency rating (854MVA) for the single line contingency outage of the Handsome Lake-Wayne 345 kV line (PN33A). This project contributes approximately 33.3MW to the thermal congestion.

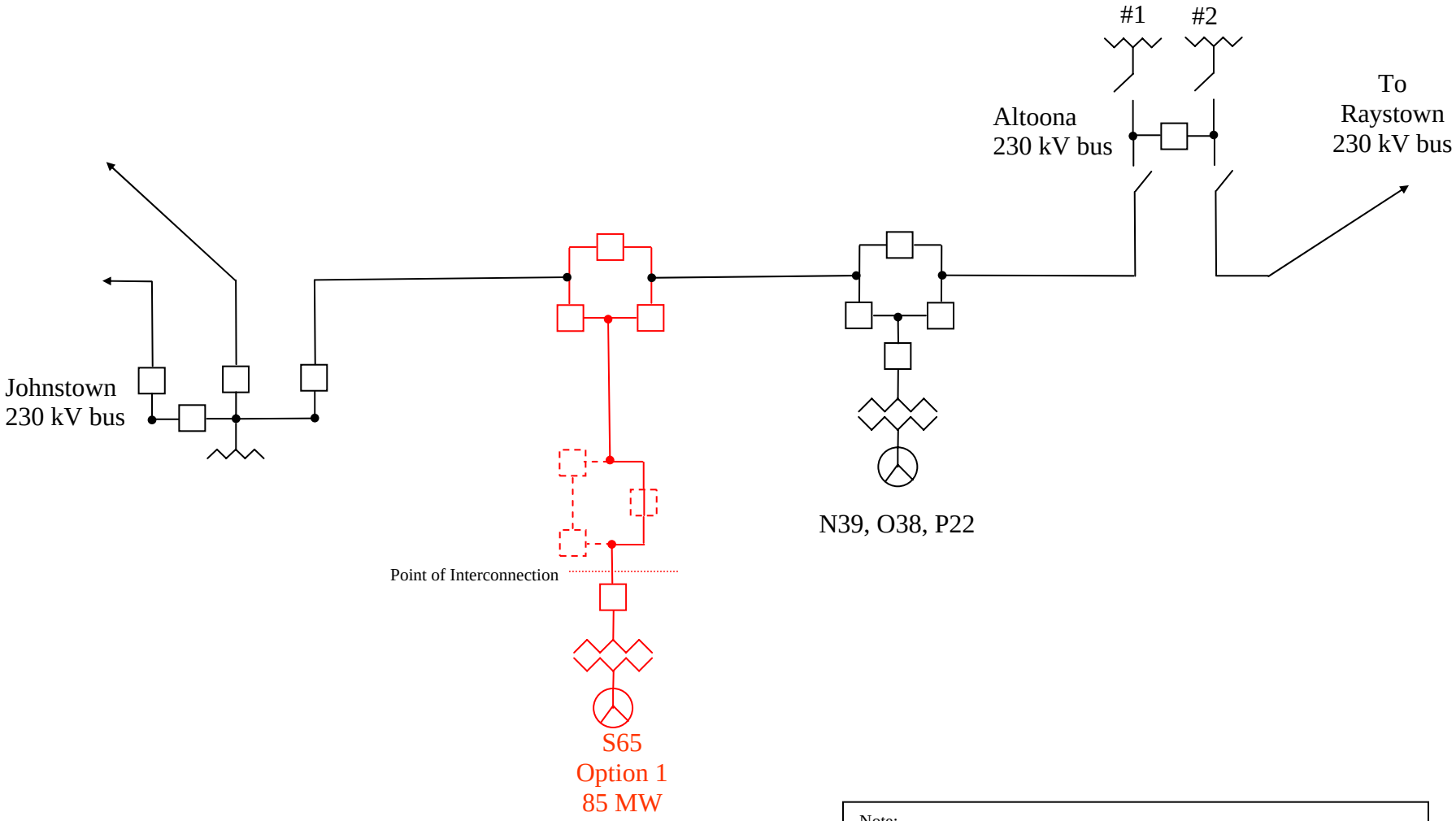
62. The HOMER CT-SHELOCTA 230kV line loads from 129.0% to 132.7% (952.9 MVA DC power flow) of its normal rating (718MVA) for non-contingency condition. This project contributes approximately 26.9MW to the thermal congestion.

63. The SHELOCTA-KEYSTONE 230kV line loads from 123.5% to 127.9% (DC power flow) of its normal rating (694MVA) for non-contingency condition. This project contributes approximately 30.1MW to the thermal congestion.

64. The KEYSTONE-KEYSTONE #4 230/500kV transformer loads from 100.3% to 104.0% (DC power flow) of its emergency rating (634MVA) for the single line contingency outage of the Keystone #3 500/230 kV transformer (PJM30). This project contributes approximately 23.6MW to the thermal congestion.

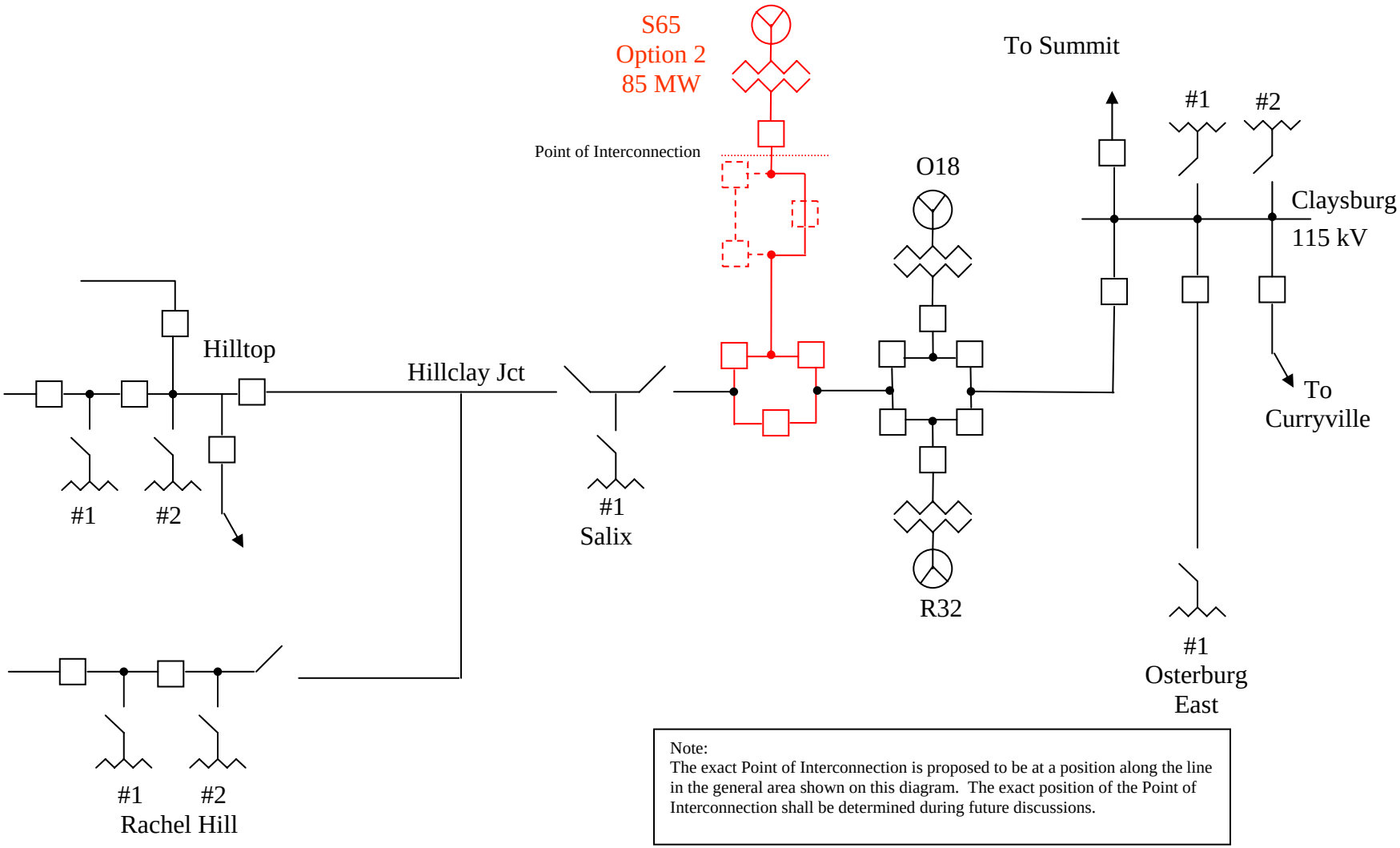
65. The KEYSTONE-KEYSTONE #3 230/500kV transformer loads from 99.2% to 102.9% (DC power flow) of its emergency rating (643MVA) for the single line contingency outage of the Keystone #4 500/230 kV transformer (PJM31). This project contributes approximately 23.7MW to the thermal congestion.

Figure #1
Propose Connection Option 1



Note:
The exact Point of Interconnection is proposed to be at a position along the line in the general area shown on this diagram. The exact position of the Point of Interconnection shall be determined during future discussions.

Figure #2
Proposed Configuration Option 2



Note:
The exact Point of Interconnection is proposed to be at a position along the line in the general area shown on this diagram. The exact position of the Point of Interconnection shall be determined during future discussions.