

**#U1-037 – LaSalle - Plano 345kV
Generation Interconnection**

General

The Interconnection Customer is proposing 167 – 1.5MW wind turbines and has requested to be studied as a 250MW Energy (50 MW Capacity) resource. The wind farm will be located in LaSalle County, IL. The proposed in-service date was requested for the **fourth quarter of 2010** and is currently under review. Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the Impact Study, which may reveal upgrades needed in the MISO system not identified in this Feasibility Study.

This Generation Interconnection Feasibility Study provides analysis results to aid the Interconnection Customer 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 interconnection customer elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Direct Connection Cost Estimate

The total preliminary cost estimate for Direct Connection work by ComEd is **\$12,745,000** and is given in the following table below:

Description	Direct Material	Direct Labor	Total Cost
345kV breaker Interconnection Substation	\$ 4,755,000	\$ 6,000,000	\$ 10,755,000
345kV transmission line tie-in (By ComEd)	\$ 690,000	\$ 1,300,000	\$ 1,990,000
Total	\$ 5,445,000	\$ 7,300,000	\$ 12,745,000

Non-Direct Connection Cost Estimate

The total preliminary estimate for Non-Direct Connection work performed by ComEd is **\$180,000** and is given in the following table:

Description	Direct Material	Direct Labor	Total Cost
Remote-end relay upgrade (By ComEd)	\$ 50,000	\$ 130,000	\$ 180,000

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 ComEd: IC will be required to install equipment necessary to provide bi-directional Revenue Metering (KWH, KVARH) and real time data (KW, KVAR, circuit breaker status, and 345 kV voltage) for IC's generating Resource. See ComEd Applicable Standards available on the PJM website ("TO Standards") – "Exelon Energy Delivery Interconnection Guidelines (Generators Greater than 20 MW)".

Network Impacts

The queue U1-037 project was studied as a 250MW (32.5MW Capacity) injection into ComEd's system. The Point of Interconnection was modeled as a line tap of the LaSalle County - Plano Red 345kV line 0102. Project U1-037 was evaluated for compliance with reliability criteria for summer peak conditions in 2013.

IN THE DELIVERY OF ENERGY PORTION OF INTERCONNECTION REQUEST SECTION THERE ARE SEVERAL SITUATIONS THAT WILL LIKELY CAUSE CURTAILMENT OF THIS PROJECT. SOME MAY LIMIT THE AGGREGATE TOTAL OF THE ENERGY OUTPUT OF THIS PROJECT AND ADJACENT GENERATING FACILITIES WELL BELOW THEIR FULL ENERGY OUTPUT ON A FREQUENT, IF NOT CONTINUOUS, BASIS. FACTORS THAT CAN AFFECT THE AMOUNT OF CURTAILMENT ARE SEASONAL VARIATIONS IN LINE RATINGS, ACTUAL LOAD FLOWS, AND ACTUAL DISPATCH OF OTHER LOCAL GENERATION. UNDER LIGHT LOAD CONDITIONS FOR WIND FARMS, CURTAILMENT MAY BE EVEN MORE SEVERE. PLEASE NOTE THAT ANY REQUIRED UPGRADES LISTED BELOW WILL NOT ELIMINATE THIS CONGESTION. SEE THIS SECTION AT THE END OF THE REPORT FOR FURTHER DETAILS.

Potential network impacts were as follows:

Generator Deliverability

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

No problems were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

Table 1 - Multiple Facility Contingency Impacts								
Item	Project	Contribution MW	Overloaded Element	Overload %		Rating		Contingency
				From	To	Type	MVA	
1a	U1-037	27.4	LaSalle 345kV/138kV transformer 81	98.4%	103.6%	Applicable Load Dump Rating	532	Tower outage of LaSalle to Plano Blue 345kV line 0101 and LaSalle to Plano Red 345kV line 0102

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

Contribution to Previously Identified Overloads

(U1-037 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

No problems were identified.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined in the System Impact Study.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined in the System Impact Study.

New System Reinforcements

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

In Item 1a from the Multiple Facility Contingency section, the overload of the LaSalle 345kV/138kV transformer 81 is caused by a tower outage of LaSalle to Plano 345kV lines 0101 and 0102. This overload can be relieved by upgrading the LaSalle 345/138kV transformer conductor leads and relays. The cost of this upgrade is estimated to be **\$500,000**. This reinforcement will be reviewed again in the System Impact Study.

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.

Potential Issues

In the previous queue, multiple projects were studied with more than one option. The U queue was studied with the primary Point of Interconnection (POI) from the prior queue. U queue primary POI selections were studied with only other U queue primary POI selections and the prior queue constraints listed above. U queue secondary POI selections were studied with only other U queue secondary POI selections and the prior queue constraints listed above. Depending on which POI selection the prior queue projects choose, results may significantly change between the Feasibility and Impact Studies.

Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the Impact Study, which may reveal upgrades needed in the MISO system not identified in this Feasibility 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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study 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	Project	Contribution MW	Overloaded Element	Overload %		Rating		Contingency
				From	To	Type	MVA	
2a	U1-037	26.6	Collins 765kV/345kV transformer 92	298.5%	300.4%	Emergency	1380	Collins to Wilton Center 765kV line 11216
2b	U1-037	63.4	Plano to Electric Junction Red 345kV line 16703	131.5%	136.2%	Emergency	1341	Plano to Electric Junction Blue 345kV line 16704
2c	U1-037	28.1	Plano to Electric Junction Blue 345kV line 16704	113.2%	115.3%	Emergency	1341	Plano to Electric Junction Red 345kV line 16703
2d	U1-037	72.4	LaSalle to Plano Blue 345kV line 0101	109.2%	114.6%	Emergency	1341	U1-037 to Plano Red 345kV line 0102