

**#P36 Nelson – Lee County Energy Center 345kV**  
**Generation Interconnection**

***Option 1***

**Interconnection of the P36 project via construction of a new 345 kV three-breaker ring bus substation (TSS195 Howland Creek) interconnected to the nearby Nelson – Lee County Energy Center 345 kV line (L15501).**

**Network Impacts – Option 1**

The #P36 project was studied as a 240 MW (48 MW of Capacity) injection into a tap of the Nelson to Lee County Energy Center 345 kV line 15501. Project #P36 was evaluated for compliance with PJM reliability criteria for summer peak conditions in 2010. Potential network impacts were as follows:

**Generator Deliverability**

No problems were identified

**Multiple Facility Contingency**

No problems were identified.

**Contribution to Previously Identified Overloads**

1. There is a potential overload on the Byron to Wempletown 345 kV line 0624, for which project #P36 contributes approximately 55 MW to the loading on the facility. PJM and ComEd are continuing to review the cause of and solution to the overload. The Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around \$20 million. The P36 cost allocation, if any, for this upgrade will be determined in the P36 Impact Study.
2. Contribution of 11 MW further overloads the 138kV station equipment and current transformers in series with the Bus Tie 2-3 Circuit Breaker at Waterman from 149% to 154% of its load-dump rating (247 MVA) for the tower outage of lines 18402 & 16703. The violation was originally caused by the #P14 project. The solution for this overload is still being developed, and P36 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.
3. Contribution of approximately 22 MW to further overload the Kammer 765/500 kV transformer from 130% to 131% of its emergency rating (1434 MVA) for the Beverly-Tidd-W. Bellair and Kammer-W. Bellair 345 kV tower outage. This violation was first identified for the #N42 project. APS is currently studying the associated network reinforcements to mitigate this condition. The necessary reinforcements and associated cost estimates will be available at the Impact Study phase for this project. The replacement cost for the Kammer 765/500 kV transformer is estimated in the \$18,000,000 range, and P36 may share an allocation cost for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.

**New System Reinforcements**

To be determined at the System Impact Study.

### **Contribution to Previously Identified System Reinforcements**

To be determined at the System Impact Study.

### **Short Circuit**

There were no overdutied circuit breakers due to #P36 identified at this time. The short-circuit study for #P36 considers the overdutied breakers to be upgraded for projects ahead of #P36 in the PJM queue. If projects ahead of #P36 drop out, the short-circuit analysis will be repeated, and #P36 may ultimately be responsible for breaker upgrades.

### **Potential Issues**

The P36 project may impact the Byron Stability Schemes due to the interconnection point on line 15501 Nelson to Lee County Energy Center. To be assessed further during the Impact Study.

During certain maintenance outages the P36 project may be required to be taken off-line.

**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.

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

No problems were identified.

## ***Option 2***

**Interconnection of the P36 project at the existing Lee County Energy Center (TSS 937) substation by expanding the substation to accommodate this new interconnection.**

### **Network Impacts – Option 2**

The #P36 project was studied as a 240 MW (48 MW of Capacity) injection into the Lee County Energy Center 345 kV substation (TSS 937). Project #P36 was evaluated for compliance with PJM reliability criteria for summer peak conditions in 2010. Potential network impacts were as follows:

### **Generator Deliverability**

No problems were identified

## **Multiple Facility Contingency**

No problems were identified.

## **Contribution to Previously Identified Overloads**

1. There is a potential overload on the Byron to Wempletown 345 kV line 0624, for which project #P36 contributes approximately 55 MW to the loading on the facility. PJM and ComEd are continuing to review the cause of and solution to the overload. The Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around \$20 million. The P36 cost allocation, if any, for this upgrade will be determined in the P36 Impact Study.
2. Contribution of 11 MW further overloads the 138kV station equipment and current transformers in series with the Bus Tie 2-3 Circuit Breaker at Waterman from 149% to 154% of its load-dump rating (247 MVA) for the tower outage of lines 18402 & 16703. The violation was originally caused by the #P14 project. The solution for this overload is still being developed, and P36 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.
3. Contribution of approximately 22 MW to further overload the Kammer 765/500 kV transformer from 130% to 131% of its emergency rating (1434 MVA) for the Beverly-Tidd-W. Bellair and Kammer-W. Bellair 345 kV tower outage. This violation was first identified for the #N42 project. APS is currently studying the associated network reinforcements to mitigate this condition. The necessary reinforcements and associated cost estimates will be available at the Impact Study phase for this project. The replacement cost for the Kammer 765/500 kV transformer is estimated in the \$18,000,000 range, and P36 may share an allocation cost for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.

## **New System Reinforcements**

To be determined at the System Impact Study.

## **Contribution to Previously Identified System Reinforcements**

To be determined at the System Impact Study.

## **Short Circuit**

There were no overdutied circuit breakers due to #P36 identified at this time. The short-circuit study for #P36 considers the overdutied breakers to be upgraded for projects ahead of #P36 in the PJM queue. If projects ahead of #P36 drop out, the short-circuit analysis will be repeated, and #P36 may ultimately be responsible for breaker upgrades.

## **Potential Issues**

The P36 project may impact the Byron Stability Schemes due to the interconnection point on line 15501 Nelson to Lee County Energy Center. To be assessed further during the Impact Study.

During certain maintenance outages the P36 project may be required to be taken off-line.

**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.**

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No problems were identified.

#P36 - Nelson – Lee County Energy Center 345kV  
(240 MW Energy and 48 MW Capacity)

**PJM Generator Interconnection**

**Feasibility Study**

***Network Impacts***

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**Generator Deliverability**

No problems were identified

**Multiple Facility Contingency**

No problems were identified.

**Contribution to Previously Identified Overloads**

1. There is a potential overload on the Byron to Wempletown 345 kV line 0624, for which project #P36 contributes approximately 55 MW to the loading on the facility. PJM and ComEd are continuing to review the cause of and solution to the overload. The Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around \$20 million. The P36 cost allocation, if any, for this upgrade will be determined in the P36 Impact Study.
2. Contribution of 11 MW further overloads the 138kV station equipment and current transformers in series with the Bus Tie 2-3 Circuit Breaker at Waterman from 156% to 160% of its load-dump rating (237 MVA) for the tower outage of lines 18402 & 16703. The violation was originally caused by the #P14 project. The solution for this overload is still being developed, and P36 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.
3. Contribution of approximately 22 MW to further overload the Kammer 765/500 kV transformer from 130% to 131% of its emergency rating (1434 MVA) for the Beverly-Tidd-W. Bellair and Kammer-W. Bellair 345 kV tower outage. This violation was first identified for the #N42 project. APS is currently studying the associated network reinforcements to mitigate this condition. The necessary reinforcements and associated cost estimates will be available at the Impact Study phase for this project. The replacement cost for the Kammer 765/500 kV transformer is estimated in the \$18,000,000 range, and P36 may share an allocation cost for this upgrade. The allocation cost, if any, will be determined during the P36 Impact Study.

### **New System Reinforcements**

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### **Contribution to Previously Identified System Reinforcements**

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### **Short Circuit**

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### **Potential Issues**

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