

PJM Generator Interconnection Request  
Queue Position # R52A  
Kings Creek 69 kV  
Facilities Study Report

July 2014

## **A. Facilities Study Summary**

### **1. Description of Project**

EverPower Ohio, L.L.C., the Interconnection Customer (IC), has proposed a 100 MW (20 MW capacity) wind power generating facility to connect into The Dayton Power and Light Company (Dayton) transmission system at Kings Creek substation. The project will utilize 44 Siemens 2.3 MW wind turbines. R52A was studied as 100 MW energy and 20 MW Capacity injection at the Kings Creek Substation on the Dayton system. It was evaluated for compliance with reliability criteria for summer peak conditions in 2012. The planned in service date, as stated in the Generation Interconnection Feasibility Study Agreement, was October 1, 2008.

The intent of this study is to determine cost and construction time estimates of system reinforcements required to facilitate the addition of the new generation plant to the PJM system. The reinforcements include the attachment facilities of the generator to the system and any network upgrades necessary to maintain the reliability of the PJM system.

### **2. Amendments to the System Impact Study data or System Impact Study Results**

The revised in service date is for 100 MW's to be in service by December, 2016.

### **3. Interconnection Customer's Submitted Milestone Schedule**

The following schedule shows the customer's installation milestones for the proposed generating facilities.

Commercial Operation	Dec 2016
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### **4. Scope of Customer's Work**

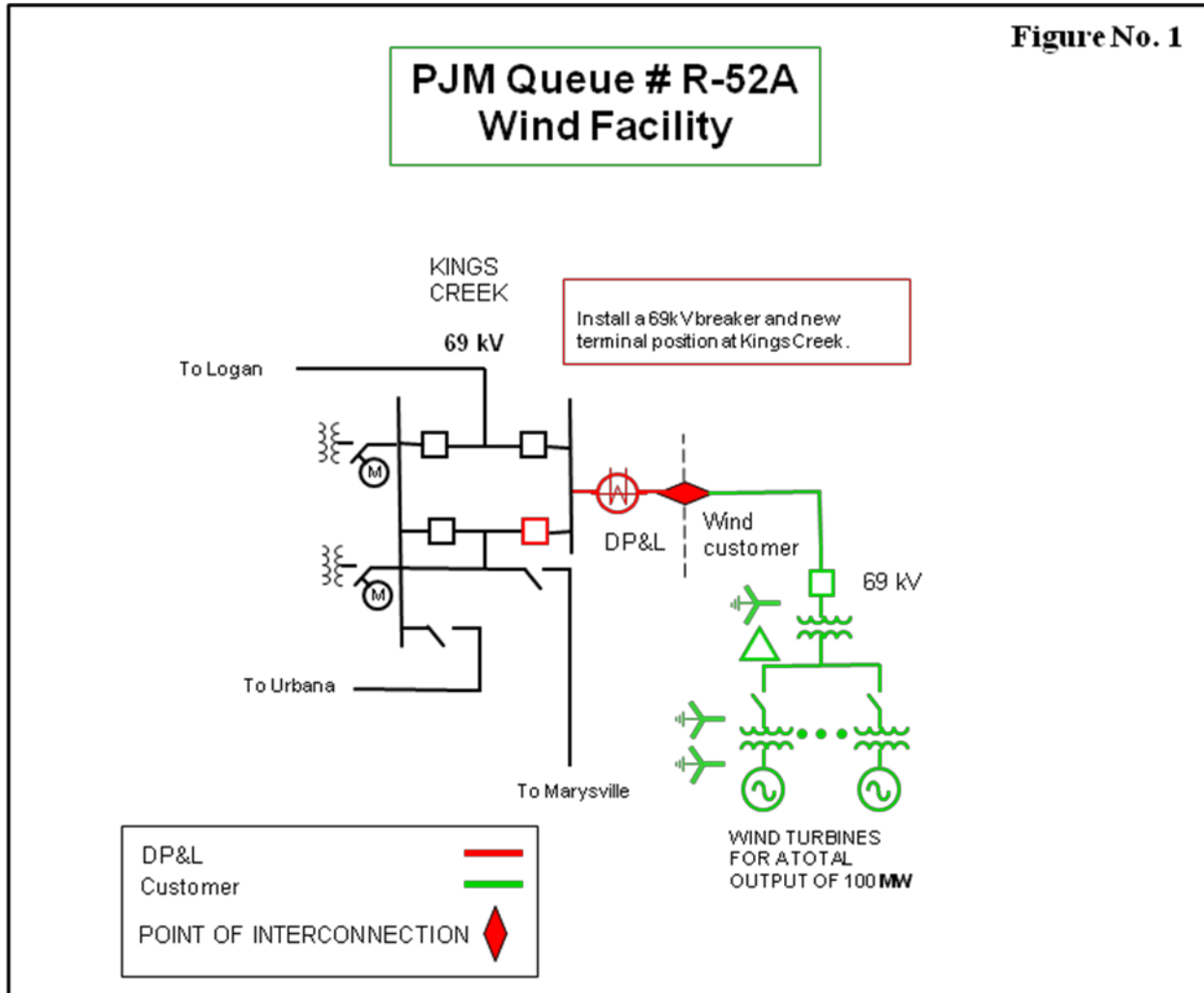
The IC will be responsible for building the 69kV circuit to the Kings Creek Substation take-off structure.

### **5. Description of Facilities Included in the Facilities Study**

#### **Attachment Facilities**

This project will require the addition of one 69kV breaker, relaying, disconnect switches and metering at Kings Creek Substation. The single line for Kings Creek Substation is shown below.

**Figure No. 1**



### Upgrades to Existing Facilities

Three Urbana Substation 69kV breakers have to be replaced due to fault duty ratings. This project was allocated in the System Impact Study 75.70% of the cost for this replacement.

## 6. Total Cost of Transmission Owner Facilities included in Facilities Study

Facilities	Cost Estimate	PJM Network Upgrade Number
Kings Creek Sub- Install new 69kV breaker position	\$ 844,754	n2180
Urbana Sub - Replace Three 69kV Breakers for Fault Duty Capabilities (75.7% allocation)	\$ 292,333	n2084.1, n2084.2, n2084.3
Total Cost	\$ 1,137,087	

## 7. Summary of Milestone Schedules for Completion of Work Included in Facilities Study

Activity	Kings Creek Sub	Breakers at Urbana
Detailed Design	Day 60	Day 25
Material & Equipment Procurement	Day 100	Day 100
Construction	Day 170	Day 142
Commissioning	Day 180	Day 142
Energize and place in service	Day 180	Day 143

## B. Transmission Owner Facilities Study Results

### 1. Transmission Lines – New

#### Purpose and Necessity

NA

#### Description of Proposed Route

NA

#### Ratings/Design Criteria

NA

**Line impedance (positive and zero sequence)**

NA

**Permits/Approvals Required**

NA

**2. Transmission Lines – Upgrades**

**Purpose and Necessity**

NA

**Description of Proposed Route**

NA

**Ratings/Design Criteria**

NA

**3. New Substation/ Switchyard Facilities**

**Purpose and Necessity**

Kings Creek Substation will have to be expanded to add one 69kV breaker position.

Ohio Power Siting approval is not required for the expansion of this substation.

The proposed DP&L substation meets the requirements of the *PJM Transmission and Substation Design Subcommittee Technical Requirements* document.

**Substation Facility**

The expanded DP&L substation will require the addition of the following equipment:

<b>Equipment - 69kV</b>	
Bus Bay Structures	2
Relaying - Line & Bus	1
Gas Circuit Breakers	1
2000 Ampere Breaker Disconnect Switches	2
2000 Ampere Line Disconnect Switches	1
2000 Ampere Line Disconnect Switches With Ground	1
CCVT s	1
PT/CT Metering Units	3
Insulators	18
Lightning Arresters	3

Bus, Insulators and Connectors

Control Duct System (Trenwa and Manholes)

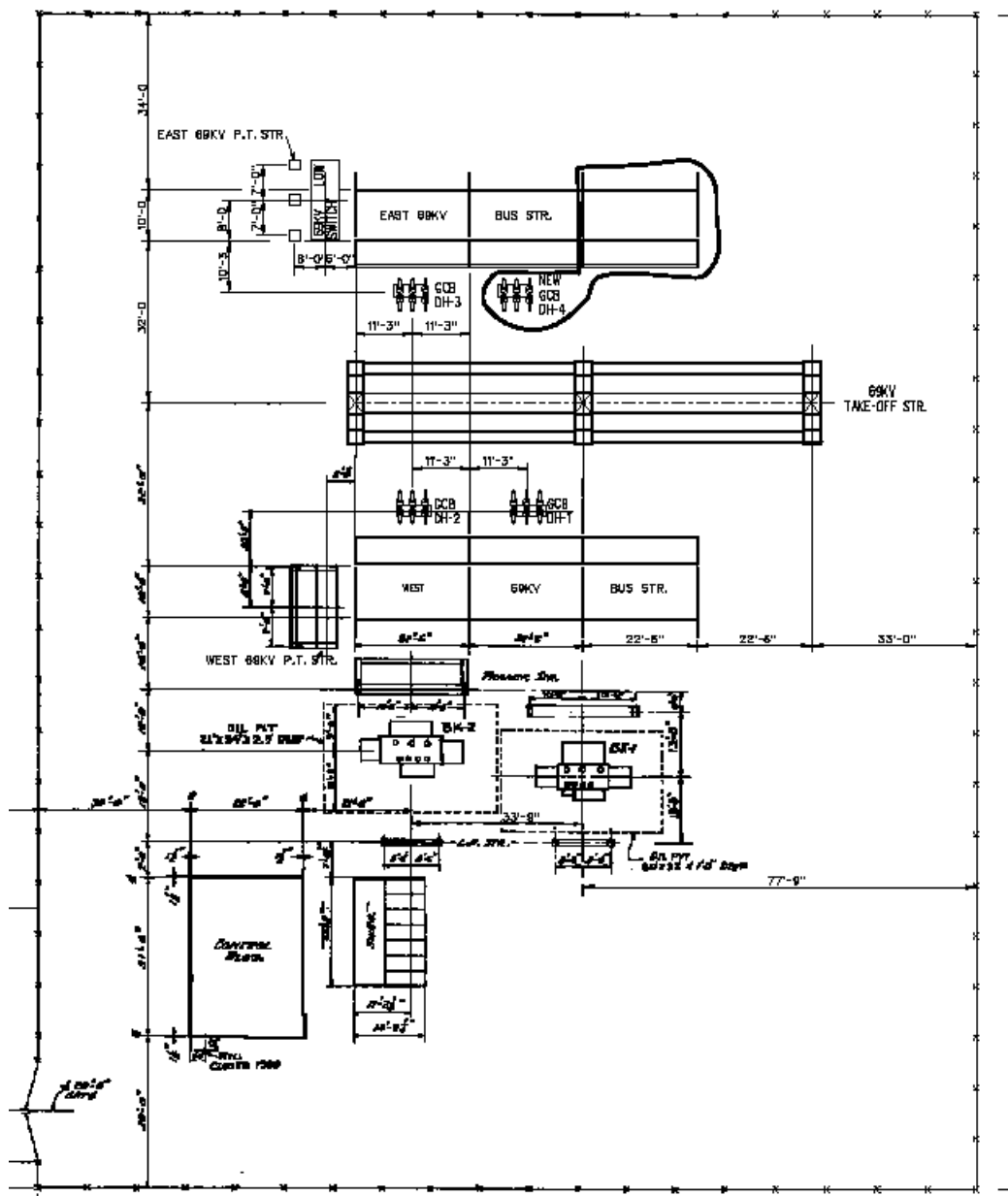
Line Relaying- SEL 311C and SEL 421-2 with Ametek TC-10B carrier

GCB Relaying- SEL 451

Transfer Trip Relaying- Ametek TCF-10B

RTU Equipment- QEI 9150 and SEL 2032

The proposed DP&L relaying meets the requirements of the *PJM Relay Philosophy and Design Standards* document. A physical layout of Kings Creek substation is shown below.



#### 4. Upgrades to Substation/Switchyard Facilities

Urbana Substation:

Replace three 69kV circuit breakers.

#### 5. Metering & Communications

RTU communications provided by radio to DP&L owned microwave. Relay communications via power line carrier. Interconnect metering consists of two JEM-STAR or ION meters. One provides the MWH In and MWH Out information with the other providing instantaneous MW and MX values

#### 6. Environmental, Real Estate and Permitting Issues

It is assumed that no environmental permits are required for the DP&L portion of this project. No building permits should be required. Permits required by the generating facility developer are not considered in this report.

#### 7. Summary of Results of Study

##### a. Cost Estimates

Direct Connect Requirements Cost Estimates			
Kingscreek Interconnection Substation Cost (n2180)			
Equipment/Function	Material	Labor	Total
Transformers	\$63,000	\$63,591	\$126,592
Building	\$0	\$0	\$0
Breakers	\$47,775	\$48,223	\$95,999
Carrier	\$14,910	\$15,050	\$29,960
Relays	\$37,748	\$38,102	\$75,849
Switches	\$24,675	\$24,907	\$49,582
Structures	\$8,820	\$8,903	\$17,723
Batteries, Insulators, LA's, Cable, Bus, etc.	\$36,322	\$36,663	\$72,984
<b>Total Materials</b>	<b>\$233,249</b>	<b>\$235,439</b>	<b>\$468,688</b>
Foundations/Ducts (Contractor)		\$52,763	\$52,763
Site Preparation, Grounding, Fence (Contractor)		\$31,500	\$31,500
Miscellaneous (Mobile, T-line, etc)		\$15,750	\$15,750
Engineering		\$99,120	\$99,120
Overheads	\$4,607	\$91,182	\$95,790
Contingency	\$36,154	\$44,990	\$81,144
<b>Sub Total</b>	<b>\$274,010</b>	<b>\$570,744</b>	<b>\$844,754</b>
AFUDC	\$0	\$0	\$0
<b>Total Cost</b>	<b>\$274,010</b>	<b>\$570,744</b>	<b>\$844,754</b>

These costs do not include CIAC Tax Gross-up. If applicable, an additional 59% should be added to these costs.

<b>Network Upgrade Costs</b>			
<b>Equipment/Function</b>	<b>Material</b>	<b>Labor</b>	<b>Total</b>
<b><i>Urbana Substation Cost - R/P Three 69kV Breakers (n2084)</i></b>		<b><i>75.70%</i></b>	<b><i>Allocation</i></b>
Replace Three 69kV Breakers	\$ 139,536	\$ 45,135	\$ 184,671
Engineering	\$ -	\$ 9,816	\$ 9,816
Overheads	\$ 4,345	\$ 63,881	\$ 68,226
AFUDC	\$ -	\$ -	\$ -
Contingency	\$ 21,628	\$ 7,992	\$ 29,620
<i>Total Urbana Substation Breakers</i>	<i>\$ 165,509</i>	<i>\$ 126,824</i>	<i>\$ 292,333</i>

These costs do not include CIAC Tax Gross-up. If applicable, an additional 59% should be added to these costs.

#### **b. Schedules**

Activity	Substations		
	Start	Finish	Duration
Engineering – Detailed Design	Day 1	Day 60	60
Procurement of Equipment	Day 5	Day 100	95
Construction	Day 100	Day 170	70
Commissioning and Energize	Day 170	Day 180	10

#### **c. Assumptions:**

1. There are no environmental problems with the proposed substation site expansion.
2. All construction is done in accordance with DP&L substation and transmission standards.
3. Equipment can be purchased to meet the final schedule required by the developer.
4. A contractor can build the substation within the scheduled time above.



## 8. Information Required for Interconnection Service Agreement

The following table gives the cost breakdown as required for the FERC filing of the Interconnection Service Agreement

Direct Connection Requirements	
Direct Charges Labor	\$ 479,561
Direct Charges Material	\$ 269,404
Indirect Charges Labor	\$ 91,182
Indirect Charges Material	\$ 4,607
Carrying Charges	\$ -
Total	\$ 844,754

Network Upgrade Requirements	
	Urbana Breakers
Direct Charges Labor	\$ 62,943
Direct Charges Material	\$ 161,164
Indirect Charges Labor	\$ 63,881
Indirect Charges Material	\$ 4,345
Carrying Charges	\$ -
Total	\$ 292,333

### Definitions

**Direct Costs:** these are costs directly associated with the project. These costs need to be separated into “Direct Labor” costs which include the cost of labor to design/build/install the upgrades or facilities and “Direct Material” costs which include the cost of the physical upgrades and equipment.

**Indirect Costs:** These costs include A&G expenses such as the salary of the payroll clerk.

**Carrying Charges:** These costs are the time value of money associated with the project (i.e. AFUDC).

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**12/22/2017 3:48:20 PM**

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**Case No(s). 17-2516-EL-BGA, 17-2517-EL-BGA**

Summary: Application Exhibit D - Facilities Study electronically filed by Mr. Ryan D. Elliott on behalf of Buckeye Wind LLC and Champaign Wind LLC