



**Generation Interconnection  
System Impact Study Report  
for  
Queue Project AF1-036  
CARVILLE 138 KV  
8.4 MW Capacity / 20 MW Energy**

August 2020

Revised: January 2022

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## 1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is DPL.

## 2 Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

## 3 Revision History

This SIS report was updated in January 2022 to reflect the results of PJM's retool analysis.

## 4 General

The Interconnection Customer (IC) has proposed an uprate to a planned/existing Solar generating facility located in Queen Anne's, Maryland. This project is an increase to the Interconnection Customer's AE2-112 and AD2-076 projects, which will share the same point of interconnection. The AF1-036 queue position is a 20 MW uprate (8.4 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 86 MW with 33.48 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is November 30, 2021. This study does not imply a TO commitment to this in-service date.

<b>Queue Number</b>	<b>AF1-036</b>
<b>Project Name</b>	CARVILLE 138 KV
<b>State</b>	Maryland
<b>County</b>	Queen Anne's
<b>Transmission Owner</b>	DPL
<b>MFO</b>	86
<b>MWE</b>	20
<b>MWC</b>	8.4
<b>Fuel</b>	Solar
<b>Basecase Study Year</b>	2023

New Service Customers proposing queue projects that can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

## 5 Point of Interconnection

AF1-036 will interconnect with the DPL on transmission system as an uprate to AE2-112 and AD2-076, via a new terminal position at Carville 138 kV substation that will be created as part of the AD2-076 project.

## 6 Cost Summary

The AF1-036 project will be responsible for the following costs:

Description	Total Cost
<b>Total Physical Interconnection Costs</b>	\$ 0
<b>Allocation towards System Network Upgrade Costs*</b>	\$ 0
<b>Total Costs</b>	\$ 0

\*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates \$0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently \$0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

### 6.1 DPL Costs

Cost estimates will further be refined as a part of the Impact Study and Facilities Study for this project. The Interconnection Customer will be responsible for all costs incurred by DPL in connection with the AF1-036

project. DPL reserves the right to reassess issues presented in this document and, upon appropriate justification, submit additional costs related to the AF1-036 project.

## **7 Transmission Owner Scope of Work**

No additional work is needed to accommodate this interconnection. Refer to AD2-076 Feasibility Study for scope of work

The total physical interconnection costs is given below:

None

## **8 Schedule**

Refer to AD2-076 for schedule.

## **9 Transmission Owner Analysis**

None

## **10 Interconnection Customer Requirements**

### **10.1 Required Relaying and Communications**

Relaying and communications will be established as part of the AD2-076 project. No additional work will be required. Refer to AD2-076 System Impact Study for scope of work.

### **10.2 Interconnection Customer Scope of Direct Connection Work**

The IC is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report and is the responsibility of the IC. Protective relaying and metering design and installation must comply with DPL's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

### **10.3 DPL Interconnection Customer Scope of Direct Connection Work Requirements**

- DPL requires that an IC circuit breaker is located within 500 feet of the DPL substation to facilitate the relay protection scheme between DPL and the IC at the Point of Interconnection (POI).

## 10.4 Special Operating Requirements

1. DPL will require the capability to remotely disconnect the generator from the grid by communication from its System Operations facility. Such disconnection may be facilitated by a generator breaker, or other method depending upon the specific circumstances and the evaluation by DPL.
2. DPL reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering and telecommunications facilities, owned by DPL.
3. Interconnection Customer shall design its non-synchronous generation facility with the ability to maintain a power factor between 0.95 leading and 0.95 lagging measured at the generator terminals.

## 11 Revenue Metering and SCADA Requirements

### 11.1 PJM Requirements

The Interconnection Customer 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 Section 8 of Attachment O.

### 11.2 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>



## 12 Summer Peak Analysis

The Queue Project AF1-036 was evaluated as a 20.0 MW (Capacity 8.4 MW) injection as an uprate to AE2-112 at the Centerville 138 kV substation in the DPL area. Project AF1-036 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-036 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

### 12.1 Generation Deliverability

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

None

### 12.2 Multiple Facility Contingency

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

None

### 12.3 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

### 12.4 Steady-State Voltage Requirements

None

### 12.5 Potential Congestion due to Local Energy Deliverability

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.

None

### 12.6 System Reinforcements

None

## 12.7 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

None

## 12.8 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

None

## 12.9 Contingency Descriptions

None

## 13 Light Load Analysis

Light Load Analysis is not required for AF1-036.

## 14 Short Circuit Analysis

The following Breakers are overdutied:

None

### 14.1 System Reinforcements - Short Circuit

None

## **15 Stability and Reactive Power**

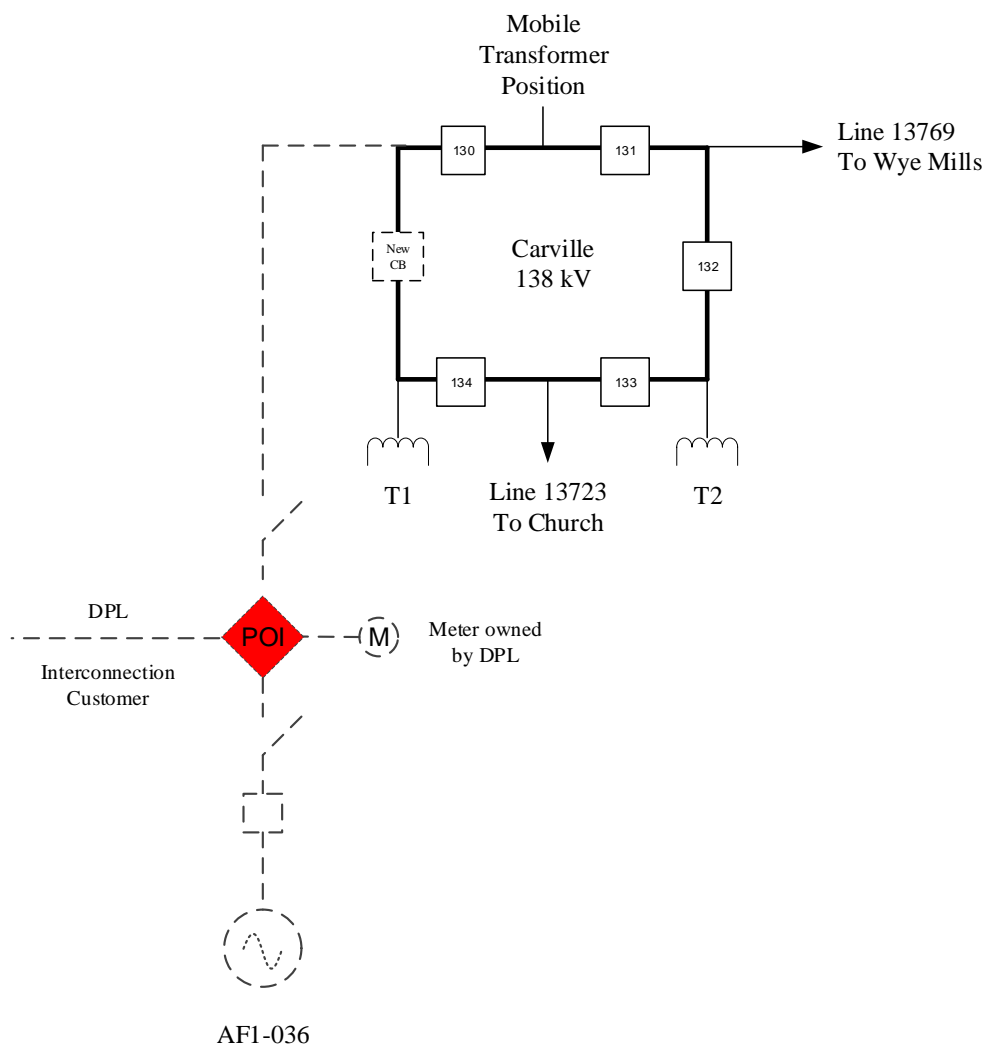
To be determined in the Facilities Study Phase.

## **16 Affected Systems**

None

## 17 Attachment 1: One Line Diagram

# AF1-036 Carville 138 kV



An Interconnection Customer circuit breaker will be required no more than 500 feet from the DPL substation.

**POI** Point of Interconnection