# *Generation Interconnection Facilities Study Report*

# *For*

# *PJM Generation Interconnection Request Queue Position AB1-014*

# *Hillcrest 138 kV*

***July 2017***

# General

Hillcrest Solar I, LLC, the Interconnection Customer, has proposed a solar generating facility located in Brown County, Ohio. The project, identified as PJM Generator Interconnection Request Queue #AB1-014, will have a total capability of 125 MW. The proposed in-service date for this project is October 31, 2020. **This study does not imply a Duke Energy commitment to this in-service date.**

The intent of this facilities study is to estimate the scope, cost and schedule for the construction of transmission facilities to accommodate the AB1-014 project on the Duke Energy transmission system. AB1-014 will interconnect with the Duke Energy transmission system by direct injection into the 138 kV bus at Hillcrest substation. This Facilities Study Report summarizes the scope, cost and schedule associated with the Attachment Facilities and Network Facilities necessary for the project interconnection.

# Scope

Duke Energy will engineer, procure, and construct Attachment Facilities and Network Facilities to interconnect AB1-014 to Hillcrest substation. The 138 kV bus will be reconfigured to add a new ring bus position for the project; please refer to the partial plan diagram in Appendix 3. New bus and a 138 kV breaker with associated disconnects will be added creating the new ring bus position. A take-off structure and overhead conductors will be installed to connect the bus to an Interconnection Customer owned disconnect switch. Revenue metering, relaying and system projection equipment will be installed. Redundant fiber circuits will be installed terminating at a junction point near the Interconnect Customer's take-off structure.

Attachment Facilities include but are not limited to overhead conductors, a take-off structure, surge arresters, line disconnects structures, fiber circuits, metering, relaying and protection equipment.

Network Facilities include one new 138 kV breaker, breaker disconnects, bus, equipment and structures required for the breaker installation and operation.

The Interconnection Customer will be required to engineer, procure, and construct a 138 kV underground feeder, a take-off structure, a disconnect switch, and redundant fiber circuits. The underground feeder will run from the project substation onto and though Duke Energy Hillcrest substation property terminating at the take-off structure mounted switch, approximately 25 feet outside the Hillcrest substation fence. The fiber communications circuits will follow the same path and connect at a junction point near the take-off structure. The Interconnection Customer will be required to acquire all permits necessary to construct Interconnection Customer owned facilities on Duke Energy property.

## Cost Summary

The AB1-014 project will be responsible for the following costs:

| Attachment Facilities | Total Cost |
|---|---|
| Equipment | $ 404,874 |
| Design and Engineering | $ 212,238 |
| Construction | $ 436,276 |
| **Total Costs** | **$ 1,053,388** |

| Network Facilities | Total Cost |
|---|---|
| Equipment | $ 282,005 |
| Design and Engineering | $ 381,410 |
| Construction | $ 1,019,074 |
| **Total Costs** | **$ 1,682,489** |

## Schedule

The requested back feed date of October 31, 2019 can be met barring significant construction or equipment supply delays. A milestone schedule for the project is shown in the table below. An Interim ISA for this project has been executed allowing for the start of engineering and procurement. In order to maintain schedule, an executed Construction Service Agreement (CSA) should be entered into as soon as practicable. Any delay to the execution of this document could result in a delay to the projected back feed date. This study does not imply a Duke Energy commitment to that back feed date.

| Project Phase | Duration | Scheduled | Scheduled |
|---|---|---|---|
| Engineering | 382 | 6/2/18 | 6/19/19 |
| Procurement | 60 | 1/8/19 | 3/9/19 |
| Construction | 134 | 6/19/19 | 10/31/19 |

## Point of Interconnection

AB1-014 will interconnect with the Duke Energy transmission system by direct injection into the 138 kV bus at Hillcrest substation. The Point of Interconnection is located where Duke Energy's overhead conductors from Hillcrest substation terminate to the Interconnection Customer's structure mounted switch; please refer to the single-line diagram in Appendix 2.

# Required Information for the Interconnect Service Agreement

The following tables show costs associated with Attachment Facilities and Network Facilities in direct and indirect charges for use in the Interconnection Service Agreement.

| Attachment Facilities | Cost | |
|---|---|---|
| Direct Charges Labor | $ | 474,481 |
| Direct Charges Material | $ | 267,141 |
| Indirect Charges Labor | $ | 262,916 |
| Indirect Charges Material | $ | 29,082 |
| Carrying Charges | $ | 19,768 |
| **Total Costs** | **$** | **1,053,388** |

| Network Facilities | Cost | |
|---|---|---|
| Direct Charges Labor | $ | 943,598 |
| Direct Charges Material | $ | 169,741 |
| Indirect Charges Labor | $ | 500,466 |
| Indirect Charges Material | $ | 17,372 |
| Carrying Charges | $ | 51,312 |
| **Total Costs** | **$** | **1,682,489** |

# Interconnection Customer Requirements

Interconnection Customer will be responsible for meeting all criteria as specified in the applicable sections of the Duke Energy "Requirements for Connection of Facilities to the Duke Energy MIDWEST Transmission System" document, Version 6, effective January 31, 2014, which can be found at this link:
http://www.pjm.com/~/media/planning/plan-standards/deok/deok-facility-connection-requirements.ashx.

# Revenue Metering and SCADA Requirements

**PJM Requirements**

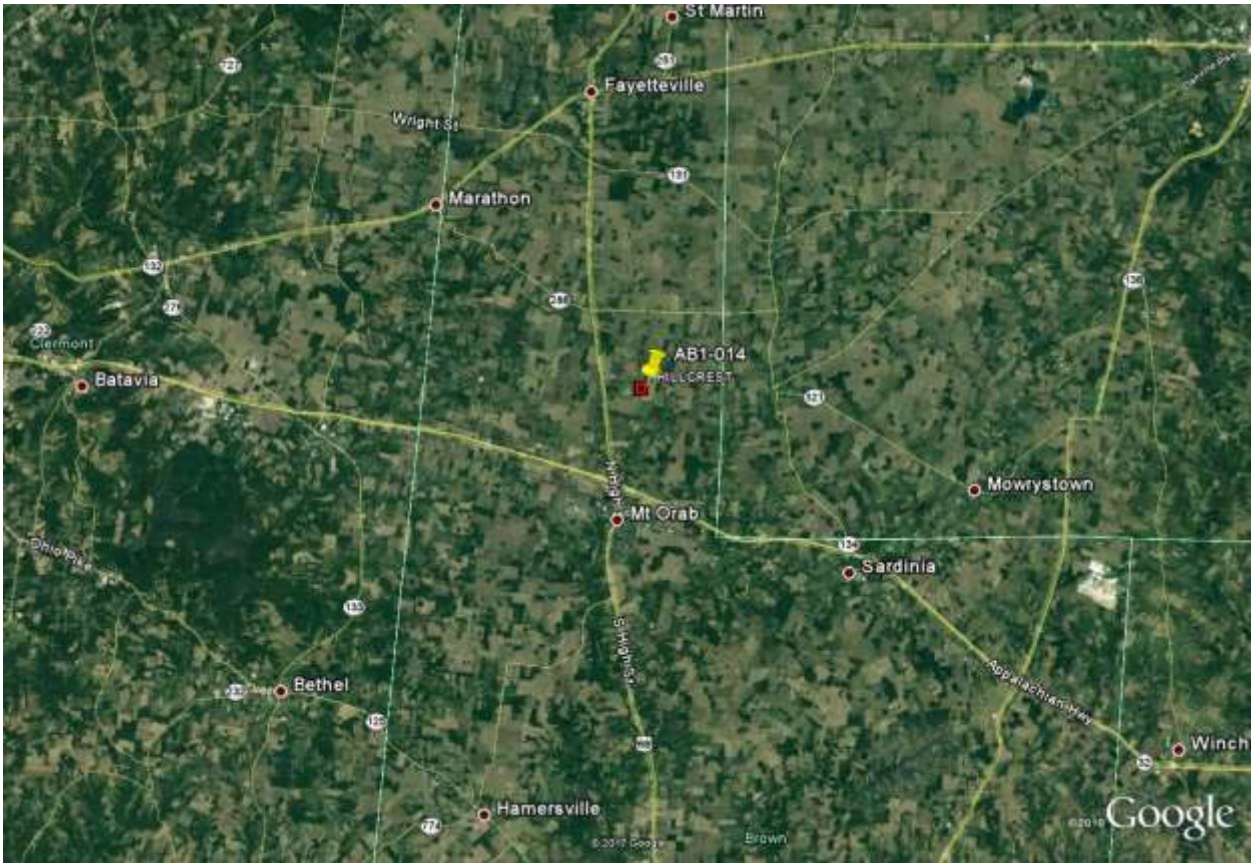
The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for Interconnect Customer's generating resource. See PJM Manuals M-01 and M-14D, and PJM Tariff sections 24.1 and 24.2.

**Duke Energy Requirements**

The Interconnection Customer will be required to comply with all Duke Energy revenue metering requirements for generation interconnection customers. The revenue metering requirements may be found within the "Requirements for Connection of Facilities to the Duke Energy MIDWEST Transmission System" document, Version 6, effective January 31, 2014.

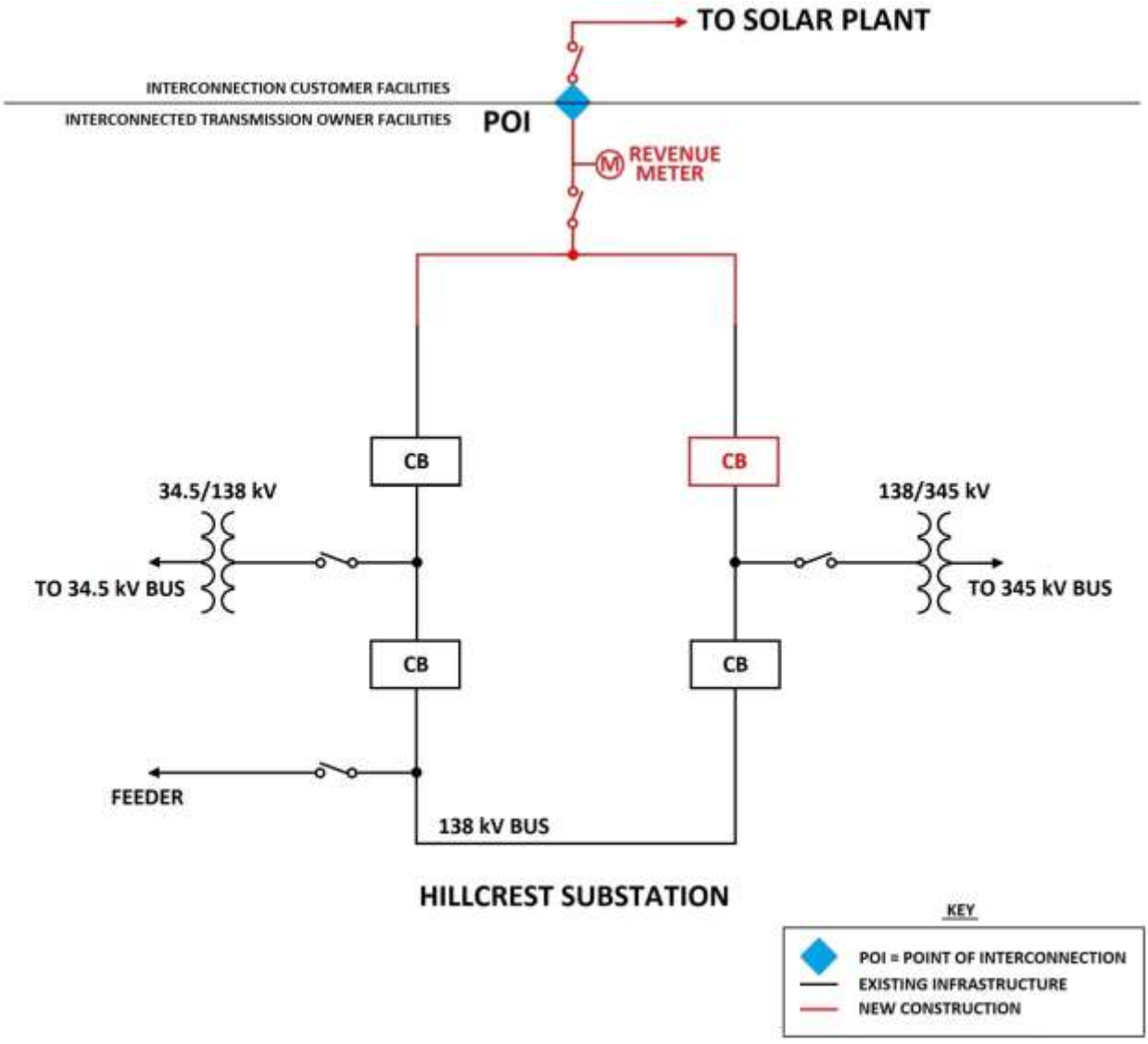
# Appendix 1

## Facility Location
## PJM Queue Position: AB1-014



# Appendix 2

## Interconnection Single-Line Diagram
## PJM Queue Position: AB1-014



# Appendix 3

## Partial Plan Diagram Hillcrest 138 kV Bus
## PJM Queue Position: AB1-014