

Appendix B: PJM Studies

Generation Interconnection Feasibility Study Report Queue Position AC2-088

General

Interconnection Customer has proposed a 70 MW solar photovoltaic generating facility located near Leonard Road, Brown County, Ohio; please refer to the Facilities Location map in Appendix 1. For the AC2-088 project, PJM recognizes 38.4 MW as Capacity Interconnection Rights. The proposed in-service date for this project is May 31, 2019. **This study does not imply a Duke Energy (“Transmission Owner”) commitment to this in-service date.**

Point of Interconnection

AC2-088 will interconnect with the Duke Energy sub-transmission system by tapping the South Bethel-Brown 69 kV line via a new 69 kV switching substation configured as a three breaker ring bus and is located adjacent to the 69 kV line. This Option #1 Point of Interconnection is located where Duke Energy’s overhead line from the new substation terminates to the Interconnection Customer’s pole mounted switch, approximately 25 feet outside the new substation fence; please refer to the single-line diagram in Appendix 2.

An alternate Point of Interconnection (or Option #2 POI) is also proposed as direct injection at the South Bethel 69 kV substation.

The impacts of both POIs are studied and the results are presented in the Network Impacts section of this report. Please note that only the costs associated with Option #1 POI are stated in this report.

Network Impacts

Option #1 Point of Interconnection

The Queue Project AC2-088 was evaluated as a 70.0 MW (Capacity 38.4 MW) injection tapping the South Bethel – Brown 69 kV line in the DEOK area. Project AC2-088 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-088 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

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

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined at a later study stage.

Short Circuit

None.

Affected System Analysis & Mitigation

LGEE Impacts:

There are potential impacts in LGEE's area; the impacts will be determined during later study phases.

MISO Impacts:

There are potential impacts in MISO's area; the impacts will be determined during later study phases.

OVEC Impacts:

There are potential impacts in OVEC's area; the impacts will be determined during later study phases.

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.

Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis - 2020

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

None

Stability and Reactive Power Requirement

To be determined

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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

Network Impacts

Option #2 Point of Interconnection

The Queue Project AC2-088 was evaluated as a 70.0 MW (Capacity 38.4 MW) injection at the South Bethel 69 kV substation in the DEOK area. Project AC2-088 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-088 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

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

Steady-State Voltage Requirements

To be determined at later study stage.

Short Circuit

None.

Affected System Analysis & Mitigation

LGEE Impacts:

There are potential impacts in LGEE's area; the impacts will be determined during later study phases.

MISO Impacts:

There are potential impacts in MISO's area; the impacts will be determined during later study phases.

OVEC Impacts:

There are potential impacts in OVEC's area; the impacts will be determined during later study phases.

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.

Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis - 2020

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

None.

Stability and Reactive Power Requirement

To be determined

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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

***Generation Interconnection
System Impact Study Report***

For

***PJM Generation Interconnection Request
Queue Position AC2-088***

South Bethel-Brown 69 kV

March 2017

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.

General

Lendlease Energy Development, LLC (“Interconnection Customer”) has proposed a 70 MW solar photovoltaic generating facility located near Leonard Road, Brown County, Ohio. For the AC2-088 project, PJM recognizes 38.4 MW as Capacity Interconnection Rights. The proposed in-service date for this project is May 31, 2019. **This study does not imply a Duke Energy (“Transmission Owner”) commitment to this in-service date.**

Point of Interconnection

AC2-088 will interconnect with the Duke Energy sub-transmission system by tapping the South Bethel-Brown 69 kV line via a new 69 kV switching substation configured as a three breaker ring bus and is located adjacent to the 69 kV line. Please refer to Appendix 2 for a one-line diagram of the interconnection.

Costs Summary and Transmission Owner Scope of Work

Duke Energy facilities and network upgrades required to support the AC2-088 project are:

- (a) Attachment Facilities:\$82,785

Duke Energy will install a revenue metering package, a take-off structure, and overhead conductors from the new substation to the Interconnection Customer's pole mounted switch.

- (b) Direct Connection Network Upgrades:\$4,381,692

Duke Energy will build a new 69 kV substation on Interconnection Customer supplied land. The substation will include, but is not limited to, a three breaker ring bus configuration, three 69 kV breakers, nine disconnect switches, relaying, metering, control building, two take-off structures, lighting, fencing, gravel, and foundations as necessary to form a complete substation installation. Duke Energy will install overhead conductors from the new substation to the Interconnect Customer's pole mounted switch.

Duke Energy will reconfigure the South Bethel to Brown 69 kV feeder to loop though the new substation and rework the distribution underbuild on that feeder path to allow for the new substation.

- (c) Non-Direct Connection Network Upgrades: \$ 0.0

- (d) Direct Connection Local Upgrades: \$ 0.0

- (e) Non-Direct Connection Local Upgrades: \$ 0.0

- (f) Option to Build Upgrades: \$ 0.0

Estimated Total Costs (a) to (f):\$ 4,464,477

NOTE: CIAC Tax Gross Up charges will be added to above costs if the project does not meet the eligibility requirements of IRS Notice 88-129.

Interconnection Customer Requirements

Interconnection Customer will be required to procure and provide land for the new substation. The land will be ceded to Duke Energy prior to construction of the new substation. The land must be near the South Bethel - Brown 69 kV feeder path and have direct access to publically maintained roadway. The land shall be environmentally permitted, graded and ready for construction. The area required is approximately 310 feet by 210 feet. Final size and location is to be approved by Duke Energy.

Interconnection Customer will be required to engineer, procure, and construct the connecting circuit from the Interconnection Customer's substation to the Point of Interconnection. This includes, but is not limited to, a pole and switch to be installed approximately 25 feet outside the new substation fence.

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 under 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 IC'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.

Network Impacts

The Queue Project AC2-088 was evaluated as a 70.0 MW (Capacity 38.4 MW) injection into a tap of the South Bethel – T58631 69 kV segment (part of the South Bethel – Brown 69 kV line) in the DEOK area. Project AC2-088 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-088 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

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

Steady-State Voltage Requirements

None

Short Circuit

None

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.

Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis - 2020

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

None

Stability and Reactive Power Requirement

None

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

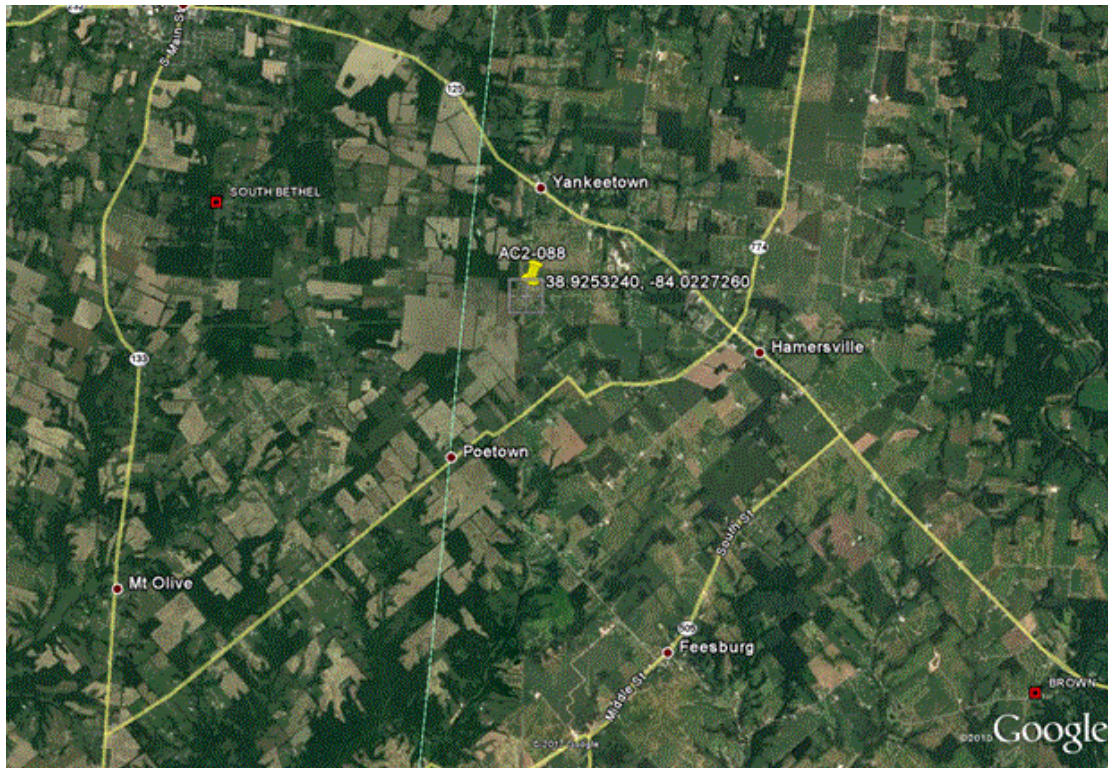
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None

Appendix 1

Facility Location

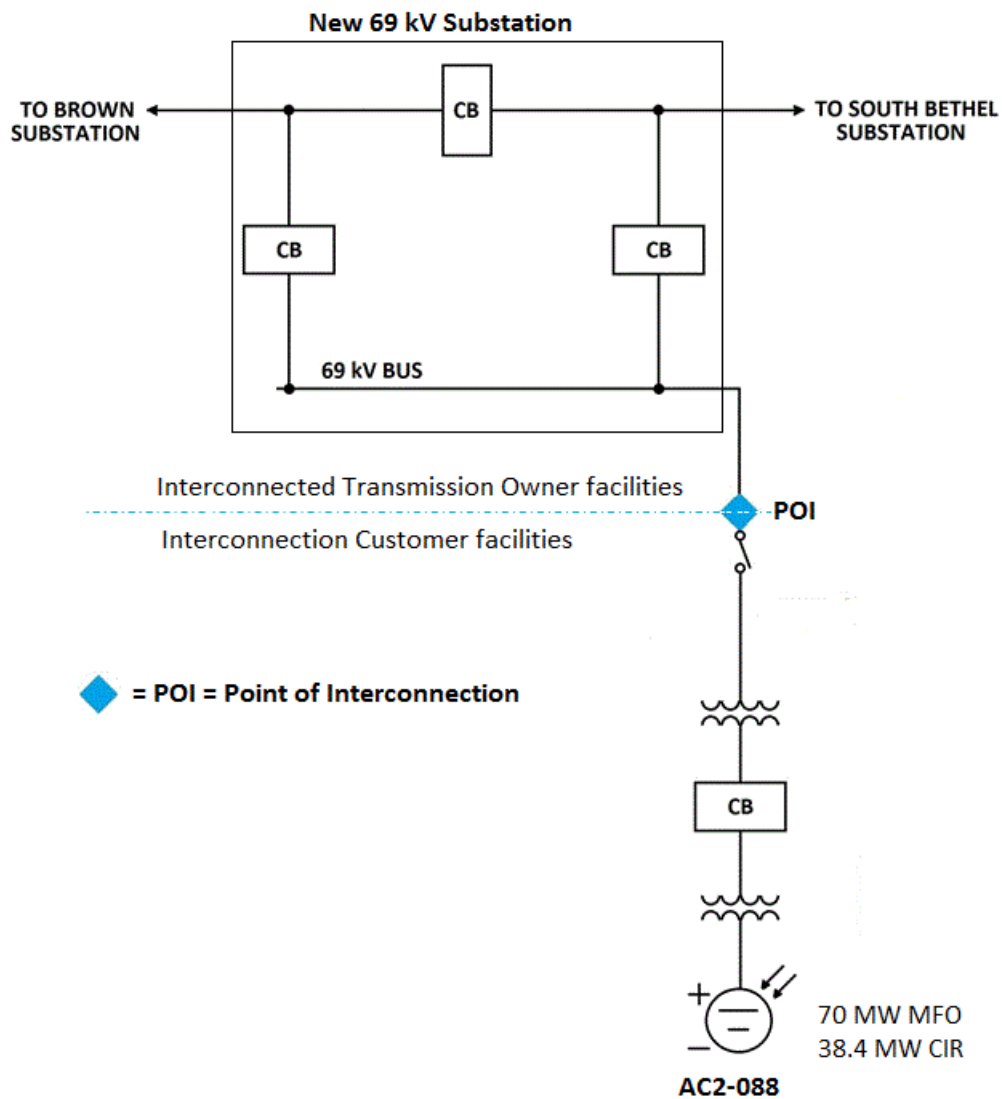
PJM Queue Position: AC2-088



Appendix 2

Interconnection One-Line Diagram

PJM Queue Position: AC2-088



***Generation Interconnection
Combined Feasibility and System
Impact Study Report***

For

***PJM Generation Interconnection Request
Queue Position AD1-136***

South Bethel-Brown 69 kV

January 2018

Preface

The intent of the Combined Feasibility and 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, if any, is included in the System Impact Study.

The Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. Interconnection Customer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs associated with them will be addressed when seeking an Interconnection Agreement as outlined below. Interconnection Customer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Lendlease Energy Development, LLC (“Interconnection Customer”) has proposed an update to an active solar project (Queue Position AC2-088) in the Duke Energy Ohio zone. The new requested increase of 10 MW Energy and 5.4 MW Capacity will result in a total Maximum Facility Output (MFO) of 80 MWs and new Capacity Interconnection Rights (CIR) of 43.8 MWs. The following is a summary of the MW values for both Queue Requests:

- AC2-088 requested capability of 70 MW Energy and 38.4 MW CIR;
- AD1-136 requested incremental increase of 10 MW Energy and 5.4 MW CIR;
- Both projects combined, AC2-088 and AD1-136, will have capability of 80 MW Energy (MFO) and 43.8 MW CIR.

The proposed in-service date for both projects (AC2-088 and AD1-136) is May 31, 2019. **This study does not imply a Duke Energy commitment to this in-service date.**

Point of Interconnection (“POI”)

The facility location is near Leonard Road, Brown County, Ohio. Interconnection Customer will build a new substation to tap the South Bethel – Brown 69 kV transmission line. The Point of Interconnection will be located at the new substation’s exist side to solar plant. Please refer to Appendix 2 for more details.

Costs Summary and Transmission Owner Scope of Work

In addition to proposed attachment facilities and network upgrades for Queue Project AC2-088, the following upgrades are required to support AD1-136:

(a) Attachment Facilities: None.

(b) Direct Connection Network Upgrades: None.

(c) Non-Direct Network Upgrades:

- (c1) Replace in-line switch and mounting structure near Brown substation with new structure and higher capacity switch.
PJM Network Upgrade Number: to be determined during Facilities Study phase.
Estimated cost:\$ 200,000

(d) Direct Connection Local Upgrades: None.

(e) Non-Direct Connection Local Upgrades: None.

(f) Option to Build Upgrades: None.

Estimated Total Costs (a) to (f):\$ 200,00

NOTE: The above shown Estimated Total Costs do not include Contribution in Aid of Construction (CIAC) Federal Income Tax Gross Up charge. The total tax amount may or may not be charged to this project depending upon whether this project meets the eligibility requirements of the latest IRS Safe Harbor provisions for non-taxable status.

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 under 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 Interconnection 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.

Schedule

Because both queue projects (AC1-088 and AD1-136) will receive one Facilities Study Report, the schedule associated with constructing any AD1-136 attachment facilities and network upgrades will be included in such report.

Network Impacts

The Queue Project AD1-136 was evaluated as a 10.0 MW (Capacity 5.4 MW) uprate to Queue Project AC2-088 in the DEOK area. Project AD1-136 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-136 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2021

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

Duke Energy Load Flow Analysis

A Summer Peak 2021 load flow study was performed by Duke Energy evaluating AD1-136 for compliance with applicable reliability planning criteria (NERC, NERC Regional Reliability Council, and Transmission Owner). AD1-136 was studied combined with AC2-088 as an 80 MW injection at a 69 kV tap bus between South Bethel and Brown substations. The load flow study showed that the feeder between the tap bus and Brown overloads to 102.7% in the case where the connecting breaker at South Bethel is opened for any of four failed breaker contingencies.

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

Steady-State Voltage Requirements

None

Short Circuit

None

Affected System Analysis & Mitigation

None

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. Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis - 2021

Not required.

System Reinforcements

Short Circuit

None

Stability and Reactive Power Requirement

To be determined during the Facilities Study phase (With queue project AC1-088.)

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

As identified by Duke Energy, an in-line switch near Brown substation is the limiting element. The overload is alleviated with the switch replaced. Duke Energy will replace the switch with a higher capacity switch and a new mounting structure near Brown substation. Estimated Cost: \$200,000.

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

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

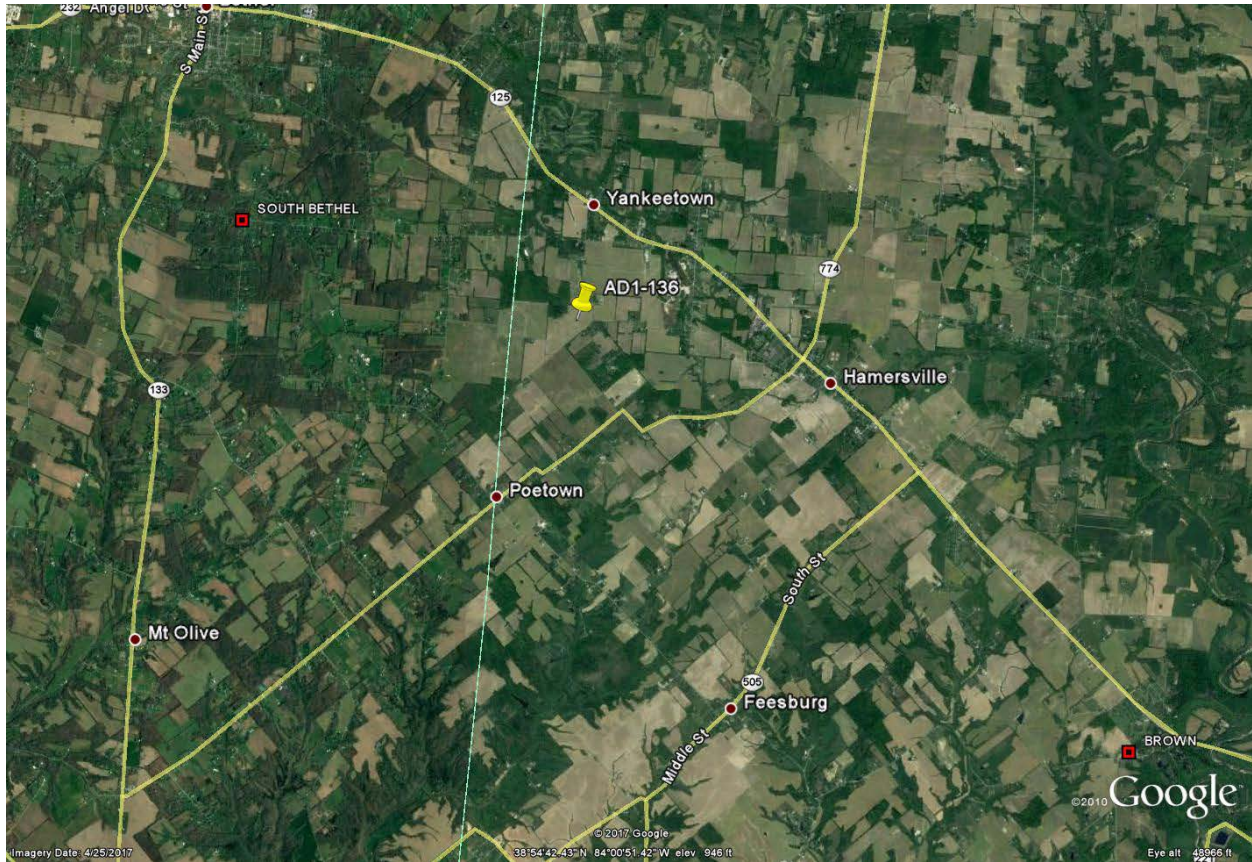
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None

Appendix 1

Facility Location

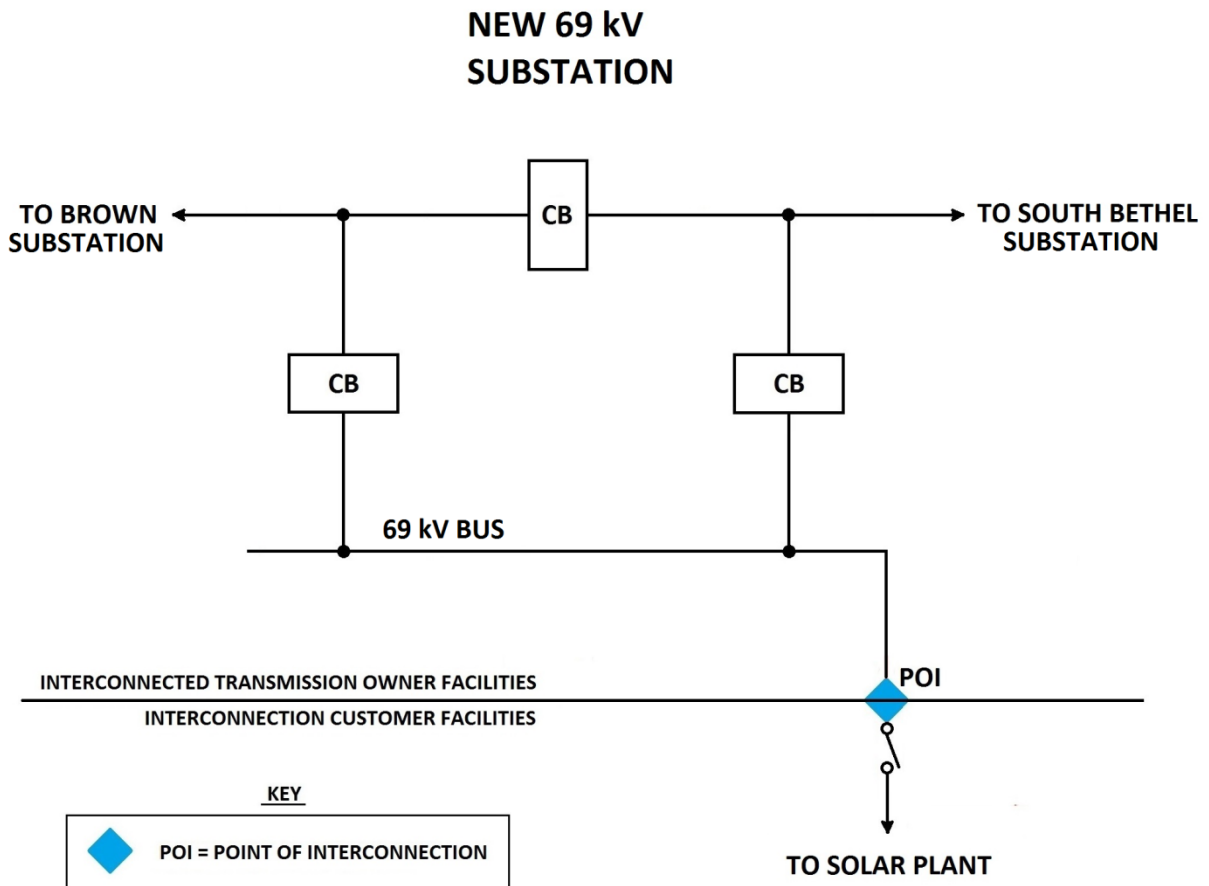
PJM Queue Position: AD1-136



Appendix 2

Interconnection One-Line Diagram

PJM Queue Position: AD1-136



***Generation Interconnection
Facilities Study Report***

for

***PJM Generation Interconnection Request
Queue Positions AC2-088 and AD1-136
(combined)***

South Bethel-Brown 69 kV

October 2018

General

Lendlease Energy Development, LLC (“Interconnection Customer”) has proposed a combined 80 MW solar photovoltaic generating facility located near Leonard Road, Brown County, Ohio. The project is a combination of AC2-088 (70MW) and AD1-136 (10MW). Both projects will be located at the same Interconnection Customer site and will connect as a single generation plant into the Duke Energy transmission system. The proposed in-service date for this project is May 31, 2021. **This study does not imply a Duke Energy (“Transmission Owner”) commitment to this in-service date.**

Facilities study is an engineering study conducted by the Transmission Provider (in coordination with the affected Transmission Owner) to (1) determine the required modifications to the Transmission Provider’s Transmission System necessary to implement the conclusions of the System Impact Study; and (2) complete any additional studies or analyses documented in the System Impact Study or required by PJM Manuals, and determine the required modifications to the Transmission Provider’s Transmission System based on the conclusions of such additional studies. Facilities Study shall also mean to determine the design and specification of the Customer Funded Upgrades necessary to accommodate Interconnection Customer’s New Service Request in accordance with Tariff, Part VI, section 207. Accordingly, this facilities study estimates the scope, cost and schedule for the construction of transmission facilities to connect the AC2-088/AD1-136 combined project in to the Duke Energy transmission system.

AC2-088/AD1-136 will interconnect with the Duke Energy transmission system by connecting to the South Bethel-Brown 69 kV circuit via a new 69 kV substation configured as a three breaker ring bus. The new substation will be located adjacent to the South Bethel-Brown circuit.

Amendments to the System Impact Study Data/Results

The following inputs to the cost estimate have changed:

- Larger footprint of overall substation to accommodate new minimum approach distance design criteria requires additional stone, fencing, grounding grid and bus
- Addition of three 69kV Capacitive Current Voltage Transformers (CCVT)
- Addition of two station power fuses and two single pole switches
- Additional communications connected grid switch
- Contracted engineering labor will be used in place of internal labor
- Contracted construction labor will be used in place of internal labor

Scope of Work

Duke Energy will build a new 69 kV substation on Interconnection Customer supplied land. The substation will include, but is not limited to, three 69 kV breakers, nine disconnect switches, relaying, metering, control building, three take-off structures, lighting, fencing, stone, and foundations as necessary to form a complete substation installation. Duke Energy will install overhead conductors from the new substation to the Interconnect Customer’s pole mounted switch.

Duke Energy will reconfigure the South Bethel to Brown 69 kV circuit to loop through the new substation and rework the distribution underbuild on that circuit path to allow for the new

substation. Duke Energy will also replace an in-line switch near the Brown substation with a higher capacity switch and a new mounting structure.

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

Network Facilities include the new in-line switch and structure near the Brown substation, and the new three breaker ring bus substation, conductor and structures as required to connect the new substation to the existing South Bethel-Brown circuit.

Point of Interconnection

AC2-088/AD1-136 will interconnect with the Duke Energy transmission system by direct injection into a bus position in a newly built 69 kV three breaker ring bus substation. The Point of Interconnection is located where Duke Energy's overhead conductors from the substation terminate to the Interconnection Customer's structure mounted switch; please refer to the single-line diagram in Appendix 2.

Schedule

The projected in-service date for the project is 5-31-2021. The Interconnect Customer supplied property for the project must meet all Duke Energy requirements and be ceded to Duke Energy on or before 6-1-2020. Duke Energy can commence engineering and procurement once the CSA is executed. Duke Energy can commence construction after the property is ceded. This schedule can be met barring a delay in the execution of the CSA, or significant construction or equipment supply delays. This study does not imply a Duke Energy commitment to the in-service date or schedule.

Estimated total construction time is 26 months, starting on 2/1/19 and completing on 5/31/21. The schedule of work is detailed as follows:

Project Phase	Duration (days)	Scheduled Start	Scheduled
Total Substation	851	2-1-19	5-31-21
Engineering	334	2-1-19	12-31-19
Procurement	397	10-1-19	10-31-20
Construction	365	6-1-20	5-31-21

Interconnected Transmission Owner Scope of Work and Cost Summary

Attachment facilities and network upgrades necessary to support the AC2-088/AD1-136 are listed below with their estimated costs. The costs are in 2018 Dollars and do not include Contribution in Aid of Construction (CIAC) Federal Income Tax Gross Up charge. The tax may or may not be charged to this project depending upon whether this project meets the eligibility requirements of the latest IRS Safe Harbor provisions for non-taxable status.

(a) Attachment Facilities:

Duke Energy will design, engineer, purchase equipment and construct overhead conductors from the new three-breaker ring bus substation to the Point of Interconnection at Customer's pole mounted switch. The installation will include, but not limited to, overhead conductors, a take-off structure, surge arresters, line disconnects, communication circuits, revenue metering, relaying and protection equipment.\$400,000

(b) Direct Connection Network Upgrades

(b1) PJM Network Upgrade Number: N5781

Construct new three (3) breaker ring bus substation

Design, engineer, purchase equipment and construct a new 69 kV substation on Interconnection Customer supplied land. The substation will include, but is not limited to, three 69 kV breakers, nine disconnect switches, relaying, metering, control building, three take-off structures, lighting, fencing, stone, and foundations as necessary to form a complete substation installation. The price includes project management, supervision and approvals.....\$5,277,360

(b2) PJM Network Upgrade Number: N5782

Loop to new substation

Reconfigure the South Bethel to Brown 69 kV circuit to loop through the new substation and rework the distribution underbuild on that circuit path to allow for the new substation.\$654,901

(c) Non-Direct Connection Network Upgrades: None

(d) Direct Connection Local Upgrades: None

(e) Non-Direct Connection Local Upgrades: None

(f) Option to Build Upgrades: None

Estimated Total Costs (a) to (f):\$6,332,261

Interconnection Customer Requirements

The Interconnection Customer will procure and prepare land for the new substation. The property will be ceded to Duke Energy before construction of the substation will begin. The Interconnection Customer shall acquire all necessary permitting. The size of the property will be determined by Duke Energy during the engineering phase of the project. Duke Energy will determine the site of the substation on the property. The property shall have direct access to county or state maintained roadway with a drive to the substation site that has a maximum 5% slope. The area inside the substation fence shall have a 1% slope. The surrounding area outside the substation fence shall have a 3:1 slope. The constructed substation and surrounding land shall not require a retention or detention pond, or a retaining wall. The site development engineer and construction contractor will need to follow Duke Energy Earthwork specification 31 00 00. They will also need to provide field density test reports for the compacted backfill, water runoff calculations, and geotechnical reports for the property. All reports and land preparation must be approved by Duke Energy prior to Duke Energy acquiring the land from the Interconnect Customer.

The Interconnection Customer will be required to engineer, procure, and construct a 69 kV circuit and communication circuits from the solar plant to the new substation. At the substation the 69 kV circuit shall have a terminating structure with a switch to act as the point of interconnection. This structure/switch shall be approximately 25 feet outside the new substation fence. The communications circuits will connect at a junction point near the terminating structure. The Interconnection Customer will be required to acquire all permits necessary to construct Interconnection Customer owned facilities on Duke Energy property.

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.

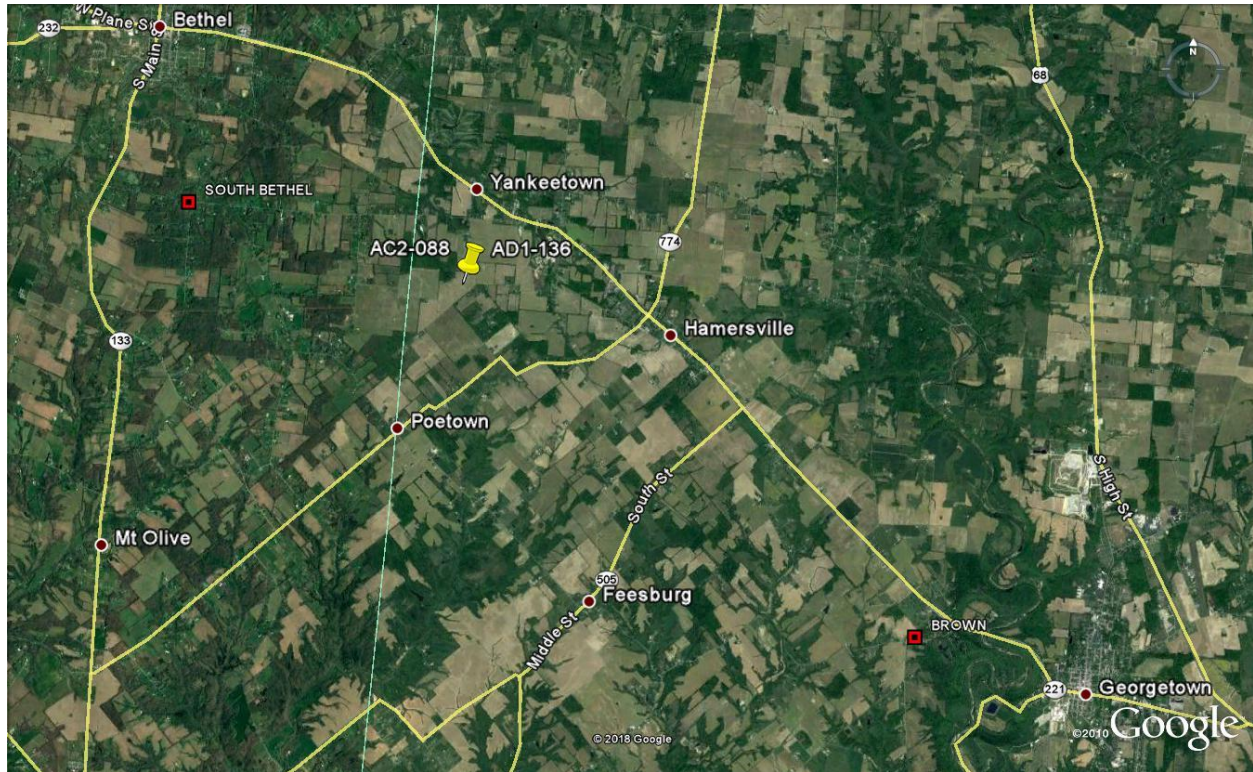
Duke Energy Requirements

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

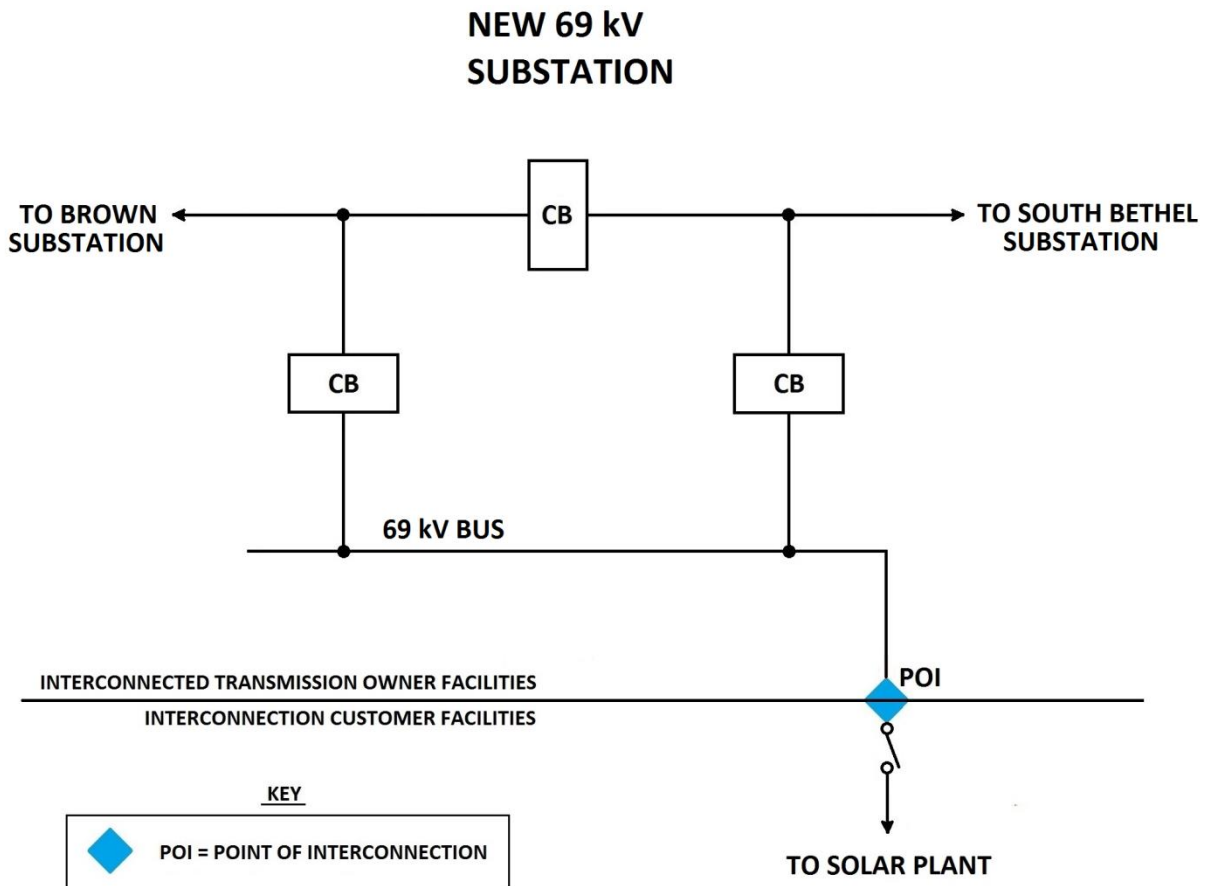
PJM Queue Positions: AC2-088, AD1-136



Appendix 2

Interconnection Single-Line Diagram

PJM Queue Positions: AC2-088, AD1-136



This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

12/14/2018 11:24:22 AM

in

Case No(s). 18-1546-EL-BGN

Summary: Application Appendix B electronically filed by Mr. Michael J. Settineri on behalf of Nestlewood Solar I LLC