Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AF2-307

"Hope-Blevins Valley Tap 69kV

39.6 MW Capacity /

64.2 MW Energy– AF2-307"

Revision 2: April 2025

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff. The Transmission Owner (TO) is East Kentucky Power Cooperative ("EKPC").

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a solar generating facility to be located in, Bath County, Kentucky with a designated PJM Project ID of AF2-307.

The AF2-307 project will have a total Maximum Facility Output (MFO) of 64.2 MW with 39.6 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the East Kentucky Power Cooperative ("EKPC") transmission system via a newly constructed 69 kV switching station, South Bath County 69 kV substation tapping the Hope – Goddard 69 kV line, approximately 1.5 miles north of Hope Substation, 3.2 miles from the Blevins Valley Tap and 25.5 miles from Goddard 69kV Substation.

3. POINT OF CHANGE IN OWNERSHIP

The Point of Change in Ownership (PCO) will be located at the Project Developer (PD) side of a 69 kV disconnect switch to be installed by EKPC at the interface between the PD-owned substation facilities and EKPC's substation facilities at the new South Bath County 69 kV Substation. The switch shall be installed on a steel transmission line monopole structure located outside the substation fence. The exact location will be determined during project detailed design and EKPC will install, own, operate, and maintain the switch.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

Developer will design, build, own, operate and maintain the Project Developer Interconnection Facilities on Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Generation step-up (GSU) transformer(s)
- Circuit breakers and associated equipment located between the high side of the GSU and the Point of Change in Ownership
- Generator lead line from the Generating Facility to the Point of Change in Ownership
- Relay and protective equipment, and Supervisory Control and Data Acquisition (SCADA) and telecommunications equipment to comply with the TO's Applicable Technical Requirements and Standards

The proposed facility must meet EKPC's published facility connection requirements. The latest version of these requirements can be accessed via the following link:

https://www.pjm.com/planning/design-engineering/to-tech-standards/ekpc.aspx

Reference section 5.9 for inverter-based generating facilities.

B. Transmission Owner Facilities Study Results

The following is a description of Transmission Owner facilities for physical interconnection of project to East Kentucky Power Cooperative ("EKPC") transmission system. These facilities shall be designed according to East Kentucky Power Cooperative ("EKPC") standards. Once built, East Kentucky Power Cooperative ("EKPC") will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

A 69 kV transmission line monopole dead-end structure and foundation outside the fence of the Interconnection Substation, to terminate the Project Developer's generator lead line will be considered Transmission Owner Interconnection Facilities (TOIF). A 69kV 3-pole disconnect switch will also be mounted to the monopole structure serving as a PCO.

The TOIF will also include the line conductor from the dead-end structure in the switchyard of the South Bath County Substation to the bus position in the switchyard of the Interconnection Substation.

Installation of Fiber Cable Circuit:

EKPC shall use telecommunications equipment that matches its current network and equipment requirements.

Two 48-count ADSS fibers will be installed between the EKPC substation control house and the Project Developer (PD) facility for relaying, metering, and SCADA circuit requirements. Separate paths shall be used to ensure both fibers are not damaged during a single incident. The exact details and installation plans for this fiber will be developed during project scoping.

2. STAND ALONE NETWORK UPGRADES

South Bath County 69 kV Interconnection Substation

A new 69 kV switching station, South Bath County, will be constructed along the Blevins Valley-Hope 69 kV transmission line to interconnect the project with the East Kentucky Power Cooperative ("EKPC") transmission system.

The major equipment and material associated with the new switching station is listed below:

QTY	Unit	DESCRIPTION
1	Each	69 kV High Profile Substation Structure
4	Each	69 kV, 1200 Amp Circuit Breakers
16	Each	69 kV GOAB Switches
1	Lot	Electrical Material (insulators, terminals, etc.)
1	Each	Station Service Transformer, 100 KVA (39.9 kV-120/240V)
9	Each	Arresters, Lightning 69 kV Station 48 MCOV Polymer
3	Each	CT's,69 kV
3	Each	PT's,69 kV

System Protection

The following system protection scope of work applies for this project. All system protection equipment described in this section will be owned, operated, and maintained by EKPC.

Control House: EKPC shall procure and install a drop-in style control building fully furnished and complete with one bus differential panel, one PD line panel, two transmission line panels, one transfer breaker panel, one SCADA panel, two 125V DC battery banks, and all required operating equipment.

Relay Panels: EKPC shall install a standard bus panel complete with P1 SEL-587Z and P2 SEL-487B relays tripping P1 & P2 lock out relays.

Line Transfer Panel – EKPC shall install a standard transfer line panel with P1 & P2 SEL-411L relays. A SEL-451 relay shall be utilized for breaker control, breaker failure, and reclosing. The line panel shall have the capability to transfer the other circuit breaker terminals.

Panel for protection of the Project Developer (PD) facility connection– EKPC shall install a standard line panel with P1 & P2 SEL-411L relays. Line option relays shall utilize line current differential. A SEL-451 relay shall be utilized for breaker control, breaker failure, and reclosing.

Line Panel for the Hope 69 kV Line Exit (1.5 miles) – EKPC shall install standard line panel with P1 & P2 SEL-411L relays for each line exit. The P1 & P2 relays shall utilize 87L schemes over fiber with fully redundant communication paths. SEL-451 relays shall be utilized for breaker control, breaker failure, and reclosing.

Line Panel for Goddard 69 kV Line Exit (25.5 miles) – EKPC shall install standard line panels with P1 & P2 SEL-411L relays for each line exit. The P1 & P2 relays shall utilize POTT scheme over fiber with fully redundant communication paths. SEL-451 relays shall be utilized for breaker control, breaker failure, and reclosing.

SCADA Panel – EKPC shall install standard SCADA panel with an Orion LX+ and dual metering for the PD. P1 Meter to be an ION8650A and P2 Meter to be a Bitronics M871.

EKPC requires the PD to utilize all Schweitzer Engineering Laboratories (SEL) relays and related protective equipment for facilities that will be interconnecting or communicating with EKPC relaying. EKPC reserves the right to specify relays or other protective equipment utilized in the PD substation as required based on the protection schemes utilized. All protection system designs shall be reviewed by EKPC System Protection or its designer during the design phase to ensure proper clearing times, coordination, and compliance with applicable NERC regulations.

Control cables shall be pulled from new breakers and other required equipment to the control house.

Commissioning: Each relay panel shall be fully commissioned prior to being placed in service. Commissioning shall include AC current and potential circuits, DC functional, relay testing, and end-to-end testing where required. Each of the remote line ends (Goddard and Hope Substations) shall be commissioned using end-to-end testing prior to energizing the POTT scheme to the South Bath County substation.

3. NETWORK UPGRADES

Transmission Line Tie-In for New Interconnection Substation:

The Blevins Valley-Hope 69 kV line will be cut and looped into the new interconnection substation.

The new transmission line loop-in facilities will be owned, operated, and maintained by EKPC. The tap from the existing transmission line into the new switching station will consist of two 3-pole guyed 90-degree transmission structures. The circuit from the Hope 69 kV substation (north circuit) will span directly into the new substation and dead-end on the substation frame. The circuit from the Blevins Valley 69 kV Tap (south circuit) on the Hope – Goddard line will span from the new 3-pole guyed 90-degree dead-end to a new guyed single pole dead-end and then into the new substation on the northeast side of the new substation. The new structures are assumed to be direct embedded structures. The tap will allow for the connection of the existing transmission line to the new switching station. The loop from the Hope – Goddard 69 kV line to the new substation is expected to extend approximately 200 feet.

Upgrades to Neighboring Substations

Goddard Substation

The Hope – Goddard 69 kV line protection will be upgraded using P1 & P2 SEL-411L relays at the Goddard Substation to accommodate the new South Bath County substation. Relay settings changes at Goddard shall be made along with updating the affected station drawings and documentation.

Hope Substation

The Hope – Goddard 69 kV line protection will be upgraded using P1 & P2 SEL-411L relays at the Hope Substation to accommodate the new South Bath County substation. Relay settings changes at Hope shall be made along with updating the affected station drawings and documentation.

Installation of Fiber Cable Circuits:

Overhead optical ground wire (“OPGW”) installation will be required to meet communications requirements for the new EKPC South Bath County Switching substation. EKPC will need to establish a fiber-optic communications path to its nearest microwave tower site. OPGW is already in place for most of the Hope – Goddard 69 kV line section, but OPGW will need to be added from the Hillsboro tap to Goddard substation to complete the communications path to the new South Bath County substation.

4. OTHER SCOPE OF WORK

No other scope has been identified for this project.

5. MILESTONE SCHEDULE FOR COMPLETION OF EKPC WORK

Facilities outlined in this report are estimated to take 33 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is based on the ability to obtain outages to construct and test the proposed facilities.

Description	Start Month	Finish Month
Engineering	1	16
Procurement	2	26

Construction	22	33

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Substation Estimate Assumptions:

- Land purchase for the substation is not included in EKPC's cost estimate. It is assumed the PD will purchase the required land (a roughly square or rectangular shape).
- Site development, excluding grading, will be by the PD.
- Access road design and construction will be by the PD.
- Site grading will be by EKPC or its representative.
- All permitting for the scope of the PD's work for the site will be by the PD.
- It is assumed that standard drilled piers can be used. If geo-technical assessment reveals poor soil conditions or contamination, additional measures may be required.
- No delays due to equipment or material delivery, environmental, regulatory, permitting, property/easement acquisitions, extreme weather, or similar events.
- No significant sub-surface rock encountered during construction, and soil conditions suitable for standard ground-grid and foundation installations.

The following engineering assumptions have been included for the substation information provided:

- Neither foundation nor structural analyses have been performed. Information provided assumes that no significant foundation or structural issues are present.
- The schedule assumes no issues related to scheduling outages of existing transmission lines to terminate into the new substation.
- Material and equipment-related costs are based on current pricing at the time of this study.
- Environmental permits and reviews will be completed by EKPC and can be completed in a timely manner.

Transmission Line Estimate Assumptions:

- The new substation will be constructed close to the line ROW. Two new dead-end self-supporting monopole structures will be needed to support the cut in of the existing circuit. In order to fit between EKPC's line and adjacent gas line ROW, the substation is turned such that two additional guyed, dead-end steel pole structures will be required to orient the new feeds between the line dead-end structures and the substation's take off towers.
- The new substation will be constructed on the west side of EKPC's line right-of-way. This estimate will need to be re-evaluated if it is located on the east side of the right-of-way.
- The PD is responsible for either providing deeded property or obtaining any new ROW/easements on behalf of EKPC for routing the looped-in transmission line to the new substation.
- Any required tree / vegetation clearing for the new substation and the transmission line loop-in work will be the responsibility of the PD.
- The existing OPGW can be split at a point where one end can be pulled into the new substation. A new section of OPGW will be ran from the new substation to connect to a splice location at the remaining end of the existing OPGW.

The following engineering assumptions have been included for the transmission line information provided:

- The conceptual design/analysis completed for this study anticipates no significant foundation or structural issues are present for the existing transmission line; however, the new 3-pole dead-end loop structures at the new South Bath County Substation and the new single pole guyed 90-degree structure at the PD location will require a full design effort.
- Material and equipment costs are based on current pricing at the time of this study.
- Easements, if necessary, shall be acquired by the PD. EKPC will provide necessary easement language and boundaries.
- Environmental permits and reviews shall be completed by EKPC and can be completed in a timely manner.

Metering Assumptions:

The following assumptions have been included for the metering information provided:

1. No delays due to equipment or material delivery, environmental, regulatory, permitting, real estate, extreme weather, or similar events.
2. Fiber-optic cable and associated equipment installation is completed as scheduled.
3. Material and equipment-related costs are based on current pricing at the time of this study.
4. Once fiber-optic cable installation is complete, the fiber will not be damaged.

Communications Assumptions:

The following assumptions have been included for the telecommunications information provided:

1. No delays due to equipment or material delivery, environmental, regulatory, permitting, real estate, extreme weather, or similar events.
2. Material and equipment-related costs are based on current pricing at the time of this study.
3. Once fiber-optic cable installation is complete, the fiber will not be damaged.

Environmental Permitting Assumptions:

The following general assumptions have been included for environmental permitting requirements:

1. For the PD's project, there are no "federal actions" (i.e. federal financial assistance or grants; or federal permit, license or approval) present that would trigger NEPA compliance obligations for the EKPC facilities as a connected action.
2. The South Bath County substation will be located at the assumed location, which is approximately 1.5 miles north of EKPC's Hope substation, and on the west side of the Hope – Goddard transmission line. Relocation of the substation site would require a re-evaluation of the permitting obligations.

7. REVENUE METERING REQUIREMENTS

All metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AF2-307 GIA, and in PJM Manuals M01 and M14D. The details of applicable metering requirements are given in the EKPC's Facility Connection Requirements Document posted on PJM website.

A three-phase 69 kV revenue metering point will need to be established within EKPC's new substation facility. EKPC will purchase and install all metering instrument transformers (including one spare to be kept on site) as well as construct a metering structure per EKPC's specifications. EKPC will be responsible for all revenue metering.

The metering will be installed on the EKPC side of the Point of Change in Ownership, and will be owned and maintained by EKPC.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in EKPC's Facility Connection Requirements Document posted on the PJM website.

9. ENVIRONMENTAL AND PERMITING

All work to accommodate the interconnection of the new substation is dependent upon the PD obtaining all necessary permits for the PD's scope of work. Moreover, it is assumed that the PD shall acquire all necessary real property rights and acquisitions, including but not limited to: rights of way, easements, and fee simple, in a form approved by EKPC. Any setbacks in obtaining the necessary real property rights, acquisitions and permits required for this interconnection may delay the construction schedule.

EKPC or its representative, will perform all necessary environmental assessments and obtain all necessary permits/approvals associated with construction of all EKPC facilities required to facilitate the interconnection of the new generating facility. This includes the Storm-water Pollution Prevention Plan ("SWPPP"), obtaining KYR 10 storm-water permit, and conducting the necessary SWPPP inspections prior to all construction activities.

C. APPENDICES

Attachment #1: Single line Diagram for the Physical Interconnection

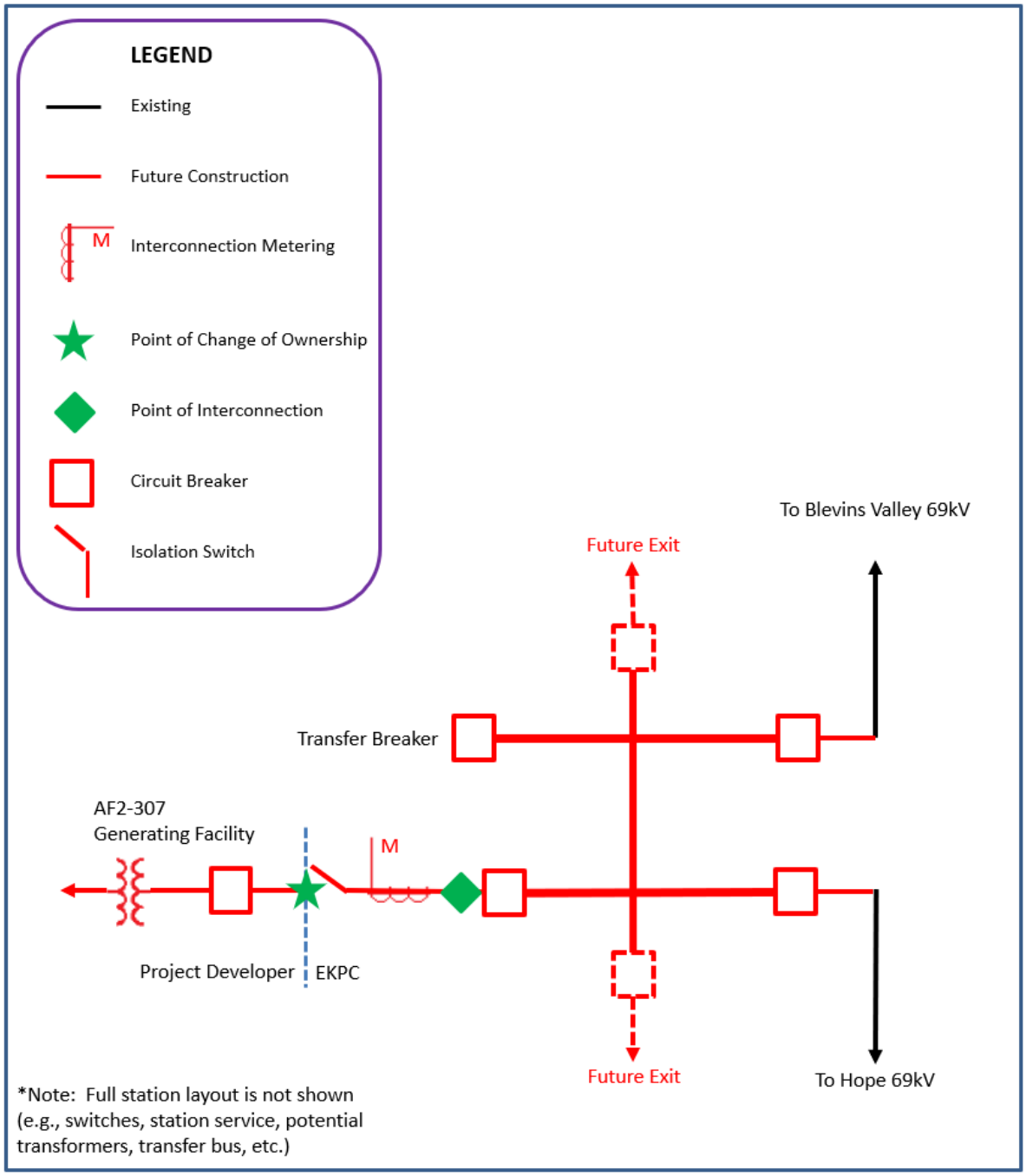
Attachment #2: Substation General Arrangement

Attachment 1:

Single Line Diagram for the Physical Interconnection

AF2-307 Conceptual One-Line Diagram of Interconnection Facilities

South Bath County 69kV Switch Station



Attachment 2:

Substation General Arrangement