PJM Generator Interconnection Request
Queue AB1-167
South Cumberland 69 kV
Feasibility Study Report

February 2016

Preface

The intent of the Feasibility 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 Feasibility 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

The Interconnection Customer proposes to interconnect a 50.0 MW (Capacity 0.0 MW) Energy Storage project, utilizing battery technology, to the existing 69 kV bus at the South Cumberland 69 kV substation via a single 69 kV circuit breaker

Back feed date requested for AB1-167 is April 30, 2017.

COD date requested for AB1-167 is August 31, 2017.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required to maintain the reliability of the AEP transmission system.

Attachment Facilities

The following work is required to connect PJM Project AB1-167 to the South Cumberland 69 kV Substation:

Station Work and Cost:

- Install a new 69 kV Circuit Breaker, revenue metering, relaying package, and SCADA. A more detailed review for accuracy or changes from the original scope will be needed if this project moves further along the PJM queue process.
- **Estimated Station Cost: $1,104,000**

It is understood that the IC is responsible for all the connection costs associated with interconnecting the PJM project AB1-167 to AEP's transmission system. The above costs are reimbursable to AEP. The cost of the battery storage plant and the costs for the line connecting the battery storage plant to the South Cumberland 69 kV substation are not included in this report, these costs are assumed to be the responsibility of the IC.
The battery storage Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Local and Network Impacts

The impact of the proposed 50.0 MW energy storage on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the

transmission system meet performance parameters prescribed in the AEP FERC Form 715[1] and Connection Requirements for AEP Transmission System[2]. Therefore, these criteria were used to assess the impact of the proposed facility on the AEP System. Project AB1-167 was evaluated as a 50.0 MW (Capacity 0.0 MW) injection at the South Cumberland 69 kV substation consistent with the interconnection application. Project AB1-167 was evaluated for compliance with reliability criteria for summer peak conditions in 2019.

Potential network impacts were as follows:

Normal System (2019 Summer Conditions Capacity Output)

- No problems identified

Single Contingency (2019 Summer Conditions Capacity Output)

- No problems identified

Multiple Contingency (2019 Summer Conditions Capacity Output)

- No problems identified

Contribution to Previously Identified Overloads (2019 Summer Conditions Capacity Output)

- No Problems identified.

Normal System (2019 Summer Conditions Full Output)

- No problems identified

Single Contingency (2019 Summer Conditions Full Output)

1. The Derwent-West Byesville 69 kV line (ckt 1) loads from 95.09% to 100.4% (DC power flow) of its emergency rating (96 MVA) for the single line contingency outage of '5719_B2_TOR729'. This project contributes approximately 5.09 MW to the thermal violation.

   CONTINGENCY '5719_B2_TOR729'
   OPEN BRANCH FROM BUS 245485 TO BUS 243144 CKT 1 / 245485
   WCAMBREQ 999 243144 05WCAMBR 138 1
   OPEN BRANCH FROM BUS 245485 TO BUS 245483 CKT 1 / 245485
   WCAMBREQ 999 245483 W CAMBRD 69.0 1

[1] http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/GuideLines/2015_AEP_PJM_FERC_715_Final_Part_4.pdf

[2] http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/Requirements/AEP_Interconnection_Requirements_Rev1.pdf

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  OPEN BRANCH FROM BUS 245485 TO BUS 245481 CKT 1          / 245485
WCAMBREQ 999 245481 W CAMBRD 13.0 1
  OPEN BRANCH FROM BUS 242997 TO BUS 243045 CKT 1          / 242997
05ENCONC 138 243045 05MUSKNG 138 1
  OPEN BRANCH FROM BUS 242997 TO BUS 243144 CKT 1          / 242997
05ENCONC 138 243144 05WCAMBR 138 1
  OPEN BRANCH FROM BUS 242997 TO BUS 245456 CKT 1          / 242997
05ENCONC 138 245456 E NCON L 12.0 1
  OPEN BRANCH FROM BUS 245468 TO BUS 245483 CKT 1          / 245468
RTE 40 8 69.0 245483 W CAMBRD 69.0 1
  END
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- The overload on this line will expose project AB1-167 to curtailment for summer peak conditions. The IC may choose to upgrade the West Byesville MOAB W, and West Byesville Bus to mitigate this overload.

Multiple Contingency (2019 Summer Conditions Full Output)

- No problems identified.

Contribution to Previously Identified Overloads (2019 Summer Conditions Full Output)

- No problems identified.

Short Circuit Analysis

- No problems identified.

Stability Analysis

- Stability study to be performed during the System Impact Study.

Voltage Variations

- No problems identified.

Flicker Study

- The voltage related visual effects of the potential +/- 50.0 MW swing for charging and discharging of the battery is to be determined during the System Impact study.

Additional Limitations of Concern

- No known additional limitations of concern.

Local/Network Upgrades

- None

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 24 months.

Conclusion

Based upon the results of this Feasibility Study, the construction of the 50.0 MW (Capacity 0.0) battery storage facility, project AB1-167, is not expected to require additional interconnection charges beyond those identified in this report. This plan of service will interconnect the proposed battery storage facility in a manner that will provide operational reliability and flexibility to both the AEP Transmission System and the RES battery storage facility.

Estimated Interconnection Cost: $1,104,000

Total Estimated Cost for Project AB1-167: $1,104,000

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.