FirstEnergy - ATSI

GREENFIELD PROJECT PROPOSAL:

Detroit 138kV Ring Bus Switching Substation

For the 2016 RTEP Proposal Window 3

PUBLIC VERSION

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A. Executive Summary

A.1. Name of proposing entity

FirstEnergy Corporation (FirstEnergy)

A.2. Proposal Window and associated violation/issue being addressed

This proposal is a submittal by FirstEnergy in response to the 2016 RTEP Proposal Window 3.

This proposal addresses the identified thermal criteria violations on the Black River-Charleston and the Charleston-Lorain Q4 138kV lines and the Avon-Admiral Q2 138kV and the Admiral-Lorain Q2 138kV lines for a tower outage of Lake Ave-Avon 345kV #1 and #2 lines and a breaker failure on S145 at Avon 345kV line. This project should also be completed with FirstEnergy proposal FE-W3-ATSI-1 Beaver-Black River 138kV relay upgrade to address the thermal overload on the Beaver-Black River 138kV Line due to the same identified contingency drivers.

A.3. Description of the proposed solution

FirstEnergy will build a new 138kV three circuit breaker ring bus switching substation (Detroit) on the existing Carlisle-Lorain Q4 138kV line. The new switching substation (Detroit) will be located approximately nine (9) miles north of the existing Carlisle substation, 2.8 miles south west of the existing Lorain substation and 2.1 miles north east of the existing Lake Ave substation. The approximate GPS co-ordinate of the new switching substation is [redacted].

The existing Carlisle-Lorain Q4 138kV line will loop in/out of the new switching substation, the existing National Bronze 138kV line tap (approximately 0.7miles) will terminate on the new switching substation ring bus and extended to the existing Lake Ave substation. At Lake Ave substation, a new 138kV line exit will be built with a breaker and half configuration, a second breaker bay for future 138kV exit, and a new 138kV line (approximately 1.7miles) will be built from the Lake Ave substation to National Bronze substation with 795Kcmil ACSR conductor. The existing National Bronze 138kV line tap will be reconductor/rebuild with 795Kcmil ACSR conductor to complete the Lake Ave-Detroit 138kV line (Lake Ave-National Bronze-Detroit 138kv line) approximately 2.4miles. OPGW conductor will be installed to provide fiber communication for overall system protection and line grounding protection. The existing National Bronze tap will be relocated to just outside of the National Bronze substation (approximately 0.7miles) and connected to the new Lake Ave-Detroit 138kV Line. A 2000A line sectionalizing switch with whips will be installed at the new tap point, the line switch will allow for sectionalizing the new Lake Ave-Detroit 138kV line at National Bronze.

The proposed project also requires a reconductor the existing Carlisle-Lorain Q4 138kV line section from the new Detroit switching substation to the existing Lorain substation (Detroit-Lorain Q4 138kV line section approximately 2.8 miles) with 954Kcmil ACSR conductor. An OPGW conductor will be installed to provide fiber communication for overall system protection and line grounding protection.

The proposed project additionally requires the replacement of the existing structures on the Carlisle-Lorain Q4 138kV line section from Carlisle to the new switching substation (Carlisle-Detroit 138kV line section approximately 13.1 miles); the existing shield wire will be removed and OPGW will be installed to provide fiber communication for overall system protection and line grounding protection. The existing primary conductor wire will be reused and transferred to the new structures.

FirstEnergy will install Schweitzer SEL411L line relays for line protection over fiber communication. A Dual SEL 411L relay will be installed at the new Detroit switching substation and at all terminal substations (Lake Ave, Carlisle & Lorain). FirstEnergy will install OPGW to provide fiber communication for overall system protection and line grounding protection between the proposed 138kV Detroit switching substation and the terminal substations (Lake Ave, Carlisle and Lorain substations).

The project also requires the reconductor of the substation conductor and an upgrade of the relays at Lorain substation. FirstEnergy will reconductor the substation conductor (line drop) 750 Cu at Lorain to Detroit 138kV line exit to 2200A, reconductor the substation conductor (line drop) 500Cu at Lorain to Admiral Q4 138kV line exit to 2000A and upgrade relays RT CFZ and ZR GCX at Lorain substation.

This project alleviates all thermal issues cited above when completed with the FirstEnergy proposal FE-W3-ATSI-1 Beaver-Black River 138kV relay upgrade.

FirstEnergy will construct, own, operate, and maintain the new facilities.

A.4. Total proposed project cost

Proposal	Estimated Total Cost
• To build a new 138kV three circuit breaker ring bus switching substation (Detroit) on the exiting Carlisle-Lorain Q4 138kV line and a new 138kV line from Lake Ave to National Bronze substation with 795Kcmil ACSR,	
• Reconductor the National Bronze tap with 795Kcmil ACSR (~0.7miles)	
• Reconductor Detroit-Lorain Q4 138kV line with 954Kcmil ACSR conductor (~2.8miles)	
• Replace the existing structure on Carlisle-Detroit 138kV line (~13,8miles)	
• Terminate the exiting Carlisle-Lorain Q4 138kV line and the existing National Bronze tap at the new switching substation	[redacted]
• Install OPGW to provide fiber communication to protection and line grounding protection between the new switching substation and the existing terminal substations[1]	<Redacted costs – See Section E for total estimated project cost>
• Install SEL line protection relay panel at the new switching substation and at the existing terminal substations and modify relay settings	
• Install line sectionalizing switches at the new National Bronze tap point and to replace the existing switch on Carlisle-Detroit 138kV line	
• Reconductor substation conductor and upgrade protection at Lorain substation • Acquisition of substation land	

[1] The route for OPGW is not finalized the cost estimates assumes the Carlisle-Lorain 138kV line structures will be replaced to accommodate the OPGW, final cost estimate may be less than what is shown in the table.

[2] Estimated project costs without AFUDC and Tax.

A.5. Designated Entity

A.5.a. Status/pre-qualification

FirstEnergy has received Pre-Qualification status from PJM under ID 13-10 indicating satisfaction of the pre-qualification requirements for Designated Entity status as defined in the PJM Amended and Restated Operating Agreement ("PJM OZ") in section 1.5.8(a).

Consequently, FirstEnergy is eligible as a Designated Entity to construct, own and operate facilities within PJM's footprint. The information as posted on PJM's website reflects the Company's current qualifications.

A.5.b. Statement of intent

For this proposal, FirstEnergy seeks to be the designated entity to construct, own, operate, maintain and finance the proposed project as described in section A.3 above.

B. Company Evaluation Information

B.1. Name and address of Designated Entity

FirstEnergy Corporation (FirstEnergy)

76 South Main Street

Akron, Ohio 44308

B.2. Technical and engineering qualifications

FirstEnergy is a regional energy provider headquartered in Akron, Ohio. Its subsidiaries and affiliates are involved in the generation, transmission, distribution and sale of electricity, as well as energy management and other energy-related services. FirstEnergy is a publicly traded corporation. JCP&L, Met-Ed and Penelec are wholly-owned direct subsidiaries of FirstEnergy. Mon Power, Potomac Edison and West Penn Power are wholly-owned direct subsidiaries of Allegheny Energy, Inc., which is a wholly-owned direct subsidiary of FirstEnergy. ATSI and TrAILCo are wholly-owned direct subsidiaries of FirstEnergy Transmission, LLC, which is a wholly-owned subsidiary of Allegheny Energy, Inc.

FirstEnergy submitted its prequalification documentation on June 27, 2013 and was subsequently granted pre-qualified status by PJM and given ID number 13-10. Further, in compliance with the PJM Operating Agreement Schedule 6, Subsection 1.5.8(a) (3), on September 29, 2014, FirstEnergy submitted the appropriate updates to Section F of its initial prequalification information. As such, FirstEnergy hereby states that the pre-qualification information provided to PJM, as updated, reflects FirstEnergy's current qualifications for eligibility as a Designated Entity as defined in the Operating Agreement Subsection 1.5.8(a).

FirstEnergy hereby submits by reference as to the specific section in its original pre-qualification documentation (dated June 27, 2013 and subsequently accepted by PJM) as evidence of the following:

- FirstEnergy's technical and engineering qualifications (Section B)
- FirstEnergy's experience in:
  - developing, operating and maintaining transmission facilities (Section C);
  - adherence to standardized construction, maintenance and operating practices (Section E), and including the ability for emergency response and system restoration (Section H);
  - working in the geographic region in which the proposed project is located (Section D);
  - ability to acquire rights of way within the proposed projects geographic region (Section I)
- FirstEnergy has adequate financial resources available to construct, operate and maintain the proposed project.
- FirstEnergy has demonstrated its managerial ability to contain costs and adhere to construction schedules for numerous transmission projects that have been constructed by its 10 utilities and 2 transmission companies.
- FirstEnergy will not be offering any construction cost caps or commitments for the proposed project.
- FirstEnergy is amply qualified to construct, operate, and maintain the proposed project (Section C).

B.3. Experience

B.3.a. Types of facilities proposed

The facilities being proposed for this proposal are typical facilities within the ATSI transmission zone in PJM. The type of facilities in this proposal are not atypical of those which FirstEnergy already has extensive experience developing, operating and maintaining on a daily basis.

B.3.b. Standardized construction, maintenance, and operating practices

FirstEnergy has fully developed standardized construction, maintenance, and operating practices.

All work and design meets and adheres to the PJM Transmission and Substation Design Technical Requirements and PJM Manual 7 - PJM Protection standards.

As mentioned above, this greenfield/upgrade proposal will become part of the existing transmission footprint of FirstEnergy. These new facilities will utilize the same standard construction, maintenance, and operating practices already in place at FirstEnergy.

For more information on FirstEnergy, please refer to the pre-qualification documents posted on PJM's website.

B.3.c. Working in the geographical region

This greenfield/upgrade project is within the geographical region of FirstEnergy's existing transmission system. For FirstEnergy, this will become part of the PJM Western region. All new facilities will be supported by existing resources of FirstEnergy.

B.3.d. Rights of way in geographical region of project

FirstEnergy has extensive experience in acquiring rights-of-way for this proposal as this proposal is part of the company's existing transmission footprint with PJM.

B.4. Financing plan

Refer to the filed pre-qualification documents of FirstEnergy posted on PJM's website for information regarding the financing plan.

B.5. Cost containment and adherence to construction schedules

FirstEnergy will not be offering any construction cost caps or commitments to construction schedules for the proposed project.

B.6. Commitments

FirstEnergy will commit to execute the Consolidated Transmission Owners Agreement, if it becomes the Designated Entity for this proposal.

B.7. Unique qualifications

Refer to the filed pre-qualification documents of FirstEnergy posted on PJM's website for information regarding the unique qualifications of FirstEnergy.

C. Proposed Project Constructability Information

C.1. Scope – Build new 138kv three circuit breaker ring bus switching substation (Detroit)

C.1.a. General description of the proposed location

This proposal is to build a new 138kV three circuit breaker ring bus switching substation (Detroit) on the existing Carlisle-Lorain Q4 138kV line. The new switching substation (Detroit) will be located approximately 9 miles north of Carlisle substation, 2.8 miles south west of Lorain substation and 2.1 miles north east of Lake Ave substation. The approximate GPS coordinate of the new switching substation is ([redacted]). The new switching substation will tie Lake Ave, Carlisle, and Lorain 138kV substations. ATIS will acquire the land for the new substation.

The proposal include build and/or reconductor the Lake Ave-Detroit and the Detroit-Lorain Q4 138kV lines and structure replacement on the exiting section of the Carlisle-Detroit 138kV line. The project also include installing OPGW to provide fiber communication for overall system protection and line grounding protection on the proposed project lines. The project scope includes work to modify/upgrade/install terminal substation equipment at various locations.

C.1.b. One-line diagram and general arrangement drawing

<Redacted: One-line diagram and general arrangement drawing>

C.1.c. Electrical Design

The new three circuit breaker ring bus switching substation will be constructed according to FirstEnergy (FE) substation design construction standards. The standard FE 138kV design calls for 2000A bus, 3000A circuit breaker and 2000A switch. OPGW[2] will be installed to provide fiber communication for overall system protection and line grounding protection on the proposed lines. The project utilizes Schweitzer line protection relay panels for transmission line protection and SEL411L relay panels will be installed at the new Detroit switching substation and at the existing terminal substations. A new 138kV line exit at Lake Ave substation will be built with a breaker and half configuration and a second breaker bay for future exit. The existing Carlisle-Lorain Q4 138kV line and the existing National Bronze tap will terminate at the new switching substation. The proposed project will utilize 795Kcmil and 954Kcmil ACSR conductor wire to build and/or reconductor transmission lines as required. The project utilize steel pole , H-Frame wood pole to replace the existing structures or install mid-span structures as required per FE standard. The Final project will create the following lines: Detroit-Lake Ave 138kV line (2.4miles), Detroit-Lorain Q4 138kv line (2.8miles) and Carlisle-Detroit 138kv line (~13.1miles)

[2]The route for OPGW is not finalized yet, ATSI is exploring economically feasible way to install the OPGW. The cost estimates and the report assumes that the Carlisle-Lorain 138kV line structures will be replaced to accommodate the OPGW.

C.1.d. Relay Plan

The project utilizes Schweitzer line protection relay panels for transmission line protection and Dual SEL 411L Standard relay panels will be installed at the new switching substation and at existing substation terminals (Lake Ave, Carlisle and Loran substation). Protection communication will over fiber communication.

C.1.e. Construction Outage Plan

The forecasted duration of the project is 35 months. The estimated outages required to complete this project are:

- Construct new line exit position at Lake Ave - [redacted].
- Tie in new line and exit at Lake Ave - [redacted].
- Reconductor from Detroit to Lorain substation (Portion of the Carlisle-Lorain 138kV Line) - [redacted].
- Tie-in and Cut-over the new Detroit substation - [redacted].

The exact facility outage duration will be determined during detailed engineering and outage coordination.

C.1.f. Geographic Map

<Redacted: Geographic Map>

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C.2. Project Component Cost Estimates

Total Project Cost Breakdown[1]	
Project Description	Estimated Cost
Engineering and Design	[redacted]
Material and Equipment	[redacted]
Construction and Commissioning	[redacted]
Real Estate	[redacted]
Project Management and Commissioning	[redacted]
Right-of-Way	[redacted]
Indirect	[redacted]
Subtotal	[redacted]
Taxes	[redacted]
AFUDC	[redacted]
Total	[redacted]

<Redacted costs – See Section E for total estimated project cost>

C.3. On-going Transmission Facility Items

C.3.a. Operational Plan

C.3.a.1. Plan for operating the new Transmission Facilities

The FirstEnergy facilities of the proposed Project will be operated from FirstEnergy's FE West control center.

C.3.a.2. Required telemetry

Facilities of the proposed Project will have telemetry consistent with FirstEnergy's practices.

C.3.b. Maintenance Plan

Facilities of the proposed Project will be maintained consistent with FirstEnergy's practices.

D. Analytical Assessment

ATSI 2021 Winter Generation Deliverability result Final AC Flow with the proposed mitigation.

<Redacted: Chart of ATSI 2021 Winter Generation Deliverability result Final AC Flow with the proposed mitigation>

As footnoted, the results take into consideration the implementation of the FirstEnergy proposal FE-W3-ATSI-1 Beaver-Black River 138kV relay upgrade at Beaver Substation.

E. Cost

E.1. Cost Breakdown

Total Project Cost Breakdown[1]	
Project Description	Estimated Cost
Engineering and Design	[redacted]
Material and Equipment	[redacted]
Construction and Commissioning	[redacted]
Real Estate	[redacted]
Project Management and Commissioning	[redacted]
Right-of-Way	[redacted]
Indirect	[redacted]
Taxes	[redacted]
AFUDC	[redacted]
Total	$34,753,000

[1]Totals are rounded up

E.2. Rates

Escalation Rate		Tax Rate Ohio	Planned ROE
2018	[redacted]	[redacted]	[redacted]
2019	[redacted]		
2020	[redacted]		

E.3. Yearly Cash Flow

E.4. Estimated Monthly AFUDC

Description of Cost	Yearly Cash Flow[2]				
	2017	2018	2019	2020	Total
Direct -None					
Escalated	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Escalation	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Indirect	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Taxes	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
AFUDC	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$1,235,800	$2,253,800	$7,977,200	$23,284,300	$34,753,000

[2]Totals are rounded up

Estimated Monthly AFUDC[3]													
Year	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2018	[redacted]												
2019													
2020													
Grand Total Project AFUDC													[redacted]

[3]Totals are rounded up

F. Schedule

Task Description	Start Date	End Date
Transmission Line Engineering	01/01/18	12/31/18
Transmission Line Construction	09/01/19	10/30/20
Transmission Major Equipment Date	01/01/18	08/01/19
Substation Engineering	07/01/19	03/31/20
Substation Below Grade	04/01/20	06/30/20
Substation Above Grade	07/01/20	10/30/20
Substation Major Equipment Date	03/01/19	06/15/20

The anticipated schedule for the design and construction of the connection facilities and system modifications is estimated to be 35 months. This schedule assumes no outage, permitting, siting or right-of-way acquisition conflicts. The schedule assumes the following: that minimal wetlands, streams or ecological features are in the project area and will not significantly impact the project.