

FirstEnergy – APS Zone

GREENFIELD PROJECT PROPOSAL:

Bunola 138kV Ring Bus Substation

For the 2017 RTEP Proposal Window 1

Redacted Version

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FirstEnergy Corporation hereby submits the following information as required by the PJM Template for Greenfield Project-Company Evaluation and Constructability Information.

A. Executive Summary

This proposal, submitted by FirstEnergy in response to the 2017 PJM RTEP Reliability Open Window 1 (“Window 1”), proposes to build a new 138 kV ring bus substation interconnecting with [REDACTED] (“[REDACTED]”) Mitchell-Wilson 138 kV line, build a new double circuit 138 kV line, and reconductor/install new conductor on existing 138 kV double circuit tower line. Collectively, the proposal is hereinafter referred to as the “Bunola Project” or “Project”. The Project resolves the flowgate violations listed below. All new construction is within FirstEnergy’s West Penn Power operating company service territory.

FG#	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S483	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

FG#	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S857	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

FG#	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S578	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S582	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S584	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S577	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S581	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
GD-S583	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

The Project addresses all locally identified flowgate violations and no other flowgate violations in the area were identified. The Bunola Project provides additional benefits to the localized transmission system. This Project strengthens interconnection between FirstEnergy’s Mitchell Substation and [REDACTED]’s Wilson substation and alleviates congestion in the area.

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.

FirstEnergy hereby indicates its intent to be designated to construct, own, operate, maintain and finance the proposed Project and thus makes clear its intent to be considered to be the Designated Entity for the proposed project.

Greenfield Project Description:

- Construct new Bunola 138 kV 4 breaker ring bus substation
- Loop the Mitchell – Wilson 138 kV transmission line, owned by [REDACTED], approximately one span into Bunola 138 kV substation. Two new interconnection points to be established at the loop structure(s).
- Build new 138 kV double circuit line from Bunola substation to the existing Wycoff Jct.-Wycoff section of the Springdale – Wycoff – Yukon 138 kV line (~2.43 miles).

Upgrades to Existing Facilities Description:

- Tap the Wycoff Jct – Springdale section of the Springdale-Wycoff-Yukon 138 kV line and string open side of existing tower with 1024 ACAR (~1.7 miles).
- Reconductor approximately 1.7 miles of the existing Wycoff Jct.-Wycoff with 1024 ACAR.
- Upgrade Yukon Relays with [REDACTED]
- Upgrade Springdale Relays with [REDACTED]

Construction of the Bunola Project (FE-2017W1-WP-7) mitigates all of the flowgate violations summarized above and reported in Window 1. The total cost of the proposed Bunola Project is approximately \$23.4 million. The expected Bunola Project duration is approximately 39 months from receipt of approval from PJM.

See Figure 1 below for an overview depicting the greenfield project and upgrades to existing facilities.

B. Company Evaluation Information

Name and address of Designated Entity

FirstEnergy Corporation (FirstEnergy)
76 South Main Street
Akron, Ohio 44308

Technical and engineering qualifications

[Redacted]

[Redacted]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[Redacted text block]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

C. Proposed Project Constructability Information

The Project will construct a new 4 breaker ring bus “Bunola” substation, construct a new double circuit 138 kV line approximately 2.43 mile to the existing Wycoff Jct-Wycoff section of the Springdale-Wycoff-Yukon 138 kV line and loop the 138 kV Mitchell – Wilson line into Bunola substation. Remote terminal points for the 138 kV Bunola Project are West Penn Power’s Yukon, Springdale, and Mitchell substations. Remote terminal points owned by [REDACTED] is Wilson substation.

Proposal Element

The Bunola Project constructs a new substation in the West Penn Power service territory (APS Zone). The proposed location of Bunola substation is in the vicinity of:

[REDACTED]

The Bunola Project will consist of new “Greenfield” elements and upgrades to existing West Penn Power facilities. The project will be owned, operated, and constructed by FirstEnergy and affiliates.

1. Purchase substation property adjacent to existing Mitchell-Wilson 138 kV line.
2. Construct 4 breaker ring bus; with room for future expansion.
3. Loop the Mitchell – Wilson 138 kV line into Bunola substation using 2 bundle 954 ACSR conductor, approximately one span.
4. Construct ~2.43 miles of new double circuit 138 kV line
 - Line conductor is 1024 ACAR on both circuits.
 - The northern most line will connect to the existing Wycoff Jct – Wycoff circuit.
 - The southernmost line will connect to the new conductor to be installed on the open tower position of the Wycoff Jct – Wycoff circuit (detail below).

5. Reconductor 1.7 miles of existing line with 1024 ACAR conductor from Wycoff Jct to tap point for new double circuit line (greenfield portion)
6. Install 1.7 miles 1024 ACAR conductor on the open side of the Wycoff Jct – Wycoff 138 kV line to tap point for new double circuit line (greenfield portion)
7. Upgrade relays at Springdale 138 kV (Bunola Terminal)
 - Install new [REDACTED]
8. Upgrade relays at Yukon 138 kV (Bunola Terminal)
 - Install new [REDACTED]

Transmission Elements to be constructed by others



Geographic Description

Attached below, Figure 1, is an aerial image of the proposed Bunola Project 138 kV line route and line tap into existing facilities. The existing 138 kV lines are shown in yellow, the proposed North Line is shown in maroon, the proposed South Line is shown in light blue. The orange line shown is the 1.70 miles of new 1024 ACAR that will be installed on the existing tower structures.

Figure 1: Geographic Description (line route for new construction (blue and red) to be determined by LRE

General description of alternative routes or routing study area

A line route evaluation (“LRE”) has not been performed to determine the final line route for the Bunola Project. The loop into Bunola substation is assumed to be ~1 span since the proposal is for the substation to be located adjacent to the Mitchell – Wilson 138 kV line as illustrated Figure 1. It is anticipated that new 138 kV structures will be built in-line with the existing structure to allow the single span into the Bunloa substation. The final line route for the new 2.43 mile section has not been determined. A LRE will be performed to determine the final route. In general, construction of the line will utilize double circuit steel-pole construction with braced post insulators. As illustrated in Figure 1 the line route for the proposed new 2.43 mile section of line is rural with minimal opposition, if any, is anticipated. The 1.7 mile section of reconductor and installing conductor in an open tower position will be completed within the existing right-of-way.

Assessment of environmental impacts

FirstEnergy will evaluate all potential environmental impacts and will submit for the necessary permits. It is anticipated that the environmental permits will be readily obtained with no unusual conditions.

Right of way and land acquisition plan and approach

FirstEnergy will negotiate with affected property owners for the right-of-way required to build the 138 kV double circuit line. Rights for access routes will also be negotiated as needed.

Permitting plan and approach

FirstEnergy will obtain all required permits and local approvals.

Discussion of potential public opposition

Due to location and relatively short length of transmission line, public opposition to project is anticipated to be minimal. FirstEnergy will work with local communities and follow normal process for communicating to public.

Construction Responsibility

FirstEnergy and affiliates intend to construct, own, operate, maintain and finance all elements of the proposed Project, [REDACTED] and thus makes clear its intent to be considered to be the Designated Entity for the proposed project.

D. Analytical Assessment

One-line Diagram

Shown below is a one-line of the Bunola Project. Facilities shown in Blue are new facilities; facilities shown in Orange and Green are upgraded facilities. Remote end upgrades at Wilson (█), Mitchell, Springdale, and Yukon are not illustrated on the one line since they do not impact the one-line.

Figure 2: Project one-line drawing

Equipment Parameters and Assumptions

The Bunola Project consists of a new 138 kV ring bus substation, approximately 2.43 miles of new 138 kV line, a 138 kV line loop (~1 span), reconductor of existing 138 kV lines and tapping into existing 138 kV lines (~1.7 miles). The text below provides the necessary information to add the Bunola Project to the Window 1 models.

PSS/E Idev & Contingency Files

FirstEnergy Bunola 138 kV Substation Greenfield Project
Company Evaluation and Constructability Information

A table with multiple rows and columns. The majority of the cells are obscured by black redaction bars. Only a few cells at the top and bottom right are visible, showing some text and numerical values.

A large table with many rows and columns. It is almost entirely covered by black redaction bars. Only a few cells are visible, primarily along the right edge, showing fragments of text and numbers.

The Proposal Template Spreadsheet labeled “FE-2017W1-APS-6” excel documented will be submitted as a separated document with this report. The excel file provides, general scope, idev, contingencies and cost for the Bunola Project.

Electrical & Physical characteristics

The proposed transmission line has the following specifications:

Double Circuit 138 kV Line (~2.43 Miles New and ~1.7 Miles Reconductor)

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

Mitchell-Wilson 138 kV Line Loop (~1 span)

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

Relay communications plan

The following relay/communication upgrades will be required:

<i>Protection and Communication/Monitoring (Bunola Substation - Wilson Terminal)</i>
[REDACTED]
[REDACTED]
[REDACTED]

<i>Protection and Communication/Monitoring (Bunola Substation - Mitchell Terminal)</i>
[REDACTED]
[REDACTED]
[REDACTED]

<i>Protection and Communication/Monitoring (Bunola Substation - Springdale Terminal)</i>
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

FirstEnergy Bunola 138 kV Substation Greenfield Project
Company Evaluation and Constructability Information

<i>Protection and Communication/Monitoring (Bunola Substation - Yukon Terminal)</i>
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

<i>Protection and Communication/Monitoring (Springdale Substation - Bunola Terminal)</i>
[REDACTED]
[REDACTED]

<i>Protection and Communication/Monitoring (Yukon Substation - Bunola Terminal)</i>
[REDACTED]
[REDACTED]

<i>Protection and Communication/Monitoring (Bunola Substation)</i>
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Construction Outage Plan

The forecasted duration of the project is 39 months. The exact facility outage duration(s) will be determined during detailed engineering and outage coordination.

E. Project Component Cost Estimates

Cost Estimate Table – Bunola 138 kV Project

Description	Total Cost
Bunola Substation Construct 4 Breaker 138 kV Ring Bus Remote End Relay Upgrades (Springdale and Yukon)	██████████
138 kV Line Loop Loop in the Mitchell – Wilson 138 kV Line into Bunola Substation	██████████
138 kV Double Circuit Line Construct 2.43 miles of new double circuit 138 kV line with 1024 ACAR Reconductor 1.7 Miles of 336 ACSR with 1024 ACAR on Wycoff Jct-Wycoff section of exiting Springdale– Wycoff Jct–Yukon 138 kV line Install 1.7 Miles of 1024 ACAR conductor on the open position of the Wycoff Jct–Wycoff 138 kV line	██████████

Total Cost \$23,402,321

Cost Breakdown

██████████		██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████
██████████	██████████	██████████

*Note All Values Rounded Up

Rates

██████████		██████████	██████████
██████████	██████████	██████████	██████████
██████████	██████████		
██████████	██████████		
██████████	██████████		
██████████	██████████		

FirstEnergy Bunola 138 kV Substation Greenfield Project
Company Evaluation and Constructability Information

Yearly Cash Flow

Description of Cost	Yearly Cash Flow				
	2019	2020	2021	2022	Total
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	\$23,402,321

*Note All Values Rounded Up

Estimated Monthly AFUDC

Estimated Monthly AFUDC													
Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

*Note All Values Rounded Up

Assumptions

The following assumptions were made for the proposed Bunola Project:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

F. Schedule

Listed below is the timeline for construction of the Bunola Project. The estimated project timeline is 39 months.

Description	Activity	Start	Finish
Bunola Substation Construction	Engineering	████████	████████
	Below Grade Construction	████████	████████
	Above Grade Construction	████████	████████
	Protection Specifications	████████	
	Major Equipment	████████	
	In Service	████████	
Double Circuit 138 kV Line Construction	Engineering	████████	████████
	Above Grade Construction	████████	████████
	Siting Engineering	████████	████████
	ROW Engineering	████████	████████
	Major Equipment	████████	
	In Service	████████	
138 kV Line Loop	Engineering	████████	████████
	Above Grade Construction	████████	████████
	Siting Engineering	████████	████████
	ROW Engineering	████████	████████
	Major Equipment	████████	
	In Service	████████	6/1/2022

The anticipated schedule for the design and construction of the connection facilities and system modifications is estimated to be 39 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.

G. On-going Transmission Facility Items

Operational Plan

The proposed Bunola Project will be operated from FirstEnergy's "FE South" control center.

Maintenance Plan

The Bunola Project facilities will be maintained consistent with FirstEnergy's existing maintenance practices.