GOVERNMENT OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: OPTIMIZATION PROCEEDING OF MINIGRID TRANSMISSION AND DISTRIBUTION INVESTMENTS	**CASE NO**.: NEPR-MI-2020-0016 **SUBJECT**: Responses to Appendix B

UPDATED RESPONSE TO QUESTION 2 OF APPENDIX B

COMES NOW the Puerto Rico Electric Power Authority through its legal representation and respectfully submits and prays as follows:

1. On December 22, 2020, the Energy Bureau of the Public Service Regulatory Board (the "Energy Bureau") entered a Resolution and Order initiating the captioned proceeding (the "Order"). The Order had three attachments with questions directed to the Puerto Rico Electric Power Authority and stakeholders. The Energy Bureau directed the Puerto Rico Electric Power Authority (the "Authority") to, within fifteen (15) days of notice of the Order, file the responses to the questions listed in Appendix B of the Order.

2. In compliance with the Order, on January 7, 2021, the Authority filed the responses to Appendix B. *See The Puerto Rico Electric Power Authority's Responses to Appendix B of the Resolution and Order Entered on December 22, 2020* (the "Responses to Appendix B").

3. Because of a clerical mistake, the Authority did not attach to the Motion the file that is responsive to the Question 2 of Appendix B. Therefore, on January 15, 2021, the Authority filed *Motion to Clarify Information Submitted on January 7, 2021 and to Reiterate Request for Confidential Treatment.* With the motion the Authority presented to the Energy Bureau the file responsive to Question 2 of Appendix B.

4. The Authority has updated the file that was presented in response to Question 2 of Appendix B. The updated file is included as Attachment A to this motion.

RESPECTFULLY SUBMITTED.

In San Juan Puerto Rico, this 22nd day of January 2021.

s/ Katiuska Bolaños-Lugo
Katiuska Bolaños-Lugo
kbolanos@diazvaz.law
TSPR No. 18888

DÍAZ & VÁZQUEZ LAW FIRM, P.S.C.
290 Jesús T. Piñero Ave.
Oriental Tower, Suite 1105
San Juan, PR 00918
Tel. (787) 395-7133
Fax. (787) 497-9664

Updated Response to Question 2

Revised Cost Estimates per 10 Yer Plan (Class 5 Estimates): Assets listed in IRP Exhibits 2-85 to 2-93

Minigrid Transmission System Required Investment			
Item	**Description**	**Cost ($M)**	**Notes**
1	**Controllers & SCADA: 8 Minigrids**	**$ 6.75**	***No change in estimate from IRP***
2	**115 kV Transmission system investment**	**$ 2,863.71**	**Class 5 Cost Estimates: Please refer to corresponding tab**
	2a. Existing Lines to Harden:	$ 447.44	List of 24 Projects ~198 miles from IRP Ex 2-11
	2b. New Lines (OH & UG):	$ 1,462.17	List of 16 Projects ~141 miles from IRP Ex 2-09
	2c. Existing Stations to Harden: 43 Projects	$ 954.10	List of Stations per IRP Ex 2-12
3	**38 kV Transmission system investment**	**$ 5,540.51**	**Class 5 Cost Estimates: Please refer to corresponding tab**
	3a. Existing Lines to Harden:	$ 476.97	List of ~241 miles per IRP Ex 24, 36 ,44 ,52, 62, 71, 84
	3b. New Lines (OH & UG):	$ 4,388.65	List of ~318 miles per IRP Ex 23, 35, 43, 51, 61, 69, 83
	3c. New Stations & Harden to Existing Stations:	$ 674.90	List of Stations per IRP Ex 24, 36 ,44 ,52, 62, 71, 84

$ 8,410.97

Notes

1 A class 5 cost estimate is one that is prepared at an early stage in the project development process and is expected, based on industry standards, to range from 50% below to 100% above the actual final project cost. Leading industry practice is to revise estimates, so they become more accurate as engineering design progresses and project requirements are solidified.

2 PREPA will begin in Q1 2021 performing field assessment and A&E design on T&D assets. Once completed, PREPA can provide more accurate estimates

Per Exhibit 2-11: New Lines (OH & UG): 24 Projects ~ 198 miles				
ID	Project	Miles	Cost Estimate: 10 YR PLAN (M$)	M$/mi
1	Reconstruction Line 37800 Cayey TC - Caguas TC @1192.5 kcmil ACSR Bunting	12.25	$ 25.13	$ 2.05
2	Reconstruction Line 36300 Maunabo TC - Juan Martin Sect. @1192.5 kcmil ACSR Bunting	4.86	$ 12.15	$ 2.50
3	Line 37800 Jobos TC - Cayey TC @1192.5 kcmil ACSR Bunting	15.32	$ 26.87	$ 1.75
4	Reconstruction Line 36200 Monacillo TC - Juncos TC @1192.5 kcmil ACSR Bunting	20.11	$ 42.74	$ 2.13
5	Reconstruction Line 39100 Cambalache TC - Hatillo TC @1192.5 kcmil ACSR Bunting	6.64	$ 14.05	$ 2.12
6	Reconstruction Line 37400 Bayamon TC - Hogar Crea Sub. - H. Tejas TC - Candelaria Arena Sub. - Dorado TC @1192.5 kcmil ACSR Bunting	10.23	$ 25.58	$ 2.50
7	Reconstruction Line 37500 Bayamón TC - Rio Bayamón Sect. - Grana Substations @ 1192.5 kcmil ACSR Bunting	2.36	$ 5.90	$ 2.50
8	Reconstruction Line 41500 Dorado TC - Bo. Piñas GIS @1192.5 kcmil ACSR Bunting	7.54	$ 14.22	$ 1.89
9	Reconstruction Line 36100 Bayamón TC - Caná Sect. - Bo. Piñas GIS @1192.5 kcmil ACSR Bunting	9.5	$ 23.75	$ 2.50
10	Reconstruction Line 36800 S. Llana TC to Canóvanas TC@1192.5 kcmil ACSR Bunting	7.76	$ 15.05	$ 1.94
11	Reconstruction Line 41200 S. Llana TC to Canóvanas TC@1192.5 kcmil ACSR Bunting	7.76	$ 14.76	$ 1.90
12	Reconstruction Line 37800 Monacillo TC - Buen Pastor TC @1192.5 kcmil ACSR Bunting	4.27	$ 11.03	$ 2.58
13	Reconstruction Line 37900 Sabana Llana TC - Encantada Sub. - Conquistador Sub. @1192.5 kcmil ACSR Bunting	5.99	$ 14.98	$ 2.50
14	Reconstruction Line 37100 C.Sur - Guánica TC@1192.5 kcmil ACSR Bunting	11.5	$ 28.75	$ 2.50
15	Reconstruction Line 36700 Mayaguez Planta - Alturas de Mayaguez - Mayaguez TC@1192.5 kcmil ACSR Bunting	3.46	$ 8.65	$ 2.50
16	Reconstruction Line 37200 Mayaguez Planta - Mayaguez TC@1192.5 kcmil ACSR Bunting	3.46	$ 8.65	$ 2.50
17	Reconstruction Line 37200 Mayaguez TC - Añasco TC@1192.5 kcmil ACSR Bunting	4.04	$ 10.10	$ 2.50
18	Reconstruction Line 39800 Mayaguez Planta - Acacias TC@1192.5 kcmil ACSR Bunting	15	$ 29.09	$ 1.94
19	Reconstruction Line 36900 C.Sur - Canas TC - Ponce TC @1192.5 kcmil ACSR Bunting	10.38	$ 21.96	$ 2.12
20	Reconstruction Line 37000 C.Sur - Ponce TC @1192.5 kcmil ACSR Bunting	11	$ 23.29	$ 2.12
21	Reconstruction Line 40300 Aguirre - Santa Isabel TC - Ponce TC @1192.5 kcmil ACSR Bunting	17.57	$ 56.18	$ 3.20
22	Line 38900 M. Peña GIS - Berwind GIS Relocation/Hardening @1192.5 kcmil ACSR	4.36	$ 9.37	$ 2.15
23	Line 38900 Berwind GIS - Parque Escorial Relocation/Hardening @1192.5 kcmil ACSR	1.4	$ 3.25	$ 2.32
24	Line 38900 Parque Escorial - Sabana Llana Relocation/Hardening @1192.5 kcmil ACSR	1	$ 1.96	$ 1.96
		197.76	**$ 447.44**	

Cost per mile ($M/mi) from 10 Yr Plan (Class 5) considers that a line will have both segments to be hardened & segments to be rebuilt. It also considers terrain adjustement: urban & rural routing

Per Exhibit 2-9: New Lines (OH & UG): 16 Projects ~ 141 miles				
ID	**Project**	**Miles**	**Cost Estimate: 10 YR PLAN (M$)**	**M$/mi**
1	New 115 kV Underground Circuit Vega Baja TC – Manati TC @2750 kcmil Cu XLPE	6.78	$ 98.95	$ 14.59
2	New 115 kV Underground Circuit Cambalache TC – Barceloneta TC @2750 kcmil Cu XLPE	8.46	$ 123.46	$ 14.59
3	New 115 kV Underground Circuit Palo Seco Steam Plant –Hato Tejas TC - Dorado TC @2750 kcmil Cu	10.88	$ 158.78	$ 14.59
4	New Underground Line 115 kV Yabucoa TC- Humacao TC @ 2750 kcmil Cu XLPE	2.50	$ 32.29	$ 12.92
5	Underground 115 kV Line Yabucoa TC - Sun Oil - Juan Martin Sect @ 2750 kcmil Cu	5.12	$ 74.72	$ 14.59
6	New 115 kV Underground Circuit Juncos TC – Caguas TC- Bairoa TC @2750 kcmil Cu XLPE	9.17	$ 118.43	$ 12.92
7	New 115 kV Underground Circuit Humacao TC - Juncos TC @ 2750 kcmil Cu XLPE	10.60	$ 136.90	$ 12.92
8	New 115 kV Underground Circuit Daguao TC – Fajardo TC@ 2750 kcmil Cu XLPE (manhole to be	10.16	$ 148.32	$ 14.60
9	New 115 kV Underground Circuit Canóvanas TC – Palmer TC@2750 kcmilCu XLPE	11.00	$ 160.53	$ 14.59
10	Line 40500 extension to Interconnect Venezuela TC GIS @2750 kcmil Cu XLPE	0.68	$ 8.79	$ 12.92
11	New Underground 115 kV Line Martin Peña GIS - Berwind TC @ 2750 kcmil Cu XLPE	6.60	$ 85.24	$ 12.92
12	New Underground 115 kV Line Sabana Llana TC- Berwind TC @ 2750 kcmil Cu XLPE	2.70	$ 34.87	$ 12.92
13	New 115 kV Underground Circuit Caguas TC/Bairoa TC – Monacillo TC @2750 kcmil Cu XLPE	10.59	$ 154.55	$ 14.59
14	Construction of 115 kV Line 37800 for Bairoa TC @ 1192.5 kcmil ACSR	1.55	$ 4.29	$ 2.77
15	New 115 kV Line Hatillo TC - Mora TC @1192.5 kcmil ACSR Bunting	17.33	$ 47.93	$ 2.77
16	New 115 kV Line Costa Sur - Dos Bocas HP @1192.5 kcmil ACSR Bunting @ 230 kV	26.80	$ 74.11	$ 2.77
		140.92	**$ 1,462.17**	

	Per Exhibit 2-12: 115 kV Stations to Harden- 43 Projects		
Item No.	**Project Description**	**Technical Justification**	**Cost Estimate (Class 5- $M)**
1	Manati TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	20
2	Cambalache - TC 115 kV and 46 kV Switchyards	Minigrid Main Backbone	23.5
3	Dos Bocas HP - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	19.1
4	Barceloneta TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	20
5	Mora TC Gas Insulated Substation 115 kV and 46 kV Switchyards	Minigrid Main Backbone	11.5
6	Bayamon TC - 230 kV, 115 kV and 46 kV Switchyards	Minigrid Main Backbone	65.7
7	Vega Baja TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	20.5
8	Dorado TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	27.1
9	Juncos TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	25.5
10	Caguas TC -115 kV and 46 kV Switchyards	Minigrid Main Backbone	29.4
11	Rio Blanco HP - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	35.8
12	Cayey TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	16.2
13	Humacao TC - Hardening and Expansion 115 kV and 46 kV	Minigrid Main Backbone	23.9
14	Canóvanas TC - 115 kV and 46 kV Switchyards (includes 46 kV bus extension	Minigrid Main Backbone	9.8
15	Sabana Llana TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	34.7
16	Fajardo TC - 115 kV and 46 kV. Extension of 46 kV Bus for New UG to Fajardo Hospital,	Minigrid Main Backbone	19.4
17	Daguao TC - 115 kV and 46 kV Switchyards	Minigrid Main Backbone	18.4
18	Victoria TC - 115 kV and 38 kV Switchyards	Minigrid Main Backbone	31.1
19	San Sebastián TC - 115 kV and 38 kV Switchyards	Minigrid Main Backbone	17.8
20	Mayaguez GP - 115 kV and 38 kV Switchyards	Minigrid Main Backbone	23.9
21	Acacias TC - 115 kV and 38 kV Switchyards (includes extension for new underground	Minigrid Main Backbone	40
22	San Germán TC - 115 kV and 46 kV Switchyard	Minigrid Main Backbone	12.7
23	Costa Sur Substation on 230 kV,115 kV and 46kV Switchyards (in addition to hardening should at least include protection and	Minigrid Main Backbone	93.3
24	Aguirre 230 kV, 115 kV and 46 kV Switchyards	Minigrid Main Backbone	42.2
25	Maunabo TC Hardening/Reconstruction 115 kV and 46 kV Switchyards	Minigrid Main Backbone	4.5
26	Jobos TC 115 kV and 46 kV Gas Insulated Substation (includes new 230/115 kV	Minigrid Main Backbone	27.6
27	Ponce TC 115 kV and 46 kV Switchyards GIS	Minigrid Main Backbone	17.1
28	San Juan GIS 115 kV Switchyard	Minigrid Main Backbone	3.5
29	Isla Grande TC - Hardening GIS 115 kV and 46 kV Switchgear	Minigrid Main Backbone	3.5
30	Monacillo TC - 115 kV, 46 kV and 13.2 kV Switchyards	Minigrid Main Backbone	49

31	Hato Rey TC - 115 kV, 46 kV and 13.2 kV Switchyards	Minigrid Main Backbone	29.2
32	Viaducto TC - 115 kV and 46 kV Swichyards	Minigrid Main Backbone	36.3
33	Berwind TC - 115 kV, 46 kV and 13.2 kV Switchyards	Minigrid Main Backbone	14.8
34	New Venezuela TC Gas Insulated Substation for 115 kV, 46 kV and	Minigrid Main Backbone	4.4
35	Yabucoa TC - 115 kV extension includes provision for 115 kV underground circuits	Minigrid Main Backbone	21.5
36	Mayaguez TC - Hardening/Reconstruction 230 kV and 115 kV Switchyards	Minigrid Main Backbone	14.2
37	Comerio TC - Hardening/Extension 115 kV and 46 kV Switchyards (includes extension	Minigrid Main Backbone	12.4
38	Palmer TC - Hardening/Reconstruction 115 kV and 46 kV Switchyards	Minigrid Main Backbone	15.5
39	Añasco TC - Hardening/Reconstruction 115 kV Switchyard	Minigrid Main Backbone	3
40	Rio Bayamon Sect - 115kv Hardening/Reconstruction	Minigrid Main Backbone	8.3
41	Crea (Hogar Crea) 115 kV Sect.	Minigrid Main Backbone	3.6
42	Candelaria Arenas 115 kV Sect.	Minigrid Main Backbone	2.8
43	Juan Martin 115 kV Sect.	Minigrid Main Backbone	1.4

$	**954.10**

Per Exhibits 2-24 to 2-84: Hardening OH ~ 241 miles

ID	Region	Miles (total)	Cost Estimate: 10 YR PLAN (M$)	NOTES
1&2	Mayaguez	24.05	$ 47.48	IRP Exhibit 2-24
3&4	Caguas/Cayey	75.3	$ 148.66	IRP Exhibit 2-36
5	Carolina	4.48	$ 8.84	IRP Exhibit 2-44
6	Arecibo	63.81	$ 125.97	IRP Exhibit 2-52
7	San Juan	58.61	$ 115.71	IRP Exhibit 2-62
	Bayamon	12.91	$ 25.49	IRP Exhibit 2-71
8	Ponce	2.44	$ 4.82	IRP Exhibit 2-84
Total c.miles:		**241.6**	**$ 476.97**	

Hardening OH (M$/mi)
$ 1.97

Cost per mile ($M/mi) from 10 Yr Plan (Class 5) considers that a line will have both segments to be hardened & segments to be rebuilt. It also considers terrain adjustement: urban & rural routing

Per Exhibits 2-23 to 2-83: New Lines (OH & UG): ~ 319 miles

ID	Region	Miles (total)		Cost Estimate: 10 YR PLAN (M$)	NOTES
		OH	UG		
1&2	Mayaguez	71.67		$ 799.73	IRP Exhibit 2-23
		21.33	50.34		
3&4	Caguas/Cayey	43.81		$ 532.11	IRP Exhibit 2-35
		9.73	34.08		
5	Carolina	26.56		$ 399.73	IRP Exhibit 2-43
		0	26.56		
6	Arecibo	23.05		$ 346.90	IRP Exhibit 2-51
		0	23.05		
7	San Juan	31.11		$ 468.21	IRP Exhibit 2-61
		0	31.11		
	Bayamon	27.7		$ 416.89	IRP Exhibit 2-69
		0	27.7		
8	Ponce	94.69		$ 1,425.08	IRP Exhibit 2-83
		0	94.69		
Total c.miles:		**318.59**		**$ 4,388.65**	

New OH (M$/mi)	New UG (M$/mi)
$ 1.974	$ 15.05

38 kV Stations to Harden- per IRP Ex 24, 36 ,44 ,52, 62, 71, 84

Item No.	Substation Name	Region	Cost Estimate (Class 5- $M)	IRP Exhibit No.
1	Aguadilla D. H. 38kV Sect. Hardening/Expansion/Reconstruction	Mayaguez	1.1	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
2	Añasco TC 38 kV Switchyard (includes extension to interconnect new underground circuits to Mayaguez TC	Mayaguez	1.1	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
3	Once de Agosto 46 kV Sect. Switchyard	Mayaguez	6.8	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
4	McKinley 38 kV Switchyard (includes new underground circuits from Mayaguez GP, 4 Hermanos Sect., 1200s	Mayaguez	10.8	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
5	4 Hermanos Sect. 38 kV Switchyard (includes extension to new underground circuits from McKinely GIS, 1200s	Mayaguez	8.9	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
6	Leon Sect. 38 kV Switchyard (includes extension to new underground circuits from Mayaguez GP, Centro Med	Mayaguez	10	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
7	New Moca Pueblo 46 kV Sect. (to provide interconnection to 2500s, substations and underground	Mayaguez	12.8	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
8	San Germán 46 kV Sect. (includes extension for 2 new undergrounds: San Germán TC and Lajas Sub., also	Mayaguez	3.2	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
9	New Lajas 46 kV Sect. (includes breakers for underground from San Germán, for Lajas Subs. and for	Mayaguez	6.3	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
10	New Boqueron 46 kV Sect.	Mayaguez	7.8	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
11	New Lares 46 kV Sect. (provides interconnection to line 1900 from Dos Bocas (NO to avoid 3 terminal), line 1900	Mayaguez	10.3	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
12	New Sabana Grande 46 kV Sect. (should provide breakers for line 1500 to Susúa Baja Sect., line 1200 to	Mayaguez	27	Exhibit 2-24: New Substations/Switchyards and Infrastructure Hardening in Mayaguez
13	Humacao Zona Industrial Sect. (2-12600's, new lines to Humacao Pueblo& Humacao TC, 2 ckts internal loops)	Caguas/Cayey	10.5	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
14	Aguas Buenas 46 kV Sect.	Caguas/Cayey	3.2	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
15	Las Piedras Sect. (including 4 extensions for Las Piedras new substation, new underground 46 kV circuit from	Caguas/Cayey	7.2	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
16	Naguabo 46 kV Sect.	Caguas/Cayey	6.3	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
17	Humacao Pueblo Sect. GIS (require extension to interconnect new underground line from Humacao	Caguas/Cayey	1.1	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
18	Gautier Benitez 46 kV Sect. GIS	Caguas/Cayey	7.3	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
19	Yabucoa Pueblo 46 kV Sect. GIS (should provide interconnection to line 3700 to Humacao TC, line 3700	Caguas/Cayey	3.4	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
20	Gurabo 46 kV Sect.	Caguas/Cayey	6.9	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
21	San Lorenzo 46 kV Sect.	Caguas/Cayey	9.1	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
22	Cidra Pueblo - 46 kV Sect.	Caguas/Cayey	3	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
23	COMSAT 46 kV Sect. - includes new undergound to Cayey TC	Caguas/Cayey	4.7	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
24	Aibonito 46 kV Sect. - includes new undergound to Hospital Menonita ACB 4865 and interconnections for	Caguas/Cayey	8.2	Exhibit 2-36: New Substations/Switchyards and Infrastructure Hardening in Caguas and Cayey
25	Carolina New 46 kV Sect. - (Eli Lilly Zone) (L3100's, Barrazas, Internal loops)	Carolina	9.1	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
26	New Vistamar 46 kV Sect. 38 kV Switchyard Interconnection of Critical Loads	Carolina	7.9	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
27	Villamar Sect. 46 kV Gas Insulated Substation (includes underground from M. Peña GIS)	Carolina	6.8	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
28	Los Angeles Sect. 46 kV Gas Insulated Substation (includes undergrounds to Vistamar Sect., Berwind TC	Carolina	3	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
29	Canóvanas 46 kV Sect. Gas Insulated Substation	Carolina	2.3	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
30	Luquillo 46 kV Gas Insulated Substation Gas Insulated Substation Interconnection of Critical Loads	Carolina	6.3	Exhibit 2-44: New Substations/Switchyards and Infrastructure Hardening in Carolina
31	Manati 46 kV Sect. GIS (includes breakers for 14700, 2200 to Manati TC, 2200 to Barceloneta TC, new	Arecibo	4.2	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
32	Hatillo 46 kV Sect. - include breakers for 2100 to Hatillo TC, 2100 to Camuy, 6900 to Mirador Azul Sect., 6900 to	Arecibo	23.3	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
33	Mirador Azul 46 kV Sect. Interconnection of Critical Loads	Arecibo	4.6	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
34	Camuy 46 kV Sect. GIS (include breakers for 2100 to Hatillo Sect., 2100 to	Arecibo	11	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
35	Quebradillas 46 kV Sect. GIS Gas Insulated Substation Interconnection of Critical Loads	Arecibo	2.3	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
36	Isabela Pueblo 46 kV Sect. GIS Gas Insulated Substation Interconnection of Critical Loads	Arecibo	8	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
37	Arecibo DH 46 kV Sect. includes expansion to interconnect 2 new underground circuits and new	Arecibo	6.1	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
38	New Charco Hondo 46 kV Sect. GIS (breakers for substation, line 2300 to Dos Bocas	Arecibo	10.1	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
39	New Dominguito 46 kV Sect. GIS (breakers for substation, line 2100 to Charco Hondo/Dos Bocas, line	Arecibo	7.2	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
40	New Utuado 46 kV Sect. GIS (provides interconnection to line 1900 from Dos Bocas	Arecibo	10.1	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
41	New Adjuntas 46 kV Sect. GIS (should provide breakers for interconnection of line 4700 from Canas TC, line	Arecibo	6.3	Exhibit 2-52: New Substations/Switchyards and Infrastructure Hardening in in Arecibo
42	Covadonga 46 kV Sect. GIS Gas Insulated Substation Reliability/Resiliency Zones	San Juan	7.7	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
43	San Juan Medical Center for 46 kV and 13.2 kV Switchyards	San Juan	15.7	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
44	New Trujillo Alto 46 kV Sect. (to provide interconnection to lines 3600's and 3100's from	San Juan	10	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
45	Crematorio 46 kV Sect. GIS (includes interconnection for 6800, 7500, 5900, new underground from San Juan SP	San Juan	13.9	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
46	Fonalledas Sect. 46 kV Gas Insulated Substation (provides interconnection to 8900's, distribution	San Juan	14	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
47	Las Lomas Sect. 46 kV GIS (includes interconnection for 3500's, 10100, 16400, substation and dedicated	San Juan	8.2	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
48	Santurce 46 kV Sect. GIS Gas Insulated Substation Interconnection of Critical Loads	San Juan	11	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
49	M. Peña GIS 46 kV Bus Extension (to interconnect Airport new underground) 38 kV Switchyard	San Juan	3	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
50	Baldrich Sect. 46 kV (including interconnection to new underground to Auxilio Mutuo) Gas Insulated	San Juan	8.9	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
51	Caparra 46 kV Sect.Hardening/Reconstruction. 38 kV Switchyard Interconnection of Critical Loads	San Juan	7.2	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
52	Cachete 46 kV Sect. Hardening - 38 kV Switchyard Interconnection of Critical Loads	San Juan	11.4	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
53	Juan Domingo 46 kV Sect. 38 kV Switchyard Reliability/Resiliency Zones	San Juan	4.1	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
54	Guaynabo 46 kV Sect. 38 kV Switchyard Reliability/Resiliency Zones	San Juan	6.2	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
55	Tres Monjitas 46 kV Sect. 38 kV Switchyard Reliability/Resiliency Zones	San Juan	5.4	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
56	Egozcue 46 kV Sect. 38 kV Switchyard Reliability/Resiliency Zones	San Juan	5.5	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
57	Jardines Metropolitano 46 kV - Hardening/Reconstruction TO 38 kV Switchyard	San Juan	3.4	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
58	Villamil 10610 Mini-Sect. 38 kV Switchyard Reliability/Resiliency Zones - Subst. 5006	San Juan	5.9	Exhibit 2-62: New Substations/Switchyards and Infrastructure Hardening in San Juan
59	New Breñas 46 kV Sect. 38 kV Switchyard - Subst. 9201	Bayamon	6.3	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
60	Bayamón Pueblo Sect. Gas Insulated Substation Gas Insulated Substation	Bayamon	9.2	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
61	Cataño 46 kV Sect. GIS Gas Insulated Substation - Subst. 1801	Bayamon	4.2	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
62	Guaraguao 46 kV Sect. GIS Gas Insulated Substation - Subst. 1707	Bayamon	8.6	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
63	Vega Alta 46 kV Sect. GIS Gas Insulated Substation - Subst. 9101/9105Bayamon	Bayamon	5.8	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
64	New Dorado Pueblo 46 kV Sect. GIS Gas Insulated Substation - Subst.	Bayamon	7.7	Exhibit 2-71: New Substations/Switchyards and Infrastructure Hardening in Bayamon
65	Juana Diaz TC 46 kV Sect. Extension/Hardening - Subst. 5802	Ponce	7	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
66	Pastillo 46 kV Sect. - Subst. 5801	Ponce	9.2	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
67	New Monte del Estado 46 kV Sect. GIS - Subs. 6303	Ponce	6.8	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
68	Patillas 46 kV Sect. GIS	Ponce	7.2	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
69		Ponce	6.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
70	Arroyo 46 kV Sect. GIS - Subst. 4101 Guayama 46 kV Sect. GIS - Subst. 4001	Ponce	4.1	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
71	Guayama Pueblo 46 kV Sect. GIS	Ponce	3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
72	Salinas Rural 46 kV Sect. GIS - Subst. 4501	Ponce	6.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
73	Salinas Urbano 46 kV Sect. - Subst. 4501	Ponce	8.7	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
74	Santa Isabel 46 kV Sect. Gas Insulated Substation - Subst. 4402	Ponce	4.2	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
75	Coamo Urbano 46 kV Sect. GIS - Subst. 4602	Ponce	8.2	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
76	Buena Vista 46 kV Sect. GIS - Subst. 5007	Ponce	8.5	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
77	La Rambla 46 kV Sect. GIS - Subst. 5003/5004	Ponce	7.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
78	Villa del Carmen 46 kV Sect. GIS - Subst. 5016	Ponce	6.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
79	New Juana Diaz Pueblo 46 kV Sect. GIS - Subst. 5802	Ponce	4.4	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
80	El Vigia 46 kV Sect. GIS - Subst. 5006	Ponce	2.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
81	Pampanos 46 kV Sect. GIS - Subst. 5005	Ponce	10.8	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
82	New Las Cucharas 46 kV Sect. GIS - Subst. 5081	Ponce	5.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
83	New Tallaboa 46 kV Sect. GIS - Subst. 5402	Ponce	5.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
84	Garzas 1 46 kV Sect. GIS	Ponce	12.7	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
85	New Peñuelas 46 kV Sect. GIS - Subst. 5401	Ponce	7.9	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
86	New Guayanilla Pueblo 46 kV Sect. GIS	Ponce	7.2	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
87	New Yauco Pueblo 1 46 kV Sect. GIS - Subst 5302	Ponce	6.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
88	New Yauco H.P. No 2 46 kV Sect. GIS - Subst. 5303	Ponce	11	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
89	New Yauco H.P. No 1 46 kV Sect. GIS - Subst. 5301	Ponce	7.6	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
90	New Yauco Pueblo 2 46 kV Sect. GIS - Subst. 5304	Ponce	6.3	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
91	New Susúa Baja 46 kV Sect. GIS	Ponce	5.8	Exhibit 2-84: New Substations/Switchyards and Infrastructure Hardening in Ponce
			$ 674.90	