

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

<del>NEPR</del>  <b>Received:</b>  <b>May 12, 2021</b>  <b>9:38 PM</b>
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**IN RE:** THE PERFORMANCE OF THE  
PUERTO RICO ELECTRIC POWER  
AUTHORITY

**CASE NO.:** NEPR-MI-2019-0007

**SUBJECT:** Substitute Exhibit A; Additional  
Metrics.

**MOTION TO SUBSTITUTE EXHIBIT A OF MOTION FILED ON APRIL 29, 2021**

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

1. On April 8, 2021, the Puerto Rico Energy Bureau of the Public Service Regulatory Board (the “Energy Bureau”) entered *Resolution and Order* directing the Puerto Rico Electric Power Authority (PREPA) to, among other things, provide additional information regarding the establishment of PREPA’s performance baseline (the “Order”).

2. On April 29, 2021, PREPA filed a *Motion to Supplement Additional Performance Metrics in Compliance with Resolution and Order Entered on April 8, 2021* before the Energy Bureau (the “Motion to Supplement”). With the Motion to Supplement, PREPA submitted its reliability metrics in compliance with Section V.A. (2) of the Order. Motion to Supplement, Exhibit A.

3. PREPA hereby requests leave to file a revised version of Exhibit A which provides additional information to the Energy Bureau which in turn, provides a more detailed record. The revised Exhibit A includes an example of the mathematical calculations used to determine Tmed IEEE 1366, as well as an index of SAIDI and SAIFI indicators divided into PREPA’s districts and regions for fiscal year 2018-2019. Exhibit A.

WHEREFORE, PREPA respectfully requests that the Energy Bureau take notice of this motion and accept the revised version of Exhibit A of the Motion to Supplement.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 12<sup>th</sup> day of May 2021.

*s/ Joannely Marrero-Cruz*  
Joannely Marrero-Cruz  
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**CERTIFICATE OF SERVICE**

It is hereby certified that, on this same date, I have filed the above motion with the Clerk of the Energy Bureau using the Energy Bureau's Electronic Filing System, at the following address: <http://radicacion.energia.pr.gov> It is further certified that I have sent a copy to [margarita.mercado@us.dlapiper.com](mailto:margarita.mercado@us.dlapiper.com) and [mmercado@mercado-echegaray-law.com](mailto:mmercado@mercado-echegaray-law.com).

In San Juan, Puerto Rico, this 12<sup>th</sup> day of May 2021.

*s/ Joannely Marrero-Cruz*  
Joannely Marrero-Cruz

Exhibit A



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May 12, 2021

In compliance with the Energy Bureau’s Part V.A of the Resolution and Order entered on April 8, 2021, PREPA has revised and restated the reliability metrics and included all sustained outage cause codes excluding interruptions from Tmed, Planned and Generation outages. Transmission and Substation outages will be included on reports to be submitted prospectively to the Energy Bureau.

Cause Codes included and/or excluded for the analysis:

Cause Code	Related Outage Tab	ANALYSYS
VIA LIBRE PROGRAMADA - DISTRIBUCION	Planned	Exclude
RELEVO DE CARGA AUTOMATICO	Generation	Exclude
VIA LIBRE A SOLICITUD DEL CLIENTE	Planned	Exclude
LINEA DE TRANSMISION	Distribution Transmission Substation	Include
NO SE REPORTO CAUSA	Distribution Transmission Substation	Include
ESTRUCTURA AVERIADA	Distribution Transmission Substation	Include
CONDUCTOR ROTO, ABIERTO O CRUZADO	Distribution Transmission Substation	Include
DESGANCHE	Distribution Transmission Substation	Include
PARARRAYOS DEFECTUOSO	Distribution Transmission Substation	Include
AISLADOR ROTO, PARTIDO O SAFADO	Distribution Transmission Substation	Include
EMPALME O TERMINACION SOTERRADA AVERIADA	Distribution Transmission Substation	Include
CABLE SOTERRADO AVERIADO	Distribution Transmission Substation	Include
DESCONECTIVO DEFECTUOSO	Distribution Transmission Substation	Include
HERRAJE ROTO O PODRIDO	Distribution Transmission Substation	Include
CAJA PRIMARIA DEFECTUOSA O QUEMADA	Distribution Transmission Substation	Include
UNIDAD SECCIONADORA (SWITCHING UNIT)	Distribution Transmission Substation	Include
TRANSFORMADOR AVERIADO	Distribution Transmission Substation	Include
BREAKER DEFECTUOSO O NO OPERA	Distribution Transmission Substation	Include
OTRAS CAUSAS(CERTIFICAR)	Distribution Transmission Substation	Include
ERROR HUMANO	Distribution Transmission Substation	Include
ANIMAL U OBJETO EXTRAÑO	Distribution Transmission Substation	Include
SOBRECARGA	Distribution Transmission Substation	Include
DISTURBIO ATMOSFERICO	Distribution Transmission Substation	Include
FUEGO	Distribution Transmission Substation	Include
VIA LIBRE PROGRAMADA - TRANSMISION	Distribution Transmission Substation	Include
VIA LIBRE DE EMERGENCIA - DISTRIBUCION	Distribution Transmission Substation	Include
VIA LIBRE DE EMERGENCIA - TRANSMISION	Distribution Transmission Substation	Include
PROTECCION DEFECTUOSA	Distribution Transmission Substation	Include
EQUIPO DE CONTROL DEFECTUOSO	Distribution Transmission Substation	Include
REMOCION DE ASBESTO O CAJAS DE ACEITE	Distribution Transmission Substation	Include
LINEA DE TRANSMISION 38KV	Distribution Transmission Substation	Include
LINEA DE TRANSMISION 115KV	Distribution Transmission Substation	Include



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<b>SECUNDARIA/CONDUCTOR ROTO, ABIERTO O CRU</b>	Distribution Transmission Substation	Include
<b>SECUNDARIA/ESTRUCTURA AVERIADA</b>	Distribution Transmission Substation	Include
<b>SECUNDARIA/DESGANCHE</b>	Distribution Transmission Substation	Include
<b>POWER TRANSFORMER AVERIADO</b>	Distribution Transmission Substation	Include
<b>LINEA DE TRANSMISION/MAL TIEMPO/WET ASH</b>	Distribution Transmission Substation	Include
<b>LINEA DE TRANSMISION/ANIMAL U OBJETO EXT</b>	Distribution Transmission Substation	Include
<b>RELEVO DE CARGA POR CONTINGENCIA</b>	Generation	Exclude
<b>RELEVO DE CARGA PROGRAMADO</b>	Generation	Exclude
<b>MAL TIEMPO/RAYOS/WET ASH</b>	Distribution Transmission Substation	Include
<b>SUBIR/BAJAR TAP</b>	Planned	Exclude

PREPA considers a sustained interruption any interruption that lasts more than 5 minutes as established on IEEE 1366. For Mayor Event threshold PREPA uses the 2.5 Beta Method as defined on IEEE 1366-2012 which establishes the following:

- *Assemble the five most recent years of historical values of SAIDI/day. If less than five years of data is available, use as much as is available.*
- *Discard any day in the data set that has a SAIDI/Day of zero.*
- *Find the natural logarithm of each value in the data set.*
- *Compute the average ( $\alpha$ , or Alpha) and standard deviation ( $\beta$  or Beta) of the natural logarithms computed in step 3.*
- *Compute the threshold  $TMED = \exp(\text{Alpha} + 2.5 * \text{Beta})$ .*
- *Any day in the next year with SAIDI > TMED is a major event day.*

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The mathematical calculation to determined Tmed IEEE 1366 example as follow:

**Table 2—One month of daily SAIDI and ln (SAIDI/day) data**

Date	SAIDI/day (min)	ln (SAIDI/day)	Date	SAIDI/day (min)	ln (SAIDI/day)
12/1/93	26.974	3.295	12/17/93	0.329	-1.112
12/2/93	0.956	-0.046	12/18/93	0	this day is not included in the calculations since no customers were interrupted.
12/3/93	0.131	-2.033	12/19/93	0.281	-1.268
12/4/93	1.292	0.256	12/20/93	1.810	0.593
12/5/93	4.250	1.447	12/21/93	0.250	-1.388
12/6/93	0.119	-2.127	12/22/93	0.021	-3.876
12/7/93	0.130	-2.042	12/23/93	1.233	0.209
12/8/93	12.883	2.556	12/24/93	0.996	-0.004
12/9/93	0.226	-1.487	12/25/93	0.162	-1.818
12/10/93	13.864	2.629	12/26/93	0.288	-1.244
12/11/93	0.015	-4.232	12/27/93	0.535	-0.626
12/12/93	1.788	0.581	12/28/93	0.291	-1.234
12/13/93	0.410	-0.891	12/29/93	0.600	-0.511
12/14/93	0.007	-4.967	12/30/93	1.750	0.560
12/15/93	1.124	0.117	12/31/93	3.622	1.287
12/16/93	1.951	0.668			

NOTE—The SAIDI/day for 12/18 is zero. The natural logarithm of zero is undefined. Therefore, 12/18/93 is note considered during the analysis

- The value of  $\alpha$ , the log-average, is the average of the natural logs, and equals -0.555 in this case.
- The value of  $\beta$ , the log-standard deviation, is the standard deviation of the natural logs, and equals 1.90 in this example.
- The value of  $\alpha + 2.5 \beta$  is 4.20.

The threshold value TMED is calculated by  $e^{4.20}$  and equals 66.69 SAIDI per day. This value is used to evaluate the future time period (e.g., the next year).

PREPA has collected data from May 1, 2018 to December 31, 2020 (2 years and 7 months), data before those dates is corrupted and useless for the analysis, data considered for the analysis will exclude Generation and Planned outages. Taking this into consideration new Tmed threshold considering the past 2 years and 7 months will be 16.66. With new Tmed and Transmission and Substation inclusion, PREPA’s index for fiscal years 2018 to 2020 would be (Excluding Major Event):





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YEARS	SAIDI	SAIFI
<b>FY 2018-2019</b>	1170.65	10.005
<b>FY 2019-2020</b>	1242.50	10.600

District index for fiscal years 2018 to 2020 will be (Excluding Mayor Event):

<b>FY2018-2019</b>		
<b>DISTRITO</b>	<b>SAIDI</b>	<b>SAIFI</b>
<b>REGION: ARECIBO</b>		
<b>ARECIBO</b>	876.684	7.360503
<b>MANATI</b>	716.7412	6.024837
<b>QUEBRADILLAS</b>	734.7418	5.221453
<b>UTUADO</b>	2483.33	16.72708
<b>REGION: BAYAMON</b>		
<b>BAYAMON</b>	742.9756	7.431271
<b>COROZAL</b>	900.4111	10.90689
<b>PALO SECO</b>	455.9399	4.854208
<b>VEGA BAJA</b>	1195.805	12.22713
<b>REGION: CAGUAS</b>		
<b>BARRANQUITAS</b>	1233.538	8.190734
<b>CAGUAS</b>	1248.316	7.569115
<b>CAYEY</b>	790.1886	6.270662
<b>HUMACAO</b>	1315.424	9.356407
<b>REGION: CAROLINA</b>		
<b>CANOVANAS</b>	947.703	8.998151
<b>CAROLINA</b>	913.807	9.585892
<b>FAJARDO</b>	963.2152	10.279
<b>REGION: MAYAGUEZ</b>		
<b>AGUADILLA</b>	1798.181	12.63503
<b>MAYAGÜEZ</b>	1574.004	12.05369
<b>SAN GERMAN</b>	1283.469	13.09298
<b>SAN SEBASTIAN</b>	1806.427	13.84475
<b>REGION: PONCE</b>		
<b>GUAYAMA</b>	874.1427	4.20833
<b>PONCE</b>	760.3399	4.974028
<b>SANTA ISABEL</b>	468.3556	3.277114
<b>YAUCO</b>	1580.051	8.965416
<b>REGION: SAN JUAN</b>		



**PO Box 364267 San Juan, Puerto Rico 00936-4267**

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<b>GUAYNABO</b>	1010.589	9.860378
<b>MONACILLOS</b>	1024.506	12.38714
<b>RIO PIEDRAS</b>	739.7122	6.631641

<b>FY2019-2020</b>		
<b>DISTRITO</b>	<b>SAIDI</b>	<b>SAIFI</b>
<b>REGION: ARECIBO</b>		
<b>ARECIBO</b>	4690.513	8.764369
<b>MANATI</b>	4758.688	8.064395
<b>QUEBRADILLAS</b>	5148.775	7.784785
<b>UTUADO</b>	7898.858	23.96678
<b>REGION: BAYAMON</b>		
<b>BAYAMON</b>	2535.59	9.764106
<b>COROZAL</b>	4625.044	10.22526
<b>PALO SECO</b>	2150.687	9.896391
<b>VEGA BAJA</b>	4100.432	9.009947
<b>REGION: CAGUAS</b>		
<b>BARRANQUITAS</b>	5026.481	10.79888
<b>CAGUAS</b>	4759.403	8.868937
<b>CAYEY</b>	4097.176	8.160667
<b>HUMACAO</b>	4889.954	12.61288
<b>REGION: CAROLINA</b>		
<b>CANOVANAS</b>	3675.801	8.990332
<b>CAROLINA</b>	3965.754	16.06832
<b>FAJARDO</b>	1684.026	7.684476
<b>REGION: MAYAGUEZ</b>		
<b>AGUADILLA</b>	5586.69	10.64229
<b>MAYAGÜEZ</b>	3920.992	18.86515
<b>SAN GERMAN</b>	4755.868	11.56881
<b>SAN SEBASTIAN</b>	6258.604	14.64126
<b>REGION: PONCE</b>		
<b>GUAYAMA</b>	2140.164	11.24505
<b>PONCE</b>	3682.765	9.197015
<b>SANTA ISABEL</b>	2637.958	7.424188
<b>YAUCO</b>	7790.122	10.27704
<b>REGION: SAN JUAN</b>		
<b>GUAYNABO</b>	4101.274	11.92525
<b>MONACILLOS</b>	3458.471	18.3117
<b>RIO PIEDRAS</b>	3498.32	8.501661



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