COMMONWEALTH OF PUERTO RICO
PUERTO RICO ENERGY COMMISSION

IN RE: ENERGY COMMISSION INVESTIGATION REGARDING THE STATE OF PUERTO RICO'S ELECTRIC SYSTEM AFTER HURRICANE MARIA	**CASE NO.: CEPR-IN-2017-0002** **Subject: Request for Public Comments.** **Issue:** Implementation of regulatory actions to facilitate the tasks of restoring electric service and encourage the deployment of new technologies.

COMMENTS BY THE AUTONOMOUS MUNICIPALITY OF BAYAMÓN IN RESPONSE TO REQUEST FOR PUBLIC COMMENTS

"The more history matters, the more worthwhile it is to invest in being informed before leaping."
Steve Isser, Electricity Restructuring in the United States - Markets and Policy from the 1978 Energy Act to the Present, p. 18 (2015)

TO THE HON. PUERTO RICO ENERGY COMMISSION:

COMES NOW the Autonomous Municipality of Bayamón ("AMB" or "BAYAMÓN"), thru the undersigned attorney and, in response to the Puerto Rico Energy Commission ("PREC" or "Commission") Request for Public Comments of November 10, 2017 ("RPC") respectfully states as follows:

I. PRELIMINARY STATEMENT

Electricity is crucial to modern society and economic activity.[1] "Maintaining energy security is of vital importance to society, because electricity infrastructure

[1] U.S. Dept. of Energy, *Staff Report to the Secretary on Electricity Markets and Energy Reliability*, p. 1, August, 2017, hereinafter, "DOE Staff Report", *Extreme Weather Events,* p. 98: "In October 2012, Superstorm Sandy caused large-scale flooding and wind damage in the Mid-Atlantic and Northeast, as well as blizzard conditions in the central and southern Appalachians. Three nuclear reactors totaling

powers consumers, businesses and other critical infrastructure such as the IT, health and food sectors."[2] [insert footnotes] Hurricane Sandy, which in November 2012 left more than 8 million people without electricity in the northeastern United States,[3] became a symbol of the need for designing and building resilient electricity generation and distribution systems that can withstand extreme weather events.

Electricity is particularly crucial to Puerto Rico, as its high cost remains one of the principal hindrances to the Commonwealth's economic recovery. Energy costs in Puerto Rico have been compared by a former International Monetary Fund chief economist as similar to those of less developed islands

Puerto Rico, a U.S. island-territory the size of Connecticut and smallest of the Caribbean's three Greater Antilles,[4] was hit during the early hours of September 20, 2017 by Category 4 Hurricane Maria. This occurred while the Island continued enmeshed in a debt crisis described as "daunting by any measure."[5] A fiscally troubled but functional island- territory, at least in terms of basic services, was—in the span of

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2,845 MW of capacity were shut down, and five operated at reduced levels due to disruptions in transmission infrastructure, reduced demand from distribution outages, and precautionary measures to protect equipment. The storm impacts significantly disrupted East Coast refining activity. Spectra Energy lost two natural gas compressor stations on its Texas Eastern Transmission pipeline in northern New Jersey due to the loss of commercial power and the failure of backup generation to operate as intended, which affected gas supply to upstream gas-fired power plants. New Jersey Natural Gas shut down part of its natural gas infrastructure serving Ocean and Monmouth counties, including Long Beach Island and the barrier islands from Bay Head to Seaside Park, with subsequent distribution line damages. Sandy also damaged solar PV installations in New Jersey, with storm surges causing $3 million of damage to ground-mounted PV systems and wind and lightning damage to rooftop PV systems."

[2] Sam C.A. Nierop, Envisioning Resilient Electrical Infrastructure - A Policy Framework for Incorporating Future Climate Change into Electricity Sector Planning, , p. 4
Dec. 2013, Center for Climate Change Law, Columbia Law School, Columbia University, hereinafter "Nierop".

[3] U.S. Department of Energy, Hurricane Sandy Situation Report # 5 Oct. 30, 2012.

[4] The other two are Hispaniola, shared by Haiti and the Dominican Republic, and Cuba. The Commonwealth of Puerto Rico also comprises the islands of Vieques and Culebra.

[5] Robert K. Rasmussen, Puerto Rico: Of Capital Structures, Control Rights and Liquidity, p. 2, Center for Law and Social Science Research Papers Series No. CLASS16-1 (Jan. 4, 2016), hereinafter Rasmussen.

two weeks—transformed from provider of shelter, medical care, and first responder assistance to residents of the Lesser Antilles, devastated by Hurricane Irma,[6] to a desperate seeker of similar aid. Hurricane Maria sliced the Island in a southwest to northwest trajectory, engulfing the whole territory within the rage of its 155 mile-per-hour sustained winds, with gusts exceeding 200 miles per hour.[7]

María wiped out all power generation and 80% of the island's power grid, which feeds approximately 900,000 homes via 31,485 miles of distribution wire; destroyed coastal and mountain thoroughfares and bridges; flooded entire towns; froze fuel and foodstuffs distribution; shut down all medical services; pushed thousands residing in floodable coastal and inland riparian areas and watersheds to homelessness; required mandatory evacuations to protect towns from the potential breach of structurally injured dams; and deprived all Island residents of distributed potable water production as well as sanitary sewer water treatment and disposal. The devastation that Maria exacted on, what has been described as Puerto Rico's "aging and grossly neglected

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[6] "More than 60 percent of households in Puerto Rico were without power. On St. Martin, an official said 95 percent of the island was destroyed. The Haitian government called for all agencies, stores and banks to shut down as the storm hit. Prime Minister Gaston Browne of Antigua and Barbuda said that half of Barbuda had been left homeless." Frances Robles, Kirk Semple and Vivian Yee, Caribbean Devastated as Irma Heads Toward Florida, New York Times, Sept. 07, 2017, available at: https://www.nytimes.com/2017/09/07/us/destruction-caribbean-irma-florida.html.

[7] Maria was the strongest hurricane to strike Puerto Rico since the Category 5 landfall of the San Felipe Segundo hurricane in September 1928, and it was also the tenth most intense hurricane on record in the Atlantic basin, with a minimum central pressure of 908 mb. On the 20th, several wind gusts exceeding 100 mph were recorded as Maria tracked near St. Croix and over Puerto Rico, including 137 mph at Sandy Point National Wildlife Refuge on St. Croix, 120 mph in Gurabo, PR, 116 mph at Yabucoa Harbor, PR, 113 mph in San Juan, PR, and 112 mph in Arecibo, PR. A preliminary total of 34 fatalities (potentially in the hundreds) were confirmed in Puerto Rico, which sustained catastrophic damage and a total loss of electricity." NOAA – National Centers for Environmental Information; National Climate Report - September 2017, available at: https://www.ncdc.noaa.gov/sotc/national/201709

electricity system" has been described as "unprecedented -- not just for the island but for all of the U.S."[8]

Nine days after María hit, "1.57 million electricity customers in Puerto Rico were without power." Two weeks after landfall, less than 10% of Puerto Rico's 3.4 million people had seen power restored and it was expected that full restoration would take months.[9] The uninterrupted lack of electricity three weeks after María hit was described as "a key factor in a humanitarian crisis as residents with no refrigeration for food and medicine scramble[…] to find open stores and wait[…] in endless lines."[10]

As of Monday November 13th, 54 days after Hurricane Maria made landfall in Puerto Rico, the island is still far from recovered. 59% of the island is still without power, 17% is without clean drinking water, and 11% of grocery stores are still closed. To date, the blackout caused by Hurricane María is the longest in US history and a few days away to becoming the longest in the world.

Hurricane María exposed, not only our immediate community, but federal agencies, Congress and stateside media, to the worst manifestations of PREPA's dysfunctional culture, including: the process that resulted in the signing of the now infamous Whitefish contract, and the agency's questionable procurement and emergency response practices. Two key components of any disaster preparation and response: suitable comprehensive emergency planning preparedness, including grid

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[8] Naureen S. Malik & Jonathan Levin, Bloomberg Technology, A Storm's Never Destroyed a Grid Like María Ruined Puerto Rico's, Sept. 22, 2017, available at: https://www.bloomberg.com/news/articles/2017-09-22/a-storm-s-never-destroyed-a-grid-like-maria-ruined-puerto-rico-s

[9] DOE pushes to repair Puerto Rico power system, S&P Global Platts, Oct. 2017. *See also,* Reuters, Special Report-The Bankrupt Utility Behind Puerto Rico's Power Crisis, N.Y. Times, Oct. 4, 2017, available at http://www.reuters.com/article/us-usa-puertorico-utility-specialreport/special-report-the-bankrupt-utility-behind-puerto-ricos-power-crisis-idUSKBN1C92B5 , hereinafter, Reuters.

[10] *Id.*

restoration capability, were obviously absent island wide and, upon belief and information, did not form part of PREPA's standard operating procedures, when Maria struck. The fact that both PREPA Executive Director, Mr. Ricardo Ramos, and Puerto Rico Emergency Management Agency Commissioner, Mr. Abner Gómez, both resigned, speaks volumes.

Puerto Rico, including all of its 78 municipalities are at a critical juncture. With the backdrop of over $100 billion in public debt, including approximately $30 billion in underfunded public employee and teacher pension funds, the island faces increased unemployment and a diminishing population in which, contrary to the migratory processes of the mid 20th century, doctors, engineers and the technically savvy form the bulk of those migrating. As all of this unfolds, the Commonwealth also needs to establish a path towards the development of a resilient power grid that is transparent in its management, cost effective, sustainable and responsive to basic shareholder concerns. At a minimum, reaching this goal will require:

1. A functional acknowledgement that PREPA cannot continue on its own, business as usual, as in past decades. It will require the exercise of effective regulatory controls.

2. That in order to avoid further loss of life, unnecessary pain and suffering, heightened migration and additional blows to the island's and the AMB's stagnant economy, Puerto Rico's power grid has to be promptly restored

3. That Puerto Rico's power grid should be re-designed, relying as a starting point, on the Integrated Resource Plan ("IRP") approved by this Commission on Sept. 23, 2916, now adding two new main components:

a. Modifying the 5-Year Action Plan approved by PREC, with a post-María emphasis that will focus on renewable energy, microgrids and distributed energy resources ("DERs")
b. A 20-Year Resiliency and Improvements Adaptive Management Based[11] Plan that, relying on broad shareholder interests and expertise, current and evolving microgrids and modern IT based management and control technologies, will develop a total redesign of Puerto Rico's power grid with a focus on the resiliency and sustainability elements needed for a Caribbean Island exposed to extreme weather events and changing climate patterns.

4. Streamlined permitting procedures with seamless integration of federal and local environmental impact analysis and review procedural and substantive requirements.

II. RESPONDENTS' INTEREST IN THESE PROCEEDINGS

Bayamón is a municipality of Puerto Rico located on the northern coastal valley, north of Aguas Buenas and Comerío; south of Toa Baja and Cataño; west of Guaynabo; and east of Toa Alta and Naranjito. The AMB is a public entity, created pursuant to Act No. 81 of August 30, 1991, as amended, known as the Autonomous Municipalities Act of the Commonwealth of Puerto Rico of 1991" that exercises its jurisdiction over the above described territorial expanse. Section 17.001 of the Act authorizes AMB, as well as other

[11] Adaptive Management has been described, by the U.S. Council on Environmental Quality as a broad policy or specific action "implementation tool that goes beyond the traditional "predict-mitigate-implement" model and incorporates the "predict-mitigate-implement-monitor-adapt" model. See, Council on Environmental Quality, *The NEPA Task Force Report to the Council on Environmental Quality - Modernizing NEPA Implementation* (Sept. 2003), available at: https://www.energy.gov/nepa/downloads/nepa-task-force-report-council-environmental-quality-modernizing-nepa-implementation.
Power grid modernization will necessarily require federal funding and, as a result, compliance with National Environmental Public Policy Act ("NEPA"), 42 U.S.C. §4321 *et seq*. (1969), environmental impact analysis procedures and actions as well as similar Puerto Rico Environmental Public Policy Act, requirements. Although not referred to by its name, Art. 1.2 (b) of Law No. 5 of May, 2014, known as the Puerto Rico Energy Transformation and Relief Act, in clear reference to the basic elements of adaptive management, states: "The implementation of the public policy on energy shall be an *ongoing planning, consultation, execution, evaluation, and improvement process* in all energy-related matters." (Emphasis added)

municipalities with authority "to authorize the creation of nonprofit special corporations for municipal development, hereinafter "special corporations", for the primary purpose of promoting in the municipalities whatever activities, enterprises and municipal, commonwealth and federal programs addressed to their integral development and that will result

in the general welfare of the inhabitants of the municipality through the growth and extension of diverse areas, such as …the *generation of power from renewable sources of energy*." (Emphasis added) Amongst the Municipalities powers, Section 2.001(w) indicates that AMB is empowered to: "Promote incentives for investments offer in equipment [sic], machinery and processes to avoid contamination, give incentives for the creation of direct and indirect employment that bolsters regional economic activity *promoting more links and incentives on external sources of energy to be carried out by the municipalities themselves or through the contracting of private, public or quasi-public entities*. (Emphasis added)

With a population of, approximately, 200,000 inhabitants, the Municipality is home to industrial, commercial, manufacturing, hotels and diverse service industries including hospitals and associated medical support facilities. The Municipality is home to property developers, banking and financial institutions, insurance companies, engineering and architectural firms, lawyers, landowners, general contractors and subcontractors that provide goods and services necessary for the design, authorization, construction and delivery of buildings and related infrastructure, schools and

universities, all serving diverse sectors both within and beyond the territorial demarcation.

The heightened cost and increasing lack of reliability of the power grid owned and operated by PREPA has always adversely impacted the economic interests of AMB and its residents and visitors. This has become more than evident in the aftermath of Hurricane María when economic activities within the Municipality were forced to cease, reduce or relocate operations and reduce their workforce.

Stable, reliable, accessible, reasonably priced power is dependent on stable reliable, resilient power generation and distribution. The existing PREPA owned and operated power generation and distribution system has been woefully inadequate. Any and all efforts aimed at improving the existing evidently unsustainable system is in the AMB's, its citizens and society's best interests.

IV. NATURE, PURPOSE, TIMING OF PROCEEDINGS AND AMB CONCERNS

A. Nature and Purpose

The instant proceeding is the immediate result of PREC's October 27, 2017, Final Resolution and Order in the captioned matter ("Oct. Final R & O") which, at the same time, is intricately intertwined with this Commission's Jan. 10, 2017 Final Resolution and Order in CEPR-AP-2015-0001 ("Jan. Final R & O"). In the latter, PREC conducted a broad examination of all aspects of PREPA's operations and stated that in its present state the agency was the product of a "culture and practices arising from 75 years of monopoly status, subject to continuous and shortsighted political interference […

absent] oversight by an objective, professional and apolitical commission…". The damage created by this culture took "the form of deep debt, a deteriorated physical system, demoralized workers, hesitant lenders, skeptical renewable developers and suffering consumers…"[12]

The Oct. Final R & O of the instant proceedings, comes about in the aftermath and in direct response to the extensive damage caused to the power grid by Hurricane María. PREC recognizes, basing itself on the determinations made in its Jan. Final R & O that:

> PREPA's delicate economic and operational condition, and the absence of a proactive maintenance schedule—contrary to reactive maintenance in response to failures in the service, which has characterized the maintenance program in recent years—reduced the electric system's ability to resist the impacts of Hurricane María and limited PREPA's agility to respond and begin to restore the electric service.[13]

In view of this, the Commissioner decided to:

> …initiate an investigation into the extent of the damage caused by Hurricane María to the electric system of Puerto Rico and the short, medium and long term corrective measures required to strengthen it. The present investigation has a dual purpose. First, the Commission will identify the measures and regulatory actions necessary in the short term to facilitate the task of restoring the electric service.
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> Second, the Commission will determine the medium and long term measures and regulatory actions necessary to modernize and strengthen the electric system, reinforce its infrastructure to make it less susceptible to atmospheric events and develop a sustainable cost effective energy model that results in a reliable electric service at just and reasonable prices.[14]

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[12] Jan. Final R&O, *Executive Summary*, p. 1.
[13] Oct. Final R&O at p. 2.
[14] *Id.*

The Commission maps its investigation along two routes. First, RFP Appendix I requests input about diverse matters concerning microgrids.[15] The matters to be addressed are:

1. Microgrid Organization
2. Microgrid placement and availability
3. Microgrid regulation
4. Microgrid Generation Technology
5. Restoring operation of existing generation using combined heat and power (CHP) systems
6. Coordination of Islanded Microgrids with PREPA
7. What Tools are Available to the Commission or other Parties to Enable Behind-the Meter Resources in areas without electric service

Secondly, Appendix II pursues information, primarily from PREPA, although other stakeholder comments are invited, related to various aspects of present conditions or operations at the utilities installations. The matters to be addressed are:

1. What is the status of power restoration.
2. What factors have been impeding deployment of behind-the-meter resources in the restored northern delivery area
3. What PREPA regulations need to be amended, at least temporarily, to address the supply emergency?

B. Timing

[15] The federal Department of Energy defines a "microgrid" as "a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island mode.'" Dan T. Ton and Merrill A. Smith, The Electricity Journal, *The U.S. Department of Energy's Microgrid Initiative*, Vol. 25, Issue 8, Oct. 2012, pp. 84-94, at p. 84.

By October 26, 2017, Hurricane Maria was described as having caused a loss of 1.25 billion hours of electricity supply for Americans making it the largest blackout in US history, well ahead of Hurricane Georges in 1998 and Superstorm Sandy in 2012.[16] Five (5) days before the filing date in this proceeding, on Wednesday 15, Puerto Rico suffered a second power outage[17] that returned power generation to 21%, equivalent to mid-October, 2017, levels.[18] The current migratory wave has been classified as unprecedented.[19]

All business activity has been severely impacted.[20] More than 22,000 applied in October, compared with 6,800 in the same month last year, for unemployment benefits. "Manufacturing, which makes up 48 percent of the island's economy and accounts for a third of the tax revenue, was bedeviled by the lack of power, structural damage, debris-strewn roads and, most recently, generator breakdowns. Many businesses, including pharmaceutical, biotechnology and medical-device companies, have struggled to reach their pre-hurricane production and shipping goals…"[21] The Association of Restaurants in Puerto Rico said that about 1,800 of its 5,000 member restaurants, including some

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[16] Eric Levenson, CNN, *Puerto Rico's power outages are the largest in US history*, available at: www.cnn.com/2017/10/26/us/puerto-rico-power-outage/index.html

[17] The Associated Press, *Blackout Hits Puerto Rico as Power Company Reached Goal*, NY Times Nov. 15, 2017, "The Electric Power Authority said it dispatched crews to investigate why a key 230-kilovolt line that connects the island's northern and southern regions had failed for the second time in a week. The failure caused the U.S. territory's power generation to drop to 22 percent, though it had improved slightly to 29 percent by early evening."

[18] *See,* StatusPR Puerto Rico se Levanta, available at: http://status.pr/Home/PRSeLevanta.

[19] More than "168,000 people have flown or sailed out of Puerto Rico to Florida since the hurricane, landing at airports in Orlando, Miami and Tampa, and the port in Fort Lauderdale. Nearly half are arriving in Orlando, where they are tapping their networks of family and friends. An additional 100,000 are booked on flights to Orlando through Dec. 31, county officials said. Large numbers are also settling in the Tampa, Fort Lauderdale and West Palm Beach areas." *See*, Lizette Alvarez, *A Great Migration From Puerto Rico Is Set to Transform Orlando*, NY Times, Nov. 17, 2017, available at: https://www.nytimes.com/2017/11/17/us/puerto-ricans-orlando.html

[20] Lizette Alvarez, *As Power Grid Sputters in Puerto Rico, Business Does Too*, NY Times, Nov.. 15, 2017

[21] *Id*.

belonging to major chains, have not yet reopened. The island's small and medium businesses, which provide 80 percent of the jobs which include accounting companies, advertisers, hair salons, law offices, media, medical labs and retail stores have been devastated. As many as 50,000 of these businesses had not reopened as of the beginning of the month.[22] The loss of power is at the heart of this economic disaster.[23]

These extraordinarily trying times mandate that this Commission implement expedited proceedings aimed at stopping the continued and progressive hemorrhage of jobs, employment and small business activity; disruptions to manufacturing; further harm to the small business sector; in sum, continued exacerbated harm to the public health, security and welfare of our community.

C. AMB Concerns

AMB is concerned that this Commission is structuring a process to evaluate distributed energy resources that operationally assumes scant availability of information for the technologies immediate to short term deployment in prioritized energy deprived facilities or regions throughout the island. It is also concerned that the significant role that municipal stakeholders, such as AMB, may play in assisting siting processes, location selection and/or securing funding and incentives for short and long-term projects, totally or partially based on sustainable, renewable energy projects, may also be ignored.

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[22] *Id*.

[23] "Chuck Watson, director of research and development at Enki Research, a disaster research and modeling company, said the lack of electricity had severely compounded Puerto Rico's economic challenges. He called the government's goal to restore power by mid-December "beyond wishful thinking." Without power, the economic losses will quickly multiply, Mr. Watson said." *Id*.

Current times do not need repetition of the burdensome cuasi-legislative exercises and procedures of the past. A past that still haunts Puerto Rico, in general, although fortunately not in Bayamón, as a hostile and burdensome place to do business, although significant improvements have been made starting with the broad permitting processes reform of 2009 as amended in 2017.[24]

Firstly, the National Renewable Energy Laboratory (NREL), is the U.S. Department of Energy's (DOE's) primary national laboratory for renewable energy and energy efficiency research.[25] As such the NREL has conducted extensive research in solar photovoltaic and wind based energy systems integration, and electric drive vehicles.[26] "The laboratory is home to three national research centers—for solar, wind, and bioenergy— and several programs that advance cutting-edge research in areas such as strategic energy analysis and energy systems integration.[27]In 2007 DOE developed the Microgrid Initiative, an academic, governmental, public/private R&D project. By 2012, DOE microgrid R&D efforts had been focusing on demonstration activities to meet niche application needs, such as the needs for meeting peak load reduction, renewable energy mandates and directives, and energy surety and reliability at some critical facilities including military installations. These microgrid demonstration projects consisted of lab- and field-scale R&D test beds, renewable and distributed systems integration (RDSI) projects for peak load reduction, select Smart Grid Demonstration Program (SGDP) projects as part of DOE's implementation of grid modernization under the American

[24] For example, Law No. 161 of 2009, known as the *Law for the Reform of the Permitting Process in Puerto Rico*, as amended by Law No. 19 of 2017, specifically contains expedited pro
[25] NREL, *Transforming Energy Through Science*, available at:
[26] *Id.*
[27] *Id.*

Recovery and Reinvestment Act of 2009 (ARRA), and assessment and demonstration projects jointly supported by the Department of Defense (DoD) and DOE.[28] "Within the U.S. Department of Energy (DOE) Office of Electricity Delivery and Energy Reliability (OE), the Smart Grid R&D Program was established to:

> accelerate the deployment and integration of advanced communication, control, and information technologies that are needed to modernize the nation's electric delivery network. This modernization includes preparing America's electric infrastructure to meet the challenges of our 21st century economy. The Smart Grid R&D Program has two goals: (1) to dynamically optimize grid operations and resources for a robust, flexible, and secure "plug-and-play" electric grid, and (2) to fully integrate demand response and consumer participation into grid resource planning and operations.[29]

The initiative has established microgrid performance goals, to be attained in 2020, consistent of : "developing commercial scale microgrid systems (capacity <10 MW) capable of reducing outage time of required loads by >98% at a cost comparable to non-integrated baseline solutions (uninterrupted power supply [UPS] plus diesel genset), while reducing emissions by >20% and improving system energy efficiencies by >20%…"[30]

Relying on a public-private partnerships model that has been a mainstay of the DOE and the NREL (DOE/NREL) approach to R&D, technology has been developed to enable grid modernization and distributed energy resources ("DER") advancement, especially renewable energy systems integration with the grid.[31] Through DOE/NREL and industry support of Institute of Electrical and Electronics Engineers ("IEEE")

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[28] *Id,* at. p. 85.
[29] *Id.*
[30] *Id.*
[31] Thomas Basso, *IEEE 1547 and 2030 Standards for Distributed Energy Resources Interconnection and Interoperability with the Electricity Grid*, NREL, Dec. 2014, p. iv.

standards development, the IEEE 1547 series of standards has helped shape the way utilities and other businesses have worked together to realize increasing amounts of DER interconnected with the distribution grid. More recently, the IEEE 2030 series of standards is helping to further realize greater implementation of communications and information technologies that provide interoperability solutions for enhanced integration of DER and loads with the grid. IEEE 1547, IEEE 1547.1 are in the process of a total revision by IEEE.[32] NREL projects are more than not, local or community based projects, dependent on input from local officers, residents and educational institutions.

Secondly, various local and federal laws provide for the expedited or streamlined treatment of regulatory enactments and projects, including permitting requirements and related environmental review procedures. All are aimed at addressing emergency conditions, specifically hurricanes, amongst others, and projects, actions or quasi-legislative proceedings thereto related. These include Law Num. 76 of May 5, 2000, as amended, known as "Ley de Procedimientos para Situaciones o Eventos de Emergencia"; Law No. 161 as amended; Public Law No: 114-187, known as the Puerto Rico Oversight, Management, and Economic Stability Act ("PROMESA") and the Commonwealth Uniform Administrative Procedure Act ("LPAU"), as amended; All contain provisions for streamlined treatment of regulatory enactments ("LPAU"), or approval of emergency related projects or actions (Laws 76, 161 & PROMESA). PREC

[32] Bri-Mathias Hodge for Dave Narang, *Update on Accelerating Systems Integration Standards (ACCEL) Revisions to IEEE 1547/IEEE 1547.1/UL 1741,* SunShot National Laboratory Multiyear Partnership (SuNLaMP) Workshop Argonne National Laboratory, Chicago, NREL, July 21, 2017

should make full use of the options for accelerated or streamlined treatment of microgird or Distributed Energy Resources for deployment in priority facilities or regions.

PREC cannot act as if it's necessary to commence a *tabula rasa* evaluation of islanded or connected microgrids and distributed energy resources or their interconnectedness or impacts upon PREPA grid assets . Huge amounts of information have been generated at DOE, NREL and related or affiliated entities during the last decade.

In the past, PREPA has relied on DOE/NREL assistance in "addressing barriers to the deployment of energy efficiency and renewable energy in Puerto Rico. As a result an overview was provided of the minimum technical requirements (MTR) for interconnection of wind power and photovoltaic generation developed by the Puerto Rico Electric Power Authority (PREPA).[33] It is critical that PREC, together with interested stakeholders reach out again to DOE/NREL, in addition, to available non-commercial, federal and state resources that can provide immediate assistance in evaluating the use of microgrid systems for this first phase of emergency power restoration in Puerto Rico following Maria.

With these preliminary general comments and observations in mind, Respondents respectfully submit their specific response to PREC's Request for Comments.

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[33] Vahan Gevorgian and Sarah Booth, *Review of PREPA Technical Requirements for Interconnecting Wind and Solar Generation*, DOE/NREL Nov. 2013, available at: https://www.nrel.gov/docs/fy14osti/57089.pdf.

III. GENERAL COMMENT AND RESPONSE TO APPENDIX I INQUIRIES

Microgrids in Unserved Areas

1. **Microgrid Organization**:

1.1. What legal authority does the Commission have to regulate actors and actions involved in microgrids? Consider the following actions, among others: Creation of a microgrid business, interconnection with other microgrids, interconnection with PREPA's transmission or distribution system, sales of microgrid output to PREPA (for resale), sales of microgrid output to retail customers (with or without participation by PREPA].

Response: Articles 6.3 and 6.4 of PREC's enabling statute, Law No. 57 of May 27, 2014, as amended, provides enumerates the agency's powers and duties, herein relevant, as follows:

Article 6.3

> (a) Fiscalizar y asegurar la cabal ejecución e implementación de la política pública sobre el servicio eléctrico en el Estado Libre Asociado de Puerto Rico;
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> (b) Establecer mediante reglamento las normas de política pública en relación con las compañías de servicio eléctrico, así como toda transacción, acción u omisión que incida sobre la red eléctrica y la infraestructura eléctrica en Puerto Rico, e implementar dichas normas de política pública. La Comisión de Energía redactará estos reglamentos en consulta con la Oficina Estatal de Política Pública Energética. Estos reglamentos deberán ser cónsonos con la política pública energética declarada por vía de legislación;
>
> (c) Establecer e implementar los reglamentos y las acciones regulatorias necesarias para garantizar la capacidad, confiabilidad, seguridad, eficiencia y razonabilidad en tarifas del sistema eléctrico de Puerto Rico;
>
> (d) Fiscalizar la calidad y confiabilidad del servicio eléctrico de la Autoridad y de cualquier otra compañía de energía certificada en Puerto Rico;

Article 6.4 (a), on the other hand provides that the Commision shall have exclusive primary jurisdiction over the following matters:

(1) La aprobación de las tarifas y cargos que establezca la Autoridad y cualquier productor independiente de energía en relación con cualquier servicio eléctrico, al amparo de lo dispuesto en el Artículo 6.25 de esta Ley, así como los casos y controversias relacionadas con las tarifas que establezca o cobre la Autoridad a sus clientes residenciales, comerciales o industriales, y sobre los casos y controversias relacionadas con las tarifas y cargos de cualquier productor independiente de energía.

(2) Los casos y controversias relacionadas con la revisión de facturación de la Autoridad a sus clientes por los servicios de energía eléctrica, conforme a lo establecido en el Artículo 6.1 de esta Ley.

(3) Los casos y controversias en las que se plantee el incumplimiento con la política pública energética del Estado Libre Asociado de Puerto Rico.

(4) Los casos y controversias en las que se plantee el incumplimiento de la Autoridad con cualquiera de los mandatos establecidos en la Ley 83 de 2 de mayo de 1941, según enmendada, conocida como la "Ley de la Autoridad de Energía Eléctrica", en relación con el servicio eléctrico o en relación con asuntos energéticos.

(5) Los casos y controversias sobre trasbordo de energía eléctrica o interconexión entre la Autoridad o sus subsidiarias, y toda persona que esté, o interese estar, conectada a la red de energía eléctrica dentro del Estado Libre Asociado de Puerto Rico o toda persona con un interés directo o indirecto en esos servicios de energía eléctrica.

(6) Los casos y controversias que surjan en relación con contratos entre la Autoridad y los productores independientes de energía, así como sobre los casos y controversias entre productores independientes de energía. Esto incluirá, pero no se limitará, a los contratos de compraventa de energía mediante los cuales un productor independiente de energía se disponga a proveer energía a la Autoridad de Energía Eléctrica para ser distribuida por esta, y a los casos en que se cuestione la razonabilidad de las tarifas de interconexión, o la razonabilidad de los términos y condiciones de un contrato de compra de energía.

(b) La Comisión de Energía tendrá jurisdicción general sobre los siguientes asuntos:

(1) La Comisión de Energía tendrá jurisdicción regulatoria investigativa y adjudicativa sobre la Autoridad y cualquier otra compañía de energía certificada que rinda servicios dentro del Estado Libre Asociado de Puerto Rico.

(2) Cualquier persona natural o jurídica que viole las disposiciones de esta Ley en materia de energía eléctrica o los reglamentos de la Comisión, incluyendo a cualquier persona natural o jurídica, o entidad que utilice su control sobre los servicios de energía eléctrica para llevar a cabo tal violación.

(3) Cualquier persona natural o jurídica cuyas acciones afecten la prestación de servicios de energía eléctrica, incluyendo a cualquier persona o entidad que utilice su control sobre dichos servicios para afectar la prestación de los mismos.

(4) Cualquier persona natural o jurídica que lleve a cabo cualquier actividad para la cual sea necesaria una certificación, autorización o endoso de la Comisión.

(5) Cualquier persona natural o jurídica cuyas acciones u omisiones resulten en perjuicio de las actividades, recursos o intereses sobre los cuales la Comisión posee poderes de reglamentación, investigación, adjudicación o fiscalización, incluyendo cualquier persona que utilice su control sobre servicios de energía eléctrica de tal manera que resulte en dicho perjuicio.

Described provisions clearly establish the legal authority to regulate actors involved in microgrids.

1.2. What are the advantages and disadvantages of alternative microgrid ownership structures (e.g., third-party, customer co-op, anchor load)?

Consider such factors as reliability, economics, and accountability.

***Response**:* AMB submits that the Commission should not become involved in determining or judging which microgrid ownership structures are acceptable or not. PREC should instead determine if a proposed microgrid or DER is safe, reliable, resilient and efficient. In so doing PREC should determine compliance with applicable IEEE, NEC and UL standards. The only matter of import concerning ownership or forms of business structures consist of assuring appropriate economic capacity and responsibility for

responding to acts and omissions that may result in damages and/or entail liability. This can be assured either through minimum capitalization requirements or appropriate insurance coverage of bonding, independently of the ownership or assumed form of business structure.

Response: See response to *supra 2.1.*

1.2.1. For each possible ownership structure, what actions by the owners, users and customers should be guided, constrained or rewarded through regulatory actions? What regulatory actions are necessary? What regulatory actions might be unnecessary or problematic?

Response: See response to *supra 2.1.*

1.3. Are there legal or practical obstacles to any desirable ownership structures? If so, what are the solutions, within and outside the Commission's authority?

Response: See response to *supra 2.1.*

1.4. What financing sources are available to support various ownership forms? Consider private investment (both independent investors and commercial entities like large stores), government investment, and foundation and other non-profit sources.

Response: Private, for profit and NGO's, public (federal DOE funding) or combinations thereof.

1.5. What types of expertise (e.g., planning, engineering, customer education, other) are necessary to make the planning, development and operation of microgrids a success? What are current examples of success and failure?

Response: The success of any profit or non-profit oriented activity is highly dependent on activity related experience, adequate staffing, proper

capitalization and government support that, in the case of innovative high-tech projects, must include financial or tax incentives, and reductions in unnecessary government interference or attempts at micromanagement.

2. Microgrid placement and availability: Given the Commonwealth's need and desire to getting service restored to all customers as soon as possible, consider these questions:

2.1. What are the advantages and disadvantages of focusing microgrid development on specific types of customer loads (e.g., large industrial loads, urban loads, rural loads, residential neighborhood loads)? Are some types of load profiles, or some geographic areas, better suited than others? What data exist to support your answer?

Response: AMB submits that efforts, in this first stage of power restoration, should focus on strategic activities, installations or sectors where economic significance, health and safety, employment or humanitarian considerations are relevant. These would include, amongst others:

Hospitals and medical service providers,
Pharmacies
Universities
Schools
Food Warehouses and Food Retail facilities
Isolated Communities
Homes for the Elder
Manufacturing installations
Pharma storage facilities
Telecommunications

Bayamón is greatly interested in, assuming a structured process is established for public purpose or critical area selection, assisting PREC in executing this process within the Municipality of Bayamon.

Maryland is currently evaluating proposals for what they refer to as "public purpose microgrids". These are microgrids that serve critical services and multiple customers and properties, like community centers,

commercial hubs, and emergency service complexes. They are similar to what other states call community microgrids.

"Maryland defines public purpose microgrids as those that serve critical services and multiple customers and properties, likely community centers, commercial hubs, and emergency service complexes. They are similar to what other states call community microgrids."[34]

Rhode Island sponsors the use of microgrids for what they refer to as critical services.[35] These are described as: "Critical infrastructure includes those assets, systems, networks, and functions—physical or virtual—so vital to Rhode Island that their incapacitation or destruction would have a debilitating impact on security, economic security, public health or safety, or any combination of those matters."[36]

2.2. Regardless of the possible priorities to place on different types of loads, what are the most cost-effective paths to getting microgrid service universally available to all customers regardless of their locations?

2.3. What level of financial assurance will microgrid developers reasonably require before investing their own funds in Puerto Rico microgrids?

Response: A reasonable rate of return that is within industry standards, predictable oversight that follows widespread industry acknowledged practices and norms.

2.4. What can the Commission do to facilitate universal service in the restoration?

3. Microgrid Regulation

3.1. What form of registration and/or approval by the Commission should be required for microgrids?

Response: AMB considers that the following questions related to microgrid regulation, should be considered as part of the 5-year and 10-year Plans that PREPA is

[34] *See,* https://microgridknowledge.com/public-purpose-microgrids/
[35] *See,* Resilient Microgrids for Rhode Island Critical Services, available at: http://www.energy.ri.gov/documents/SRP/RI-microgrid-exec-summary-170331.pdf.
[36] *Id.*

required to develop and submit to PREC. At this first stage, aimed at securing energy restoration, efforts should be focused on restoring energy to those we have identified as critical. Nonetheless, in the future PREC should examine microgrid regulatory enactments approved or under consideration in New York City, Rhode Island, Maryland, Hawaii California and the European Community.

PREC should consider the interaction of municipal plans, needs, and capabilities and, together with the Puerto Rico Planning Board, authority over certain land use activities.

3.1.1. What regulatory changes would be needed to permit various microgrid arrangements? **N/C**[37]

3.1.2. What aspects of microgrid operations should be regulated? **N/C**

3.1.3. What are the advantages and disadvantages of the Commission establishing technical and financial qualifications for the microgrid developers? **N/C**

3.1.4. What are the risks of incompetent or unscrupulous developers and what are reasonable ways to prevent such problems?

Response: The risks are multiple from defrauding consumers, creating safety risks and adversely affecting energy distribution assets. Minimization will require proper project and proponent due diligence and vetting.

3.2. What technical standards should apply to islanded microgrids?

Response; All those developed by IEEsE or incorporated by reference in IEEE microgrid standards.

3.2.1. What safety standards should apply?

3.2.1.1. Are the existing standards—IEEE Standard 1547 for design; UL Standard 1703, UL Standard 1741, or IEEE Standard 1547 for equipment; and the 2011 National Electric Code—sufficient? Why or why not?

Response: These standards have been developed through the efforts of DOE, NREL and multiple public and private sector shareholders. These should apply in Puerto Rico, absent peer reviewed studies or studies and reports by qualified professionals (experts)

[37] No comment.

with specific expertise, that conditions in Puerto Rico contraindicate their local application. PREC should avoid the establishment of artificial regulatory barriers that will serve to limit access of proven technologies and providers to the local energy market.

3.2.2. What are the advantages and disadvantages of requiring inspections? If the Commission requires inspections, what types of professionals and entities should be responsible for conducting them and certifying compliance? Consider registered engineers (working for the developer, for the Commission or for some other independent entity, municipal construction permit inspectors; others]. What technical specifications should apply to the process of interconnecting a microgrid to PREPA's transmission or distribution system?

Response: Project proponents should submit, subject to prior described federal and local requirements applicable to emergencies, certified drawings to**:**) Permits Management Office ("OGPe, according to Spanish language acronym) that comply with applicable provisions of Law 161 as amended, or o 2) PROMESA Title V. Inspections by licensed engineers, duly qualified in generation, transmission and distribution power systems should be required. Mere licensing as an engineer should be deemed insufficient. All projects should be adequately insured, for e.g. "Inherent Defect Insurance" or bonded.

3.2.3. Based on what factors should the Commission determine whether microgrids be interconnected only to PREPA's distribution system vs. to PREPA's transmission or sub-transmission system?

Response: The same factors and criteria considered in other jurisdictions such as New York, Rhode Island and Hawaii and or recommended by DOE/NREL

3.3. How should the location of microgrids be determined?

Response: For the first phase of emergency power restoration, see response to 2.1 *supra*.

3.3.1. Should the Commission establish limits on the size of a microgrid? On what factors should that limit be based (geographic extent, capacity, number of

customers, other)?

Response: For the first phase of emergency power restoration, see response to 2.1 and 3.2.3 *supra*.

3.3.2. Should the Commission issue franchise rights for microgrids? What conditions should be applied for a franchisee to maintain franchise rights?

Response: Those conditions that are acknowledged as part of industry wide practice or standards.

3.4. What consumer protections are required, and how should those vary with the ownership of the microgrid?

Response: Those protections that are acknowledged as part of industry wide practice or standards..

3.4.1. Prices and costs.

Response: Price controls regulating the economic relationship between providers and private actors should be avoided.

3.4.1.1. Assuming (for purposes of this question] that microgrid owners can sell their output directly to retail customers, what are the advantages and disadvantages of different pricing methods (including traditional cost-based pricing, price caps based on reasonable projected cost, and allowing market forces to set prices)? Is it reasonable for there to be an administrative charge to cover the Commission's oversight costs?

Response: The government should avoid becoming involved in price setting or controls. Market factors should control.

3.4.2. Contract terms.

3.4.2.1. What are the advantages and disadvantages of the Commission establishing standard contract terms for retail and wholesale (to

PREPA) sales?

Response: Standard contracts are desirable to the extent they establish uniform defined concepts, terms and conditions concerning design and operation standards/practices, management, project financial aspects, acceptable insurance coverage, amongst others. However, they should be developed with the participation of industry, financial, technical, legal, and insurance and consumer interests, amongst others. Such efforts are currently undergoing in stateside jurisdictions. Puerto Rico contracts should share similar terminology and contract clauses with stateside contracts.

3.4.2.2. How does the answer to the preceding question vary by group? For example, should standard terms be required only for residential and small-commercial customers?

Response: No.

3.4.2.3. Should the standard terms be required only for microgrids owned or operated with the main purpose of selling energy at retail?

3.4.2.4. Should contract provisions be subject to Commission review?

Response: No. Standard terms should be industry-wide.

3.4.2.5. Should the Commission set limits on contract duration?

Response: No.

3.4.2.6. How should the Commission address customers who decide they no longer wish to be part of a microgrid?

Response: The matter should be addressed as part of the terms and conditions agreed to by contracting parties.

3.4.2.7. Should the development of microgrids require unanimous approval of customers within the area to be served by microgrids?

Response: No, particularly in the csse of case of public purpose or critical facilities described in 2.1.

3.4.2.8. What are the advantages or disadvantages of allowing specific

customers to opt in or opt-out from being served by a microgrid?

Response: Will potentially have an adverse impact upon both project economics and technical specifications. Again, should be dealt with contractually by the interested parties.

3.4.3. What types of pre-payment or deposits are appropriate? How does the answer vary by customer group?

3.4.4. Are non-discrimination rules necessary?

3.4.5. Are other protections necessary?

3.5. Must all microgrids (at least those serving multiple customers] charge for services by metering delivered energy, or are other pricing structures acceptable?

3.6. To ensure that a microgrid project is cost-effective, safe and reliable, what information should the Commission receive from a microgrid developer prior its connecting customers? For example, should the Commission require developers to specify:

3.6.1. Maximum set of customers to be served? Type of customers to be served?

3.6.2. Maximum generation and storage capacity anticipated?

3.6.3. Costs?

3.6.4. Pricing?

Responses: 3.4.3 - 3.6.4, Industry wide practices or those followed in jurisdictions such as New York, Hawaii, Rhode Island, amongst others.

3.7. What timing requirements, in terms of the development process, must the Commission take into account, when determining how long it will take to approve or reject a microgrid proposal?

Response: Scant information available for a proper response. However emergency related projects should be processed subject to Laws 76, 161 and PROMESA applicable time limits. Projects subject to both local and federal (NEPA) environmental review proceedings should make use of options for joint documents and public that are part and parcel of existing streamlining mechanisms.

4. Microgrid Generation Technology: Solar photovoltaics, supplemented with storage, have been employed to power microgrids. The Commission is interested in the range of other options for reenergizing the disconnected portions of the island.

Response: N/R for total section.

4.1. Information provided to the Commission by Pattern Santa Isabel, LLC suggests that the Santa Isabel wind farm is operable, but lacks load and a source of energizing power. This condition could affect other renewable independent power producers, whose installations are operable but require power from PREPA to get back online.

4.1.1. Is there a technical solution to add a small solar or diesel generator to restart the wind farm, and storage to firm up the supply?

4.1.2.1s there load close to the wind farm that could be served from a microgrid based on the wind farm?

4.1.3. What legal or contractual obstacles would prevent or limit the ability of the Santa Isabel wind farm from (i) procuring a small-scale generation source to power up its turbines and [ii] serve surrounding communities directly through the use of microgrids?

4.2. Are there any existing solar facilities that could be firmed up with storage and connected to load?

4.3. For generation facilities under contract with PREPA, how would use of those facilities to serve a microgrid affect PREPA's contract?

4.3.1. Can a party other than PREPA develop a microgrid from such a facility?

4.4. Can any of PREPA's hydro-electric facilities be firmed up with storage and connected to load?

4.4.1. Can other parties use those facilities to serve local load?

4.4.2. What arrangements would be needed with PREPA to implement this option?

4.5. Is it legal, practical, and necessary for solar-storage or wind-storage microgrids to have some fossil fuel back-up capacity?

4.5.1. How much fossil fuel based back-up capacity can be used in a microgrid without compromising its renewable status and ability to sell to customers?

5. Restoring operation of existing industrial generation using combined heat and power (CHP) systems.

Response: N/R no response for total section.

5.1. How much CHP is currently installed on the island? (The Commission would be interested in anecdotal information about specific facilities, as well as more comprehensive data.]

5.1.1. What portion of the installed CHP capacity is operating interconnected with PREPA?

5.1.2. What portion of the installed CHP capacity is operating in islanded mode, without PREPA supply?

5.1.3. What portion of the installed CHP capacity is physically capable of operating, if utility power were restored to the host facility?

5.2. Are those systems capable of operating in islanded mode?

5.2.1. For those that cannot operate islanded, would a small amount of additional on-site generation allow the CHP to restart?

5.3. For CHP installations that could operate now, but are sitting idle, what else would be needed to bring those plants back into service, to serve the host facility, feed

power back to PREPA and/or power a microgrid?

5.4. Do any CHP facilities have unused electrical capacity that could be delivered to PREPA or a microgrid?

5.5. What regulatory actions would be required to allow a CHP to sell excess power to PREPA?

5.6. What regulatory actions would be required to allow a CHP to sell excess power to a microgrid?

6. Coordination of Islanded Microgrids with PREPA:

6.1. To PREPA: Please provide the Commission with any information relating to plans for serving rural communities with solar/storage microgrids. Such information should include responses to the following questions:

If so,

6.1.1. What details are available regarding this plan?

6.1.2. When will the first of these systems be installed?

6.1.3. What duties does PREPA propose to assume for these communities?

6.1.4. How would PREPA's rates and role in these areas differ from areas served by central generation?

6.1.5. For all commenters: What are the advantages and disadvantages of the Commission requiring PREPA to develop microgrids in some areas? Would such a requirement avoid duplication of effort and conflict? Would it discourage competitors from entering the Puerto Rico microgrid market?

6.2. Are there areas that should be reserved for PREPA restoration; or should microgrids be encouraged everywhere?

7. Use of Stranded PREPA Equipment: This set of questions addresses the possibility of assisting microgrid development by using existing PREPA equipment that PREPA is temporarily unable to use.

7.1. Should microgrids be allowed to deliver power to customers through existing PREPA metering equipment?

7.1.1, If so, how and when should PREPA be compensated for that use?

7.1.1.1. Should the Commission set a fixed rate per meter, based on the average embedded costs of PREPA meters?

7.1.1.2. Should the microgrid pay a monthly fee, or purchase the equipment outright?

7.2. Should microgrids be allowed to purchase distribution equipment (poles, primary lines, secondary lines, service drops, and transformers] that PREPA is not currently able to use due to lack of connection to central generation?

7.2.1. If so, how and when should PREPA be compensated for that use?

8. What tools are available to the Commission or other parties to enable behind-the meter resources in areas without electric service?

8.1. Are there technical resources (such as pile drivers for ground mount systems] in short supply in Puerto Rico? If so, what can be done to alleviate those shortages?

8.2. Do firms that are new to Puerto Rico need information about local design and approval processes and standards? If so, how can that information be efficiently shared?

Appendix II

Distributed Resources to Augment Northern Supply

Although these questions are primarily addressed to PREPA, the Commission welcomes comments from any other stakeholder.

Response: PREPA is a member of the Large Public Power Council (LPPC). whose members commonly prepare and implement Emergency Disaster plans that follow Federal Emergency Management Guidelines and recommendations and industry standards. PREPA should be required to produce all documentation describing the its emergency planning and mitigation efforts and disaster response preparedness and status of these plans prior to Hurricane Maria.

1. What is the status of power restoration?

[remaining Appendix II sections omitted]

WHEREFORE, the Municipality of Bayamón respectfully requests that this Hon. Commission receive and consider this response and recommendations in response to the Request for Comments in the captioned proceedings.

In San Juan, Puerto Rico this ___ day of November, 2017.

Respectfully submitted,

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