

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

**NEPR**

**Received:**

**Feb 11, 2022**

**9:05 PM**

**IN RE:** REVIEW OF THE PUERTO RICO  
ELECTRIC POWER AUTHORITY'S 10  
YEAR INFRASTRUCTURE PLAN-  
DECEMBER 2020

**CASE NO.:** NEPR-MI-2021-0002

**SUBJECT:** Petition for Leave to Conduct  
Works in PREPA's Steam Units to Achieve  
Environmental Regulatory Compliance

**PETITION FOR LEAVE TO CONDUCT WORKS IN PREPA'S STEAM UNITS  
TO ACHIEVE ENVIRONMENTAL REGULATORY COMPLIANCE**

**COMES NOW** the Puerto Rico Electric Power Authority ("PREPA"), through its counsel of record, and respectfully submits and requests as follows:

**I. Introduction**

"The electric power system should be reliable and accessible, promote industrial, commercial, and community development, improve the quality of life at just and reasonable cost, and promote the economic development of the Island." Statement of Motives, Act 17.<sup>1</sup> PREPA's has a commitment to meet these goals and provide continued, reliable, clean, and affordable power service to Puerto Rico. However, as it becomes more apparent each time, PREPA's infrastructure is aging and requires repairs that will guarantee the integrity of the system while the transition to renewable energy ensues. Among the many challenges the aging of units entails, the most important one is achieving environmental compliance which is of utmost importance as it's aims to improve the air quality for the residents of Puerto Rico by reducing harmful emissions.

Failure to comply with environmental regulations will inevitably result in the impositions of fines on PREPA. Complying with environmental regulations is crucial, not only to avoid the costs the fines that would ultimately be borne by PREPA's customers, but also to avoid unit

---

<sup>1</sup> *Puerto Rico Energy Public Policy Act*, Act No. 17 of April 11, 2019, 22 L.P.R.A. §§ 1141-1141f ("Act 17").

shutdowns and, as a result, generation shortfalls. Additionally, at present, Puerto Rico has the unique opportunity to use billions of dollars earmarked for Puerto Rico by the Federal Government but some of those funds are subject to compliance in different areas, including compliance with certain environmental rules and regulations. Thus, failing to comply with mandated environmental policies would not only be costly because of the fines, but also have the effect of disallowing use of federal funds for failure to meet mandatory standards.

In 2018 the United States Environmental Protection Agency (EPA) designated the Guayama-Salinas and San Juan air districts as areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the national ambient air quality standard (NAAQS). These areas must clean up emissions to reach, or “attain,” the official parameter for the sulfur dioxide (SO<sub>2</sub>) pollutant. The Government of Puerto Rico must submit to EPA a plan with feasible proposals to attain to the official standards on or before June 3, 2022. This submittal must be finalized to avoid the imposition sanctions and restrictions. The Puerto Rico Department of Natural and Environmental Resources (DNER) and PREPA have made several analyses and after careful consideration, have determined that burning natural gas in the existing steam units of Aguirre, San Juan, and Palo Seco power plants would achieve “attainment” in the designated districts.

In furtherance of the above, PREPA submits to the Puerto Rico Energy Bureau of the Public Service Regulatory Board (the “Energy Bureau”) that it has analyzed the options to achieve attainment and has determined that the conversion of the existing steam units of the San Juan power plant to the burn of natural gas is the correct path forward. Not only does the conversion of these units to dual-fuel helps achieve attainment, but it also benefits and supports PREPA’s transition from fossil fuels to clean and renewable energy, which must be executed in parallel with delivering a safe and reliable electric service to the People of Puerto Rico. As further explained

below, the proposed conversions shall provide the optimal operational and economic conditions for the new renewable resources' integration.

Accordingly, PREPA herein requests leave from the Energy Bureau to begin preliminary works with the goal of converting the existing steam units of San Juan power plant to burn natural gas. This request has the ultimate goal of submitting to the EPA a feasible plan to attain to the emissions official standards on or before June 3, 2022, avoid the imposition of sanctions and fines for failure to comply with environmental standards, avoid the risk of disallowance of federal funds and avoid generation restrictions.

## **II. Background**

On August 24, 2020, the Energy Bureau approved a modified Integrated Resource Plan ("Approved IRP") with a Modified Action Plan,<sup>2</sup> which includes a comprehensive plan to achieve said public policy. The Modified Action Plan is to be implemented during the next five (5) fiscal years unless the Energy Bureau decides to approve a revision before said term elapses.

One of the targets of the Modified Action Plan approved by the Energy Bureau is to achieve compliance with Act 82<sup>3</sup> and Act 17 Renewable Energy Portfolio Standard (RPS). The approved RPS seeks to reduce and eventually eliminate electric power generation from fossil fuels by integrating orderly and gradually alternative renewable energy while safeguarding the stability of the electrical system and maximizing renewable energy resources in the short-, medium-, and long-term. The current RPS was established to achieve a minimum of forty percent (40%) on or before 2025; sixty percent (60%) on or before 2040; and one hundred percent (100%) on or before 2050

---

<sup>2</sup> *Final Resolution and Order on the Puerto Rico Electric Power Authority's Integrated Resource Plan*, entered by the Energy Bureau on August 24, 2020, in case no. CEPR-AP-2018-0001, *In Re: Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*, in which the Energy Bureau approved the Modified IRP with a Modified Action Plan ("IRP Order").

<sup>3</sup> *Public Policy on Energy Diversification through Sustainable and Alternative Renewable Energy in Puerto Rico*, Act. No. 82 of July 19, 2020, as amended, 22 L.P.R.A. §§ 8121 - 8136

of renewable energy production in Puerto Rico. Act 33<sup>4</sup> established that by 2022 twenty percent (20%) of all generation must come from renewable sources. Moreover, Act 17 calls for a total ban of coal-based generation by January 1, 2028.

To meet these ambitious targets, the Energy Bureau included in the approved Modified Action Plan several tasks that PREPA must pursue to transition from fossil fuels to clean and renewable energy. One of these endeavors is a directive for PREPA to develop a plan and procure 3,750 MW of renewable energy generation and 1,500 MW of battery energy storage systems (BESS) by 2023. This procurement is divided in six (6) stages or tranches of requests for proposals (RFPs) for the construction of renewables and BESS projects. IRP Order at pp. 266 - 268, ¶ 860. The RFP for the first tranche was published by PREPA on February 22, 2021. With the Tranche 1 RFP, PREPA sought to procure a minimum of 1,000 MW of solar or other equivalent renewable energy and 500 MW of 4-hour BESS. Per the IRP Order, the last of the six (6) tranches is to be published by PREPA on June 2023 and must secure that PREPA has procured the totality of 3,750 MW of renewable energy generation and 1,500 MW of BESS.

Currently, PREPA is executing the final action items to complete the Tranche 1 procurement process. On December 16, 2021, PREPA submitted the final report for this procurement process recommending fifteen (15) photovoltaic (PV) projects with an aggregated capacity of 732.7 MW and 3 BESS projects with an added capacity of 220 MW, along with their respective power purchase and operating agreements (PPOAs) and energy storage services agreements (ESSAs) drafts for the Energy Bureau's evaluation and approval. Thereafter, on December 23, 2021, PREPA submitted an additional 112.1 MW associated with three (3) PV

---

<sup>4</sup> *Puerto Rico Climate Change Mitigation, Adoption and Resilience Act*, Act No. 33 of May 22, 2019, 12 L.P.R.A §§ 8011 – 8014.

projects.<sup>5</sup> On February 3, 2022, the Energy Bureau approved eighteen (18) PV projects totaling 844.8 MW.

PREPA expects to complete the procurement process of Tranche 1 after LUMA Energy, LLC (LUMA)<sup>6</sup>, acting as the operator of the electrical system in Puerto Rico, completes the interconnection studies of the proposed projects.<sup>7</sup> LUMA informed that it expects to complete these studies for the Tranche 1 proposals by May of 2022. PREPA's procurement process for Tranche 1 should finalize with the execution of PPOAs and ESSAs once the Fiscal Oversight and Management Board for Puerto Rico (FOMB) approves them. According to PREB's approved procedure, after executing these agreements, the proponents would start developing the corresponding projects in compliance with current regulations and the interconnection requirements determined by LUMA. Per the approved PPOAs, all eighteen (18) PV projects must achieve commercial operation date twenty-four (24) months or less after execution.

The Tranche 2 procurement process for the integration of an additional 500 MW of renewables and 250 MW of 4-hour BESS was set to begin in June 2021, but was subjected to a continuance by the Energy Bureau. On October 15, 2021, PREPA submitted to the Energy Bureau the totality of the documents to be published by PREPA needed to launch Tranche 2.<sup>8</sup> However, on October 29, 2021, the Energy Bureau entered an order informing PREPA that the Tranche 2

---

<sup>5</sup> See, *Motion Submitting 733 MW of PV Renewable Energy Draft Power Purchase and Operating Agreements Offered in Tranche 1 of PREPA's Renewable Generation and Energy Storage Resources RFP for Energy Bureau Evaluation and Approval*, case no. NEPR-MI-2020-0012, *In Re: Implementation of the Puerto Rico Electric Power Authority Integrated Resource Plan and Modified Action Plan*.

<sup>6</sup> Pursuant to the *Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement* ("OMA") dated as of June 22, 2020, by and among the Puerto Rico Electric Power Authority, the Puerto Rico Public-Private Partnerships Authority, LUMA Energy, LLC and LUMA Energy ServCo, LLC, LUMA operates and maintains PREPA's transmission and distribution system. The OMA is available for review at <https://www.p3.pr.gov/wp-content/uploads/2020/06/executed-consolidated-om-agreement-td.pdf> (Last visited on December 29, 2021)

<sup>7</sup> LUMA's responsibilities include compliance with interconnection of renewables in accordance with applicable law. OMA at p. I-1, Annex I, Sec. I (A).

<sup>8</sup> See, *Motion Submitting Tranche 2 Request for Proposals for Renewable Energy Generation and Energy Storage Resources (RFP)*, filed by PREPA on October 15, 2021, *In Re: Implementation of the Puerto Rico Electric Power Authority Integrated Resource Plan and Modified Action Plan*, *supra*.

RFP would be executed through a PREB-Independent Coordinator in accordance with a future resolution.<sup>9</sup> On January 27, 2022, the Energy Bureau issued a *Resolution and Order* informing the appointment of the PREB-Independent Coordinator, including its duties and responsibilities. However, this resolution did not include PREPA's or LUMA's roles and responsibilities in the Tranche 2 process. The Energy Bureau has yet to issue the order detailing PREPA and LUMA's roles in the Tranche 2 process.

Pursuant to the mandates included in the IRP Order, and to the best and prudent engineering practices, the transition from fossil fuels to clean and renewable energy shall be executed in parallel with delivering a safe and reliable electric service to the People of Puerto Rico. In general, the reliable integration of new resources with a power system, especially renewables, consists primarily of performing interconnection studies; determining the technical operational requirements like voltage and frequency regulation; obtaining the required construction and environmental permits; developing the design, procurement, installation, construction, and commissioning of the generation facility; and performing operational interconnection tests. Completing this development process can take a minimum of two years for each renewable generating facility. Thus, if it is expected that the Tranche 1 PPOAs will be executed after LUMA finalizes the interconnection studies on May 2022, and taking in consideration the twenty-four (24) months that the Resource Providers have to achieve commercial operation date, the first set of MWs of PV and BESS may achieve commercial operation by mid-2024.

In particular, the new resources operational interconnection tests can take several months, as during these tests the system operator verifies that the resource's operation complies with the technical operational requirements and that does not affect the reliability of the power system. In

---

<sup>9</sup> *Resolution and Order*, entered by the Energy Bureau on October 29, 2021, at *id.*

addition, even though PREPA could execute simultaneously several PPOAs and ESSAs at the end of the Tranche 1 procurement process, the operational interconnection of these renewables projects will need to be phased-in with the power system. This phased interconnection strategy will allow the system operator to maintain the stability and reliability of the electrical system while testing the new resources' technical requirements. Otherwise, interconnecting all the new resources at the same time would expose the power system to a high risk of instability substantially reducing the system's reliability.

Considering that, as explained before, the development of each renewable generating facility can take at least two years and the reliable integration of new resources requires a phased interconnection strategy, it is expected that the first renewables project of Tranche 1 would be integrated with electrical system at least two (2) years after the proponent start its development. From that moment on, the rest of the projects would be interconnected in a phased manner, maintaining the reliability of the power system. Given the renewables resources interconnection conditions summarized before, achieving the RPS goals in a safe and reliable manner is a long-term effort.

Therefore, to supply the energy demand in Puerto Rico and maintain a safe and reliable electrical service while the mentioned renewables projects are developed and interconnected, it is essential to keep the existing generating units operational and in service. Furthermore, it must be noted that the availability of the generating units in an electrical system have direct effect on the power system reliability, as when the dependable available generation capacity decreases, the system reliability also decreases. Also, when the available operational generation capacity is lower than the minimum required for a reliable operation, the power system is at high risk of losing

stability, which is even higher in an isolated system like Puerto Rico's system, where an instability event can evolve into a total outage or blackout more easily than in an interconnected system.

To prevent such total system outage during generation capacity limitations, the system operator needs to execute partial outages across the power system (load-shedding events), affecting thousands of customers, possibly including critical loads such as hospitals and other essential services facilities. During recent months, Puerto Rico's electric system customers suffered frequent and prolonged outages due mainly to generating units forced outages.<sup>10</sup> These situations demonstrate that presently there is a limitation in dependable available generation, which reduces considerably the reliability of the power system, making it vulnerable to events that cause instability. To increase the current limited dependable available generation and provide a reliable and continuous generation service to the People of Puerto Rico, preventing events like those mentioned before, it is crucial to keep the generating units and their auxiliary equipment operational, in the best possible condition, and in compliance with all environmental regulations.

Another important aspect of the integration of renewable resources is the capacity and ability of the existing power system to handle and accept such integration reliably and safely. The interconnection studies that LUMA will initially conduct with the Tranche 1 projects will show this capacity and their results will indicate which improvements and modifications to the system will be necessary and required before the interconnection is executed. The interconnection studies shall be based on the current conditions and limitations of the system, including environmental constraints of the generating units. It is important to consider that the existing generating units control most of the power system voltage and frequency fluctuations caused by the intermittency nature of PV resources. These studies shall evaluate the reliable and economic dispatch of the

---

<sup>10</sup> See, *PREPA's Motion to Clarify and Request for Technical Conference* (November 29, 2021).



existing resources along with the new PV and energy storage resources, which could include an increase in the dispatch hours of the existing combined turbines. This, mainly due to the fact that these units have faster starting times than the large thermal units have and, thus, can be online faster when sudden loss of PV sources occur. In addition to operational conditions, the aforementioned studies will show the operational costs of the resulting generation scenario, especially if the PV and energy storage resources costs differ from those assumed in the Approved IRP.

In general, the system's improvements and modifications are additional to the operational requirements tested during the operational interconnection tests and shall provide the optimal operational and economic conditions for the new resources integration. The interconnection of the amount of renewable energy proposed in the Tranche 1 may require improvements and modifications to the transmission and distribution and the generation systems. Among the improvements in the transmission and distribution system that may be required, PREPA contemplates construction of new transmission lines and substations, additions to existing transmission substations, line increased capacity, new protection and control equipment and software, and new or expansion of telecommunications systems. For the generation system, improvements that may be required include retrofit to existing combustion turbines and new fast start turbines, like aeroderivative machines and small combined cycles. The aforementioned improvement projects, if needed, shall be considered for determining the new resources integration schedule, as delays in executing these works could delay the interconnection of the resources.

Considering the above, the Approved IRP and Modified Action Plan have provisions to maintain a safe and reliable electrical service while the integration of reliable new resources is

completed.<sup>11</sup> It specifically provides that “PREPA should retire its older, oil-fired steam assets in order of the declining cost to operate when they are no longer necessary for system reliability,” “[t]he retirements should align with synchronous condenser conversion.” (*Id.* at p. 10, ¶ 64) and that “PREPA should retire the older, oil-fired steam assets, roughly in order of declining cost to operate (and in consideration of retirement sequencing by unit to align with synchronous condenser conversion) as soon as they are no longer necessary for reliable system operations.” *Id.* at p. 193, ¶ 630. The Approved IRP further provides that the generating units retirement schedules determination be “dependent on achieving specific reliability milestones: completion of new battery energy storage capacity, potential additional peaking capacity, and obtaining [demand response] resources and peak load reduction through [energy efficiency] provision.” *Id.* at pp. 14 - 15, ¶ 92.

In summary, the retirement of the generation units shall occur upon the reliable integration of new resources with the power system. Therefore, PREPA must keep and maintain existing generating units operational and running until the reliable integration of new resources is completed.

Pursuant to the IRP Order, the thermal units’ retirement must be “in accordance with PREPA’s caveats<sup>12</sup> indicating a need for replacement capacity, assurance of meeting the overall reliability needs, and in alignment with more specific timing thresholds described in the Modified Action Plan.” *Id.* at p. 193, ¶ 630. In tandem with the above, the Energy Bureau adopted PREPA’s caveats and limitations related to the retirement of existing generating units, which provide that:

---

<sup>11</sup> IRP Order at p. 10, ¶ 64 (“The Energy Bureau FINDS that PREPA should retire its older, oil-fired steam assets in order of the declining cost to operate when they are no longer necessary for system reliability. The retirements should align with synchronous condenser conversion.”); *see also, id.* at p. 193, ¶ 630.

<sup>12</sup> Included in PREPA’s proposed IRP at Part 9, Caveats and Limitations, No. 17, p. 9-4, filed in case no. CEPR-AP-2018-0001, *In Re: Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*.

- The recommendations are based on other prerequisite developments which include the forecasted reduction in load, assumed levels of reliability of the remaining of the existing fleet at the time of retirement, and the commissioning of the new generation resources and
- the retirement of existing generating units should be only implemented after all the prerequisites above have been met, particularly that all new resources are fully operational, and units planned for retirement are not required for reliable operation of the system.

PREPA's proposed IRP, Part 9, Caveats and Limitations, no. 17, p. 9-4.

Pursuant to the above, PREPA is committed to determining the generating units' retirement schedules consistent with the Approved IRP and Modified Action Plan and keeping the units operational until they are no longer necessary for reliable system operations. Given that the decision of retiring existing generating units depends on the reliable integration of new resources, the new generating facilities shall be fully operational and dependable before existing generating units are retired. Otherwise, retiring existing units before the new resources are interconnected and fully operational will have the effect of reducing substantially the system's reliability, resulting in prolonged outages affecting the health, safety, and quality of life of thousands of customers. In addition to the generating capacity considerations, the retirement schedules shall consider the ancillary services provided by most of the existing generating units, like voltage and frequency regulation, plus the necessary electrical system's improvements.

Accordingly, and given the development and interconnection timeline for the renewable projects, PREPA currently needs to maintain all its generating units fully operational and available. Furthermore, and during the transition phase, PREPA must guarantee strict compliance with other

regulatory mandates, like environmental regulations, while the existing units remain operational. The actions described below will assist PREPA to achieve these objectives.

### **III. Environmental Compliance**

As an electric utility, PREPA must comply with different environmental laws and regulations, including the Clean Air Act (CAA)<sup>13</sup>, which is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorizes the EPA to establish NAAQS to protect public health and public welfare and to regulate emissions of air pollutants, including hazardous air pollutants.

Under Section 107(a) of the CAA, each state, territory, or local air district has the primary responsibility for submitting a state implementation plan (SIP) for specifying the manner in which NAAQS will be achieved and maintained within each of its air quality control regions. 42 U.S.C. § 7407(a). The CAA also requires that the EPA review and approve SIPs that meet the requirements of the Act. In the case of Puerto Rico, compliance with the CAA requires the DNER to submit a SIP for EPA's approval in relation to the 2010 1-Hour Sulfur Dioxide (SO<sub>2</sub>) NAAQS.

The EPA designated the Guayama-Salinas and San Juan air districts as nonattainment areas for the SO<sub>2</sub> NAAQS, effective April 9, 2018. EPA's nonattainment designation was based on SO<sub>2</sub> modeling results from modeling performed on these air districts. On May 2016, the Government of Puerto Rico decided to use the EPA's approved air dispersion model (AERMOD) as the strategy to demonstrate compliance with the SO<sub>2</sub> NAAQS.

The air district of Guayama-Salinas includes part of the municipalities of Guayama and Salinas. In the case of the San Juan air district, it includes the municipality of Cataño and part of

---

<sup>13</sup> 42 U.S.C. §§ 7401 *et seq.*

the municipalities of San Juan, Guaynabo, Bayamón, and Toa Baja. These air districts cover the area where PREPA's Aguirre, San Juan, and Palo Seco steam plants are located.

Given the nonattainment designation by EPA under the CAA, the DNER must submit a final SIP for EPA approval, which shall provide for attainment of the 2010 1-Hour SO<sub>2</sub> NAAQS in the Guayama-Salinas and San Juan nonattainment areas by April 9, 2023. The SIP was due to EPA by October 9, 2019. Because the DNER missed the October 9, 2019 deadline, EPA issued the *Findings of Failure To Submit (FFS) SIP Required for Attainment of the 2010 1-Hour Primary Sulfur Dioxide (SO<sub>2</sub>) NAAQS*, with an effective date of December 3, 2020. 85 Fed. Reg. 69,504 (Nov. 3, 2020). The FFS triggers CAA deadlines for EPA to impose mandatory sanctions if EPA has not determined that Puerto Rico made a complete SIP submittal and starts a 2-year clock for EPA to issue a Federal Implementation Plan (FIP).

According to the current Puerto Rico SIP process, EPA must determine that the DNER's final SIP submission is complete by June 3, 2022, to avoid the imposition of 2-to-1 offset sanctions in the nonattainment areas. If the EPA does not determine that DNER has made a complete SIP submittal by this date, each new ton of SO<sub>2</sub> emitted from any new or modified source in the nonattainment areas must be offset by a two-ton reduction. In addition to PREPA's power plants, the 2-to-1 offset sanction applies to all facilities considered as emissions sources in the nonattainment areas. To achieve compliance with EPA's regulations, the 2-to-1 offset sanction will require all the owners and operators of emissions sources in the nonattainment areas to implement emissions control measures for twice the emissions in comparison with their actual emissions. This sanction would increment the operational and maintenance costs of operating industrial and commercial facilities in the nonattainment areas, affecting the economic development in these areas.

Furthermore, if EPA does not determine that the SIP is complete by December 3, 2022, additional sanctions will apply, consisting of a moratorium on roads and highways funds for *all* projects in the nonattainment areas, except projects related to safety. In general, these projects include new roads or improvements to existing roads and highways. Puerto Rico depends on receiving federal funds for developing roads and highways projects, which can amount over \$144 million annually. These federal funds or part of them would enter in a moratorium if the SIP submitted by the DNER is not declared complete by December 3, 2022. In case the roads and highways funds moratorium sanctions are applied and considering the current fiscal situation of the Government of Puerto Rico, the safe transit across the roads and highways in the nonattainment areas would be adversely affected due to the lack of funds to execute the necessary maintenance, repairs, and construction on these roads and highways.

As part of the development of the SIP, the DNER has modeled the SO<sub>2</sub> emissions in the Guayama-Salinas and San Juan air districts and found that these areas cannot achieve attainment if PREPA continues using Bunker C and regular Diesel fuels in the generating units of Aguirre, San Juan, and Palo Seco Power Plants, absent generating unit retirements. When modeling combustion turbines using ultra-low sulfur diesel (ULSD), the emissions are reduced but not enough for achieving attainment, because of the Bunker C burning in the steam units. In the absence of generation retirements, various modeling runs indicated that achieving attainment in the relevant air districts would require burning natural gas in existing steam units of Aguirre, San Juan, and Palo Seco Power Plants.

Looking for an environmental compliance strategy that allows PREPA's thermal units to remain operational while the reliable transition to new renewable energy resources is achieved, PREPA held several meetings with DNER and EPA staffs during recent months. During these

meetings, both the DNER and PREPA agreed on the dual priorities of providing reliable electricity to the residents of Puerto Rico and meeting the NAAQS requirements, for the benefit of the health and welfare of the People of Puerto Rico. Some of these meetings have been held with EPA's staff from the Caribbean Environmental Protection Division located in Puerto Rico and from EPA's Region 2 office in New York.

On December 9, 2021, PREPA's Executive Director and DNER's Secretary held a meeting with Ms. Lisa F. García, Regional Administrator of EPA Region 2, at EPA's New York office. A copy of EPA's letter to PREPA summarizing this meeting discussion is attached to this motion as Exhibit A. During this meeting the parties discussed the possible emission reduction scenarios that can bring attainment of the SO<sub>2</sub> NAAQS, including the possibility of switching to natural gas as an option, along with long-term conversion to renewable energy sources. EPA's parallel SIP process for meeting the approaching deadlines was also discussed.

Among others, Ms. Lisa F. García from EPA states in her letter:

EPA is encouraged that PREPA is committed to continue working with PR DNER, and to provide the necessary technical information to perform the air quality modeling analysis for the San Juan and Guayama-Salinas nonattainment areas, determine appropriate 1-hour SO<sub>2</sub> emission limits, and identify other potential control strategies that are enforceable and can be implemented in a timely manner.

With respect to the assertion in PREPA's letter that it cannot retire certain baseload generating units as ordered by the Puerto Rico Energy Bureau, through the [Approved IRP], and that it intends to seek a modification of the IRP, EPA understands that PREPA is obliged, under Puerto Rico law, to comply with the IRP and that avenues exist for PREPA to seek modification of the IRP by the Puerto Rico Energy Bureau. EPA also notes that any modification to the IRP must ensure compliance with all environmental regulations and laws.

EPA encourages PREPA to continue to work with PR DNER to explore options for bringing the areas into attainment with the health-based 1-hour SO<sub>2</sub> standard. Perhaps an interim approach would be for PREPA to provide

PR DNER with a combination of emission reduction strategies to reach attainment.

Ex. A, Ms. F. Garcia letter at p. 2.

Considering the priorities of providing reliable electricity and meeting the SO<sub>2</sub> NAAQS, the DNER and PREPA have identified the following action items as feasible strategies for achieving attainment:

- Integration of renewable energy as mandated by the Approved IRP and Modified Action Plan.
- Substituting fuels used in existing thermal generating units.
- Development of an SO<sub>2</sub> monitoring network within the designated nonattainment areas for demonstrating attainment with the NAAQS.

Consistent with these actions, in the short-term, PREPA will:

- Complete Tranche 1 procurement process and continue working diligently with the remainder tranches mandated in the Modified Action Plan.
- Substitute regular diesel with Ultra-Low Sulfur Diesel (ULSD) fuel at combined cycle units, combustion turbines, and the aeroderivative machines located at the San Juan, Palo Seco, and Aguirre Power Plants.
- Comply with the DNER's requirements for the development of an SO<sub>2</sub> monitoring network.

Regarding this short-term strategy, PREPA is already completing the final phase regarding the completion of the renewables Tranche 1 RFP process, taking steps for substituting regular



diesel with ULSD fuel, and following the DNER's requirements to implement the SO<sub>2</sub> monitoring network<sup>14</sup>.

As explained in Part II of this motion, given the renewables resources interconnection conditions, achieving the RPS goals in a safe and reliable manner is a long-term effort, given that the renewable projects' completion date is not contemplated during the next year. Accordingly, it is not possible for the SO<sub>2</sub> NAAQS SIP to solely rely on the implementation of the new resources integration mandated by the Approved IRP and Modified Action Plan to achieve attainment with the NAAQS. To adequately maintain a safe and reliable electric service for the people of Puerto Rico, PREPA will need to execute the necessary actions to keep its steam units operational and in compliance with the environmental regulations. As explained before, modeling results indicate that achieving attainment with the SO<sub>2</sub> NAAQS would require burning natural gas at existing steam units. Thus, in the short and medium term, pursuing the substitution of Bunker C fuel with natural gas in the steam units at the San Juan, Palo Seco, and Aguirre Power Plants would be an appropriate course of action.

Currently, there is no natural gas infrastructure on the premises of the Palo Seco and Aguirre power plants. This constraint, together with the lack of a current final integration schedule for the renewable resources, do not allow PREPA to establish a SO<sub>2</sub> compliance strategy based on natural gas fuel switching for the steam units at the Palo Seco and Aguirre Power Plants, at this stage. Hence, PREPA will continue focusing on the finalization of the Tranche 1 renewables and energy storage projects mandated by the Approved IRP and Modified Action Plan and, once there is a clearer renewables integration schedule, PREPA will present additional SO<sub>2</sub> SIP compliance

---

<sup>14</sup> On February 2, 2022, PREPA and DNER executed a memorandum of understanding (MOU) stating PREPA's responsibilities in the development of the SO<sub>2</sub> monitoring network, as required by the DNER. The MOU is attached to this motion as Exhibit B.

strategy and commitments related to natural gas for the Palo Seco and Aguirre Power Plants, as necessary. The renewables and energy storage projects integration schedule should be known once the Tranche 1 process concludes during the first semester of year 2022. In case the SO<sub>2</sub> SIP cannot be met with the new resources' integration mandated by the Approved IRP and Modified Action Plan, to maintain a safe and reliable electric service for the people of Puerto Rico, PREPA will execute the necessary actions to keep Palo Seco and Aguirre steam units operational and in compliance with the environmental regulations. This will be done in consultation with the relevant regulatory entities, such as EPA, DNER, and the Energy Bureau.

In the case of the San Juan Power Plant, there is nearby natural gas infrastructure, which is currently supplying the San Juan Combined Cycle units 5 and 6. This existing infrastructure can be used to supply natural gas to San Juan steam units 7, 8, 9, and 10, in an effort to achieve attainment with SO<sub>2</sub> in the San Juan air district. The burning of natural gas in these generating units will allow them to remain operational and in compliance with environmental regulations during the years that the renewable resources are safely integrated in the electrical system. In light of the above, PREPA has determined to pursue conversion of San Juan steam units 7, 8, 9, and 10 ("SJ 7-10") to combust natural gas to achieve attainment with the 2010 1-Hour SO<sub>2</sub> NAAQS mandated in the CAA. Accordingly, PREPA hereby seeks leave from the Energy Bureau to pursue this project of paramount importance, which will benefit the people of Puerto Rico in the following ways:

1. It is an essential step to achieve attainment with the 2010 1-Hour SO<sub>2</sub> NAAQS in the San Juan air district and, consequently, helping the Government of Puerto Rico to avoid costly sanctions, especially those that represent losing federal funds for roads and highways improvements.

2. Burning natural gas in SJ 7-10 will significantly reduce emissions to the air of SO<sub>2</sub> as well as other pollutants, which has a direct effect in the environment and health of the People of Puerto Rico, particularly those that live and work in the municipalities of San Juan, Guaynabo, Bayamón, and Toa Baja. A summary of the DNER modeling results showing the reduction in emissions when burning natural gas in SJ 7-10 is attached to this motion in Exhibit C.
3. Converting SJ 7-10 to natural gas will also achieve compliance of these units with the Mercury and Air Toxics Standards (MATS) required by EPA, 40 CFR 63 Subpart UUUUU - National Emission Standards for Hazardous Air Pollutants which became effective on April 16, 2012. As such, several PREPA units were subject to the regulation on the Non-Continental Liquid Oil Fired Electric utility steam-generating unit (EGU). As regulation compliance strategies, PREPA effectively committed and completed the dual fuel conversion of its Costa Sur 5 and 6 units, adding natural gas to the operation. Similarly, PREPA is adopting this compliance strategy with the regulation by achieving the dual fuel conversion project in the San Juan Steam Plant Units 7, 8, 9, and 10.
4. Because natural gas is a much cleaner fuel than Bunker C, the operations and maintenance costs of burning natural gas in SJ 7-10 are lower than those of burning Bunker C. This reduction in operations and maintenance costs results in lower costs in customers energy bills.
5. The fuel market prices of natural gas do not have as much fluctuation as those of petroleum derivatives, like diesel and Bunker C fuels. In addition, natural gas prices

tend to be lower than diesel and Bunker C fuel prices. These economic aspects result in a more stable and lower fuel cost for the customers.

#### **IV. Environmental Compliance Plan for SJ 7-10**

PREPA seeks leave from the Energy Bureau to initiate works to convert SJ 7-10 to burn natural gas. The plan is to convert SJ 7-10 to dual-fuel because, in the event of an emergency where the supply of natural gas is disrupted, these units must maintain the capacity of operating with an alternate fuel. It is respectfully asserted that the request made herein does not warrant an amendment to the Approved IRP or Modified Action Plan. The conversion of the SJ 7-10 units to dual-fuel units in no way interferes with the actions mandated by the Energy Bureau in the approved Modified Action Plan, nor with the Puerto Rico public energy policy established by the Legislature of Puerto Rico.

As explained in Section III of this motion, with this conversion PREPA will add reliability to the system during the development and interconnection for the renewable projects. Moreover, conversion to dual-fuel units will help PREPA achieve attainment with the 2010 1-Hour SO<sub>2</sub> NAAQS in the San Juan air district and comply with MATS rule, significantly reducing the emissions profile of these units and thus, achieving environmental regulatory compliance, while providing cost-effective generation in the North of the Island where the majority of the demand is located.

Furthermore, PREPA hereby informs the Energy Bureau that it has already started conversations with AES Puerto Rico (“AES”) to substitute its generating capacity with baseload capacity burning a cleaner fuel, like natural gas, or other clean technology. AES existing power plant will cease operations by the end of its PPOA in December 2027, which represents the loss of generating capacity that currently supplies about 15% to 17% of the electrical demand supply

in Puerto Rico. If the alternative of substituting this generating capacity with clean energy materializes, the people of Puerto Rico would benefit for the reduction in emissions to the air and from the dependable generating capacity, which AES power plant could continue providing to the electrical system.

**a. The conversion is feasible**

The conversion of SJ 7-10 to combust natural gas as primary fuel is feasible. Assessments for this conversion were performed back in 2011, when PREPA conducted evaluations to convert Costa Sur steam units 5 and 6 to operate on natural gas fuel. The assessment summary reports of the conversion of San Juan units 7 and 8 and of San Juan units 9 and 10 are attached to this motion as Exhibits D and E, respectively. At that time, PREPA conducted evaluations, with the support of generating units' original manufacturers, regarding the conversion to operate with natural gas fuel of steam units at Costa Sur, Aguirre, Palo Seco, and San Juan, which resulted in a plan for converting these power plants' steam units to natural gas. One of the main purposes of this fuel conversion plan was to comply with MATS environmental rule. In addition, the natural gas supply to the SJ 7-10 is possible without the need to develop significant additional infrastructure. Currently there is a natural gas supply station located adjacent to the North side of San Juan power plant, which already supplies natural gas to units 5 and 6. Further, PREPA has confirmed that there is availability to supply the natural gas volume needed by all the San Juan steam units once they are converted.

**b. Added capacity and reliability**

SJ 7-10 added capacity is 400 MW. The conversion will not modify the capacity of these units. Nevertheless, due to environmental restrictions and repairs that are pending, the current available capacity is limited to 163 MW. Therefore, once SJ 7-10 are repaired and converted to

burn natural gas, the electric system will have an additional 237 MW of reliable generation compliant with the 1-Hour SO<sub>2</sub> NAAQS and MATS that will serve as base load generation. This added dependable generation capacity is essential for the reliable and safe integration of renewable energy in the power system.

Like the Energy Bureau reasoned when it approved the San Juan 5 and 6 steam units' conversion to operate with natural gas in January 2019<sup>15</sup>, and as the situation remains today, Puerto Rico needs reliable base load generation to provide much-needed stability for the system. In case of Puerto Rico, given the lack of base load from hydro or nuclear, and the projected retirement of coal-fired generation in 2027, the best option for environmental compliant base load, during the period of integration to renewable sources of generation, would be natural gas fired generating units. As with the San Juan 5 and 6 conversions, the conversion of SJ 7-10 will make available to PREPA necessary base load generation in a relatively short timeframe.

### **c. Conversion project schedule**

PREPA envisions that the execution of the engineering, procurement, and construction (EPC) of the SJ 7-10 conversion project and the completion of the environmental permits of all these units would take from five (5) to ten (10) years. It is estimated that the environmental permits process completion of each unit could take from eighteen (18) to twenty-four (24) months. For illustration purposes only, assuming February 2022 as the effective date of the EPC contract what follows is a hypothetical project schedule:

<b>Unit</b>	<b>Project Start<sup>16</sup></b>	<b>Project Completion</b>
San Juan 7	February 2022	January 2024

---

<sup>15</sup> See, *Resolution and Order* approving the conversion of San Juan 5 and 6 steam units to dual-fuel units, *In Re: Request for Proposals for Conversion of San Juan Units 5 & 6 to Natural Gas*, case no. CEPR-AP-2018-0001.

<sup>16</sup> The project start date refers to commencing the process of obtaining the required preconstruction permits and needed predesign engineering studies.

San Juan 8	February 2024	January 2026
San Juan 9	February 2026	January 2028
San Juan 10	February 2028	January 2030

This schedule shows a period of eight (8) years for converting all SJ 7-10. However, a reasonable contingency period of two (2) years should be added to this schedule, considering that the conversion project could be affected by unforeseen and extraordinary events such as atmospheric disturbances or earthquakes, among others. Therefore, it could take ten (10) years to develop the SJ 7-10 conversion project. According to PREPA's experience developing fuel conversion projects in existing generating units, the minimum time required for executing the SJ 7-10 conversion project is five (5) years.

#### **d. Cost estimate of the conversion**

Currently, PREPA does not have an estimate of what the conversion of SJ 7-10 will cost. Once PREPA performs the necessary assessment of the conversion cost, this information will be submitted to the Energy Bureau, along with the analysis of the savings associated with the lower cost of natural gas fuel supply when compared with Bunker C. PREPA will request federal funding to cover the cost of SJ 7-10 conversion to burn natural gas. Because federal funding programs are based on a reimbursement process, the first stages of the conversion project will be included in the Necessary Maintenance Expenses (NME) budget. PREPA will seek the approval of the Fiscal Oversight and Management Board (FOMB) to include the conversion project in the NME budget, including any revision of the current fiscal year NME.

### **V. Conclusion**

The Energy Bureau has stated on several occasions that shares PREPA's goal to ensure cost-effective and reliable supply of energy, while avoiding jeopardizing the health and safety of

the citizens of Puerto Rico, due to generation shortfalls and noncompliance with environmental regulations. With the conversion of steam units to burn natural gas, PREPA will achieve environmental regulatory compliance and will also add reliability to the system during the development and interconnection for the renewable projects.

PREPA looks forward to continue working together with the Energy Bureau for the benefit of the People of Puerto Rico.

**WHEREFORE**, PREPA respectfully requests the Honorable Energy Bureau to grant leave to begin works with the goal of converting the existing steam units of the San Juan power plant to burn natural gas to achieve environmental regulatory compliance.

**RESPECTFULLY SUBMITTED.**

In San Juan Puerto Rico, 11<sup>th</sup> day of February 2022.

*s/ Katuska Bolaños-Lugo*  
Katuska Bolaños-Lugo  
[kbolanos@diazvaz.law](mailto:kbolanos@diazvaz.law)  
TSPR No. 18,888

**DÍAZ & VÁZQUEZ LAW FIRM, P.S.C.**  
290 Jesús T. Piñero Ave.  
Oriental Tower, Suite 803  
San Juan, PR 00918  
Tel. (787) 395-7133  
Fax. (787) 497-9664



**CERTIFICATE OF SERVICE**

It is hereby certified that I have filed the foregoing with the Clerk of the Energy Bureau using the electronic filing system using <https://radicacion.energia.pr.gov/login> and also, that I have served a copy on LUMA Energy, LLC and LUMA Energy ServCo, LLC through their counsel of record at [laura.rozas@us.dlapiper.com](mailto:laura.rozas@us.dlapiper.com) and [margarita.mercado@us.dlapiper.com](mailto:margarita.mercado@us.dlapiper.com).

In San Juan Puerto Rico, this 11<sup>th</sup> day of February 2022.

s/ Katuska Bolaños-Lugo  
Katuska Bolaños-Lugo

## **Exhibit A**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

December 29, 2021

Mr. Josué A. Colón Ortiz  
Executive Director  
Puerto Rico Electric Power Authority  
P.O. Box 364267  
San Juan, PR 00936-4267

Dear Mr. Colón Ortiz:

Thank you for meeting with us on December 9, 2021 at the U.S. Environmental Protection Agency (EPA) office in New York City. I appreciated having the opportunity to discuss with you and Secretary Rafael Machargo of the Puerto Rico Department of Natural and Environmental Resources (PR DNER) the efforts by the Puerto Rico Electric Power Authority (PREPA) to implement SO<sub>2</sub> emission reduction measures in the nonattainment areas of San Juan and Guayama-Salinas, in order to address Puerto Rico's SO<sub>2</sub> State Implementation Plan (SIP).

During the meeting, you and Secretary Machargo described the dual priorities of providing reliable electricity to the residents of Puerto Rico and meeting the federal air quality standards. We agree both of these priorities are important to the health and welfare of Puerto Ricans. We also discussed the possible emission reduction scenarios that can bring attainment of the SO<sub>2</sub> air quality standard. You described the possibility of switching to natural gas as an option, along with long-term conversion to renewable energy sources. We mentioned the efforts of the Department of Energy's National Renewable Energy Laboratory in having conducted feasibility studies for solar-on-closed-landfills in PR, and we committed to provide you more information, which is attached to this letter. We also discussed EPA's parallel SIP process for meeting the approaching deadlines. We look forward to receiving the draft SIP documents, which Secretary Machargo indicated would be provided by the end of December.

In addition, I would like to address some of the items from your letter dated October 31, 2021, as it relates to Puerto Rico's SO<sub>2</sub> SIP. Your letter addressed PREPA's ability to retire or limit generation units. We thank you for including a summary of PREPA's emission modeling operating scenarios for the San Juan, Palo Seco, and Aguirre facilities and for your efforts in participating in the modeling technical workgroup calls with the PR DNER and EPA.

As your letter stated, the Puerto Rico government -- specifically the PR DNER -- must develop a SIP under the Clean Air Act (CAA) to demonstrate how the two SO<sub>2</sub> nonattainment areas in Puerto Rico will attain the 2010 1-hour SO<sub>2</sub> health-based standard. The SIP was due to EPA by October 9, 2019, and the attainment date is April 9, 2023. Because the PR DNER missed the October 9, 2019, deadline, EPA issued a finding of failure to submit (FFS) a nonattainment SIP, with an effective date of December 3, 2020. 85 *Fed. Reg.* 69504 (Nov. 3, 2020). The FFS triggers CAA deadlines for EPA to impose mandatory sanctions if EPA has not determined that Puerto Rico made a complete SIP submittal and starts a 2-year clock for EPA to issue a Federal Implementation Plan (FIP).

As you are aware, if the SIP is submitted and EPA affirmatively determines that it is timely and complete, the completeness determination will stop the sanctions clock that was triggered by the FFS

and terminate any applied sanctions due to the FFS. For the SIP submittal to be considered complete, enforceable emission measures and/or limits need to be in place through a state-approved rule or permit that has gone through a public review process. All other SIP-required elements must also be addressed and submitted. EPA must disapprove the SIP if it fails to demonstrate attainment by the required attainment date (April 9, 2023), fails to have enforceable emission measures and limits in place (through a SIP-approved rule or permit), or has other identified deficiencies. If EPA has not approved a SIP by December 3, 2022, EPA will be obligated to develop a FIP on its own, with no additional obligation to engage with Puerto Rico except for the public comment period.

EPA is encouraged that PREPA is committed to continue working with PR DNER, and to provide the necessary technical information to perform the air quality modeling analysis for the San Juan and Guayama-Salinas nonattainment areas, determine appropriate 1-hour SO<sub>2</sub> emission limits, and identify other potential control strategies that are enforceable and can be implemented in a timely manner.

With respect to the assertion in PREPA's letter that it cannot retire certain baseload generating units as ordered by the Puerto Rico Energy Bureau, through the Integrated Resource Plan (IRP), and that it intends to seek a modification of the IRP, EPA understands that PREPA is obliged, under Puerto Rico law, to comply with the IRP and that avenues exist for PREPA to seek modification of the IRP by the Puerto Rico Energy Bureau. EPA also notes that any modification to the IRP must ensure compliance with all environmental regulations and laws.

EPA encourages PREPA to continue to work with PR DNER to explore options for bringing the areas into attainment with the health-based 1-hour SO<sub>2</sub> standard. Perhaps an interim approach would be for PREPA to provide PR DNER with a combination of emission reduction strategies to reach attainment.

PREPA should not hesitate to contact our team at the EPA to further discuss these options. Please reach out to Richard Ruvo, Director of the Air and Radiation Division, at (212) 637-4014.

Sincerely,

A handwritten signature in black ink, appearing to read 'LFG' followed by a stylized flourish.

Lisa F. Garcia  
Regional Administrator

cc: Richard Ruvo, Director  
Air and Radiation Division, EPA Region 2

Rafael A. Machargo Maldonado, Secretary  
Puerto Rico Department of Natural and Environmental Resources

**Exhibit B**

**GOVERNMENT OF PUERTO RICO  
PUERTO RICO ELECTRIC POWER AUTHORITY  
MEMORANDUM OF UNDERSTANDING**

-----**APPEAR**-----

**AS FIRST PARTY:** The Puerto Rico Electric Power Authority (PREPA), a public corporation and government instrumentality of the Commonwealth of Puerto Rico, created by Act 83 of May 2, 1941, as amended (Act 83), represented in this act by its Executive Director, engineer Josué A. Colón Ortiz, of legal age, married, and resident of Caguas, Puerto Rico. -----

**AS SECOND PARTY:** The Department of Natural & Environment Resources (DNER) an agency of the Commonwealth of Puerto Rico, created by Act 23 of June 20, 1972, as amended (Act 23), represented in this act by its Secretary, Rafael Machargo Maldonado, of legal age, married and resident of Gurabo, Puerto Rico. -----

Both PREPA and DNER are herein individually referred to as a Party and collectively referred to as the Parties. -----

-----**WITNESSETH**-----

WHEREAS, PREPA was created to provide electrical energy in a reliable way contributing to the general welfare and sustainable future of the people of Puerto Rico, maximizing benefits and minimizing social, environmental, and economic impacts. In addition, PREPA provides a service based on the affordable, fair, reasonable, and non-discriminatory cost that is consistent with environmental protection, non-profit model, and focused on citizen participation and its clients. -----

WHEREAS, the main function of the DNER is to protect, conserve, and manage the natural and environmental resources of Puerto Rico in a balanced way. -----

Memorandum of Understanding between the Puerto Rico Electric Power Authority and  
the Department of Natural and Environmental Resources of Puerto Rico  
Page 2

WHEREAS, the Parties have the authority to enter into this Memorandum of Understanding (MOU) to share technical and economic resources for the benefit of the citizens of Puerto Rico. -----

WHEREAS, DNER is the agency of the government of Puerto Rico leading the development of the State Implementation Plan (SIP) required by the United States Clean Air Act (CAA), administered by the United States Environmental Protection Agency (EPA) to achieve National Ambient Air Quality Standards (NAAQS). -----

WHEREAS, the development of the SIP includes a specific plan for each designated non-attainment area in Puerto Rico required to meet the sulfur dioxide (SO<sub>2</sub>) NAAQS (Non-Attainment Areas).-----

WHEREAS, the DNER and the EPA designated two (2) Non-Attainment Areas, one in the North and a second one in the South of Puerto Rico where PREPA has some of its generation's plants. -----

WHEREAS, the DNER will concentrate its regulatory efforts on addressing compliance with the NAAQS for SO<sub>2</sub> (one-hour standard 196 µg/m<sup>3</sup>) within the two designated Non-Attainment Areas. -----

WHEREAS, as part of the efforts to achieve and demonstrate attainment of the NAAQS for SO<sub>2</sub> in the Non-Attainment Areas, the installation of twelve (12) SO<sub>2</sub> ambient air monitoring stations (the "Air Monitoring Stations"), six (6) in the North (within or near the San Juan, Cataño, Guaynabo, and Toa Baja Non-Attainment Area) and six (6) in the South (Guayama-Salinas Non-Attainment Area), is necessary to validate attainment. ---



WHEREAS, siting, installation, operation, and data collection of the Air Monitoring  
Stations shall be consistent with applicable EPA guidance (e.g. 2016 SO<sub>2</sub> NAAQS  
Designations Source-Oriented Monitoring Technical Assistance Document). -----

WHEREAS, the major objectives of the SO<sub>2</sub> Air Monitoring Stations are (i) demonstrating  
attainment of the SO<sub>2</sub> NAAQS, and (ii) future calibration of the AERMOD mathematical  
model to allow predictions consistent with the measured data. -----

WHEREAS, although PREPA has been appointed as the primary entity responsible for  
the designation of the two (2) Non-Attainment Areas, the DNER, as the Puerto Rico state  
environmental agency responsible for implementing, maintaining and enforcing the  
NAAQS, is the entity that must carry out the monitoring work. -----

NOW, THEREFORE, in consideration of the mutual covenants and agreements  
contained in this Memorandum of Understanding, hereinafter stated, the Parties agree to  
themselves, their personal representatives, and successors, enter into this agreement  
under the following: -----

-----**TERMS AND CONDITIONS**-----

**FIRST:** The DNER as an independent regulator is the entity that will carry out the ambient  
monitoring work in the Non-Attainment Areas in the North (extending through San Juan,  
Cataño, Bayamón, and Toa Baja) and South (including Salinas and Guayama) of  
Puerto Rico, in accordance with current EPA Ambient Monitoring guidance. -----

**SECOND:** The DNER will be responsible for the operation of the ambient monitoring  
network, data gathering, analysis, and validation of all data secured consistent with the





Memorandum of Understanding between the Puerto Rico Electric Power Authority and  
the Department of Natural and Environmental Resources of Puerto Rico  
Page 4

guidelines approved by the EPA. These efforts are required to validate attainment of the  
NAAQS SO<sub>2</sub> standard with the goal of redesignating the Non-Attainment Areas to  
attainment. -----

**THIRD:** DNER will be responsible for ensuring conformance with applicable EPA  
guidance, including with respect to quality assurance and data completeness, and will  
certify such conformance on a monthly basis. -----

**FOURTH:** DNER will be responsible for: -----

- 
- 
1. Procuring and installing the SO<sub>2</sub> Air Monitoring Stations and all related equipment and  
required appurtenances, as described in Attachment 1. -----
  2. Guaranteeing the appropriate selection of the SO<sub>2</sub> Air Monitoring Stations to be  
installed. -----
  3. Assuring the operation, maintenance, security, and availability of the monitoring  
station and its systems. -----
  4. The contracting of an environmental consultant qualified in the preparation and  
assessment of emissions data inventories of air pollutants, air quality analysis and  
modeling, including weather and meteorological data, and federal environmental laws.

**FIFTH:** For this project, PREPA will contribute with a not-to-exceed amount of \$4,673,370  
during the four-year term of the MOU, which includes the base preliminary budget detailed  
in Attachment 2, \$4,063,800, plus a contingency of fifteen percent (15%), \$609,570. For  
each year of the MOU, the not to exceed amount will be as follow: -----

First Year - \$2,968,092.50


Memorandum of Understanding between the Puerto Rico Electric Power Authority and  
the Department of Natural and Environmental Resources of Puerto Rico  
Page 5

Second Year - \$691,092.50

Third Year - \$507,092.50

Fourth Year - \$507,092.50

These funds shall be used for the following actions: (i) acquisition and installation of the Air Monitoring Stations; (ii) maintenance service; (iii) operational costs; (iv) quality assurance; and (v) contracting a qualified environmental consultant to a) prepare the emission data inventories, b) assess and analyze such data to prepare the monthly reports, in order to comply with the SIP rules, and c) to provide expert testimony to EPA, if necessary. -----



**SIXTH:** The DNER will provide PREPA with an invoice or quotation with supporting documents for each of the equipment, materials, and services used in the project so that PREPA can proceed to reimburse or pay for them. Invoices should be provided to PREPA within 30 days of purchase, in the case of reimbursement, and quotations should be provided at least 30 day prior to DNER's request to purchase. An authorized representative of the DNER must certify the invoice or the quotation. -----

**SEVENTH:** DNER shall share with PREPA the raw data, maintenance reports, and quality assurance documentation generated by the Air Monitoring Stations. -----

**EIGHTH:** DNER agrees to share and discuss with PREPA any commitments related to the SIP, which may affect PREPA's ability to provide the essential energy service to the citizens of Puerto Rico, before its submittal to EPA. -----

**NINETH:** Applicable Law and Venue: This agreement shall be governed by the laws of the Commonwealth of Puerto Rico. Also, the Parties expressly agree that only the San Juan Superior Court of Puerto Rico will be the court of competent and exclusive jurisdiction to decide over the judicial controversies that the appearing Parties may have among them regarding the terms and conditions of this MOU. -----

**TENTH:** DNER agrees to save and hold harmless and to indemnify PREPA for all expenses and costs of any nature (including reasonable attorneys' fees) incurred by PREPA arising out of any third party claim made by any person for bodily injuries, including death, or for property damage, to the extent directly caused by DNER, its employees, consultants, contractors or subcontractors by its negligent act or omission, in the performance or nonperformance of its obligations under the MOU and SO<sub>2</sub> monitoring system, but not to the point directly caused by negligence or tort of PREPA or a third party, which is not an employee or subcontractor of DNER. PREPA agrees to save and hold harmless and to indemnify DNER for all expenses and costs of any nature (including reasonable attorneys' fees) incurred by DNER arising out of any third party claim made by any person for bodily injuries, including death, or for property damage, to the extent directly caused by PREPA, its employees, consultants, contractors or subcontractors by its negligent act or omission, in the performance or nonperformance of its obligations under the MOU and SO<sub>2</sub> monitoring system, but not to the point directly caused by negligence or tort of DNER or a third party, which is not an employee or subcontractor of PREPA. -----



Memorandum of Understanding between the Puerto Rico Electric Power Authority and  
the Department of Natural and Environmental Resources of Puerto Rico  
Page 7

The terms and conditions contained herein constitute the entire agreement between the  
Parties with respect to the subject matter of this MOU and supersede all communications,  
negotiations, and agreements between the Parties, whether written or oral, other than  
these, made prior to the signing of this MOU.-----

IN WITNESS THEREOF, the Parties hereto sign this Memorandum of Understanding in  
San Juan, Puerto Rico this 2nd day of February 2022. -----

Puerto Rico Electric Power Authority



Josué A. Colón Ortiz  
Executive Director  
Tax ID: 660-43-3747

Department of Natural and  
Environmental Resources



Rafael Machargo Maldonado  
Secretary  
Tax ID: 660-43-3481

  
Revised by: Hiram J. Zayas, Esq.  
Legal Affairs Office, DNER

**Attachment 1**  
**Preliminary Air Monitoring Stations Implementation Schedule**

Action Required	Date
Selection of external environmental consultant	February 2, 2022
Compilation of equipment and related appurtenances specifications	February 2, 2022
Coordination of meeting at General Services Administration	February 9, 2022
Completion of purchasing transactions	March 21, 2022
Hiring of required resources	April 1, 2022
Proposed Air Monitoring Stations operation	August 12, 2022

**Attachment 2**  
**Base Preliminary Budget for Air Monitoring Stations**

Expense Type	MOU Year			
	First	Second	Third	Fourth
Acquisition and installation of 12-SO <sub>2</sub> monitoring stations	\$1,680,000	---	---	---
Maintenance, service, and operation cost	\$100,950	\$100,950	\$100,950	\$100,950
<b>Sub-Total:</b>	\$1,780,950	\$100,950	\$100,950	\$100,950
Hiring of environmental consultant law	\$800,000	\$500,000	\$340,000	\$340,000
<b>Total:</b>	\$2,580,950	\$600,950	\$440,950	\$440,950

**Exhibit C**

Natural Gas Advantage - Estimated SO2 Emission Reductions
---

Unit	SO2 Emission Rate (Lb/Hr)			
	.5%/wt Sulfur Content Bunker C	.05%/wt Sulfur Content Diesel	1 gr/100 dscf Sulfur Content Natural Gas	Percent Reduction
SJ 5		84.7	4.9	94%
SJ 6		84.7	4.9	94%
SJ 7	540.9		2.8	99%
SJ 8	540.9		2.8	99%
SJ 9	540.9		2.8	99%
SJ 10	540.9		2.8	99%

Unit	Base Load Heat Input (MMBtu/Hr)		
	Bunker C	Diesel Fuel	Natural Gas
SJ 5		1694	1748
SJ 6		1694	1748
SJ 7	1007.3		
SJ 8	1007.3		
SJ 9	1007.3		
SJ 10	1007.3		

Fuel Type	Emission Factor per Fuel	
	Fuel Sulfur Content	Emission Factor (Lb/MMBtu)
Bunker C	.5%/wt	0.537
Diesel	.05%/wt	0.05
Natural Gas	1 gr/100 dscf	0.0028

**Exhibit D**





**Summary Report – Units 7-8**

**Revision 3**

January 5, 2011

Coen Company  
Messrs. Mike McElroy & Vivek Chetty  
100 Foster City Boulevard  
Foster City, California 94404

**Re: Summary Report – Boiler Performance Modeling -- PREPA San Juan GS Boilers 7/8**

Dear sirs:

This is in response to your verbal request by Mr. Mike McElroy for a brief, bullet type interim summary report of the findings related to the boiler performance modeling results developed for conversion of these duplicate units from heavy oil firing to natural gas.

The objective of this abridged report is to;

- Present results of the boiler performance under oil test conditions at 100 and 71 MW, respectively, and extrapolated load to peak boiler load rating.
- Present the results firing natural gas without changes to the design or boiler operation.
- Present the results with various alterations to safely and efficiently operate with natural gas. This includes operational changes, heating surface adjustments and boiler load derating.
- Provide a basis of discussion with the owner as to which option(s) should be pursued to a more detailed level.

**Introduction**

San Juan GS Units 7 & 8 are duplicate Babcock & Wilcox units. These boilers are natural circulation radiant boilers, El Paso configuration, single reheat, balanced draft with single furnace, front wall firing pattern with nine (3 x 3 array) burners. They are rated with a MCR main steam flow of 787,000 lb/hr at 1005°F and 1,800 psig at the superheater outlet, with a corresponding reheat steam flow of 693,000 lb/hr at 1,000°F. The units were commissioned in 1966.

Both units operate in a load following mode for grid frequency stabilization in the range of 70 to 90 MW, with a capability of operating up to approximately 100 MW.

The draft system was converted from a pressurized to balanced draft design on both units a number of years ago.

In early December 2010 Coen recorded the requested boiler board and DCS screen prints performance data. S E&C utilized this information along with boiler arrangement drawings and respective sections to develop the baseline boiler performance modeling cases. These focused on the 71 and 100MW load points since this is the normal operating load range.

**Analyses Done**

The cases run spanned the normal boiler operating range and considered a number of boiler design and operating changes to maintain the design steam temperatures and strived to: minimize reheat spray attemperation flow, maintain the front primary superheater outlet temperature to <~950°F, maintain the outlet steam temperature directly downstream of the respective spray attemperators greater than 25°F above saturation temperature, and maintain an economizer outlet water approach temperature (to saturation) of at least 60°F.

The 16 specific cases run include;

1. 100MW - OIL
2. 71 MW - OIL
3. Peak Load - OIL
4. 100MW - Nat. Gas
5. 71 MW - Nat gas
6. Peak Load - Nat. gas
7. 100 MW - OIL- Surf. Adj.
8. 71 MW - OIL- Surf. Adj.
9. 100 MW - OIL- Surf. Adj. & FGR
10. 71 MW - OIL- Surf. Adj. & FGR
11. 100 MW - Nat. Gas- Surf. Adj.
12. 100 MW - Nat. gas - Surf. Adj.
13. 51 MW - Nat. Gas - Derate
14. 51 MW - Nat. Gas - Derate & Surf. Adj.
15. 100 MW – Combination Firing, 67 % Nat. gas and 33% Oil
16. Peak Load – Combination Firing, 67 % Nat. gas and 33% Oil

The summarized modeling results are attached in the Excel file -- ***U7-8 Summary(1)***.

**Summary of Results**

S E&C was successful in developing boiler operating cases considered as being representative, and which can be used to project boiler operation at peak boiler load rating on both oil and natural gas firing. The major findings and results are listed below;

- Based on the performance data recorded with the boiler firing oil, the boiler does not operate throughout the load range in a manner consistent with the B & W original prediction. FGR is neither needed nor controlled to maintain design steam temperature levels throughout the normal operating range.
- There is presently a nominal quantity of reheat spray attemperation used at load points extending down to 50 MW firing oil, which indicates and confirms that boiler surfacing does not perform as the boiler was originally designed.
- To operate the Unit on 100% natural gas without doing any operational or design modifications, it is estimated that derating the Unit to ~50 MW is necessary (Case #13) without excessive reheat spray, which could affect the LP turbine backend.
- One option investigated, on the applicable runs (Cases #7-12, and #14), the optimum heating surface adjustments included a 25 percent reduction of reheater surface, a 50 percent surface reduction in the rear (inlet) primary superheater section, and the addition

of 50 percent heating surface in the economizer to maintain boiler heat absorption. The backpass heating surface adjustments also attained a weight balance and maintained a suitable economizer approach temperature differential.

- An operating scheme using oil cofiring with natural gas throughout the normal operating load range produced significant improvement over unmodified 100% gas baseline conditions with reduced spray flow rates and also a lower Primary Superheater Outlet Steam Temperature level. The concept is to use oil in the uppermost row of burners, which results in a 67% nat. gas and 33% oil blend being fired.
- It is likely that the SH spray attemperation valving and nozzle sizing may have to increase to achieve high load ratings when firing natural gas. Both SH spray attemperation valves are each rated at 27,000 pph and the nozzles are each rated for 20,000 pph. There is no data on the RH spray valve & nozzle capacity, but it is very likely that the RH attemperation valve and nozzle sizing will need to be increased as well.

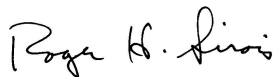
### **Concluding Remarks**

The fuel conversion project being planned on Units 7 & 8 will require either operational changes such as boiler derating or oil/gas cofiring, or implementing expensive boiler design changes combined with using the existing FGR system to maintain steam temperatures when oil firing. As a practical approach, we recommend the following approach be taken to complete this evaluation:

- Eliminate the option to alter boiler superheater and reheater heating surface areas. This would be very expensive (estimated at > \$5 million per unit) and time consuming to implement. Further, it could reduce the value of boiler section replacements made a few years ago.
- Derating load to ~50 MW when firing 100% natural gas would require no physical changes to the boiler, but, it would reduce the operating flexibility and economy now existing.
- Cofiring natural gas with oil offers maximum operating flexibility throughout the load range as it very likely permits full load operation. It is a technically acceptable and economical solution if SH & RH spray system upgrades are done, and it is confirmed that the turbine LP exhaust and the condenser can accommodate the additional flow. One likely scenario would be to fire 100% natural gas up to 50 MW, then as load is raised fire oil to gradually reduce the proportion of gas to 60-70% heat input up to 100 MW. The exact proportions of gas and oil would be determined by operational tests.

Please call me at 978 939-5142 should you have any questions related to this report.

Very truly yours,



Roger H. Sirois P.E.  
President

Attachment

## **Exhibit E**



**Summary Report – Units 9-10**

**Revision 3**

January 5, 2011

Coen Company  
Messrs. Mike McElroy & Vivek Chetty  
100 Foster City Boulevard  
Foster City, California 94404

**Re: Summary Report – Boiler Performance Modeling -- PREPA San Juan GS Boilers 9/10**

Dear sirs:

This is in response to your verbal request by Mr. Mike McElroy for a brief, bullet type interim summary report of the findings related to the boiler performance modeling results developed for conversion of these duplicate units from heavy oil firing to natural gas.

The objective of this abridged report is to;

- Present results of the boiler performance under oil test conditions at 99 and 71 MW, respectively, and extrapolated load to peak boiler load rating.
- Present the results firing natural gas without changes to the design or boiler operation.
- Present the results with various alterations to safely and efficiently operate with natural gas. This includes operational changes, heating surface adjustments and boiler load derating.
- Provide a basis of discussion with the owner as to which option(s) should be pursued to a more detailed level.

**Introduction**

San Juan GS Units 9 & 10 are duplicate C-E (now Alstom) units. These boilers are natural circulation radiant boilers, El Paso configuration, single reheat, balanced draft with single furnace, four-corner firing pattern with five levels of non-tilting circular Peabody burners retrofitted in 2001. They are rated with a MCR main steam flow of 787,000 lb/hr at 1005°F and 1,800 psig at the superheater outlet, with a corresponding reheat steam flow of ~693,000 lb/hr at 1,005°F. The units were commissioned in 1968 & 1969, respectfully.

Like for Units 7 & 8 both boilers operate in a load following mode for frequency stabilization in the range of 70 to 90 MW, with a capability for operating up to approximately 100 MW.

The draft system was converted from a pressurized to balanced draft design on both units a number of years ago.

In early December 2010 Coen recorded the requested boiler board and DCS screen prints performance data. S E&C utilized this information along with boiler arrangement drawings and respective sections to develop the baseline boiler performance modeling cases. These focused on the 71 and 99MW load points since this is the normal operating load range.

**Analyses Done**

The cases run spanned the normal boiler operating range and considered a number of boiler design and operating changes to maintain the design steam temperatures and strived to: minimize reheat spray attemperation flow, maintain the SH attemperator outlet steam temperature at a level greater than 640°F, maintain the PSH outlet steam temperature below ~735°F, and maintain an economizer outlet water approach temperature (to saturation temperature) of at least 60°F.

The 21 specific cases run include;

1. 99 MW - OIL
2. 71 MW - OIL
3. Peak Load - OIL
4. 99 MW - Nat. Gas
5. Peak Load - Nat gas
6. 71 MW - Nat. gas
7. 71 MW - Nat. gas, Tilt
8. Peak Load - Nat gas, Tilt
9. 99 MW - OIL- Burner Tilt, Surf. Adj. & FGR
10. Peak Load - OIL- Burner Tilt, Surf. Adj. & FGR
11. 71 MW - OIL- Burner Tilt, Surf. Adj. & FGR
12. 50 % Load - OIL- Burner Tilt, Surf. Adj. & FGR
13. Peak Load - Nat Gas- Burner Tilt, Surf. Adj.
14. 99 MW - Nat Gas- Burner Tilt, Surf. Adj.
15. 71 MW - Nat Gas- Burner Tilt, Surf. Adj.
16. 50 % Load - Nat Gas- Burner Tilt, Surf. Adj.
17. 50% Load, Oil, Burner Tilt, FGR
18. 99 MW - 67 % Nat. gas, 33% Oil
19. Peak Load - 67 % Nat. gas, 33% Oil
20. 99 MW - 67 % Nat. gas, 33% Oil, Burner Tilt
21. Peak Load - 67 % Nat. gas, 33% Oil, Burner Tilt

The summarized modeling results are attached in the Excel file – ***U9-10 Summary(1)***.

**Summary of Results**

S E&C was successful in developing boiler operating cases considered as being representative, and which can be used to project boiler operation at peak load rating on both oil and natural gas firing. The major findings and results are listed below;

- The boilers must utilize a fixed burner tilt position of -25 to -30 degrees when operating throughout the load range on 100% natural gas (or with significant quantities of natural gas cofiring). However, downward burner tilts alone produce marginal results in terms of risking water carryover into the finishing superheater per Cases #7 & #8.
- A more conservative combination of design features must be employed for 100% natural gas firing. In addition to the downward burner tilt, heating surface adjustments to the Finishing Superheater (-17%), the Reheater (-20%), Primary Superheater (-50%) and

- Economizer (+50%) are necessary, per Cases #9 to #16. Surface adjustments produce conservative characteristics needed to operate throughout the load range in a manner that will not jeopardize the PSH outlet temperature level, result in significant SH & RH spray flow, prevent spraying the SH to within 25°F of saturation temperature and protect the economizer from steaming.
- With a stationary, downward burner tilt position, FGR operation is likely needed when firing 100% oil to maintain design steam temperature levels. See Case # 17.
  - Without the revised heating surface arrangement it is unlikely that existing SH and RH attenuation systems are adequately sized to meet the predicted flow rate requirements. Therefore, their upgrading is required under any option selected other than for boiler SH & RH resurfacing .
  - Cofiring natural gas and oil offers an alternative to surface modifications as described below.

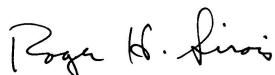
**Concluding Remarks**

The fuel conversion project being planned on Units 9 & 10 will require either operational changes such as boiler derating or gas/oil cofiring, or implementing expensive boiler design changes combined with using the existing FGR system to maintain steam temperatures when oil firing. As a practical approach, we recommend the following approach be taken to complete this evaluation:

- Eliminate the option to alter boiler superheater and reheater heating surface areas. This would be very expensive (estimated at >\$6 million per unit) and time consuming to implement. Further, it could reduce the value of boiler section replacements made a few years ago.
- There are no load points above 50 percent rating that will permit satisfactory operation with 100% natural gas without design or operating modifications.
- With the downward burner tilt setting, marginal performance will likely result throughout the normal operating load range firing gas. This option alone is expected to impose risk in attaining satisfactory operating characteristics in load changes and with varying degrees of furnace cleanliness.
- Cofiring natural gas with oil at high firing rates (e.g. > 50 MW) and firing gas only at lower load points (e.g., < 50 MW), and incorporating a fixed downward burner tilt position offers maximum operating flexibility throughout the load range. It is a technically acceptable and economical solution if a SH spray system upgrade is done. A possible operating scenario would be to operate up to 50 MW with 100% natural gas (or any proportion of gas and oil cofiring), and then to raise load while reducing the proportion of gas to 60-70% up to 100 MW. The optimum proportions of gas and oil would be determined by operational tests.

Please call me at 978 939-5142 should you have any questions related to this report.

Very truly yours,



Roger H. Sirois P.E.  
President  
Attachment