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

IN RE: HIGHLY EFFICIENT FOSSIL GENERATION DEFINITION	CASE NO.: CEPR-MI-2016-0001 SUBJECT: Comments on Proposed Definition

THE PUERTO RICO ELECTRIC POWER AUTHORITY'S COMMENTS ON THE PROPOSED DEFINITION OF THE TERM HIGHLY EFFICIENT GENERATION

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW, the Puerto Rico Electric Power Authority, through its counsel and respectfully submits its comments to the proposed definition of the term *Highly Efficient Generation* for the purposes of Act 60-2019[1] in compliance with the November 12, 2020 *Resolution*[2] issued by the Puerto Rico Energy Bureau of the Public Service Regulatory Board.

In San Juan, Puerto Rico, this 14th day of December 2020.

s/Katiuska Bolaños Lugo
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[1] *Puerto Rico Tax Incentives Code*, Act. No. 60 (July 1, 2019) ("Act 60-2019").
[2] *Resolution* dated November 12, 2020.

Exhibit A

PREPA's Generation Directorate Comments on the proposed definition

Comments to The Energy Bureau's proposed definition of the term Highly Efficient Generation provided by PREPA's Generation Directorate.

Eng. Alexis Cruz, Central Aguirre Chief:

In the proposed definition for highly efficient fossil generation provided by the Energy Bureau, subsection (B) describes Operational Requirement, (1), (i), it is necessary to consider the historical data for the cost of energy production from at least three consecutive recent years. Reviewing Puerto Rico's data will help to establish an achievable cost for energy production using fossil fuels with the existing units.

Eng. Jaime Umpierre, Chief of the Engineering and Technical Services Division:

The proposed definition provided by the Energy Bureau should define the minimum thermal performance, as well as the minimum and maximum generating capacity in the case of a system connected to the grid. The Energy Bureau should also consider establishing a penalty intended for an energy producer that does not meet the cost of production or comply with carbon dioxide (CO2) emissions requirements. In addition, a retroactive date for the requirements should be determined in case the proposed definition is not prospective to the date of its approval. The Energy Bureau should consider that none PREPA's units currently comply with the requirements.

It is important to note that the formula to calculate the annual cost of production is applicable to only to private / independent energy producers. In PREPA's case, it is difficult to determine the total amount billed by the seller per central or per generating unit, since the generating capacity is integrated to all the clients connected in the network.

Eng. Alejandro Castillo, Central San Juan Chief:

Due to the energy transformation that is in process, all analyzes point to, among other things, efficient, economic, and stable energy. With this in mind, energy companies must operate with the most efficient and lowest cost units possible for the customer. To achieve this, they should have among their program's efficiency tests of their units and plan to switch to more economical and less polluting fuels.

Eng. Herminia Arroyo, Central Cambalache Chief:

The gas turbines units of the Central Cambalache are used with the purpose to replace energy load or for emergencies. It is not clear how the Energy Bureau plans to apply or will treat the definition of high efficiency for the type of operation these units manage. Considering that most of the time the units are operated in the Rapid Spinning Reserve - RSR mode (60% relative load) which acts as a footbrake in cases of declines in the frequency of the electrical network. This operation is crucial for the stability of the network due to the peculiar design of the RSR, supplying 30 mw in 3 seconds. This implies a safety or reliability operation while not necessarily high efficiency one. There is no way that the units meet the definition of high efficiency, even more so when the operation is intermittent and when performing the annual efficiency and cost calculations, they are dependent on the total power generated. The lower the generation, the higher the cost and efficiency.

Exhibit B

PREPA's advisor Sargent & Lundy LLC. Comments on the proposed definition

Introduction

In PREB Resolution "Highly Efficient Fossil Generation Definition" (Case No. CEPR-MI-2016-0001) the criteria for a highly efficient fossil fired power plant are defined (Attachment 1). PREB requested comments on the proposed definition by December 14, 2020. This definition is only for the purposes of Act 60-2019 – "Incentives Code for Puerto Rico", and does not apply to the definition of the term "Highly Efficient Fossil Power Generation" as established in the March 20, 2019 resolution (Attachment 2). The main purpose of the Incentives Code is to promote economic development.

PREB Proposed Definition of the term "Highly Efficient Generation" for the purposes of Act 60-2019

Emissions Requirements

The PREB proposed definition of a highly efficient fossil fueled power generation established a maximum average annual rate of CO_2 emissions as noted below:

The average annual rate of carbon dioxide emissions from the generating unit, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the United States nationwide average for plants with the same primary fuel and primary fuel generation category as reported in the U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database ("eGRID") (or successor source) for the most recent year in which data is available. The Energy Bureau may modify the referenced limits based on updates to the eGRID (or successor) data.

The average annual rate of carbon dioxide emissions for the most recent year in which data is available are as follows:

Fuel Type	Average Annual Rate of CO_2 emissions (lbs/MWh)
Coal	2,187
Residual Fuel Oil	1,930
Diesel Fuel	2,681
Natural Gas	1,433

S&L Recommendation: Any new fossil fueled power generation, per the requirements of Act 17-2019 requires the availability of two fuels, the primary being natural gas. The projected CO_2 emissions, as an average annual rate, lbs/MWh, for the proposed black starts, peakers and new combined-cycle, are below the PREB's defined rates for diesel fuel and natural gas. Once the proposed new thermal generation modifications are implemented (installation of modern power generation technology including new black starts, peakers and combined-cycle units) the average annual rate of CO_2 emissions can be maintained below the limits established by the eGRID data.

Operational Requirements

Other criteria that must be meet to meet the definition of a highly efficient fossil generation include cost and efficiency.

Cost:

For fossil-fueled generation assets that use the electric grid to provide service to their respective clients, may it be in the form of a Power Purchase and Operating Agreement ("PPOA") with PREPA or its successor, or with a particular customer through the wheeling mechanism:

i. The yearly unit or system total cost of generating electricity cannot exceed $100/MWh (i.e. $0.10/kWh) adjusted to 2018 dollars. The cost per MWh shall be the total amount billed by the seller divided by the yearly net electrical power output of the unit or system.

S&L Recommendation: Any new fossil fueled power generation that is base loaded must operate with natural gas as the primary fuel. Based on current natural gas pricing, the expected yearly unit or system total cost of generating electricity is $80 to $100/MWh. Based on the current retirement projections, without the installation of a new, natural gas fired combined-cycle power plant, the remaining fossil fueled power generation or any new simple cycle generation cannot meet the proposed $100/MWh total cost of generating electricity.

The use of diesel fuel results in a much greater system total cost of about $140/MWh. To meet the PREB proposed operating costs, the use of diesel fuel must be limited; it is more advantageous to locate units so that gas fuel may be used and/or more efficient generating configurations are planned.

Efficiency

Combined Heat and Power

For fossil-fueled generation assets that provide service to its clients on site, may it be disconnected from the grid or connected for the purpose of exporting excess energy, or that provide service to its clients by using other means than the electric grid:

i. For Combined Heat and Power ("CHP") systems:

(a) The useful thermal energy output of the system is no less than fifty percent (50%) of the total energy output; and

(b) The fuel input, minus the useful thermal energy output, is no more than 7,000 BTU/kWh of generator output.

S&L Recommendation:

There are currently no existing or proposed Combined Heat and Power (CHP) Plants in the PREPA system. Therefore, this requirement of achieving a minimal balance between useful thermal energy output and generator output is not applicable to PREPA. In the future, should PREPA enter into an agreement with an industrial client to provide such thermal and power services, the target CHP efficiency will need to be thoroughly evaluated to achieve this PREB efficiency requirement.

All other Fossil-Fueled Assets

ii. For all other fossil-fueled generation assets:

(a) The average annual heat rate is less than 8,200 BTU/kWh.

For each "Highly Efficient Energy Producer", as such term is defined in Act 60-2019, the percentage of fossil-fueled generation considered highly efficient for any reporting year is calculated as follows:

$$Highly\ Efficient\ Generation\ (\%) = \frac{Total\ kWh\ from\ Highly\ Efficient\ Units}{Total\ kWh\ from\ all\ fossil-fueled\ generating\ units} \times 100\%$$

If the percentage of fossil-fueled generation considered highly efficient is greater than sixty percent (60%) for the reporting period, then it could be construed that the "Highly Efficient Energy Producer" met the requirements established in Act 60-2019.16"

S&L Recommendation:

With the installation of a new combined-cycle, peakers and black starts the projected PREPA fleet efficiency will be better than 60%. However, without the majority of the system power coming from large, natural fired combined cycle power plants, the 60% criteria cannot be achieved.

Conclusion

The PREB's proposed definition of "Highly Efficient Fossil Generation" cannot be met with the existing PREPA power generation fleet. It also cannot be met with the continued reliance on diesel and heavy fuel oils. The criteria used to define a highly efficient power plant can be met with the future envisioned PREPA fleet. The future PREPA fleet must include a new natural gas fired combined cycle power plant (300 to 400 MW) and the continued use of San Juan's gas-fired combined-cycle Units 5 and 6. The future peaking sites and black starts cannot be operated for a significant number of hours (burning either natural gas or diesel) as they have a negative impact on meeting the combined fleet efficiency criteria.

In order for PREPA to meet the "Highly Efficient Fossil Generation" criteria, PREB must allow for the installation of a new, gas-fired combined-cycle power plant. With the planned fleet retirements, and the suggested future conversions to the PREPA fleet (black starts with future conversions, peakers and a new combined-cycle power plant) there will be reliable, efficient power generation to promote the Incentives Code, and provide economic development. The use of additional gas-fired units in more efficient configurations (such as future black start or peaker combined-cycle conversions operating on natural gas) will provide additional cost benefits to PREPA and at the same time, drive the fleet efficiency towards improved conditions.

Attachments

1. Case No. CEPR-MI-2016-0001 – Resolution initiating the process for the adoption of a definition of the term “Highly Efficient Fossil Generation,” for the purposes of Act 60-2019, dated November 12,2020
2. Case No. CEPR-MI-2016-0001 – Resolution adoption the definition of Highly Efficient Fossil Generation, dated March 20, 2019

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

IN RE: HIGHLY EFFICIENT FOSSIL GENERATION DEFINITION	**CASE NO.:** CEPR-MI-2016-0001 **SUBJECT:** Resolution initiating the process for the adoption of a definition of the term "Highly Efficient Fossil Fuel Generation", for the purposes of Act 60-2019.

RESOLUTION

I. Introduction

On March 20, 2019, the Energy Bureau of the Puerto Rico Public Service Regulatory Board ("Energy Bureau") issued a Resolution ("March 20, 2019 Resolution") in the instant case through which it adopted the definition of the term "Highly Efficient Fossil Fuel Generation", as required by Article 6.29 of Act 57-2014.[1]

According to the definition, a generation unit is considered "Highly Efficient" if it meets two requirements: (1) the yearly unit total cost of generating electricity cannot exceed $100/MWh (*i.e.* $0.10/kWh) adjusted to 2018 dollars ("Cost Requirement"); and (2) the average annual rate of carbon dioxide emissions from the generating unit, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the United States nationwide average for plants with the same primary fuel and primary fuel generation category as reported in the U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database ("eGRID") (or successor source) for the most recent year in which data is available ("Emissions Requirement").[2]

On July 1, 2019, Act 60-2019, known as the Puerto Rico Incentives Code, was enacted. Chapter 7 of Subtitle B of Act 60-2019 describes the eligibility criteria, tax benefits and the requirements for the concession of such benefits, pertaining to infrastructure and green energy. To that effect, Section 2071.01 of Act 60-2019 establishes that Highly Efficient Energy Producers and properties dedicated to the production of Highly Efficient Energy may be considered an Eligible Business under such Act.[3] Specifically, paragraph (10) of Section 2071.01 of Act 60-2019 establishes, among other things, that:

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[1] Known as *The Puerto Rico Energy Transformation and RELIEF Act*, as amended.

[2] March 20, 2019 Resolution, p. 6.

[3] Paragraph (a)(45) of Section 1020.01 of Act 60-2019 defines the term "Eligible Business" as those individuals or business activities that qualify for a Decree under the Act. Paragraph (a)(20) of Section 1020.01 of Act 60-2019 defines the term "Decree" as the concession though a contract issued by the Secretary of the Puerto Rico Department of Economic Development and Commerce granting an Eligible Business the incentives and/or Tax

During the first five (5) years from the effective date of this Code, a business established or to be established in Puerto Rico by a Person, whether organized or not under a common name, may apply for a Decree to carry out the following eligible activities:

(i) A High-Efficiency Energy Producer engaged in the production, sale, or operation at a commercial scale for consumption in Puerto Rico, whether as owner and direct operator, or as owner of a system operated by a third party, or as operator of a system owned by a third party, in which case, both shall be considered an Eligible Businesses under this Chapter;

(ii) Equipment assembly, including the installation thereof, for High-Efficiency Energy Generation Systems;

(iii) Property devoted to the production of High-Efficiency Energy.

(iv) Every contractor under Act No. 120-2018, as amended, known as the "Puerto Rico Electric Power System Transformation Act," shall be eligible for a Decree under this subsection and/or tax treatment provided under subsection (a) of Section 12 of Act No. 29-2009, as amended, known as the "Public-Private Partnership Act".

For the purposes of the referenced Chapter 7, Paragraph (a)(14) of Section 1020.07 of Act 60-2019, defines the term "Highly Efficient Generation" as the production of electric power at a minimum of sixty percent (60%) in a highly efficient manner, **as established by the Energy Bureau, pursuant to Act 57-2014, as amended**. Similarly, Paragraph (a)(23) of Section 1020.07 of Act 60-2019 defines the term "Highly Efficient Energy Producer" as the operator of a Highly Efficient Generation System that generates and sells electricity at a commercial scale. Finally, Paragraph (a)(20) of Section 1020.07 of Act 60-2019 defines the term "Operator" as any person that controls, operates or manages a Production Unit, a Highly Efficient Generation System, a Sustainable Renewable Energy Source or an Alternate Renewable Energy Source.

Therefore, according to the provisions of the referenced Section 2071.01, eligible Highly Efficient Energy Producers are those dedicated to the production, sale or operation at a commercial scale, may it be as owner and direct operator, the owner of a system that is operated by a third party, or as the operator of a system that is owned by a third party, in which case, both may be considered an Eligible Business under Chapter 7 of Subtitle B of Act 60-2019. Moreover, as established in Paragraph (a)(14) of Section 1020.07 of Act 60-2019,

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Credits corresponding to such Eligible Business, subject to compliance with all applicable requirements and regulations, either under Act 60-2019 or prior incentives laws.

the Energy Bureau must define the term "Highly Efficient Generation", for the purposes of Act 60-2019.

Through this Resolution, the Energy Bureau publishes its proposed definition of the term "Highly Efficient Fuel Generation" for the purposes of Act 60-2019.

II. Energy Bureau's interpretation of Act 60-2019; Case No. NEPR-IR-2019-0001

On December 23, 2019, Crowley LNG Puerto Rico, LLC ("Crowley") filed before the Energy Bureau a document through which it requested the Energy Bureau to issue an interpretative resolution regarding certain provisions of Act 60-2019 ("Crowley's Petition"). The Energy Bureau considered Crowley's Petition under Case No. NEPR-IR-2019-0001.[4]

Crowley argued that, for the purposes of Act 60-2019, the current definition of the term "Highly Efficient Generation", as adopted by the Energy Bureau on its March 20, 2019 Resolution, does not apply to the operation of Combined Heat and Power ("CHP") systems or electrical power generating units that are commonly used in industrial and commercial settings.[5] In support of its argument, Crowley stated that such definition only encompasses the requirements for the generation units owned by the Puerto Rico Electric Power Authority ("PREPA") and by third parties selling power to PREPA.[6]

According to Crowley, the current definition of the term "Highly Efficient Generation" is designed to meet the policy objectives of Act 57-2014 of ensuring the modernization and/or the efficient use of fuel in order to reduce the costs of generating electricity in Puerto Rico.[7] As such, Crowley argued, this definition is not suitable for third parties unrelated to PREPA, for the purposes of Act 60-2019.[8]

After a thorough analysis of Crowley's Petition, as well as of Act 60-2019 and Act 57-2014, on March 5, 2020, the Energy Bureau issued a Resolution in Case No. NEPR-IR-2019-0001,[9] through which it determined that, for the purpose of Act 60-2019, there are two types of fossil-fueled generation assets: (i) assets that use the electric grid to provide service to their respective clients, may it be in the form of a Power Purchase and Operating Agreement ("PPOA") with PREPA or a particular customer through the wheeling mechanism; and (ii)

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[4] Crowley's Petition, In Re: Request for Interpretative Resolution; Crowley LNG Puerto Rico, LLC – Petitioner, Case No. NEPR-IR-2019-0001, December 23, 2019 ("Crowley's Petition").

[5] Crowley's Petition, p. 4.

[6] *Id.*, pp. 4 – 5.

[7] *Id.*, p. 4.

[8] *Id.*, pp. 4 – 5.

[9] Resolution, In Re: Request for Interpretative Resolution; Crowley LNG Puerto Rico, LLC – Petitioner, Case No. NEPR-IR-2019-0001, March 5, 2020 ("March 5, 2020 Resolution").

fossil-fueled generation assets that provide service to its clients on site, may it be disconnected from the grid or connected for the purpose of exporting excess energy, or that provide service to its clients by using other means than the electric grid.[10]

To that effect, the Energy Bureau interpreted that, for the purposes of Act 60-2019, the definition of the term "Highly Efficient Generation", as established in the March 20, 2019 Resolution, applies to all assets that use the electric grid to provide service to their respective clients, may it be in the form of a PPOA with PREPA or a particular customer through the wheeling mechanism.[11] The Energy Bureau further interpreted that, for the purposes of Act 60-2019, the definition of the term "Highly Efficient Generation", as established in the March 20, 2019 Resolution, does not apply to fossil-fueled generation assets that provide service to its clients on site, may it be disconnected from the grid or connected for the purpose of exporting excess energy, or that provide service to its clients by using other means than the electric grid.[12]

The Energy Bureau further stated that it would initiate a proceeding to establish the parameters for the definition of the term "Highly Efficient Generation" that will apply to fossil-fueled generation assets that provide service to its clients on site, may it be disconnected from the grid or connected for the purpose of exporting excess energy, or that provide service to its clients by using other means than the electric grid. In establishing the proposed parameters, the Energy Bureau will take into consideration the provisions of paragraph (a) of Section 6.29 of Act 57-2014[13], as well as all other applicable statues and regulations.[14]

III. Proposed definition of the term "Highly Efficient Generation" for the purposes of Act 60-2019

The Energy Bureau hereby proposes the following definition for the term "Highly Efficient Generation", for the purposes of Act 60-2019:

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[10] March 20, 2019 Resolution, pp. 7 – 8.

[11] *Id.*, p. 8.

[12] *Id.*

[13] Paragraph (a) of Section 6.29 of Act 57-2014 establishes that the term highly efficient shall include as essential factors the electric power plant or the facility's thermal efficiency by the type of fuel used, the cost of fuel, technology, the capacity to reduce the costs of producing one (1) kilowatt-hour (kWh) of the proposed technology, and/or any other industry parameter that guarantees efficiency in energy generation. Although the main purpose of the definition of the term "Highly Efficient Generation", as established and described in Act 57-2014, was to promote the efficient use of fossil fuels in order to reduce generation costs and in turn, reduce customer bills, the provisions of paragraph (a) of Section 6.29 of Act 57-2014 can be used to guide the process to establish a definition that meets the purposes and mandates of Act 60-2019.

[14] March 5, 2020 Resolution, p. 8.

"For the purposes of Act 60-2019, a generation unit or system is considered "Highly Efficient" if it meets the Emissions Requirement and the Operational Requirement as follows:

(A) Emissions Requirement:

The average annual rate of carbon dioxide emissions from the generating unit, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the United States nationwide average for plants with the same primary fuel and primary fuel generation category as reported in the U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database ("eGRID") (or successor source) for the most recent year in which data is available. The Energy Bureau may modify the referenced limits based on updates to the eGRID (or successor) data.

The average annual rate of carbon dioxide emissions for the most recent year in which data is available are as follows:

Fuel Type	Average annual rate of CO_2 emissions (lbs/MWh)[15]
Coal	2,187
Residual Fuel Oil	1,930
Diesel Fuel	2,681
Natural Gas	1,433

(B) Operational Requirement:

(1) For fossil-fueled generation assets that use the electric grid to provide service to their respective clients, may it be in the form of a Power Purchase and Operating Agreement ("PPOA") with PREPA or its successor, or with a particular customer through the wheeling mechanism:

i. The yearly unit or system total cost of generating electricity cannot exceed $100/MWh (*i.e.* $0.10/kWh) adjusted to 2018 dollars. The cost per MWh shall be the total amount billed by the seller divided by the yearly net electrical power output of the unit or system.

(2) For fossil-fueled generation assets that provide service to its clients on site, may it be disconnected from the grid or connected for the purpose of exporting excess energy, or that provide service to its clients by using other means than the electric grid:

[15] Source: "egrid2018_data_v2.xlsx", Tab "PLNT18", Column "BA", "Plant annual CO2 total output emission rate (lb/MWh)", available at https://www.epa.gov/egrid/download-data, visited on October 20, 2020.

i. For Combined Heat and Power ("CHP") systems:

(a) The useful thermal energy output of the system is no less than fifty percent (50%) of the total energy output; and

(b) The fuel input, minus the useful thermal energy output, is no more than 7,000 BTU/kWh of generator output.

ii. For all other fossil-fueled generation assets:

(a) The average annual heat rate is less than 8,200 BTU/kWh.

For each "Highly Efficient Energy Producer", as such term is defined in Act 60-2019, the percentage of fossil-fueled generation considered highly efficient for any reporting year is calculated as follows:

$$\textit{Highly Efficient Generation (\%)} = \frac{\textit{Total kWh from Highly Efficient Units}}{\textit{Total kWh from all fossil-fueled generating units}} \times 100\%$$

If the percentage of fossil-fueled generation considered highly efficient is greater than sixty percent (60%) for the reporting period, then it could be construed that the "Highly Efficient Energy Producer" met the requirements established in Act 60-2019.[16]"

IV. Comments and Public Participation

All interested parties and the general public may present its comments regarding the proposed definition until December 14, 2020.

Comments may be filed as following:

a. By email to the following address: comentarios@energia.pr.gov;

b. Online, using the Energy Bureau's Electronic Filing System, at the following address: https://radicacion.energia.pr.gov.

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[16] As an example, assume a person owns two fossil-fueled assets with an installed capacity of 100 MW and 50 MW, respectively. Assume the 100 MW asset produces 438 GWh in a given year and meets the definition of Highly Efficient Generation and assume the 50 MW asset produces 219 GWh in the same year but doesn't meet the definition. Then, for this owner, the percentage of fossil-fueled generation considered highly efficient for that particular year equals to 438 GWh/(438 GWh + 219 GWh) = 438/657 = 0.667 = 66.7%. In this case, the owner meets the highly efficient generation standards, therefore, may be considered a "Highly Efficient Energy Producer", for the purposes of Act 60-2019. If the person only owns one generation asset, then such asset must meet the requirements of the Highly Efficient Generation definition in order to be considered a "Highly Efficient Energy Producer", for the purposes of Act 60-2019.

c. By mail addressed to the Puerto Rico Energy Bureau's Clerk's Office, at World Plaza Building, 268 Muñoz Rivera Ave., Suite 202, San Juan, PR 00918; or

d. In person at the Energy Bureau's Clerk's Office, at the address set forth above.

As stated before, this proposed definition is only for the purposes of Act 60-2019. It should not be construed as a modification of the definition of the term "Highly Efficient Fossil Generation", as established in the March 20, 2019 Resolution.

Be it published.

Edison Avilés Deliz
Chair

Ángel R. Rivera de la Cruz
Associate Commissioner

Lillian Mateo Santos
Associate Commissioner

Ferdinand A. Ramos Soegaard
Associate Commissioner

Sylvia B. Ugarte Araujo
Associate Commissioner

CERTIFICATION

I hereby certify that the majority of the members of the Puerto Rico Energy Bureau has so agreed on November 12, 2020 and I have proceeded with the filing of the Resolution. For the record, I sign this in San Juan, Puerto Rico, today November 12, 2020.

Wanda I. Cordero Morales
Clerk

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

COMISIÓN DE ENERGÍA DE PUERTO RICO
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IN RE: HIGHLY EFFICIENT FOSSIL GENERATION DEFINITION	**CASE NO.:** CEPR-MI-2016-0001 **SUBJECT:** Resolution adopting the definition of Highly Efficient Fossil Generation.

RESOLUTION

I. Introduction

On August 30, 2018, the Puerto Rico Energy Bureau ("Energy Bureau") issued a Resolution in the instant case proposing a definition for the term "Highly Efficient Fossil Generation", in accordance with Section 6B of Act 83[1] and Article 6.29 of Act 57-2014[2]. The Energy Bureau invited all interested parties to submit their written comments regarding the proposed definition, on or before September 28, 2018.

In order to provide interested parties with further opportunity to submit inputs regarding the proposed definition, through Resolution of October 26, 2018, the Energy Bureau extended the period for public comments until November 26, 2018. The Energy Bureau received comments from the Puerto Rico Electric Power Authority ("PREPA") on November 21, 2018. The Energy Bureau received no other comments regarding the proposed definition.

Through this Resolution, the Energy Bureau adopts the definition of the term "Highly Efficient Fossil Fuel Generation" as described herein.

II. Analysis of Public Comments

As we stated above, only PREPA submitted comments regarding the proposed definition. In this section we address PREPA's comments.

PREPA argues that the proposed definition lacks the statutory criteria established in Section 6.29 of Act 57-2014. Specifically, PREPA states that "the draft definition does not include any criteria that relate directly to thermal efficiency (in general or by fuel type), the cost of fuel, technology, and any other industry parameters".[3] We disagree.

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[1] Act No. 83 of May 2, 1941, known as *The Puerto Rico Electric Power Authority Act*, as amended.

[2] Known as *The Puerto Rico Energy Transformation and RELIEF Act*, as amended.

[3] PREPA's Comments, p. 3, ¶ 6.

As we discuss below, for a generation unit to be considered "Highly Efficient" it must meet two requirements: (i) the yearly total cost of a unit generating electricity cannot exceed $100/MWh and, (ii) the average annual rate of carbon dioxide emissions from the generating unit, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the United States national average for plants with the same primary fuel type.

The yearly total cost of generating electricity is determined in two ways. For each unit owned and operated by PREPA or owned and operated by a party that sells power to PREPA, the yearly unit total cost of generating electricity is calculated by dividing the total cost to operate the unit during the reporting year, adjusted to 2018 dollars, by the net unit electrical output, in MWh. It is important to note that the total cost to operate the unit shall include, and will be the sum of, fuel costs, operation and maintenance ("O&M") costs, capital expenditures, and any other costs directly related to the unit during the reporting year. On the other hand, for each unit owned or operated by a person that sells power to PREPA (or its successor) the yearly total cost of a unit generating electricity is calculated by dividing the total amount billed to PREPA during the reported natural year, adjusted to 2018 dollars, by the net electrical power output of the unit, in MWh.

Section 6.29 of Act 57-2014 establishes that the term "Highly Efficient" shall include as essential factors, the unit's thermal efficiency, cost of fuel, technology, **the capability to reduce the cost of producing one kWh**, and/or any other industry parameter that guarantees efficiency in energy generation. Moreover, Act 57-2014's Statement of Motives states that "the Energy Reform established herein is the most effective manner to promote initiatives and measures **that shall result in the much needed and permanent reduction of the cost of electricity**, to restructure the electric power system in the Island and to serve as a driving force to promote the economic and competitive development that the people claim for our Island."[4]

Act 57-2014 also states that "[t]he high cost of energy limits our ability to stimulate the economy, strengthen small and medium-sized business, as well as to attract private investors from abroad, develop commercial, industrial and manufacturing activities, and improve the quality of life of all Puerto Ricans."[5] Therefore, "it is imperative and compelling to enforce a thorough reform of the energy sector **that promotes the operation and administration of an efficient system at just and reasonable costs**, considering that we are an isolated jurisdiction that needs to have a safe and stable electric power grid."[6]

One of the major drivers in the approval of Act 57-2014 was the reduction of

[4] Statement of Motives, Act 57-2014, ¶ 25. Emphasis supplied.

[5] *Id.*, ¶ 2.

[6] *Id.*, ¶ 3. Emphasis supplied.

electricity costs and to generate electricity in an efficient manner.[7] That is why two factors to be considered in the definition of the term "Highly Efficient" are fuel costs and the capability to reduce the cost of producing one kWh.

Contrary to PREPA's assertion, the proposed definition considers these two factors. First of all, fuel costs are included in the total cost to operate the unit. Moreover, the yearly cost of fuel on a per kWh basis (*i.e.*, $/kWh) is a function of the unit's yearly heat rate (in BTU/kWh, which inversely correlates with thermal efficiency[8]) and the cost of fuel (in $/MMBTU). Therefore, the unit's heat rate or thermal efficiency, which according to Section 6.29 of Act 57-2014 is a factor to be considered in the definition of the term "Highly Efficient", is implied on the yearly cost of fuel on a per kWh basis ($/kWh).

PREPA argues that the manner in which the cost cap is calculated is fundamentally different for units that are not owned and operated by PREPA.[9] We disagree.

As we stated before, for units owned or operated by other parties selling power to PREPA or its successor, the cost per MWh is calculated based on the total amount charged by the seller and the net electricity generation for that particular unit. In other words, the yearly total cost of a unit generating electricity is calculated by dividing the total amount billed to PREPA (in dollars) during the reported natural year, adjusted to 2018 dollars, by the net electric power output, in MWh, for the reported year.[10] Contrary to PREPA's argument, this method of computing the annual cost for these units takes into consideration all aspects of their operation (*i.e.*, fuel costs, O&M costs, capital expenditures, and any other costs directly related to the unit, including profit), since it uses the total actual cost to PREPA (*i.e.*, total amount billed) in computing such parameter.

PREPA also argues that the proposed definition lacks an escalator factor or other process to update the definition to account for inflation.[11] As a result, PREPA argues that

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[7] *See Id.*, ¶ 18. "As part of the energy reform, the Energy Commission shall adopt rules to ensure high efficiency in the generation of electricity, based on fossil fuels. This shall lead to a more efficient use of fuel and, consequently, to lower energy production costs. This, in turn, shall have an impact on the electricity bill."

[8] Thermal efficiency, in percent, can be calculated as follows:

$$Thermal\ Efficiency\ (\%) = \frac{3412\ \frac{BTU}{kWh}}{Heat\ Rate}$$

Therefore, a higher Heat Rate represents lower thermal efficiency and vice versa.

[9] PREPA's Comments, p. 5, ¶ 11.

[10] PREPA argues that the cost cap for these units "refers to the price charged, but the draft definition does not indicate how the price charged is defined, and it does not indicate how prices charged over the course of a year will be translated into a single annual figure." *Id.*, p. 4, ¶ 9. Section IV of this Resolution details the manner in which the yearly cost for these units is to be calculated.

[11] *Id.*, p. 3 and 5–6, ¶¶ 6 and 12.

after 2018, the definition could be "out of sync" with what is a reasonable standard.[12] PREPA also argues that a lack of periodic review of the cost cap is inconsistent with the emission standard portion of the definition.[13]

It is important to note that paragraph (d) of Section 6.29 of Act 57-2014, states that the Energy Bureau **will review periodically and, if necessary, will modify the established efficiency standard**. As such, there is a suitable process through which the Energy Bureau can review and modify the approved definition. On the other hand, PREPA's argument regarding the lack of a proper escalator has merit. Therefore, we have modified the proposed definition to establish that all costs shall be adjusted to 2018 dollars. We have also clarified that the Energy Bureau may periodically review and, if necessary, modify the definition established herein, pursuant to paragraph (d) of Section 6.29 of Act 57-2014.

PREPA also argues that the proposed definition, as to the total cost cap, may not be achieved by its units or the units owned and operated by entities other than PREPA.[14] Therefore, PREPA proposes to establish "a standard or metric that is based directly on the efficiency of a fossil unit from an operational perspective, incorporates the factors referenced in the statutory language, **is reasonably achievable by a reasonable portion or numbers of fossil units**, and provides for suitable updating over time."[15] First of all, the purpose of the definition of the term "Highly Efficient Fossil Fuel Generation" is to ensure the modernization and/or the efficient use of fuel in order to reduce the costs of generating electricity. As such, if the existing units do not meet the standards, as established by the Energy Bureau, then PREPA, as well as any power producer, must take all necessary steps to modernize its fleet. That is the express mandate of Act 57-2014.

It seems that PREPA's request is for the Energy Bureau to adopt a definition tailored to the existing fleet. The statutory mandate regarding the definition is for PREPA's generation fleet and all other units to meet the standard established by the Energy Bureau. Not the other way around.

PREPA also recommends using other measures of efficiency of fossil fuel units, such as "heat rate", instead of the proposed cost cap. Using only "heat rate" as a metric does not meet the statutory language of Act 57-2014. Moreover, this concept was evaluated and rejected by the Legislature.

Article 4 of Senate Bill 839 (which is one of the precursors of Act 57-2014) proposed

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[12] *Id.*

[13] *Id.*

[14] *Id.*, p. 4–5, ¶¶ 7 and 10.

[15] *Id.*, p. 6, ¶ 13.

using a heat rate of 7,500 BTU/kWh as the standard that at least sixty percent of the electricity generated in Puerto Rico must meet.[16] However, this requirement was changed as part of Act 57-2104 legislative process.

The Senate Commission on Energy and Water Resources modified the above referenced language to establish that sixty percent (60%) of the electricity generated in Puerto Rico must be "highly efficient", as defined by the Energy Commission.[17] Such term should include as a principal factor the unit's thermal efficiency and any other industry parameter that guarantees efficiency in electricity generation.[18] The Bill was amended by the House of Representatives establishing the current language of Section 6.29 of Act 57-2014.[19] Therefore, the Legislature established a mandate to consider other factors to define the term "highly efficient".

Finally, PREPA argues that the cost cap portion of the proposed definition assumes or appears to assume a 100% capacity factor for PREPA owned and operated units.[20] Based on this interpretation, PREPA states that is not realistic to maintain a 100% capacity factor on any of its units during the reporting period of one year.[21] PREPA misconstrued the purpose

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[16] *See* Senate Bill 839, Article 4. Commonwealth of Puerto Rico, 17th Legislative Assembly, 1st Extraordinary Session, November 20, 2013.

[17] *See* Senate Substitutive Bill to S. B. 837, S. B. 838, S. B. 839, S. B. 840, S. B. 841, S. B. 842, S. B. 843, S. B. 881, S. B. 882 and to House Substitutive Bill to H. B. 1457 and H. B. 1618, Article 2.106. Commonwealth of Puerto Rico, 17th Legislative Assembly, 3rd Ordinary Session, March 20, 2014.

[18] *Id. See* also *Informe Positivo del Proyecto Sustitutivo a los Proyectos: P. del S. 837, P. del S. 838, P. del S. 839, P. del S. 840, P. del S. 841, P. del S. 842, P. del S. 843, P. del S. 881, P. del S. 882 y Sustitutivo de la Cámara al P. de la C. 1457 y P. de la C. 1618*, Senate Commission on Energy and Water Resources, March 20, 2014. "Como parte de la reforma energética, CEPR adoptará estándares para asegurar que la generación de energía sea altamente eficiente, lo que viabilizará una utilización más eficaz del combustible y por ende un menor costo en la producción de electricidad. Esto a su vez tendrá un impacto en la factura de todo abonado. Para ello se dispone que CEPR deberá, en un período que no exceda dos (2) años contados a partir del 1 de julio de 2014, asegurarse que, como mínimo, sesenta (60) por ciento de la electricidad trasmitida y distribuida en Puerto Rico sea producida por generadores "altamente eficientes", según este término sea definido por la CEPR, que deberá incluir como un factor la eficiencia térmica de la planta o instalación eléctrica según el tipo de combustible utilizado." *Id.*, p. 164. Quotations in the original.

[19] *See Informe del Proyecto Sustitutivo a los Proyectos: P. del S. 837, P. del S. 838, P. del S. 839, P. del S. 840, P. del S. 841, P. del S. 842, P. del S. 843, P. del S. 881, P. del S. 882 y Sustitutivo de la Cámara al P. de la C. 1457 y P. de la C. 1618*, Special Commission for a New Energy Policy, Puerto Rico House of Representatives, May 12, 2014. "Se dispone que la Comisión de Energía definirá el término "altamente eficiente" para la generación por combustible fósil utilizando como factores esenciales la eficiencia térmica de la planta o instalación eléctrica por el tipo de combustible utilizado, costo de combustible, tecnología, el potencial de reducción en el costo de producir un kWh de la tecnología propuesta, y/o cualquier otro parámetro de la industria que garantice la eficiencia en la generación de energía. Se establece que el porciento requerido en esta sección incluye la energía vendida a la Autoridad bajo los contratos de compra y venta de energía suscritos a la fecha de aprobación de esta Ley." *Id.*, pp. 59–60. Quotations in the original.

[20] PREPA's Comments, p. 4, ¶ 8.

[21] *Id.*

of Appendix A of the proposed definition. The calculation presented on the referenced Appendix A is a baseline calculation used to establish the metric on the cost cap. As we stated before, the parameters to be used in the calculation of the yearly total cost of each unit generating electricity are the actual costs associated to fuel, O&M, capital expenditures, and any other costs directly related to the unit, and the net yearly electrical power output, in MWh. As discussed before, the cost of fuel on a per kWh basis is a function of the unit's heat rate. Therefore, any variation on operational heat rates during the reporting year is accounted by the variation on the cost of fuel on a per kWh basis. Contrary to PREPA's interpretation, the definition does not assume a 100% capacity factor for its units.

III. Definition of Highly Efficient Fossil Generation

The Energy Bureau hereby defines the term "Highly Efficient Fossil Generation" as follows:

A generation unit is considered "Highly Efficient" if it meets the following **two requirements**:

(1) The yearly unit total cost of generating electricity cannot exceed $100/MWh (*i.e.*, $0.10/kWh) adjusted to 2018 dollars.

a. For units owned and operated by the Puerto Rico Electric Power Authority the total cost shall be the sum of the yearly costs associated with fuel, O&M, capital expenditures, and any other costs directly related to the unit, divided by the yearly net electrical power output of the unit.

b. For units owned or operated by other parties selling power to PREPA or its successor, the cost per MWh shall be the price charged by the seller divided by the yearly net electrical power output of the unit.

(2) The average annual rate of carbon dioxide emissions from the generating unit, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the United States national average for plants with the same primary fuel type, as reported in U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database ("eGRID") (or successor source) for the most recent year in which data is available.[22]

The average annual rate of carbon dioxide emissions for the most recent year in which data is available are as follows:

[22] As of today, the most recent year in which eGRID data is available is 2016. *See* https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid.

Fuel Type	Average annual rate of CO_2 emissions (lbs/MWh)
Coal	1,998
Residual Fuel Oil	1,720
Diesel Fuel	2,161
Natural Gas	1,201

The Energy Bureau may update the above limits based on updates to the eGRID (or successor) data.

IV. Demonstrating Compliance

The owner or operator of a fossil-fueled generation unit may demonstrate compliance with the above definition as follows:

(1) For each unit owned and operated by PREPA or owned and operated by a party that does not sell power to PREPA, the yearly unit total cost of generating electricity shall be calculated by dividing the total cost to operate the unit during the reporting year[23], adjusted to 2018 dollars, by the net unit yearly electrical output, in MWh.

(2) For each unit owned or operated by a person that sells power to PREPA (or its successor) the yearly unit total cost of generating electricity shall be calculated by dividing the total amount billed to PREPA during the reported natural year, adjusted to 2018 dollars, by the net unit yearly electrical output, in MWh.

(3) For all units, their annual rate of carbon dioxide emissions, as measured in pounds per megawatt-hour (lbs/MWh), is lower than the metric established herein, or as modified by the Energy Bureau from time to time.

PREPA and any party who owns and operates any fossil-fueled generation units that inject power to PREPA's grid, must file its compliance report with the Energy Bureau on or before March 31 of the year following the reporting year.[24] All compliance reports must contain detailed information for each unit and shall include all supporting documents and workpapers, in native format, with formulae intact.

Paragraph (a) of Section 6.29 of Act 57-2014 establishes that at least sixty percent (60%) of the electric power generated in Puerto Rico based on fossil fuels must be "highly efficient", as such term is defined by the Energy Bureau. The percentage of fossil-fueled generation considered highly efficient for any reporting year is calculated as follows:

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[23] The total cost shall include fuel, O&M, capital expenditures, and any other costs directly related to the unit during the reporting year.

[24] In its compliance filing, PREPA must include the report of AES and EcoEléctrica, as well as any other independent power producer that generates electricity based on fossil fuels and sells its output to PREPA.

$$Highly\ Efficient\ (\%) = \frac{Total\ kWh\ from\ Highly\ Efficient\ Units}{Total\ kWh\ from\ all\ fossil-fueled\ generating\ units} \times 100\%$$

If the percentage of fossil-fueled generation considered highly efficient is greater than sixty percent (60%) for the reporting period, then the Energy Bureau will determine that the requirement of Section 6.29 of Act 57-2014 is met for such period.

Pursuant to paragraph (d) of Section 6.29 of Act 57-2014, the Energy Bureau may periodically review and, if necessary, modify the definition established in this Resolution.

Be it published.

Edison Avilés Deliz
Chair

Ángel R. Rivera de la Cruz
Associate Commissioner

Lillian Mateo Santos
Associate Commissioner

Ferdinand A. Ramos Soegaard
Associate Commissioner

José J. Palou Morales
Associate Commissioner

CERTIFICATION

I hereby certify that the majority of the members of the Puerto Rico Energy Bureau has so agreed on March 20, 2019 and I have proceeded with the filing of this Resolution. For the record, I sign this in San Juan, Puerto Rico, today, March 20, 2019.

María del Mar Cintrón Alvarado
Clerk