

**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 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<sup>1</sup> and Article 6.29 of Act 57-2014<sup>2</sup>. 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".<sup>3</sup> We disagree.

<sup>1</sup> Act No. 83 of May 2, 1941, known as *The Puerto Rico Electric Power Authority Act*, as amended.

<sup>2</sup> Known as *The Puerto Rico Energy Transformation and RELIEF Act*, as amended.

<sup>3</sup> 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.”<sup>4</sup>

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.”<sup>5</sup> 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.”<sup>6</sup>

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

<sup>4</sup> Statement of Motives, Act 57-2014, ¶ 25. Emphasis supplied.

<sup>5</sup> *Id.*, ¶ 2.

<sup>6</sup> *Id.*, ¶ 3. Emphasis supplied.





electricity costs and to generate electricity in an efficient manner.<sup>7</sup> 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<sup>8</sup>) 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.<sup>9</sup> 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.<sup>10</sup> 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.<sup>11</sup> As a result, PREPA argues that

<sup>7</sup> 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.”

<sup>8</sup> Thermal efficiency, in percent, can be calculated as follows:

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

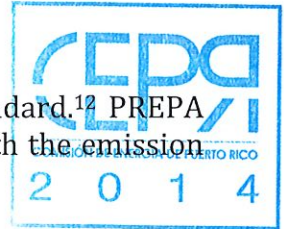
Therefore, a higher Heat Rate represents lower thermal efficiency and vice versa.

<sup>9</sup> PREPA’s Comments, p. 5, ¶ 11.

<sup>10</sup> 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.

<sup>11</sup> *Id.*, p. 3 and 5–6, ¶¶ 6 and 12.

after 2018, the definition could be “out of sync” with what is a reasonable standard.<sup>12</sup> PREPA also argues that a lack of periodic review of the cost cap is inconsistent with the emission standard portion of the definition.<sup>13</sup>



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.<sup>14</sup> 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.”<sup>15</sup> 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

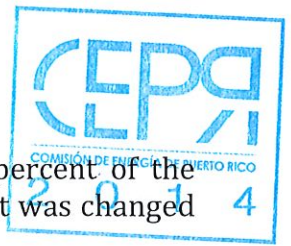
<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*, p. 4-5, ¶¶ 7 and 10.

<sup>15</sup> *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.<sup>16</sup> 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.<sup>17</sup> Such term should include as a principal factor the unit's thermal efficiency and any other industry parameter that guarantees efficiency in electricity generation.<sup>18</sup> The Bill was amended by the House of Representatives establishing the current language of Section 6.29 of Act 57-2014.<sup>19</sup> 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.<sup>20</sup> 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.<sup>21</sup> PREPA misconstrued the purpose

<sup>16</sup> See Senate Bill 839, Article 4. Commonwealth of Puerto Rico, 17<sup>th</sup> Legislative Assembly, 1<sup>st</sup> Extraordinary Session, November 20, 2013.

<sup>17</sup> 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, 17<sup>th</sup> Legislative Assembly, 3<sup>rd</sup> Ordinary Session, March 20, 2014.

<sup>18</sup> *Id.* See also *Informe Positivo del Proyecto Substitutivo 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 Substitutivo 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 transmitida 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.

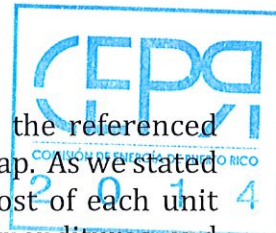
<sup>19</sup> See *Informe del Proyecto Substitutivo a los Proyectos: P. del S. 837, P. del S. 838, P. del S. 839, P. del S. 840, P. del S. 841, P. del S. 842, P. del S. 843, P. del S. 881, P. del S. 882 y Substitutivo de la Cámara al P. de la C. 1457 y P. de la C. 1618*, Special Commission for a New 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 porcentaje 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.

<sup>20</sup> PREPA's Comments, p. 4, ¶ 8.

<sup>21</sup> *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.<sup>22</sup>

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

<sup>22</sup> 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 <sub>2</sub> 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<sup>23</sup>, 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.<sup>24</sup> 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:

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

<sup>24</sup> 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.



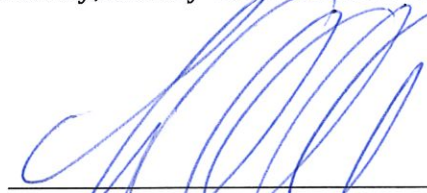


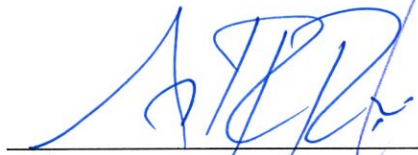
$$\text{Highly Efficient (\%)} = \frac{\text{Total kWh from Highly Efficient Units}}{\text{Total kWh from all fossil-fueled generating units}} \times 100\%$$

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.

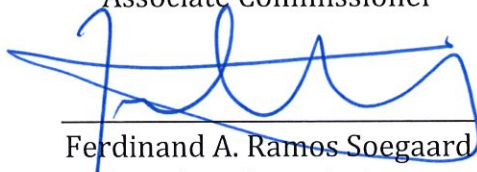
Pursuant to paragraph (d) of Section 6.29 of Act 57-2014, the Energy Bureau may periodically review and, if necessary, modify the definition established in this Resolution.


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