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

IN RE:

REVIEW OF THE PUERTO RICO ELECTRIC POWER AUTHORITY INTEGRATED RESOURCES PLAN

CASE Number: CEPR-AP-2018-0001

Matter: Empire Gas Company, Inc. final brief.

EMPIRE GAS COMPANY, INC. FINAL BRIEF

To the Honorable Puerto Rico Energy Bureau: ("Bureau")

NOW COMES, EMPIRE GAS COMPANY, INC. ("Empire") through its undersigned legal representation and respectfully STATES as follows:

I. INTRODUCTION

Empire has established by means of its submited writen pre-filed testimony and personal appearance durning the adjudicative process, the following facts. Such facts have not been disputed or contradicted by any other testimony or documentary evidence submited in the process.

II. PROVEN FACTS

1. *"Liquefied Petroleum Gas*" (LPG) is a heavier than air mixture of hydrocarbon gases; the two most common being butane and propane and it is considered an alternative fuel under the *Energy Policy Act of 1992*. Almost all of the LPG imported

and used in Puerto Rico is of the *HD5* standard, having at least 90% propane content. LPG is not toxic and not classified a *greenhouse gas;* contrary to natural gas, which is.

2. At room temperature, LPG is a colorless and odorless gas. LPG is liquefied generally by pressurization; compared to natural gas ('NG") which is *cryogenically* turned to liquefied natural gas ("LNG"). For safety reasons, LPG is mixed with an odorant, *mercaptan,* to allow for detection by its consumers. Under pressure or in cooler conditions; it transforms into a liquid state. This process leads to the reduction of the volume to 1/260 of the gaseous aggregate state. LPG has a caloric value (BTU/cuft) at 60 F, of 2,506 while LNG has a value of 1,012.

3. Currently, on a worldwide basis, LPG is produced with two methods; with approximately 60% derived from raw natural gas during natural gas processing and approximately 40% coming from crude oil refining. However, in the U.S.A. the percentage derived from natural gas ("NG") is much higher, 83%. In 2017, hydrocarbon gas liquids (including LPG) produced from NG amounted to 3.78 million barrels per day, while refinery derived liquids only 0.63 million barrels per day.

4. LPG is a clean and environmentally friendly fuel. Contrary to natural gas, it is not classified as a greenhouse gas. In terms of CO2 emissions, its impact is slightly more than LNG but substantially lower than fuel oils. LPG emits 0,23 KgCO2/KWr versus 0,20 for natural gas. Diesel emissions are much higher, at 0,28 KgCO2/KWr.

5. *Synthetic Natural Gas* ("SNG") is LPG or propane mixed with air; in exact proportions as to replicate the characteristics of natural gas. To ensure the greatest certainty and clarity when discussing the issue of interchangeability between LPG

("propane') and liquefied natural gas ("LNG"), the technically correct and globally accepted definition must be incorporated. The most common specific method to mediate the exchange of combustible gases is the so-called "*Wobbe Index*". It is an indicator of the interchangeability of fuels such as LPG, liquefied natural gas ("LNG"), natural gas ("NG") and SNG or propane air. LPG can easily be converted into SNG by a simple air dosing process, in which approximately 45% of atmospheric air is mixed with 55% LPG vapor. It is also known as "*propane air*" ("*aire-propanado*") in Spain and Latin America. Once converted to SNG it is fully interchangeable and compatible with natural gas.

6. Both LPG and SNG are used on a worldwide basis to produce electricity either for peacking and base load applications; particulary in jurisdictions were natural gas is not readibly available. Several countries operate LPG/SNG fired power plants; including the U.S.A. (as *Peak Shaving* plants with SNG) the USVI, Pakistan, Ghana, El Salvador, China and Honduras. The U.S. Virgin Islands Water and Power Authority (WAPA) will operate seven GE turbines at the 198-MW plant on St. Thomas and operates a 118-MW plant on St. Croix using LPG.

7. When compared to diesel fuel for electric generation, LPG and/or SNG can achieve a fuel savings of approximately 30%.

8. Contrary to Siemen's proyection, LPG prices on a global scale are substantially lower than in the past decade and are forecasted to remain low in the next decade. Furthermore, there is an excess production/supply of LPG in the worlds market. Such

market would be capable of supplyng any PREPA'S demand requirements for the generation of electricity.

9. The IRP's Fuel Cost estimate for 2018 is based on a *Base Forecast* of $0.87 (Nom. $/gal). See PREPA, CEPR Fuel Cost ROI 1_7_01. This appears to be based on the 2018 yearly price as indicated by the EIA of $0.878. But as of August 2019, the yearly average for LPG Spot Mt. Belview was approximately $0.56 (January to August) a $0.31 difference. Today it stands at $0.409.

10. There is no base or factual evidence supporting the IRP's LPG future cost proyection. The evidence presented by Empire claearly states the current LPG prices (lower today) are not the result of a immediate market inbalance and will substantialy increase in the future as indicated in the IRP section 7.1.2.14 ; but rather that the price will reamain low for year to come due expansion of U.S. LPG production associated with the "*shale revolution*".

11. The current Mont Belview average price is $0.409 as of February 28, 2020. This would allow Empire to offer LPG to PREPA (assuming no excise taxes are applicable) for a price of approximately $0.85. Considering that each gallon of LPG has an energy contenmts of 91,333 BTU, (propane HD5) then the current cost per million BTU's would be **9.28 $**MM/BTU. According to the IRP, Exhibit 4-1, *Summary of Existing Plant Characteristics and Performance,* the $MM/BTU of existing plants running on Number 2 Oil and diesel range between $11.73 to $22.73. Key units in the system like Mayaguez 1-4 with a 220 MW installed capacity and Cambalache with a 248 MW installed capacity; show $MM/BTU'S rates of $17.20 and $16.40. At the current price of LPG

such product would be comparable to the $MM/BTU cost of natural gas used in Costa Sur units 5 and 6, with a cost of 9.01 $MM/BTU.

12. The construction cost and time of completion of a LPG/SNG storage facility is substantially less than for a natural gas instalation.

12. LPG/SNG would be an ideal and vastly superior fuel source for the planned *peacking* units in the IRP due to the following:

a. Storage facilities would be available in much shorter periods of time than natural gas. Having a permanent storage facility on site would eliminates the risk of depending o self contained LNG tank trucks; entirely dependent on maritime transport.

b. LPG/SNG is readibly available and there are enough ports and storage facilities to handle any prospective increase in demand. LNG's potential availability depends on the substantial expansion of the LNG import and distribution infrastructure. This remains as an unlikely scenario.

c. Modern GT and reciprocating generating facilities can be ordered to be LPG compatible. If they can only run on LNG gas they can be fueled by SNG by adding simple air dosification components to the storage tanks. SNG and LNG are fully interchangeable.

13. For medium size base load generation facilities like Mayagüez or Yabucoa, with existing port facilities, LPG is also the ideal fuel source since:

a. May be easily delivered by ship or barge, the storage facilities could be rapidly constructed and the conversion to gas would not have to be dependent on the costly and time consuming expansion of the natural gas infrastructure.

b. Modern GT and reciprocating generating facilities can be ordered to be LPG compatible. If they can only run on natural gas, they can be fueled by SNG by adding simple air dosification components to the storage tanks.

III. REQUEST

Based on the evidence on file, Empire hereby respectfully requests as follows:

a. **First,** the IRP should be reviewed (including but not limited to Section 7.1.2.14 *No New Natural Gas Infrastructure*), and amended to conclude that **LPG/SNG is a viable and practical primary fuel for PREPA'S need for a clean, affordable fuel in order to fulfill the IRP's policy objective,** for the following reasons: a) The LPG market operates on a supply side, with a low cost forecast for the next 10-15 years; it is available and ready to immediately serve Puerto Rico's immediate needs for a safe, economic and environmental friendly fuel as a replacement for fuel oils. b) LPG/SNG is a safe and clean fuel, and it is NOT classified as a greenhouse gas, c) LPG/SNG storage cost and development time are a fraction of those required by LNG d) LPG/SNG infrastructure and market have been developed in Puerto Rico for decades, and the local LPG industry is ready to serve PREPA'S needs; and at the same time, helping our local economies' growth.

Second, the IRP should be amended to provide for the use of LPG/SNG instead of LNG for the conversion of existing "*Peaking Units*" and future *MGTPU's* from diesel fuel to a new fuel; as well as for the proposed building of additional units up to a total of 18 units. The IRP indicates that these new units will be capable of burning **containerized natural gas** delivered by truck with on-site tankage. See **Section 10.1.5 Install New Resources, Mobile *Gas Turbine Peaking Units (MGTPU's*). <u>We propose that such units should be fueled instead with LPG or SNG entirely.</u>**

It is Empire's proposal that such *Peaking Units* and new *MGTPU's* should be fired entirely using LPG/SNG instead of LNG, at a lower cost than diesel; taking into effect the following factors: a) LPG/SNG is readily available for immediate consumption, whereas a containerized natural gas is not and its availability in significant numbers depends on the yet to be built LNG importation and re-gasification facilities; b) capital cost of establishing an *on-site* LPG/SNG storage facilities is minimal compared to containerized natural gas, which might be several times higher; c) containerized natural gas depends on the continuous availability of relatively small capacity self-contained storage trucks and does not provide a high security of supply assurance d) LPG/SNG can be stored nearly indefinitely without degradation e) as demonstrated in the weeks following Hurricane *Maria*, diesel supplies were rapidly exhausted; but LPG was available in quantity due to the industries' proven storage capacity.

Third, as to the proposed new LNG marine terminals in Mayagüez and Yabucoa, Sections 1.2.3 (10), 1.2.3 (11) and 10.1.7 of the IRP; for which the IRP, based on the uncertainty of the availability of an abundant natural gas supply on the

island, recommends that PREPA proceed with the preliminary permitting and planning activities for LNG conversion together with their associated ship-based LNG delivery infrastructure; (Section 1.2. page 1-8) **we request instead that such terminals should be for LPG instead of LNG importation and work to begin immediately.**

Fourth, as to existing mayor mayor oil or diesel fueled generating units that are close to a port facility; such as Aguirre Steam and Costa Sur Steam and Palo Seco; the IRP should consider switching from natural gas to LPG/SNG as their main fuel source; because of the immediate availability of such fuel sources, immediate favorable environmental impact and the short construction time for storage facilities.

In San Juan, PR this 6 Th day of March 2020.

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I CERTIFY: that I have sent a copy of this motion via e mail to all parties in the case as follows:

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