BEFORE THE GUAM PUBLIC UTILITIES COMMISSION

IN THE MATTER OF:	)	GPA Docket 19-13
	)	
The Application of the Guam Power	)	
Authority to Approve the Energy	)	**ALJ REPORT**
Conversion Agreement (ECA) with	)	
KEPCO for the 198MW Power Plant.	)	
	)	

INTRODUCTION

This matter comes before the Guam Public Utilities Commission ["PUC"] upon the Petition of the Guam Power Authority's ["GPA"] for Approval of the Energy Conversion Agreement (ECA) with Korean Electric Power Company ["KEPCO"] for the 198MW Power Plant.[1] GPA asks PUC to approve the ECA and the award of the 198MW Power Plant project, including the construction, operation, and financing.

BACKGROUND

The PUC does not undertake its task to review the award to KEPCO for the 198MW Power Plant and the Energy Conversion Agreement "with a blank slate." For a period of over 10 years, the PUC has been intricately involved in reviewing GPA's plans for generation capacity and a New Power Plant. The Power Plant Plan was jointly formed by GPA and the PUC. PUC has worked with GPA in the development of the Power Plant plan, the procurement process, the procurement forms, the technical specifications for the Plant, the land siting of the Plant, pipeline improvements, and numerous other aspects.

On December 29, 2008, in Docket No. 08-06, the PUC approved the GPA "INTEGRATED RESOURCE PLAN." This plan addressed the timing, size and technology of future power generating units, and addressed issues such as fuel diversification and the renewable portfolio standards.[2] In particular, GPA agreed to undertake a study to determine "the optimal use of natural gas" for its baseload generators.[3]

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[1] GPA Petition for Approval of the Energy Conversion Agreement (ECA) with KEPCO for the 198MW Power Plant, GPA Docket 19-13, filed September 5, 2019.
[2] PUC Order, In the matter of: GPA INTEGRATED RESOURCE PLAN, Docket No. 08-06, dated December 29, 2008.
[3] Id.

On November 13, 2012, GPA presented the PUC with a Briefing on GPA Integrated Resource Plan. That plan already referenced GPA's need, in its generation resource options, to comply with the USEPA RICE MACT and EGU MACT environmental requirements. A liquified natural gas option was considered for a Combined Cycle Plant and conversion of existing plants for 2018.[4] GPA's plan focused on LNG as an alternate fuel of choice.[5] In response to the PUC order conditionally approving the IRP, GPA filed a detailed "IRP implementation strategy decisions".[6] Therein GPA specifically referenced that, based upon the possible retirement of Cabras No. 1 & 2, and/or the Tanguisson plants, as well as other diesel units, GPA proposed to construct "a new 60 to 120MW gas-fired combined cycle power plant, preferably in northern Guam to reduce technical line losses…"[7] The PUC declined to give approval to the LNG conversion plan and indicated that there should be a "cautious approach" with conversion to LNG.

On October 27, 2014, the Guam Consolidated Commission on Utilities (CCU) authorized GPA, in Resolution 2014-48, to petition the Guam Public Utilities Commission (PUC) for approval of the procurement of a new dual fuel powered plant. Its justifications were the need to lower ratepayers' costs by reducing the amount of fuel needed to supply Guam's power, and for baseload generating units to come into compliance with certain environmental regulations issued by USEPA (RICE-MACT/EGU-MACT). On November 10, 2014, GPA filed its Petition with the PUC for approval of the procurement of a 120MW dual fired Combined Cycle Generation Plant (USLD/LNG) with an option for an additional 60MW.[8] However, in its January 29, 2015 Order, the PUC rejected GPA's petition for Approval of the Procurement on the ground that it had not presented evidence that there was a need for the proposed new generation.[9] GPA's Consultant, Lummus, confirmed that "GPA had not justified the procurement of new generation capacity…".[10] However, there was a major, game-changing occurrence after the submission of the Lummus Report, which was a complete failure of the Cabras No. 3 & 4 Power Plants on August 31, 2015, when an explosion and fire occurred. The explosion resulted in the loss of 78MW of baseload capacity, which placed GPA in a difficult position of meeting system demand if there was an outage in

[4] On July 30, 2013, the PUC conditionally approved GPA's 2013 Integrated Resource Plan.
[5] PUC Order, GPA Docket 13-02, dated July 30, 2013, at p. 4.
[6] GPA Response to PUC Order re: Resource Allocation Implementation Plan, GPA Docket 13-02, dated November 27, 2013.
[7] Id., at p. 4.
[8] GPA Petition for Approval of Procurement of New Generation Combined Cycle Units, GPA Docket 15-05, filed November 10, 2014.
[9] PUC Order, GPA Docket 15-05, dated January 29, 2015.
[10] Id., at p. 3.

one of the baseload or other large units.[11] The PUC determined that, as a result of the Cabras 3 & 4 explosion on August 31, 2015, the existing reserve generation capacity of GPA was not sufficient to meet the required load. A Reserve Generation Restoration Plan submitted by GPA on October 14, 2015, indicated that GPA had insufficient generation capacity from September 2015 through February 2016 to meet customer demand. The insufficiency ranged from 44MW to 50MW. There was no assurance that either Cabras 3 or 4 could be restored or would be available. The PUC further required GPA to submit a plan to the PUC for the proposed request for the procurement. The plan was required to include an evaluation of whether Cabras No. 3 and/or 4 could be returned to service, and, if so, when. PUC included other requirements, including that GPA's plan for new generation capacity be based on the Independent Power Producer Model and that GPA further develop its plan for implementing renewable energy resources.[12]

The major decision of the PUC in approving GPA's procurement for the new 180MW plant was issued on October 27, 2016.[13] In its Order, the PUC approved GPA's petition to procure a new generation plant based upon the Independent Power Producer (IPP) model, as a "Build, Operate, Transfer (BOT)", including transmission facilities and pipelines for both ULSD and LNG. In approving the procurement, the PUC made explicit determinations: (1) GPA had justified the need to procure new generation capacity; it appeared that Cabras No. 3 & 4 were unavailable, resulting in the loss of 78MW. (2) GPA's current plan to retire the Cabras No. 1 & 2 plants upon the commissioning of the New Power Plant was approved; (3) Based upon the increased need for baseload capacity, GPA had offered sufficient justification to procure a new generation combined cycle plant of 180MW. (4) It was reasonable for GPA to request procurement of 180MW to replace the Cabras No. 1 & 2 plants (132MW) and to offset the loss of the Cabras No. 3 & 4 plants (78MW). (5) Renewable energy was not reliable or stable enough to provide firm baseload generation for Guam. It was "speculation to suggest when renewable energy would be a viable alternative to baseload fossil fuel generation"; (6) GPA was authorized to procure engineering, procurement and construction contractor support for the new combined cycle plant. (7) As to the rate impact of the New Power Plant, GPA was required to provide a fully updated and comprehensive rate impact study. (8) The plan for proceeding with LNG was disapproved, as GPA had not demonstrated that such plan was economically viable.[14]

[11] Id., at p. 4.
[12] Id., at pgs. 5-6.
[13] PUC Order, GPA Docket 15-05, dated October 27, 2016.
[14] Id.

On April 17, 2017, the PUC clarified its October 27, 2016 Order.[15] GPA should consider any technology for the New Power Plant, not only combined cycle units, which would provide efficient, reliable, and least cost baseload generation. GPA's Request for Proposals should be "technology agnostic." Based upon proposals by Commissioner Andrew Niven, GPA would consider any type of technology for its generation, including renewable and LNG. The proposal would be awarded to a company that could provide firm, reliable power at the lowest cost. The PUC reversed its prior determination that LNG could not be considered. An amendment to the October 27, 2016 Order provided that LNG could also be considered.[16] However, it should be noted that no specific plan or proposal for the use of LNG has ever been approved by the PUC to date.

Once the procurement of a 180 MW Combined Cycle Plant had been approved, the PUC and GPA proceeded to consider GPA proposals for the manner in which the RFP would be structured. Ultimately, the PUC authorized a three-step request for proposal process. In GPA Docket 18-02, the PUC authorized GPA to issue a Request for Qualifications (RFQ) regarding the procurement of the 180MW plant.[17] The purpose of the RFQ was to establish a list of qualified proponents who could submit technical proposals for the power plant. Finding that such an RFQ process was authorized by Guam procurement law, PUC permitted GPA to issue its Request for Qualifications.[18] The PUC required GPA to remove the language in the Request for Qualifications that required the power plant to operate on ultra-low sulfur diesel and, in the future, LNG. The requirement was changed to provide that "the project shall provide efficient, reliable and least cost baseload capacity." The obvious purpose of the PUC changes in the procurement were to provide a proposal process that was open to all types of technology, including renewables. Other requirements relating to USLD/LNG fuel procurement were also deleted. The terms "diesel fuel and natural gas burning technologies" were deleted from the RFQ.

On August 30, 2018, the PUC approved the bid documents for Multi-Step Bid GPA-034-18 (Procurement of the 180MW Power Plant) and the Functional Bid Specifications as submitted by GPA.[19] The PUC carefully reviewed the technical specifications for the IFB, which were the technical requirements for the construction of the New Power Plant. The requirements were extremely detailed; they were prepared by GPA's Consultants Stanley and K&M Advisors. The functional technical specifications cover

[15] PUC Supplemental Order, GPA Docket 15-05, dated April 27, 2017.
[16] Id., at p. 1.
[17] PUC Order, GPA Docket 18-02, dated November 30, 2017.
[18] Id.
[19] PUC Order, GPA Docket 18-02, dated August 30, 2018, at p. 8.

every aspect of the power generation facility, including engineering, design, mechanical plant and system requirements, plant piping systems, products, electrical plant, civil and structural requirements, structural loads, foundation and steel design, substation requirements, transmission requirements, and electrical requirements, etc. As noted in the Order, the Consultants "properly opened up the procurement to all types of technology, including fossil fuel technologies, renewable technologies, and hybrid technologies. The bid documents, in numerous places, make it clear that no one technology is favored, but that bidders may submit proposals from any technology that can satisfy the generation and other requirements of bid."[20] GPA and its Consultants represented that the technical specifications for the bid were fully adequate to protect the interest of GPA and its ratepayers.[21]

In GPA Docket 18-09, the PUC approved an increase in funding for GPA's Contractor regarding the Engineering, Procurement, Construction, and Management of the new generation plant. The PUC recognized that GPA needed sufficient funds to undertake the numerous tasks involved in bidding and procuring the new plant.[22] Later, on November 29, 2018, the PUC approved an additional increase for the Stanley EPCM Contract. The PUC recognized that "GPA clearly has a need for an EPCM Contractor. The proposed 180MW IPP project is a substantial and technical undertaking. It has complicated aspects, including provision for dual firing with ULSD and LNG, and the need to install a new pipeline. GPA needs the technical assistance of a contractor such as Stanley to assist it as Owner's Representative and to guide GPA through the construction and commissioning process. Such assistance can help to ensure that the new plant is constructed in an efficient and safe manner."[23]

In GPA Docket 18-14, GPA petitioned the PUC for review and approval of the purchase of the Harmon Property for the New Generation Plants, specifically three lots in Ukudu Dededo. GPA's EPCM Contractor Stanley determined that the siting of the new power generation plant "must be proximate to the GWA Northern District Waste Water Treatment Plant to utilize its tertiary treated waste water to cool the New Power Plant thus eliminating the extraction of up to 3 million gallons of water daily from Guam's fresh water aquafer…".[24] GPA issued a bid seeking to acquire the approximate area of 240,000 square meters for the New Power Plant. GPA selected the lowest priced bidder, at a price of between $42.75 and $47.00 per square meter. The Guam Legislature, in Public Law 34-102, approved the consolidation of the lots and rezoned them from R2 to

[20] Id., at p. 5.
[21] Id., at p. 7.
[22] GPA Docket 18-09, dated March 29, 2018, at pgs. 3-4.
[23] Id., at p. 4.
[24] PUC Order, GPA Docket 18-14, dated May 31, 2018 at p. 1.

M1 for the construction and operation of a power generation plant on behalf of the Guam Power Authority.[25] GPA determined in a written informational Report that the proposed Ukudu location was superior to three other possible sites, Northern WWTP, Tanguisson, and Cabras-Piti. The advantages of the proposed Ukudu location included low Tsunami and Storm Surge Risk, ability to obtain environmental permitting, ability to serve central and northern areas, adequacy of space to build a power plant, and low location development costs. The Guam Legislature had also found that the Ukudu area was "suitable" and the "best" site. Public Law 34-102. Finding that land purchase price was within a range of acceptable valuation conducted by appraisers, the PUC approved GPA's request to purchase the Ukudu, Dededo property for the new generation plant.

In GPA Docket 19-02, the PUC reviewed the application of GPA for Procurement of a new ULSD pipeline. The proposed pipeline would supply ULSD to the Piti Tank Farm, Tie-Ins for Piti Power Plant 7, and MEC 8, and 9,[26] and could tie in a USLD pipeline to the planned New Generation Plant."[27] The PUC approved the procurement of a new ULSD pipeline.[28]

The record establishes that the PUC has conducted an extensive review of GPA's plans for a New Power Plant over the last 10 years. The PUC has thoroughly reviewed all aspect of GPA's proposal. However, PUC has not automatically approved all proposals of GPA; PUC has engaged in critical review at all stages of this process. The PUC rejected GPA's New Power Plant Proposal when GPA could not yet prove that there was insufficient load capacity to provide power to the ratepayers of Guam. The PUC rejected plans of GPA to construct a new regasification plant and implement LNG as the fuel of choice. Now, although PUC has left open the option for GPA to use LNG in the future, such option has in no manner been approved. Before GPA could undertake any effort to use LNG in the generation plant, or build necessary regasification and other facilities for LNG, thorough review and approval by the PUC would first be required. Given the extensive review by the PUC of the New Plant Power Project over a ten-year period, it would now be a complete reversal of position for PUC to reject the award of the Energy Conversion Agreement to KEPCO. The ten-year process between GPA and PUC of developing and refining the power plant proposal would be discarded. The resources expended over the years by GPA (as well as those of PUC), including purchase of the plant site, would be wasted. Where would a PUC rejection of the New Power Plant, or a delay of decision, leave the ratepayers of Guam? The

[25] Id., at p. 2.
[26] PUC Order, GPA Docket 19-02, dated October 25, 2018 at. p. 1.
[27] Id., at p. 2.
[28] Id., at p. 5.

procurement process would have to be commenced from scratch and could take many more years to complete. No New Power Plant could be built until this new procurement process was completed. The urgent environmental compliance issues of USEPA would go unaddressed. The likely result would be load-shedding, substantial fines for GPA, a degraded and insufficient power system with potential for blackouts, and a possible federal receivership.[29]

KEPCO'S SELECTION AS MOST QUALIFIED PROPONENT, IT'S PROPOSAL FOR THE NEW GENERATION PLANT, AND THE ENERGY CONVERSION AGREEMENT

KEPCO was selected by GPA as a result of a three-step bidding process (GPA's Multi-Step Invitation for Bid (MS IFB) for Build, Operate & Transfer Contract for 120-180 MW of New Generation Capacity). In the Request for Qualifications, Step 1, seven of the original 18 proponents were qualified to proceed to Step 2, submission of technical specifications. At step 3, three proponents submitted price proposals. On June 10, 2019, GPA determined that KEPCO was the lowest responsive and responsible proponent.[30]

Along with its Petition, GPA has submitted a proposed Energy Conversion Agreement "ECA" between GPA and KEPCO to Build, Operate, and Transfer (BOT) a 198MW power generation plant. The Agreement provides for the construction, operation and maintenance of the facility over a 25-year term. In accordance with KEPCO's proposal, the Power Plant will include a Combined Cycle Unit: three (3) 44MW Siemens SGT-800 combustion turbine units with heat recovery steam generators (HRSG); one (1) 68MW Siemens steam turbine; one (1) 25MW battery energy storage system, providing up to 15MW output for 30 minutes; and 64.5MW of reserve capacity from high-speed diesel generators.[31] The cost to build the plant has been estimated in the range of $600M. KEPCO was the lowest qualified bidder, with a 25-year Net Present Value cost of $3,121,230,000.[32] The economic evaluation of KEPCO's bid was based upon net present value, incorporating all costs over the 25-year period. These include: Fixed Capacity Cost, Fixed Operation and Maintenance Cost, Variable Operation and Maintenance

[29] These issues will be addressed in detail in the "ANALYSIS" Section of this Report.
[30] Testimony of General Manager John Benavente for Legislative Oversight Hearing on September 10, 2019, dated September 10, 2019, at p. 3; see also GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p.16.
[31] Testimony of General Manager John Benavente for Legislative Oversight Hearing on September 10, 2019, dated September 10, 2019, at p. 3; see also GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p.29.
[32] GPA Application to approve the Energy Conversion Agreement (ECA) with KEPCO for the 198MW Power Plant, GPA Docket 19-13, dated September 5, 2019, at p. 1.

Cost, and Fuel Cost.[33] The estimated annual first-year cost based upon the power plant capacity and production at the 81% capacity factor is $69,440,216, with a charge to GPA for energy produced at $0.049/kWh.[34]

The draft Energy Conversion Agreement presented by GPA is a document of 298 pages. The document is comprehensive and covers every aspect of the building, construction, financing, and operation of the New Power Plant. The ALJ has reviewed the contract in its entirety. It includes the Technical Specifications that were previously approved by the PUC. Overall, it is a far more detailed and comprehensive Agreement then GPA's prior Energy Conversion Agreements for the ENRON 8 & 9 plants (now MEC 8 & 9), TEMES 7, and the Tanguisson plants. The Agreement was drafted by GPA with the assistance of its Consultants Stanley and K&M. GPA GM John Benavente has outlined the specific protections for GPA ratepayers and the government of Guam included in the Agreement[35]:

> "The ECA contains specific protections for GPA ratepayers and the government of Guam:
> 1. Funding: The generation plant is wholly funded by the proponent and the proponent is required to maintain 20% equity in the project.
> 2. Bid Guarantee & Construction Security[36]: GPA retains the $3 million bid guarantee until the proponent reaches financial close, approximately eight (8) months after contract execution. Upon financial close, the proponent is required to provide and maintain $63.8 million in security for the duration of the construction period, estimated at 28 months.
> 3. Liquidated Damages[37]: Delay in commissioning is subject to $2,000 per day for the initial 60 days. Thereafter, the liquidated damages shall be $240,000 per day for each additional day delayed.
> 4. Performance Guarantees: The proponent is subject to penalties for excessive forced outages[38]

[33] Testimony of General Manager John Benavente for Legislative Oversight Hearing on September 10, 2019, dated September 10, 2019, at p. 3; see also GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p. 20.
[34] Testimony of General Manager John Benavente for Legislative Oversight Hearing on September 10, 2019, dated September 10, 2019, at p. 3; see also GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p. 3.
[35] Testimony of General Manager John Benavente for Legislative Oversight Hearing on September 10, 2019, dated September 10, 2019, at pgs. 3-4.
[36] Energy Conversion Agreement, Article 8.5(d).
[37] Energy Conversion Agreement, Article 8.1.
[38] Energy Conversion Agreement, Article 8.3(a).

5. Dependable Capacity Tests[39]: Calculation of monthly fixed charges are confirmed through capacity tests scheduled prior to commercial operation date and annually thereafter.
6. Transfer of Security at Contract Year 21[40]: The proponent must transfer $15 million as security to ensure plant maintenance is continued until the end of the contract term.
7. Default: The proponent's lender shall have step-in rights to address and/or correct the proponent's default.[41] Additionally, upon default of the proponent, GPA may exercise its termination right to purchase the plant at the amount of the outstanding debt.[42]"

The PUC Consultant Concentric Energy Advisors ["CEA"] submitted its Report, "High Level Review of 198 MW Combined Cycle Energy Conversion Agreement," dated October 16, 2019.[43] The Report contains a thorough assessment of the reasonableness of the Energy Conversion Agreement between GPA and KEPCO. CEA concludes that, "when benchmarked against best practices, the ECA proves to be reasonable." The interests of both parties are balanced, and the pricing components are in line with other documents that Concentric has reviewed or assisted in negotiating. CEA further finds that the ECA and the project are "well-conceived." They comply with USEPA Regulations, replace the aged Cabras Steam Plants, meet load growth, and increase renewable integration.[44] Citing standards for agreements such as the ECA, prepared by the World Bank and the Edison Electric Institute, CEA concludes that the ECA includes the required provisions that are necessary for such an Agreement.[45] Based upon the testimony submitted by GPA GM Benavente and CEA, the ALJ recommends that the PUC find that the ECA adequately protects the interests of GPA and its ratepayers, and is a reasonable, well-conceived agreement.

RATE IMPACT

[39] Energy Conversion Agreement, Article 7.
[40] Energy Conversion Agreement, Article 17.4.
[41] Energy Conversion Agreement, Article 4.5; and Lender's Direct Agreement.
[42] Energy Conversion Agreement, Article 4.5(e); and Schedule 8.
[43] Concentric Energy Advisors Inc., High Level Review of 198 MW Combined Cycle Energy Conversion Agreement, GPA Docket 19-13, dated October 16, 2019.
[44] Id. at p. 4.
[45] Id. at p. 3 and Table 1.

In GPA Docket 15-05, PUC ordered that GPA conduct a "rate impact study" indicating what impact the proposed New Power Plant would have on customer rates. GPA retained Mark Beauchamp, President of Utility Financial Solutions, LLC, to conduct a review of New Generating Rate Impacts. Mr. Beauchamp conducted a presentation to the ALJ and the Commissioner on August 18, 2019. Mr. Beauchamp found that there would be no rate impact until fiscal year 2023, when the New Power Plant would already have been constructed and would be in operation.[46] Mr. Beauchamp indicated that fuel costs were expected to decrease by $50 to $60 million between 2023-2025. At the same time, due to operational cost increases, there would be a base rate increase of 11.8% in fiscal year 2023. For the average customer this would result in a monthly dollar increase of approximately $10.80. However, due to a reduction in fuel usage by the new plant (which is more efficient than the Cabras plants), the net residential rate will decrease by 7.95% in FY2023. Similarly, there would be a decrease in net residential rates for 2024 and 2025 of 11.84% and 12.37% respectively.[47] Throughout the entire process for development and consideration of the new generation plant, GPA committed to undertaking all possible efforts to avoid any rate impact from the new plant. At the Public Hearings on the new plant procurement in 2016, GPA indicated that there are numerous cost-cutting and savings initiatives which will result from the addition of the new plant that minimize any rate impact upon GPA customers. GPA has promised to minimize such rate impact by any means available.[48]

PUBLIC HEARINGS

The PUC caused a Public Notice for Public Hearings on GPA's request for approval of the KEPCO Energy Conversion Agreement to be published in the Pacific Daily News on September 13, September 20, and September 27, 2019.

The ALJ notes that a Public Hearing is not expressly required by the Ratepayer Bill of Rights or by law for such matter. GPA's Petition for Approval of the New Power Plant does not specifically include a request for a rate increase. However, it was appropriate to hold Public Hearings on this matter so that the members of the public could express their views concerning this New Power Plant project. It has been estimated that this

[46] Mark Beauchamp, Guam Power Authority Review of New Generating Rate Impacts, Presentation, dated August 18, 2019.
[47] Id.
[48] PUC Order, GPA Docket 15-05, dated October 27, 2016.

project, including fuel costs, will cost Guam power customers $3.12 billion (net present value, over the next 25 years).

The PUC conducted three public hearings on the 198MW Power Plant project: On October 1, 2019, at 6:30p.m., at the PUC Conference Room, Hagatna; on October 2, 2019, at 6:30p.m., at the Dededo Senior Citizens Center; and on October 3, 2019, 6:30p.m., at the Agat Community Center. Over the course of the three evenings, a total of 117 persons attended the public hearings. See Attachment 1 (ATTENDANCE SHEETS). This attendance was the highest at any PUC Public Hearings since at least September 2008, and possibly ever. Over the course of the three evenings, 32 witnesses testified. 5 supported the GPA proposal and 4 were for some form of fossil fuel plant. The majority of testifying individuals, 23, were against the GPA power plant proposal. See Attachment 2 (TESTIMONY LIST).

16 individuals submitted written testimony. A listing of the testimonies is indicated in Attachment "3" hereto (WRITTEN TESTIMONY), with a brief description of each. At the Dededo Public Hearing one of the witnesses, Clarrisa Torres, sang the Guam Hymn "Fanoghe Chamorro", and the other witnesses, GPA and PUC personnel, joined in. Thereafter there was a recitation of the Inifresi.

Principal Arguments of the Witnesses testifying against the 198MW Power Plant

1. Instead of building a fossil fuel generation plant, GPA should expand its reliance upon renewable energy sources.

   The $3.1 billion investment should instead be used for an alternative renewable energy plan. (Testimony of Renee Carpella). Even if GPA may not be able to go 100% immediately, it should rely more upon renewables and avoid "fossil fuel expansion" for a plant that could become a "stranded asset." (Testimony of Michelle Voacolo). There should be a more rapid incorporation of renewables into the Guam Power system than the current 25% Renewable Portfolio Standard. (Testimony of Kai Murrell). Even if GPA requires some additional baseload, it could procure a far smaller plant (i.e. 80MW) and make the "moral choice" to incorporate more renewables. (Testimony of Analyn Palugod). Island nations such as Palau, Tuvalo, and Samoa have adopted 100% renewable standards, which suggests that GPA could far more quickly increase the amount of renewables in the system. (Testimony of Franceska DeOro). Instead of building fossil fuel oil plants, GPA should seek to be 100% renewable. Pending solar projects, with 120MW, can compensate for the loss of the Cabras 3 & 4 plants. Instead of the New Power Plant, GPA should invest in battery storage.

Expansion of roof top solar to 2,000 roof tops could produce 200MW. New micro grids could be created, and hosting of solar roof tops by businesses could be encouraged through tax and other breaks. (Testimony of Senator Clynt Ridgell). Other jurisdictions such as the State of Vermont and Georgetown, Texas have demonstrated that it is possible to achieve 100% renewable (Testimony of Renee Carpella).

2. Korean Electric Power Company (KEPCO) and Korea East West (KEWP) are improper and inappropriate parties to construct GPA's power plant. The PUC should reject GPA's proposed contract with KEPCO.

   Witnesses opposing the New Power Plant contend that KEPCO should not be approved to construct the New Power Plant due to corruption and bribery scandals, and issuance of false licenses. (Testimony of Tonnie Guzman). KEPCO has failing grades in addressing climate change issues. It lost $529.6 Million in operating losses in the first quarter of this year. KEPCO is the subject of bribery scandals and numerous officers and employees have been criminally charged. The U.S. Securities and Exchange Commission has launched an investigation into allegations that KEPCO, as well as KEWP, have been involved in graft. (Testimony of Michelle Voacolo). A member of the KEPCO Group, KEWP, was responsible for the Cabras 3 & 4 explosion according to insurance companies. KEWP should not be allowed to operate the plant. GPA should await the outcome of the law suit by the insurance companies against KEWP. (Testimony of Senator Clynt Ridgell).

3. The proposed 198MW fossil fuel oil plant is environmentally harmful and will negatively impact global warming and climate change.

   Even if the proposed plant were now compliant with environmental standards, it could well become non-compliant over the 25-year period. (Testimony of Renee Carpella). With the climate changes, this power plant threatens the viability of life and may take us on the road off the cliff. Fossil fuel is not the right path. (Testimony of Moneka DeOro). The Intergovernmental Panel on Climate Change (IPCC) has indicated that the effects of climate change are worsening, and surface temperatures could rise by more than 1.5 degrees by 2030. Carbon emissions resulting from fuel oil could cause a climate crisis. This fuel power plant will increase the environmental hazards. (Testimony of Kyle Dahilig). Climate change will lead to Pacific genocide. (Testimony of Chellete San Nicolas). Global warming is affecting the beaches of Guam. (Testimony of Joey Charfauros). Areas of Nimitz Beach have been swallowed up by the ocean, as

well as Talofofo Bay due to rising sea levels. (Testimony of Senator Clynt Ridgell). Emissions from the Plant will affect areas such as Micronesia Mall and GRMC.

4. Utilization of renewable energy sources will be less costly in the long run than a fossil fuel generation plant.

   Gas is the most expensive option for power. The world is running out of gas and oil. It is very unlikely that fuel prices will go down in the future. (Testimony of Kai Murrell). GPA always raises the power rates, but the "sun is free." (Testimony of Jonathan Savares). GPA's own figures indicate that the proposed plant would be more expensive than the most recent solar plants. The proposed fossil fuel plant, the cost will be $0.15 per KWH; for solar plants it will be $0.06-$0.08 per KWH. Fuel prices are always volatile and subject to international incidents. Fuel oil is projected to rise substantially between 2030 and 2050. (Testimony of Senator Clynt Ridgell). It makes no sense to spend millions of dollars on fuel oil to send off island to rich companies. Other renewable alternatives can be considered such as water and wave power generation and hydroelectric.

5. If the 198MW fossil fuel plant is built, it should be sited at a location other than Ukudu.

   Joaquin P. Perez, while not questioning the need for GPA to construct a new baseload power plant, objects to the proposed location of the new baseload unit at Ukudu (Testimony of Joaquin Perez). A more appropriate location would be the first one considered by GPA, which is on parcels adjacent to the Guam Waterworks Authority Northern Wastewater Treatment Plant. GPA, however, was unable to secure agreement from the Guam Ancestral Lands Commission to obtain ownership of the parcels next to the Wastewater Treatment Plant. Mr. Perez suggests that GPA seek to exchange the parcels it subsequently purchased for the new plant location with those currently owed by the GALC. Some witnesses believed that the plant should not be moved out of Piti. Moving the plant to Dededo is not good for ratepayers. (Testimony of Jeff Pleadwell).

<u>Principal Arguments of the Witnesses testifying in favor of the 198MW Power Plant</u>

1. The 198MW Power Plant is the best available solution to provide reliable power to the ratepayers of Guam.

GPA submits that the 198MW of new baseload capacity is vitality needed. In 2015 GPA lost the Cabras 3 & 4 Units, a total of 78MW. In addition, Cabras 1 & 2 Units are nearly 46 years old. Those units have already been derated from 60MW to 55MW each. It is not expected that said units will have a life span beyond five years (GPA NEW COMBINED CYCLE POWER PLANT PRESENTATION). Without additional baseload capacity provided by the new plant, GPA will be unable to sustain load growth. It is presently estimated that, without additional baseload capacity, GPA could only support 1% load growth beyond 2023. GPA could likely meet the load growth within the next 3 years; however, without the new capacity beyond 2022, load shedding will again impact ratepayers. The additional capacity is needed to avoid rolling load shedding again (Id.). GPA is under the ongoing monitoring, review and regulation of the United States Environmental Protection Agency. All of GPA's current baseload plants are in violation of USEPA RICE-MACT and EGU-MACT regulations, which became effective in 2013 and 2015. For a number of years now, GPA has been negotiating a resolution of these violations with USEPA. For conversion of baseload plants, such as MEC 8 & 9, Ultra Low Sulfur Diesel is required to comply with air omission regulations. Thus, GPA needs to replace 198MW of capacity and will also need to convert MEC 8 & 9 to ULSD no later than September 30, 2020. The current fines and penalties that GPA faces from the USEPA for its non-compliance is $352,200,000. An imminent resolution of these issues with USEPA is required. Solar advocates offer no immediately available solution to these issues other than apparent abandonment of the existing plants and rejection of the New Power Plant proposal.

2. A 100% Solar Renewable alternative is incapable of providing any immediate solution for reliable power on a 24/7 basis. The basic problem with a 100% renewable solution is that there is no detailed plan, estimated costs, or timelines to provide the needed capacity and energy for Guam in the future (Testimony of Simon A. Sanchez).

3. Other than hopeful reliance upon solar renewable alternatives, the solar advocates do not specifically indicate how they would address the provision of reliable baseload capacity. Solar cannot function without reliable fossil fuel baseload generation backup. This is indicated by the fact that net metering customers continue to rely on GPA for affordable and reliable back up to their systems, and have not, for the most part, relied upon their own solar battery systems. (Testimony of Simon A. Sanchez). The cost of renewable energy contracts is still not competitive with conventional generation for the provision of firm and reliable power. Energy Storage Technology is not yet reliable and

cost effective as a replacement for baseload generation. (Id.). GPA's bid for baseload power was "technology agnostic." Bidders were able to propose solar and/or other renewable solutions had they chosen to do so. However, not one bidder on GPA's Request for Proposals proposed a solution to bid a 100% renewable solution or to use only renewable technology (Id.). Current renewable technology, including storage, is too expensive and unreliable. An 100% renewable solution would require at least 3,400 acres of land (Written and Oral Testimony of Eloy Hara). There is no indication of whom would provide the land. Even assuming that such land was available, solar proponents have not indicated how sufficient land could be located and who would pay for it (Id.). GPA states that the cost alone for an immediate 100% renewable system would be more than $3,777,138,508 (GPA Submission for September 10, 2019 Legislative Oversight Hearing). The proposed new generator will provide 24/7 power more reliably than the 100% renewables alternative. Land alone could cost more than $140M (Id.).

Solar power is "intermittent"—its effectiveness is reduced by cloud cover, extended periods of rain, and non-production at night time. For as many as 13 days in April 2019, the Dandan Solar plant failed to meet minimum kWh required levels (GPA NEW COMBINED CYCLE POWER PLANT PRESENTATION). On the other hand, the new Plant will provide 96% guaranteed availability. Id.). Renewables are "grossly inefficient" to supply the capacity and reliability demanded by GPA customers. (Testimony of Joaquin Perez). As an example, recently Kauai was faced with load shedding despite significant renewable energy resources being available. Kauai now produces 55% of its energy from renewables. However, when 2 of its 3 largest diesel generating units failed, renewables, with 118 megawatts of generating capacity, were not able to carry Kauai's 75-megawatt peak load. When the sun was not shining, the solar energy resources failed to provide minimal output. General Manager David Bissell concluded that there must be a back up to the renewables in the form of diesel fuel generators. The system must maintain both conventional and renewable resources. However, it is unlikely that KIUC will decommission its diesel-fuel powered plants and shift completely to renewable energy "for a long time." (Testimony of Simon A. Sanchez).

4. Unless the 198MW power plant is built, GPA will be unable to integrate more solar renewables into the IWPS. GPA has already planned or contracted up to an additional 165MW of solar power. (Id.). However, without a new and more modern power plant, GPA will be unable to integrate more solar renewables. The existing GPA units such as Cabras 1 & 2 and MEC 8 & 9 are not able to

operate well with intermittent renewables. The new plant is needed in order to achieve higher Renewable Portfolio Standards. The new plant can withstand start/stop operations, provide faster response to rapid and constant changes in the renewable loads, and support added renewables to the grid. (GPA NEW COMBINED CYCLE POWER PLANT PRESENTATION). The new plant is far more reliable than the existing units. It's characteristics and location will substantially improve the reliability of the system.

5. GPA's 198MW Power Plant Proposal will satisfy environmental issues raised by the USEPA; it will also reduce green-house gases and other harmful omissions released at present. The island's carbon footprint will also be reduced. Instead of using seawater for cooling of the plants, the New Power Plant will rely upon "gray water" from the GWA Northern District Wastewater Plant. It will reduce omissions by decreasing the amount of fuel burned annually by 35M gallons. There will be a reduced impact on climate change (Id.). One proponent of the New Power Plant, Ivan Matek, testified that there are numerous adverse environmental impacts resulting from the manufacturer of solar panels and batteries. Substantial amounts of fuel and electricity are used in the manufacturing process for solar panels, batteries and components. He estimates that total annual consumption for production of solar panels and auxiliaries is 15,680,400 gallons. There are also the environmental problems of disposing of defective or used solar panels, batteries, and components.

6. The new 198MW power plant project will ultimately result in reduced rates for residential ratepayers. GPA currently estimates that the year 2023, residential ratepayers will experience a 7.95% reduction in the current power rate. Although the base rate could rise, GPA indicates that the reduction in fuel costs will result in an overall reduction in the residential rate impact. If LNG could subsequently be used by the New Power Plant, the reduction in the rate impact could reach 21.15% in year 2026 (GPA NEW COMBINED CYCLE POWER PLANT PRESENTATION).

7. Korea Electric Power Company was properly selected by GPA as the "lowest, responsive bidder". The opponents of the New Power Plant have failed to justify reversing the selection of KEPCO as the most qualified, lowest cost bidder and preventing it from building the New Power Plant. KEPCO has over 50 years of experience in the power plant business. It is a globally traded company with huge financial capability and provides power around the world, including providing South Korea with 94% of its energy. (Testimony of Simon A. Sanchez). Opponents of the power plant have objected to KEWP, a part of the KEPCO

business consortium, on the ground that it allegedly "blew up the plant". There is no evidence that KEWP "blew up the plant." There is currently a lawsuit by the insurance companies against KEWP alleging negligence. However, there has been no determination whatsoever at this time that KEWP caused the explosion. It is inaccurate to compare the Cabras 3 and 4 situation with the New Power Plant. The Cabras 3 & 4 explosion has nothing to do with the current bid. With Cabras 3 & 4, the plant was built and owned by GPA. KEWP was a performance management contractor for the plant, but the plant was operated by GPA employees (Testimony of Eloy Hara). Under the current RFP for the New Power Plant, KEPCO will be entirely responsible for building and operating the plant. It will bear all risk for the plant and must put up 20% the cost of the plant through its own capital (Testimony of Simon A. Sanchez).

ANALYSIS

1. THE PUC SHOULD NOT FURTHER DELAY DECISION ON GPA'S PROPOSAL FOR THE 198MW POWER PLANT.

There is no justifiable reason for the PUC to further delay decision on GPA's proposal for the 198MW Power Plant. Both GPA and the PUC have been in a continual process of vetting and considering New Power Plant alternatives for the island wide power system for over ten years. It is unnecessary to conduct further study on "the feasibility of other alternative power solutions." In the past 15 years, GPA has conducted over 57 studies relating to integration of renewables into the IWPS, battery storage, and system performance/reliability. See Attachment 4 hereto.[49] In GPA Docket 17-06, the PUC authorized GPA to undertake a Renewables Integration System Study.[50] The Study found that the GPA system cannot accept more renewables at the present time because of non-responsive and non-flexible generation, low short-circuit currents, no Automatic Governor Control (AGC), slow 34.5kV and 115 kV fault clearing, and fault induced delayed voltage recovery.[51] However, with certain improvements, including a flexible generation plant, transmission line improvements, and Energy Storage System Transient Grid

[49] Listing of GPA Planning Studies, submitted to PUC ALJ Fred Horecky on October 14, 2019, by John Cruz, Assistant General Manager, Engineering & Technical Services, GPA (Attachment 4 hereto).
[50] PUC Order, GPA Docket 17-06, dated October 27, 2016.
[51] Guam Power Authority System Improvement Plan for Renewables, Final Report and Present, dated July 23, 2018 (Electric Power Systems Inc. Consulting Engineers).

support, GPA would be able to accept renewables in the system "up to the economic limit of the renewables, not technically limited."[52]

GPA has over five years of practical experience in assessing the Dandan 25MW Solar Plant. In numerous dockets, as well as at the Public Hearings herein, GPA has presented evidence that solar power is not presently firm or stable enough to support the baseload generation needs of the power system (GPA NEW COMBINED CYCLE POWER PLANT PRESENTATION). The PUC has already made a factual determination, on the record, that renewable generation is not reliable or stable enough to serve as baseload generation capacity. The PUC, in its Order in GPA Docket 15-05, dated October 27, 2016, held that "at present, there has been no showing that renewable energy is reliable or stable enough to provide base load generation for Guam… It is pure speculation to suggest when renewable energy will be a viable alternative to baseload fossil fuel generation."[53] There has been no testimony or evidence submitted by solar proponents establishing that solar energy can provide the type of baseload generation now needed by GPA. GPA has demonstrated that it will not be possible to further integrate solar generation into the island wide power system without constructing the new baseload plant. While moving forward with the new 198MW power plant, GPA has already procured an additional 165MW of solar power to function together with New Power Plant.

The record before the PUC justifies approval of GPA's plan for the 198MW Power Plant. The prior Lummus Report was issued *before* GPA lost 78MW with the Cabras No. 3 & 4 explosion. The recent Report of Concentric Energy Advisors states as follows: "**It would not be reasonable to replace the Cabras units only with renewable resources. The renewable technology is not mature enough to provide the level of reliability to support baseload needs.** Countries like Germany are targeting full renewable generation, but this is done primarily to over-sizing the capacity of generation built and by relying on an integrated transmission grid. Guam does not have the land or geographical proximity to other electric systems to afford such configuration."[54] (emphasis added). The PUC should now proceed ahead to determine whether the New Power Plant will be authorized. Delay in the construction of this plant will also delay fuel savings which will benefit ratepayers and lower power rates. There is simply no reason for further delay on this decision.

[52] Id., at Slides 2-3.
[53] PUC Order, GPA Docket 15-05, dated October 27, 2016, at pgs. 5-6.
[54] Concentric Energy Advisors Inc., High Level Review of 198 MW Combined Cycle Energy Conversion Agreement, GPA Docket 19-13, dated October 16, 2019, at p. 5.

There is no need for a further study on the feasibility of other alternative power solutions. No benefit would be gained from such study.

2. THE AUTHORITY TO DECIDE WHAT POWER PLANT WILL BE APPROVED, AND THE TIMETABLE FOR CONSTRUCTION, IS FIRMLY VESTED BY LAW IN GPA, SUBJECT TO PUC APPROVAL, NOT IN OTHER THIRD PARTIES. THE PUC SHOULD DETERMINE THAT GPA HAS JUSTIFIED APPROVAL FOR THE 198MW PLANT AND THE ENERGY CONVERSION AGREEMENT.

Who decides what type of power plant is necessary for the GPA system? In accordance with 12 GCA § 8104(k), it is the Guam Power Authority that exercises the power to "**control, operate, improve, equip, maintain, repair, renew, replace, reconstruct, alter and insure the electric system**..."[55] The Guam Legislature reinforced the control of GPA over the power system by creating a Consolidated Commission on Utilities, an elected body, which exercises "all powers vested in the Authority."[56] The Legislature created an elected Consolidated Commission on Utilities whose purpose "is to exercise powers vested in them by the laws establishing the Guam Power Authority ("GPA") and the Guam Waterworks Authority ("GWA")."[57] The Legislative intent was to vest control over the power system in GPA and the CCU. By law, neither the Legislature or other parties are empowered to determine what plants or improvements will be added to the power system. With regard to review of GPA decisions, the Organic Act of Guam created the Public Utilities Commission as an "independent rate-making authority."[58] The Federal Government required Guam to create the PUC. The Legislature established the Guam PUC and vested it with responsibility for review of GPA contracts and rate decisions. Whatever rate-making authority the Legislature may previously have had, it delegated such authority to the PUC. PUC is obligated under law to review any GPA contracts which could increase rates ("the utilities shall not, however, enter into any contractual agreements or obligations which could increase rates and charges prior to the written approval of the Commission.").[59]

GPA has submitted an Energy Conversion Agreement for the 198MW project to the PUC for review and approval. By virtue of the Contract Review Protocol between

[55] 12 GCA § 8104(k).
[56] 12 GCA § 8107.
[57] 12 GCA § 79100 at et seq.
[58] 48 USC § 1423a, as amended by P.L. 98-454, Title II, § 203, 98 Stat. 1733(1984).
[59] 12 GCA § 32105(e)(1).

GPA and the PUC, PUC is required to review the Energy Conversion Agreement.[60] GPA and the PUC are responsible for deciding whether the ECA will be approved. It is entirely appropriate for the PUC to take public testimony on this matter, but ultimate responsibility for approving the ECA is the sole decision of the Commissioners of the Guam Public Utilities Commission. The PUC has exercised caution and due diligence in its review process over the years. It has never been a "rubber stamp" for GPA decisions. In 2015, PUC rejected GPA's petition to procure a New Power Plant, holding that GPA had not demonstrated that the current generation capacity of the power system was insufficient to meet existing load.[61] After its original disapproval, PUC, Lummus, and GPA engaged in additional proceedings and obtained information from GPA concerning its Strategist and Financial Model. The "game changer" for the PUC was the loss of the Cabras No. 3 & 4 plants, 78MW of power.[62]

With the deteriorating condition of the aged Cabras No. 1 & 2 plants, and with only a likely 5-year further life span for those plants (loss of another 132MW), it became increasingly apparent that GPA needed a new plant with at least 180MW of generation capacity. GPA filed an Update with the PUC on its Integrated Resource Plan on May 24, 2016.[63] The key implementation recommendation of the IRP was to procure up to 180MW combined cycle units, to retire the Cabras plants, and to convert MEC No. 8 & 9 to ULSD under the IPP capitalization model.[64] Based upon GPA's justification for a New Power Plant, on October 27, 2016, the PUC approved GPA's procurement for a 180MW power plant.[65] At that time PUC disapproved GPA's plans to utilize LNG.[66] Decisions as to what power plant should be approved, and the type of fuels used, should be determined by the CCU, GPA and its staff of Engineers, and the PUC and its Consultants. GPA has a staff of forty professional engineers to make decisions concerning the electric power system. However, contrary to testimony at the public hearing (Testimony of Barry Mead), GPA did not rely only upon its internal staff but over the years retained a substantial

[60] Contract Review Protocol for the Guam Power Authority, Administrative Docket, dated February 15, 2008.
[61] PUC Order, GPA Docket 15-05, dated January 29, 2015, at p. 3.
[62] PUC Order, GPA Docket 15-05, dated October 27, 2016.
[63] Consolidated Commission on Utilities UPDATE, Integrated Resource Plan and GPA Implementation Plan, GPA Docket 15-05, filed May 17, 2016.
[64] Id., at GPA Implementation Plan.
[65] PUC Order, GPA Docket 15-05, dated October 27, 2016.
[66] Id.

number of qualified off-island consultants to assist it in arriving at the best proposal for a new generation plant (Attachment 4).[67]

3. CONTRARY TO PUBLIC TESTIMONY, GPA HAS FULLY CONSIDERED ALTERNATIVES TO THE 198MW COMBINED CYCLE PLANT, INCLUDING RENEWABLE ALTERNATIVES.

Since its submission of an Integrated Resource Plan in 2008, GPA has consistently revised its power plant proposals and has thoroughly considered alternatives. It initially considered a plan to convert the existing plants, Cabras No. 1 & 2, and MEC No. 8 & 9, for compliance with environmental regulations (with low Sulfur RFO), with life extension plans and addition of scrubbers, etc.[68] However, subsequently GPA decided that a preferable investment would be to build a New Power Plant, with fuel-efficient compliant generators.[69] Originally GPA had plans to use LNG for the new generators, which use was not approved by the PUC. Subsequently, in GPA's 2016 update of its IRP, it agreed to build a 180MW combined cycle plant with fuel conversion to Ultra Low Sulfur Diesel.[70] GPA has fully considered the use of renewables as an alternative to the fossil fuel plant. In response to the PUC Order in GPA Docket 15-05 dated October 29, 2015, GPA provided a substantial amount of information to PUC concerning how it arrived at a projected plant size of 180MW, what fuels would be used, its procurement plans and what technology it would seek, whether it would use the IPP model, whether Cabras 3 or 4 were still operable, and what ratepayer impacts would result from the new plant.[71]

GPA addressed the Lummus concern that GPA must adequately incorporate the impact of renewable energy in its resource/compliance planning. GPA stated that it was continuing to investigate renewables as an alternate source of power which contributes to fuel diversity and could reduce fossil fuel generator capacity requirements. However, GPA submitted that both solar photovoltaic technology and wind technology are "intermittent resources or non-firm capacities that would only contribute to supporting peak demand if energy storage was implemented to store and shift energy from the renewable energy resources to discharge during

[67] See Attachment 4.
[68] GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p.3.
[69] Id.
[70] Consolidated Commission on Utilities UPDATE, Integrated Resource Plan and GPA Implementation Plan, GPA Docket 15-05, filed May 17, 2016.
[71] GPA Response to PUC Order in GPA Docket 15-05 dated October 29, 2017 (Attachment to GPA Revised Petition for Approval of New Generation Combined Cycle Units, GPA Docket 15-05, dated July 14, 2016).

GPA peak periods which occur at night."[72] It pointed out that it had increased the Phase II bid awards to 60MW of installed energy capacity and ultimately agreed upon 120MW of solar energy capacity. There was an additional 40MW plan with the Navy for additional renewable capacity.[73] GPA indicated that it had been working with its consultants and energy storage suppliers to evaluate cost for energy shifting. The problem with battery storage is its high cost. GPA's feasibility study indicated that battery-type energy storage for "on demand spinning reserve of 40MW for 15 minutes", an energy capacity of 10MWH, would cost nearly $40 million. The cost of energy storage for the Dandan solar plant was more than $320 million.[74]

GPA determined that other renewable forms of energy were not feasible: "Since 2008 GPA has evaluated other renewable opportunities that would provide the firm power and could lower thermal or fossil-fuel capacity reserve requirements. These include waste to energy, geothermal, bio fuels and even sea water air conditioning as a cooling cost offset. Our renewable bids since 2009 only confirmed that these options are not cost effective or require expensive studies to further confirm their potential."[75] GPA has also conducted Engineering Feasibility Studies to evaluate and determine additional Energy Storage System capability for its utility scale projects. In a May 17, 2016 GPA/CCU Presentation, GM Benavente stated that energy storage was not yet matured enough for baseload generation, but would be "a part of the future."[76] He also indicated that renewables do not significantly reduce peak load generation needs of GPA. CCU Chairman Joey Duenas stated that there was no proof that renewables could provide 24/7 firm power, or when battery storage technology would be sufficient to provide peak load power during the night time. GPA has recognized its obligation to keep the lights on for 24 hours per day.[77]

The incontestable fact is that not one solar provider submitted a bid in response to GPA's procurement for the new 198MW power plant. Opponents of the New Power Plant proposal claim that no company proposed a renewable solution for the 180MW plant "because it was made clear" that GPA and CCU were set on a fossil

[72] Id. at p. 14.
[73] Id. at pgs. 14-15.
[74] Id. at p. 15.
[75] Id.
[76] GM Benavente's Presentation on Update of the Integrated Resource Plan, GPA Boardroom May 17, 2016; Notes of PUC ALJ Frederick J. Horecky.
[77] Id.

fuel burning power plant.[78] However, the Request for Qualifications, as well as the Bid Documents for the New Power Plant, were technologically "neutral" and "agnostic". The bid documents stated that all proposals would be considered, including renewable proposals. In numerous Orders, PUC required that any language that limited RFQs or bids to fossil fuel proposals be removed. As established by the PUC Supplemental Order dated April 27, 2017, it was crystal clear that bidders could offer technology solutions other than the combined cycle units.[79] Bidders were fully authorized to submit proposals other than combined cycle, which could also include LNG, LPG, or possible renewable solutions.[80] No facts or evidence are submitted to back up the claim of plant opponents that no bidder submitted a renewable solution because of what was "known" about GPA's position. The fact that no bidder submitted a renewable solution is likely due to the conclusion that renewable solutions could not meet the 96% reliability standards which GPA sought for its power plant in the bid. It is also telling that two bidders who have already secured contracts to build a total of 120MW solar plants, KEPCO and Hanwha, did not submit solar renewable bids for the 198MW New Power Plant proposal.

4. KOREAN ELECTRIC POWER COMPANY (KEPCO) WAS PROPERLY DETERMINED BY GPA TO BE THE MOST QUALIFIED, LOWEST COST PROPOSER FOR THE 198MW POWER PLANT. KEPCO IS FULLY CAPABLE OF CONSTRUCTING THE NEW POWER PLANT; THERE IS NO LEGAL BASIS FOR RETROACTIVELY DISQUALIFYING KEPCO FROM THE RFP AWARD.

   A principal argument of the opponents of the New Power Plant is that the awardee of the Energy Conversion Agreement, KEPCO, and its subsidiary KEWP, are improper and inappropriate parties to construct GPA's New Power Plant. There is a claim that a subsidiary of KEPCO, Korea East West Power (KEWP) "blew up" the Cabras No. 3 & 4 units when it was in charge of the maintenance, operations and overall management. To date, there is no factual evidence proving that KEWP was responsible for "blowing up" GPA's plant. There is a pending lawsuit in which insurance companies are seeking indemnification from KEWP, as they allege that it was responsible for the plant explosion. There has been no legal determination of "causation" or "responsibility" for the explosion. KEWP denies negligence and responsibility. The explosion could have occurred as the result of defective plant

[78] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019.
[79] PUC Supplemental Order, GPA Docket 15-05, dated April 27, 2017.
[80] Id.

construction, equipment or materials, or even as the result of actions of GPA employees. These issues will be determined after years and years in a lawsuit, but it is impractical for GPA to delay proceeding with its new plant until the lawsuit is resolved, which could take years and years. In reality, however, the Cabras No. 3 & 4 explosion is irrelevant to the current RFP award. To begin with, the awardee for the ECA is KEPCO, not KEWP. It is unknown whether KEPCO will utilize KEWP as its new plant operator. However, even if KEWP will be the operator, comparisons between the Cabras explosion and the new plant operation are inapposite. Cabras No. 3 & 4 were constructed and owned by the Guam Power Authority. Neither KEPCO nor KEWP had any role in the construction of the plants. KEWP was the Performance Management Contractor of Cabras No. 3 & 4 at the time of the explosion; however, as required by contract, KEWP was utilizing many GPA employees to operate and run the plant. Since the new plant will be operated by an Independent Power Producer, KEPCO, the IPP will be entirely responsible for the construction and operation of the plant. That is the whole purpose of an IPP—to remove the risk of construction and operation from GPA and shift it to the contractor, KEPCO. GPA's insulation from risk would be destroyed if GPA compelled KEPCO to hire a specific plant operator.

There are further claims that: (1) since KEPCO had over $500 Million in operating losses in the first quarter of this year, it is somehow disqualified from bidding or being awarded the ECA; (2) KEPCO is the subject of bribery scandals and numerous of its officers and employees have been criminally charged; and (3) The U.S. Securities and Exchange Commission is investigating allegations that both KEPCO and KEWP have been involved in graft.[81] Much of KEPCO losses are due to the fact that it is a government owned utility and has also been required to implement expensive renewables: "KEPCO is poised to raise electricity rates as it continues to lose money amid the Moon Jae-in governments drive to phase out nuclear power and expand the use of expensive renewable energy…".[82] One would be hard-pressed to find large world-wide corporations that have no lawsuits against them. However, the existence of such suits is not a disqualifying factor which prevents corporations such as KEPCO from bidding on or being awarded contracts.

What the opponents are really asking here is for GPA to go backwards in time, undo its determination that KEPCO was a qualified bidder, and now find that KEPCO is disqualified for the three reasons cited above. Such a course of action is unauthorized by the Procurement Law of Guam and most undoubtedly would

[81] Testimony of Michelle Voacolo.
[82] The Korean Times, Biz & Tech, http:www.koreatimes.co.kr.www/tech/2019/05/515_268836.html

result in a lawsuit by KEPCO that would prevent the people of Guam from obtaining a New Power Plant for many years into the future. Such action would be a disaster for Guam, would likely result in load shedding, the imposition of huge amounts of USEPA fines, and the likelihood of a receivership for the entire GPA system. Regardless of whether KEPCO has lost money or has bribery allegations against it and investigations, it is a competent company to build power plants and has the technical capability to do so. KEPCO is the national power company of South Korea, and supplies 94% of all power to South Korea.[83] South Korea is one of the most technologically advanced countries in the world. If KEPCO can supply the people of South Korea with power, it likely can construct a power plant on Guam. At the Public Hearing in Dededo, General Manager John Benavente testified that KEPCO has built similar power plants to the one envisioned in Guam in Malta and in Illinois in the United States.[84] The arguments casting aspersions on KEPCO and KEWP are irrelevant to the selection of KEPCO by GPA as the lowest responsive bidder for the 198MW power project.

5. THE PUC HAS REJECTED THE ARGUMENT THAT THE 198MW POWER PLANT WILL BECOME A 'STRANDED ASSET."

Opponents of the New Power Plant have argued that, in a few years, the fossil fuel power plant will become a "stranded asset" due to rapid improvement in renewable technologies and lowering in cost. When renewables become the technology of choice, the fossil fuel power plant will be useless and obsolete.[85] However, there has been no showing by the opponents as to when solar renewables will be able to provide firm and reliable power or when fossil fuel technology will be displaced. The PUC has previously rejected the argument that the 198MW Power Plant will become a "stranded asset". In public hearings held in GPA Docket 15-05 regarding the procurement of the New Power Plant, Jeff Voacolo of Micronesia Renewable Energy Inc. indicated his belief that a smaller plant, perhaps 60MW or 100MW, would be sufficient. He argued that there could be substantial developments regarding renewable energy, such as advancements in battery storage that would make renewable energy a more viable alternative within the next few years. The fossil fuel plant would then become a "stranded asset"; it would be taken out of commission or seldom used, which would render the financial cost for the plant a waste.[86]

[83] Testimony of Simon A. Sanchez.
[84] Testimony of GPA General Manager John Benavente.
[85] Testimony of Michelle Voacolo.
[86] PUC Order, GPA Docket 15-05, dated October 27, 2016, at pgs. 4-6.

However, the PUC held that, even if renewable energy became reliable and available during the 30 year IPP Contract, GPA could still use the combined cycle units as peaking units and possibly retire the other peaking units.[87] When solar power and battery storage will be able to provide baseload generation capacity, or 24/7 availability, is speculation and unknown. As one solar company executive on Guam, Bill Hagen, testified at the September 10, 2019, Legislative Oversight Hearing on the future of solar renewables, it would be impossible for the General Manager of GPA to predict what the status or technology of solar renewables and batteries would be five years from now. Mr. Hagen sympathized with the need of GPA to make determinations as to the New Power Plant based upon its current knowledge and evaluation.[88] GPA is not required to speculate on when renewable energy will be viable alternative to baseload fossil fuel generation. Under Guam law, decisions as to what type of power plant generation should be utilized, and whether an alternative is presently acceptable, are firmly within the control of the Guam Power Authority.

6. INSISTANCE UPON THE IMMEDIATE 100% IMPLEMENTATION OF RENEWABLES WILL JEOPARDIZE GPA'S COMPLIANCE WITH USEPA REQUIREMENTS, AND COULD RESULT IN HUNDREDS OF MILLIONS OF DOLLARS OF FINES TO GPA, AND EVEN RECEIVERSHIP.

There are two issues concerning conversion of GPA's power system to solar renewables. The first is the timetable for such conversion; the second is whether immediate conversion of GPA's power system to 100% renewable is practical or desirable. Since it is GPA's responsibility to maintain adequate and reliable power, it must also be responsible for determining the risk of converting to solar renewables system wide too quickly. Guam, unlike stateside jurisdictions, has no ability to buy power from other state or local grid jurisdictions, or to sell power to such jurisdictions. One of the most important purposes of the New Power Plant is to comply with USEPA RICE-MACT and EGU-MACT regulations which became effective in 2013 and 2015.[89] GPA's Cabras No. 1 & 2 base units are non-compliant with those regulations.[90] GPA has been engaging in negotiations with USEPA for agreement upon a Consent Decree since at least 2013. If a Consent Decree and Compliance Plan is not implemented soon, GPA will face significant penalties from

[87] Id. at p. 6.
[88] Testimony of Bill Hagen at the Legislative Oversight Hearing on September 10, 2019.
[89] GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p.2.
[90] Id. at p. 3.

USEPA. For non-compliance with USEPA regulations, GPA currently faces $352,200,000 in penalties.[91] The plan that GPA has proposed for the new 198MW combined cycle power plant will comply with USEPA regulations and appears to be satisfactory to USEPA. The plan includes retirement of the Cabras No. 1 & 2 plants after construction of the New Power Plant, and conversion of the MEC No. 8 & 9 units to ULSD within one year after the commissioning of the 198MW combined cycle plant.[92]

On the other hand, the opponents of the New Power Plant have no real plan for compliance with USEPA regulations other than to contend that conversion to 100% solar will comply with USEPA emission standards. The opponents have proposed no specific timetable for the building of new solar plants, addition of battery storage, or conversion of more roof top solar that would comply with the USEPA requirements. How long would it take to implement an alternative plan? What would be the plant components and the time schedule for compliance? Who would be responsible for deciding the plan for implementation of renewables? None of these questions are answered by the opponents of the new 198MW power plant. Without specific plans for compliance, GPA would again face the risk that USEPA will impose hundreds of millions of dollars of fines upon GPA. Even other drastic alternatives, such as receivership for GPA, could be considered. Given the immediate need of GPA to come into compliance USEPA regulations and enter a Consent Decree, it is too risky to rely upon an undefined, unplanned process concerning implementation of renewables.

The opponents claim that renewable energy can solve all of USEPA's emission requirements. There is no specific plan as to how the renewables will be implemented and over what timeframe. Then, however, recognizing that GPA already has 120MW of renewable energy in the pipeline, the opponents allege that renewables will be sufficient to cover the loss of the Cabras 1 & 2 plants and render the 198MW power plant unnecessary.[93] Unless GPA proceeds with the construction of its new 198MW power plant, the 120MW pending solar projects in Phase II will not be able to function or be supported in the power system.[94] The opponents' assertion concerning the sufficiency of renewables is based upon the erroneous assumption that megawatts produced by solar plants are the same as, or equivalent

[91] Id. at p. 4.
[92] Id. at p. 5.
[93] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019, at pgs. 3-4.
[94] Phone Conversation between John Cruz, GPA Assistance General Manager, Engineering & Technical Services, and PUC ALJ Frederick J. Horecky, on October 17, 2019.

to megawatts produced by fossil fuel plants. To date, GPA does not include system solar production in its determination of total system load capacity. The reason is that solar power is not firm or reliable. The power produced by the Dandan plant has been extremely intermittent and is not reliable baseload power (See Attachments 5 and 6).[95] That plant, with 25MW nameplate capacity production, is actually estimated by GPA to produce about 5MW of solar power. GPA utilizes a 20% factor to determine the actual energy production of the Dandan plant. Furthermore, Inverter based generation does not provide the same value of synchronous generation as baseload generation. It does not provide voltage support or short circuit current.[96] Ruben Moreno, of Concentric Energy Advisors, PUC's Consultant, has represented to the ALJ that, in general, a solar plant only produces 30-32% of the power production of a fossil fuel plant of the same size. In other words, to replace a fossil fuel plant that produced 100MW of firm power, a solar plant replacement would need to have available capacity of 300MW.[97]

Solar power will not be a replacement for fossil fuel generations unless there is full time and sufficient battery storage. The costs will be astronomical. Although the KEPCO and Hanwha plants will have some amount of battery storage, it is not anticipated that those plants will produce baseload generation. Unless there is sufficient battery storage, it is unrealistic to expect that the 120MW of renewable energy that will be produced by the KEPCO and Hanhwa projects will "cover" the 110MW that the Cabras No. 1 & 2 plants are presently producing. The opponents' argument also does not take into account that 78MW of power was already lost through the explosion and fire regarding the Cabras No. 3 & 4 plants. Battery storage is now too expensive and not sufficiently reliable to provide the needed power. GPA deserves credit for the numerous steps it has taken to integrate solar renewables into the IWPS. However, the integration process should be measured. GPA's Renewable Integration Study demonstrated that it will not even be possible to integrate more renewables into the system unless this power plant is constructed.[98] The new plant will provide faster response to the rapid and constant changes in renewable loads. It creates a flexible response to grid intermittency. The

[95] Attachment 5, April 2019 Solar PV Production, GPA Work Session Presentation to the Consolidated Commission on Utilities, September 19, 2019; Attachment 6, August 1 – September 30, 2019, 25MW PV Production, submitted by Tricee P. Limtiaco, Assistant General Manager, Guam Power Authority, on October 16, 2019.

[96] Id.

[97] Phone Conversation between Ruben Moreno, Concentric Energy Advisors, and PUC ALJ Frederick J. Horecky, on October 18, 2019.

[98] Guam Power Authority System Improvement Plan for Renewables, Final Report and Present, dated July 23, 2018 (Electric Power Systems Inc. Consulting Engineers), at Slide 2.

new plant will allow the addition of further renewables to the system.[99] But, without the stability of a fossil fuel plant, Guam will be incapable of creating a reliable solar renewable system.

7. CONVERSION TO AN ENTIRELY RENEWABLE POWER SYSTEM AT PRESENT IS NOT A PRACTICAL OR FEASIBLE SOLUTION TO GUAM'S POWER NEEDS.

There is also an assumption by opponents to the power plant that Guam can rely upon solar roof top net-metering power to provide the necessary generation capacity in the system.[100] However, GPA's planning model assumes that it is more feasible to rely upon utility scale solar renewable generation to add renewable power to the IWPS.[101] A Study by the Massachusetts Institute of Technology cites evidence that distributed solar generation costs utilities, and ratepayers, more than it saves.[102] Residential solar receives far higher subsidies per watt of deployed capacity than utility-scale solar. Utility-scale solar is viewed as a more advantageous solution.[103] GPA has also provided cost estimates for implementation of a 100% renewable power system. The initial costs for land and construction would be more than $3.7 billion dollars (Attachment 7).[104] With full battery storage and supply redundancy, the cost could approach $9 Billion.[105] There is no jurisdiction now that is 100% solar or that relies exclusively upon renewable power. Solar generation still represents a very small portion of U.S. Net Electricity Generation (Attachment 8).[106] The General Manager, David Bissell of the Kauai Island Utility Cooperative, which obtains 55% of its energy from renewables, states that there must be diesel fuel generators as a backup to the renewables. The system must have a combination of conventional and renewable resources.[107]

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[99] GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p.2. Id. at p. 13.

[100] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019, at p. 4.

[101] Guam Power Authority System Improvement Plan for Renewables, Final Report and Presentation, dated July 23, 2018 (Electric Power Systems Inc. Consulting Engineers), at Slides 14 and 15.

[102] https://www.cleanenergyauthority.com/solar-energy-news/mit-study-favors-utility-scale-solar-over-rooftop-solar

[103] Id.

[104] Testimony of Simon A. Sanchez; see also Attachment 7, Solar PV Cost for 1-day Supply, GPA Work Session Presentation to the Consolidated Commission on Utilities, September 19, 2019.

[105] Id.

[106] Attachment 8, Graph submitted by John Cruz, GPA Assistance General Manager, Engineering & Technical Services, and PUC ALJ Frederick J. Horecky, on October 18, 2019.

[107] Testimony of Simon A. Sanchez, attached Article, tgi, The Garden Island (Kauai Newspaper, September 9, 2019, by David Bissell, President and Chief Executive Officer, Kauai Island Utility Cooperative).

Opponents of the power plant reference different solar projects and claim that GPA can now implement 100% renewables. However, a review of the projects suggests that none of them can succeed in providing the firm, reliable power presently needed by GPA. A Scientific American Article is cited for the proposition that "utility-scale energy storage will enable a renewable grid."[108] When one reads the article, however, it becomes apparent that neither utility-scale energy storage nor a renewable grid are imminent or expected in the near future: "...**getting to the point where renewables and energy storage can handle the baseline load of electricity generation will take energy storage at longer timescales, which will mean moving beyond lithium-ion batteries....[I]t is uncertain whether and how much the costs of energy storage will continue to decline.**"[109] (emphasis added). Renewables and battery storage are not currently capable of providing firm and reliable power to the GPA system. Another suggested alternative is "pumped storage hydro."[110] There is no showing that hydro storage presents any realistic solution to Guam's power issues. There have been no studies regarding implementation of hydro storage in Guam, and it would be extremely expensive to study or implement such proposal in Guam. There are apparently two hydroelectric projects in operation in Pennsylvania. However, they require hundreds of acres of land and the right "upgradient" area to allow for the fall of water. The ALJ is not aware of any evidence suggesting that hydro storage or hydroelectric power is a plausible form of energy generation on Guam.

Another proposed solution is that GPA could simply rely upon the roof top solar systems on 20,000 Guam homes to produce 200MW of power.[111] The immediate implementation of such a solution appears to be fantasy. Who would pay for the 20,000 roof tops solar systems? How long would it take to implement all of these systems? There is almost no existing battery storage currently associated with roof top solar systems for the 2,500 existing customers. Who is going to pay for the battery storage systems? At present net metering customers have the luxury of relying upon GPA for back-up power.[112] The cost to GPA will expand exponentially if it is required to subsidize an additional 20,000 homes and to buy any excess power

[108] Andrea Thompson, the Scientific American, "Utility-Scale Energy Storage will Enable a Renewable Grid, July 1, 2019.
[109] Id. at p. 3.
[110] Renewable Energy Aggregators, "Is Pumped Storage Hydro the Next Wave of Energy Development in PA [Pennsylvania], May 15, 2017.
[111] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019, at pg. 4.
[112] Testimony of Simon A. Sanchez.

produced by such homes. This is an unrealistic proposal, with no time frame provided, guaranteed or otherwise, for the production of 200MW solar. A further suggestion is made that schools and every Gov Guam building could be used for solar panels.[113] There is already a program for school roof top panels, but little to no progress has been made. Who is going to pay the cost of installing panels on all of the schools and "every Gov Guam building"? Will the customer power rates all be subsidized by GPA? These proposals are extremely hypothetical and not adequate to provide the reliable power that GPA needs.

For the "solar host program" the opponents would apparently require GPA to pay for installation of solar panels on public and private rooftops and further subsidize the power rates. This program appears to be similar to the third party, zero down proposals, that already exist on Guam and elsewhere.[114] The utility would hire a project firm to install roof top solar systems of five megawatts on homes and businesses. A 25-year commitment is required. The utility, such as GPA, would be required to provide a credit on the power bill per kilowatt-hour that customer panels generate. In San Antonio, Texas, PowerFin, a private company, and a partner of CPS Energy, hires subcontractors to install the system at no cost to the customer. The Utility, CPS Energy, credits $0.03 for each kilowatt hour that the customer panels generate. According to PowerFin, an average homeowner saves about 20-30% on their monthly electricity bill.[115] Thus, this program is based upon subsidization by the utility. GPA has indicated that it has already provided more than $10M subsidization to net-metering customers over past years. GPA estimates that, for 2019, it will subsidize net metering customers in the amount of $3,424,495.[116] The solar host program would increase the amount of the subsidy, and GPA submits that such subsidies are shifted to non-net metering customers. The solar host program raises issues concerning subsidization of net-metering customers by non-net metering customers. Even if feasible, the program would obviously take time to implement, and there is no indication how such program could be implemented quickly enough to provide a solution to stave off USEPA fines and the need for a Consent Order.

The San Antonio solar hosting project has not demonstrated that it could provide a quick or immediate solution to Guam's lack of power capacity problem. Three years after a contract was awarded in 2015, the CPS Energy hosting program in San

[113] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019, at pg. 4.
[114] https://www.solarhostsa.com/.
[115] Id.
[116] Packet for CCU Commissioners for CCU Regular Meeting of May 28, 2019, at p. 161.

Antonio has added "5 megawatts of renewable energy to San Antonio's power grid."[117] Solar systems were built for 600 homes and 25 businesses.[118] With a three-year period between the signing of a contract by PowerFin Partners with CPS Energy, a 5 megawatt addition to the system does not provide the firm reliable power that would be supplied by the 198MW power plant. Recently, CPS slashed the average rebate amount to homeowners from $4,857 for residential projects to $2,500, and the rate will eventually drop to $1,500.[119] The ultimate goal of the San Antonio plan is to provide 40 megawatts.[120] This is not a solution of large enough scale or magnitude to meet Guam's power needs.

The Australia Tesla Virtual Power Plant initiative plan has resulted in installation of PV systems on 100 homes with an additional 1,000 homes "underway." A 5kWh solar system and Tesla Powerwall batteries are installed on low income households.[121] The project is interesting, but what stands out is that it is entirely supported by the South Australian Government. Support includes a $2 Million grant and a $20 Million loan from the South Australian (SA) Renewable Technology Fund.[122] This is another subsidy program, where US $4,300 subsidies are offered to homes towards the purchase of lithium ion battery systems.[123] Even with the subsidy, the price for the Powerwall is still "out of reach for many of SA's homeowners even with the discount."[124] A recent change in the South Australian government has caused the project to "hit a roadblock." The low-income families would be expected to pay for some of the solar system equipment.[125] In Guam, where will the subsidized funds come from to build such a system? In a country as large as Australia, the project is proposed for 1,100 Homes. There is no assurance that the implementation of this type of program in Guam would be a replacement for 198MW of power. We have no idea of how many customers in Guam would even wish to participate in such a program. After ten years of net-metering in Guam, there are only 2,500 customers. There are few, if any, experts who presently suggest that solar power is now capable of supplying 100% of baseload power needs. Bill Gates, founder and Board Member of Microsoft, a supporter of climate

[117] San Antonio Business Journal, "SolarHostSA program reaches 5-megawatt goal", February 26, 2018
[118] Id. at p. 2.
[119] Expressnews.com, Rye Druzin, "CPS' solar changes will halve rebates for homeonwers", November 30, 2018,
[120] Id. at p. 3.
[121] Shobhit Seth, Investopedia, "Tesla: First Trial of Virtual Power Plant Succeeds", dated June 25, 2019.
[122] Dacia J. Ferris, News-Tesla-Spacex-Elon Musk, dated August 12, 2019, at p. 2.
[123] Id. at p. 5.
[124] Id.
[125] Shobhit Seth, Investopedia, "Tesla: First Trial of Virtual Power Plant Succeeds", dated June 25, 2019, at p. 3.

change initiatives and renewable power technologies, has summed it up when he states that battery storage is presently unreliable to provide firm power. Batteries are also expensive. The challenge is how to store solar energy when the sun isn't shining. In his view, there was no battery technology that's even close to allowing us to take all of our energy from renewables.[126]

8. THE 198MW POWER PLANT WILL SIGNIFICANTLY REDUCE PRESENT HARMFUL EMMISSIONS, ADVERSE EVIRONMENTAL IMPACTS, AND GREENHOUSE GASES.

Issues have been raised concerning the emissions and smoke from the proposed power plant that will impact Micronesia Mall, GRMC, and other locations. Similar concerns were raised before the Guam Legislature, but the Legislature refused to allow such concerns to dissuade it from approving the Ukudu site for the New Power Plant. The Legislature approved the New Power Plant Ukudu location in Public Law 34-102, enacted on May 16, 2018.[127] The Legislature was satisfied that the proposed site could appropriately be used for the construction and operation of a power generation plant on behalf of the Guam Power Authority. The Guam Legislature stated that the site was "suitable" "and the "best" site. Various witnesses at the public hearings testified that the proposed plant is "bad" for the world's environment, as it adds "another carbon emitting component further exacerbating climate change." To the contrary, the fact is that the New Power Plant, utilizing ULSD, will reduce greenhouse gases by 36% (Attachment 9).[128] It will result in lower emissions, cleaner emissions, and exceed the National Ambient Air Quality Standards. It substantially reduces almost all levels of pollutants, including nitrogen oxides, sulfur dioxide, and particulate matter.[129] There are also beneficial environmental impacts from the New Power Plant. GPA's annual fuel consumption will be reduced by about 35 million gallons annually.[130] This will result in less pollutants and greenhouse gases being released into the air. Furthermore, the new plant will use tertiary-treated waste water for cooling, substantially reducing

[126] Energy Comment: Bill Gates Slams Unreliable Wind & Solar Energy, The Global Warming Policy Forum, February 18, 2019; Why Bill Gates Thinks It's Time to End Subsidies for Wind and Solar Power, Fortune, September 17, 2019; Bill Gates on Twitter(gtaesnotes.com) Bill Gates@BillGates, May 15, 2019.
[127] Public Law 34-102, enacted on May 16, 2018.
[128] Attachment 9; GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 3, 2019, at p.25.
[129] GPA PRESENTATION ON NEW COMBINED CYCLE POWER PLANT, dated October 1, 2019, at p. 24.
[130] Id. at p. 32.

demand on the aquafer.[131] The use of seawater cooling, which is the case with the Cabras plants, will be eliminated, thereby protecting the ocean environment. Finally, the new plant complies with USEPA regulations by burning clean fuel and much less fuel thereby reducing the island's carbon footprint and its impact in climate change.[132] GPA's proposed solution is a move in the right direction to improve and ameliorate adverse environmental impacts that resulted from prior plants.

9. SOLAR POWER IS MORE EXPENSIVE THAN POWER PRODUCED BY THE NEW PLANT

The opponents of the New Power Plant contend that, since the cost of solar power to be produced by the KEPCO and Hanwha Solar Plants is between $.06 and $.08 per kWh, and power produced by the New Power Plant is approximately $.15 per kWh, that a solar power solution for Guam is cheaper than fossil fuel. However, this contention misstates the true cost of solar plants. The prices of $.06 and $.08 referred to are the costs per kWh for the KEPCO and Hanwha solar plants to be constructed in Phase II of GPA's solar program. These plants were never intended to be baseload units. While they have some battery storage to avoid intermittency system faults, they will not have load shifting energy storage systems. Load shifting is only required for projects beyond Phase II, which does not include the KEPCO and Hanwha projects.[133] In accordance with GPA's plan, "Phase 111 and beyond systems should have energy storage included as an integral component of the project, in order to optimize the economics of the projects—this reduces the PV ramping effects due to intermittent solar irradiation."[134] Furthermore, as set forth in paragraph 6 above, megawatts produced by a solar plant are simply not comparable to those produced by a fossil fuel plant. To produce the same output as a fossil fuel plant, a solar plant would need to produce nearly three times the capacity. To serve as baseload plants, the Hanwha and KEPCO solar plants would need to have substantial energy storage systems, which would likely increase the per kWh charge beyond that of the proposed new plant. GPA has submitted cost figures that for a 100% renewable system; the initial construction cost would be over $3.7 billion, which is in excess of the New Power Plant cost over 30 years of operation.[135] The

[131] Id.
[132] Id.
[133] See Attachment 7.
[134] Guam Power Authority System Improvement Plan for Renewables, Final Report and Present, dated July 23, 2018 (Electric Power Systems Inc. Consulting Engineers), at Slide 96.
[135] See Cost discussion in Paragraph 3, Principal Arguments of the Witnesses testifying in favor of the 198MW Power Plant, which is incorporated herein by reference.

total cost for a 100% renewable system, which includes daily use, recharge capacity for 1 day recharging, and one day battery reserve capacity would be $8,816,860, 731.[136] The estimated per kWh charge would be $0.335.[137]

There is a further claim that the fossil fuel plant will be too expensive because of the volatility of fuel prices. Fuel prices could rise as high as $123.55/barrel by 2030 and $225.74/barrel by 2050.[138] It is alleged that fuel prices are vulnerable and volatile as a result of occurrences in the worldwide fuel market. The fuel market is volatile; but it is difficult, if not impossible, to forecast what fuel prices will be by 2030 or 2050. Recall that the Brent Crude oil price reached an all-time high of $147.50 in July of 2008. The current Brent fuel price as of 2019 is roughly the same as it was in 2006 ($60bbl). As a general principle, oil prices are not predictable.[139] Another Article has a substantially different prediction of future fuel prices. According to it, Brent Crude oil price will be $92.98bbl. by 2030 and $107.94bbl. by 2050. Forecasting future fuel prices is inherently unreliable because only information available at the time of the forecast is relied upon.[140] Unanticipated events in Crude markets "leave the futures price barely more capable than a random walk."[141]

CONCLUSION

The 198MW of new baseload capacity is vitally needed for the IWPS. When the Cabras No. 1 & 2 plants are retired, there will have been a loss of nearly 200MW in the power system. Such lost capacity must be replaced. At present, solar generation and battery storage are not sufficient to provide the firm, reliable power needed. Without the additional baseload capacity provided by the new plant, GPA will be unable to sustain load growth. GPA could only support the 1% load growth beyond 2023. If the PUC does not approve the New Power Plant, there is a very definite possibility that load shedding, receivership, and blackouts will result in subsequent years.

RECOMMENDATION

The Administrative Law Judge recommends that the PUC approve the 198MW power plant and the Energy Conversion Agreement with KEPCO.

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[136] Attachment 7, at p. 3.
[137] Id.
[138] Senator Clynton E. Ridgell, Letter All Members of the Public Utilities Commission, Testimony on GPA Docket 19-13, dated October 9, 2019, at p. 1.
[139] www.vbalance.com/oil/price/forecast/3306219.
[140] www.forbes.com/sites/uhenergy/2016/01/19/why-are-oil-prices-so-hard-to-forecast/.
[141] Id.; See also www.brookings.edu/opinions/why-is-the-price-of-oil-so-hard-to-predict/.

A Proposed Order is submitted herewith for the consideration of the Commissioners.

Dated this 28th day of October, 2019.

Frederick J. Horecky
Chief Administrative Law Judge

ATTENDANCE SHEET

PUBLIC UTILITIES COMMISSION OF GUAM
PUBLIC HEARING (Hagatna GCIC Building)

SUBJECT MATTER: PUC-GPA Docket 19-13
[GPA Petition to Approve Energy Conversion Agreement (ECA) with KEPCO for the 198 MW New Power Plant]

October 1, 2019 (Tuesday) 6:30 p.m.

	NAME	COMPANY or VILLAGE
1	CONSOLACION C. HARA	SELF
2	Talmy Tartuno	GWA
3	Art S. Perez	GPA
4	Patricia L. Diego	GPA
5	Joey Duenas	CCU
6	Simon Sanchez	CCU
7	Jeff Pleadwell	J.P.C.
8	Angela Santos	Barrigada
9	Eloy P. Hara	SINAJANA
10	Renee Q. Carpela	Barrigada
11	R. CARPELA	BARRIGADA
12	Nolan Flores	Yo'ña
13	Melinda Mafnas	GPA
14	Michael Limtiaco	CCU
15	Moñeka DeOro	Ipan
16	David Ma'ase DeOro	Ipan
17	Rick Unpingco	Mangilao

Attachment 1

	NAME	COMPANY or VILLAGE
18	John O'Connor	[redacted] GDP
19	James Borja	GPA
21	Jennifer Saldan	GPA
22	Michelle Vacalo	
23	Alexandra Kerr	
24	JOHN SELLECK	MARIANAS GAS
25	JOHN KIM	GPA
26	D. Graham Botha	GPA
27	John Cruz, Jr.	GPA
28	Kathy Reyes	Self
29	Kelly Clark	GWA
30	Angelica Porez	AIM Insurance
31	Annmarie Muna	AIM Insurance.
32	Melvyn Knek	GPA
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ATTENDANCE SHEET

PUBLIC UTILITIES COMMISSION OF GUAM
PUBLIC HEARING (Dededo Senior Center)

SUBJECT MATTER: PUC-GPA Docket 19-13
[GPA Petition to Approve Energy Conversion Agreement (ECA) with KEPCO for the 198 MW New Power Plant]

October 2, 2019 (~~Tuesday~~ WED) 6:30 p.m.

	NAME	COMPANY or VILLAGE
1	Angela Santos	Barrigada
2	Javan Santos	Guam Youth Congress
3	Art S. Perez	GPA
4	Patti Diego	GPA
5	VIEN WONG	GPA
6	Chellette SanNicolas	Yigo
7	Ann Dacanay	Yigo
8	Kyle Dahilig	Dededo
9	Kai Perez	Barrigada
10	Melfred James	Barrigada
11	Agvann Lmore	Yigo
12	Francine CM	Dededo
13	Geo Dela Rosa	Yigo
14	Kai Murrell	Shortys
15	Kevin Leasiolagi	Shortys
16	Kyra Blas	Chalan Pago
17	Genine Blas	"

	NAME	COMPANY or VILLAGE
18	Ezra Leasiolagi	Shorty's SWIMWEAR
19	EDGAR T. FLORES	YIGO.
21	Kathleen Savares	Dededo
22	Jonathan Savares	Dededo
23	Tonnie Guzman	Dededo
24	Amanda Shelton	Asan
25	Clarissa Torres	Barrigada
26	HANNA JUGO	MANGILAO
27	GINO DATUIN	MANGILAO
28	Labang, Al	DEDEDO
29	Johanes Temengil	Yigo
30	Cortez, Marisa	Dededo
31	Cortez, Elisha	Dededo
32	Angelica Perez	AM Insurance
33	Mary-Therese Goberla	Hagatna Heights
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ATTENDANCE SHEET

PUBLIC UTILITIES COMMISSION OF GUAM
PUBLIC HEARING (Agat Community Center)

SUBJECT MATTER: PUC-GPA Docket 19-13
[GPA Petition to Approve Energy Conversion Agreement (ECA) with KEPCO for the 198 MW New Power Plant]

October 3, 2019 (Thursday) 6:30 p.m.

	NAME	COMPANY or VILLAGE
1	Patti Diego	GPA
2	Richard Peredo	GPA
3	Art Perez	GPA
4	CONNIE HARA	SINAJANA
5	ELOY HARA	SINAJANA
6	IVAN & SHARON MATEK	
7	ROGL CRUZ	
8	Joey C Chaframes	Agat
9	Dione Young	Agat
10	Jaime Thompson	Agat
11	Ronald Young	Agat
12	Clarissa Torres	Barrigada
13	Roberto Aguon II	mangilao
14	Analyn Paluged	Dededo
15	Elisew Schenis IV	Dededo
16	Frank Jesus	AGAT
17	Melinda Mafnas	GPA

	NAME	COMPANY or VILLAGE
18	Michelle Vacalon	TAMUNING
19	Phillip Cruz	Tamuning
21	Kai Murrell	Shorty's
22	Aria Stevens	Tamuning
23	Francis Santos	CCU
24	Joaquin P. Perez	Santa Rita
25	Regine B. Lee	Tamuning
26	Jeanenne P. Cordero	Agat
27	Duenas, Miranda	Agat
28	Roman Duenas	Agat
29	Barry MEAD	Santa Rita
30	Mary Duna-alg	Agat
31	Steve Kidder	Barrigada
32	Simone Kidder	Barrigada
33	James Borja	PITI
34	FRANCESCA DEORO	PITI
35	Hilalan San Nicolas	
36	Clyst Rivera	Talofofo
37	JJ CRUZ JR	A.H.
38	Malcolm Pangelinan	Santa Rita
39	Meghan Borja	Agat SHS
40	Kaitlin McMahon	GCC / Agat

	NAME	COMPANY or VILLAGE
41	Angelica Perez	San Inocencio
42	Annmarie Muna	San Inocencio
43	Turang Gilliam	Sinajana
44	[illegible] Gilliam	"
45	Angela Santos	Barrigada
46	William Parkinson	MTM
47	Renee A. Carpela	Barrigada
48	Kayleigh Carpela	Barrigada
49	Zyan Pangelinan	Barrigada
50	Amanda Shelton	Asan
51	ROGER CARPELA	BARRIGADA
52	Giordan Kho	Yigo
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PUBLIC TESTIMONY

Subject Matter: PUC-GPA Docket 19-13 (GPA Petition to Approve Energy Conversion Agreement CECA) with KEPCO for the 198 MW New Power Plant)

Hagatna, GCIC Building, October 1, 2019
(Tuesday) 6:30p.m.

NAME	VILLAGE/COMPANY	POSITION ON NEW POWER PLANT
1. Eloy P. Hara	Sinajana	FOR
2. Jeff Pleadwell	Talofofo	AGAINST
3. Renee Q. Carpela	Barrigada	AGAINST
4. John Benavente	GPA	FOR
5. Mońeka DeOro		AGAINST
6. Simon Sanchez	Tumon/CCU	FOR
7. Michelle Voacolo	Tamuning	AGAINST
8. Alexander Kerr	Yigo	AGAINST

Dededo, Senior Citizen Center, October 2, 2019
(Wednesday) 6:30p.m.

NAME	VILLAGE/COMPANY	POSITION ON NEW POWER PLANT
1. Kyle Dahilig	Dededo	AGAINST
2. Chellette San Nicolas	Yigo	AGAINST
3. Kai Murrell	Shorty's	AGAINST
4. Kevin Leasiolagi	Shorty's	AGAINST
5. Jonathan Savares	Dededo	AGAINST
6. Tonnie Guzman	Dededo/Z's Green Canteen	AGAINST
7. Clarissa Torres	Barrigada	AGAINST

Agat, Community Center, October 3, 2019
(Thursday) 6:30p.m.

NAME	VILLAGE/COMPANY	POSITION ON NEW POWER PLANT
1. Ivan Matek	Chalan Pago	FOR
2. Noel Cruz	Agana Heights	AGAINST
3. Joey C. Charfauros	Agat	FOR SOME PLANT, BUT DIVERSITY.
4. Clarissa Torres	Barrigada	AGAINST
5. Analyn Palugod	Dededo	AGAINST
6. Michelle Voacolo	Tamuning	AGAINST
7. Eloy P. Hara	Sinajana	FOR
8. Franceska DeOro	Piti	AGAINST
9. Clynt Ridgell	Talofofo	AGAINST
10. Turang Gilham	Sinajana	AGAINST
11. Barry Mead	Santa Rita	AGAINST
12. Kai Murrell	Shorty's	FOR SOME FOSSIL FUEL, BUT NOT CANDIDATE SELECTED.
13. William Parkinson	MTM	AGAINST
14. Kayleigh Carpela	Barrigada	AGAINST
15. Zyan Pangelinan	Barrigada	AGAINST
16. Renee Q. Carpela	Barrigada	AGAINST
17. Gordan Kho	Yigo	AGAINST

WRITTEN TESTIMONIES SUBMITTED TO THE GUAM PUBLIC UTILITIES COMMISSION REGARDING GPA'S PROPOSAL FOR A NEW 198MW PLANT

1. John M. Benavente, GM of GPA PRESENTATION IN SUPPORT OF NEW COMBINED CYCLE POWER PLANT.

2. John M. Benavente, GM of GPA, Testimony submitted to the Guam Legislature for Oversight Hearing, September 10, 2019, Re: New 198MW Combined Cycle Power Plant Contract & Related Matters.

3. Simon A. Sanchez II, Member of CCU, Testimony in Support of the Construction of New Generation as proposed by GPA.

4. Joaquin P. Perez, Private Citizen, in support of the construction of a new baseload power plant but in opposition to the proposed location of the plant.

5. Ivan Matek, former GPA employee supports the new GPA power plant; manufacturing of solar panels has harmful effects, and solar powers unreliable and costly.

6. Eloy Hara, former CCU member, indicates that the new power plant is necessary to allow the integration of renewables into the system. The new power plant will not negatively impact the environment. Most sulfur diesel fuel meets EPA's omission requirements. There will be broad savings of costs with the new plant.

7. Michelle Voacolo, Climate Change Specialist, Micronesia Climate Change Alliance, submission of internet materials on Korea Electric Power Company; indicates big company financial losses in recent quarters, a poor record on climate change initiatives, and prosecution of officials for bribery and other charges.

8. Kat David, testimony indicates that we are in the middle of an environmental apocalypse; PUC has the power to change the world.

9. Kyle Dahilig, Korea Electric is accused of being responsible for an explosion in Guam, the new power plant also has environmental problems. PUC should search for better alternatives such as nuclear energy, bio-energy and hydroelectricity.

10. Kara Flores Mays, using fossil fuel for the next 30 years will cause suffering from the impacts of climate change. There is a lack of respect for the future of the children of the island. Options must be committed to.

11. Zachary Carr, GPA should not put all of its eggs into one basket with one large power plant; there should be investment in smaller, diversified renewable energy sources. Plant cost could rise with LNG use. Natural gas still produces CO2.

12. Lindsay Williams, rather than the new plant, GPA should explore more alternative and renewable forms of energy. This quick fix will be a liability for coming generations of children. KEPCO is riddled with corruption and lack of concern for safety and regulations.

13. Shane Concepcion, because of global warming, Guam needs to avoid this power plant at all costs. The plant will make us dependent upon fossil fuel for 30 years. Years with costs. The new plant may become obsolete.

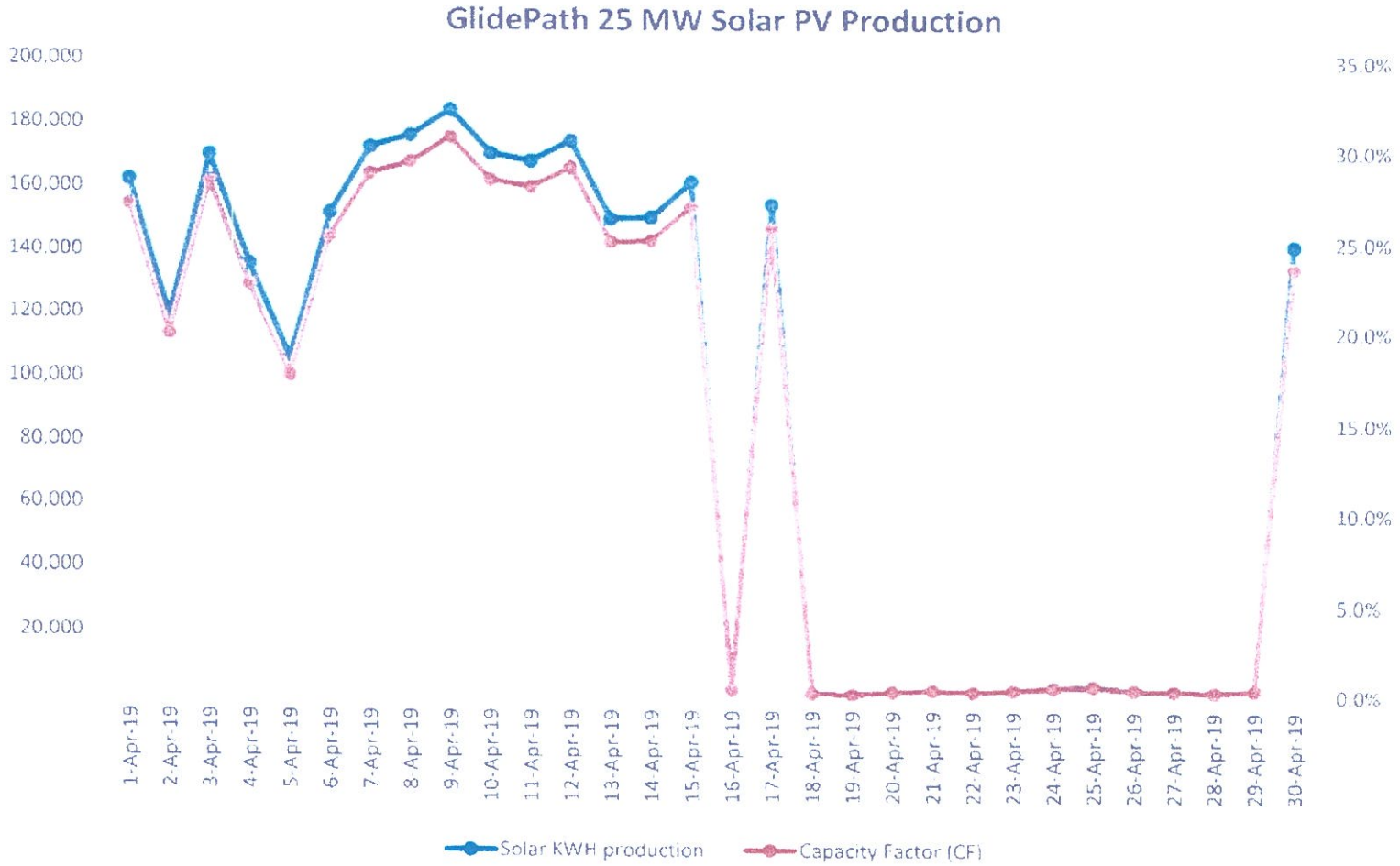
14. Change.org petition to stop the GPA power plant; Michelle Voacolo of the Micronesia Climate Change Alliance submitted a change.org petition which seeks to stop the GPA power plant. Petition indicates that LNG is not environmentally friendly. The new power plant would lock Guam into decades of climate-disrupting fossil fuel use. By 2026, renewable energy will offer grid reliability at lower costs than gas generators. The Micronesia Climate Change Alliance indicates that over 1000 individuals have joined in the petition.

15. Kai Leigh Harrison, pollution and climate change are adversely affecting the island; construction of another fossil fuel plant will contribute to the destruction of our home. Locking in unclean energy for thirty years will be a disaster in our lifetimes and for future generations.

16. Senator Clynton E. Ridgell, Testimony on GPA Docket 19-13 addressed to Members of the Public Utilities Commission, dated October 9, 2019.

Planning Study	Principal	Support
Final Report System Stability, Reliability, and Relay Protection Coordination Study	EPS	
A Technical and Economic Feasibility Assessment of a Deep Sea Water District Cooling System at Tumon Bay, Guam	Makai Ocean Engineering, Inc	Market Street Energy, LLC
Preliminary Site Assessment of Guam To Evaluate the Potential for Utility-Scale Wind Power Development on The Island	DNV-GEC	RW Beck
Preliminary Solar Siting Study for the Island of Guam	W&K	
Scope of Work Requirements for Department of the Interior, Office of Insular Affairs Grant Award No.: Guam-CIP-2009-1, Guam Power Authority Wind Turbine Project	DNV-GEC	W&K
Two-Year Wind Study at Cotal		
Summary of DNV Wind Data Reports Report No. 03 August 2011 through December 2011	DNV-GEC	W&K
Summary of DNV Wind Data Reports Report No. 07 January 2012 through March 2012	DNV-GEC	W&K
Wind Resource Data Summary Cotal Area, Guam Data Summary and Transmittal for January 2013	DNV-GEC	W&K
Governor Tuning Study	EPS	
Cabras 1 Unit Testing and Modeling	EPS	
Cabras 2 Unit Testing and Modeling	EPS	
Cabras 3 Unit Testing and Modeling	EPS	
Cabras 4 Unit Testing and Modeling	EPS	
MEC 8 Unit Testing and Modeling	EPS	
MEC 9 Unit Testing and Modeling	EPS	
Tanguisson Plant Unit Testing and Modeling	EPS	
Temes 7 Unit Testing and Modeling	EPS	
Engineering & Technical Services for Energy Storage Feasibility Study Final Report	EPS via TGE	
Energy Storage Operations Study – Final Report	EPS via TGE	
Ultra-Low Sulfur Diesel Transition: A Guam Power Authority Evaluation	GPA	
Renewable Energy Interconnection Strategy - Final Report	EPS	GPA
Phase I Renewable Energy System Impact Study	Leidos	
Solar Ramp Rate Analysis with Actual Dandan Data	EPS via AEB	
Phase I ESS Project Update Final Report	EPS via AEB	
GPA ESS Phase1 HMI-PMS Tag Mapping (Agana) Ver. 1.0 Copyright © LG CNS	LG CNS	
GPA ESS Phase1 HMI-PMS Tag Mapping (Talofofo)	LG CNS	
GPA ESS Phase1 Interface Specification Ver. 3.0 Copyright © LG CNS	LG CNS	
GPA ESS Phase1 PMS Architecture Design Ver. 3.0 Copyright © LG CNS	LG CNS	
GPA ESS Phase1 PMS Algorithm Design Ver. 3.0 Copyright © LG CNS	LG CNS	
GPA ESS Phase I Agana Substation ESS Daily Report Design	LG CNS	
GPA ESS Phase I UI/Report Design (Agana) Ver. 3.0 Copyright © LG CNS	LG CNS	
GPA ESS Phase I UI/Report Design (Talofofo) Ver. 3.0 Copyright © LG CNS	LG CNS	
GPA ESS Pahse I ESS Comunication Diagram Ver 2.0 Copyright © LG CNS	LG CNS	
Phase II Renewables – System Impact Study for Proposed 120 MW Solar Projects	EPS via AEB	
ESS Support Recommendations	EPS via AEB	
Phase III Support	EPS via AEB	
System Improvement Plan for Renewables Final Report	EPS via AEB	GPA
Guam Power Authority System Improvement Plan: Short Circuit Ratio Study	EPS via AEB	
2010 Long Range Transmission Plan	GPA	SAIC
2018 Environmental Strategic Plan	GPA	TRC
Condition Assessment Report, Guam Power Authority Piti 7 Final	Leidos	GPA
Condition Assessment Report, Guam Power Authority Piti 8&9 Final	Leidos & Valhalla	GPA
Condition Assessment and Transition Plan Guam Power Authority Fuel Oil Facility	Leidos	GPA
2008 IRP	GPA	RW Beck
2008 IRP Stakeholder Meeting Presentations	GPA	RW Beck
2008 IRP Stakeholder Sign In Sheets	GPA	
2008 IRP Stakeholder Meeting Notes	GPA	
2013 IRP	GPA	SAIC, TRC, A. Muzzin
2013 IRP Stakeholder Meeting Presentations	GPA	SAIC
2013 IRP Stakeholder Sign In Sheets	GPA	
2013 IRP Stakeholder Meeting Notes	GPA	
2016 IRP Update	GPA	
DSM Report (First 4 Programs)	Leidos	GPA
DSM and EE Implementation Plan	Leidos	GPA
Bringing Energy Savings To (BEST) Schools Program: Preliminary Feasibility Assessment	Siemens	GPA
GPA IRP Forum (Videos + Presentations)	Several	GPA
Total		

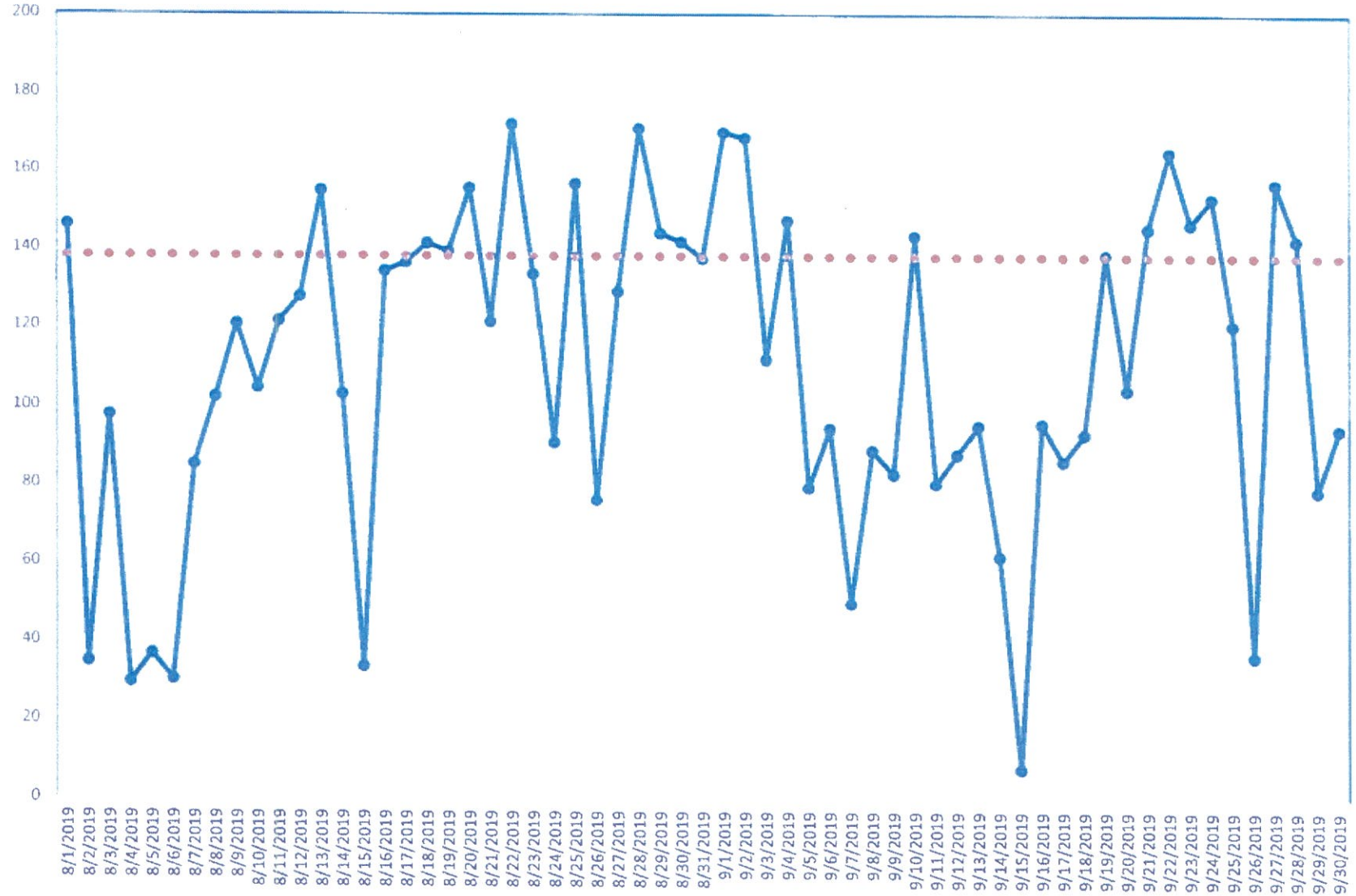
April 2019 Solar PV Production



Attachment 5

Attachment 6

25 MW Solar PV Production
August 1 - September 30, 2019



Solar PV Cost for 1 day Supply

Description	Existing GPS	Phase II	Phase III	Total	100% Renewables
Capacity kW	**25,000**	**120,000**	**40,000**	**185,000**	**792,428**
Approximate Acres (233kW/Acre)	**107**	**515**	**172**	**794**	**3,401**
Estimated Annual Energy kWh	52,560,000	283,824,000	84,096,000	420,480,000	
Estimated System Annual Energy kWh	1,666,000,000	1,666,000,000	1,666,000,000	1,666,000,000	1,666,000,000
Capacity Factor	24.0%	27.0%	24.0%	24.0%	24.0%
Percentage of System Delivery	3.2%	17.0%	5.0%	25.2%	
Estimated Sales	1,549,380,000	1,549,380,000	1,549,380,000	1,549,380,000	1,549,380,000
RPS	3.4%	18.3%	5.4%	27.1%	
System Heat Rate kWh/Gal	15.3	15.3	15.3	15.3	
Total Barrels Fuel avoided	**81,793**	**441,681**	**130,868**	**654,342**	
Fuel Cost Amount Avoided @$55/BBL.	$4,498,599	$24,292,437	$7,197,759	35,988,796	
Contract $/kWh	$0.198	$0.085	$0.120		$0.120
			Estimated-On Bid		
Annual Cost	$10,406,880	$24,125,040	$10,091,520	$44,623,440	$199,920,000
Average $/kWh				$0.106	
$/kW	$4,000	$4,000	$5,000		
Investment Required	**$100,000,000**	**$480,000,000**	**$200,000,000**	**$780,000,000**	**$3,777,138,508**
$/kW				$4,216.22	$4,766.54

All projects beyond phase II requires ESS for load shifting.

The ESS provided is for only one day operations.

Attachment 7

Solar PV Cost for 1 day Supply

Frequency Control Energy Storage System:

Battery KW Size	40,000
Investment	$35,000,000
Annual Debt Service 5%, 20 years	$2,006,065
Annual O&M	$300,000
Total Annual Cost	$2,306,065
GPA Total KWH Sales	1,650,000,000
$/KWH Sold	$0.0014
Monthly Cost/Average 1,000KWH Residential User	$1.40
Annual Cost/Average 1,000KWH Residential User	$16.77

Load Shifting Energy Storage System:

Peak Demand KW	256,000
Battery KW Size	40,000
Daily Net KWH	5,000,000
Max 10 hours Storage of 40MW Battery	360,000
Number of Batteries Required	14
Estimated Battery Cost for 1 day reserve :	
$/KWH USA	$209
$/KWH Guam	$314
Investment for system Daily 5,000,000 KWH	$1,567,500,000
Annual Cost 5%, 20 Years	$125,780,255
$/Kwh For 1,650 KWH	$0.076
For 1,000 KWH Customer Monthly Charge	$76.23

GUAM CCU

GUAM POWER AUTHORITY GPA

100% Renewables Plus 1 Day Storage Plus 1 Day Recharging

Cost 100% Renewables plus one day reserve storage plus 1 days recharge time:

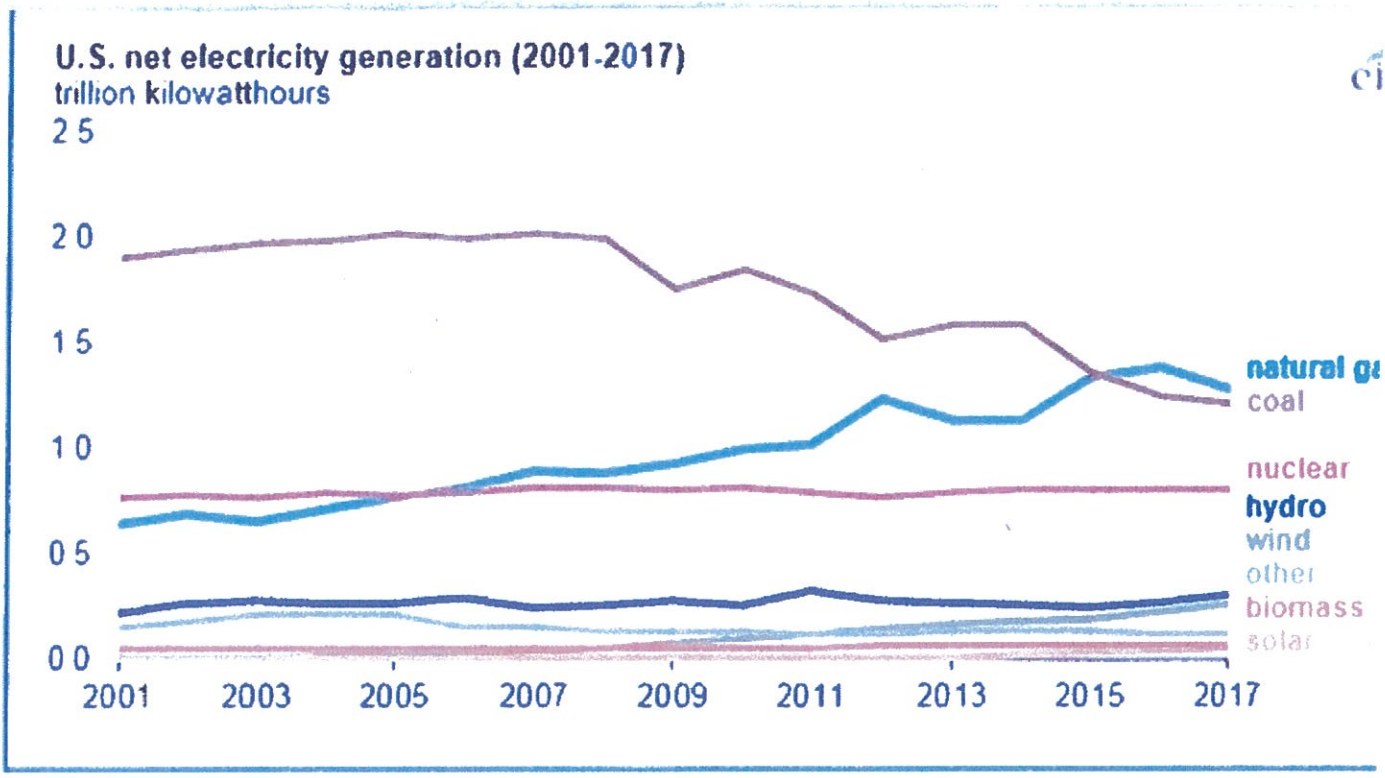
Solar PV System for one day recharge:	
Daily Required KWH	5,000,000
Total Production Required due to losses of 10%	5,555,556
KWH Production on sunny day /KW Capacity	6
KW Capacity Required	868,056
KW Capacity Required for 1 Days to full charge:	868,056
$/KW Investment	$4,000
Total Investment	**$3,472,222,222**

Daily use	**$3,777,138,508**
Recharge Capacity for 1 day Recharging	**$3,472,222,222**
One Day Battery Reserve Capacity	**$1,567,500,000**
Total:	**$8,816,860,731**

Annual Cost; 20 year life	$440,843,036.53
Annual KWH	1,666,000,000
Annual $/KWH	**$0.265**
Base Rate less $0.03 /KWH Avoided with retirement of conventional units	$0.070
$/KWH 100% Renewables Plus One Day Storage and 1 day Recharge	**$0.335**

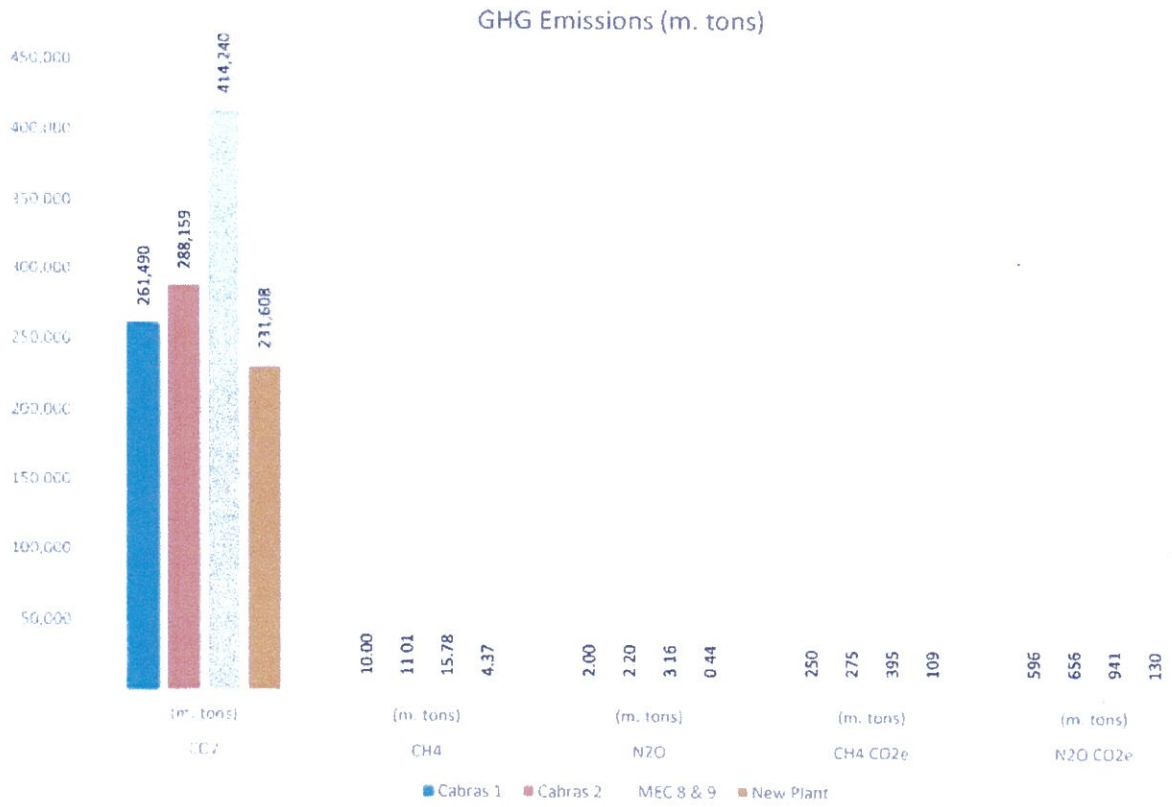
GUAM CCU

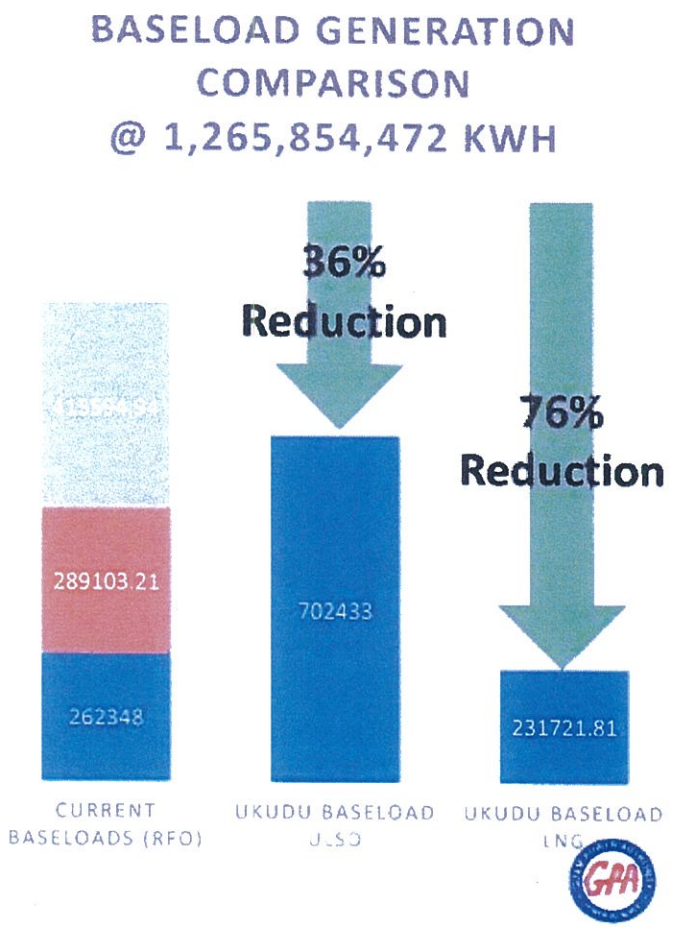
GUAM POWER AUTHORITY GPA



Attachment 8

SIGNIFICANT REDUCTION OF GHGs





Attachment 9