BEFORE THE GUAM PUBLIC UTILITIES COMMISSION

IN RE: PETITION FOR APPROVAL OF THE CHANGE ORDER FOR GWA'S SCADA MASTER PLAN	))))	**GWA DOCKET 14-02** **ALJ REPORT** **RE: SCADA AMENDMENT**

INTRODUCTION

This matter comes before the Guam Public Utilities Commission (the "PUC") pursuant to the November 12, 2013 Petition for Approval of the Change Order for GWA's SCADA Master Plan, filed by the Guam Waterworks Authority ("GWA").

BACKGROUND

According to GWA, it is currently on contract with T.G. Engineers, P.C. ("T.G."), to "develop a Supervisory Control and Data Acquisition ('SCADA') Master Plan for Nine Hundred Fifty-Six Thousand Nine Hundred Eighty-Six Dollars ($956,986.00)."[1] GWA, however, has proposed additional items to the existing scope of work, thereby adding $115,533 to the total cost of the contract, and increasing such contract to $1,072,519.[2]

DISCUSSION

A. Contract Review Protocol

Pursuant to 12 G.C.A. §12004, GWA may not enter into any contractual agreements or obligations which could increase rates and charges without the PUC's express approval. Additionally, pursuant to GWA's Contract Review Protocol issued in Administrative Docket 00-04, "[a]ll professional service procurements in excess of

[1] GWA's Petition for Approval of the Change Order for GWA's SCADA Master Plan ("Petition"), p. 1 (Nov. 12, 2013).

[2] Petition, p. 1.

ORIGINAL

$1,000,000" require "prior PUC approval under 12 G.C.A. §12004, which shall be obtained before the procurement process is begun . . . ."[3] GWA must also seek PUC approval for any uses of bond funds.[4]

B. GWA's Petition for PUC Approval

In its petition, GWA submits that the proposed Change Order with T.G. will add $115,533 to the cost of the contract for items that were not contemplated at the time the contract was executed.[5] According to GWA, the Change Order includes the following: (1) an increase in the Master Meter Count from 9 to 64; (2) an increase in the pressure regulating valve ("PRV") count from 26 to 73; (3) the addition of approximately 50 Guam Power Authority communications routers to the site listing; and (4) the addition of these items to the drawings.[6]

GWA contends that these items should be included in its SCADA Master Plan to ensure that GWA's complete system is covered under the contract.[7] GWA maintains that these items were not initially included in the original scope of work because the total number of master meters and PRVs were not known at the time.[8]

---

[3] GWA's Contract Review Protocol ("GWA CRP"), Administrative Docket 00-04, p. 1 (Oct. 27, 2005).

[4] *Id.*

[5] Petition, p. 1.

[6] Petition, p. 2.

[7] Petition, p. 2.

[8] Petition, p. 2.

C. Amendment to T.G. Fee Proposal ("Change Order")

T.G. Engineers and ArcSine Engineering are currently on contract with GWA to provide master planning for approximately 315 field sites, with includes filed visits to approximately 30% of the sites.[9] The total fee for the amendment and Change Order amounts to $115,533, which involve the following additional projects, in addition to others[10]: Increasing the Master Meter count from 9 to 54; increasing the PRV count from 26 to 73; and adding approximately 420 GPA communication routers to the site list.[11] In addition, location and system drawings will also have to be revised to reflect the additional Master Meters and PRVs.[12] The 64 new Master Meters and PRVs will also be added to the Technical Memoranda and SCADA conceptual designs.[13]

Furthermore, T.G. has indicated in its amended Fee Proposal that the U.S. E.P.A. "requires GWA to perform comprehensive water audits on water service areas (WSA) to determine water loss from the public water system and all known connections"; and that "[t]he design of the Master meter Project is intended to provide GWA a comprehensive real time water measurement assessment to fully account for water consumption and accurately meter the volume of water entering the distribution system."[14]

---

[9] Petition, Exhibit A, Exhibit A ("Amendment No. 2-Engineering Fee Proposal"), p. 1 (Oct. 9, 2013).

[10] Petition, Exhibit A, Exhibit A, p. 1.

[11] Petition, Exhibit A, Exhibit A, p. 2.

[12] Petition, Exhibit A, Exhibit A, p. 2.

[13] Petition, Exhibit A, Exhibit A, p. 3.

[14] Petition, Exhibit A, Exhibit A, p. 1.

T.G. explains that "[t]he SCADA system is the conduit to provide real time water measurements and enable GWA to detect water loss quickly"; that "[t]he SCADA system can collect data from the master meters every few seconds or minutes of every day providing metered data that can be readily accessible for leak detection"; and that "drive-by meter readings" may not detect large leaks for several weeks.[15]

T.G. adds that "the SCADA system can also free up valuable staff resources and fewer personnel that may be assigned to the drive-by reads" and that such staff could therefore be redirected to perform other duties, such as preventative maintenance.[16]

D. CCU Resolution No. 03-FY2014

Based on Resolution No. 03-FY2014, the Consolidated Commission on Utilities (the "CCU") found that T.G. is currently under contract with GWA to develop a SCADA Master Plan. The CCU also found that GWA has recommended that additional pressure regulating valves and master meters be added to the SCADA Master Plan for critical system monitoring and planning; as well as some additional communication details for the planning of the "critical communication network."[17]

The CCU further found that the addition of this work to the existing contract will cost GWA an additional $115,533, and thereby increasing such contract to $1,072,519, with such funding to be provided by the 2010 Bond funds, particularly CIP Project No. EE 09-06 and EE 09-08.[18] Pursuant to the Resolution, the CCU found the

[15] Petition, Exhibit A, Exhibit A, p. 1.

[16] Petition, Exhibit A, Exhibit A, p. 1.

[17] Petition, Exhibit A (Guam Consolidated Commission on Utilities Resolution No. 03-FY2014), p. 1 (Oct. 22, 2013).

[18] Petition, Exhibit A, pp. 1-2.

terms of the fee proposal to be "fair and reasonable."[19] Accordingly, the CCU approved the Change Order and, thereby approving a total of $1,072,519 for this particular project.[20]

CONCLUSION

GWA has provided adequate documentation to support the additional funding required under the SCADA Master Plan Change Order, which project is contained in GWA's Engineering CIP previously reviewed by the PUC. Such additional tasks appear necessary for GWA to proceed with capturing a more comprehensive assessment of its water system. In addition, the additional projects, terms, and costs appear reasonable. Therefore, the ALJ recommends that the PUC approve the Change Order.

RECOMMENDATION

Based on the foregoing, the ALJ recommends that the PUC approve GWA's petition. Accordingly, GWA should be authorized to proceed with the amendment to the original fee proposal with T.G. Engineers related to the SCADA project. A proposed Order is submitted herewith for the Commissioners' consideration.

Dated this 22nd day of November, 2013.

JOEPHET R. ALCANTARA
Administrative Law Judge

P134103.JRA

[19] Petition, Exhibit A, p. 2.

[20] Petition, Exhibit A, pp. 2-3.

BEFORE THE GUAM PUBLIC UTILITIES COMMISSION

)	**GWA DOCKET 14-02**
IN RE: PETITION FOR APPROVAL)	
OF THE CHANGE ORDER FOR)	
GWA'S SCADA MASTER PLAN)	**ORDER**
)	

INTRODUCTION

This matter comes before the Guam Public Utilities Commission (the "PUC") pursuant to the November 12, 2013 Petition for Approval of the Change Order for GWA's SCADA Master Plan, filed by the Guam Waterworks Authority ("GWA").

DETERMINATIONS

Pursuant to 12 G.C.A. §12004, GWA may not enter into any contractual agreements or obligations which could increase rates and charges without the PUC's express approval. Additionally, pursuant to GWA's Contract Review Protocol issued in Administrative Docket 00-04, "[a]ll professional service procurements in excess of $1,000,000" require "prior PUC approval under 12 G.C.A. §12004, which shall be obtained before the procurement process is begun . . . ."[1] GWA must also seek PUC approval for any uses of bond funds.[2]

On June 21, 2013, the Administrative Law Judge of the PUC (the "ALJ") filed an ALJ Report detailing his review of GWA's request for PUC approval of the Change Order with T.G. Engineers, P.C., related to the SCADA project. In the Report, the ALJ found that GWA provided adequate documentation to support the

---

[1] GWA's Contract Review Protocol ("GWA CRP"), Administrative Docket 00-04, p. 1 (Oct. 27, 2005).

[2] *Id.*

additional funding required under the SCADA Master Plan Change Order, which project is contained in GWA's Engineering CIP previously reviewed by the PUC. The ALJ found that such additional tasks appeared necessary for GWA to proceed with capturing a more comprehensive assessment of its water system; and that the additional projects, terms, and costs appeared reasonable. Based on the documentation provided, the ALJ therefore recommended that the PUC approve the Change Order.

The Commission hereby adopts the findings contained in the November 22, 2013 ALJ Report and, therefore, issues the following:

ORDERING PROVISIONS

Upon careful consideration of the record herein, the November 22, 2013 ALJ Report, and for good cause shown, on motion duly made, seconded and carried by the affirmative vote of the undersigned Commissioners, the Commission hereby ORDERS the following:

1. November 12, 2013 Petition for Approval of the Change Order for GWA's SCADA Master Plan is hereby approved. GWA is therefore authorized to proceed with executing the Change Order with T.G. Engineers, P.C. with respect to the SCADA project.

2. GWA is ordered to pay the Commission's regulatory fees and expenses, including, without limitation, consulting and counsel fees and the fees and expenses associated with the instant contract review. Assessment of the PUC's

/ /

/ /

regulatory fees and expenses is authorized pursuant to 12 G.C.A. §§12002(b), 12024(b), and Rule 40 of the Rules of Practice and Procedure before the Public Utilities Commission.

SO ORDERED this 26th day of November, 2013.

JEFFREY C. JOHNSON
Chairman

JOSEPH M. MCDONALD
Commissioner

ROWENA E. PEREZ
Commissioner

FILOMENA CANTORIA
Commissioner

MICHAEL A. PANGELINAN
Commissioner

PETER MONTINOLA
Commissioner

ANDREW L. NIVEN
Commissioner

P134104.JRA

BEFORE THE GUAM PUBLIC UTILITIES COMMISSION

IN RE: PETITION FOR APPROVAL OF THE CHANGE ORDER FOR GWA'S SCADA MASTER PLAN	**GWA DOCKET 14-02** **ALJ REPORT** **RE: SCADA AMENDMENT**

INTRODUCTION

This matter comes before the Guam Public Utilities Commission (the "PUC") pursuant to the November 12, 2013 Petition for Approval of the Change Order for GWA's SCADA Master Plan, filed by the Guam Waterworks Authority ("GWA").

BACKGROUND

According to GWA, it is currently on contract with T.G. Engineers, P.C. ("T.G."), to "develop a Supervisory Control and Data Acquisition ('SCADA') Master Plan for Nine Hundred Fifty-Six Thousand Nine Hundred Eighty-Six Dollars ($956,986.00)."[1] GWA, however, has proposed additional items to the existing scope of work, thereby adding $115,533 to the total cost of the contract, and increasing such contract to $1,072,519.[2]

DISCUSSION

A. Contract Review Protocol

Pursuant to 12 G.C.A. §12004, GWA may not enter into any contractual agreements or obligations which could increase rates and charges without the PUC's express approval. Additionally, pursuant to GWA's Contract Review Protocol issued in Administrative Docket 00-04, "[a]ll professional service procurements in excess of

[1] GWA's Petition for Approval of the Change Order for GWA's SCADA Master Plan ("Petition"), p. 1 (Nov. 12, 2013).

[2] Petition, p. 1.

$1,000,000" require "prior PUC approval under 12 G.C.A. §12004, which shall be obtained before the procurement process is begun . . . ."[3] GWA must also seek PUC approval for any uses of bond funds.[4]

B. GWA's Petition for PUC Approval

In its petition, GWA submits that the proposed Change Order with T.G. will add $115,533 to the cost of the contract for items that were not contemplated at the time the contract was executed.[5] According to GWA, the Change Order includes the following: (1) an increase in the Master Meter Count from 9 to 64; (2) an increase in the pressure regulating valve ("PRV") count from 26 to 73; (3) the addition of approximately 50 Guam Power Authority communications routers to the site listing; and (4) the addition of these items to the drawings.[6]

GWA contends that these items should be included in its SCADA Master Plan to ensure that GWA's complete system is covered under the contract.[7] GWA maintains that these items were not initially included in the original scope of work because the total number of master meters and PRVs were not known at the time.[8]

---

[3] GWA's Contract Review Protocol ("GWA CRP"), Administrative Docket 00-04, p. 1 (Oct. 27, 2005).

[4] *Id.*

[5] Petition, p. 1.

[6] Petition, p. 2.

[7] Petition, p. 2.

[8] Petition, p. 2.

C. Amendment to T.G. Fee Proposal ("Change Order")

T.G. Engineers and ArcSine Engineering are currently on contract with GWA to provide master planning for approximately 315 field sites, with includes filed visits to approximately 30% of the sites.[9] The total fee for the amendment and Change Order amounts to $115,533, which involve the following additional projects, in addition to others[10]: Increasing the Master Meter count from 9 to 54; increasing the PRV count from 26 to 73; and adding approximately 420 GPA communication routers to the site list.[11] In addition, location and system drawings will also have to be revised to reflect the additional Master Meters and PRVs.[12] The 64 new Master Meters and PRVs will also be added to the Technical Memoranda and SCADA conceptual designs.[13]

Furthermore, T.G. has indicated in its amended Fee Proposal that the U.S. E.P.A. "requires GWA to perform comprehensive water audits on water service areas (WSA) to determine water loss from the public water system and all known connections"; and that "[t]he design of the Master meter Project is intended to provide GWA a comprehensive real time water measurement assessment to fully account for water consumption and accurately meter the volume of water entering the distribution system."[14]

---

[9] Petition, Exhibit A, Exhibit A ("Amendment No. 2-Engineering Fee Proposal"), p. 1 (Oct. 9, 2013).

[10] Petition, Exhibit A, Exhibit A, p. 1.

[11] Petition, Exhibit A, Exhibit A, p. 2.

[12] Petition, Exhibit A, Exhibit A, p. 2.

[13] Petition, Exhibit A, Exhibit A, p. 3.

[14] Petition, Exhibit A, Exhibit A, p. 1.

T.G. explains that "[t]he SCADA system is the conduit to provide real time water measurements and enable GWA to detect water loss quickly"; that "[t]he SCADA system can collect data from the master meters every few seconds or minutes of every day providing metered data that can be readily accessible for leak detection"; and that "drive-by meter readings" may not detect large leaks for several weeks.[15]

T.G. adds that "the SCADA system can also free up valuable staff resources and fewer personnel that may be assigned to the drive-by reads" and that such staff could therefore be redirected to perform other duties, such as preventative maintenance.[16]

D. CCU Resolution No. 03-FY2014

Based on Resolution No. 03-FY2014, the Consolidated Commission on Utilities (the "CCU") found that T.G. is currently under contract with GWA to develop a SCADA Master Plan. The CCU also found that GWA has recommended that additional pressure regulating valves and master meters be added to the SCADA Master Plan for critical system monitoring and planning; as well as some additional communication details for the planning of the "critical communication network."[17]

The CCU further found that the addition of this work to the existing contract will cost GWA an additional $115,533, and thereby increasing such contract to $1,072,519, with such funding to be provided by the 2010 Bond funds, particularly CIP Project No. EE 09-06 and EE 09-08.[18] Pursuant to the Resolution, the CCU found the

[15] Petition, Exhibit A, Exhibit A, p. 1.

[16] Petition, Exhibit A, Exhibit A, p. 1.

[17] Petition, Exhibit A (Guam Consolidated Commission on Utilities Resolution No. 03-FY2014), p. 1 (Oct. 22, 2013).

[18] Petition, Exhibit A, pp. 1-2.

terms of the fee proposal to be "fair and reasonable."[19] Accordingly, the CCU approved the Change Order and, thereby approving a total of $1,072,519 for this particular project.[20]

CONCLUSION

GWA has provided adequate documentation to support the additional funding required under the SCADA Master Plan Change Order, which project is contained in GWA's Engineering CIP previously reviewed by the PUC. Such additional tasks appear necessary for GWA to proceed with capturing a more comprehensive assessment of its water system. In addition, the additional projects, terms, and costs appear reasonable. Therefore, the ALJ recommends that the PUC approve the Change Order.

RECOMMENDATION

Based on the foregoing, the ALJ recommends that the PUC approve GWA's petition. Accordingly, GWA should be authorized to proceed with the amendment to the original fee proposal with T.G. Engineers related to the SCADA project. A proposed Order is submitted herewith for the Commissioners' consideration.

Dated this 22nd day of November, 2013.

JOEPHET R. ALCANTARA
Administrative Law Judge

P134103.JRA

[19] Petition, Exhibit A, p. 2.

[20] Petition, Exhibit A, pp. 2-3.

2013

October 9, 2013

Guam Power Authority

Strategic Planning & Operations Division (SPORD)

Appendices

management to provide the right execution, the best plans may fail. Therefore, leadership, vision, strategy, tactics, and management form the cornerstones for continued success.

1.2 Confluence of Factors

The IRP recognizes that several events and factors must be considered as part of working towards a holistic, system-wide solution to the problems GPA faces. Table 1-1 summarizes the most important factors that GPA must consider as part of the IRP implementation. These factors lead to policy and funding requirements that the CCU must approve. Furthermore, the decisions made for the resolution of these factors have major ramifications for downstream decisions.

Important Table 1-1: Important Milestones

	Due Date	Notes
Retire Dededo Diesels	FY2014	To comply with RICE MACT
Retire Marbo CT	FY2014	
RICE MACT Compliance	May 06, 2013	Original Compliance Date
Medium Speed Diesels	May 06, 2014	Extension Date
Slow Speed Diesels	???	GPA working with USEPA on consent decree to address compliance schedule.
EGU MACT Compliance	Apr 16, 2015	Original Compliance Date
Cabras 1&2	Apr 16, 2015	GPA submitted request for 1-year extension on 10/10/2012. Response pending.
Tanguisson	Apr 16, 2015	GPA has indicated derating units to 25 MW from 26.5 MW which would exempt them from rule (applies to units > 25MW)
National Ambient Air Quality Standards	Jul 17, 1905	Recent USEPA publishing of Non-Attainment Areas excludes Guam which defers compliance until 2025. (Note that siting new plants may affect compliance requriements)
Ambient Air Quality Monitoring		3 years data required. Plan scheduled for review by USEPA in December 2013. (Assume starts 1 year after USEPA review)
Clean Water Act Section 316b Requirements	Final Rule expected by Nov 2013	Refers to Cabras 1-4 and Tangussion Plants regarding impact of cooling water discharge to fish life (outfall)
IPP Contract Expirations		
TEMES	Dec 01, 2017	20 Year Contract Term
Tanguisson (HEI)	Sep 01, 2017	20 Year Contract Term
MEC	Jan 31, 2019	20 Year Contract Term
PMC Contract Expirations		
Cabras 1&2	Sep 30, 2015	May extend for additional 5 years per contract
Cabras 3&4	Jun 30, 2015	Contract performance disallows contract extension
Fuel Contract Expirations		
Diesel (TEMES CT)	Nov 30, 2014	Currently under contract extension.
RFO	Aug 09, 2015	May extend annually up to 3 years for total of 5 years contract term.
MDI Contract Expiration	Jun 30, 2017	25 years from CSA date of 6/30/1992
IRP Resource Acquisition Implementation	Nov 27, 2013	120 Days from PUC Order dated 7/30/2013

2 FY 2012 Integrated Resource Plan Recommendations

To recap, the 2012 Integrated Resource Plan made the following primary recommendations, which the PEP must address:

- Obtain an agreement between the United States (USEPA) and Guam Environmental Protection Agencies to suspend compliance with the RICE MACT for Cabras 3&4 and MEC 8&9 until GPA completes transition to LNG;
- Procure an additional 40 MW of renewable energy resources under the Phase II Renewable Energy Acquisition Program, if cost-competitive with other available technologies, as early as 2017 to reduce present value costs;
- Develop the necessary infrastructure and contracts to engender the transition from residual fuel oil to Liquefied Natural Gas (LNG) by 2018 or sooner;
- Retire Marbo CT and Dededo Diesels 1-4 by FY 2014;
- Firm up the decision by the end of FY 2014 to retire the Cabras 1 & 2 and/or Tanguisson 1&2 units in 2018 concurrent with the availability of LNG;
- Based upon baseload retirement decisions, construct a new 60 to 120 MW gas-fired combined cycle power plant, preferably in northern Guam to reduce technical line losses, online concurrent with the availability of LNG in 2018;
- If GPA makes the decision not to retire Cabras 1&2 or Tanguisson 1&2, complete conversion of these units to burn natural gas concurrent with the availability of LNG in 2018;
- Complete repowering Piti 7 GE Frame 6B combustion turbine generator (CTG) into a combined cycle burning natural gas concurrent with the availability of LNG in 2018;
- Complete conversion of the Cabras 3 & 4 and MEC Piti 8 & 9 units to burn natural gas concurrent with the availability of LNG in 2018;

3 PUC Ordering Provisions on the 2012 IRP

As described in the PUC Order under GPA Docket 13-02, dated July 30, 2012, PUC gave conditional approval of the IRP subject to the following conditions:

1. Within 120 days of this Order or sooner, GPA shall prepare and submit a detailed Resource Implementation Plan to the PUC for approval. This Plan shall identify the acquisition strategy GPA intends to utilize to bring LNG resources to Guam, including:
    - A detailed implementation schedule;
    - Projected project expenditures consistent with the project schedule;
    - Identification of key decision-making milestones, criteria, and expenditures to reach those milestones; and
    - Identification of the expected schedule milestones for establishing contracts for the LNG supply.
    - The Resource Implementation Plan should also address appropriate business models for adoption of LNG and other resources in the future;
2. GPA shall continue negotiations with the USEPA related to compliance with the RICE MACT standards for the slow speed diesels;

3. GPA shall continue with the recommendations of the IRP, with additional investigations performed in parallel as suggested in the Lummus Letter Report, including:
    - Further investigation of renewable fuels
    - Further investigation of alternative low sulfur fuels.
    - Early identification and discussions with potential suppliers of LNG to Guam including expressions of interest in serving this size market;

4. In parallel, GPA will continue to investigate the economics of diversification of fuels and a project plan for this path will be included in the Resource Implementation described in 1 above. This should include investigation of lower sulfur fuel, renewables including battery storage technology, and identification of the preferred level of diversification for Guam including the economic impact;

holistic approach with upcoming U.S. EPA regulations. Otherwise, a piecemeal approach will lead to higher costs and not take advantage of possible economies of scale or synergies.

For example, GPA has identified two competing strategies on how to proceed with the U.S. EPA consent decree:

- Since GPA originally went into the consent decree process with U.S. EPA for RICE, it should allow the process to go forward only for RICE MACT; and,
- Since other future compliance mitigation measures are interrelated with compliance measures for RICE MACT, GPA should consider a comprehensive consent decree to take GPA into compliance for all future regulations over the next five years to a decade.

3.3 Additional Parallel Investigations

GPA continues to support parallel investigations related to the IRP. In particular, SPORD has worked with the CCU General Manager – Consolidated Utility Services in his investigations made on behalf of the Board to clarify issues with the IRP. In particular, these investigations have clarified that retiring the GPA's old steam units and replacing them with significantly more efficient and reliable technologies drives customer savings outside of avoided capex and O&M for environmental compliance systems, in the event GPA does not move from residual fuel oil.

3.3.1 Further Investigation of Renewable and Alternative Low Sulfur Fuels

GPA has begun further investigation of renewable fuels including dimethyl ester (DME) from bio feed stock and alternative low sulfur fuels. Additionally, GPA is investigating an intermediate liquefied petroleum gas (LPG) solution bridging the gap between existing residual fuel based operations and natural gas.

GPA consulted briefly with SAIC regarding their experience with dimethyl ether (DME) as well as methanol. Appendix E contains the SAIC response to questions regarding DME and other potential generation fuels. Appendix F shows historical methanol pricing by region.

3.4 Fuel Diversification and Energy Storage

GPA has investigated lower sulfur fuel and renewable energy supply since 2008. Additionally, GPA is currently investigating energy storage including battery storage technology. Both the 2008 and 2012 IRPs identify the preferred level of diversification for Guam including the economic impact.

Guam Power Authority has been investigating using lower sulfur fuels since 2008. For example, GPA initiated a stakeholder dialog to obviate Guam's exemption from ultralow sulfur diesel mandates the federal government had imposed on the contiguous 48 states. GPA helped facilitate studies supporting a move from 5,000 ppm diesel to 15 ppm ultralow sulfur diesel. GPA worked with the Guam and U.S. Environmental Protection Agencies, Guam Senator Telo Taitague's office, the United States Defense Logistics Agency, the Guam transportation industry, and other stakeholders. This effort culminated in the passage of Guam Public Law 30-184. Therefore, GPA has played a significant part in decreasing sulfur emissions not only for power generation but for mass transportation and industries using diesel-fired heavy equipment.

Furthermore, GPA has discussed biodiesel fuel, syngas, biomass, and wood pellet fuels with many proponents and suppliers. GPA has encouraged these proponents to bid these fuels as part of GPA's renewable acquisition solicitations. None of these proponents have bid their biofuels. GPA prefers to allow the market's response to engender the introduction of these fuels as cost competitive renewable alternatives to existing fuels.

GPA realizes that the introduction of LNG would completely eliminate using residual fuel oil. Hence, without careful review, GPA would seem to be moving from a heavy reliance on one type of fuel to a heavy reliance on another without meaningful fuel diversification. Without additional information, it would seem that the IRP does meet the strategic goals for fuel diversity. This is far from the truth. GPA's medium speed diesel power plants will remain ultralow diesel-fired. Additionally, a portion of energy will come from renewable energy sources. New and retrofitted units will have the capability to burn both gas and ULSD. Therefore, GPA will have diversified to use three different types of "fuel". If there are significant

scopes of work may come into play. SPORD will conduct these investigations using an internal and external stakeholders approach. Appendix G contains the contract for these services including scopes of work and estimated costs.

Table 3-1: IRP Related Activities Begun Prior to PUC Order

Project	Contract Cost	Scope
Energy Storage Feasibility & Operations Studies	$276,972	These studies will recommend the appropriate energy storage system that will help resolve power quality and system reliability issues resulting from existing low-inertia generators and the integration of existing and planned renewable energy generation
System Impact Study	$99,521	This study will evaluate the system to identify the impact of the proposed system changes, such as the interconnection of additional renewable energy generation
Renewables Phase II RFP Development	TBD	A renewable energy consultant will be hired to provide technical assistance with the development of the RFP or Bid document for the solicitation of 45 MW of renewable energy generation
Environmental Strategic Planning	$285,174	Project Commenced: FY 2012 Environmental Strategic Planning was initiated to supplement the Integrated Resource Plan, and provide a path for GPA's compliance with new and/or updated environmental regulations. Discussions with the consultant are in progress. The work has since expanded to include actions to address the regulations prior to compliance deadline, such as internal emission testing, feasibility studies, and continuous regulatory support such as for permitting. (Note: Contract approved for up to $1.4 million, but costs indicated in previous column are those incurred for Environmental Strategic Planning up to Sept 2013)
Re-Designation of Cabras & Piti Area, and Ambient Air Quality Monitoring	$153,916	Project Commenced: July 2011 To support recommendations from the previous IRP, GPA solicited the services of an Environmental Consultant to create an Ambient Air Quality Monitoring Plan, Air Quality Modeling and a Re-Designation Plan for GPA. In 2012, GPA submitted the AAQM Plan to USEPA, and communication is currently in progress. Re-Designation may impact GPA's plans of putting in new generating units, or replacing current units. (Note: this activity is bond-funded, for $1.9 Million, but costs indicated in previous column are those incurred up to Sept 2013)

5 Independent Power Producer Contract Expirations

All of GPA's 20-year Energy Conversion Agreements (ECA) with IPPs will expire by 2019. The Tanguisson Power Plant ECA with Pruvient will end effective September 2017 followed by the Piti 7 ECA with TEMES in December. On January 31, 2019, the MEC 8&9 ECA with Osaka Gas will terminate. The CCU must decide how GPA will operate and maintain these power plants in the post-ECA period. GPA must immediately begin the process to meet these needs.

GPA must undertake a review of current Energy Conversion Agreements to include lessons learned and improvement areas discovered through the contract periods. SPORD will head a cross-functional team to address these issues including interviews with plant personnel, IPP incumbents, and other stakeholders. SPORD will work with accounting, PMM, and generation to determine total historical operating and capital costs including determining if contractual guarantees were met and project benefits realized. SPORD will also create a team to evaluate the status/condition of plant equipment and personnel to determine additional investment needed (human resource and capital resource) prior to the procurement of services.

5.1 Required Decisions

The CCU must decide whether GPA should pursue the following:

- Procure services under new Independent Power Producers;
- Procure services under Performance Management Contract(s);
- Staff up for GPA operation and provide resources for staff training, generation management planning, plant operations organizational change management.

Furthermore, if the CCU agrees on a policy to contract these services, the CCU must decide whether to procure a single contract or multiple contracts. Finally, the CCU must decide whether GPA should place other existing power plants under PMC or IPP arrangements.

6 Performance Management Contract Expirations

GPA's PMC for Cabras 1&2 will expire in September 2015. The PMC for Cabras 3&4 expires in June 2015. The Cabras 1&2 PMC contract has a provision to extend the contract for an additional five years. However, the Cabras 3&4 contract has performance provisions that disallow for contract extension if in any given contract year the forced outage rate performance is greater than 2.5% as is the case.

The CCU must decide how GPA will operate and maintain these power plants in the post-PMC period. GPA must immediately begin the process to meet these needs.

GPA must undertake a review of current PMCs to include lessons learned and improvement areas discovered through the contract periods. SPORD will head a cross-functional team to address these issues including interviews with plant personnel, IPP incumbents, and other stakeholders. SPORD will work with accounting, PMM, and generation to determine total historical operating and capital costs including determining if contractual guarantees were met and project benefits realized. SPORD will also create a team to evaluate the status/condition of plant equipment and personnel to determine additional investment needed (human resource and capital resource) prior to the procurement of services.

6.1 Required Decisions

The CCU must decide whether GPA should pursue the following:

- Procure services under new Independent Power Producers;
- Procure services under Performance Management Contract(s);
- Staff up for GPA operation.

Furthermore, if the CCU agrees on a policy to contract these services, the CCU must decide whether to procure a single contract or multiple contracts. Finally, the CCU must decide whether GPA should place other existing power plants under PMC or IPP arrangements.

6.2 Resources Required

No external resources are required. GPA and the CCU have a large body of experience with the aforementioned service models.

quality (most efficient) with the most economical pricing, GPA must acquire the services of a fuel consultant to optimize fuel specifications to reduce price while not adversely affecting power plant operation or efficiency. Alternatively, GPA can send employees to fuel contracting or further technical training.

7.1 Required Decisions

The CCU must make the following approvals to obtain a new diesel fuel contract including:

- Approval to go forward with the procurement;
- Approval of GPA's recommendation to award a contract and to file with the Guam PUC for approval under the Contract Review Protocol.

The CCU must make the following decisions regarding residual fuel oil including:

- Approvals for any extensions of the current contract;
- Approval for procurement of a new RFO supply contract at the appropriate time.

7.2 Resources Required

GPA and the CCU have a large body of experience in this area to support the CCU decisions. However, GPA should provide Fuel Supply Management and Fuel Supply Operations staff adequate training to ensure that current industry practices are applied to contracts and standard operating procedures. Furthermore, to ensure that GPA procures the best fuel quality (most efficient) with the most economical pricing, GPA should acquire the services of a fuel consultant to optimize fuel specifications to reduce price while not adversely affecting power plant operation or efficiency. Furthermore, GPA should send employees to fuel contracting or technical trainings. SPORD will provide a budget and schedule for these items.

9 Environmental Compliance

GPA developed an Environmental Strategic Plan (ESP) to determine the impact of new U.S. Environmental Protection Agency regulations. GPA folded into its IRP analysis the information gathered by the ESP. Environmental compliance is a major driver towards adopting LNG as a substitute fuel for RFO. However, GPA must continue to update the ESP because the regulations can and are being modified based on comments from stakeholders.

Since environmental compliance efforts for different new US EPA regulations may provide opportunities to reduce costs, GPA should decide on a strategy for negotiating and implementing the consent decree with US EPA. GPA has identified two strategies regarding negotiating a consent decree:

- Since GPA originally went into the consent decree process with U.S. EPA for RICE, it should allow the process to go forward only for RICE MACT; and,
- Since future compliance mitigation measures are interrelated with compliance measures for RICE MACT, GPA should consider a comprehensive consent decree to take GPA into compliance for all future regulations over the next five years to a decade.

9.1 Required Decisions

The CCU should make the following decisions on the funding for:

- Regular updates to the Environmental Strategic Plan; and,
- Developing an appropriate strategy for negotiating the consent decree with U.S. EPA.

9.2 Resources Required

If the CCU decides to fund updates to the Environmental Strategic Plan, GPA will require additional services from TRC. The additional funding required specific to ESP updates is $187,000 annually.

If the CCU decides on the strategy for negotiating the consent decree with US EPA, GPA will require additional services from a law firm with a specialty in environmental legal practice especially with U.S. Region IX. GPA has retained on a time-and-materials basis Pillbury as our environmental legal counsel via our existing environmental technical services contract with

10 Energy Storage, Renewable Energy, and Customer Outage Reduction

In the July 30, 2013 PUC Order on the matter of the 2012 IRP, GPA Docket 13-02, the Guam PUC determined: "GPA will investigate as part of the next steps how to enhance system reliability in order to encourage inclusion of renewable technologies and to enhance service to customers and will submit reports to the GPUC semiannually on its progress." GPA has already initiated a series of studies to address customer outages, penetration of gird-tied intermittent renewable energy, and improve power system stability and power quality.

Additionally, the CCU has required GPA to determine the true cost of incorporating intermittent renewable energy including net metering. GPA has stayed its Phase II Renewable Acquisition program in order to comply with the request. Furthermore, the CCU has required GPA to address these issues before it releases its Phase II solicitation. Finally, GPA has made substantial progress with Naval Facilities Marianas on addressing a Utility Energy Services Contract mechanism to meet the federal requirements for renewable energy, energy efficiency, reduction of greenhouse gases, and energy security at DOD installations and similar federal facilities.

10.1 Required Decision

The CCU must decide whether to approve funding for these series of studies.

10.2 Resources Required

GPA has contracted with T.G. Engineers/EPS, Inc. to perform Energy Storage Feasibility, Operations & System Impact Studies. The cost for the current slate of studies is $376,493. The scope of these studies includes a recommendation for the appropriate energy storage system that will help resolve power quality and system reliability issues resulting from existing low-inertia generators and the integration of existing and planned renewable energy generation. One of the objectives of this contract is customer outage reduction.

GPA anticipates that it should contract for additional work to perform the following:

11 Ownership Models

In relation to majority of infrastructure decisions it faces, GPA must determine what asset/infrastructure ownership model it prefers. Ownership models GPA may consider include:

- Non-GPA ownership and operations with no transfer of ownership;
- Non-GPA ownership and operations with buyout option;
- GPA ownership but privately managed;
- Build-Operate-Transfer (BOT);
- Shared ownership and operation (SPE joint vendor).

11.1 Required Decision

The CCU must decide which ownership model the IRP Implementation Strategy will adopt for:

- New power plants;
- LNG import terminal;
- LNG Cryogenic storage
- Natural gas distribution pipelines
- Energy storage facilities
- Others.

11.2 Resources Required

No external resources are required. GPA and the CCU have a large body of experience with the aforementioned ownership models.

12.3 Required Decision

The CCU must decide the scope of projects to procure separately and which to bundle into a single procurement. Additionally, the CCU must decide which projects GPA should execute using internal or external resources. In summary the CCU must make the following decisions:

1. Choose the projects that GPA will execute internally and externally;
2. Choose the projects that GPA will procure as multi-scope, bundled projects or single-scope projects.

12.4 Resources Required

No external resources are required unless the CCU needs further clarification. GPA will answer questions regarding the potential for bundling through a Request For Information (RFI) addressed to potential project developers.

- Wherever private equity is used, GPA should ensure that there are contract provisions allowing GPA to buyout this private equity stake subject to decisions made on infrastructure ownership.

13.3 Required Decision

The CCU must decide how to fund the different resources. Additionally, the CCU must decide how to manage and mitigate customer rate impacts.

13.4 Resources Required

GPA has purchased the Ventyx GenOps application. GenOps is part of the Ventyx suite of analysis tools including Strategist. GenOps provides GPA with a powerful tool to address outage optimization, economic dispatch, unit commitment, and detailed production cost studies. GPA recommends purchasing the Nostradamus forecasting module ($74,000). The purchase of Nostradamus would eliminate the need for contracts to provide revenue and sales forecasts. It would also provide a short-term (down to hourly) forecast capability for use in economic dispatch planning. It will also help aggregate Smart Grid AMI data for future load studies.

GPA has the program but will require technical and training services in order to make use of it in short order. The cost for training and technical service support is $150,000 for the GenOps application, and $75,000 for the Nostradamus application. There will also be Annual Maintenance Charges of $48,015 (subject to CPI escalation) and $14,000 (subject to CPI escalation) respectively. This resource requirement is also listed for the following sections:

- *Generation Retirement and Outage Management*
- *Remaining Generation Facilities*
- *Review of Existing Generation Capital Improvement and Large O&M Projects.*

SPORD will perform these production cost studies using Strategist, GenOps, Nostradamus, and PICES. SPORD will work with finance on using the GPA's FMP model to determine rate impacts.

The CFO will create and lead a cross-functional team to address funding related to the IRP implementation.

14 Generation Retirement and Outage Management

The IRP recommends that GPA further investigate three scenarios regarding retirement of Cabras 1&2 and Tanguisson 1&2. These scenarios are part of the top three least cost expansion plans. The scenarios include:

- Retire Cabras 1&2
- Retire Tanguisson 1&2
- Retire Cabras 1&2 and Tanguisson 1&2.

The choice to adopt a baseload retirement scenario affects downstream LNG infrastructure and new baseload power plant decisions. Once this decision is made, GPA must determine the Retirement and Outage Management Execution Plan.

14.1 Required Decision

The CCU must decide which of the baseload retirement decisions to adopt:

- Retire Cabras 1&2
- Retire Tanguisson 1&2
- Retire Cabras 1&2 and Tanguisson 1&2.

14.2 Resources Required

Guam Power Authority has purchased the Ventyx GenOps application. GenOps is part of the Ventyx suite of analysis tools including Strategist. GenOps provides GPA with a powerful tool to address outage optimization, economic dispatch, unit commitment, and detailed production cost studies. GPA recommends purchasing the Nostradamus forecasting module ($74,000). The purchase of Nostradamus would eliminate the need for contracts to provide revenue and sales forecasts. It would also provide a short-term (down to hourly) forecast capability for use in economic dispatch planning. It will also help aggregate Smart Grid AMI data for future load studies.

GPA has the program but will require technical and training services in order to make use of it in short order. The cost for this training and technical service support is $150,000 for the

15 Remaining Generation Facilities

GPA has already retired the Dededo Diesel Power Plant and the Marbo CT. If the CCU decides to retire Cabras 1&2 and Tanguisson 1&2, then GPA will have the following resources remaining:

- Cabras 3&4 (which has experienced four catastrophic failures over XX timeframe), 80 MW
- MEC 8&9 (increasing forced outage rates and decreasing availability), 88 MW
- MDI Diesel Power Plant (lease expires 2017, several plant systems inoperable), 10 MW
- Talofofo Diesel Power Plant (minor operational issues), 8.4 MW
- Tenjo Vista Diesel Power Plant (minor operational issues), 26.4 MW
- Yigo CT ($10 MM requirement remediation identified), 20 MW
- Macheche CT (minor operational issues), 20 MW
- Dededo CT 1&2, (EPA contends that GPA requires a new PSD permit if the plant will operate more than 96 hours per year, SPORD and P&R are currently working with Environmental Consultants to determine remediation requirements and estimated costs.)

The U.S. Navy provided GPA a study (Appendix I) identifying the costs for bringing CT power plants into acceptable operating condition.

15.1 Required Decision

The CCU must decide on whether to retire additional power plants and replace them with more efficient power plants or, spend additional customer money on remediating aging equipment.

15.2 Resources Required

Guam Power Authority has purchased the Ventyx GenOps application. GenOps is part of the Ventyx suite of analysis tools including Strategist. GenOps provides GPA with a powerful tool to before outage optimization, economic dispatch, unit commitment, and detailed production

16 Review of Existing Generation Capital Improvement and Large O&M Projects

GPA should revisit its existing capital improvement and large O&M programs to determine what expenses it should defer due to impending unit retirements.

GPA must prioritize maintenance on existing units to ensure that GPA can optimize remaining reserve and maintain system ability to serve loads while plants are being retrofitted or retired. "The priority order for maintenance activities should be noted as follows:

1) Preventive maintenance;
2) Planned repairs;
3) Problem-solving;
4) Improving performance;
5) Unplanned! Emergency repairs;
6) Setup/changeovers;
7) Fabrication;
8) Installation projects.

"If the maintenance team doesn't have time to perform preventive maintenance, planned repairs and problem-solving, it has no business doing fabrication and installation projects. This type of approach just keeps digging a deeper emergency-repair hole. That is all the more reason for focusing on the top four priorities to eliminate unplanned emergency work."[1]

Additionally, "the top business-policy priorities in a capital-intensive operation include health, environmental, safety, quality and equipment and facility reliability- not five separate priorities, but five equal priorities."[2]

16.1 Required Decision

The CCU must decide which capital improvement and large O&M projects it should defer, accelerate, or terminate.

[1] Bob Williamson. "Do We Really Need Preventive Maintenance?" Maintenance Technology. Vol. 24, No. 5. May 2011. p. 8
[2] Ibid. p. 9

- All pertinent lifecycle costs.

18 Marketing and the Stakeholder Process

GPA should follow a stakeholder-based process throughout the development of the PEP and its execution. GPA, the CCU, and the Guam PUC have used stakeholder processes for the Integrated Resource Planning, Renewable Resource Acquisition, Wind Turbine Generation project development, rate making, smart grid, etc. Furthermore, GPA is not the sole decision maker in this process and must form community-wide consensus with the Guam PUC, customers, potential gas customers, the Guam Legislature, the Guam Administration, environmentalists, and others. Finally, GPA needs to carefully market and communicate throughout all project phases including the decision making phase.

18.1 Required Decision

The CCU must decide whether to recommend using a stakeholder-based process and development of a marketing and communication program.

18.2 Other Resources Required

The Communication Manager, Artemio Perez will develop a scope and budget for consulting and other services including marketing and communications plan development, and associated materials development.

20 Consideration of Different Paths to LNG

There are several alternatives when considering the switching from oil-based fuels to LNG. This decision entails whether GPA should:

- Proceed with LNG or continue with current oil-based fuels for baseload generation;
- Proceed with an alternate to LNG
- Proceed directly to using LNG; or,
- Proceed with a less capital intensive infrastructure fuel such as LPG immediately to secure immediate benefits while working to complete the long-term LNG infrastructure build-out.

20.1 Required Decision

The CCU must decide which of the aforementioned scenarios provides the best path forward.

20.2 Resources Required

Several LNG infrastructure and engineering firms have provided GPA with different cost studies. GPA should consolidate and verify these studies. GPA can perform this scope in the following ways:

- Hire an independent consultant
- Work with these firms through close collaboration and several RFIs.

Note that this scope is to garner sufficient detail to make an informed decision. It is not a detailed design project.

22 New Generation: Design/Requirements Phase

Once the decision is made to proceed with LNG or another fuel, GPA must prepare bid specifications. GPA may meet this required scope in at least three ways:

- Complete engineered solutions and design
- Develop functional requirements.

22.1 Required Decision

The CCU must approve the funding to develop these designs/requirements once the CCU and PUC agree upon the desired unit retirements and new generation capacity. The CCU must decide whether GPA will perform this work using internal resources or outsourced, external resources. If the CCU decides on external resources, the CCU must decide whether to specifically contract for these services or use a Program Management Office to execute the procurement.

22.2 Resources Required

GPA will need a third party engineering and technical consultant to assist the GPA Team. SPORD should form and lead a cross-functional team including members from SPORD, Engineering, Finance/Accounting, P&R, Safety, Legal Counsel, Engineering, Generation, and T&D to develop technical and commercial requirements. GPA should avail themselves of the services and experience of the GMCUS. Alternately, this group may negotiate scope and budget with the PMC or IPP for this work.

Furthermore, this team will develop the procurement documents and process.

24 New Generation: Construction Phase

Once GPA contracts with a firm to deliver the new generation facilities, GPA must manage the construction phase. This entails but is limited to:

- Construction management;
- Project reporting;
- Project budget management;
- Communications management;
- Public meetings management;
- Factory and site acceptance testing;
- Project materials and inventory management.

24.1 Required Decision

The CCU must decide whether GPA will perform this work using internal resources or outsourced, external resources. If the CCU decides on external resources, the CCU must decide whether to specifically contract for these services or use a Program Management Office to execute the procurement.

24.2 Resources Required

Engineering should form and lead a cross-functional team including members from SPORD, Finance/Accounting, P&R, Safety, Legal Counsel, IT, Engineering, Generation, PSCC, and T&D to develop the procurement documents and process. If the CCU and PUC approve a PMO to execute the procurement process, then this team will have oversight over the PMO.

26 LNG: Project Structure

The selection of an appropriate LNG project structure increases the likelihood for project success. GPA must base its choice among different project structure based on the project's complexity, financial restrictions and risk considerations. GPA must decide what LNG Project Structure (LPS) it will adopt for the supply of liquefied natural gas, regasification, and natural gas distribution for use by GPA Generation Plants. The business model options include:

- Merchant Structure
- Tolling Structure with GPA Alternative
- FSRU Charter Party Structure
- Multi-User Structure.

26.1 Merchant Structure

Figure 2-1 Merchant Structure (Source: Ashurst)

Under the Merchant Structure, the Terminal Company builds, owns and operates the import terminal, storage and regasification system. The Terminal Company also purchases the LNG from the LNG Supplier through Sale and Purchase Agreements (SPAs) and converts it to gas form. The gas is then distributed to the Gas Buyers through Gas Sales Agreements (GSAs). The Gas Buyer in our case is GPA or, if GPA desired, an IPP contracted with GPA. This structure places a lot of contracting responsibility and risk on the Terminal Company and would most probably yield the highest costs to GPA. This may not be the best structure in a cost evaluation as GPA may be able to reduce costs by securing the fuel contract and having it processed by the Terminal Company.

26.4 Multi-User Structure

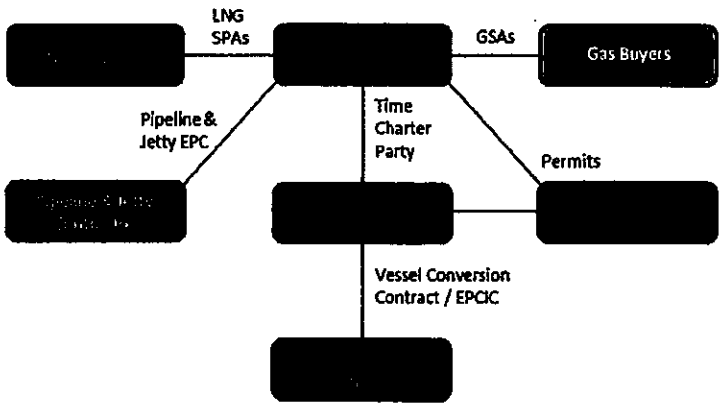


Figure 2-4 Multi-User Structure (Source: Ashurst)

Regulatory requirements drive the choice for adopting a Multi-User Structure as no one entity has dedicated rights to the LNG infrastructure. Inclusion of Lenders is usually for Lender risk reduction in case of default by Terminal Company. Lenders will have some involvement in completing the project and selection of replacement Terminal Company.

26.5 Required Decision

The CCU must decide which LNG Project Structure to adopt. The CCU may opt to let the market decide among a subset of project structures that they determine to be in the best interest of Guam. GPA can achieve this objective by developing a more flexible IFB/RFP format which allows GPA to negotiate openly with more than one bidder at a time.

26.6 Resources Required

The aforementioned candidate market structures derive from presentations and material from the LNG Conference. No external resources are required unless the CCU needs further clarification.

28 LNG: Risk Mitigation for Supply Interruption

The 2012 IRP recommends that GPA retrofit all generation units except for the small medium speed diesels for dual-firing with gas or ultralow sulfur diesel. This serves two purposes. First, it allows GPA to switch fuels based on favorable market fuel price. Secondly, it serves as a contingency for interruptions of supply for LNG or diesel, but not both. GPA will have to decide how much inventory of both LNG and diesel to always have on inventory. GPA should also ensure that its diesel contracts have provisions for emergency supply.

Another risk mitigation strategy is to construct additional cryogenic LNG storage tanks. If GPA decides to acquire more than one such storage tank, it makes best sense to have enough physical separation so that should a catastrophic event occur at one facility then the other will not be affected. Cryogenic LNG storage facilities are expensive. Thus, having additional such facilities will have much greater expense. Furthermore, a small amount of LNG will boil off. Therefore, storing greater amounts of LNG must account for the economics of boil-off. Still another strategy is to provide cryogenic LNG isotainer storage throughout the island. However, this additional storage would be limited.

28.1 Required Decision

A major decisions and question that GPA requires before addressing the risk mitigation questions is: How long a disruption should GPA plan for? Currently GPA has a fifteen day supply left (ANF & MAT to verify) when it receives a RFO fuel shipment. GPA's planning criteria is 60 to 90-day supply.

The CCU must decide the risk mitigation strategy for LNG Supply Interruption. The CCU must decide between the following alternatives:

- Choose a strategy without further detailed analysis;
- Task GPA to perform the analysis and make recommendations; and
- Task GPA to contract for external resources to perform the analysis and make recommendations

29 Other IRP Recommendations

The 2012 IRP's other recommendations include important activities pertinent to the IRP Strategy include:

- Ensure that all generation plants meet the performance standards agreed with the Guam Public Utilities Commission (Guam PUC);
- Implement automated economic dispatch and unit commitment to optimize fuel use;
- Work collaboratively with the Guam PUC and stakeholders to improve GPA's financial position relative to obtaining funding for these projects;
- Work with Guam Waterworks Authority (GWA) and others on an interruptible load arrangement in order to hedge against the risk of higher than baseline load growth.

29.1 Required Decision

The CCU should determine how it will keep GPA accountable to meet performance standards for generation availability, prudent use of fuel, fiduciary health, and risk management.

29.2 Other Resources Required

GPA has the internal resources to perform these tasks.

Appendix B: PUC Order regarding the 2012 IRP

Appendix D: Environmental Compliance Issues Map

Appendix F: Methanex Monthly Average Regional Posted Contract Price History

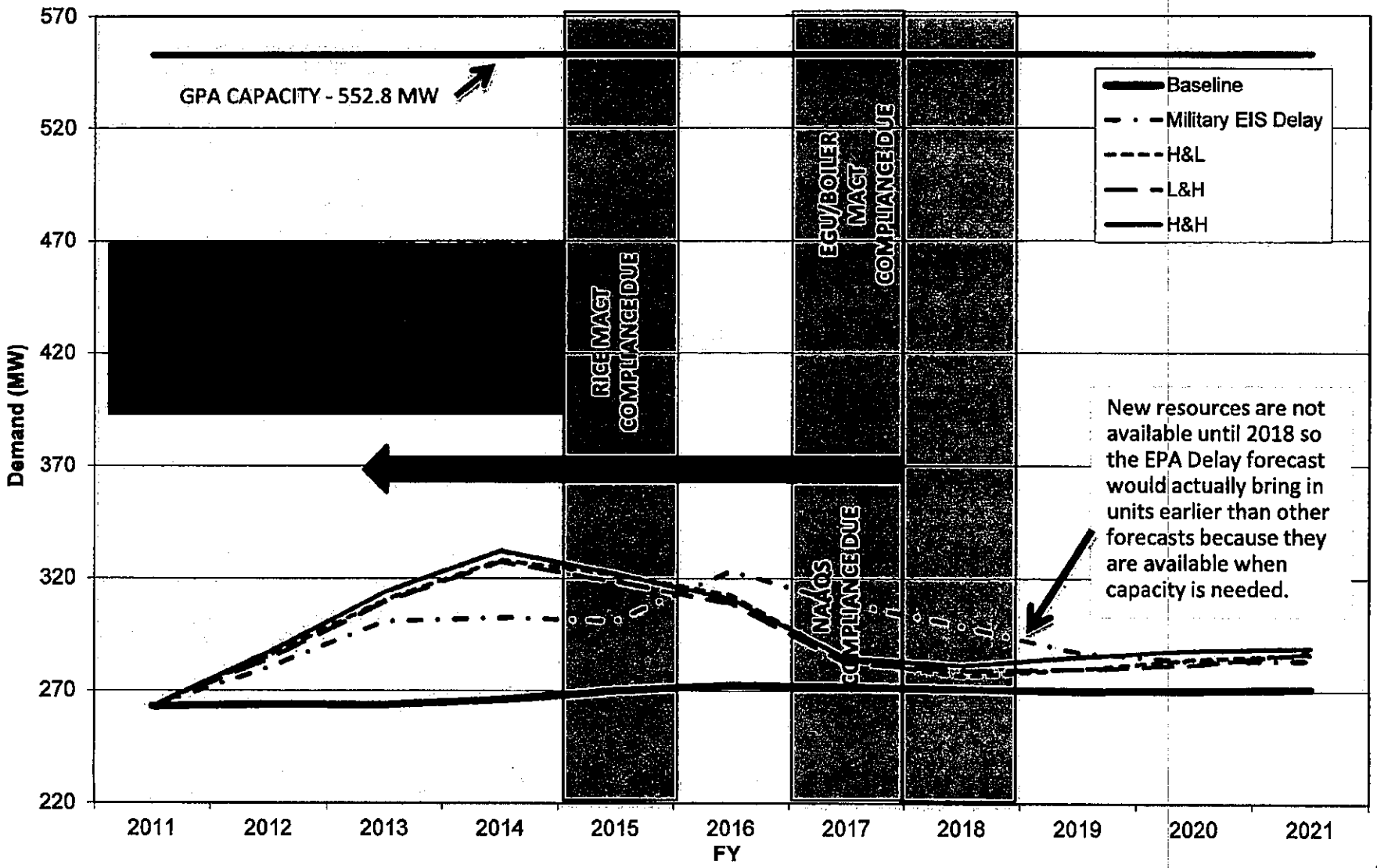
Appendix H: RFP for IRP Implementation Strategic Planning Services

Appendix J: List of Potential LNG Fuel Suppliers and Infrastructure Developers

IRP Assumptions

- **Study Period** is 30 years
- **Fuel Forecast** is Base Case *(provided by RWBeck)*
- **Load Forecast** is the Baseline forecast *(provided by PL Mangilao)*
- Includes recently contracted **35 MW of Renewable Energy**.
- Assumes **Capital Costs for Life Extension** of existing units *(provided by RWBeck)*
- Assumes **Capital Costs for EPA Compliance** requirements *(provided by TRC)*
- Assumes **CAPEX and O&M Costs and Operating Characteristics** of new generation resources *(provided by RWBeck)*
  - *Interest Rate/Term: 6.25%, 30 Years*
  - *Combined Cycle Efficiency: 41%*
- Assumes **Permitting and Construction Schedules** *(provided by RWBeck)*
  - *38 Months for New Combined Cycle Plant; 30 Months for Solar and Wind*
- Assumes **Fuel Premium for new LNG Terminal Costs** based on projected fuel use *(Terminal Costs provided by RWBeck)*
  - *$1.84/MBTU for 12,410,000 MBTU annual natural gas consumption*

Demand Forecast and Timeline



Note: Since IRP submittal NAAQS Compliance Date has moved to out after 2021.

System Reliability Impact of Single Units and Plant Retirement

Sets of Unit Retired	Maximum Net Generaton Capacity Retired	System Capacity After Retirements	System Peak Load Carrying Capacity at One Day in 4.5 Years LOLE	Reserve Margin For One Day in 4.5 Years LOLE	Load Carrying Capability (%)	
	MW	MW	(MW)	%	System	Incremental
None	0.0	524.0	339	54.26	64.69	N/A
Cabras Steam Turbine 1	62.0	462.0	292	58.11	63.20	75.81
Cabras Steam Turbine 2	59.0	465.0	293	58.93	63.01	77.97
Cabras 1&2 Steam Plant	121.0	403.0	257	56.8	63.77	67.77
Cabras Slow Speed Diesel 3	35.0	489.0	298	64.02	60.94	117.14
Cabras Slow Speed Diesel 4	36.0	488.0	297	64.32	60.86	116.67
Cabras 3&4 Diesel Plant	71.0	453.0	263	72.01	58.06	107.04
Tanguisson 1	25.0	499.0	310	61.21	62.12	116.00
Tanguisson 2	25.0	499.0	310	61.21	62.12	116.00
Tanguisson 1 & 2	50.0	474.0	287	65.45	60.55	104.00
Tenjo Diesel (2 Units)	8.0	516.0	324	59.39	62.79	187.50
Tenjo Diesel (4 Units)	16.0	508.0	316	60.59	62.20	143.75
Tenjo Diesel (6 Units)	24.0	500.0	308	62.1	61.6	129.17
Talofofo Diesel Units	8.0	516.0	324	59.39	62.79	187.50
MDI Units	10.0	514.0	324	59.39	63.04	150.00
Macheche CT	22.0	502.0	311	61.16	61.95	127.27
Yigo CT	22.0	502.0	311	61.16	61.95	127.27
Dededo CT 1	23.0	501.0	311	61.24	62.08	121.74
Dededo CT 2	22.0	502.0	311	61.16	61.95	127.27
Dededo CT 1&2	45.0	479.0	292	64.22	60.96	104.44
Dededo Diesel Units	8.0	516.0	324	59.39	62.79	187.50
Marbo CT	16.0	508.0	317	60.47	62.40	137.50

System Load Carrying Capability is on Net System Peak

IRP Base Case

Reference No.	**1**
Forecast	Baseline
PV Utility Costs ($000	6,451,778
Variance from Base Case (CAPEX A)	**BASE CASE**
CAPEX	Yes
Air Quality Control Systems (EPA)	Yes
Add New Resources	**NO**
QGP & PGR (Renewable Contracts)	Yes
Sea Water Air Conditioning (SWAC)	
Renewable Firming & Shaping Assumption ($100/MWH Intermittency Cost Added to Wind & Solar)	
Geothermal	

Scenario results were compared against the Base Case present value utility costs (PV) = **$6,451,778** over a 30 year study period.

Case 4 Evaluation:
Retire Cabras 1&2 and Tanguisson

Reference No.	1	4			
Forecast	Baseline	Baseline	Baseline	Baseline	Baseline
PV Utility Costs ($000)	6,451,778	5,241,317	5,250,353	5,301,194	5,373,385
Variance from Base Case (CAPEX A)	BASE CASE	(1,210,462)	(1,201,425	(1,150,584)	(1,078,394)
CAPEX	Yes	Yes	Yes	Yes	Yes
Air Quality Control Systems (EPA)	Yes	Yes	Yes	Yes	Yes
Add New Resources	NO	Yes	Yes	Yes	Yes
QGP & PGR (Renewable Contracts)	Yes	Yes	Yes	Yes	Yes
Sea Water Air Conditioning (SWAC)		No	No	No	
Renewable Firming & Shaping Assumption ($100/MWH Intermittency Cost Added to Wind & Solar)		Yes			
Geothermal		Yes			

Apply compliance requirements to units that don't convert or retire

Evaluates Firming/Shaping Assumption Impact

Considers Geothermal Feasibility still pending

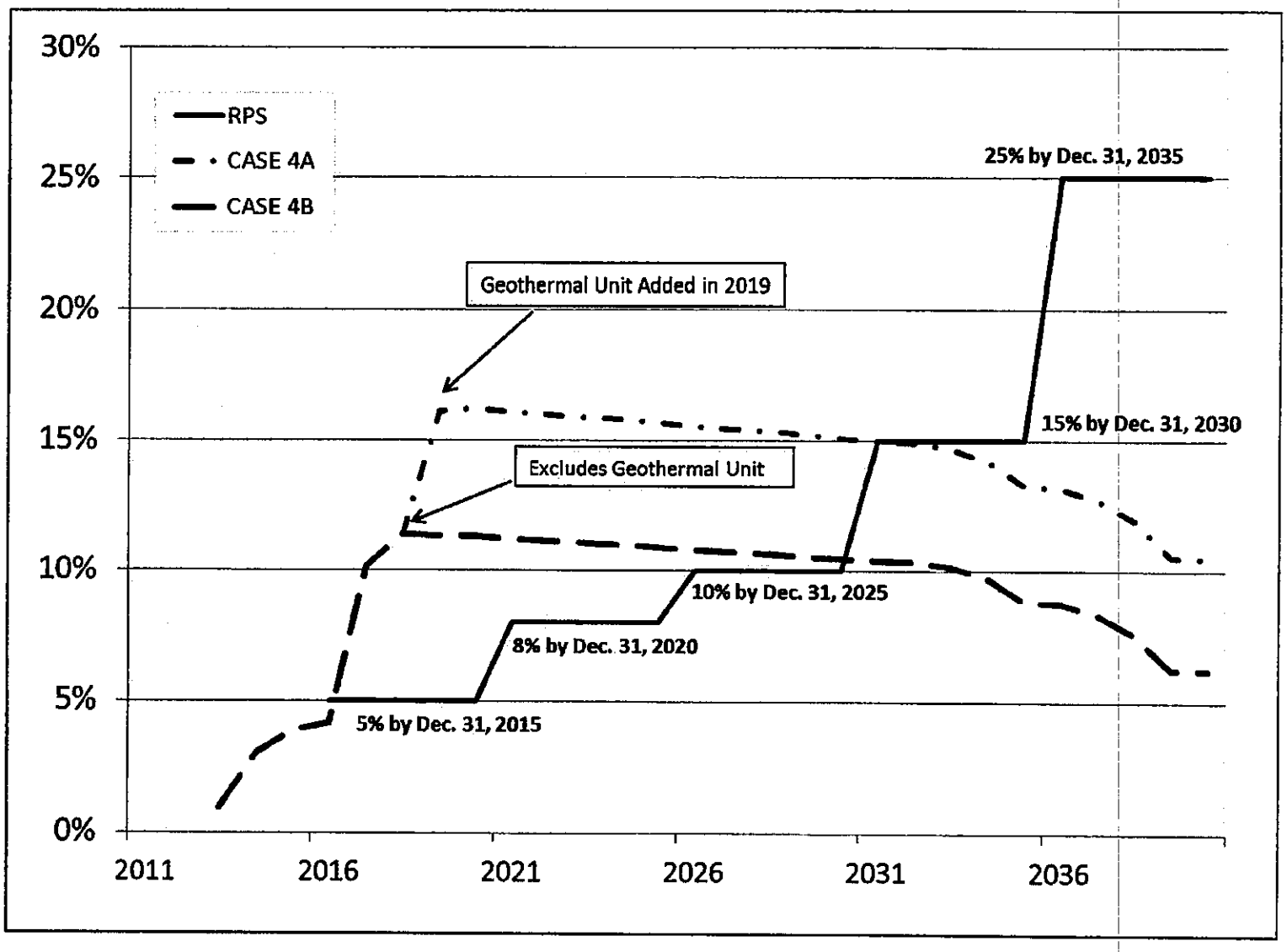
Evaluates the impact of Sea Water Air Conditioning (SWAC), ~12MW equivalent

Case 4B removes Geothermal as a new source option since feasibility and potential is still pending. It also removes the additional cost assumptions for Solar and PV intermittency which allows these units to be selected. These conditions are used for further analysis. GPA would still need to evaluate these units' system impact and costs based on siting and types of units to be installed.

IRP Results Discussions

- Reduces GPA's overall generation capacity
- Reduces overall costs
  - Fixed costs: reduced capacity requires less fixed costs
  - Fuel costs: LNG vs. RFO fuel prices
  - Efficiency improvement: new combined cycle with better heat rates also lowers fuel costs
- Maintains diversification with addition of renewables
- Meets or near minimum of the LNG fuel use requirements to cover cost of LNG import terminal and regasification infrastructure debt.
- Contributes to Renewable Portfolio Standards goals

Renewable Portfolio Standards
Case 4: Cabras 1&2 and Tango Retired



Projected Capital Costs
Case 4 – Retire Cab1&2 & Tanguisson

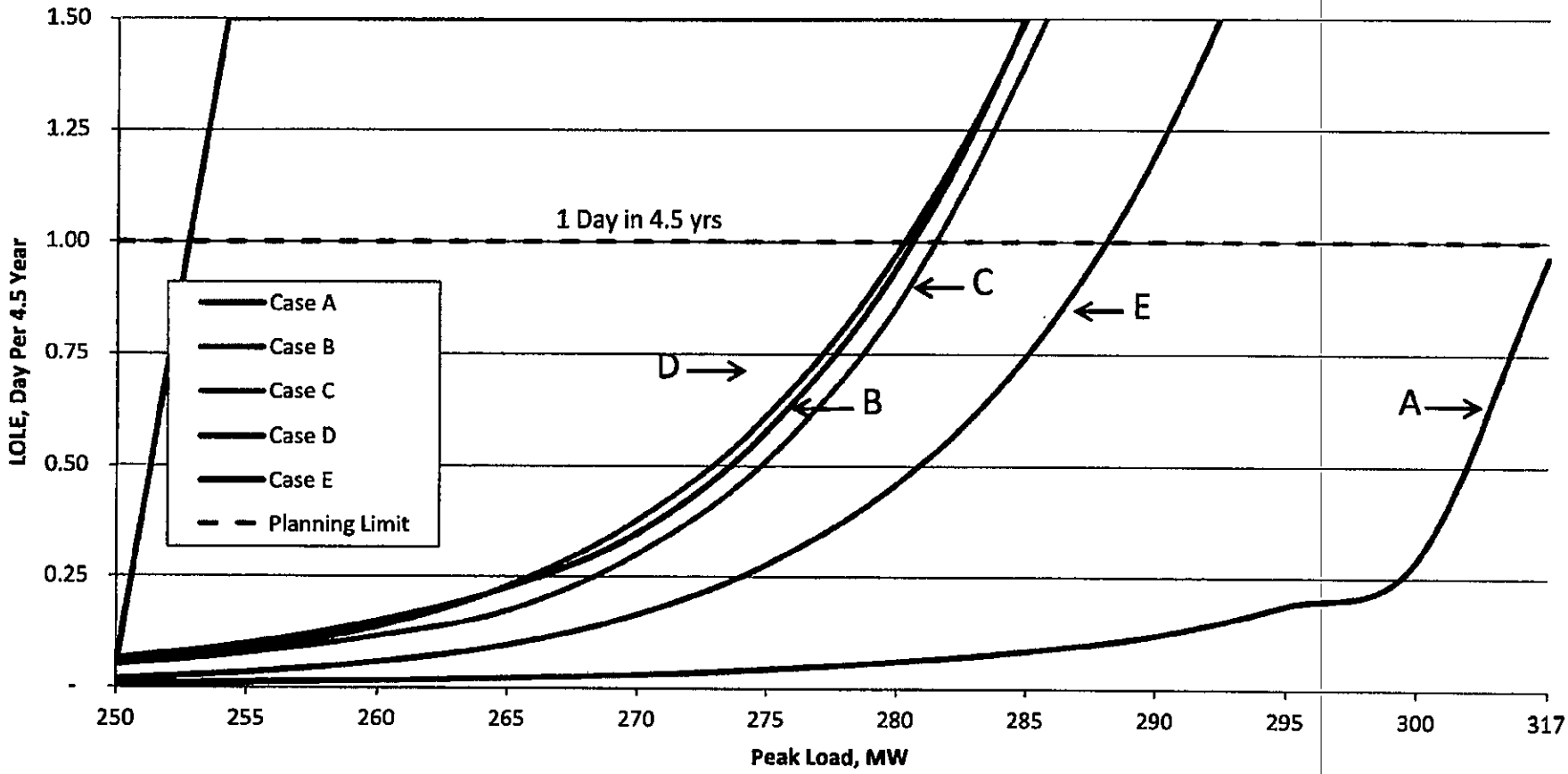
Complete / Commission By FY	Description	Project Period	IWPS Capacity Impact	Life Extension ($000)	Fuel Conversion / New Construction ($000)	EPA Compliance ($000)	Total CAPEX ($000)
2013	Retire Marbo CT and Dededo Diesel		- 26 MW	$ -	$ -	$ -	$ -
2014	Life Extension & Environmental Compliance for *Peaking Units*[1]	2013 - 2014	-	$ 24,220	$ -	$ 7,150	$ 31,370
2015	Environmental Compliance for *Baseload Plant*[2]	2013 - 2015	-		$ -	$ 13,002	$ 13,002
2018	Life Extension of Baseload Plants (Excluding Cabras 1&2 & Tanguisson)	2014 - 2019	-	$ 2,680	$ -	$ -	$ 2,680
2017	Solar PV	2014 - 2017	+ 20 MW (2x10MW)		$ 90,000		$ 90,000
	Wind	2014 - 2017	+ 20 MW		$ 93,000		$ 93,000
2018	LNG Import Terminal & Gasification Facility[3]	2013 - 2018	-		$ 212,000		$ 212,000
	TEMES CT Repower as *Combined Cycle*[4] & LNG Conversion	2014 - 2018	+ 20 MW (capacity increase)		$ 81,000		$ 81,000
	New Combined Cycle[4] Units (2 Each)	2014 - 2018	+ 120 MW (2x 60MW)		$ 256,800		$ 256,800
	Cabras 3 LNG Conversion	2014 - 2018	-		$ 13,560		$ 13,560
	Cabras 4 LNG Conversion	2014 - 2018	-		$ 13,560		$ 13,560
	MEC 8 LNG Conversion	2014 - 2018	-		$ 13,711		$ 13,711
	MEC 9 LNG Conversion	2014 - 2018	-		$ 13,711		$ 13,711
	Retire Cabras 1 & 2		- 132 MW (-2x66MW)				$ -
	Retire Tanguisson 1 & 2		- 53 MW (-2x26.5MW)				$ -
			TOTAL:	$ 26,900	$ 787,342	$ 20,152	$ 834,394

LNG Related Costs: $ 604,342
Renewable Costs: $ 183,000

Summary of Cases for Additional Evaluations

	Cases VII & VIII :	Cases V, VI, IX, X :	Cases II, III, IV
Generating Plants	**MW**	**MW**	**MW**
Cabras 1&2	0	0	0
Tanguisson 1&2	0	0	0
Enron 8&9	0	88	88
Cabras 3&4	0	0	78
New 110 MW CC Plant	110	110	110
New 110 MW Combined Cycle	110	110	0
4th New 55MW Combined Cycle	110	0	0
Total Baseload:	**330**	**308**	**276**
MDI Diesel	11	11	11
Tenjo Vista	26	26	26
Talofofo	9	9	9
Total Diesels:	**46**	**46**	**46**
Yigo CT	0	20	20
Macheche CT	20	20	20
TEMES CT	40	40	40
Dededo CT 1	0	0	20
Dededo CT 2	0	0	0
Total CT:	**60**	**80**	**100**
Total Capacity:	**436**	**434**	**422**

Evaluation of Loss of Load Expectation for Various Unit Sizes and Quantities



	Case A	Case B	Case C	Case D	Case E
System Capacity, MW	433	376	371	366	371
Peak Load, MW 1 day in 4.5 yr	318	281	282	280	288
New CC Units	220 MW (4 x 55MW)	185 MW (5 x 37MW)	180 MW (6 x 30MW)	175 MW (7 x 25MW)	180 MW (9 x 20MW)
RM%, 1 day in 4.5 yr	36%	34%	32%	31%	29%

Retirements:

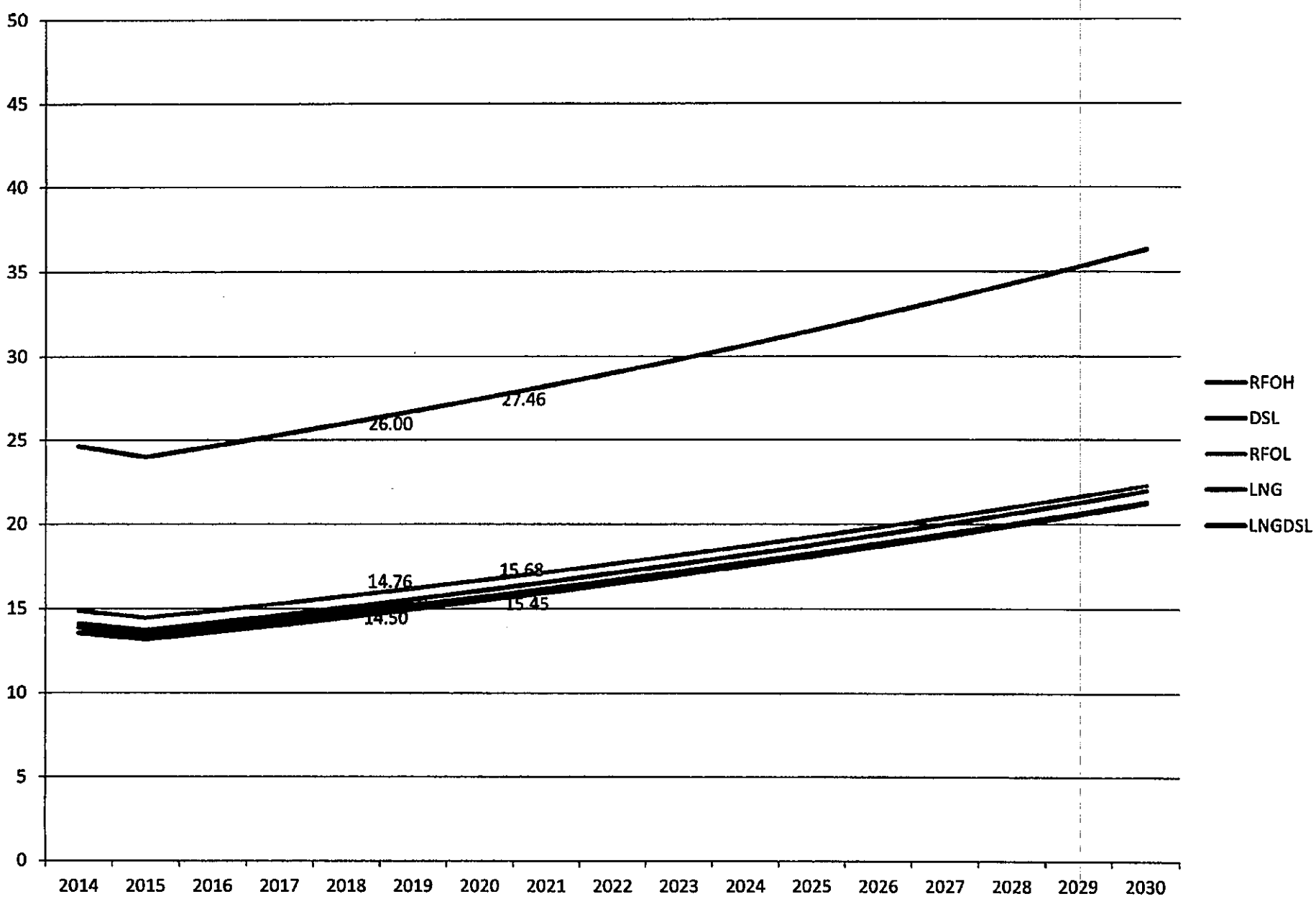
Case A: Cabras 1&2, Tanguisson 1&2, Cabras 3&4, Dededo CT 1&2 are retired

Cases B-E: Cabras 1&2, Tanguisson 1&2, Cabras 3&4, Dededo CT 1&2, Yigo Ct are retired

Why look at smaller units?

- Smaller Units
  - Require more capex dollars per KW than larger plants of the same technology
  - Maybe less efficient
- However …
  - Need less capacity for similar generation system reliability
  - May end up using less fuel in the dispatch
  - Operating larger units may require running them at much lower efficiencies at light loads than smaller units

Fuel Forecast: June 2013 Update



Strategist Evaluation of Schedules, Pricing & Retirements

CASE	Scenario Edit	Net PV Savings from Base Case ($000)				Total New Units by 2021 for 50% Eff Case	Net PV Savings from Base Case ($000)	Total New Units by for 50% Eff Case with 38% RM
		Updated Fuel Forecast	$LNG=$RFO (Updated Fuel Forecast)	$LNG>$RFO (Updated Fuel Forecast)	50% Eff (Updated Fuel Forecast)		Change RM to 38% after 2 New Units	
IRP CASE 4:								
Cab12/Tango Retire (2018)	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, Retire move to 2021	673,950	664,138	563,699	887,432	120 MW (2x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, Retire move to 2021, **TEMES Not Converted**	618,306	608,686	510,616	895,225	120 MW (2x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, **Retire Tango @ 2018**, Retire Cab12 at 2021	702,526	692,908	593,324	907,418	120 MW (2x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, **Retire Tango @ 2015**, Retire Cab12 at 2021	713,112	703,494	603,910	920,014	120 MW (2x60MW)		
	2020, **Retire Tango @ 2015**, Retire Cab12 at 2021, **TEMES Not Converted**				930,120	120 MW (2x60MW)	930,120	120 MW (2x60MW)
ADDITIONAL RETIREMENTS TO IRP CASE 4:								
Cab1-4/ Tango/ CT12/Yigo CT Retire	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, Retire move to 2021	497,500	487,505	383,710	844,345	240 MW (4x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, Retire move to 2021, **TEMES Not Converted**	433,019	422,786	318,257	815,794	300 MW (5x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, **Retire Tango @ 2018**, Retire Cab1-4 & CT's by 2021	518,034	508,040	404,244	865,573	240 MW (4x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, **Retire Tango @ 2015**, Retire Cab1-4 & CT's by 2021	528,620	518,626	414,830	876,159	240 MW (4x60MW)		
	All PV, Install CC by 2018 on diesel & convert to LNG by 2020, **Retire Tango @ 2015**, Retire Cab1-4 & CT's by 2021, **TEMES Not Converted**				839,173	240 MW (4x60MW)	961,416	240 MW (4x60MW)

Review of CCU Questions

- When do we shut down C1/C2/Tango/C3/C4 - retire or deactivate.
- Do we decide C1/C2/ Tango/C3/C4 before anything else?
- Is LNG the answer?

Do we decide C1/C2/ Tango/C3/C4 before anything else?

- The decisions on these plants will affect:
  - Procurement requirements and planning efforts for new plants.
  - Human Resource issues.
  - Existing Contract decisions for PMCs, IPPs, and Fuel Supply
- Evaluations show that due to size and reliability requirements Cabras 1&2 and Cabras 3&4 should be retired after new units are installed and LNG is available (~2021)

Attachment C to Resolution No. 13-50

Work Order No. :

Task Order No.:

Description: **Core/Continuous Services - Execution of IRP / LNG Resource Implementation Plan**

SCOPE OF SERVICES

To fulfill Program Directives outlined in the contract between GPA and Program Management Office (PMO), RWA will provide a core team of dedicated resources who will assist GPA in managing the Integrated Resource Plan (IRP) and its capital improvement program. The PMO will utilize traditional program management approaches and concepts including manpower assignment, financial oversight, workplace issues and program management tools and technological systems.

This team of dedicated PMO consultants will provide strategic advice and technical and administrative consulting services; augment GPA's own technical staff; conduct communications training, public relations outreach and community engagement regarding options for regenerating GPA in the future; coordinate special projects and make presentations to organizations and key stakeholders as directed by the General Manager (GM) or his designee; and implement a web-based program management database tool. In the course of its Core and Continuous Services in support of the IRP and LNG Resource Implementation Plan, the PMO will identify situations that might impact the Program Directives and shall, in each case, present to GPA solutions that should be taken or decisions that should be made in a timely manner. The PMO will make regular reports in regard to activities associated with fulfilling the Program Directives as well as actions taken to maintain the budget, schedule and image development as well as to monitor actions required by governmental agencies.

The PMO will assist GPA with carrying out the Resource Implementation Plan (Plan) for bringing LNG to Guam as conditionally approved by the Guam PUC. The Plan calls for an evaluation of alternative low sulfur fuels that would comply with USEPA Clean Air Act requirements, provide for increased fuel diversity for the GPA generation fleet, and provide lowest cost energy for Guam. Implementation of the Plan will require that a number of economic, engineering, and environmental evaluations be undertaken. The PMO shall act as GPA's representative during the economic, engineering, and environmental evaluations and shall facilitate the progress and process of these evaluations with GPA, current members of the GPA Team, or additional specialty contractors that may need to be engaged to complete the necessary evaluations and analyses.

Scope of Work:

I. **Program Management Services**

The PMO's Core and Continuous Services consist of providing technical advice and assistance rather than management duties - which are retained by GPA through its GM.

- Conduct high-level evaluation of alternative low sulfur fuel options including LNG, propane, ULSRFO, methanol, DME
- Identify conversion costs for use of alternative fuels including AQCS compliance
- Identify potential schedule for conversion to alternative fuels
- Prepare report on findings of fuel diversity options and recommendations

b. Conduct Supplemental Fuel Study

- Based on task above, develop scope of work for fuel supply study to obtain current data on sources, availability, and price of alternative fuels
- Qualified consultant to conduct fuel study
- PMO to assist GPA with study management and review of work product

c. Identify Fuel Delivery, Storage, and Distribution Options

- For importation of LNG and LP, identify potential import terminal options building on findings of previous studies.
- Evaluate suitability of existing fuel receiving facilities to accommodate ULSRFO, methanol, or DME
- Review alternatives with relevant stakeholders and eliminate fatal flaws
- Conduct environmental and engineering evaluation of potentially feasible options
- Identify permitting requirements and potential schedule for implementation of import terminal options
- Identify construction and operation costs of import terminal options
- Prepare report on findings of fuel diversity options and recommendations

d. Develop Revised Financial Model

- Revise model structure as required to incorporate risk analytic framework, resolve "black box" issues, address ratepayer impacts, and consider alternative funding strategies
- In consultation with stakeholders, identify reasonable range of alternatives to be analyzed
- Update key input parameters based on fuel and facility cost data developed above
- Conduct revised financial modeling
- Review interim results with GPA and other stakeholders and revise analyses as necessary

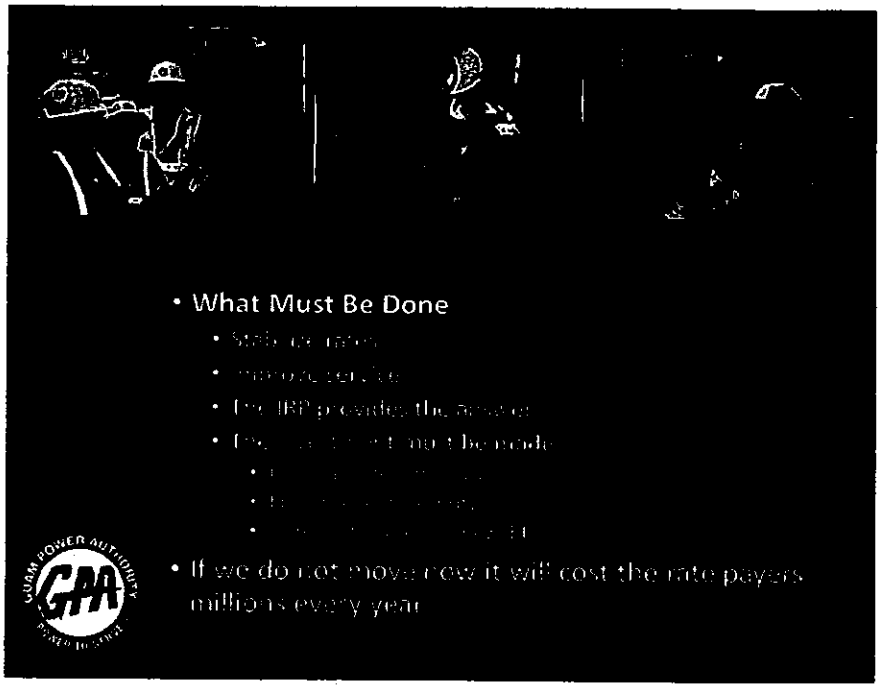
e. Plan Submittal

Within 90 days, The PMO and GPA will prepare and submit a detailed Resource Implementation Plan to the CCU and PUC

Following the approval of the Resource Implementation Plan by the CCU, additional hierarchal milestones, priorities and KPI's will be identified for the subsequent work - Program Definition.

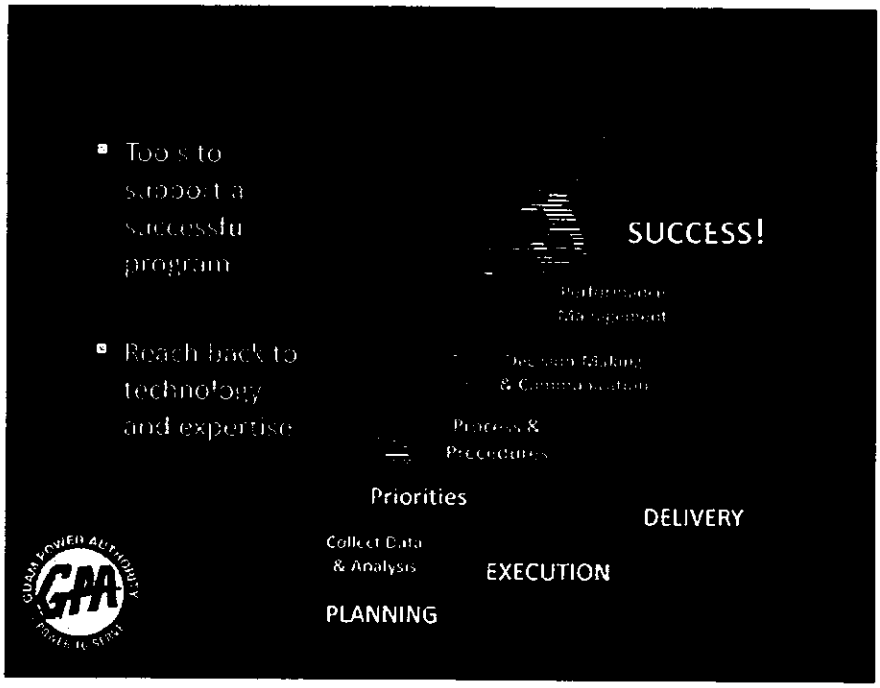
PMO Cost

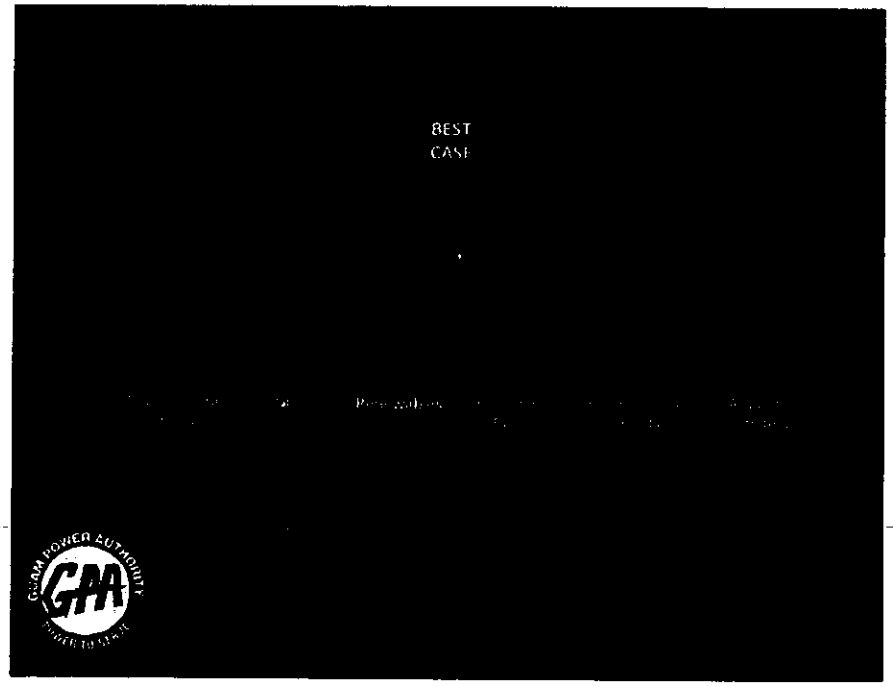
- Work Order Fee: $3,900,000

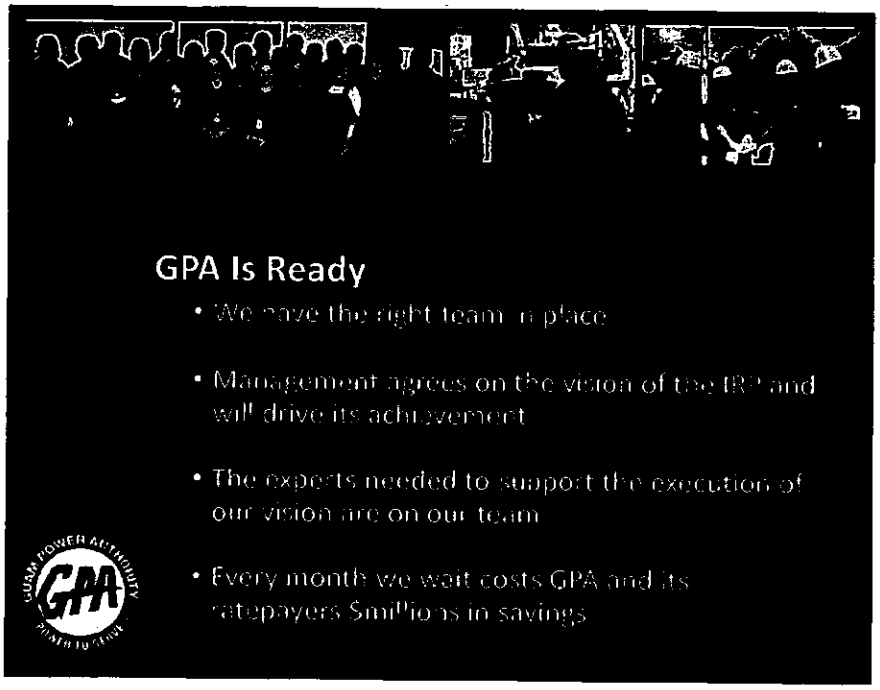


- What Must Be Done
  - [illegible]
  - [illegible]
  - [illegible] provides the [illegible]
  - [illegible] must be made
    - [illegible]
    - [illegible]
    - [illegible]
- If we do not move [illegible] it will cost the rate payers millions every year

- Execution of the IRP – Single largest opportunity to improve the quality of life on Guam
  - [illegible] of our [illegible] to the economy
    - Jobs
    - [illegible]
    - Income
    - [illegible]
  - [illegible]
- To improve the quality of life on Guam


Tools to support a successful program
Reach back to technology and expertise
SUCCESS!
Process & Procedures
Priorities
DELIVERY
Collect Data & Analysis
EXECUTION
PLANNING


BEST CASE



GPA Is Ready

- We have the right team in place
- Management agrees on the vision of the IRP and will drive its achievement
- The experts needed to support the execution of our vision are on our team
- Every month we wait costs GPA and its ratepayers $millions in savings

I will Lead

- GPA's commitment is to remain
  - On Schedule
  - On Scope
  - On Budget
- CCU's commitment is needed now
  - A resolution to move forward with the IRP as it has been provided for your review