H Energy Policy Act of 2005 Implications

May 28, 2008

John J. Cruz, Jr.
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P.O. Box 2977
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Subject: **Energy Policy Act of 2005 and Its Implications for GPA**

Dear Mr. Cruz:

The Energy Policy Act of 2005 included a number of changes and updates to PURPA. These changes may impact Guam Power Authority as discussed below.

What is PURPA?

PURPA is the Public Utility Regulatory Policies Act of 1978. This legislation was passed by Congress to encourage conservation of energy supplied by electric utilities, optimize the efficiency of use of facilities and resources by electric utilities, and provide for equitable rates to electric consumers. The 1978 legislation established six standards for utilities to follow. The Energy Policy Act of 1992 added four more standards and, most recently, the Energy Policy Act of 2005 added an additional five standards. The purpose of this letter is to focus on the five newest standards and their implication for GPA.

Why?

PURPA applies to any electric utility with total annual retail sales of 500 million kilowatt-hours or greater. This includes GPA.

Energy Policy Act of 2005 – Standards

1. **Net Metering.** Each electric utility shall make available upon request net metering service to any electric consumer that the utility serves. The term "net metering service" means service to an electric consumer under which electric energy generated by that consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the consumer during the applicable billing period.
2. **Fuel Diversity.** Each electric utility shall develop a plan to minimize dependence on one fuel source and to ensure that the electric energy it sells to consumers is generated using a diverse range of fuels and technologies, including renewable technologies.

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3. **Fossil Fuel Generation Efficiency**. Each electric utility shall develop and implement a ten-year plan to increase the efficiency of its fossil fuel generation.

4. **Smart Metering**. Each electric utility shall offer all of its customer classes (and individual customers upon customer request), a time-based rate schedule under which the rate charged by the utility varies during different time periods and reflects the variance, if any, in the utility's costs of generating and purchasing electricity at the wholesale level. The time-based rate schedule shall enable the electric consumer to manage energy use and cost through advanced metering and communications technology. (This reflects the opening paragraph of the standard. The second paragraph of the standard lists some of the types of time-based rate schedules that may be offered and the third paragraph provides that each electric utility subject to the first paragraph shall provide each customer requesting a time-based rate with a time-based meter capable of enabling the utility and customer to offer and receive such rate.)

5. **Interconnection**. Each electric utility shall make available, upon request, interconnection service to any electric consumer that the electric utility serves. "Interconnection service" means service to an electric consumer under which an on-site generating facility on the consumer's premises shall be connected to the local distribution facilities. Interconnection services shall be offered based upon the standards developed by the Institute of Electrical and Electronics Engineers: IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems, as they may be amended from time to time. In addition, agreements shall be established whereby the services that are offered shall promote current best practices of interconnection for distributed generation, including but not limited to practices stipulated in model codes adopted by associations of state regulatory agencies. All such agreements and procedures shall be just and reasonable, and not unduly discriminatory or preferential.

What action is required?

- PURPA requires electric utilities to "consider" each standard and then "make a determination" regarding whether or not it is appropriate to implement the standard.
- Consideration and determination are required, but the decision to implement is discretionary.
- The Guam Public Utilities Commission (GPUC) must "consider and determine" the standards prior to ruling on implementation of a standard.

Deadlines for the 2005 Standards

- The deadline to begin consideration for smart metering and interconnection was August 8, 2006 and the deadline to begin consideration for net metering, fuel diversity and fossil fuel generation efficiency was August 8, 2007.

- The deadline to make a determination for smart metering and interconnection was August 8, 2007 and the deadline to make a determination for net metering, fuel diversity and fossil fuel generation efficiency was August 8, 2008.
- Failure to meet the proscribed dates usually requires the appropriate Public Utilities Commission to include review of the issue in future rate proceedings.

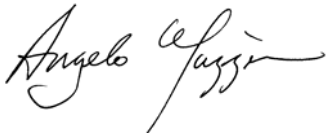
Proposed GPA Action Plan

- **Net Metering**. The Guam Legislature has passed a law that requires electric utilities to provide net metering service. Implementation of net metering will require the GPUC to define the rules, procedures and tariffs that would apply to customers requesting net metering. GPA and GPUC will also need to outline standards to be adopted to govern the physical interconnections and safety standards. GPA should determine, in conjunction with GPUC, the appropriate time for the regulatory process to begin on this issue. In light of the fuel diversity goals outlined in the Integrated Resource Plan (IRP), the net metering effort should start in the near future.
- **Fuel Diversity**. GPA's recent efforts on its IRP are designed to develop a strategy for fuel diversity of its generation resources. As discussed in the IRP, GPA will undertake a significant effort to acquire renewable generation in the near term. It is expected that the acquisition process will begin during 2008. The IRP also outlines GPA's desire to reduce its dependence on fuel oil by the use of LNG as a part of its fuel mix. These efforts are a significant step in diversifying GPA's fuel mix.
- **Fossil Fuel Generation Efficiency**. GPA's IRP examines several generation efficiency improvements. These efforts, including repowering some facilities with LNG, are examined at a high level. Subsequent to the acceptance of the IRP by the GPUC, it may be appropriate to develop a more detailed 10-year tactical plan of efficiency improvements.
- **Smart Metering**. The primary focus of most smart metering efforts has been on the implementation of time of use (TOU) tariffs and customer metering investments to support TOU data. The implementation of TOU on Guam would require significant study. For most utilities there exists a significant price differential between the cost of power during on-peak hours and the cost of power during off-peak periods. A large price differential drives the positive economic outcome for TOU metering. However, given the current resource mix of the GPA system, one in which the price difference between on-peak and off-peak is not great, TOU may not be economical. As GPA starts to diversify its fuel mix, then the TOU approach may be economic. Smart metering also envisions cost reductions associated with improvements in the distribution function of a utility. Smart metering and TOU activities should be considered in the near future.

- **Interconnection**. It is anticipated that the regulatory efforts defining the policies and procedures for net metering will also include policies and procedures for interconnection. The development of net metering tariffs will also include the offer of interconnection to the GPA system and the requirements for physical connection and safety requirements. A significant amount of work has been undertaken in the area of interconnection by mainland utilities and this information and data should help guide GPA toward implementation.

Sincerely,

R. W. BECK, INC.



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I Vertical Axis Turbine Viability

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Via email: jcruz@gpagwa.com

Subject: **Viability of Vertical Axis Turbine Technology**

Dear Mr. Cruz:

Global Energy Concepts, LLC (GEC) prepared this letter to answer your question regarding why horizontal-axis wind turbines (HAWTs) are currently more common and are regarded as more economically competitive than vertical-axis turbines (VAWTs). It is beyond the scope of our preliminary assessment to present detailed analysis comparing the merits of HAWTs versus VAWTs; however, potential height restrictions and typhoon risks elicited questions about the applicability of VAWTs on Guam. This discussion documents key differences and limitations between HAWTs and VAWTs that decisionmakers should consider regarding VAWTs. Figures 1 and 2 show a typical 3-bladed HAWT and a 2-bladed VAWT.

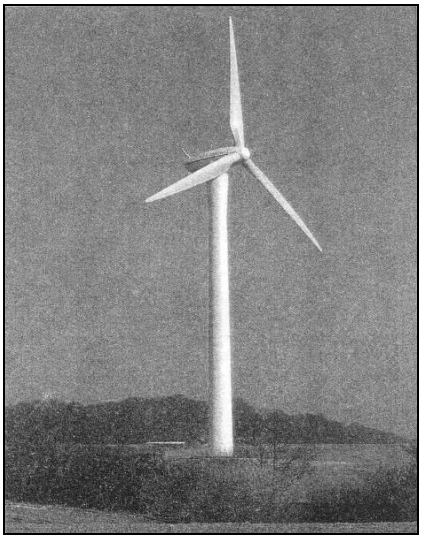


Figure 1. Typical Modern 3-Bladed HAWT

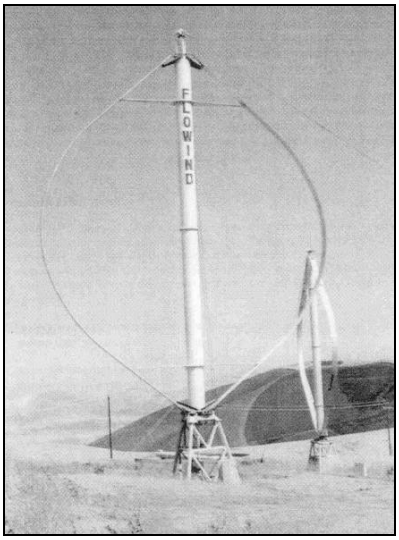


Figure 2. A Commercial 2-Bladed VAWT

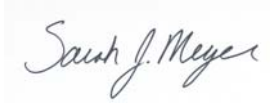
Theoretically, VAWTs may offer an attractive alternative to HAWTs for locations with height and space restrictions. Many VAWT models can be installed without the use of high-capacity cranes and are not as sensitive to turbulent or omni-directional winds. Also, the major

components of a VAWT, such as the drivetrain, are usually ground-mounted, allowing easier access for maintenance.

However, there are inherent limitations in any VAWT that impede its ability to offer a lower cost of energy in comparison to HAWTs. A fundamental limitation of VAWTs is their low height, which prevents the rotor from accessing stronger winds that typically prevail as height above the ground increases. In addition, the maximum aerodynamic efficiency of VAWTs will be lower than available HAWT designs. This difference is likely to be between 15% and 25%. Due to the lower efficiency, the VAWT will capture less energy for the same swept area. For a given swept area, the mass of the rotor and support structure of a VAWT will be greater than that of an equivalent HAWT. This mass difference will likely translate into a cost difference. The savings that a VAWT may enjoy due to lower drivetrain and maintenance costs are unlikely to balance the lower energy capture and higher initial rotor costs.

A few companies are marketing VAWTs as commercially available units; however, none of these companies have constructed and pilot tested their machines or had their claims of lower cost of energy independently verified. Any consideration of VAWTs should be done under the assumption that it is a demonstration project and manufacturer claims are under evaluation. In the 25-year history of the wind energy industry, virtually every government-sponsored research program has examined this issue, multiple companies have designed and built prototype VAWTs, a small number of companies have built more than 20 machines, and none have been a commercial success. Given these reasons, VAWTs are not economically competitive with HAWTs and will not be considered in our site assessment on Guam.

Sincerely,



Sarah Meyer
Senior Project Coordinator

cc: Angelo Muzzin, R.W. Beck

J Description of Analysis Tools

STRATEGIST

INTEGRATED STRATEGIST AND OPTIMIZATION

Strategist is composed of multiple application modules incorporating all aspects of utility planning and operations.

Strategist has been the industry standard for integrated resource planning for more than 25 years. Users include municipalities, electric cooperatives, state commissions, consulting firms, and investor-owned utilities. Strategist is composed of multiple application modules incorporating all aspects of utility planning and operations. This includes forecasted load modeling, marketing and conservation programs, production cost calculations including the dispatch of energy resources, optimization of future decisions, non-production-related cost recovery (e.g. construction expenditures, AFUDC, and property taxes), full pro-forma financial statements, and rate design.

PROVIEW Module

Ventyx's PROVIEW Module utilizes a proprietary dynamic programming algorithm to optimally select and rank alternative resource plans based on 10 different objective functions (including minimizing utility cost and maximizing earnings per share). Resource alternatives are evaluated while also considering purchases from and sales to a spot energy market. PROVIEW can evaluate all types of supply and demand-side alternatives:

1. Supply Side Alternatives – hydro, storage, and thermal units; multiple types of power purchase and sales contracts; and transmission interface enhancements. In addition, refurbishment, repowerment, mothballing, and/or retirement of both existing and newly added resources can be modeled. Distributed generation and renewal resources (wind, solar, biomass, geothermal, etc.) can also be represented.
2. Demand-Side Resources – energy efficiency, load control, and demand-response resources can be represented. Examples include traditional demand-side resources, such as direct load control and efficient appliance rebates, as well as time-of-use rates and real-time pricing programs.

Differential Cost Effectiveness (DCE) Module

This Module calculates the benefit-cost (B/C) ratios for each supply and demand alternative against a base resource plan. The use of a base resource plan allows the DCE Module to identify the yearly marginal capacity and energy savings for each alternative. PROVIEW and the DCE Module use the same database to define the operational characteristics and costs of supply and demand alternatives, so that cost-effective options can be directly incorporated into a full optimization analysis in PROVIEW.

Load Forecast Adjustment (LFA) Module

Our Load Forecast Adjustment Module is a multi-purpose tool for modeling and modifying load forecasts and modeling Demand Side Management (DSM) programs. The LFA Module is used in conjunction with the Differential Cost Effectiveness (DCE) Module, PROVIEW, and other Strategist modules to evaluate DSM programs. Using the LFA, a strategic planner may address key issues related to future electricity

demand and impacts attributed to each customer group. Results from this analysis are automatically transferred to other Strategist modules to determine production costs, system reliability, cost-eff ectiveness of DSM initiatives, financing, and revenue requirements, and a variety of other indicators affected by loads.

Capital Expenditure and Recovery (CER) Module

The Ventyx CER Module provides detailed capital project modeling that is critical to accurately evaluating the economics of resource alternatives that require capital outlay. The CER can be used to model the entire capital budget of a utility company, or just the incremental capital projects associated with resource alternatives under evaluation using PROVIEW. Results from the CER Module are automatically transferred to PROVIEW, and to the Financial Reporting and Analysis (FIR) Module.

Financial Reporting and Analysis (FIR) Module

The Financial Reporting and Analysis Module provides a method of evaluating fi nancial and rate impacts of alternative construction programs, fuel cost scenarios, regulatory actions, and financial strategies. The FIR Module provides a sound structure for performing extensive analyses of the aff ects on a utility's financial condition of future inflation rates, interest rates, regulatory policies, and financial market conditions. The Class Revenue Module is a component of the FIR Module and provides for jurisdictional and customer class cost-of-service and rate projections consistent with the financial projection. The FIR Module is capable of efficiently producing planning studies in a short period of time, as well as providing the necessary detail to reflect the long-range financial structure of the company accurately.

Class Revenue Module (CRM)

Our CRM Module provides the capability to analyze long-range rate strategy and the implications of utility plans on customer classes. The CRM picks up where the jurisdictional logic in the FIR ends. All rate base and expense items that have been classified and allocated to the jurisdictions are subsequently allocated to the rate classes. Revenue requirements are then calculated to meet the target return-on-rate base. One or more rate classes may have user-input rates, allowing the rates for other rate classes to "float" in order to achieve a target return at the jurisdictional level. Additionally, the user has extensive flexibility in determining the actual structure of rates for each class, with varying proportions of expenses being recovered through the demand, energy, and customer charge portions of the total rate.

KEY BENEFITS

- Dynamic Programming Algorithm generates and evaluates all appropriate resource plans
- Evaluate the economics of resource alternatives that require capital outlay
- Analyze long-range rate strategy and its implications
- Multi-area resource optimization
- Quickly evaluate financial, rate, and shareholder impacts
- Minimize scope by reducing the need for external systems and spreadsheets
- Ensure data integrity through sound data integration
- Assess affects of market volatility on resource plans using Monte Carlo analysis

K Bibliography

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- **Consolidated Commission on Utilities**
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  Benigno Palomo, Vice Chairman-GPA
  Eloy P. Hara, Vice Chairman-GWA
  Gloria Nelson, Secretary
  Joana "Margaret" Castro Blas, Commissioner

- 29th Guam Legislature
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Office of Senator Lujan Representative
Village Mayors
Local and Off-island Vendors, Engineers, Consultants & Contractors
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