

**STAFF RESPONSE TO
LONG TERM ELECTRICAL
SUPPLY PLAN
QUESTIONS, ISSUES, AND
RECOMMENDATIONS**

**MADE IN NOVEMBER 2004
TO THE
GAINESVILLE CITY COMMISSION**

**PREPARED BY
GAINESVILLE REGIONAL UTILITIES
DECEMBER, 2004**

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EXECUTIVE SUMMARY

BACKGROUND

Gainesville Regional Utilities (GRU) began a community outreach program to develop a long term electrical energy plan in August of 2003, drawing on studies performed with City Commission authorization beginning September 2002. To date, there have been numerous community outreach meetings, presentations to civic, professional and other organizations, and City Commission Workshops and special meetings. Three special Commission meetings were held to summarize previous studies and follow-up from previous meetings. The focus of the first summary meeting September 30, 2004 was environmental studies, the focus of the second on November 1, 2004 was conservation and renewable energy, and the focus of the meeting November 15, 2004 was an analysis of the financial aspects of the proposed plan and the adequacy of staff's evaluations to date.

SOURCE OF RECOMMENDATIONS, COMMENTS AND QUESTIONS

At the November 15 meeting, the City Commission heard a presentation from the Alachua County Environmental Protection Department (EPD). Presentations were also made by the Alachua County Environmental Protection Advisory Committee (EPAC) and independent consultant, R.W.Beck. Comments about the long term electrical supply plan were made by members of the public at both the November 15 and 22 Commission meetings.

On November 23, 2004, GRU Staff, EPD, and EPAC each made presentations to the Alachua County Board of County Commissioners on GRU's proposed long term electrical supply plan. The County Commission unanimously voted to make certain requests of GRU at that time.

PURPOSE AND SCOPE

Staff has developed this document to provide responses to the questions, issues, and recommendations made in these various presentations and forums, as well as to provide supplemental information related to these responses. A major aspect of this supplemental information is contained in a report provided under separate cover. This report is entitled Supplementary Study of Generating Alternatives for Deerhaven Generating Station and was prepared by Black and Veatch for GRU in March of 2004. This report was used by GRU to develop estimates of biomass availability, the least cost way to utilize the biomass, and the cost of gasification and IGCC alternatives.

ADDITIONAL DATA AND NEW PLAN ELEMENTS

It should be noted that as a result of the feedback obtained, GRU staff have developed additional data and are proposing to add several new elements to its long term energy supply proposal.

Additional data developed as part of developing the responses contained herein include:

1. The sensitivity of the proposed plan to an alternative low case natural gas price forecast;
2. The sensitivity of the proposed plan assuming carbon taxes up to \$200/ton carbon (\$55/ton CO₂);
3. Additional PM_{2.5} air quality modeling using particle size distribution data suggested by EPAC;
4. An order of magnitude estimate of the reduction in non-point source particulate emissions resulting from the harvesting and use of forest waste products in a scrubbed, filtered process as compared to open air burning.

New elements that staff suggests be added to the proposed long term electrical supply plan are:

1. To begin monitoring ambient air particulate matter concentrations on a continuous basis if the decision is made to proceed with developing additional solid fuel capacity.
2. To establish a funding mechanism and process for obtaining additional local greenhouse gas offsets. These offsets can be obtained from a wide range of opportunities, including energy conservation, renewable energy, or carbon sequestration from any sector of our local economy, including transportation, residential, commercial, or industrial.
3. To establish a goal of meeting an additional 10% of the communities' electrical needs by 2012 through renewable energy and conservation in conjunction with an affirmative decision to proceed with the proposed project.



Alachua County Environmental Protection Department

Technical Review of Gainesville Regional Utilities Integrated Resource Plan
By

Alachua County Environmental Protection Department
Updated November 15, 2004

***Gainesville Regional Utilities Annotated Responses
December, 2004***

- ***The Gainesville City Commission and Gainesville Regional Utilities staff are grateful for the hard work and input from the Alachua County Environmental Protection Department and the Alachua County Environmental Protection Advisory Committee. This form of intergovernmental cooperation between professionals and citizens is a model that exemplifies the best of Alachua County's local government. Important questions and observations have been raised since the process began in August 2003, and addressing these has improved the planning process.***

1.0 Introduction

This report presents the findings of the Alachua County Environmental Protection Department's (ACEPD) technical review of the Gainesville Regional Utilities (GRU) Integrated Resource Plan (IRP) dated December 2003, and supporting technical reports provided by GRU. ACEPD reviewed the GRU information and public input presented during workshops with the Gainesville City Commission on December 15, 2003, March 10, March 22, April 19, October 30, and November 1, 2004 as well as the information presented at the joint meeting of the Alachua County Environmental Protection Advisory Committee (EPAC) and former members of the Alachua County Air Quality Commission (AQC) on February 16, 2004. Technical review assistance and supporting information was provided to ACEPD from local air quality control programs in Hillsborough County and Jacksonville experienced with the combustion technologies proposed by GRU and from Water & Air Research, Inc., an environmental consulting firm under contract to ACEPD. Technical assistance was also obtained from the Florida Department of Environmental Protection (FDEP), the US Environmental Protection Agency (USEPA), US Department of Energy (USDOE), and members of EPAC and the former AQC.

The focus of this review was on air quality and greenhouse gas impacts from the proposed GRU new power plant expansion. Future electrical needs projections, generating technology and energy conservation projections were also evaluated because these items can have a significant impact on the amount and type of fuel consumed and therefore on air pollution emissions. ACEPD's findings, recommendations and supporting information are presented below in the following sections:

1.0 Introduction

- 2.0 Electrical Generation Needs Projections
- 3.0 Natural Gas Options
- 4.0 Air Quality Issues
- 5.0 Emission Control Issues
- 6.0 Solid Waste Issues
- 7.0 Water Resource Issues
- 8.0 Greenhouse Gas Issues
- 9.0 Energy Conservation and New Technologies
- References

2.0 Electrical Generation Needs Projections

2.1 Findings and Recommendations -- Electrical Generation Needs Projections

Finding 1 --- Widely different GRU projections of future electrical generation needs in the IRP and recent Ten year site plans create some uncertainty about the amount of new local power generation needed, the type of generation technology that is optimum and the phasing of the additional power increments as compared to what GRU is proposing to build.

- *GRU changes its forecast annually to adjust for conservation plans and other economic factors. The forecasts vary by only a small percentage from year to year, and GRU has not had widely different projections of load growth as compared to existing generation capacity. This finding appears to be the result of mistaking the various options for solid fuel capacity that have been evaluated through time. Information to clarify this misconception is presented as comments inserted into the supporting information in Section 2.2*

Finding 2 --- Future local electrical generation projections in the IRP are based on supplying all peak load and reserve power from local generation sources. This may cause an overestimate of local generation needs, since peak demand loads occur for a very small number of hours annually.

- *The various alternatives evaluated to date are not based solely upon peak demands. GRU has to consider all aspects of electrical supply reliability, including fuel costs, base loads, peak demands, the age and condition of the generation fleet, and reserve margins. On February 9, 2004, the City Commission instructed GRU staff to develop local generation options to assure maximum reliability and local control of emissions.*

Recommendation 1 --- GRU should further evaluate and discuss the feasibility of supplying peak load and reserve power by purchases as compared to building excess local capacity.

- ***Purchased power agreements to provide firm capacity as well as energy have always been and will continue to be included as an alternative in GRU's long term energy supply studies. It must be remembered that purchased power prices are affected by transmission wheeling charges, additional energy losses that occur due to long distance transmission of electricity, and the excess revenue requirements of the provider. Although infrequent, power obtained from off-system is also subject to interruptions from transmission interruptions. If we proceed with our proposed plan, as part of our due diligence, we will issue an RFP for alternatives to our self build option.***

Recommendation 2 --- GRU should further evaluate feasibility of adding generation capacity in phases to provide greater flexibility in incorporating newly developing, less polluting technologies and to provide a more accurate estimate of future demand needs.

- ***GRU has evaluated phased capacity additions. There are substantial tradeoffs between unit size, cost per megawatt of capacity, and thermal efficiency. The smaller the unit, the higher the cost per megawatt and the lower the efficiency. Tradeoffs related to economies of scale are already included in GRU's proposed plan, which currently includes a smaller solid fuel unit rather than shared capacity in a much larger and lower cost unit. The proposed plan is robust under a wide range of customer forecasts and fuel prices as confirmed by an independent consultant, R.W. Beck.***

Recommendation 3 --- GRU should clarify whether all new planned additional conservation/demand reduction programs in addition to those proposed in the IRP have been taken into account in their projections of future load. Planned reductions should be factored in the projections prior to deciding on the amount and type of electrical generation needed.

- ***The additional conservation programs funded by the City Commission as part of the FY 05 Budget have been taken into account. On November 15, 2004, the Gainesville City Commission made a unanimous finding that the implementation of additional conservation programs will not eliminate the need for additional base load electric generating capacity in the 2011 timeframe. This decision was made after extensive review and input by the community and staff, including benchmarking against other electric utilities.***

2.2 Supporting Information

Widely varying estimates of need for adding local electrical generating capacity to meet projected local demand in the next two decades are presented in the GRU-IRP and in recent GRU Ten Year Site plans for the years 2002, 2003 and 2004. The differing estimates create uncertainty about the true needs and timing for additional local generating capacity.

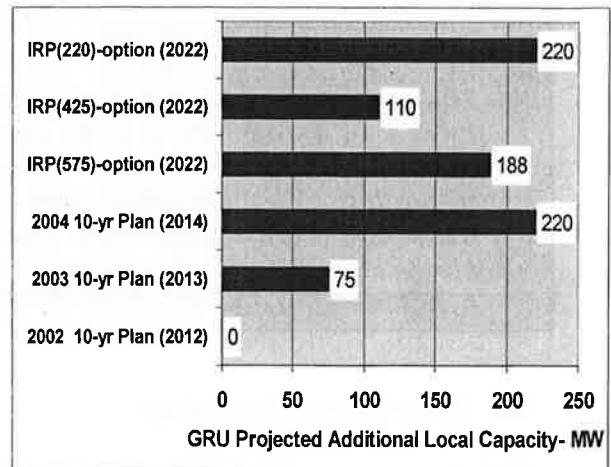
GRU uses a series of linear multiple regression models to forecast demand and energy consumption. In the 2002 Ten-Year Site Plan, GRU found no need for expansion of their generation capacity. The Florida Public Service Commission in its "Review of 2002 Electric Utility Ten Year Site Plans" looked at current and future generation capacity of state utilities on a statewide basis. The data in this PSC document shows forecasted reserves for each generating utility in Florida. GRU is the only generating utility to receive the comment "far exceed" for the amount of reserves available to meet future demands through the year 2012.

The projections in the GRU 2003 Ten-Year Site Plan show possible loss of a required 15% reserve margin in generating capacity in about 2010. The 2003 Ten-Year Site Plan proposes to meet this need by installing a 75MW combustion turbine at the Deerhaven site. The unit would use natural gas as the primary fuel, with distillate oil as a backup fuel. Construction was planned to begin in 2006 for commercial service by May 2010. Based upon their own analysis and recommendations of a Stone & Webster study referenced in this 2003 plan, there was no reason to retire any currently operating generating units prior to 2012.

- ***The 2003 Ten-Year Site Plan (TYSP) was the first time this standardized report to the Florida Public Service Commission (FPSC) extended far enough into the future (10 years) to include a projected reserve margin shortfall in the very last year of the report. GRU foresaw the need for additional generation and had already obtained approval from the City Commission in September 2002 to participate in some base planning studies with other municipal utilities that would be integrated into a resource planning study. Submittal of a TYSP in April 2003 without a solution to meet the reserve margin shortfall would have been deemed insufficient by the FPSC. Accordingly a nominal 75 MW combustion turbine was cited pending a full integrated resource plan study, which has since been completed.***

Evaluation of GRU summer peak load projections presented in the December 2003 GRU- IRP which explores alternatives to meeting requirements through 2022 shows that another addition of approximately 75 to 100 MW may be needed somewhere between 2015 and 2017. However, the December 2003 GRU-IRP and subsequent documents from GRU say that due to increasing demands for electricity, the need to retire older generating units, and the need for cost effective "baseload" capacity, a new solid fuel-fired unit approximately the same size as the existing coal-fired unit Deerhaven 2 (DH2) is needed. The proposed unit would use circulating fluidized bed technology to burn coal, petroleum coke, and other solid fuels. It appears that the proposed unit would be similar to the two 300 MW circulating fluidized bed units currently operated by Jacksonville Electric Authority. The reason for the sudden change in the magnitude of local electrical generation needs and the increased focus on a coal fired generating unit is not presented in the GRU documents.

Figure 1 – Recent Electrical Power Needs Projections by GRU



- ***See comment above. The data in Figure 1 are taken out of context without including the other components of the alternative plans evaluated, which included components of gas fired and purchased power in addition to solid fuel capacity, and are therefore misleading.***

In a February 2003 draft report by R.W. Beck, Inc. titled, "Pre-Feasibility Study Report--Public Power Solid-Fueled Power Plant Project", a report sponsored by five publicly owned utilities including GRU, an evaluation of possibly building a large local coal fired generating plant was performed. The study had as its major objective increased fuel diversity among the generating resources of the sponsoring utilities, who felt too much of the group's generating capacity was based on natural gas. As part of the study, candidate sites for a new solid-fuel power plant were solicited from the sponsors for evaluation. GRU's Deerhaven generating plant site was the only existing power plant site offered along with several so-called "greenfield sites" for evaluation. The nominal plant judged to be needed by the group was a 425 MW unit to meet a 106.25 MW need by GRU and a 318.75 MW need by the other participants by 2022. The site selected had to be capable of expansion to 850 MW. The conclusions of the study were that supercritical or subcritical pulverized coal technology appeared to be competitive technologies and that the Deerhaven site was the preferred location for execution of this project.

In Table 3 of the December 2003 GRU-IRP Executive Summary (presented on December 15, 2003 to the Gainesville City Commission), GRU presented options for a 557 Megawatt (MW) and a 425 MW coal plant. While GRU has since dropped these larger coal fired options from consideration, it could be implied from the electrical power share available to GRU from these two proposed options that additional baseload capacity increase in the range of 110 MW to 188 MW would have been sufficient to meet local needs through the year 2022. It should be noted that the 110 MW share is consistent with the local share needs from the earlier pre-feasibility study of approximately 106 MW. GRU also presented a 220 MW CFB coal fired generating option, which is still being considered. The 220 MW CFB plant option will provide significantly more generation capacity than the community will need when it is proposed to go on line in 2010-2011 and projections are that it will continue to be more than is needed to meet peaks and reserve margin requirements even in 2022. GRU (IRP Executive Summary Page 4) does in fact indicate that the 220 MW option is significantly more than is needed for the local service area and intends to sell the excess power until local needs grow to use more of this generating capacity.

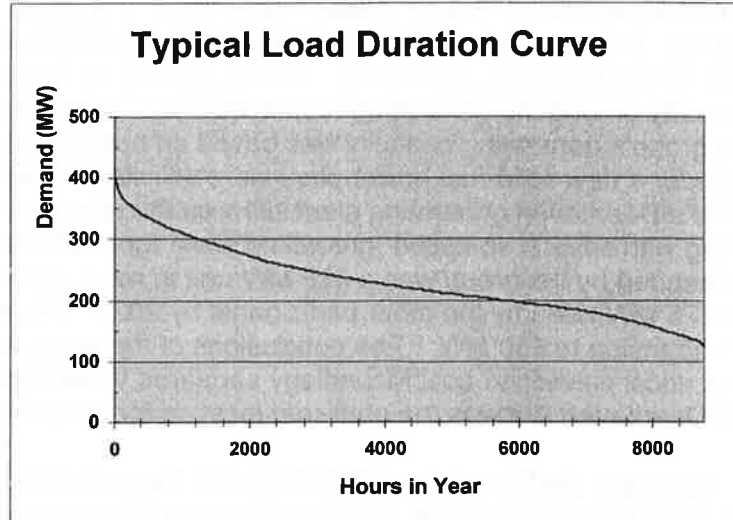
- ***It should be noted that pursuant to direction of the City Commission on February 9, 2004, the currently proposed CFB sacrifices economies of scale to provide a small enough unit to be solely owned by the City of Gainesville that can accommodate the widest range of fuels possible and be locally sited. The IRP notes that the 220 MW option is not fully needed to serve local needs when it would first come on line, but by 2020 all of the capacity would be needed to meet local requirements, due to retail customer growth. When optimizing the selection of various types and sizes of options, no consideration for the ability to market this excess capacity was taken into account. GRU does plan to market any excess capacity for the benefit of our customers. This approach is common in the industry and is the manner in which Deerhaven 2 was handled.***

Projections of future needs for new local electrical generation capacity in the IRP appear to be based on supplying all peak load power and reserves from local generation sources.

An analysis of the time duration of GRU peak power needs during the year, a load duration curve, will reveal how many hours in a typical year GRU actually needs the peak power. Review of load duration curve data provided by GRU indicates that local demand exceeds 90% of peak power loads for less than 75 hours per year.

Figure 2. (Reference 12)

Typically, a load demand curve (Figure 2) with particularly steep slope at the high demand end (high load for a short percentage of time) indicates peaks are only occurring for a small number of time intervals. A flat curve in this region (more of a constant load) indicates the peaks occur over a substantial number of time intervals. If extra power is needed for only a few days a year it is obvious that purchasing power to meet the peaks will be much cheaper than building and operating new capacity. On the other hand, if peaks extend over several months in a year, a new plant may well be worth the investment. The “peakiness” may also influence the type of plant that should be added to the system. GRU should further clarify feasibility of supplying portions of total load demand from outside sources by purchases as compared to building excess local capacity.



- ***The above analysis is an incomplete depiction of how generation planning is performed. GRU has to consider all aspects of electrical supply, including reliability, fuel costs, base loads, peak demands, the age and condition of the generation fleet, and reserve margins. The various alternatives evaluated to date are not based solely upon peak demands and we have discussed these various factors many times over the last year.***

GRU indicates that its long term peak power demand projections have been reduced by the implementation of various proposed conservation and demand side management programs described in the IRP and the 2004 Ten Year report. These programs appear to reduce summer demand by 7 MW from 2003 levels when fully implemented in 2013. The demand reduction from these proposed programs appear to have a minimal effect on reducing the projections for baseload power in the future. GRU should clarify that the maximum load reduction which could result from implementing more demand side management or energy conservation programs including the programs which could result from GRU's recent solicitation of demand reduction projects have been factored into the GRU load projections prior to deciding the magnitude or type of future local electrical generation needs

- ***The additional conservation programs funded by the City Commission as part of the FY 05 Budget have been taken into account. The above analysis fails to mention the aggressive conservation programs GRU has had in place since 1980, the***

Gainesville Urban Areas' ranking of having the lowest electric use of any urban area in Florida and the generation capacity that has already been avoided. On November 15, 2004, the Gainesville City Commission made a unanimous finding that the implementation of additional conservation programs will not eliminate the need for additional base load electric generating capacity in the 2011 timeframe. This decision was made after extensive review and input by the community and staff, including benchmarking against other electric utilities.

On page M-5 of the GRU IRP in the section titled "Sensitivity to Forecast Assumptions" it is stated that 100-120 MW of solid fuel capacity is recommended in 2010, with "options on an additional 100MW of capacity through 2022". It does not state that this additional 100 MW capacity through 2022 needs to be coal fired capacity. If additional capacity is truly needed in the future after an aggressive demand reduction program has been implemented, alternatives to adding coal or pet coke based capacity could include purchasing power from other utilities, the possible upgrade of Deerhaven 1 (DH1) to combined cycle operation (which GRU indicates could generate an additional 150 MW) and use as a "baseload unit", greater utilization of the upgraded Kelly combined cycle plant, the utilization of additional biomass fuel or the addition of additional natural gas combustion turbine units thereby reducing the reliance on coal and its associated increased emissions. These options may need to be further evaluated by GRU. If in fact the increase in capacity is performed in a staged manner (say adding 75 MW of capacity in 2010 and, if needed, adding additional capacity in 2016), there would be a better estimate of actual growth trends at that time and also there would be more flexibility to take into account future emerging less polluting technologies as there are developed in the next few years rather than committing to a much larger coal plant now.

- ***The above analysis is taken out of context, and incorrectly depicts the document it is describing. The re-powering of the primarily gas-fueled Deerhaven 1 into a combined cycle unit was originally evaluated as part of the study that led to re-powering the Kelly unit, and the engineering cost opinion was updated for the 2004 IRP. The repowering of Deerhaven 1 was found not to be cost-competitive compared to other options. GRU recognizes the risks associated with committing to a larger sized unit, and has addressed these risks with a thorough sensitivity analysis of a wide range of fuel prices and forecast scenarios. We met and discussed these issues with outside financial council and bond rating agencies. An independent review by R.W. Beck presented to the City Commission on November 15, 2004 found GRU's approach to this analysis appropriate and the proposed plan to be robust (lowest cost under the widest range of scenarios).***

Population growth forecasts for Alachua County as a whole and not population increases in the actual GRU service area were used as one of the key factors in the electrical power demand forecasts presented by GRU at the March 10, 2004 City Commission Workshop on Future Electrical Needs. The actual GRU service area population is a fraction of the total County population. The GRU service area is much closer to full development than the remainder of Alachua County. Relying on the population growth in Alachua County as a whole could overestimate future electrical demand in the GRU service area because a larger percentage of future population growth may occur outside this service area.

- ***Current land use policies promote infill to avoid urban sprawl, and the infill potential for both the incorporated and unincorporated areas of the Gainesville Urban Area is very substantial. Also keep in mind that non-residential electrical***

use is about half of the total used in Gainesville, and tends to be concentrated in the more urbanized areas. GRU's forecast of residential customer growth uses the University of Florida's Bureau of Economic and Business Research's Alachua County population estimates and forecasts as an input variable, together with other factors such as household size, etc., in models that empirically adjustment for differences in the rate of GRU customer growth versus county population.

3.0 Natural Gas Options

3.1 Findings and Recommendations -- Natural Gas Options

Finding 3 --- The use of cleaner burning, efficient, natural gas fueled combined cycle combustion turbine (CCCT) technology as "baseload" generation at higher capacity factors could be further considered and evaluated by GRU. Operation costs for CCCT generation are lower and more cost competitive at higher capacity factors. Higher operation costs of CCCT technology may be partially offset by lower pollution control costs.

Recommendation 4 --- GRU should further evaluate natural gas fired CCCT technology operated at higher capacity factors as "baseload" generation and not only as "intermediate" generation as an alternative to adding more coal fired capacity. This option should be considered also with the retrofit of DH2.

- *In response to Finding 3 and Recommendation 4, GRU has considered a wide range of CCCT technologies as presented in planning documents and during public presentations. GRU's planning methodologies do include potentially high capacity factors for CCCT units. Figure 4 of this report does not include all the planning criteria and methodologies employed by GRU. The voluntary Deerhaven 2 retrofit portion of GRU's proposed plan is also designed to meet potential new regulations. Accordingly, GRU does not recommend a lower cost emission control scenario for the Deerhaven 2 retrofit.*

Recommendation 5 --- GRU should further evaluate converting the existing DH1 natural gas fueled steam generating plant to CCCT technology and use of this plant as more of a "baseload" unit to meet part of the anticipated future demands as an alternative to a solid fuel plant.

- *GRU has invested in engineering studies to determine the feasibility of converting the existing DH1 natural gas fueled steam generating plant to CCCT technology. See Table L-1 of the December 2003 IRP document. This alternative was not found to be cost effective.*

Finding 4 --- Building the proposed CFB coal plant would significantly shift the mixture of fuels used to generate electricity in the local community in 2013 and beyond in favor of coal or solid fuel (91% versus 64% currently) which will result in more environmental impacts and potentially less flexibility in generation options.

- *GRU's current percentage of coal use is substantially lower than in prior years, especially in comparison to the 1982 time frame when Deerhaven 2 first came on-line. This is because of customer growth and the fact that our customers are now using all the available electricity produced by Deerhaven*

2. GRU's 2004 Ten-Year Site Plan reported all solid fuels under the category "Coal, however GRU has proposed up to 30 MW of renewable energy in the form of waste wood, representing approximately 8% of total electrical production by 2012, thus 83% would be the correct statistic for our coal and petroleum use in 2013.

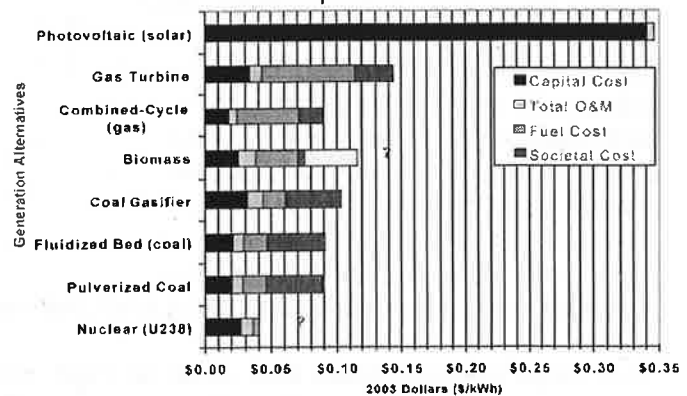
3.2 Supporting Information

Greater consideration should be given by GRU to the use of additional natural gas fueled combined cycle combustion turbine (CCCT) generating capacity as a viable option for meeting future electrical needs. Natural gas would be significantly cleaner than coal technology in terms of its environmental impacts. The comparison of societal and economic costs for combined cycle gas generation versus circulating fluidized bed (CFB) coal generation as presented in **Figure 3** shows that combined cycle (CCCT) and fluidized bed (CFB) generation options have equal economic and societal costs.

- **GRU has presented alternative plans to the City Commission consisting of nothing but natural gas fired capacity. Instead of approximately a 60% reduction in regulated emissions from the proposed plan, an "all gas" plan would result in a 74% reduction. The contribution of GRU's current generation operations to ambient air concentrations is already slight, and the additional reduction from an "all gas plan" would not be detectable. When half a billion dollars net present value additional cost for electricity over the life of the proposed new capacity, it is clear that the solid fuel unit is the best choice.**

In Table I-5 of the IRP, the CCCT natural gas option is rated lower than coal for "reducing local emissions". This is inconsistent with the fact that natural gas generation has inherently lower emissions than coal. It appears that GRU assumed the retrofit of DH2 with additional pollution controls in the CFB coal evaluation but did not consider the retrofit of DH2 in evaluating the CCCT natural gas option. This option should be more fully evaluated and considered.

Figure 3 (from GRU-IRP Fig I-3)
Societal and Generation Costs for Selected Options



- **The analysis performed by GRU in response to questions during the public outreach process and documented in the December 2003 Planning document did not include the retrofit of Deerhaven 2 for any of the options. What this screening analysis demonstrated is that even after using the highest externality costs for NO_x, SO₂, particulate matter, and carbon dioxide imposed by any regulatory agency or state in the USA, the cost of the fuel outweighed the cost of the externalities (a carbon dioxide cost of \$40 per ton was applied).**

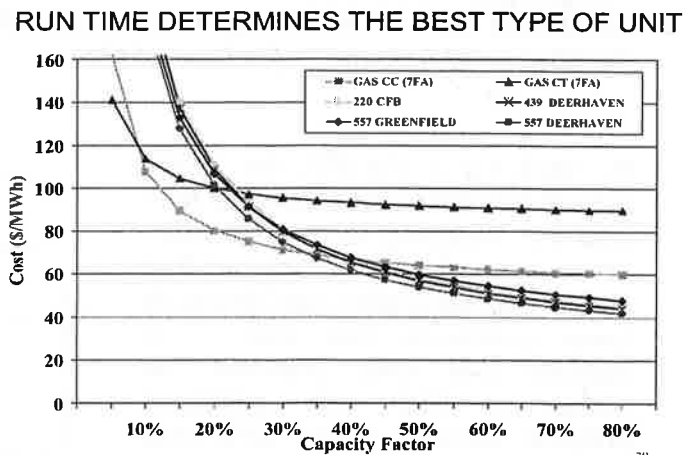
In the economic factor evaluation in Table I-5 of the IRP, a coal fired plant at Deerhaven is rated as “best”, while a CCCT (natural gas) plant is ranked as “good”. This ranking may be influenced by the assumption that a new CCCT unit would be used as an “intermediate” unit with capacity factor of about 40% versus the use of the CFB coal/petroleum coke fired unit as a “base load” unit with a capacity factor of around 80%. Although CCCT units are typically used as intermediate units, some electric utilities (TECO, for example) are using them as base load units with higher capacity factors.

- **The economic factor evaluation in Table I-5 was a qualitative assessment employed for public discussion purposes. Final optimization studies all included natural gas CT and CCCT options at various sizes, and the generation planning software employed by GRU did not constrain the run times (capacity factors) for the alternative options. A key feature of any combustion turbine is that its maintenance outage times and costs are very sensitive to run time and much more significant than for steam units, given that the turbine blades are subjected to the extreme conditions of combustion, unlike steam turbines.**

Operational costs are dependent upon run time or capacity factors. If one assumes that GRU operates a natural gas powered CCCT as a baseload unit with a capacity factor similar to the existing DH2 and the proposed CFB plant (70% to 85%), then the costs per MWh (Figure 3) for both technologies are relatively close (approximately \$50/MWh for CFB and \$60/MWh for CCCT(CC7FA)).

Although the operational cost for using a CCCT is more than that of a equivalent coal fired unit, the emissions reductions in NO_x, SO₂ and PM that could be achieved by building a CCCT unit instead of a CFB unit are considerable. Reduced costs for additional pollution control equipment on a coal plant could possibly offset some of the increased fuel costs for a CCCT plant. Natural gas prices may also be more competitive with coal/pet-coke prices in the future due to increasing supply and possible carbon taxes on coal. These factors may make the construction of a CCCT plant a more cost feasible option. This approach should be further evaluated and considered by GRU.

Figure 4 (Slide 39, 12-15-03 GRU Presentation)



- **This slide demonstrates that even at high capacity factors, CCCT alternatives are more expensive to operate. The voluntary Deerhaven 2 retrofit portion of GRU's proposed plan is also designed to meet potential new regulations. Accordingly, GRU does not recommend a lower cost emission control scenario for the Deerhaven 2 retrofit.**

Table L-1 of the GRU- IRP indicates that re-powering of DH1, a natural gas and distillate fuel simple cycle steam turbine plant, through conversion to a combined cycle combustion turbine (CCCT) plant has the potential to generate an additional 150 MW of additional

capacity due to the significant efficiency improvements from the new combined cycle technology. The literature indicates that conversion of older natural gas plants to combined cycle operation is being seen as increasingly cost effective by utilities due to the substantial increases in generating efficiencies. This option, which appears to have the potential to meet all or a significant percentage of the future electrical demand, appears not to have been fully discussed in the GRU-IRP in terms of economic feasibility and environmental advantages. On the contrary, it appears that GRU may be planning less natural gas usage in the future and more use of coal as indicated in the IRP on page 4 of the Executive Summary where it is stated that an additional CFB coal plant may be considered after 2022 to replace the DH1 gas burning plant. This would increase significantly the utilization of solid fuel with resulting increased pollution.

- ***GRU has invested in engineering studies to determine the feasibility of converting the existing DH1 natural gas fueled steam generating plant to CCCT technology. See Table L-1 of the December 2003 IRP document. This alternative was not found to be cost effective.***

Estimates of future costs and availability of natural gas supplies made by US Department of Energy (DOE) in its "Annual Energy Outlook 2004" report of January 2004 appears to indicate that increasing liquefied natural gas supplies will be available in the period to 2025 that will lessen the cost increases projected for natural gas. In the GRU 2003 Ten Year Site Plan, natural gas prices are projected to increase 3.8 % per year, while in the GRU 2004 Ten Year Site Plan natural gas prices are projected to increase 3.1% per year. This seems to indicate that natural gas prices may not consistently increase at the rate projected by GRU. While the future costs for coal in the DOE and the GRU report show that natural gas will still be the more expensive fuel, future regulation of carbon dioxide such as carbon taxes could add significantly to the price of coal and make natural gas more competitive. Information from the FDEP indicates that there will be a substantial amount of new natural gas fuel electrical generating capacity in the state of Florida during the period from 2003 to 2025. This excess capacity may significantly improve the availability and cost of electrical power that can be bought by GRU to meet local needs.

- ***DOE's Annual Energy Outlook is the source of GRU's fuel price forecast, and the rapid expansion of LNG imports to supplement domestic supplies of natural gas (methane) has been taken into account. LNG is a very expensive and energy intensive process that requires substantial capital investment and fuel to freeze gaseous methane into a liquid. GRU is a member of a utility association that is actively engaged in attempting to secure LNG as a fuel price hedge. The analysis of fuel price growth rates above is premised on the assumption that rate of growth is the only factor involved in fuel price forecasts. The starting and ending points are also critical, and affect the apparent rate of growth enormously. One thing that GRU is certain of is that any fuel price forecast is uncertain, so upper and lower ranges, designed to encompass a 95% confidence limit were used in GRU's optimization studies.***

In the 2004 Ten Year Site Plan (Schedule 6.2), GRU is projecting that in the 2013, after the construction of the proposed 220 MW CFB coal-fired power plant, coal or solid fuel would comprise about 91% of the energy utilized to generate power and natural gas would go down to approximately 6%. This compares to a percentage of about 64% coal and 21% natural gas in 2003. While there may be cost advantages to using more coal over natural gas to generate the bulk of the power needs, there will be an environmental

disadvantage to the local community in using more coal with its higher emissions instead of natural gas with its inherently lower emissions. The greater dependence on coal would also reduce the diversity in fuel sources and will restrict flexibility if there are cost increases for coal or if cleaner technologies become available in the future.

- **GRU's current percentage of coal use is substantially lower than in prior years, especially in comparison to the 1982 time frame when Deerhaven 2 first came on-line. This is because of customer growth and the fact that our customers are now using all the available electricity produced by Deerhaven 2. GRU's 2004 Ten-Year Site Plan reported all solid fuels under the category "Coal, however GRU has proposed up to 30 MW of renewable energy in the form of waste wood, representing approximately 8% of total electrical production by 2012, thus 83% would be the correct statistic for our coal and petroleum use in 2013.**

4.0 Air Quality Impacts

4.1 Findings and Recommendations – Air Quality Impacts

- **Findings 5-8 do not address the implications of GRU's proposed projects on ambient concentrations of SO₂, NO_x, PM₁₀ and PM_{2.5}. A document entitled Planning Study Of The Effects Of Gainesville's Long Term Electrical Energy Supply Plans On Ambient Air Quality And Greenhouse Gas Emissions summarizing GRU's many ambient air quality studies was unanimously referred to the Alachua County Board of County Commissioner on September 30, 2004 by the Gainesville City Commission. This report's findings demonstrate that:**

- 1. Alachua County's air quality is well within standards created to protect public health and safety,**
- 2. GRU's current operations, at their point of highest impacts, contribute only a very small portion of ambient concentrations, and**
- 3. GRU's proposed plan will further reduce ambient concentrations of SO₂, NO_x, and PM_{2.5}. GRU's contribution of PM₁₀ will slightly increase from 0.10% to 0.14% of Florida Ambient Air Quality Standards.**

Finding 5 — Proposed federal regulations may require reduction of emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x) and mercury from the current DH2 coal-fired power plant or the purchasing of emission credits regardless of whether a new plant is constructed. However this is not definite.

- **GRU is monitoring these regulatory issues very closely.**

Finding 6 — The retrofit of the current DH2 coal burning plant with the proposed additional pollution control will reduce emissions of SO₂, NO_x, particulates (PM₁₀) and mercury and will likely reduce fine particulate (PM_{2.5}).

- **GRU is willing to commit to these investments on a voluntary basis as part to the proposed plan.**

Finding 7 — Assuming the retrofit of DH2 with additional pollution control, the further addition of a new CFB coal/pet coke power plant will offset (reduce) a

portion of the emission reductions obtained from the retrofit of DH2 by increasing emissions of PM₁₀, SO₂, NO_x, Mercury, PM_{2.5} and volatiles.

- ***As documented in "Planning Study of the Effects of Gainesville's Long Term Electrical Energy Supply Plans on Ambient Air Quality and Greenhouse Gas Emissions", GRU, September 30, 2004, there will still be a 70% overall net reduction permit to permit for SO₂, NO_x, and total PM. Mercury is not regulated, so a permit to permit comparison is not possible. In comparing current actual emissions (which are less than the levels permitted) to expected emissions from actual operating conditions, there will be 60% reductions SO₂, NO_x and a 70% reduction of mercury. PM₁₀ will increase slightly, even though PM_{2.5} concentrations in ambient air will be reduced. Substantial decreases in secondary PM_{2.5} formation can be expected due to the significant decreases in SO₂, NO_x emissions from DH2, which are precursors to PM_{2.5} formation.***

Finding 8 --- Total SO₂, NO_x and Mercury emissions from the combined DH2 retrofit and new CFB plant will be less than current emissions from DH2 alone but particulate emissions (PM₁₀) will be higher as possibly primary PM_{2.5}.

- ***There will be a slight increase in PM₁₀ emissions but a net reduction of PM_{2.5} concentrations in ambient air. The substantial reduction in PM from collecting and burning biomass in a controlled environment as proposed, instead of open burn which is the usual fate of the biomass GRU intends to use, should result in overall lower PM in Alachua County's air.***

Finding 9 --- Increased PM emissions from the substantial increase in coal and petroleum coke handling operations at the Deerhaven site are not addressed.

Recommendation 6 --- GRU should evaluate and quantify impacts from increased particulate emissions from coal and petroleum coke handling operations.

- ***In response to Finding 9 and Recommendation 6, fugitive emissions from GRU's current coal handling and dust control operations have been estimated as part of GRU's Title V air operating permit, and have been found to be small compared to emissions from combustion. Fugitive emissions from proposed operations can only be estimated from a completed preliminary conceptual design. GRU is committed to minimizing fugitive dust.***

Finding 10 --- Maximum mercury deposition from the current DH2 coal plant in the near vicinity of the Deerhaven site are potentially much higher than the presented average mercury deposition on the entire Santa Fe River Basin.

- ***GRU's consultants have suggested that the average over the watershed is a more meaningful comparison.***

Finding 11 --- PM_{2.5} modeling results did not consider short term impacts which are most important to assessing potential health effects. The reliability of input data for the PM_{2.5} modeling for the current DH2 plant is of concern.

Recommendation 7 --- GRU should reevaluate the PM_{2.5} modeling studies and input data for the model and provide additional information on current and future projected short term (24 hour) maximum impacts of PM_{2.5} from DH2 and the future CFB plant.

- *In response to Finding 11 and Recommendation 7, GRU has performed worst case short term modeling of PM_{2.5} under anticipated permit limits, which would allow greater emissions than GRU expects. At permit limits, PM_{2.5} would be decreased by the proposed project. GRU is unaware of any study or modeling methodology to assess the potential health effects of particulates at the low levels of GRU's power plant emissions and resultant ambient air impacts. At the maximum point of impact, GRU's combined short term impacts contribute less than 3% of the ambient air quality standard. Emissions data for DH2 employed for GRU's particulate dispersion modeling were collected and developed by researchers at the University of Florida (Lundgren, and Wu). In general, site-specific data is preferable to data which has been derived by averaging data from multiple sites with different fuels, control equipment and control efficiencies such as that in AP-42. GRU will rerun the CALPUFF model using AP-42 data to evaluate the significance of this difference. Once a preliminary design is completed, air modeling as required by the permitting process will have to be done again to reflect that specific design. GRU is interested in collaboration between local experts to develop the best possible data to use at that time.*

Recommendation 8 --- GRU should install and operate continuous PM_{2.5} monitoring stations in local areas where modeling predicts maximum impacts will occur if a new coal/pet coke generating plant is built.

- *If GRU is authorized to proceed with developing its proposed plan for additional solid fuel capacity, GRU is willing to recommend this expense to the City Commission.*

Finding 12 --- Combustion of petroleum coke produces more carbonaceous fine particulates than coal which may be a concern in the high sulfur environments associated with burning petroleum coke. Petroleum coke also contains high amounts of vanadium and nickel metals.

Recommendation 9 --- GRU should provide additional information addressing potential concerns associated with carbonaceous fine particles in a high sulfur environment and the control and impacts of high metals in petroleum coke.

- *With regard to Finding 12 and Recommendation 9, GRU has requested the source of the information indicating that the particulate matter from petroleum coke is more carbonaceous and problematic than from other solid fuels. CFB technology as proposed by GRU is ideally suited to the combustion of petroleum coke and the resulting ash is relatively low in carbon. Many of the concerns expressed in this report derive from combustion of petroleum coke in non-CFB boilers. CFB boilers have a limestone combustion substrate, which mitigates sulfur, metals, and pH concerns.*

4.2 Supporting Information

USEPA has determined that many of the critical federal Clean Air Act of 1990 objectives can be met by reducing sulfur dioxide, nitrogen oxides, and mercury emissions from fossil fuel fired electric generating units.

The EPA Clean Air Interstate Rule (CAIR), currently in a proposed stage with a target adoption date near the end of 2004, would establish permanent caps significantly reducing emissions of nitrogen oxides (NO_x) and sulfur dioxide (SO₂) in the eastern United States. Individual electrical generating units would either install pollution reduction equipment on generating units that do not meet the new emission caps or will be allowed to purchase offset credits from other utilities.

EPA is also committed to regulating and reducing power plant mercury emissions and is on track to issue the Utility Mercury Reductions rule by March 15, 2005. The Utility Mercury Reductions rule would permanently cap emissions from coal-fired power plants and provide companies with flexibility to achieve early reductions of mercury. EPA proposed two alternatives for controlling mercury. One approach would require power plants to install controls known as "maximum achievable control technology" (MACT) under section 112 of the Clean Air Act. If implemented, this proposal would reduce nationwide mercury by about 30 percent by early 2008. A second approach proposed by EPA would create a market-based "cap and trade" program that, if implemented, would reduce nationwide utility emissions of mercury in two phases. Phase 1 is expected to result in reductions similar to the MACT reductions. Phase II reductions will be on the order of 70% below current levels.

It is expected that the State of Florida will participate in CAIR and mercury cap and trade programs and employ EPA's model rule methodologies of providing allowances to each power plant based on their annual baseline heat input related to the total for the state in allocating nitrogen oxides and mercury allowances. Sulfur dioxide allowances will likely be based on a percentage reduction from the existing Acid Rain Program. It is expected that DH2 coal-fired plant will be required to participate in this program. GRU could attempt to meet the new requirements for SO₂, NO_x and mercury emissions on DH2 through actual reductions by installation of pollution control equipment or the purchase of credits on the open market.

➤ **GRU agrees with this summary.**

GRU has expressed the intent in the IRP to reduce emissions at DH2 before buying credits. This intent should be made a more firm commitment by GRU, especially considering the possible changes in what the state and federal regulations will require to address emissions and the potential to purchase credits. By 2012 if GRU decides to implement actual reductions in emissions rather than use offsets or credits to meet the new rules on the current DH2, a 50% reduction in SO₂, 65% reduction in NO_x and 45% reduction in Mercury emissions would be required. Phase 2 requirements are almost a 70% reduction in sulfur dioxide, nitrogen oxides, and mercury in about 2018 to 2020.

If the new 220 MW coal/pet coke plant is built including the retrofit of DH2, the Phase 1 emission caps will be met for SO₂ and NO_x but the mercury caps may not be achieved and may require offsets. In Phase 2, the proposed project with the new coal/petcoke

plant and the retrofit of DH2 will not achieve the new emission caps for mercury, SO₂ and NO_x and will require the application of additional technology or the purchase of credits.

- **The above synopsis is incorrect, the only parameter that GRU might have difficulty complying with in phase 2 is SO₂ and possibly NO_x, although its outcome depends on the final version of the rule. GRU has included a detailed assessment of strategies to address proposed regulations in the report entitled *Planning Study Of The Effects Of Gainesville's Long Term Electrical Energy Supply Plans On Ambient Air Quality And Greenhouse Gas Emissions*.**

The proposal to add a 220 MW coal/petcoke fired power plant will add a major new air pollution source to Alachua County. If GRU were to install the proposed emission controls on the coal fired DH2, air quality would be improved by reductions in SO₂ and NO_x and PM. Installing a new additional coal/petcoke unit at Deerhaven will increase the pollution levels again but the total emissions of SO₂ and NO_x and PM will still be less than those of the current DH2 plant. **Figures 5, 6 and 7** show the estimated changes in SO₂, NO_x, PM₁₀ and Mercury emissions projected for the future controlled DH2 and new CFB plant.

Figure 5. Estimated SO₂ and NO_x emissions from Future Controlled DH2 and CFB

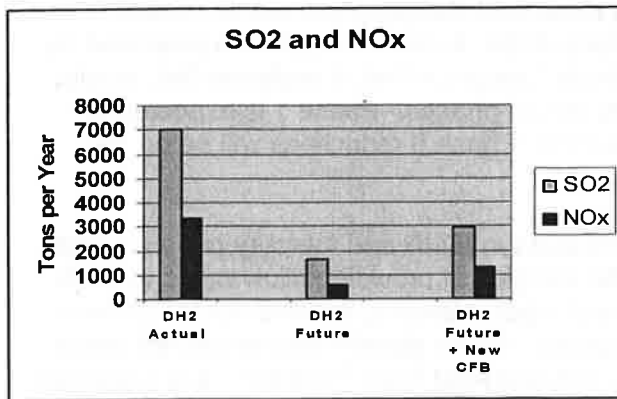


Figure 6. Estimate Particulate Matter (PM₁₀) emissions from Future Controlled DH2 and CFB

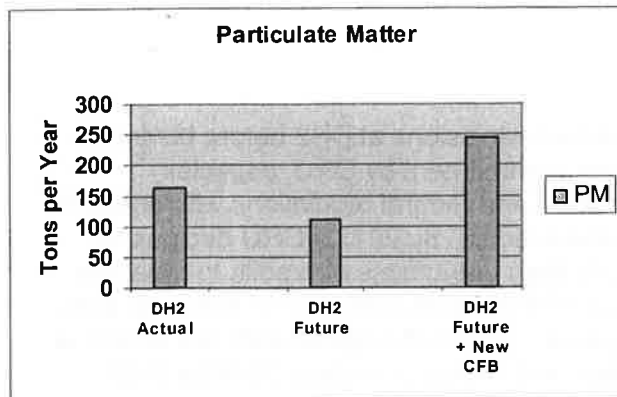
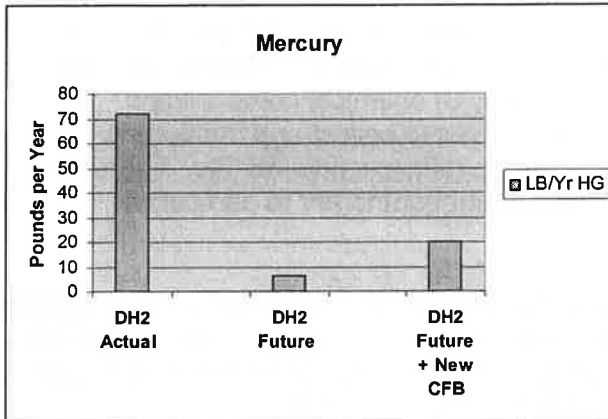


Figure 7. Estimated Mercury Emissions from Future Controlled DH2 and CFB



- ***Under the proposed plan, GRU will voluntarily commit to install emission controls on Deerhaven 2 as part of an overall expansion project to capture economies of scale (construction and operation cost savings) by combining the retrofit with the construction of a new unit.***

It is also not unreasonable to speculate that there will be legislation over the next five to ten years to limit carbon dioxide emissions. Senator Jefford's bill is under active consideration at this time. Such regulation will increase the cost of using high carbon fuels such as coal and petroleum coke in electric generating units. A possible result of such legislation is that the coal-fired unit at Deerhaven may need to be upgraded to allow combustion of natural gas or some form of renewable fuel. These increased carbon taxes or costs may also significantly effect the cost for electricity generation using the proposed 220 MW CFB plant.

- ***Carbon constraints will apply to all fuel types, although coal and petroleum coke have more carbon per unit of heating value than natural gas. Under all scenarios evaluated, even up to \$200/ton of carbon, the cost of carbon taxes does not outweigh the fuel cost savings.***

Particulates: Table 3(N-3) of the IRP indicates that with the construction of a new 220 MW CFB plant burning a fuel of 50% coal/50% petroleum coke and the retrofit of the existing DH2 plant with additional pollution controls, the total NO_x and SO₂ emissions will be reduced as compared to the current emissions from DH2. These seem to be reasonable assumptions for these technologies. However, Table 3 and Table J-7 of the IRP indicate that particulates (PM₁₀) will increase by 52% over actual current emissions from DH2 (an additional 84 tons/ year). The June 2004 Air Quality Impact Modeling studies prepared by Black and Veatch for GRU confirms that average annual maximum total particulate levels will increase with the addition of an new 220 MW CFB plant.

- ***In reality, we are already doing very well in controlling particulate emissions, so the absolute value of the increase is very small. The substantial reductions of SO₂ and NO_x, which are precursors to PM_{2.5} formation, will result in reduced concentrations of PM_{2.5} in the ambient air.***

In the IRP, GRU states that particulate speciation studies sponsored by GRU and conducted by the University of Florida (UF) indicate that the GRU DH2 coal fired power plant is not a major source of atmospheric particulates in the County. This conclusion may not be entirely reliable because the UF report indicates that the Chemical Mass Balance Model used in the studies may significantly overestimate or underestimate the contribution of various sources because of the similarity of chemical compositions. There may also be limitations in the sampling methodology used to collect and fractionate particulate matter from the DH2 stack that could lead to different final results. Therefore GRU DH2 cannot be definitively ruled out as a significant contributor to particulate pollution in Alachua County

- ***GRU respectfully disagrees. Not only does the chemical speciation data suggest that coal is a tiny fraction of the PM collected, the mass balance, air dispersion models and emissions inventory in Alachua County also indicate power plant operations contribute only a tiny portion of the PM in ambient air.***

Additional PM emissions will be generated from the handling of the additional coal and petroleum coke in the coal yard that would result from a new coal/petroleum coke fired unit, and the dry lime handling system associated with its corresponding wet scrubber. GRU may be handling an additional estimated 667,000 tons of coal/petroleum coke per year. The PM emissions associated with the handling of the additional coal in the coal yard may be substantial. A new CCCT unit fired with natural gas will not have the additional PM emissions that are associated with the handling of coal and petroleum coke. GRU needs to include and address the additional PM emissions increases associated with coal and petroleum coke handling in the IRP.

The localized and short term impacts of additional PM emissions and especially PM2.5 and smaller particulates from a new coal plant needs to be more fully evaluated. Several residential developments, some of which contain a high proportion of senior citizens who may be more sensitive to impacts of increased PM emissions, are in the near vicinity of the Deerhaven plant site. The impact of any increased PM emissions on human health and on the quality of life and property values in the vicinity of the Deerhaven plant is a concern and should be more fully considered by GRU in evaluating the options for additional coal generating capacity at the Deerhaven site.

PM2.5 modeling studies performed for GRU by Black and Veatch do not show the maximum 24 hour impacts from PM2.5 emissions which would be important to know considering the increased concern about the impacts of very fine particle emissions on human health. Additionally, a brief review of the modeling assumptions indicates that 1990 Ozone data from Duval County (Jacksonville) was used in the modeling to calculate the formation of sulfate and nitrate particulates. Alachua County currently has two FDEP certified Ozone monitoring stations and it is unclear why this local data was not used in the modeling calculations. Additionally, to be consistent with the treatment of data for all other GRU generators, size fractionation data from standard AP-42 EPA tables should have been used for determining the fraction of PM2.5 in the particulate emissions from DH2 rather than data from a UF particulate study. The UF particulate study may not have been reliable due to the sampling technique used (Reference 12).

- ***GRU's PM_{2.5} modeling studies under the scenario which evaluated current permitted conditions with future permitted conditions did present the maximum 24-hour impacts.***

The reactions of carbonaceous particulates from the burning of petroleum coke are not considered in the CALPUFF modeling performed. The modeling did not consider the enhanced presence of sulfur trioxide/sulfuric acid in the emissions of a petroleum coke burner and their possible role in the formation of PM_{2.5}. Combustion of petroleum coke produces particulate matter that contains more unburned carbon than that produced by burning coal. These carbonaceous particles absorb acid gases such as sulfuric acid. Those fine particles that pass through the particulate control equipment are capable of delivering a concentrated dose of acid to sensitive tissues of the lungs potentially resulting in adverse impacts to the lungs. More information from GRU would be helpful to evaluate the magnitude of any potential concerns about the adsorption of sulfur gases on carbonaceous fine particulates from pet coke.

- ***The CFB unit produces conditions favorable to the minimization of unburned carbon. These include extended boiler residence time, turbulence and temperature.***

Recent research indicates that very fine particulates should be of special concern with regards to impacts on human health. This research is active in two areas: the enhancement of toxic effects on the human body of chemicals carried on fine particulates (<2.5 μ) and the ability of ultra-fine particles (<1 μ) to impact the human body. For example, research conducted by Quinn et al. at McMaster University (Somers, et al. 2004) suggests that heavy metals and polynuclear aromatic hydrocarbons carried by fine particulate matter, such as that which may be generated by a fossil fuel burning plant, may pose genetic risks to humans and wildlife. Research has shown that very small particles have an unexpectedly large impact upon the body. This research was the basis for the new federal PM 2.5 standard. The combustion of petroleum coke fuel can produce a carbonaceous type fine particulate.

Considering the concern about the possible adverse short term impacts of PM 2.5 emissions from the current and proposed new coal-pet coke fired generating plant and the uncertainties of modeling studies, GRU should potentially consider establishing and operating continuous PM_{2.5} monitoring stations in the areas where modeling results indicate the maximum impacts will likely occur. Baseline monitoring data of existing PM_{2.5} levels should be obtained for a multiyear period prior to construction of a new coal plant and monitoring should continue after a new plant is built.

- ***At permit limits, PM_{2.5} would be decreased by the proposed project. GRU is unaware of any study or modeling methodology to assess the potential health effects of particulates at the low levels of GRU's power plant emissions and resultant ambient air impacts. At the maximum point of impact, GRU's combined short term impacts contribute less than 3% of the ambient air quality standard. EPA has recently released the Air Quality Criteria document for PM as part of its periodic reassessment of PM standards, which are set to protect public health and welfare. EPA recommendations regarding the existing NAAQS are expected in 2005. GRU has met with the Alachua County Environmental Protection Department which has also been unable to suggest a method to assess any potential health effect.***

Volatile Organic Chemicals: The IRP did not provide an evaluation of increased volatile organic chemicals (VOCs) emissions from a new 220MW coal powered power plant. These increases could be significant. Using the controlled emission factors in Table 1.1-19 of AP-42, and the estimated annual use of 667,000 tons of coal/petcoke from a 220 MW CFB coal fired unit, potential emissions of VOCs would increase by approximately 16 tons per year. Increases in VOCs emissions are not beneficial to air quality in the region due to the fact that VOCs and NO_x are precursors to the generation of ozone which has been averaging approximately 80% of national air quality standards in Alachua County. Use of the alternate CCCT natural gas technology would not increase VOCs and would lessen the impacts on ozone formation.

- ***This is a relatively small level of emission compared to other ambient sources and ambient levels of VOCs are very small in Alachua County. Furthermore, there will be less NO_x for the VOCs to react with due to the substantial reductions in NO_x emissions.***

Mercury: Mercury is of concern because in the environment it can be transformed to methylmercury, a persistent toxic compound that can bioaccumulate in biota such as fish and affect organisms and humans that eat the fish. The elevated mercury level in Alachua County, and its effects throughout the food chain, has resulted in fish consumption advisories and bans in Alachua County. Burning of coal in a new plant at Deerhaven will add to the emitted mercury burden to local and regional watersheds and increase the potential risks to human health and the environment. In the IRP, GRU states that it may need to add specific additional controls on the new coal plant for mercury emissions in the future when and if federal standards or policies are implemented. Mercury emissions are very difficult to measure from power plant emissions. Therefore USEPA has developed estimates of potential mercury reduction from applying various pollution control technologies. New proposed federal regulations may allow a cap and trade system to be implemented for mercury reductions. This system will allow electrical utilities to either put in pollution controls to reduce mercury emissions to new federal and state allowed levels or purchase or trade allowances to compensate for continuing to emit higher levels of mercury. It is difficult to predict with certainty what the actual emissions will be for the current DH2 and new proposed coal plant since GRU may apply technology to reduce emissions or may choose to purchase allowances. However, it can be reasonably assumed that with two coal powered power plants in operation the amount of mercury emitted to the environment will be greater than for only one coal powered plant.

Black and Veatch (October 2003) performed a mercury modeling study for the current DH2 coal plant on behalf of GRU. Sulfur dioxide (SO₂) was used as a surrogate for mercury emissions due to the inability of the ISCST3 air dispersion model to directly characterize a pollutant such as mercury. Annual deposition rates for SO₂ were calculated by Black and Veatch (October 2003) that were subsequently used to calculate estimated mercury deposition rates in the report titled "Potential Rates of Deerhaven 2 Mercury Deposition in the Santa Fe River Basin of North Central Florida" by Dr. Curt Pollman (October 2003). This report used basin wide average modeled deposition SO₂ deposition rates over the entire Santa Fe River Basin to calculate basin wide average mercury deposition rates of approximately 0.5 ug/sq meter/yr and a conclusion that DH2 plant contributes only 1.7% of the mercury deposition to the basin area. However, if data from the point of maximum impact is used in the calculation of mercury deposition rates as obtained from the Black and Veatch modeling report, then maximum mercury deposition

rates of approximately 18 ug/sq meter/yr are obtained. Black and Veatch modeling indicates that the point of maximum impact is in the near the near vicinity of the Deerhaven plant. Therefore mercury impacts in this area could be as much as 36 times higher than the values reported by Pollman and GRU. Considering an expected operational lifetime of a new coal plant of 40 years or more and the continuing operation of DH2 over time, the additional mercury emission load from a new 220 MW coal plant could have a significant impact on the accumulated mercury in the environment. Because of this increased mercury concern, stronger consideration should be given by GRU to using non-coal based generation options in the future. If a decision is made to build a new coal plant, considering the uncertainty in the type of federal standards that will be required and increased concern about mercury in the environment and its impacts on the health of the community, it is recommended that GRU make a commitment to applying the best control technologies and achieving the maximum reduction in mercury emissions on both the retrofitted DH2 and a new CFB coal plant.

- ***The proposed plan will result in a 70% overall reduction in mercury emissions. GRU will comply with EPA's mercury reduction regulations which are expected to be promulgated in spring 2005.***

Metals emissions: Petroleum coke is known to have high concentrations of vanadium and nickel metals as well as high sulfur content. Pollution control of metals emissions and the potential impacts of airborne emissions of vanadium, nickel and other metals on the public health and welfare has not been adequately discussed in the IRP. GRU in their presentations to the public has indicated that metals content in petroleum coke is low.

- ***GRU has since corrected its statement. Mercury in Petroleum Coke is very low, but it does contain other metals. CFB technology as proposed by GRU is ideally suited to the combustion of petroleum coke and the resulting ash is relatively low in carbon. Many of the concerns expressed in this report derive from combustion of petroleum coke in non-CFB boilers. CFB boilers have a limestone combustion substrate, which mitigates sulfur, metals, and pH concerns and are equipped with scrubbers and baghouses to minimize sulfur and metal emissions.***

5.0 Emission Control Issues

5.1 Findings and Recommendations -- Emission Control Issues

Finding 13 --- Similar CFB coal and petroleum coke generating plants in Jacksonville have had some compliance issues with SO₂ and PM and lead emissions. No discussion of potential emission control issues have been provided by GRU.

Finding 14 --- High vanadium metal content in petroleum coke can act as a catalyst and the high sulfur content of petroleum coke could pose increased corrosion problems for equipment from acidic sulfur gases.

Recommendation 10 --- GRU should further evaluate and discuss potential compliance and operational issues and GRU plans to assure compliance with emission limits and avoid operational problems associated with a 220 MW CFB plant at Deerhaven site.

- *In response to Findings 13, 14, and Recommendation 10, GRU has been in close communication with a number of CFB operators as well as manufacturers of CFB technology. JEA's CFB units were DOE funded "clean coal" demonstration units that had several design innovations that complicated initial start up. The units are currently expected to comply with environmental requirements pending additional design corrections. GRU intends to adopt only a well proven, standard design. The catalytic effect of vanadium is different in a CFB than in a pulverized coal plant because of the limestone combustion substrate. Vanadium becomes tied up in the limestone substrate during combustion.*

Recommendation 11 --- GRU should commit to implement the most stringent technology for emission control for regulated pollutants and mercury for any generating plant constructed.

- *As part of the proposed plan GRU is volunteering to implement proven technologies that will substantially reduce the emission of regulated pollutants and mercury.*

5.2 Supporting Information

The CFB coal technology has demonstrated reduced emissions of NO_x and SO₂ as compared to conventional pulverized coal technology when operated optimally at a generating unit sizes smaller than the 220 MW unit proposed by GRU. However, ACEPD has learned that a recently completed CFB plant burning coal and petroleum coke operated by JEA in Jacksonville, which is of similar size to the plant proposed by GRU, has had difficulties in achieving compliance with SO₂, and PM emission limits. The plant has also had exceedances in lead emission limits. While these problems may have been resolved, GRU has not discussed possible compliance challenges that could be associated with this type of plant.

Petroleum coke is a solid carbon material produced from the high temperature treatment of heavy petroleum fractions. Petroleum coke contains relatively high amounts of sulfur (3% to 7% by weight) and relatively high amounts of metals such as nickel, iron and vanadium. (www.worldenergy.org) Combusting petroleum coke using the GRU proposed CFB technology requires the use of limestone to scrub out the sulfur and sequester the metals in order to meet emission requirements. The combustion temperature has to be closely controlled. Too hot and the calcium sulfate begins to degrade releasing sulfur. Too cool, and the limestone is not calcined and can't pick up the sulfur. In practice though, as with the JEA CFB plant, control of the process appears to be difficult which could result in occasional exceedance of regulatory emission limits.

Gaseous emission from coal combustion includes sulfur oxides. These are largely sulfur dioxide (SO₂) with low levels of sulfur trioxide (SO₃) and gaseous sulfates. Petroleum coke contains a level of sulfur similar to that typically found in high sulfur coal. Petroleum coke contains a much higher level of vanadium than coal. In its oxidized state, vanadium catalyzes the formation of SO₃ from SO₂. Thus, burning petroleum coke is expected to produce more SO₃ and particulate sulfates and less SO₂ than burning coal with a similar level of sulfur. This has implications for corrosion of equipment and efficiency of control equipment. Burning petroleum coke instead of coal is expected to have little effect upon

generation of nitrogen oxides and may reduce the amount of carbon monoxide and volatile organics because of the lower volatile content of the petcoke relative to coal.

While GRU has presented anticipated emission limits for the new 220 MW plant and for the Deerhaven retrofit, actual final permitted emission limits will be set in the final FDEP permit. Emission permit limits could be different than those projected by GRU. In the GRU emission modeling studies, the reduction efficiencies (approx. 77% for SO₂, 82% for NO_x) assumed for the retrofit of DH2 appear to be possible with the technology selected but are at the high end of efficiencies for this technology. Actually achieved reduction efficiencies may be less than those in the modeling studies. GRU in order to assure the community that any additional coal plant will be operated with the public health and welfare in mind should make a commitment to design any new plant such that emissions of NO_x, SO₂, PM, VOCs and Mercury are reduced to the maximum extent feasible with Maximum Achievable Control Technology levels or Best Available Control Technology levels (whichever is more stringent).

6.0 Solid Waste Impacts

6.1 Findings and Recommendations -- Solid Waste Impacts

Finding 15 --- A new CFB coal-petroleum coke fired generation option will significantly increase the amount of solid waste produced from plant operations.

Recommendation 12 --- GRU should further evaluate and discuss handling and disposal issues associated with the significantly increased volume of solid waste from a new CFB coal/pet coke plant.

- *Once a design is finalized to allow the by-product materials to be fully characterized, GRU intends to fully explore the most environmentally sound methods to manage and recycle these materials. Typical applications include use for environmental remediation projects, road bed stabilization, or construction materials.*

6.2 Supporting Information

The CFB coal technology will generate a higher level of solid waste as compared to conventional pulverized coal technology and natural gas options due to the large amount of calcium sulfate and limestone mixture produced that has to be stored on site or disposed of in a responsible manner. Estimates are that new solid waste equivalent to 30 to 50% of the amount of petroleum coke burned, depending on sulfur content, will wind up in the form of solid waste. GRU has not discussed or evaluated the handling or disposal impacts of this larger volume of solid waste.

7.0 Water Resource Impacts

7.1 Findings and Recommendations -- Water Resource Impacts

Finding 16 --- Reclaimed water from the Kanapaha and Main Street wastewater plants is proposed to be used for evaporative cooling at the proposed CFB power plant at Deerhaven. The water resource impacts due to the diversion of reclaimed

water discharges and evaporative losses from the cooling towers of the proposed new generating plant have not been addressed and need to be quantified.

Recommendation 13 --- GRU should provide an assessment to quantify the hydrologic impacts associated with the proposed diversion of reclaimed water discharges and cooling tower evaporative losses.

- *All of the Water Management Districts in Florida (Including the St. Johns River Water Management District and the Suwannee River Water Management District) promote the beneficial use of reclaimed water for power plant cooling. Promotion of beneficial use of reclaimed water is also a goal in the City of Gainesville and Alachua County Comprehensive Plans. The proposed project will significantly expand the availability of reclaimed water from GRU's reclaimed water system. GRU is committed to using reclaimed water in conjunction with the Deerhaven expansion due to its environmental benefits. Detailed evaluations of various water supply sources (Main Street Water Reclamation Facility, Kanapaha Water Reclamation Facility or groundwater) and associated environmental impacts will be evaluated in detail as a part of preliminary design development. In addition, the impacts of diverting reclaimed water flow from Paynes Prairie is being assessed in detail as part of the ongoing Total Maximum Daily Load (TMDL) development process for Alachua Sink. The water supply strategy for Deerhaven will be consistent with GRU's approach for meeting this TMDL.*

7.2 Supporting Information: Evaporative cooling using a combination of reclaimed water from the Kanapaha and Main Street wastewater treatment plants and groundwater (as a make-up and back-up source) is proposed by GRU for coal generation options at the Deerhaven site. No data is presented in the IRP on the water resource usage of a 220 MW CFB coal plant. Using the data from the 475 MW and 600 MW plants that are discussed in Table J-9 of the IRP, it appears that several million gallons per day of reclaimed water and groundwater will be used. The IRP does not discuss the amount of groundwater and reclaimed water that will be lost to the atmosphere through net evaporative cooling. In Alachua County this lost water would have returned to the aquifer if applied to the soil or discharged to local surface waters. Also the hydrologic impact of the diversion of the reclaimed water from Paynes Prairie and the aquifer on natural ecosystems and water supplies has not been discussed.

8.0 Greenhouse Gas (GHG) Issues

8.1 Findings and Recommendations -- Greenhouse Gas (GHG) Issues

- *In response to Findings 17 through 22 and Recommendation 14, GRU is addressing climate change concerns through the promotion of renewable energy, the use of carbon –neutral fuels (waste wood) and both demand and supply side energy efficiency programs. The protocols for establishing the value of carbon offsets have not been uniformly established for the U.S.A. GRU has been using protocols developed in countries that have the Kyoto treaty, but we welcome continued discussion on this topic. We have not yet quantified all of our potential carbon offsets. The capture and utilization of landfill gas is one*

such methane recovery strategy that has succeeded through collaboration with the Alachua County Board of County Commissioners. The generating units purchased for that facility are designed to allow future relocation to other landfill sites. GRU is aware of the N₂O issue, which is small compared to GRU's potential offsets. N₂O emissions will depend on the final conceptual design of the proposed unit.

- *GRU is willing to propose to the City Commission that costs be included in the proposed plan to increase the amount of greenhouse gas reduction offset projects that could be implemented in Alachua County, with the target being to make the solid fuel facility carbon neutral as compared to a natural gas fired facility in as cost-effective manner as possible.*

Finding 17 --- Increased GHG emissions will result from the addition of a new 220 MW coal-pet coke fired CFB plant. The reduction of "carbon intensity" as presented by GRU refers to an improved efficiency of combustion (less pounds of CO₂ per MWh of energy produced) but a reduction in "carbon intensity" does not mean that the actual tons of CO₂ emitted is being reduced.

Finding 18 --- Increased GHG emissions from a new coal plant is not consistent with the County's Greenhouse Gas Reduction Goals as contained in the County's comprehensive plan and the goals of the "Cities for Climate Protection" campaign which GRU has joined.

Finding 19 --- Some GHG reduction projects proposed by GRU are not sustainable and overestimate actual CO₂ reductions

Finding 20 --- Operation of a CFB coal plant will generate Nitrous Oxide (N₂O) emissions, a stronger GHG than CO₂.

Finding 21 --- GRU has indicated an intention to burn biomass (which is considered carbon neutral for GHG purposes) in the new CFB unit to generate power in the range of 30 MW. However, it is unclear how definite the GRU commitment is to utilize biomass as a fuel.

Finding 22 --- Actual emission reduction benefits of GRU projections of more power output with less pollution for a generating unit are highly dependent on the actual operation time and mix of fuels utilized at any period of time and may be significantly different than currently predicted by GRU.

Recommendation 14 --- GRU should propose additional GHG reduction projects or initiatives to offset the significant GHG increases from a new coal-pet coke burning power plant. These additional projects could be funded from the additional revenues that will be generated by GRU in selling excess power.

Recommendation 15 --- GRU should make firm its commitment to utilize 30 MW or more of biomass for electrical generation if a new CFB plant is built.

- *The supply of biomass fuel is anticipated to be season in availability and price. GRU is proposing to construct a facility that could utilize up to 45 MW of biomass, but only if it retains the ability to vary the utilization of biomass to*

reflect these variations in supply and price, and to bid biomass against coal and petroleum coke. The best available information suggests that up to 30 MW of capacity on an average basis is likely to be sustainable.

8.2 Supporting Information

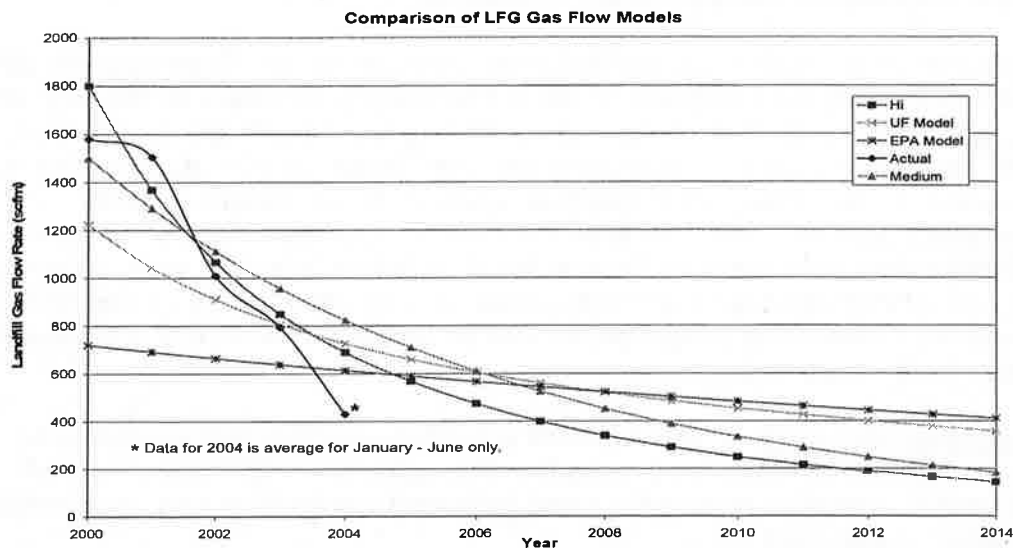
Alachua County has adopted a policy in its comprehensive plan that supports a reduction in greenhouse gas (GHG) generation by 20% over 1990 levels. Both Alachua County and GRU have joined the US Cities for Climate Protection national campaign and have committed to work toward GHG reductions in the community. The GRU plan to increase fossil fuel powered electrical generating capacity will result in a significant increase in CO₂ emissions in the community. The GHG Inventory completed by Alachua County in 1998 reported that an estimated 2,751,000 tons of CO₂ are emitted annually by Alachua County sources including GRU electrical plants. The addition of new 220 MW coal/pet coke powered electrical generating plant is estimated to add approximately 800,000 tons of additional CO₂ to the inventory which is a 29% increase. This increase will make it more difficult for Alachua County or GRU to meet their goals for GHG reduction. It is also of concern that the proposed CFB coal/petcoke generator will generate more nitrous oxide (N₂O) than either the conventional coal combustion or use of natural gas. N₂O is a much stronger GHG than carbon dioxide. GRU indicates that through efficiency improvements and burning of biomass that the "carbon intensity" will be reduced. Carbon intensity refers to the amount of CO₂ produced per MWh of electricity generated. A reduction in carbon intensity is not the same as a reduction in total tons of CO₂ released to atmosphere.

GRU indicates that it will make use of carbon credits that it hopes to get from various GHG reduction projects (such as the landfill gas to energy project) and other planned energy conservation efforts it has currently underway or is planning to offset possible future costs of regulations on CO₂ emissions. However, it should be noted that two of the largest GHG reduction projects listed in Table 8 of the September 30, 2004 GRU report on ambient air impacts, the landfill gas to energy project (57,120 tons) and the Kelly plant re-powering project (90,524 tons), are projects that have already been completed and are not new projects. These projects were completed before the concept of a new coal fired power plant was presented to the community. While GRU may be able to get carbon credits in the future for these already established projects, in the interest of demonstrating a greater commitment to the community in reducing greenhouse gas emissions, GRU should propose and support additional, new significant greenhouse gas reduction projects in the community to help offset some of the more than 800,000 tons of CO₂ that the new plant will produce annually.

The anticipated tons/year of CO₂ reductions credited to the landfill gas to energy project overestimates the actual tons of CO₂ reduction because it takes credit for the GHG potential of the methane gas produced and released to the atmosphere at the County's Southwest Landfill. The methane gas at the landfill was burned in a flare before this project was started and was not released to the atmosphere. Therefore strict accounting for the carbon dioxide reduction potential should not include the carbon reduction from this methane gas. As shown in **Figure 8**, the landfill gas to energy project is not a sustainable project for GHG reduction due to the limited lifetime over which landfill gas will be available for electrical generation compared to the projected operational lifetime of the power plant of probably more than 40 years. In fact most of the methane and GHG emission reduction potential will be exhausted

before a new coal plant will begin operation in 2010 or 2011. Because of this limitation, Alachua County in its Greenhouse Gas Reduction Local Action plan approved by the County in October 2002, decided not to include the landfill gas to energy project as a GHG reduction credit project in its plan.

Figure 8. Landfill Gas Flows vs Time



The maximum greenhouse gas reductions from the Kelly plant re-powering project may not be fully realized if the Kelly plant is not operated at full capacity or is only used as a peaking unit or for intermediate load and most of the base load is generated by new and existing coal plants. The benefits of the re-powering to generate “five times the power for one-half the pollution” while technologically possible have not been fully achieved in practice since the Kelly CCT unit has not been utilized to full capacity. The reductions of 90,500 tons of CO₂ offsets claimed for the Kelly repowering by GRU are calculated based on the avoidance of DH2 coal power generation. In 2002 the Kelly Unit 10 combined cycle plant was used approximately 28% of the time during the year. If an additional new coal plant is built for baseload generation, it is possible that the use of the Kelly combined cycle unit will likely decrease further and the GRU projected greenhouse gas reductions will not be sustained and will significantly decrease. GRU projections of more power for less pollution from any proposed generating plant combination or upgrade are realized only if the mix of actual generating plant usage matches future assumptions and are subject to change due to market and operational conditions.

9.0 Energy Conservation and New Technologies

9.1 Findings and Recommendations – Energy Conservation and New Technologies

Finding 23 --- GRU has presented plans to increase its demand management and energy conservation programs to reduce peak demand. Additional load reduction from additional energy conservation programs is achievable. However, it appears that only those programs that pass the RIM test are being proposed. This condition significantly restricts the number and types of available conservation programs.

Recommendation 16 --- GRU should continue to emphasize and implement more aggressive demand management projects and to take into account new technologies for reducing demand even though some may not pass the RIM test but have the potential to significantly reduce peak or baseload demand and avoid the need for more generation capacity.

- *In response to Finding 23 and Recommendation 16, on November 15, 2004, the Gainesville City Commission made a unanimous decision to employ the Rate Impact Measure (RIM) Test for conservation program planning and design. The RIM Test is a cost-effective measure that looks at the perspective of what happens to the rates and charges applied to all electric utility customers. Therefore, this test assures that the cost of any new conservation initiatives would be less than the cost for additional base load electric generating capacity. As part of this decision staff has recommended exceptions to the RIM Test for customer information programs as well as those that address the basic human needs of low income customers.*

Recommendation 17 --- GRU should establish specific percentage goal commitments for future load reduction through conservation and use of renewable energy to reduce the need for power generation and associated increase in pollution.

- *Under the proposed plan, GRU would achieve the highest percentage of renewable energy of any electric utility in Florida. GRU will be willing to propose to the City Commission a goal of meeting 10% of the community's electrical needs through renewable energy and energy conservation by 2012 as part of the proposed plan.*

9.2 Supporting Information

GRU in the IRP proposed only 1.8 MW of energy demand reductions from conservation efforts. Furthermore, GRU did not specifically outline how it will meet the 1.8MW reduction goal for conservation. In the 2004 Ten Year Site plan, GRU projects a 6 MW to 7 MW annual peak reduction effect from planned Demand Side Management Programs (DSM) through 2013. It should also be noted that GRU in the 2004 Ten Year Site Plan projected a decreasing cumulative energy demand impact from conservation and demand management programs going forward to 2013 as compared to 2003 levels. The decrease in projected demand side energy savings in the 2004 Plan includes the impacts of the new Demand Side Management programs planned to be implemented in the future. GRU has stated that only those conservation projects that pass the Rate Impact Measure (RIM) test will be considered for implementation to reduce energy demand. Passing the RIM test means that the project will not result in a net loss of revenues to GRU and it will not give benefits to certain rate payers over others. It is not clear that GRU is legally required to apply this test to all projects. It may be beneficial in terms of reducing impacts to the environment to implement some projects that because of their value in reducing demand would not pass the RIM test.

A more aggressive energy conservation and demand management program with specific commitments by GRU as a matter of policy to achieve a certain percentage reduction in

energy demands in the next 10 to 15 years and a more aggressive commitment to solar and renewable energy is desirable to minimize the environmental impacts of increased fossil fuel combustion. Solicitation of energy reduction proposals from the private sector as GRU has recently done along with a thorough evaluation of successful energy conservation programs from other utilities in the state and nation should be conducted by GRU. The full load reduction potential of these programs should be taken into consideration to reduce or eliminate the need for additional generation capacity.

- ***The above analysis fails to mention the aggressive conservation programs GRU has had in place since 1980, the Gainesville Urban Areas' ranking of having the lowest electric use of any urban area in Florida and the generation capacity that has already been avoided. On November 15, 2004, the Gainesville City Commission made a unanimous finding that the implementation of additional conservation programs will not eliminate the need for additional base load electric generating capacity in the 2011 timeframe. This decision was made after extensive review and input by the community and staff, including benchmarking against other electric utilities.***

In considering alternatives for meeting Gainesville's electrical requirements through 2022, consideration should be given to the new technologies that are just beginning to influence the generation and distribution of electricity. Newer choices for generating electricity include fuel cells, microturbines, wind turbines, and solar cells. Energy storage is approaching practicality, for example through reversible fuel cells and flywheels. Under development are smart home appliances that can sense and adjust to grid conditions, as well as commercial heating-ventilation-air conditioning systems that allow remote diagnosis and control. The most powerful energy technology entering the field is the microprocessor, which has already made over economic sectors from manufacturing to retailing. Information technology has been used in grid command centers since it has been available. It is now starting to infuse electronic intelligence throughout the grid. Driven by the emergence of cheap computing power and low cost bandwidth, the traditional grid is in the early stages of transformation to a "smart energy" network. The information technology base of a smart energy network is comprised of communications and control systems that create two fundamentally new capabilities:

1. The ability to precisely manage electrical power demand down to the residential level, bringing tremendous gains in efficiency, and
2. The ability to network vast numbers of small-scale distributed energy generation and storage devices.
- 3.

Advanced technologies provide serious options to cut power plant pollution by making energy use far more efficient, and by integrating a multitude of clean, distributed generators into the grid.

- ***GRU follows these technical innovations closely and will modify its conservation and energy supply plans through time as appropriate to employ them.***

CONCLUDING COMMENTS BY GRU

- ***GRU's long term electrical supply not only balances energy conservation, renewable energy, and conventional fossil fuels, it will result in improved ambient air quality in Alachua County while maintaining affordable and reliable supplies of electrical power for our community. While the primary focus of this document was environmental emissions, the global and national issues affecting the price and relative abundance of fuels available to Gainesville, and the reliance of our community on reliable electrical services, is also of vital importance to GRU and the City Commission.***
- ***The proposed long term electrical supply plan was developed as the result of many studies performed by staff and professional consultants, with a considerable amount of public participation. Most of the technical information developed as part of this process is readily available on our web site (www.gru.com). In particular, the Gainesville Energy Advisory Committee has taken an active role in the public outreach that has been ongoing over the last 15 months. This outreach has included six community workshops, seven special City Commission workshops, and over forty presentations to professional organizations and civic groups. Each of GRU's more than 80,000 customers received a letter from the Mayor outlining the process and issues involved in long term electrical supply planning, and there has been abundant media coverage of the community dialog.***
- ***Alachua County's Environmental Protection Department and the Alachua County Environmental Protection Advisory Committee have also contributed substantial effort to the process. They have reviewed over thirty different documents, and made over 150 requests for explanation and supplemental information. They have demonstrated extraordinary interest and commitment to the issues of power supply. GRU appreciates this level of interest and concern, and believes it has resulted in an improved planning process.***

References:

1. "Alternatives for Meeting Gainesville's Electrical Requirements through 2022" (GRU Integrated Resource Plan IRP), December 2003
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4. "Planning Study of the Effects of Gainesville's Long Term Electrical Energy Supply Plans on Ambient Air Quality and Greenhouse Gas Emissions", GRU, September 30, 2004.

5. "Potential Rates of Deerhaven 2 Mercury Deposition in the Santa Fe River Basin of North Central Florida", Tetra Tech, Inc., October 2003.
6. "A Study to Assess the Impact of Power Plant Particulate Emissions on Alachua County's Air Quality", C.Y. Wu, D. Lundgren, D. Cooper, University of Florida Department of Engineering Sciences, January 2003.
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8. R.W. Beck, Inc. and Power Engineers, Inc., "Prefeasability Study Report, Public Power Solid Fueled Power Plant Project", Draft February 17, 2003.
9. World Energy.org—"Challenges and Economics of Using Petroluem Coke for Power Generation", www.worldenergy.org/wec-geis/publications/default/tech_papers
10. Nemmar, A.; Vanquickenborne, B.; Dinsdale, D.; Thomeer, M.; Hoylaerts, M.; Vanbilloen, H.; Mortelmans, L.; Nemery, B. "Passage of Inhaled Particles into the Blood Circulation in Humans" *Circulation*, Vol 105, #4, January 29, 2002.
11. Somers, C.M.; McCarry, B.E.; Malek, F; and Quinn, J.S. "Reduction of Particulate Air Pollution Lowers the Risk of Heritable Mutations in Mice" *Science*, Vol 304, pp1008 to 1010, 14 May 2004.
12. Information from EPAC Air Quality Subcommittee and former AQC members.

Staff : John J. Mousa, Ph.D.

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**STAFF RESPONSE TO
EPAC'S RECOMMENDATIONS TO GAINESVILLE CITY
COMMISSION REGARDING GRU'S POWER PLANT PROPOSAL
DECEMBER 13, 2004**

As

PRESENTED TO GAINESVILLE CITY COMMISSION
15 NOVEMBER 2004

BY THE
ALACHUA COUNTY
ENVIRONMENTAL PROTECTION ADVISORY COMMITTEE (EPAC)

- *The Gainesville City Commission and Gainesville Regional Utilities staff are grateful for the hard work and input from the Alachua County Environmental Protection Advisory Committee. This form of intergovernmental cooperation between professionals and citizens is a model that exemplifies the best of Alachua County's local government. Important questions and observations have been raised since the process began in August 2003, and addressing these has improved the planning process and promoted the development of valuable information for the community.*
- *The following comments address the specific recommendations made by EPAC at the November 15, 2004 City Commission meeting, as well as some of the comments made by EPAC members who gave different parts of the presentation accompanying the recommendations.*

EPAC Recommendation No.1

City Commission directs GRU to explore the health impacts of short-term exposures to fine particulate matter from GRU's proposal and EPAC alternatives using additional air quality modeling.

- ***General Observation:** While the majority of the EPAC comments are factually correct related to health impacts due to air pollution, this comment presented failed to recognize the fact that all air pollutants emitted from GRU's power plants, except PM₁₀, are expected to decrease with the proposed project. The pollutant of the greatest health concern for EPAC, PM_{2.5}, is expected to decrease due to the proposed project. With respect PM₁₀ which is expected increase slightly, GRU is unaware of any study or modeling methodology to assess the potential health effects of particulates at the low levels of GRU's power plant emissions and resultant ambient air impacts. At the maximum point of impact, GRU's combined short term impacts contribute less than 3% of the ambient air quality*

standard. Air quality or $PM_{2.5}$ which is a subset of PM_{10} and human health are very important issues, which GRU staff has taken quite seriously. However, with the retrofit of Deerhaven 2 and based on the modeling staff has conducted, the proposed project is not expected to have a detrimental impact on air quality or human health.

➤ **Specific Comments:**

➤ **EPAC incorrectly stated that National Ambient Air Quality Standards (NAAQS) were not designed to protect health and that EPA considers cost “trade offs” when establishing NAAQS. EPA is mandated by Congress to establish NAAQS that are protective of the sensitive members of the population (asthmatics, children and elderly) with a margin of safety. EPA is required to establish NAAQS using the latest health and scientific data available at the time. In addition, the NAAQS are to be periodically reviewed (normally every five years) in light of the most recent relevant data and revised as warranted by that data. The $PM_{2.5}$ standard is currently in the final stages of such a review. EPA recommendations regarding the existing NAAQS are expected to be made in 2005. It is important to note that EPA is required to establish NAAQS based only on health impacts and cannot by law consider the cost of complying when setting NAAQS.**

➤ **EPAC implies that the GRU proposed project will increase $PM_{2.5}$ and ultra-fine particles and therefore will increase adverse health impacts in Alachua County. In fact the Proposed Project will decrease $PM_{2.5}$ as compared to the Deerhaven 2's current contribution. This is due to the fact the vast majority of $PM_{2.5}$ related to coal fired generation is secondary $PM_{2.5}$ formed by SO_2 and NO_x gaseous emissions being converted to sulfate and nitrates as the result of atmospheric chemical reactions. That is why EPA is proposing to focus on SO_2 and NO_x reductions from electric generating units in its proposed Clean Air Interstate Rule (CAIR) that is designed to reduce overall $PM_{2.5}$. GRU's modeling studies have shown that the reductions in SO_2 and NO_x that will result from the proposed project will result in lower levels of $PM_{2.5}$ in the ambient air.**

➤ **EPAC is correct in pointing out that most, if not all, recent health studies indicate that fine particulates ($PM_{2.5}$ and smaller) are the critical fraction in human health effects. However, these same studies indicate that all fine particulates are not equal in their effect on the human body. It is not correct to assume that all $PM_{2.5}$ will produce the same health impacts at the same concentrations. Organic fine particulates, specifically diesel exhaust, have been linked to health effects at low levels,**

while inorganic fine particulate sulfates have shown little or no health effects at many times that level.

- ***EPAC contends that 2 hour PM_{2.5} levels will be five times or more higher than the 24 hour modeled results. EPAC then expands the five-fold increase to encompass all of Alachua County, implying that short-term health effects will dramatically increase countywide. While normal Gaussian type air quality diffusion models have a statistical relationship that allows a reasonable estimate of short term concentrations from longer term modeled results (going from annual modeled results to 24 hour estimated concentrations and 24 hour modeled results to 1-2 hours concentrations), the same is not necessarily true of the CALPUFF model used to estimate PM_{2.5} concentrations. Unlike the basic air diffusion model that starts with the maximum pollutant concentration leaving the stack, the CALPUFF model also reflects the conversion of gaseous pollutants to PM_{2.5} over time.***
- ***EPAC implies that the assumed five fold increase in PM_{2.5} will be additive to existing PM_{2.5} concentrations also assumed to be at their maximum. This is physically impossible since all Alachua County sources cannot have the same short-term maximum concentration at the same time and location. (Some sources will be downwind of GRU facilities, while some are not inline with the maximum point.) Note that all sources can contribute to a maximum point on an annual basis, however, the Deerhaven generating station's maximum concentration location will likely still not be the maximum for all contributing sources.***

EPAC Recommendation No. 2

The City Commission direct GRU to evaluate proposals regarding GHG controls.

- ***Background: Expanding GRU's ability to use coal and petroleum coke is expected to have substantial economic benefits for utility customers and strategic benefits for the City of Gainesville's electric utility (GRU). A disadvantage of these fuels is their relatively high carbon content per unit heat compared to natural gas. This results in relatively high emissions of carbon dioxide (CO₂) per unit of electricity produced compared to natural gas. CO₂ is a greenhouse gas that contributes to climate change through its tendency to trap heat in the atmosphere.***
- ***Financial Assessments: On November 15, 2004 the City Commission received the results of a sensitivity analysis of the proposed plan to a wide range of assumptions related to load growth, fuel prices, and the potential imposition of carbon taxes at \$50 and \$100 per ton of carbon (which is***

equivalent to \$14 and \$27 per ton of CO₂, respectively). These analyses extended over the entire life of the proposed facilities and employed commonly accepted financial analysis techniques, as confirmed by R.W. Beck. Based on comments from EPAC, staff has extended the range of the sensitivity studies to \$200 per ton of carbon (equivalent to \$55 per ton of CO₂, the highest range suggested by EPAC). At this new range, the proposed plan was only slightly more expensive than a natural gas only plan for scenarios with low load growth and low fuel prices. It should be noted that the current commodity value of CO₂ offsets is about \$1.50 per ton.

- **Best Practices Worldwide:** Staff shares EPAC's concerns about the implications of CO₂ on climate change, and has reviewed global trends related to this issue. Worldwide, countries that have adopted carbon constraints have adopted various market structures to achieve the desired results. Nonetheless, the use of coal and petroleum coke continues to expand globally. To overcome the carbon disadvantage of coal and petroleum coke, the use of greenhouse gas offsets is prevalent.
- During the community outreach program of the last 15 months, GRU has heard of many techniques by which we might acquire additional carbon offsets. Quantifying and prioritizing these opportunities presents a substantial task requiring a wide range of expertise in a number of different and often unrelated fields and technologies. Furthermore it is extremely difficult to establish realistic goals and objectives for local initiatives to reduce greenhouse gases. One way to assure an appropriate process is to enlist the aid of the experts that are resident in Gainesville's population.
- **A Greenhouse Gas Offset Fund:** Greenhouse gas offsets are methods by which the emission of greenhouse gases are either directly reduced (i.e. through energy efficiency), avoided by the use of renewable sources of energy, or mitigated by carbon capture and storage (sequestration). These offsets are attainable from many aspects of an economy, including agriculture, transportation, industrial, commercial and residential sectors. Local policies such as land use, zoning, development regulations and purchase of development rights can also play a role. The most cost-effective methods by which to achieve greenhouse gas offsets depend upon regional climatic, socio-economic, and natural resource characteristics, not to mention consumer acceptance.
- Staff is proposing a process and a funding mechanism to begin the acquisition and/or demonstration of additional, local greenhouse gas offsets for climate protection and to acquire carbon credits as part of its long term electrical supply plan.

- **Fund Objectives:** *The proposal envisions that the City Commission would establish a technical advisory committee. The objective of this committee would be to identify, prioritize, and recommend strategies to use the Greenhouse Gas Offset Fund to obtain greenhouse gas offsets to be used by the City of Gainesville to enhance climate protection and hedge its utilities' system position in the event that carbon constraints are imposed in the USA. The goal would be to obtain up to 714,000 tons per year of CO₂ reductions or sequestration, which is the amount that would make the proposed solid fuel facility carbon neutral compared to natural gas. Factors to be considered by the Committee could include potential economic development, synergy with other Commission objectives, promotion of the City Commission's land use and transportation objectives, and demonstration of beneficial technologies. It is essential however, that funding be performance based to assure that the utility's purpose of obtaining carbon credits is achieved.*
- **Funding Source:** *Staff proposes that the Greenhouse Gas Fund be established as a percentage of capital outlay for the proposed additional solid fuel generation. This will establish a seven-year funding cycle (2005 through 2011 as currently envisioned) that will start relatively slowly and allow a maximum of flexibility, trial and error, and innovation through time.*
- **CAVEAT:** *The approach GRU is proposing here is far from common in the utility industry. It is extremely critical that the Greenhouse Gas Fund be subjected to critical auditing and clearly be applied to obtaining measurable and useful greenhouse gas offsets as a hedge against potential financial exposure.*

EPAC Recommendation No. 3

The City Commission direct GRU to evaluate potential customer base reductions under deregulation.

- **EPAC's concern here is that generation facilities might become stranded in the event that retail deregulation occurs. Because wholesale power markets have already been deregulated, only generation units that are "out-of-the-money" (expensive to operate) are at risk. A primary benefit of the proposed new unit would be to hold down GRU's generation costs. GRU's other, gas-fired units are more at risk in the event of deregulation. One of GRU's process safeguards that will demonstrate that the proposed unit will be "in the money" is the expectation that firm financial commitments for excess capacity in the early years, from other utilities, will be obtained before major investments are made.**

EPAC Recommendation No. 4

Choose Biomass over Coal

City Commission directs GRU to evaluate maximizing biomass use to meet increased demands for the near term.

- ***GRU has performed the necessary studies to assure the Commission that a substantial amount of biomass is utilized in a cost effective and environmentally sound manner. The factors that lead to this conclusion are:***
 - ***1. The decision was made to utilize only clean waste wood from forestry, land clearing, and tree trimming operations. This material is currently burned or left to rot in the field, and does not require the dedication of productive land for its production.***
 - ***2. Independent studies of available biomass were commissioned (Cunilio and Post, October 2003, and Black and Veatch "Supplementary Study of Generating Alternatives For Deerhaven Generating Station", March 2004). Roughly 700 tons per day, or enough to fire 30 MW of capacity, is expected to be sustainable. This is roughly 50% of the Cunilio and Post estimate but close to the Black and Veatch estimate.***
 - ***3. Meetings were held with forestry professions to ascertain if the collection of the biomass material described would be environmentally harmful and to discover the ability to collect, process, and deliver the biomass as a usable fuel at a cost below that of coal.***
 - ***4. Engineering studies were conducted to determine the most cost-effective and flexible way to provide the ability to utilize biomass (Black and Veatch "Supplementary Study of Generating Alternatives For Deerhaven Generating Station", March 2004).***
 - ***5. The proposed project is expected to be able to co-fire up to 45 MW of biomass without substantial degradation of heat rate or performance (subject to final design). Biomass supplies are expected to be seasonal, and it is GRU's intent to optimize production costs by bidding the price of biomass, coal, and petroleum coke against each other. Accordingly, GRU feels compelled to caveat its commitment to be "up to an average of 30 MW of biomass capacity", given the current estimates of fuel availability.***

EPAC Recommendation No. 5

- **City Commission should convene independent experts to peer review GRU's response to these counter proposals, and others proposals as may be deemed critical by the City Commission**
- ***Staff has discussed EPAC's intent for this recommendation with their Chair, Mr. Dunn. EPAC recognizes that experts in the same field can disagree; hence they see a need for developing a majority of opinion from a group of experts. Although it was not addressed by his committee, he concurred that the range of issues at hand would suggest more than one expert panel would be needed, perhaps one per recommendation made by EPAC. Furthermore he agreed that it would be reasonable to assume that the expert panels would most usefully be employed to review final designs and modeling work. With these objectives in mind, staff developed the following comments.***
- ***Recommendation 5 Part 1: Air Modeling and Health Impacts. GRU has retained qualified and experienced professional and licensed engineering firms to perform all air quality modeling. The results are entirely dependent upon the assumed facility designs, which are very conceptual to date. All of GRU's efforts are focused on knowing that a professional and independent audit of GRU's results will be performed by regulators as part of the permitting process. EPAC has questioned the validity of existing standards to protect public health and safety. These are currently under peer review at a national level. EPA recommendations regarding the existing NAAQS are expected in 2005. Furthermore GRU has queried a number of regulators, health organizations, and professionals involved in risk assessments. The pollutant of the greatest health concern for EPAC, PM_{2.5}, is expected to decrease due to the project. GRU is unaware of any study or modeling methodology to assess the potential health effects of particulates at the low levels of GRU's power plant emissions and resultant ambient air impacts. At the maximum point of impact, GRU's combined short term impacts contribute less than 3% of the ambient air quality standard. GRU does not believe that local resources are sufficient to develop a better level of peer review than currently underway by the EPA and as provided by permitting processes at the state and federal level.***
- ***Recommendation 5 Part 2: Greenhouse Gases. GRU agrees with EPAC that a committee of experts, provided with resources, can help develop greenhouse gas offsets that will be of value to the utility in the long run. Accordingly GRU will propose an expert panel process and a funding mechanism.***
- ***Recommendation 5 Part 3: Deregulation. Members of GRU staff are considered experts in this topic by their peers in the electric power***

industry. The General Manager was the President of the American Public Power Association and represented this organization in Congress on a wide range of industry restructuring issues. Bond rating agencies have complimented GRU's deregulation strategies and have mentioned them as best practices in a number of workshops and forums. GRU's staff earned awards from the Florida Municipal Electric Association for their work with Governor Bush's Energy 2020 Commission. Deregulation issues are central to GRU's long term planning, and at their heart, are all about competitively priced and reliable electrical supplies that meet customers' needs and expectations.

- *Recommendation 5 Part 4: Biomass. GRU agrees with EPAC that a committee of experts could help develop additional greenhouse gas offsets. GRU has already enlisted a wide range of experts from the University of Florida, the Division of Forestry, Silviculturalists, the forest product industry, tree surgeons, and wastewood collectors (Seminar/Workshop held February, 2004 and subsequent discussions. See attached letter from Don West, Forestry Center Manager, Florida Department of Agriculture and Consumer Services dated December 2, 2004). Additional participation by biomass experts would be appropriate as part of the Greenhouse Gas Fund proposal described above.*
- *Recommendation 5 Part 5: GRU Proposed Process Steps: As presented in the November 15 City Commission meeting, GRU has designed a process to provide two very powerful levels of peer review not addressed by EPAC. The first of these is to solicit bids against GRU's self-build option, and the second is to lock in purchased power agreements before finally committing to the project. These process steps were designed to assure that the proposed plan was in the best long term interests of the community.*

EPAC Recommendation No. 6

- **Following the outcome of the independent peer review the City Commission can set broad guidelines for GRU's path forward to provide for the community's future energy needs while controlling the impacts of the identified risk factors**
- *As outlined above, GRU agrees with EPAC that there are opportunities for local peer review to improve the project development process. However, GRU believes that substantial peer review has already occurred and that the process it intends to follow provides ample opportunities to change direction should changes in trends, information, or technology in the next three to four years warrant. GRU respectfully disagrees that additional peer review is needed for the City Commission to decide whether or not to proceed with plans to meet the Community's long term energy needs.*

FINDINGS FROM PM_{2.5} DISPERSION MODELLING
BASED ON EPA'S AP-42
PARTICULATE MATTER PARTICLE SIZE DISTRIBUTION
INSTEAD OF SITE SPECIFIC DATA
PERFORMED PURSUANT TO
ALACHUA COUNTY ENVIRONMENTAL PROTECTION DEPARTMENT AND
ALACHUA COUNTY ENVIRONMENTAL PROTECTION ADVISORY
COMMITTEE RECOMMENDATIONS

Gainesville Regional Utilities
December 2004

BACKGROUND

The November 15, 2004 report entitled "Technical Review of Gainesville Regional Utilities Integrated Resource Plan" prepared by the Alachua County Environmental Protection Department (EPD) expressed concern over the data GRU used to model ambient air concentrations of fine particulates. Specifically, Finding 11 and Section 4.2 of the EPD report addressed GRU's modeling of PM_{2.5} ambient air quality (particulates less than 2.5 microns in diameter). To address their issue, EPD suggested that GRU re-run the models using EPA's published values (AP-42) for the size distribution of particulate emissions, instead of the site-specific emission collected for GRU by University of Florida researchers (Lungren and Wu).

The Alachua County Environmental Protection Advisory Committee (EPAC) in their presentation to the Gainesville City Commission November 15, 2004 expressed the same concern.

RE-EVALUATION WITH AP-42 DATA

Although the use of site specific data is generally preferred, GRU had their consultant, Black & Veatch rerun the CALPUFF model previously employed to model the contributions of GRU's power plants to annual average and short term (24 hour) ambient air concentrations of PM_{2.5}. Previously, two scenarios had been evaluated, 1) current permit limits compared to future expected permit limitations, and 2) current operations (2003) compared to future expected operations. The previous "current permit to future permit" scenario demonstrated large reductions in all forms of PM, whereas the previous "actual compared to expected" Annual scenario demonstrated a slight increase in PM₁₀ and an 18% decrease in PM_{2.5}.

Because the previous "actual compared to expected" scenario was identified by EPD and EPAC as being the scenario most likely to be affected by the particle size distribution, this was the scenario GRU had re-evaluated with the EPA AP-

42 data. Only sufficient operational data is available to model annual average contributions. All other assumptions and methodologies were the same as described in the report entitled "Gainesville Regional Utilities Final PM_{2.5} Air Quality Modeling Study, addressing Past Actual Annual Emissions and Expected Future Actual Emissions" prepared by Black & Veatch, June 2004. The model results obtained with the AP-42 size distribution data, for the point of maximum impact in Alachua County, are compared below. The results are not materially different, with only a negligible increase in the results from current operations. There would still be a slight decrease in PM_{2.5} using the AP-42 data.

TABLE 1
 MAXIMUM CONCENTRATION IMPACTS IN ALACHUA COUNTY
 2003 ACTUAL OPERATION TO FUTURE EXPECTED OPERATION
 COMBINED POWER PLANT OPERATION
 PM_{2.5} Annual Average (µg/m³)

CASE	RESULTS FROM UF DATA	RESULTS FROM EPA AP-42 DATA
Actual Operations	.038	.038
Future Scenario	.031	.037

National Ambient Air Quality Standard is 15.0 mg/m³ for annual average PM_{2.5}

GREENHOUSE GAS OFFSET FUND PROPOSAL

Gainesville Regional Utilities
December, 2004

PURPOSE AND SCOPE

Gainesville Regional Utilities (GRU) is proposing to establish a funding source for the City Commission to use to acquire greenhouse gas offsets for climate protection and to provide carbon credits for its long term electrical supply plan. The funding source will be equal to 1% of the funds expended to develop the additional solid fuel generating capacity proposed as part of the long term energy supply plan. This is estimated to be roughly a total of \$4,700,000 for the period between 2005 and 2011. As part of the Greenhouse Gas Fund proposal, GRU is recommending that an advisory panel of experts be created to identify, prioritize, and recommend strategies for fund investment.

BACKGROUND

Expanding GRU's ability to use of coal and petroleum coke is expected to have substantial economic and strategic benefits for GRU's customers. A disadvantage of these fuels is their relatively high carbon content per unit heat compared to natural gas. This results in higher emissions of carbon dioxide (CO₂) per unit of electrical generation compared to natural gas. CO₂ is a greenhouse gas that contributes to climate change through its tendency to trap heat in the atmosphere.

Worldwide, countries that have subscribed to the Kyoto treaty have imposed carbon emission constraints upon themselves to address this issue. Most countries have adopted various market structures to achieve the desired results. Nonetheless, the use of coal and petroleum coke continues to expand globally. To overcome the carbon disadvantage of coal and petroleum coke, the use of greenhouse gas offsets is a widely accepted strategy for reducing overall carbon emissions.

GREENHOUSE GAS OFFSETS

Greenhouse gas offsets are methods by which the emission of greenhouse gases are either directly reduced (i.e. through energy efficiency), avoided by the use of renewable sources of energy, or mitigated by carbon capture and storage (sequestration). These offsets are attainable from many aspects of an economy, including agriculture, transportation, industrial, commercial and residential

sectors. Local policies such as land use, zoning, and development regulations can also play a role. The most cost-effective methods by which to achieve greenhouse gas offsets depend upon regional climatic, socio-economic, and natural resource characteristics, not to mention consumer acceptance.

During the public process it has been engaged in over the last 15 months, GRU has heard of many techniques the utility could implement to gain additional carbon offsets. Quantifying and prioritizing these opportunities presents a substantial task requiring a wide range of expertise in a number of different and often unrelated fields and technologies. Furthermore it is extremely difficult to establish realistic goals and objectives for local initiatives to reduce greenhouse gases. One way to assure an appropriate process is to enlist the aid of Gainesville's local experts on this topic. It is our recommendation that a greenhouse gas fund be established to acquire additional local carbon offsets, and that a Technical Advisory Committee of local experts be appointed to identify and prioritize these opportunities and make recommendations to the City Commission.

SIZE OF THE GREENHOUSE GAS FUND

The approach taken for sizing the Greenhouse Gas Fund was to invest the current value of the carbon credits needed to make the proposed solid fuel facility carbon neutral as compared to natural gas. This approach recognizes that the market is able to produce carbon offsets at this price, and presents the challenge of finding similar yields through local programs. It is also desirable to create a funding mechanism that provides a source of money through time. This will allow trial and error, and will promote a diversity of ideas with a minimum of administrative overhead.

GRU has already begun the process of developing CO₂ credits, for example by investing in a landfill gas to energy project, promoting energy efficiency and solar energy, and purchasing substantial acreage of development rights for well field protection. GRU estimates these projects currently provide about 255,000 tons per year of carbon offsets.

GRU proposes to add 220 MW of solid fuel electric generating capacity, of which approximately 30 MW on the average is expected be fueled with carbon neutral biomass. The proposed use of a blend of coal, petroleum coke, and biomass in the facility are less expensive than natural gas, even when it is assumed that the new facility might have to operate in an economy with carbon constraint costs of up to \$55 per ton of CO₂. At maximum capacity, this additional capacity is expected to increase carbon dioxide (CO₂) emissions by approximately 714,000 tons per year more than a similar facility fueled with natural gas. GRU already has an estimated 255,000 tons per year of CO₂ offset credits, thus an additional

459,000 tons per year of CO₂ offset is needed to make the proposed project carbon neutral with a similar facility fueled with natural gas.

The current market value for vintage 2005 CO₂ credits in the U.S.A. has averaged roughly \$1.50/ton in the last quarter (the Chicago Climate Exchange, www.chicagoclimatex.com). At this market value and if carbon credits could be obtained in a fully liquid commodity market, GRU would be able to obtain enough credits to offset 459,000 tons per year, for operations beginning in 2012 through 2041 (30 years) for a present value cost of \$4,900,000. This represents 1.5% of the non-interest expenditures (principal draws) associated with the retrofit of Deerhaven 2 and the additional 220 MW CFB generating unit. GRU recommends that this percentage be applied to the capital draws associated with developing the project as shown in Table 1.

TABLE 1
PROPOSED FUNDING MECHANISM

Fiscal Year	Projected Spending Plan	Principal Draw	Greenhouse Gas Fund
2005	2.0%	\$8,388,696	\$125,830
2006	3.0%	\$12,960,536	\$194,408
2007	2.0%	\$8,899,568	\$133,494
2008	14.0%	\$64,165,885	\$962,488
2009	41.0%	\$193,551,810	\$2,903,277
2010	33.0%	\$160,459,171	\$2,406,888
2011	5.0%	\$25,041,356	\$375,620
		Nominal Total	\$7,102,005
		Present Value Total	\$4,921,728

TECHNICAL ADVISORY COMMITTEE

The Committee's objective would be to identify, prioritize, and recommend strategies to use the Greenhouse Gas Offset Fund to obtain local greenhouse gas offsets to be used by the City of Gainesville to enhance climate protection and hedge its utilities' system position in the event that carbon constraints are imposed in the USA. Factors to be considered by the Committee could include potential economic development, synergy with other Commission objectives, promotion of the City Commissions land use and transportation objectives, and demonstration of beneficial technologies. Committee members would be selected by the City Commission from applicants representing pre-established criteria of professional experience, technical knowledge, and objectivity. The solicitation and selection process must be carefully thought out due to the fiduciary nature of the Committee's charge.

need. A market for these heavy fuels created by a lack of prescribed burning will encourage private landowners to help with this growing concern.

- There is enough waste wood and excess oaks that growing of plantations for just fuel wood is not necessary to meet your demand.
- Ten years ago there were a lot of small business owners that had short wood pulpwood trucks and worked independently in this county. Modern mechanization has put all of these people out of work, and I know of none in business today. A market for energy wood would help create an environment for these private individuals. The east side of the county has a lot of wood resources and a lack of jobs for its citizens; this would have to be positive economically for this area.

There are other benefits but I just wanted to highlight a few of those that the City Commission may not be aware of. Please share my thoughts with them and should they wish to speak to me or our biologist please have them contact me at (352) 955-6270 or www.westd@doacs.state.fl.us.

Sincerely Yours,

Don West
Forestry Center Manager



Florida Agriculture and Forest Products
\$53 Billion for Florida's Economy

REDUCED AIR EMISSIONS OF PARTICULATE MATTER FROM HARVESTING AND USE OF FOREST WASTE WOOD

Gainesville Regional Utilities
December 2004

BACKGROUND

Gainesville Regional Utilities (GRU) proposed long term electrical supply plan includes the harvesting and use of forest waste wood (biomass) to produce approximately 30 MW of electricity. The proposed 220 MW solid fuel power plant in which the biomass would be burned would include state-of-the-art technology to reduce all emissions, included a circulating fluidized bed to reduce SO₂, NO_x, and metals emissions, a polishing scrubber and a bag-house filter for particulate matter control. The solid fuel facilities at the Deerhaven plant are currently producing about 163 tons of particulate air emissions per year, which would increase by 65 tons per year to a new total of 228 tons per year.

It was observed at the November 15 City Commission that that much of the forest waste wood that would be harvested would otherwise be burned in the field, producing much more particulate matter than burning it in the controlled environment of a modern power plant. Staff has estimated this benefit.

METHODOLOGY

Emissions factors for open burning of forest residue are published in the USEPA Office of Air and Radiation, Office of Air Quality Planning and Standards, Emissions Factor Documentation for AP-42 Section 2.5, Open Burning as shown in Table 1 below.

TABLE 1
EMISSION FACTORS FOR
OPEN BURNING OF AGRICULTURAL MATERIALS:
FOREST RESIDUES

Refuse Category	Particulate (lb/ton)
Unspecified	17
Hemlock, Douglas fir, cedar	4
Ponderosa pine	12

The ponderosa pine category would be the most appropriate value for use in estimating emissions from forest residue open burning in north central Florida.

Actual emissions depend upon moisture content, burn technique (i.e., headfire or backfire), use of accelerants (e.g., diesel fuel, etc), fuel loading, and arrangement

(i.e., piles, rows or spread out). Particulate matter from most agricultural refuse burning has been found to be in the submicrometer range (E.F. Darley, *et al.*, *Air Pollution From Forest and Agricultural Burning*. California Air Resources Board Project 2-017-1, California Air Resources Board Project 2-017-1, University of California, Davis, CA, April 1974). Submicrometer particulates are smaller than one micrometer in diameter which can penetrate deep into the lungs.

RESULTS

Particulate emissions from burning 700 tons per day of wood waste in open piles, a common practice in the forestry industry, would be approximately 1533 tons per year (GRU December 2004 estimate, based upon USEPA AP-42 emission factors). If only half of the wood waste is burned in open piles and the other half is left to rot in the field, then the particulate emissions would exceed 766 tons per year and, in addition, methane will be released to the atmosphere by anaerobic digestion of the rotting wood. These results indicate that the air particulate emission reductions from the use of biomass (766 tons per year) are in the order of 10 times as great as the increase in particulate matter emissions from the proposed project (65 tons per year)

PROPOSED RENEWABLE ENERGY AND CONSERVATION GOAL

Gainesville Regional Utilities
December, 2004

The following goal is attainable by Gainesville Regional Utilities if the proposed long term electric supply plan, with the capacity to utilize forestry waste wood, is implemented.

“Meet an additional 10% of our customers’ electrical needs through renewable energy and conservation by 2012”.

This goal is higher than that of any other electric utility in Florida.

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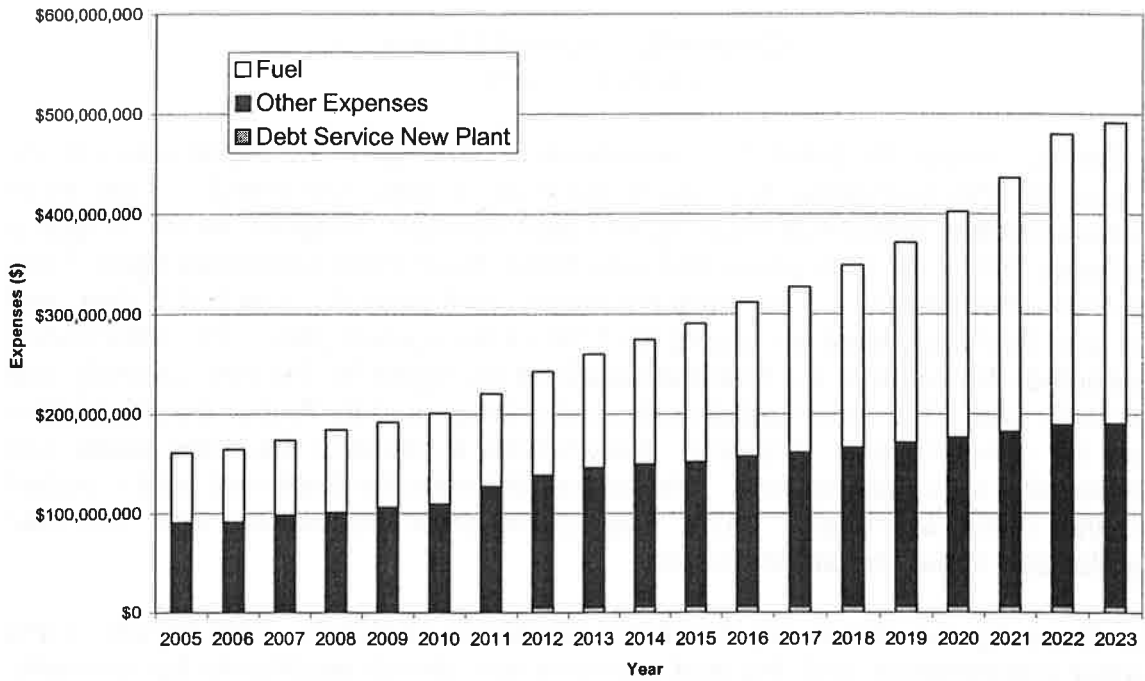
IMPACT OF FUTURE GENERATION SCENARIOS ON EXPENSES

Gainesville Regional Utilities
December, 2004

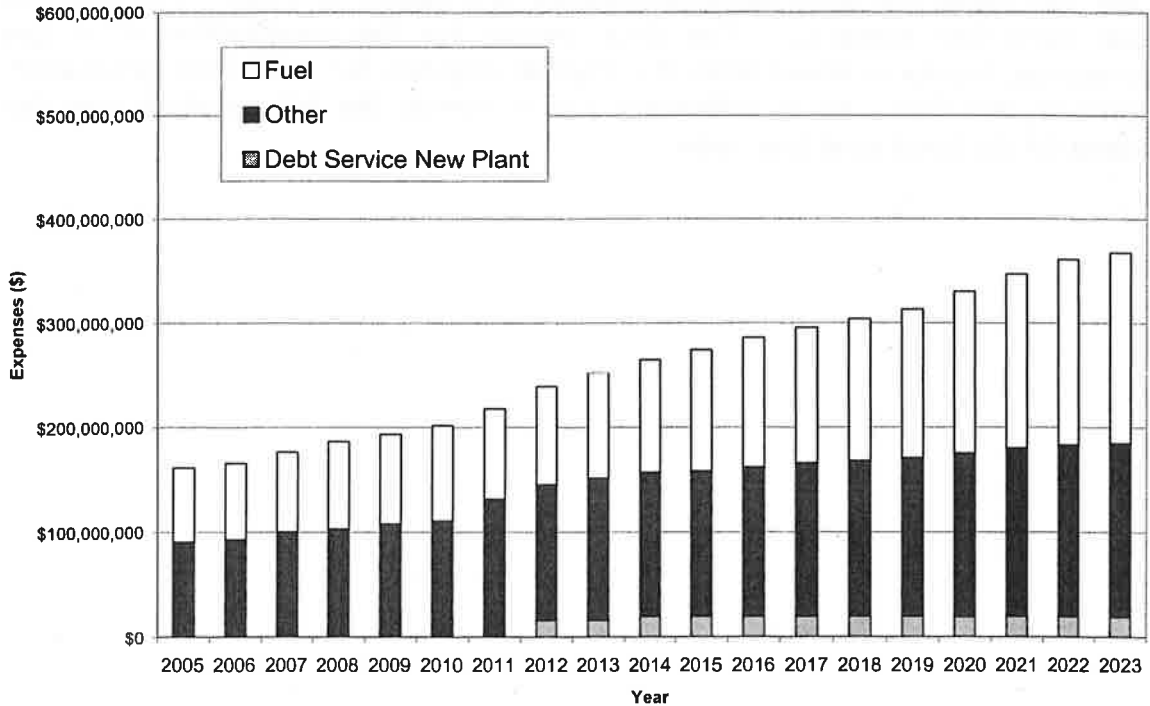
At the November 15, 2004 City Commission meeting further explanation of the impact of the scenarios for future generation was requested. The three scenarios were presented showing fuel and non-fuel components for a typical customer bill. The slide presented was titled "Base Rate Increases More Than Pay For Themselves." The three scenarios, rent capacity, gas build plan, and the solid fuel plan, were compared for 1,000 kWh consumption. The information presented showed that the fuel charge would be higher for the rent capacity and gas build plan. The solid fuel plan showed a lower cost for fuel and a price lower than the other options. However, the analysis to develop the rates made rate stabilization fund assumptions. The rate stabilization fund was not held constant for the three scenarios. The City Commission requested that the rate stabilization impact be standardized.

The three figures shown represent the scenarios analyzed. The impact of the capital expenditures and the fuel expense are shown separately by scenario. The amount of the fuel expense and debt service associated with new generation, as well as the fuel component is shown in relation to system expense. The rent capacity scenario shows a small debt service component. This debt service is associated with the Scrubber for the Deerhaven 2 retrofit. The fuel component for the rent capacity scenario is the highest. The gas build case has lower fuel than the rent capacity and higher fuel expenses than the build solid fuel scenario. The debt service for the construction of a gas generating facility is lower than the capital required for solid fuel generation. However, the fuel cost is sufficiently low to render the total system cost the lowest for the build solid fuel case.

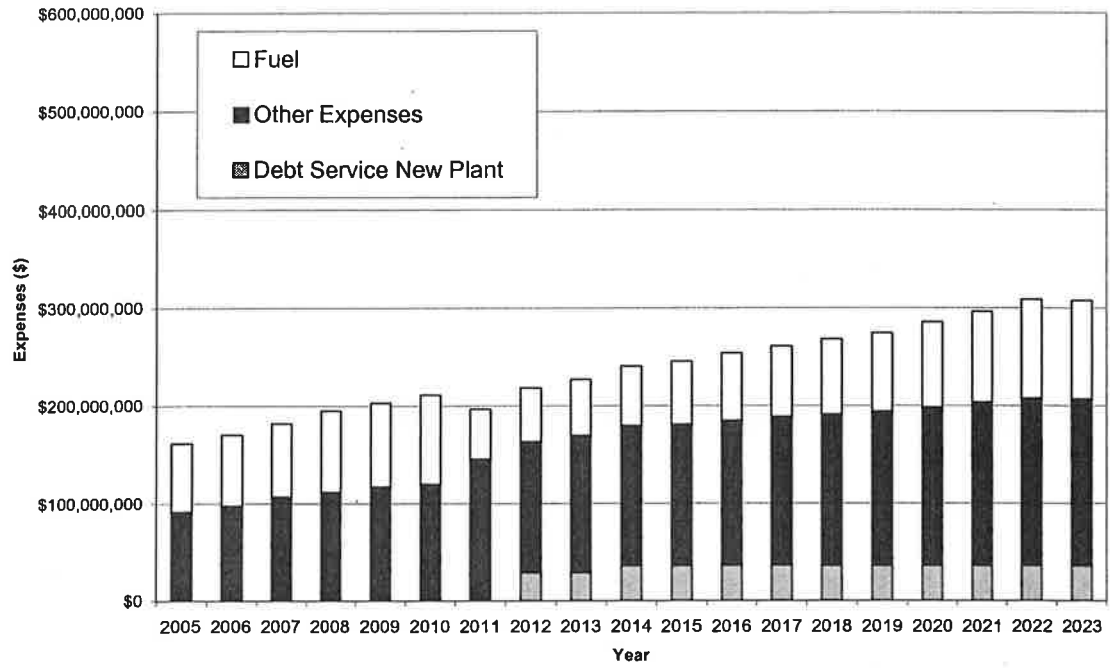
Rent Capacity (Scrubber) System Expenses by Category



Gas Build Case System Expenses by Category



Solid Fuel Build Case System Expenses by Category



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RESPONSE TO COMMENTS FROM
DR. PARKER, MR. FONOROW, AND MR. VAN SOESTENBERG

Gainesville Regional Utilities
December, 2004

Although numerous individuals have made comments during the Commission meetings on November 15 and 22, these three individuals had unique contributions or concerns that were not addressed by responses to other, more formal presentations addressed elsewhere.

On November 15, 2004 Dr. Parker commented that his son was developing a proprietary new technology for emission control.

Response: GRU staff has met with his son and it was mutually understood that the technology, which has not been tested other than on a bench scale, was not ready for commercial deployment any time soon. We have since heard that a scale up demonstration had been potentially funded. GRU is interested in following the progress of this technology. The process of soliciting bids against GRU's self build option could conceivably provide an opportunity for a proponent of a new technology to receive corporate support from an organization willing to provide performance guarantees to GRU.

On November 22, Mr. Fonorow made comments that indicated his belief that GRU staff was unwilling to out-source any of the proposed conservation programs. He used the example of a pre-bid meeting (related to a new conservation program) which he alleged was arranged to preclude bidders, since he was the only attendee. Mr. Fonorow also alleged that the reason that he had not responded to GRU's RFP for innovative demand side management programs was onerous language which did not protect any of a submitter's intellectual property from the public domain.

Response to the out-sourcing issue: Mr. Fonorow was the only attendee because the meeting had been cancelled and every other potential attendee had registered intent to bid with a phone number or e-mail that allowed them to be notified of that cancellation in a timely manner. Mr. Fonorow did not provide this information and could not be contacted.

Response to the RFP issue: It is common practice for GRU to inform bidders that it may not be able to protect proprietary information in an open bidding process due to Florida's public record laws. Specifically, GRU has a section in their bid package titled Selection and Intellectual Property. GRU retains the right to use any part of, or none of the applications submitted pursuant to the Request for Proposal (RFP). The bidders were informed that all information included in any proposal submitted pursuant to a RFP will be reviewed through a process

Mr. Ed Regan
 Gainesville Regional Utilities
 December 8, 2004
 Page 2

Annual Energy Outlook (“AEO 2004”). Also as shown below the high and low based gas fuel price forecasts are projected to be 128 percent and 72 percent of the base fuel price forecast by the year 2025.

GRU Revised Fuel Price Forecast ^[1]

	Delivered 2.7% Sulfur Coal (\$/MMBtu)			Delivered PET Coke (\$/MMBtu)			Delivered Gas (\$/MMBtu)		
	Low	Base	High	Low	Base	High	Low	Base	High
2011	1.99	1.99	2.35	.79	1.06	1.59	4.65	4.91	5.19
2025	2.54	2.81	3.80	1.24	1.65	2.48	6.53	9.08	11.64
% of Base in 2011	100%	--	118%	75%	--	150%	95%	--	106%
% of Base in 2025	90%	--	135%	75%	--	150%	72%	--	128%

[1] There were no changes to coal or pet coke prices. Prices are shown for comparison to gas prices only.

GRU’s actual historical weighted average cost of gas and the previous and revised annual projected prices for the base, low band and high band gas fuel price forecasts for the years 2004 through 2025 are shown on Attachment 1 and Figure 1. As this data indicates, the revised base, low and high gas fuel price forecast, which projects a down turn in gas prices from current levels, is projected to be lower than the previous forecast. Since the coal fuel price forecast was not changed, this revision has resulted in a reduced spread between gas and coal prices for the base case and sensitivity cases compared to under the previous forecast.

CONCLUSIONS

Based on our review of the Revised Gas Fuel Price Forecast, we believe that GRU has prepared a revised base gas fuel price forecast that is (i) projected to be lower than the previous gas fuel price forecast, and (ii) results in a spread between gas and coal fuel prices consistent with the spread indicated in the AEO 2004, both as addressed in our November 9, 2004 Letter. Also, GRU has developed a low and high band set of natural gas price projections that cover a reasonably wide range about the revised base gas price.

We appreciate the opportunity to assist GRU with the Integrated Resource Plans and are available to answer any additional questions concerning this letter and our November 9, 2004 Letter.

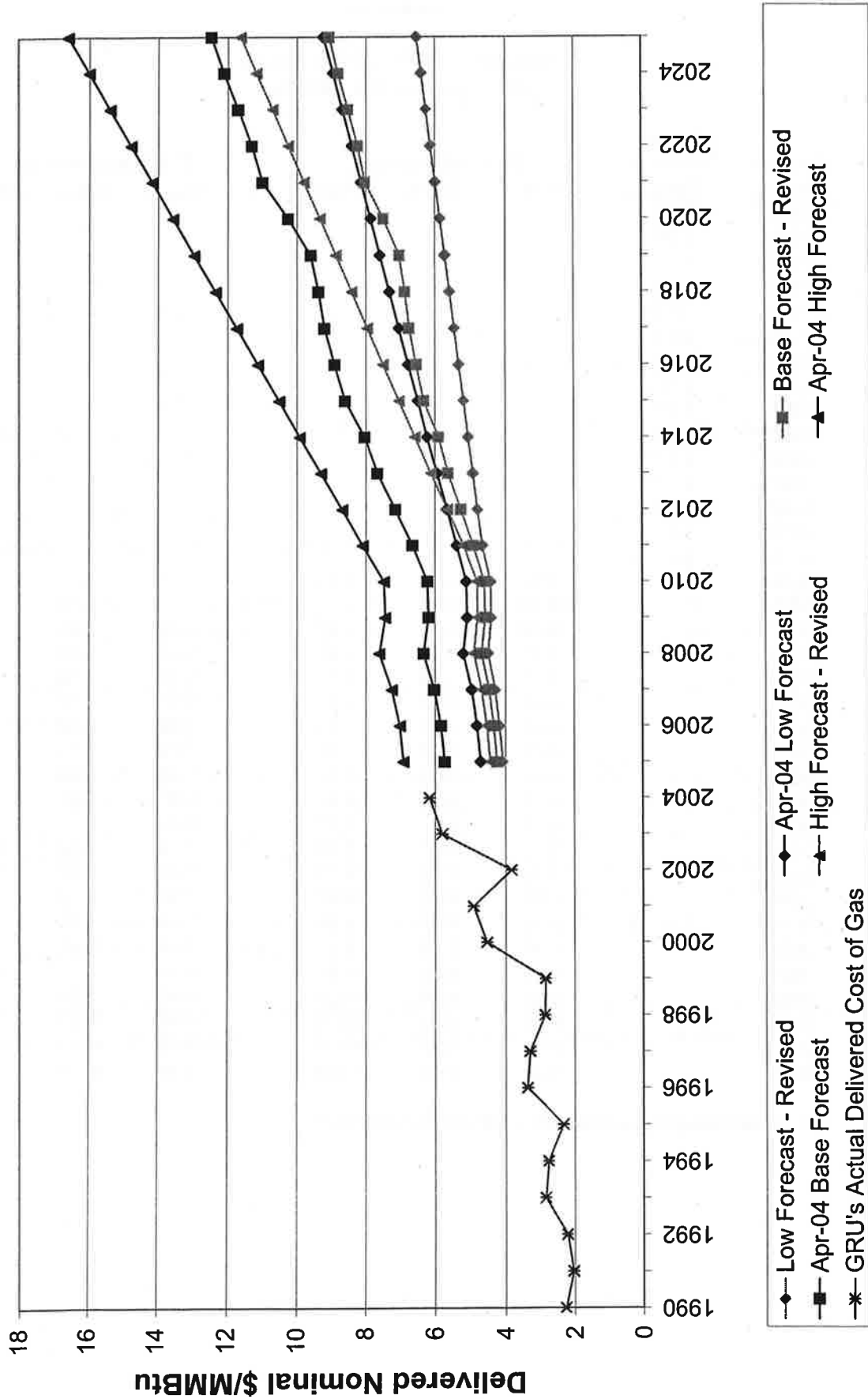
Respectfully submitted,

R W Beck, Inc.

Attachments

Figure 1

Natural Gas Price Forecasts



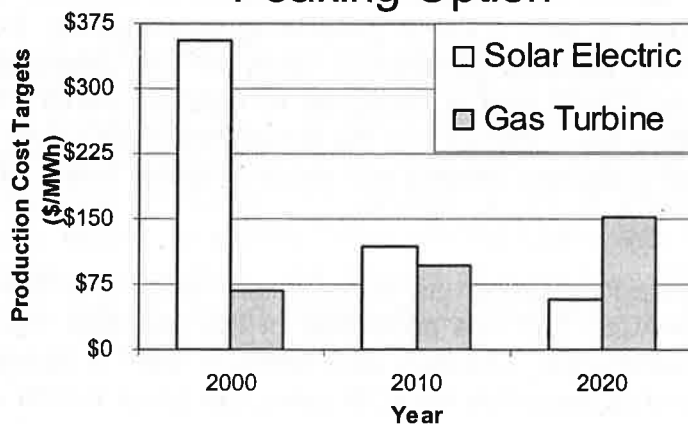
data and revised as warranted by that data. The PM_{2.5} standard is currently in the final stages of such a review. EPA recommendations regarding the existing NAAQS are expected to be made in 2005. It is important to note that EPA is required to establish NAAQS based only on health impacts and cannot by law consider the cost of compliance when setting NAAQS.

GRU is unaware of any study or modeling methodology to assess the potential health effects of particulates at the low levels of GRU's power plant emissions and resultant ambient air impacts. At the maximum point of impact, GRU's combined short term impacts contribute less than 3% of the ambient air quality standard.

3. Request that GRU provide relative costs for alternative energy technologies that include market externalities, and estimate when these technologies will likely become competitive with coal;

Response: The relative cost effectiveness of various renewable energy technologies, using the highest price externalities that are applied by any state in the USA may be found in Chapter I of the Document entitled Alternatives For Meeting Gainesville's Electrical Requirements Through 2023 by Gainesville Regional Utilities, December 2003. This information will be excerpted and provided to the BoCC. GRU has performed detailed evaluations of when photovoltaic (solar) electricity might theoretically become cost effective, as shown in the figure below provided to the Gainesville City Commission on November 1, 2004.

Photovoltaic Electricity May Some Day Become A Viable Summer Peaking Option



Source for Solar Data: "REDUCING THE COSTS OF GRID-CONNECTED PHOTOVOLTAIC SYSTEMS" ASME Solar Forum 2001

4. Request a weatherization report from GRU, including input from JEA, the Orlando Utility (OUC), FPL and Clay Electric.

Response: Last year GRU provided financial assistance for the weatherization of 26 low income dwellings in cooperation with the Central Florida Community Action Agency. OUC, FPL, and Clay Electric all participate in similar Low-Income Weatherization activities through a variety of programs (that are difficult to quantify), as follows:

OUC

Partners with City of Orlando

60 homes per year

\$1000 per home

JEA

Assists the Jacksonville Housing Authority in weatherizing low-income homes by participating in the evaluation process.

FPL

Assists agencies in weatherization programs by providing energy audits and up to \$154 in incentives for duct sealing.

Gainesville has contracted with the Community Energy Cooperative to develop a multi-agency, coordinated approach to low income household weatherization. The Community Energy Cooperative will develop a process to bring together service providers from throughout and beyond the community to pool their resources and take advantage of the core business competencies (e.g., income verification, weatherization services, energy auditing, etc.) of each organization. The Greenhouse Gas Offset Fund currently being proposed by GRU might be applied to this purpose, depending on the competing proposals.

