ICF FINAL REPORT (RFP No. 2005-147)
CITY OF GAINESVILLE ELECTRICAL SUPPLY NEEDS

EXECUTIVE SUMMARY AND DECISION MATRIX

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BACKGROUND

ICF Consulting has performed an independent assessment of possible electrical supply alternatives for the Gainesville Community. This assessment consisted of detailed study of the possible economic and environmental consequences of each plan under a variety of scenarios. Staff has been requested to summarize the key findings of this study and develop a means by which the weight (or relative importance) given to each evaluation criteria to be explicitly examined and varied.

PURPOSE AND SCOPE

Staff has developed a "Decision Matrix" to allow the City Commission to apply different weights (or relative importance) to each evaluation criteria. This will allow the Commission to study the effects of various policies upon the relative ranking of the options being studied. The purpose of this report is to document the development of the Decision Matrix, which is based only upon ICF's assumptions and findings. The criteria included in the Decision Matrix are: a) affordability, b) environment and public health, c) carbon emissions, d) economic development, and c) price volatility (exposure to high electrical rates due to high natural gas or oil prices). Note that ICF did not present any information to differentiate between the options based upon reliability or energy security.

This report is organized into three sections, as follows:

1. A review of the five energy supply options (or "plans") that were used as inputs to the evaluation process.

2. A summary of the financial and environmental evaluations of these plans, as well as a discussion of parameters used to rank each option based upon the following evaluation criteria:
    a. Electric rates and revenue requirements.
    b. Environment and Health Effects.
    c. Carbon Emissions.
    d. Local Economic Development.
    e. Price Volatility (exposure to high natural gas and oil prices).

3. A discussion of how the ranking factor for each criterion is computed.

All page numbers and references in the following text apply to ICF's March 1, 2006 final report, City of Gainesville Electricity Supply Needs (RFP No. 2005-147), unless otherwise stated.

FIVE ENERGY SUPPLY OPTIONS

The five of the energy supply options evaluated are summarized in Table 1. The evaluations were designed to allow identification of the possible merits and shortcomings of each option. Each option was evaluated with a common in-service date, an assumed capacity and treated as mutually exclusive. ICF performed all of the analyses used in this review except for the revenue requirements associated with the natural gas combined cycle option, and the electric rates that would be associated with the revenue requirements for each option. Staff performed the NGCC and rate impact evaluations upon the Commission's request using ICF's load and energy, fuel price, cost, performance and market condition assumptions.

TABLE 1
ENERGY SUPPLY OPTIONS EVALUATED
($x 1,000,000)

PLAN CHARACTERISTICS	PLAN				
	1	2	3	4	5
Short Hand Label	CFB	IGCC	Small CFB + Max. DSM	Maximum DSM	NGCC
Conservation Cost-Effectiveness Test Used In Forecast	RIM	RIM	TRC	TRC	RIM
Base Load Capacity	220 MW	220 MW	75 MW	None	240 MW
Fuel For Base Load Unit	Coal Pet Coke Biomass	Coal Pet Coke Biomass	Biomass	Not Applicable	Natural Gas
Installed Cost [a] ($2003)	$470	$445	$229	$44	$129
Annual Fuel Cost For New Base Load Unit[b] ($2012)	$32/yr	$26/yr	$14/yr	$0/yr	$86/yr

RIM- Rate Impact Measure
TRC- Total Resource Cost
DSM – Demand Side Management
CFB – Circulating Fluidized Bed
IGCC – Integrated Gasification Combined Cycle

a. Exhibit 4-10, p. 121, ICF Report.
b. Exhibit 4-10, p. 121 and Exhibit 5-15, p. 136, ICF Report.

STUDY SCENARIOS

Each plan was evaluated under 18 different scenarios, including two load and energy forecasts (base and high, see page 41), three natural gas price forecasts (low, base and high, see page 43), and three carbon allowance cost scenarios (none, medium, high, see page 41). Note that in effect, four load and energy forecasts were actually employed. The "base" and "high" load and energy forecasts used to evaluate options 3 and 4 were lower than the ones used for options 1 and 2. This modeled the effects of implementing the maximum cost-effective energy conservation based on the Total Resource Cost test. The average results from the 18 scenarios from each plan were used.

RATES AND REVENUE REQUIREMENTS

Table 2 summarizes some of the key financial and operating results developed for each of the plans. Each option required additional peaking capacity whose costs were included in the generation revenue requirements. Each option also had widely different requirements for off-system purchases. The Revenue requirements for generation included debt service, fixed and variable operation and maintenance costs, fuel costs, and off-system purchases, as well as offsetting revenues from off-system sales. The effects on rates took into account all utility costs, such as transmission and distribution, as well as generation. The figure of merit selected for decision analysis was the typical residential bill in 2025, as an indicator of affordability.

TABLE 2
FINANCIAL AND OPERATING RESULTS
STUDY PERIOD 2006-2025
Average of All Cases Studied

PLAN CHARACTERISTICS	PLAN				
	1	2	3	4	5
Short Hand Label	CFB	IGCC	Small CFB + Max. DSM	Maximum DSM	NGCC
Additional Combustion Turbine Peaking Capacity Requirement[a] (MW)	159	141	174	249	140
Average Annual Energy Purchases MWH per Year[b]	-98	-151	357	731	3
Generation Revenue Requirements [c] ($NPV x 1,000,000)	$2,067	$1,904	$2,096	$2,085	$3,236
Typical Residential Bill (1,000 kWh)[d] $ per Month	$167.68	$157.54	$180.59	$181.77	$179.51

a. All options assumed 30 MW firm contractual peaking capacity. Exhibit 8-26, p. 207, ICF Report
b. Negative sign indicates net sales. Exhibit 8-26, p. 207, ICF Report

c. Exhibit 8-8, p. 195, ICF Report.
d. Note that the revenue requirements for plans 3 and 4 have fewer megawatt-hours associated with them. GRU calculations for March 6, 2005 City Commission Meeting, based on Exhibit 8-8, p. 195, ICF Report.

ENVIRONMENTAL AND HEALTH EFFECTS

Table 3 summarizes the key findings from analysis of potential emissions. All of these levels of emissions are well below regulatory standards, and Alachua County's air is considered to be clean. Models typically applied on a regional level were applied to these plans to estimate the monetary value of the health effects that might be assigned to these emissions. A wide range of monetary health cost impacts were estimated for each option. ICF's discussion of these results indicates their belief that the differences between the options are not significant (see Exhibit 36). In order to most sensitively capture the difference between each plan across a range of parameters, the midpoint of the range of monetary health effects from the additional unit plus effects from off-system purchased power was selected as a figure of merit for subsequent analysis.

TABLE 3
ENVIRONMENTAL EMISSIONS[a] AND HEALTH EFFECTS

Parameter	Energy Supply Option				
	1 **CFB**	2 **IGCC**	3 **Small CFB + DSM**	4 **Max DSM**	5 **NGCC**
SO_2	780	664	15	0	0
NO_x	517	143	76	0	76
Hg	< 0.01	< 0.01	< 0.01	0	0
PM	117	not estimated	not estimated	0	< 0.01
Compliance with Ambient Standards	Yes	Yes	yes	yes	yes
Health Effects in 2020 - New Unit plus Purchased Power [b]	$5-50	$3-30	$2.5-25	$2-20	not estimated
Health Effects in 2020 - Total [b]	$14-140	$12-120	$11-110	$11-110	not estimated

a. Exhibit 6-12, p. 166, ICF Report.
b. Exhibit 6-17, p. 179, ICF Report, 2003 dollars in millions.

CARBON EMISSIONS

Table 4 compares each of the contribution of carbon to the atmosphere estimated for each option. Biomass was assumed to be carbon neutral. Both local and regional carbon emissions are presented due to the carbon required for the purchase of off-system power. Although carbon is a global issue, local carbon emissions were chosen as the figure of merit to better reflect the hedge local carbon reductions provide against carbon taxes. In some scenarios, ICF

assumed that up to 100% biomass was consumed in the CFB and IGCC scenarios, which is not a possibility for the NGCC option.

TABLE 4
CO_2 EMISSIONS[a]
Cumulative Millions of Tons
2006-2025

Parameter	Energy Supply Option				
	1 **CFB**	2 **IGCC**	3 **Small CFB + DSM**	4 **Max DSM**	5 **NGCC**
New Units + Purchased Power	45	43	29	30	44
Total Power Region	7,567	7,565	7,559	7,563	7,566

a. Exhibit ES-31, p. 24, ICF Report.

ECONOMIC DEVELOPMENT

The effect of the various options on local economic development was evaluated by ICF as the numbers of local jobs created during the installation and operation of each, both directly and indirectly. The number of job-years over the planning period was chosen as the figure of merit for analysis.

TABLE 5
JOB CREATION[a]

Parameter	Energy Supply Option				
	1 **CFB**	2 **IGCC**	3 **Small CFB + DSM**	4 **Max DSM**	5 **NGCC**
Total number of job years 2006-2025	13,192	11,986	18,288	1,500	n/a

a. Exhibit ES-35, p. 26, IFC Report.

PRICE VOLATILITY

Risk is associated with a variety of aspects of each option, most of which were discussed qualitatively by ICF as shown in Table 5 below. However, the effect of load, fuel price and carbon costs on each of the options were evaluated

quantitatively. Some of the options resulted in much higher electric rates than others under the scenarios of high fuel prices. This sensitivity was apparent in the range of revenue requirements across the 18 scenarios evaluated for each option (highest NPV revenue requirement – lowest NPV revenue requirement). This range was chosen plan as the figure of merit for analysis to represent this evaluation criterion.

TABLE 5
QUALITATIVE AND QUANTITATIVE FINANCIAL RISKS[a]

Adverse Risk Due To:	**Energy Supply Option**				
	1 **CFB**	2 **IGCC**	3 **Small CFB + DSM**	4 **Max DSM**	5 **NGCC**
Performance/Capital Cost/Financing Penalties	**Low**	**Medium High**	**Medium High**	**Medium High**	**Low**
High Market Power and/or High Oil/Gas Prices	**Low**	**Low**	**High**	**Highest**	**High**
Low Gas Prices	**Medium**	**Medium**	**Low**	**Low**	**Low**
Range in NPV of Revenue Requirements [b]	758	720	812	952	1270

a. Exhibit ES-36, p. 28, ICF Report.
b. Exhibit 8-8, p. 195, ICF Report, and results of 18 EGEAS scenarios for NGCC

RANKING FACTORS

Normalized ranking factors were required in order to allow the weights to be applied to each criterion to be compared directly to each other in terms of relative importance. Furthermore, ranking factors were required that were consistent in the meaning of their direction, e.g. a larger value would be better than a smaller value. The factors employed here were designed such that a higher score would be "better" and the "best" option would have the highest overall score. Finally, numerical criteria were employed to allow the ranking factor for each option to be scaled relative to other options. Scaled ranking, as opposed to simply assigning a numerical order (e.g. high, medium, low) adds information to the analysis in terms of the distance between rankings as well as the relative order. Scaling was accomplished by linear interpolation between the low and high scores as follows:

1. Affordability
   - Lowest residential bill = 5
   - Highest residential bill = 1
2. Environment and Health
   - Lowest mid-range of $ costs = 5
   - Highest mid-range of $ costs = 1

3. Climate Protection
   - Lowest carbon emissions = 5
   - Highest carbon emissions = 1
4. Economic Development
   - Highest Job-Years = 5
   - Lowest Job-Years = 1
5. Price Risk Exposure
   - Lowest NPV range = 5
   - Highest NPV range = 1

The results for each criterion and each option are presented in Table 6 below. The monetary health effects and job creation for NGCC option were not estimated by ICF for the NGCC option. For completeness, staff assigned values for these criteria, guided by the levels of emissions and construction costs compared to the other options. Assigned values are in italics.

TABLE 6
UNWEIGHTED RANKING FACTORS FOR EACH OPTION
AND EACH CRITERIA

FACTOR **5** = Best 1 = Worst	**CFB**	**IGCC**	**Small CFB + DSM**	**Max DSM**	**NGCC**
Residential Bill -$/Month	$167.68	$157.54	$180.59	$181.77	$179.51
Rank	**3.33**	**5.00**	**1.19**	**1.00**	**1.37**
Health Effects -$M/Year	$22.50	$13.50	$11.25	$9.00	*$9.00*
Rank	**1.00**	**3.67**	**4.33**	**5.00**	**5.00**
$CO_{2\ (tons)}$	45	43	29	30	44
Rank	**1.00**	**1.50**	**5.00**	**4.75**	**1.25**
Number of Job Years	13,192	11,986	18,288	1,500	*11,986*
Rank	**3.79**	**3.50**	**5.00**	**1.00**	**3.50**
Revenue Risk -NPV $M	$758	$720	$812	$952	$1,270
Rank	**4.72**	**5.00**	**4.33**	**3.31**	**1.00**

RELATIVE IMPORTANCE

The Relative Importance score is used to compute the percentage weight assigned to each of the evaluation criteria in order to develop overall composite rankings in the Decision Matrix. The percentage weight is computed as the

Relative Importance for a given evaluation criterion, divided by the sum of Relative Importance score for all the evaluation criteria. It is a simple technique used to avoid the necessity of having to be sure that the numerical weights sum up to 100%.

A spreadsheet has been prepared to allow the Commission to discuss and assign Relative Importance scores interactively.