SECTION 4 – DEMAND SIDE ISSUES (Updated on March 21, 2006)

1. Introduction

In the Final ICF Report, published on March 1st, ICF has increased its estimates of additional[1]cost effective DSM peak demand savings by 2015 from 6.8 percent to 9.7 percent, a dramatic increase. ICF has also increased its estimates of the maximum achievable cost effective kWh savings potential by 2015 from 4.2 percent to 5.3 percent. It is also important to note that in its Final Report, ICF has adjusted its per unit cost estimate for residential solar water heating systems from $3,656 to $2,323. GDS finds that ICF's estimates for the potential savings from DSM programs is indeed now moving in the right direction, but more work and refinement is needed.

GDS has carefully reviewed Chapter 3 of the final version of the ICF Study, dated March 1, 2006) and the appendices that relate to DSM options and we have determined that the analysis of DSM options conducted by ICF is a good start, but the analysis still falls short in several respects, and it underestimates the maximum achievable cost effective potential savings from DSM and demand response measures. After thoroughly reviewing the March 6, 2006 Powerpoint Presentation done by David Pickles of ICF, GDS has updated the DSM section of our review to address comments made by ICF on March 6th, and we have added several footnotes to our report to clarify our review of the DSM portion of the ICF final report. GDS stands by our conclusion that there are still numerous energy efficiency, load management, and demand response measures that ICF simply did not examine. In addition, the ICF final report of March 1, 2006 still does not provide adequate data sources or documentation for the costs, savings, useful lives and applicability factors for the DSM measures that ICF considered. This new GDS review supersedes our initial analysis of the draft ICF report that GDS completed on February 28th.

GDS has identified several other underlying DSM assumptions and methodology decisions made by ICF that certainly need further review and discussion before they should be accepted by the City Commission. The Final ICF report has significantly higher estimates of the DSM savings potential by the year 2015 in the City of Gainesville. First, ICF has revised their estimate of the maximum achievable reduction in peak demand from additional DSM programs upward to 9.7%[2] by 2015. The comparable figure in the draft report was 6.8 percent. ICF has also revised their estimate of the maximum achievable reduction in annual kWh sales from additional DSM programs to 5.3%[3] of annual kWh sales (kWh sales before DSM) by 2015. ICF

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[1] GRU's 2005 Ten-Year Site Plan states on page 26 that the GRU system forecast includes the effects of program implementations scheduled through 2014. The kW and kWh impacts of these planned program implementations are shown in Table 3.1 on page 44 of the Ten-Year Site Plan.

[2] Table 3-5 on page 68 of the Final ICF report shows that DSM provides 56 MW of savings by 2015, which is 9.7 percent of total GRU peak load before consideration of DSM savings. The comparable figure in the ICF draft report was 6.8 percent. The new 9.7 percent estimate is ICF's estimate of potential MW savings. This is not a GDS produced estimate.

[3] Table 3-6 on page 69 of the Final ICF report shows that DSM provides 143 GWH of savings by 2015, which is 5.3 percent of total gWh sales before consideration of DSM savings. The comparable figure in

provided no explanation in their final report on why the DSM savings potential estimates have increased so dramatically. The significant increase in the potential DSM savings included in the ICF Final Report corroborates GDS' analysis that the DSM savings estimates in the ICF draft report were far too low.

The GDS review of February 28, 2006 found that ICF's initial estimates of the maximum achievable savings potential for DSM were unrealistically low when compared to findings of other recent energy efficiency potential studies, and when compared to actual DSM achievements made by other leading DSM municipal utilities (for example, the Sacramento Municipal Utility District). In fact, ICF's recent 2005 study for the State of Georgia estimated maximum achievable cost effective kWh savings of 9% by 2015, **over twice** ICF's initial 4% potential savings estimate included in the ICF draft report for the GRU service area. GDS recommends that the Gainesville City Commission request that ICF address all of the DSM methodology and assumptions issues listed in this updated GDS review, and that ICF report back to the City Commission with updated estimates of MW, MWH and dollar savings as soon as possible for the alternative scenarios examined by ICF that involve DSM.

There exist other municipal electric utilities in the United States that have achieved far higher electricity savings from DSM programs than the City of Austin, Texas. The City of Gainesville should examine the DSM savings achievements of such municipal utilities as the following:

- City of Burlington, Vermont (has saved **17%** of annual kWh sales, **22%** of peak demand)
- City of Eugene, Oregon (has saved **17%** of annual kWh sales, **15%** of peak demand)
- Sacramento Municipal Utility District (has saved **10%** of annual kWh sales, **15%** of peak demand)

GDS has included in our review a detailed comparison of how GRU's DSM savings compare to other electric utilities in the US. It is clear that other municipal utilities have achieved far, far more than the 4% to 5% kWh savings (savings as a percent of annual kWh sales) that ICF estimated in their draft and final reports as the maximum achievable savings for GRU.[4] GDS has included all of the statistical data on the DSM performance of electric utilities in the U.S. in Appendix A to the GDS February 28, 2006 report. GDS recommends that GRU aim for DSM performance of the top-ranked DSM utilities in the country, such as the three municipal utilities listed above.

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the ICF draft report was 4.2 percent. The new 5.3% estimate is ICF's estimate of potential annual kWh savings from DSM by 2015. This is not a GDS produced estimate.

[4] GDS agrees with ICF that it is necessary to add to the impacts of "additional DSM programs" already included in the base case load forecast that is included in the GRU Ten Year Site Plan. IN the year 2015, this would add 1% savings for kWh sales and .9% savings for summer peak demand. If one adds the annual kWh savings from DSM in 2015 already in the forecast to the additional potential savings of 5% of annual kWh sales form energy efficiency programs, then ICF's estimate of potential kWh savings increases to 6.3%, still a relatively small amount compared to other studies.

The City of Gainesville is at key decision point in its energy and environmental future. GDS has determined that there still are several additional very cost effective DSM and demand response options that need to be examined by ICF in order for the City Commission to have a complete foundation on which to base a decision on whether to build a new 220 MW coal plant. In addition, the City Commission must recognize that if a new 220 MW coal plant is constructed, and the GRU grid has excess capacity, GRU will have little or no incentive to pursue aggressive DSM programs. A decision to build a new 220 MW coal plant could be the "death knell" for aggressive DSM programs.

The key findings from our review of the ICF DSM analysis are provided below.

2. Energy Efficiency and Load Management Options Not Examined by ICF

The revised ICF maximum achievable cost effective amount of peak load reduction from DSM of 49 MW (this figure was 40 MW in the draft report) by ten years from 2006 (in 2015) appears to be a realistic figure given the limited range of DSM measures and technologies that ICF included in its analysis. There are, however, numerous additional commercially available energy efficiency, load management and demand response measures that ICF did not include in its analysis that should be considered. Notably absent, for example, from the list of programs (see Figure 3-29 on page 79 of the ICF report) is a commercial new construction program. It is important to note that ICF did not dispute this finding by GDS during the ICF March 6, 2006 Powerpoint presentation by David Pickles. In addition, ICF states in its final report that it did not develop any estimate of potential DSM savings for the industrial sector at all. **If ICF had included these additional energy efficiency, load management, and demand response measures and programs, and if ICF had examined potential savings for the industrial sector, the potential peak savings and kWh savings would be much, much greater.**

Based on GDS' new and thorough review of the ICF Final Report and the ICF March 6th presentation, examples of residential sector energy efficiency measures that ICF did not examine in its Final Report include the following measures[5]:

- LED lighting in the residential sector[6]
- Inefficient room air conditioner buy-back program[7]

[5] According to the March 6, 2006 ICF Powerpoint Presentation to the Gainesville City Commission, ICF either agreed that it did not examine the DSM technologies listed below, or ICF did not disagree with the GDS assessment that ICF failed to examine these DSM technologies.

[6] This measure is not included anywhere in the ICF draft or final report. The March 6, 2006 ICF presentation to the City Commission states that ICF did not examine this measure. ICF states that it did not examine LED lighting in the commercial sector because ICF does not believe the LED lighting is commercially available or cost effective. Thus it is true that ICF did not include LED lighting in their assessment of DSM savings potential. It is important to note that LED lighting technologies, such as Christmas lighting, are commercially available.

[7] In a buyback program, a utility pays a "bounty" (a financial incentive) to buyback an old, inefficient appliance to remove it from the electric grid. Southern California Edison is an example of a utility that has implemented such buyback programs. According to ICF's March 6, 2006 presentation to the City Commission, ICF did examine residential high efficiency room air conditioners as a measure, but ICF did not examine a buyback program to remove inefficient room air conditioners from the GRU grid.

- Instantaneous electric water heaters[8]
- 1 kWh/day refrigerator (for residential sector)[9]
- High efficiency pool pump system[10]
- Zero energy homes[11]

Examples of commercial and industrial sector energy efficiency measures that ICF did not examine include the following measures:

- LED signage in the commercial sector
- Advanced unitary HVAC compressors
- Advanced HVAC fan motors
- High efficiency pool pump system
- Commercial T-5 lighting[12]
- High performance T8 lamps and ballasts
- CFL torchieres
- Solid state exit signs
- Vending miser
- Water source heat pumps
- Air to air heat pumps
- Fluorescent daylighting dimming controls
- Daylighting dimming and high-low controls
- Heat recovery options from compressors and condensers
- Heat pump water heaters

Examples of agricultural sector energy efficiency measures that ICF did not examine include the following measures:

- Plate exchanger
- Vacuum pump with VFD
- Scroll compressor
- High volume low speed fans

Examples of fuel switching technologies that ICF did not examine include the following measures:

- Electric-to-gas water heating (residential and all commercial categories)
- Engine-driven chillers and unitary equipment (large commercial buildings)

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[8] The March 6, 2006 ICF presentation agreed that ICF did not examine this measure. ICF stated that they did not examine this measure because ICF did not believe that they would be cost effective.
[9] During his oral presentation on March 6, 2006, David Pickles of ICF stated that ICF did not examine this specific high efficiency refrigerator. The ICF presentation states that this high efficiency refrigerator DOES indeed provide additional energy savings over the ENERGY STAR refrigerator.
[10] The March 6, 2006 ICF Powerpoint Presentation to the City Commission said that ICF should have examined high efficiency swimming pool pumps and that this is a "good idea" from GDS.
[11] In its March 6, 2006 presentation, ICF did not address Zero Energy Homes.
[12] In its March 6th Powerpoint presentation, ICF stated that it did not include an assessment of energy savings from T-5's because ICF believes that T-5s do not save more energy than T-8s. GDS does not agree with ICF on this issue.

- Absorption Chillers (for large institutional applications, e.g., university campuses and hospitals)
- Combined heat and power applications

3. ICF Analysis of Solar Water Heating

The final ICF report concludes that residential solar hot water heating is not cost effective and that this measure has a Total Resource Cost test of .42. (The .42 TRC in the final report) is higher than the .27 TRC that ICF reported in its draft report. On the other hand, a June 2004 report from the Florida Solar Energy Center titled "Florida's Energy Future: Opportunities for Our Economy, Environment and Security" notes that the State of Florida should take steps to dramatically increase the use of solar systems for domestic water use. This report found the following about solar water heating for the residential sector:

> "Solar thermal systems have been available for decades and despite a variety of economic incentives, including state sales tax exemptions to promote their use, solar applications are far fewer than they could be. Solar thermal systems are much more cost-effective in the marketplace than solar photovoltaics (PV) that generate electricity. **<u>The state should take steps to dramatically increase the use of solar systems for domestic water use.</u>** Historically, solar domestic hot water has been envisioned as competitive with electricity but not as competitive with natural gas. However, the cost of natural gas has continued to increase over the years, making the economics of solar more favorable in many commercial and large building installations regardless of fuel type. Solar systems have higher first costs than their competition but are generally viewed as more cost effective where life cycle costs are considered. Figure 20 of this Florida Solar Energy Center report shows that solar hot water is a **<u>highly cost-competitive</u>** option for improvement in new buildings, occurring before options like R-13 walls and R-38 ceilings. The minimum present value of the life-cycle costs is reached after the solar hot water system is installed."

After reviewing the draft ICF report at the end of February 2006, GDS recommended that ICF redo its analysis of residential solar water heating to consider these systems as **<u>off-grid distributed generation</u>**, similar to the way that the City of Lakeland, Florida operates its program. ICF has not chosen to follow this recommendation, nor, according to the manager of the residential solar water heating program at the City of Lakeland, did ICF contact the City of Lakeland about its solar water heating program.

GDS understands that the City of Lakeland finds its solar water heating program to be cost effective based on the way this utility implements its program. It is important for the City of Gainesville to determine if it could replicate the City of Lakeland approach in the City of Gainesville. The City of Lakeland treats this solar water heating technology as "off-grid distributed generation". The City of Lakeland also found that this technology passes the total resource cost test and the rate impact measure test. If this could be done, the demand for new, on-grid, central electric generation could be significantly reduced in Gainesville. The City of Lakeland utility also does not have an obligation to sell solar water heating equipment to every residential customer that requests it from the utility. In this solar water heating program at the City of Lakeland, the city utility only needs to serve those residential customers that have the best technical and economic potential to heat water with solar technology.

GDS also notes that the ICF assumption for the annual kWh savings per household due to installation of a solar water heating system is only 1,466 kWh a year. GDS has collected data from a few other electric utilities in Florida that run solar water heating programs, and the kWh savings experience is substantially higher. The municipal utility of the City of Lakeland, Florida, for example, reports that annual kWh savings for a solar water heating system are likely on the order of 2,700 kWh a year or more. In addition, the City of Lakeland reports that the average cost experienced in their program for purchase and installation of solar water heating equipment is $2,200 per installation, significantly less that the $3,656 figure used by ICF in its draft report.(ICF reports this $3,656 figure on page 192 of the ICF draft report). GDS is pleased to see that ICF has revised its cost estimate for solar water heating downward by **36 percent** to $2,322.56 in its final report, but GDS does not know where ICF obtained this new cost estimate.

GDS also notes that the 2005 Integrated Resource Plan for the City of Lakeland[13] municipal utility found that a residential solar water heating program is cost effective and passes the Total Resource Cost Test as well as the Rate Impact Measure Test. After reviewing the draft ICF report, GDS reported that it seemed odd to GDS that ICF was reporting a Total Resource Cost Test benefit/cost ratio of .27 (see page 192 of the ICF report) when the City of Lakeland finds this technology to be cost effective with a TRC ratio over 1.0. It is clear that the ICF assumptions for solar water heating still need to be closely re-examined and revised as appropriate. The ICF kWh savings figure for solar water heating still appears very low to GDS based on our discussions with other electric utilities in Florida.

GDS has reviewed the twenty-five pages of underlying assumptions for all of the DSM measures examined by ICF, including solar water heating, to determine if the assumptions used by ICF are consistent with the underlying assumptions used by other utilities in Florida and in the Southeast. In its draft and final reports, ICF did not provide any information or documentation on the data sources for any of the underlying assumptions on energy efficiency measures costs, savings, useful lives or applicability factors. This is still a major and serious deficiency in the draft and final ICF reports, and GDS would expect that for ICF's final report to be credible for the City Commission, this information should have been provided in the final report (and it was not). If this information is not provided in the final report, GDS recommends that the City Commission obtain this information, and GDS will review this information when it becomes available. This detailed review of these underlying assumptions and their data sources needs to be done in order to determine if ICF's findings relating to solar water heating and other DSM and demand response measures are reasonable, and are supported by up-to-date and reliable data sources.

[13] This 2005 IRP was prepared for the City of Lakeland by Black and Veatch.

4. Lack of Basis for Applicability Factors and Other Factors Used by ICF

Third, the draft and final ICF DSM analysis methodology still "cripples" the potential energy and peak impacts of cost effective energy efficiency measures because of ICF's use of extremely low "applicability factors". While it is appropriate to apply applicability factors, ICF still has provided no basis or foundation for the factors used. For example, in the residential sector, ICF examined 70 individual DSM measures. The ICF applicability factor for each energy efficiency measure varies from "0" to "1", and reflects the engineering feasibility of implementing a measure in a particular end use.[14] It is very interesting to note that ICF has assigned a "1" value for applicability **to only 13** of the 70 measures (this is only 18% of the measures). ICF has assigned 18 measures with an applicability factor of .25 or less (in fact, ten measures have been assigned an applicability factor of "0" by ICF). ICF has assigned a "0" applicability factor for duct insulation, and it is still not entirely clear to GDS why ICF finds that duct insulation has zero applicability from an engineering feasibility perspective.

ICF provides no explanation or documentation in its draft or final reports on the basis for any of these applicability factors. It is also interesting to note that ICF has applied an applicability factor of .25 for solar water heating, for example, but provides no basis or explanation for this applicability factor. GDS is very concerned about the lack of documentation for these factors, especially since they drastically reduce the potential kWh and kW savings for numerous technologies.

GDS has conducted a detailed comparison of the residential efficiency measure applicability factors used in the draft ICF report to those used in the November 2002 California Statewide Residential Sector Energy Efficiency Potential Study. This comparison is shown below. The average applicability factor used by ICF is **.55** for the 70 residential measures examined by ICF. On the other hand, the average applicability factor for these same measures is **.95** (almost double) for the applicability factors used in the November 2002 California Study for the Southern California Edison service area. This is a dramatic difference, and ICF has provided no basis for using such extraordinarily low applicability factors. Thus not only has ICF failed to consider numerous cost effective DSM measures in its analysis, as noted previously, but ICF's use of very low applicability factors contributes to a maximum achievable cost effective potential savings estimate that is far too low.

Mr. Pickles stated in his March 6th presentation to the City Commission that ICF had assigned a "zero" for an applicability measure in those instances where a measure was saving the same kWh as a different measure (i.e., two measures were competing with each other). So, to allow for this possibility, GDS has calculated the average applicability factor for measures not having a "zero" applicability factor. The average

[14] Definition of ICF Applicability Factor: It is stated in the ICF draft report that "Applicability factors, varying from 0 to 1, determine the engineering feasibility of implementing a measure in a particular end-use. For instance, the applicability factor for a CFL would represent the percentage of inefficient incandescent light bulbs that could feasibly be upgraded to CFLs from a purely technical perspective (accounting for the fact that due to their size and performance characteristics, CFLs cannot universally be used to replace all incandescent bulbs)". ICF draft Report for the City of Gainesville, February 13, 2006, page 65.

applicability factor for residential measures (excluding those measures with "zero" applicability). After this adjustment, the average ICF applicability factor is only **65%**, compared with an average of **95%** from the California Secret Surplus Study.

Comparison of Residential DSM Applicabiity Factors - Draft ICF Report Versus KEMA California Report				
Technology Number	End Use	Measure Name Used in ICF Draft Report	ICF Applicability (Feasibility) Factors for Residential Measures - GRU Service Area	California Secret Surplus Report - Applicability Factors for Southern California Edison Service Area
1	Central A/C	solar gain controls	50.00%	100.00%
2	Central A/C	shade screens	0.00%	100.00%
3	Central A/C	window film	50.00%	100.00%
4	Central A/C	central a/c retrofit	100.00%	100.00%
5	Central A/C	central a/c retrofit charge testing	75.00%	100.00%
6	Central A/C	air sealing (caulking, weatherstripping)	75.00%	100.00%
7	Central A/C	two speed a/c	0.00%	100.00%
8	Central A/C	Energy star or better windows	0.00%	100.00%
9	Central A/C	Central A/C filter cleaning and/or replacement	75.00%	100.00%
10	Central A/C	landscape shading	0.00%	100.00%
11	Central A/C	insulated metal or fiberglass doors	80.00%	100.00%
12	Central A/C	whole house fan	50.00%	100.00%
13	Central A/C	duct insulation	0.00%	70.00%
14	Central A/C	shell insulation upgrades	5.00%	90.00%
15	Central A/C	programmable thermostat	75.00%	100.00%
16	Central A/C	reflective roof coatings	50.00%	100.00%
17	Central A/C	duct sealing	80.00%	100.00%
18	Central A/C	solar control glazing	0.00%	100.00%
19	Clothes Dryer	Energy Star or better clothes dryer	100.00%	100.00%
20	Clothes Washer	Energy Star Clothes Washer - all electric	100.00%	100.00%
21	Diswasher	Energy Star Dishwasher - electric dhw	100.00%	100.00%
22	Freezer	remove second freezer	20.00%	100.00%
23	Freezer	Energy Star or better freezer	100.00%	100.00%
24	Lighting	CFLs	60.00%	68.00%
25	Lighting	outdoor floodlight	50.00%	68.00%
26	Lighting	motion detectors	50.00%	68.00%
27	Refrigerator	remove second refrigerator	20.00%	100.00%
28	Refrigerator	Energy Star or better refrigerator	100.00%	100.00%
29	Room A/C	solar gain controls such as exterior shades	80.00%	100.00%
30	Room A/C	room A/C - various retrofits	100.00%	100.00%
31	Room A/C	refrigerant charge testings and recharging	75.00%	100.00%
32	Room A/C	air sealing (caulking, weatherstripping)	75.00%	100.00%
33	Room A/C	ceiling fan	0.00%	100.00%
34	Room A/C	Energy Star or better windows	80.00%	100.00%
35	Room A/C	filter cleaning and/or replacement	75.00%	100.00%
36	Room A/C	Attic, roof, wall insulation	5.00%	90.00%
37	Room A/C	insulated metal or fiberglass doors	80.00%	100.00%
38	Room A/C	solar control glazing	0.00%	100.00%
39	Space Heat	air sealing (caulking, weatherstripping)	80.00%	100.00%

Technology Number	End Use	Measure Name Used in ICF Draft Report	ICF Applicability (Feasibility) Factors for Residential Measures - GRU Service Area	California Secret Surplus Report - Applicability Factors for Southern California Edison Service Area
40	Space Heat	insulated metal or fiberglass doors	80.00%	100.00%
41	Space Heat	programmable thermostat	100.00%	100.00%
42	Space Heat	duct insulation	0.00%	70.00%
43	Space Heat	furnace upgrades	100.00%	100.00%
44	Space Heat	attic radiant barriers	50.00%	100.00%
45	Space Heat	shell insulation upgrades	5.00%	90.00%
46	Space Heat	duct sealing	80.00%	100.00%
47	Space Heat	Energy star or better windows	80.00%	100.00%
48	Space Heat	air sealing (caulking, weatherstripping)	75.00%	100.00%
49	Space Heat	insulated metal or fiberglass doors	80.00%	100.00%
50	Space Heat	Energy Star or better heat pump upgrade	100.00%	100.00%
51	Space Heat	Energy star or better windows	80.00%	100.00%
52	Space Heat	programmable thermostat	100.00%	100.00%
53	Space Heat	duct insulation	0.00%	70.00%
54	Space Heat	duct sealing	80.00%	100.00%
55	Space Heat	shell insulation upgrades	5.00%	90.00%
56	Space Heat	two speed heat pump with elec. Resist. Htr.	50.00%	70.00%
57	Space Heat	two speed heat pump	50.00%	70.00%
58	Space Heat	attic radiant barriers	50.00%	100.00%
59	Space Heat	heat pump maintenance	100.00%	100.00%
60	Space Heat	groiund source heat pump	50.00%	100.00%
61	Space Heat	ground source heat pump - electric resistance heat	50.00%	100.00%
62	Space Heat	heat pump - load control	68.00%	100.00%
63	Water Heat	pipe wrap for hot water pipes	50.00%	75.00%
64	Water Heat	water heater tank wraps	20.00%	75.00%
65	Water Heat	low flow showerheads	50.00%	95.00%
66	Water Heat	faucet aerators	50.00%	95.00%
67	Water Heat	vapor compression cycle	50.00%	100.00%
68	Water Heat	heater efficiency upgrades	100.00%	100.00%
69	Water Heat	heat trap - water lines	25.00%	100.00%
70	Water Heat	solar water heater	25.00%	75.00%
Average factor			**55.97%**	**94.70%**
Source:			ICF draft report, page 193	November 2002 California Statewide Energy Efficiency Potential Study, Appendix C, page C.6-1. Factors listed are for single-family homes

More importantly, while the draft and final ICF reports provide the underlying numbers for incremental costs, kWh and kW savings and useful lives of energy efficiency and load management measures, these ICF reports do not provide the data sources used for any of these numbers. This makes it very, very difficult to determine if these estimates are credible and reliable.

5. Basis for Avoided Costs Due to Implementation of DSM Programs

The draft and final ICF reports provide the underlying forecast of electric avoided costs used in the study in Attachment 3, Figure A3-4. Apparently these electric generation avoided costs were provided to ICF by GRU. GDS has at least two questions about these avoided costs shown in Figure A3-4:

- For 2006 to 2011, there is no value for avoiding generation, transmission or distribution capacity. If energy efficiency and load management programs can "free-up" energy and capacity that can be sold on the wholesale market, then there should be a positive value for avoided generation capacity costs in these six years. It is GDS' understanding that GRU believes that there is large market for wholesale power sales, and in fact, GRU believes that unused capacity and energy from a new GRU coal plant could be sold to wholesale power customers.

- Second, energy efficiency and load management programs can help defer or eliminate the need for new T&D infrastructure. There is a positive value associated with deferring or eliminating the need for new T&D infrastructure. It is obvious that ICF has not included such avoided costs in the first six years of its analysis (or perhaps it has not included such avoided T&D costs in any year?). GDS recommended in its Febraury 28th review report that the City Commission find out what avoided costs for capacity has ICF assumed for avoided T&D infrastructure. ICF responded on March 6th in its presentation that GRU told ICF that its current plans for T&D upgrades are insensitive to thed amount of DSM that is done, so ICF did not assume any avoided T&D costs. It is still GDS' judgment that, because such avoided T&D costs were not included in ICF's analysis, then it is clear that the benefits of the maximum DSM alternative are still significantly understated. GDS does not agree with ICF that including such T&D avoided costs in the analysis "would not have" a significant effect on the benefits of DSM programs.

- Third, it is important to note that ICF used the 8/31/2005 GRU avoided costs for the initial screening of individual DSM measures. For the evaluation of overall programs and the determination of the maximum DSM case, an integrated, dynamic analysis was done in ICF's IPM model using the cases, scenarios, and assumptions listed in the ICF draft report. According to ICF, CO2 prices were not explicitly included in the initial measure screening, except as they may be included in the GRU avoided costs. ICF did include CO2 prices in the program cost-effectiveness screening at the prices documented in the ICF draft report. GDS agrees with ICF's approach with respect to CO2 prices.

6. *Interruptible Load and Other Demand Response Options Not Considered*

In the GDS initial report of February 28, 2006, GDS stated that it was GDS' understanding that ICF did not examine other DSM options, such as an expanded interruptible load program or other demand response and electricity pricing options. Other demand response options that were not considered by ICF include mandatory time-of-use rates; inverted block rates; real time pricing and special incentive tariffs for new homes that are built to Energy Star standards. ICF confirmed in its March 6, 2006 presentation that ICF did not examine these demand-side options because, in ICF's opinion, this analysis was not in ICF's scope of work. Because ICF did not examine these additional demand-side options, GDS considers this as additional firm evidence that the ICF analysis of demand-side management and demand response potential is incomplete.

Electricity pricing options are a very powerful tool available to electric utilities that want to reduce the need to build new generation, transmission and distribution facilities. There are several pricing options that allow a utility to charge customers for electricity in ways that discourage using electricity during periods of peak demand (when electricity is most costly to produce), and encourage using it during off-peak periods (when electricity production is less costly). Currently GRU customers pay a flat rate that gives them no indication that electricity costs vary by time of day. Even small reductions in energy usage during these peak periods could significantly delay the need for new generation capacity. But the flat rates GRU charges provide no incentive to customers to change their patterns of energy usage, or reduce total usage.

No study of opportunities for DSM is complete without an analysis of the options open to the City Commission to incorporate incentives in the rates charged to residential and commercial customers. Shaping customer energy use by informing them when energy is expensive to produce and when it is cheap, and using rate incentives to persuade them to use less expensive energy and more cheap energy is termed "Demand Response". There are many kinds of demand response programs, and the 2005 Energy Policy Act includes a requirement for investigating the benefits of demand response and recommendations for achieving these benefits[15]. Mayor Hanrahan's February 24th comments on the draft ICF report question whether such demand response and pricing alternatives exist, and rightly so. These options do exist, they are very cost effective, and they are not addressed in the draft ICF report.

A reasonable first step for residential customers could include progressive rates whereby the charge per kWh increases steeply with increases in the total monthly kWh usage. GRU uses two rates at present, charging X cents per kWh for the first 750 kWh used each month, and Y for all usage above 750 kWh.

[15] See "Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them: A Report to the United States Congress Pursuant to Section 1242 of the Energy Policy Act of 2005". US Department of Energy, February 2006.

At present, GRU's current portfolio of rates do not offer incentives to encourage customers to participate in DSM or conservation programs. Electricity rates are the same throughout the day and year for all customers.

Much DSM is oriented toward reducing peak demand or persuading customers to shift their energy usage from times of day when it is most expensive to produce to other times when production is cheaper for the utility. However, if the financial benefits are small, customers will be less likely to adopt these programs.

A very effective way to reduce peak demand is to charge customers more for using energy at peak times, and less for using it at time when it is inexpensive to employ. However, like many vertically-integrated utilities, GRU charges all customers the same rate for energy regardless of when it is used. For this reason, customers see no financial benefit in shifting their use of electricity from peak time periods to off-peak periods when the utility can produce electricity more efficiently and for a lower price.

7. ICF's Estimate of Potential kWh Savings (as a percent of annual GRU kWh sales) Is Very Low Compared to Other Studies

GDS has reviewed several recent energy efficiency potential studies. These studies are listed in the table below. These studies indicate that the maximum achievable cost effective potential for kWh savings is far higher than the 4% to 5% figures estimated by ICF for the GRU service area (the maximum achievable cost effective kWh savings potential estimated by ICF by 2015 is 6.3% if one includes the impacts of DSM already included in the Load forecast).. For example, the recent studies done in California, Florida, Kentucky, the Southwest, and Georgia, all show a kWh savings potential of 10% or more of annual kWh sales within 10 years, over double ICF's figures of 4 to 5 percent (in the draft and final reports, respectively) for the GRU service area. None of the recent energy efficiency potential studies have kWh savings as low as projected by ICF (4% to 5% by 2015). In fact, the 2005 energy efficiency potential study done by ICF for the State of Georgia (study sponsored by the Georgia Environmental Facilities Authority) found that the maximum achievable cost effective potential for energy efficiency in that State was over 9% of annual kWh sales by 2015, **over twice** ICF's 4% to 5% estimate for the GRU service area. Thus there are many indications that ICF has still significantly underestimated the potential for cost effective kWh savings in the GRU service area by 2015.

Summary of Electricity (or All Fuels) Savings Potential Studies - US

Technical potential is defined as the complete penetration of all measures analyzed in applications where they were deemed to be technically feasible from an engineering perspective.
Economic potential refers to the technical potential of those energy conservation measures that are cost-effective when compared to supply-side alternatives.
Maximum Technically Achievable potential is defined as the amount of technical potential that could be achieved over time under the most aggressive program scenario possible.
Maximum Economically Achievable potential is defined as the amount of economic potential that could be achieved over time under the most aggressive program scenario possible.
Budget Constrained potential refers to the amount of savings that would occur in response to specific program funding and measure incentive levels.

Area(s) Covered	Type of Savings Potential	Year Completed	Author(s)	Estimated DSM kWh Savings as % of Annual kWh Sales				Estimated Summer Peak Savings as % of Total Capacity	Years to Achieve Estimated Savings Potential	Comments
				Res.	Comm.	Indus.	Total			
California	Technical Economic Max. Economically Achievable Budget Constrained	2002	Xenergy	21% 15% 10% 8%	17% 13% 10% 7%	13% 12% 11% 4%	19% 14% 10% 6%	25% 16% 10% 6%	10	Integrated measures not addressed; agriculture included in industrial sector
Connecticut	Technical Max. Technically Achievable Max. Economically Achievable	2003	GDS Associates/ Quantum Consulting	21% 17% 13%	25% 17% 14%	20% 15% 13%	24% 17% 13%	24% N.A. 13%	10	Also includes results for Southwest CT region
Georgia	Max. Economically Achievable	2004	Alliance to Save Energy	N.A.	N.A.	N.A.	25%	17%	10	
Florida	Max. Economically Achievable	2004	Alliance to Save Energy	N.A.	N.A.	N.A.	22%	16%	10	
Kentucky	Max. Economically Achievable	2005	Big Rivers Electric Cooperative	N.A.	N.A.	N.A.	12%	N.A.	10	
Massachusetts	Max. Economically Achievable	2001	RLW Analytics / SFMC	25%	16% - C&I		N.A.	N.A.	5	Excludes non-utility impacts & low income savings/sales
New York	Technical Economic	2002	OEI / VEIC / ACEEE	37% 26%	41% 38%	22% 16%	37% 30%	N.A.	10	Also 5- and 20-year scenarios
Oregon	Technical	2003	Ecotope / ACEEE / Tellus	28%	32%	35%	31%	N.A.	10	Residential includes manufactured housing
Puget Sound Energy	Max. Technically Achievable Max. Economically Achievable	2003	KEMA-XENERGY / Quantec LLC	17% 7%	7% 6%	0% 0%	12% 6%	33% 11%	20	
Vermont	Max. Technically Achievable	2002	OEI / VEIC	30%	32% - C&I		31%	37%	10	Includes fuel switching; also 5-year scenario
VELCO	Max. Technically Achievable	2002	OEI / VEIC	18%	17% - C&I		17%	23%	10	Excludes measures with little peak demand, that require regional coordination, and emerging technologies; includes fuel switching; also 5-year scenario
AZ,CO,NV,NM,UT,WY	Max. Economically Achievable	2002	SWEEP / ACEEE / Tellus	14%	20%	19%	18%	N.A.	8	Also 18-year scenario
NJ, NY, PA	Max. Economically Achievable	1997	ACEEE	35%	35%	41%	N.A.	N.A.	14	Residential savings are for all fuels, not just electricity
National	Budget Constrained	1997	U.S. DOE	9%	8%	11%	10%	14%	13	Addresses all fuel; also 23-year scenario

8. Comparison of GRU's Existing DSM Program Efforts to Other Utilities in the U.S.

As part of our review of the draft ICF DSM analysis done for the City of Gainesville, GDS examined the portion of the report that examines GRU's existing DSM programs. Figures 3-33 and 3-34 in the draft ICF report show the 2005 and 2006 GRU DSM budgets for 2005 and 2006. In order to compare GRU's DSM efforts to other utilities, GDS obtained the latest available DSM spending and electricity savings data (from the year 2004) from the US Department of Energy, Energy Information Administration (EIA) data base. This data is useful for comparing GRU's level of kWh and kW savings from DSM programs to all other utilities in the US. This data can be used by decision-makers to determine if a utility ranks high or low compared to other utilities in the US.

Several of Florida's electric utilities do offer energy efficiency programs. The actual kWh savings performance (kWh savings as a percent of total kWh sales) for the twenty-two Florida utilities (based on 2004 data from the EIA Form 861 database) in the year 2004 ranged from a low of **.00%** of annual kWh sales to a high of **8.06%** of annual kWh sales (see Table 1-1 below). It is interesting to note that nine of the twenty-two Florida utilities show zero savings from energy efficiency programs (because they do not offer energy efficiency programs). The EIA's 2004 data for GRU shows that the cumulative impact of GRU's DSM programs was 3.79% of annual kWh sales in 2004.

Table 1-1: Ranking of Florida Utilities on kWh savings from energy efficiency programs as a percent of total kWh sales				
Utility Code	**Name of Electric Utility**	**DSM Program kWh Savings as % of Total kWh Sales**	**Rank in US**	**# of Utilities in EIA Database**
18445	City of Tallahassee	8.06%	18	1,118
7801	Gulf Power Co	5.41%	30	1,118
6909	Gainesville Regional Utilities	3.79%	44	1,118
6452	Florida Power & Light Company	3.45%	48	1,118
18454	Tampa Electric Co	3.15%	49	1,118
6455	Florida Power Corp	2.41%	63	1,118
18304	Sumter Electric Coop, Inc	1.80%	76	1,118
10857	Lee County Electric Coop, Inc	1.75%	79	1,118
9617	Jacksonville Electric Authority	0.58%	124	1,118
7264	Glades Electric Coop, Inc	0.31%	150	1,118
20885	Withlacoochee River Elec Coop	0.23%	157	1,118
15776	Reedy Creek Improvement Dist	0.14%	180	1,118
10623	City of Lakeland	0.04%	214	1,118
6443	Florida Keys El Coop Assn, Inc	0.00%	241	1,118
3245	Central Florida Elec Coop, Inc	0.00%	1,049	1,118
3774	City of Clewiston	0.00%	1,050	1,118
6616	Fort Pierce Utilities Auth	0.00%	1,051	1,118
7593	City of Green Cove Springs	0.00%	1,052	1,118
10376	Kissimmee Utility Authority	0.00%	1,053	1,118
13485	New Smyrna Beach City of	0.00%	1,054	1,118
13955	City of Ocala	0.00%	1,055	1,118
18360	Suwannee Valley Elec Coop Inc	0.00%	1,056	1,118

On the other hand, each of the top ten ranked DSM utilities in the EIA database saved over 10% of annual kWh sales per year with energy efficiency programs, far more than is being saved by GRU. Table 1-2 below shows the cumulative annual kWh percentage savings (as reported for 2004) for the top ten DSM utilities in the US. It is important to note that the number one DSM utility (for kWh savings as a percent of annual kWh sales) is a municipal utility, with cumulative annual kWh savings of over **17%** of annual kWh sales. Thus the future kWh savings potential of **only 5.3%**[16] estimated by ICF for GRU appears very low compared to what has actually been achieved through aggressive energy efficiency programs at other electric utilities throughout the US. More importantly, the top three DSM utilities in the country for kWh savings as a percent of total sales are municipal electric utilities. In addition to examining the DSM programs

[16] GDS agrees with ICF that it is necessary to add to the impacts of "additional DSM programs" s already included in the base case load forecast that is included in the GRU Ten Year Site Plan. IN the year 2015, this would add 1% savings for kWh sales and .9% savings for summer peak demand. If one adds the annual kWh savings from DSM in 2015 already in the forecast to the additional potential savings of 5% of annual kWh sales form energy efficiency programs, then ICF's estimate of potential kWh savings increases to 6.3%, still a relatively small amount compared to other studies.

at the City of Austin, the City of Gainesville needs to explore how these top three DSM utilities, all municipal utilities, have achieved such large kWh savings, ranging from 16.2% to 17.4% of 2004 annual kWh sales.

Table 1-2: Cumulative kWh Savings from DSM Programs for Top 10 DSM Utilities in US

Utility Code	Utility Name	Type of Utility	State	DSM Program kWh Savings as % of Total kWh Sales	Rank in US
2548	Burlington City of	Municipal	VT	17.4%	1
6022	Eugene City of	Municipal	OR	16.5%	2
15783	City of Redding	Municipal	CA	16.2%	3
19497	United Illuminating Co	Private	CT	11.9%	4
20455	Western Massachusetts Elec Co	Private	MA	10.9%	5
13781	Northern States Power Co	Private	SD	10.5%	6
20856	Wisconsin Power & Light Co	Private	WI	10.2%	7
16534	Sacramento Municipal Util Dist	Political Subdivision	CA	10.1%	8
17839	City of Springfield	Municipal	OR	10.1%	9
12647	Minnesota Power Inc	Private	MN	10.1%	10

Table 1-3 below shows the ranking of Florida electric utilities for peak demand (kW) savings (i.e., the percent of annual system peak load saved with energy efficiency programs in 2004). GRU saved 2.78% of its peak load with energy efficiency programs in 2004, and ranks 209th from the top of the list. Only one Florida electric utility (Florida Power and Light Company) ranks in top 50 of all electric utilities that reported data on DSM program kW demand savings as a percent of system peak load in 2004. The peak demand savings from energy efficiency programs for the Florida electric utilities ranged from 0.0% to 15.1% of actual 2004 peak load. Based on this data, it is clear that GRU could do significantly more to save peak demand with expanded DSM and demand response programs than what ICF has projected for the maximum achievable cost effective potential...

Table 1-3: Ranking of Florida Utilities on kW savings from energy efficiency programs as a percent of total system peak load in 2004				
Utility Code	**Name of Electric Utility**	**DSM Program kW Savings as % of Total System Peak Load in 2004**	**Rank in US**	**# of Utilities in EIA Database**
6452	Florida Power & Light Company	15.09%	42	1,118
18454	Tampa Electric Co	12.95%	51	1,118
7801	Gulf Power Co	9.95%	72	1,118
10857	Lee County Electric Coop, Inc	7.57%	91	1,118
18445	City of Tallahassee	7.08%	97	1,118
18304	Sumter Electric Coop, Inc	6.82%	102	1,118
6455	Florida Power Corp	5.41%	132	1,118
7264	Glades Electric Coop, Inc	4.29%	150	1,118
6909	Gainesville Regional Utilities	2.78%	181	1,118
6443	Florida Keys El Coop Assn, Inc	2.17%	200	1,118
20885	Withlacoochee River Elec Coop	2.07%	203	1,118
20910	Wolverine Pwr Supply Coop, Inc	2.07%	204	1,118
9617	Jacksonville Electric Authority	1.13%	242	1,118
10623	City of Lakeland	0.17%	277	1,118
3245	Central Florida Elec Coop, Inc	0.00%	1,055	1,118
3774	City of Clewiston	0.00%	1,056	1,118
6616	Fort Pierce Utilities Auth	0.00%	1,057	1,118
7593	City of Green Cove Springs	0.00%	1,058	1,118
10376	Kissimmee Utility Authority	0.00%	1,059	1,118
13485	New Smyrna Beach City of	0.00%	1,060	1,118
13955	City of Ocala	0.00%	1,061	1,118
15776	Reedy Creek Improvement Dist	0.00%	1,062	1,118
18360	Suwannee Valley Elec Coop Inc	0.00%	1,063	1,118

Table 1-4 below shows the annual kW percentage savings (as reported for 2004) for the top ten DSM utilities in the US. It is important to note that the number one DSM utility (for kW savings as a percent of annual system peak demand) is a municipal utility in Minnesota, with annual kW savings of over 50% of annual system peak demand. The top ten ranked DSM utilities (for peak savings) all saved over 31% of system peak demand in 2004 with their DSM programs. The peak demand savings from DSM programs for the Florida electric utilities ranged from 0.0% to 15.1% of actual 2004 peak demand. In addition to examining the DSM programs at the City of Austin, the City of Gainesville needs to explore how these top ten "peak savings" utilities, again all public power utilities, have achieved such large peak demand savings, ranging from 31.6% to 52.1% of 2004 system peak demand.

Table 1-4: Annual kW Savings from DSM Programs for Top 10 DSM Utilities in US					
Utility Code	**Utility Name**	**Type of Utility**	**State**	**DSM Program kW Savings as % of Total System Peak Demand**	**Rank in US for Peak Demand Savings**
16971	Shakopee Public Utilities Comm	Municipal	MN	52.1%	1
12301	Nodak Electric Coop Inc	Cooperative	ND	46.3%	2
2890	City of Camden	Municipal	SC	45.8%	3
16740	Scenic Rivers Energy Coop	Cooperative	WI	41.3%	4
10539	La Plata Electric Assn, Inc	Cooperative	NM	40.0%	5
24949	Cass County Electric Coop Inc	Cooperative	ND	39.0%	6
17868	St Croix Electric Coop	Cooperative	WI	34.4%	7
5780	Elkhorn Rural Public Pwr Dist	Political Subdivision	NE	34.3%	8
5585	Eastern Illinois Elec Coop	Cooperative	IL	32.6%	9
13050	Mountain Parks Electric, Inc	Cooperative	CO	31.6%	10

Figure 1-1 below shows how Florida electric utilities rank compared to other utilities in the United States on kWh savings from energy efficiency programs in 2004 as a percent of 2004 annual mWh sales. GRU ranks 44th from the top of this ranking. Figure 1-2 shows how Florida electric utilities rank compared to other utilities in the United States on MW savings from energy efficiency programs in 2004 as a percent of 2004 annual peak load. As noted above, GRU ranks 181st from the top of the list. Figure 1-3 shows how Florida electric utilities rank compared to other utilities in the United States on energy efficiency program spending in as a percent of 2004 annual retail revenues. The detailed data supporting these rankings is provided in Appendix A to this report. As one can see the Florida electric utilities rank far from the top ranked electric utilities in the US on all three attributes of energy efficiency program savings and spending.

Figure 1-1: Ranking of US Electric Utilities - 2004 DSM kWh Savings As % of 2004 kWh Sales

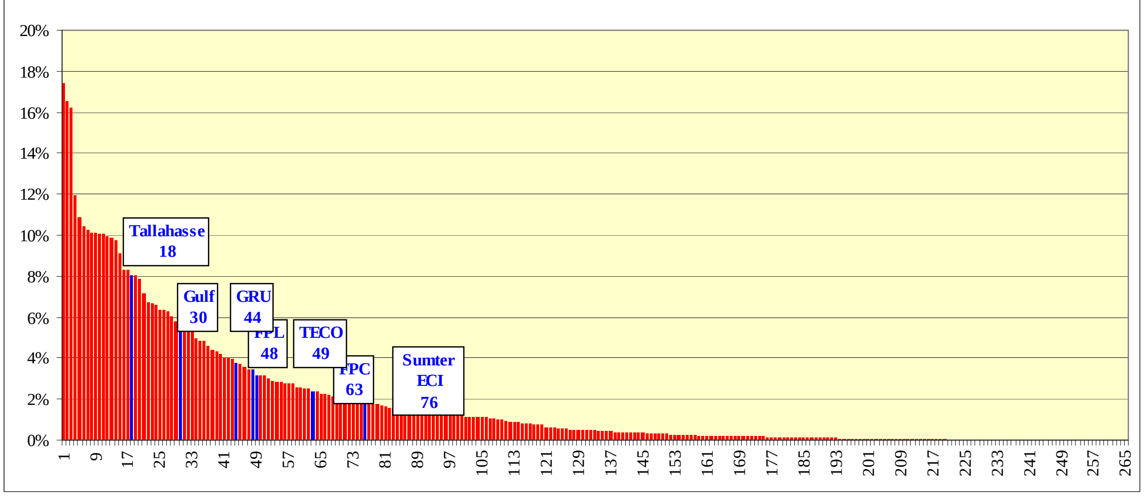


Figure 1-2: Ranking of US Electric Utilities - DSM MW Savings as % of Annual System Peak Demand

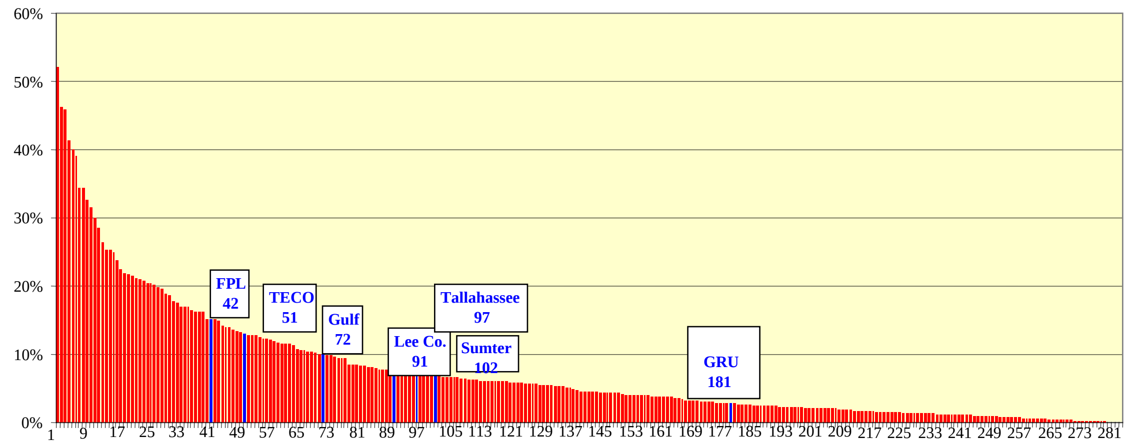
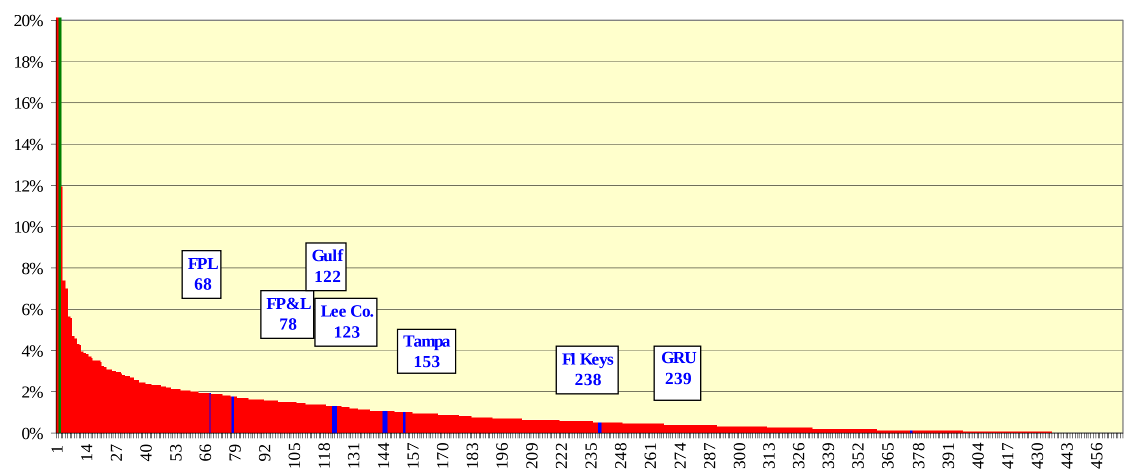


Figure 1-3 shows the ranking of US utilities for annual spending on DSM programs as a percent of annual utility revenues in 2004. As one can see GRU ranks 239th from the top of the list.

Figure 1-3: Ranking of US Utilities - % of Annual Revenues Spent on DSM Programs



9. Investing in DSM Has Risk Diversification Benefits

One major benefit of DSM programs that should be addressed in the ICF report is risk minimization. ICF did not examine this issue in its draft or final reports. If the City were to build a 220 MW coal plant at the Deerhaven site, it would be putting "all its eggs in one basket". If this plant has a mechanical failure or if its fuel supply is disrupted, the City loses 232 MW of power immediately. This concept is also known as "single shaft risk". In fact, a recent Standard and Poor's credit rating report for the City of Gainesville noted that "GRU is contemplating constructing a new 220 MW solid fuel generating plant to be brought on line around 2013. The plant construction will require additional borrowing and would likely ad risk to the utility's overall financial profile."

On the other hand, cost effective investments in DSM equipment and building materials are dispersed throughout the homes and businesses in the City. Once these measures are installed, they operate quietly and economically **with no fuel costs** year after year after year. Because hundreds of pieces of energy efficient equipment are installed in numerous residential and commercial businesses, the risk of failure is minuscule, while the risk of failure for a large, central station power plant is dramatically larger. This risk minimization benefit from DSM is an essential consideration for the City Commission.

10. Impact of New Federal Energy Efficiency Standards

It is GDS' understanding that the effect of higher mandated federal HVAC efficiency requirements (SEER 10 raised to SEER 13) are not accounted for in the latest available GRU-developed load forecast. Because of these new Federal energy efficiency standards, the electricity use of HVAC systems will be lower than in the past. The City Commission should require GRU to update its load forecast to account for these new Federal energy efficiency standards.

11. New Estimates of DSM Savings Potential from the Florida Solar Energy Center

As noted above, GDS has determined that the draft ICF report underestimates the energy and peak demand savings from aggressive implementation of DSM programs. ICF concludes that implementation of the maximum DSM scenario will save only 4% to 5% of annual energy sales by 2015 (ten years from now). Yet the January 2006 report just presented to the Florida Legislature by the Florida Solar Energy Center projects a 26% reduction just in residential sales of electricity. This difference needs to be more thoroughly explored. This new report is available at the web site of the Florida Solar Energy Center. Dr. James Fenton, Director of the Center, made a presentation to the Florida Senate Committee on Public Utilities. Dr. Fenton cites FSEC studies based on Florida data that demonstrates significantly higher energy savings in the residential sector (26%) than assumed in the ICF analysis. Dr. Fenton noted that new buildings can be constructed to consume 70% to 92% less electricity than existing residential and commercial structures.

12. GRU's Sales to Wholesale Customers

GRU currently sells power on a wholesale basis to the City of Alachua and Seminole Electric Cooperative, the wholesale supplier for Clay Electric Cooperative. The GRU load forecast includes the peak demands that these wholesale customers place on the GRU grid. These two wholesale customers have contributed from 6% to 7% of the total GRU system peak demand between 1993 and 2004, and they are projected to contribute up to nearly 10% in the year 2022. (Note, these calculations are based on the forecasts in Table B-2 of the December 2003 IRP study produced by GRU.)

Some parties have raised the issue of whether or not service to these loads could be terminated to delay the need for new generation.

First, in the interest of full disclosure, Seminole Electric Cooperative is a client of GDS and has been for many years. As a result we will respectfully refrain from making any recommendations with regard to the issue of continued service to GRU's wholesale load.

To aid the discussion, however, we have a couple of observations. First, without having researched any applicable Florida laws or Commission rules with regard to the obligation to serve at wholesale versus at retail, we suspect that continuing to serve the wholesale load may be at GRU's option, subject only to the terms of the contracts between GRU and its wholesale customers. From the ICF report, it is not clear whether or not ICF studied the terms of these contracts and the potential implications regarding GRU's power supply requirements, nor does the IFC report indicate whether or not discontinuing service to the wholesale customers is feasible.

According to what appears to be GRU data in the ICF report (page 187), the amount of wholesale load is approximately 35 MW today at summer peak, and it is expected to grow to approximately 46 MW by 2014. These numbers are load numbers, and for generation planning they would need to be grossed up by the 15% reserve margin used by GRU. From the projections provided, the total of the projected load plus reserve margins appears to equate to approximately three years of GRU's retail load growth, meaning that without the wholesale load, generation addition needs could be deferred by three years.

While GDS is not making a recommendation on whether GRU should discontinue electricity sales to existing wholesale customers or whether such is contractually and legally feasible, we have developed new scenarios that include revised estimates for maximum achievable cost effective DSM, the inclusion of a 25 MW power plant, and the discontinuation of such wholesales sales. These scenarios are presented in the Executive Summary to this report, and they show that GRU may be able to defer the need for new generation until the year 2020.