Figure 2-1
Historical Peak Electricity Demand Growth (%) Ten Year Rolling Average – Slowing Demand Growth

Ten Year Rolling Average	GRU	FRCC
1994-2004	3.3	3.5
1995-2005	3.2	3.2
2000-2004	2.9	2.8
2001-2005	2.7	2.6
2002-2004	2.6	2.5
2002-2005	2.5	2.3
Source: GRU 2005 Ten-Year Site Plan Submitted to the Florida Public Service Commission, April 2005 and NERC ES&D.		

GRU has been growing at 3.2 to 3.3 percent per year which means electricity demand doubles approximately every 22 to 23 years. The ten year rolling average estimate of 3.3 percent is the simple average of 10 ten year periods, e.g., 1984 – 1994, 1985 – 1995, etc. The rolling average tends to correct for weather variation which can strongly affect peak demand growth.

Figure 2-2
GRU Electricity Demand Growth History – Ten Year Rolling Averages – Peak Demand

Year	Average (%)	Year	Average (%)
1995 – 2005	2.56	1984 – 1994	3.94
1994 – 2004	2.70	1983 – 1993	NA
1993 – 2003	2.09	1982 – 1992	NA
1992 – 2002	3.07	1981 – 1991	NA
1991 – 2001	3.25	1980 – 1990	NA
1990 – 2000	3.37	1979 – 1989	NA
1989 – 1999	3.54	Average 1985 – 2005	3.16
1988 – 1998	3.45	Average 1981 – 2001	NA
1987 – 1997	3.28	Average 1991 – 2005	2.74
1986 – 1996	3.90		
1985 – 1995	3.50		

Figure 2-3
FRCC Electricity Demand Growth History – Ten Year Rolling Averages – Electrical Energy

Year	Average (%)
1995 – 2005	2.34
1994 – 2004	2.56
1993 – 2003	2.12
1992 – 2002	2.89
1991 – 2001	3.09
1990 – 2000	3.15
1989 – 1999	2.97
1988 – 1998	3.96
1987 – 1997	3.24
1986 – 1996	4.30
1985 – 1995	4.69

Year	Average (%)
1984 – 1994	4.96
1983 – 1993	4.86
1982 – 1992	5.50
1981 – 1991	4.57
1980 – 1990	4.01
1979 – 1989	5.25
Average 1985 – 2005	3.21
Average 1981 – 2001	4.12
Average 2000 – 2005	2.69

In this context, the historical GRU electricity demand growth reflects several aspects of the Gainesville community including:

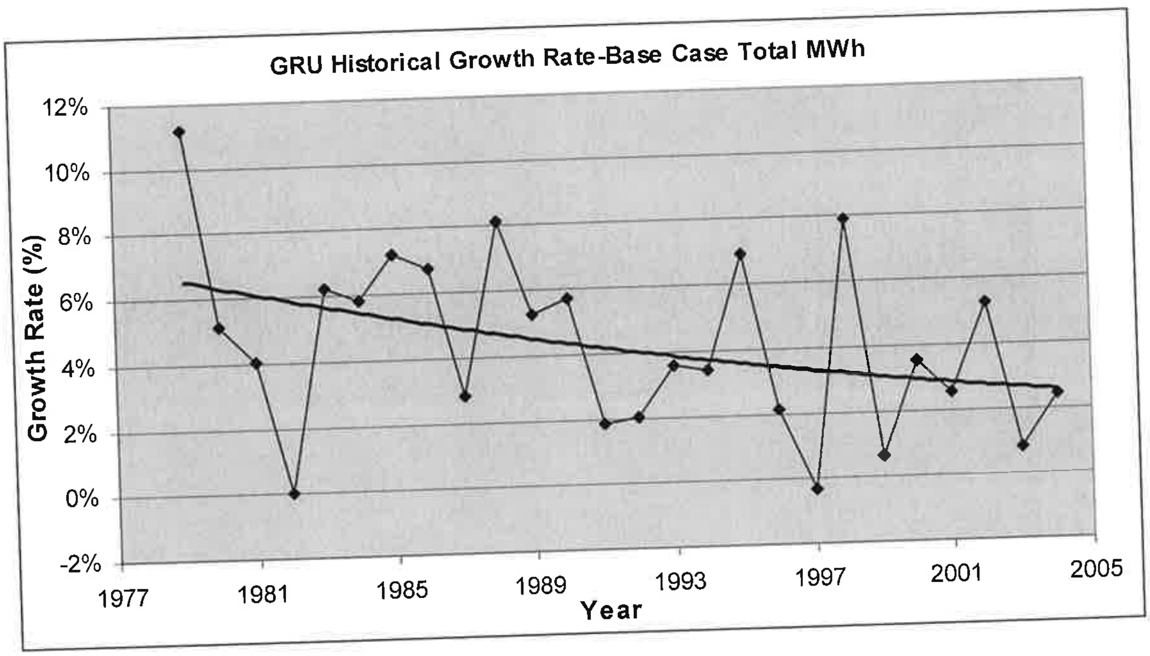
- **GRU Service Area Population Growth** – Population growth has been 2.2 percent per year between 1995 and 2004.
- **Residential Customers** – The number of residential customers has been growing at 3.0 percent per year between 1995 and 2004.
- **Commercial Customers** – The number of commercial customers has been growing at 2.6 percent per year between 1995 and 2004.
- **Residential and Commercial Sales** – Together, the commercial and residential sectors account for 88 percent of total ultimate customers sales by GRU, and hence, their strong growth explains most of the total growth in demand.
- **Retail versus Wholesale** – 13 percent of the total growth in net peak demand between 1995 and 2004 has been from wholesale sales with the

remainder from retail sales. Thus, retail sales are the most important factor explaining growth.

More recently, GRU electricity demand growth appears slower. The five ten year periods ending in 2001 – 2005 show 2.7 percent annual growth, and the three ten year averages for the 2003 to 2005 period show 2.5 percent growth. This recent demand growth trend continues to match closely FRCC-wide demand growth which has also been slowing.

Between 2000 and 2004, GRU peak demand grew in total only 1 percent (see Figure 2-7). In 2005, peak demand grew 4.8 percent. However, the year-by-year trend also shows demand growth slowing though it also appears to be bottoming out around two percent which is GRU's projection.

Figure 2-4



This slowing in demand growth in recent years seems to be related to slowing in population growth and income growth though they may be a temporary post-9/11 2001 recession phenomenon.

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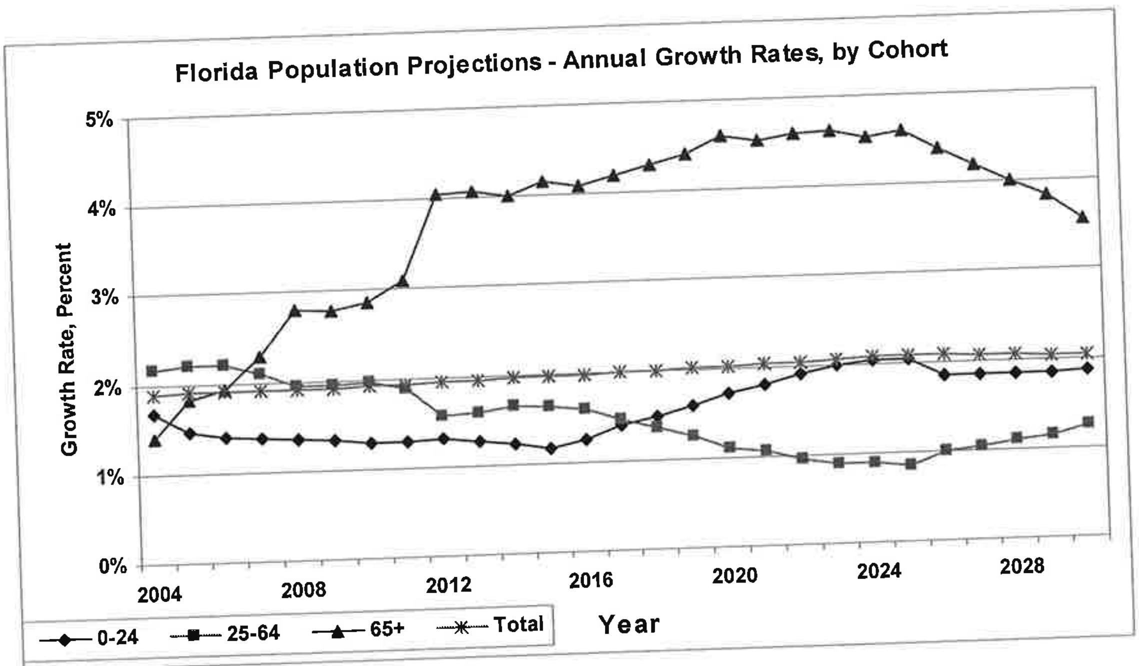
Figure 2-5
There Also Seems to be Modest Slowing in Key Drivers

	Personal Income Growth (%)	Population Growth (%)
Ten-Year Rolling Average – 1984 – 2002	3.6	1.8
Ten-Year Rolling Average 1989 – 2003	3.4	1.7
Ten-Year Rolling Average 1991 – 2003	3.3	1.5

Source: Bureau of Economic Anlysis.

The Figure below shows projected growth rates in population for different cohorts in Florida and supports the view that population growth will return to the longer term trend and the decline in demand growth is slowing. As has been discussed in several forums, the aging of the US population is expected to have a more severe impact on Florida than many other states. The graph below shows that, while the growth rate of the overall population in Florida is expected to hold steady at around 2 percent, different cohorts are expected to grow at rates significantly different from the overall population growth rate.

Figure 2-6



Source: U.S. Census Bureau Population Projection data.

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Figure 2-7
GRU Historical Demand

Year	Summer Peak Demand (MW)	Net Energy for Load (GWh)
1995	361	1648
1996	365	1659
1997	373	1661
1998	396	1779
1999	419	1798
2000	425	1868
2001	409	1882
2002	433	2008
2003	417	2015
2004	432	2049
2005	465	2122
Annual Average Growth Rate (%)[1]		
1995 – 2004	2.02%	2.45%
1995 - 2005	2.56%	2.56%

Period	Summer Peak Demand Growth Rate (%)	Net Energy for Load Growth Rate (%)
1995-2000	3.3%	2.55%
1999-2005	1.75%	2.8%

[1]These growth estimates do not correct for weather variation which strongly affects peak demand. Thus, rolling averages are preferred.
Source: GRU 2005 Ten-Year Site Plan Submitted to the Florida Public Service Commission, April 2005 and GRU provided 2005 update for peak demand.

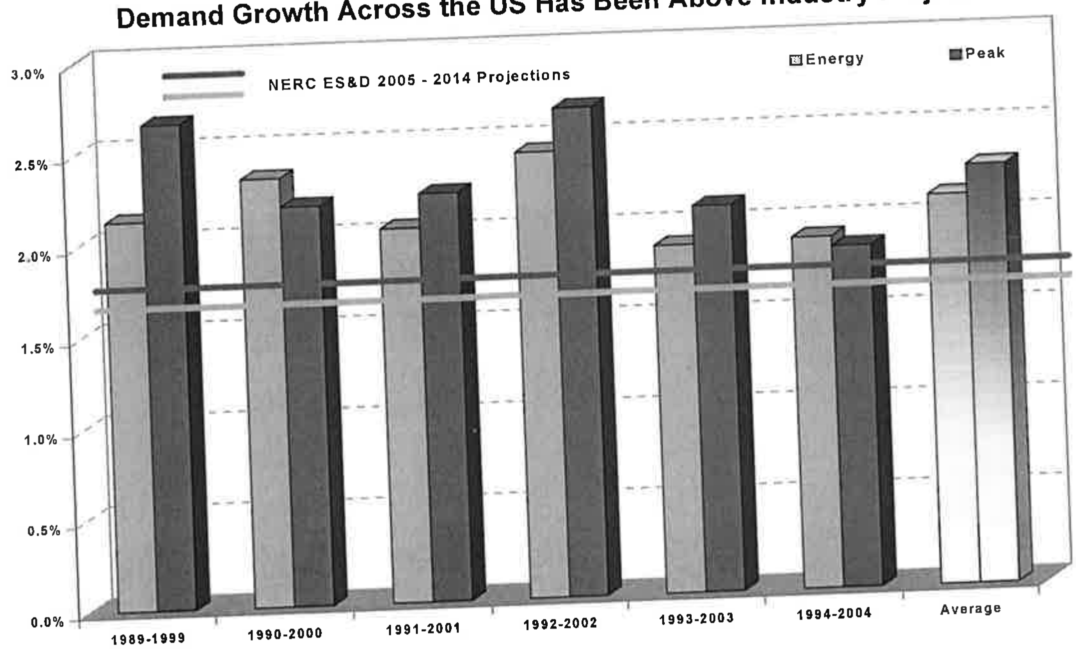
ELECTRICITY DEMAND GROWTH PROJECTIONS

Electricity demand growth projections by the U.S. and Florida utility industry tend to be too low compared to actual historical growth (see Figures 2-8 and 2-9). The causes of this under-forecasting are not fully understood, however, nationally it is a broad based phenomenon extending over nearly two decades. This has contributed to our view that the GRU forecast is reasonable to conservatively low.

Figure 2-8
Total Retail Energy Sales – Historical Forecast Accuracy – Significant Under Forecasting

Utility	Average Forecast Error (%)
Progress Energy Florida	-0.43
Florida Power & Light Company	-1.25
Gulf Power Company	-0.78
Tampa Electric Company	-0.73
Gainesville Regional Utilities	-1.00
JEA	-0.36
City of Lakeland	1.04
City of Tallahassee	0.31
Seminole Electric Cooperative	-0.47
Weighted Average (2000-2004) -2005 TYSP	-0.41
Weighted Average (1999-2003) -2004 TYSP	-0.72
Weighted Average (1998-2002) -2003 TYSP	-1.69
Source: A Review of Florida Electric Utility 2005 Ten Year Site Plans, prepared by the Florida Public Service Commission, Division of Economic Regulation, December 2005, page 19.	

Figure 2-9
Demand Growth Across the US Has Been Above Industry Projections



FORECASTS OF DEMAND GROWTH BEFORE ADDITIONAL DSM

ICF has adopted the demand forecast of GRU and FRCC as its base case. The high case for these entities reflect a weighting of historical growth and utility forecast. In 2006-2010, the estimate is a weighting of 75% historical GRU 10 year rolling average and 25% GRU 2005-2014 annual average forecast rate (AAGR); 2011-2020: 50% historical GRU 10 year rolling average and 50% GRU 2005-2014 AAGR; 2021 and thereafter : 25% historical GRU 10 year rolling average and 75% GRU 2005-2014 AAGR.

Figure 2-10
Forecast Electricity Demand Growth (%)

SCENARIO	GRU[1]	FRCC[2]
Low	NA	NA
Base	2.1	2.5
High[3]	2.8	3.1

[1]GRU's 2005 Electric System Forecast 2006-2024.
[2]FRCC 2004 Regional Load and Resources Plan, July 2004 (2004-2013 annual average)
[3]High demand scenario is a combination of historical and forecast.

GRU SUPPLY AND DEMAND BALANCE

In 2006, GRU's peak demand is forecast to be 470 MW. In 2005, actual peak demand was 465 MW. This requires GRU to have 541 MW which is 470 MW times one plus the required reserve margin of 15 percent. Reserves are required in large part because in the industry standard practice involves peak demand forecasts that assume average summer conditions, not the conditions of hotter than average summer. Also, in the industry, generation capacity is specified assuming no unexpected outages or problems even though they are very common if not ubiquitous.

Current GRU supply equals 611 MW providing a reserve margin of 30 percent. By 2012, under the base case demand growth, reserve requirements will be 626 MW and GRU supply 579 which accounts for planned retirement of Kelly #7. Thus, GRU will need more resources, supply or demand.

By 2023, current supply less retirements is approximately 454 MW. At that time, reserve requirements will be 772 MW. Firm capacity import limits are estimated by ICF to be approximately 300 MW. Thus, even if imports are available, GRU will not be able to meet its needs without more local resources.

Figure 2-11
GRU Supply & Demand (MW) – Base Case Demand Growth

Year	Peak Demand	Reserve Requirements[1]	Existing Supply Net of Retirements With no New Builds	Surplus (Deficit)
2006	470	541	611	71
2007	483	555	611	56
2008	495	569	611	42
2009	508	584	611	27
2010	520	598	602[2]	4
2011	532	612	579	-32
2012	544	626	579	-46
2013	556	639	579	-60
2014	569	654	579	-75
2015	580	667	579	-88
2016	592	681	579	-102
2017	603	693	579	-115
2018	614	706	551	-155
2019	625	719	537	-182
2020	636	731	537	-195
2021	648	745	537	-209
2022	659	758	537	-221
2023	671	772	454	-235
2024	683	785	454	-332
2025	694	798	454	-344

[1]Reserve margin requirement of 15 percent.
[2]Accounts for 8 MW of capacity penalty for Deerhaven 3

Figure 2-12
GRU Supply & Demand (MW) – High Demand Growth

Year	Peak Demand	Reserve Requirements[1]	Existing Supply Net of Retirements With no New Builds	Surplus (Deficit)
2006	470	541	611	71
2007	483	556	611	55
2008	497	571	611	40
2009	511	587	611	24
2010	525	604	602[2]	-1
2011	540	621	579	-41
2012	555	638	579	-59
2013	570	656	579	-76
2014	586	674	579	-95
2015	603	693	579	-114
2016	619	712	579	-134
2017	637	732	579	-154
2018	655	753	551	-202
2019	673	774	537	-237
2020	692	796	537	-259
2021	711	818	537	-281
2022	731	841	537	-304
2023	752	864	454	-411
2024	773	889	454	-435
2025	794	913	454	-460

[1] 15 percent reserve margin.
[2] Accounts for 8 MW of capacity penalty for Deerhaven 3.

Figure 2-13
GRU Expected Retirements (2011 – 2025)

Plant Name	Unit No.	Unit Type	Primary Fuel	Expected Retirement Month/Year	Summer Net Capability (MW)
J.R. Kelly	7	ST	NG	8/2011	23
J.R. Kelly	3	GT	NG	2019	14
J.R. Kelly	2	GT	NG	2018	14
J.R. Kelly	1	GT	NG	2018	14
Deerhaven	1	ST	NG	2023	83
SW Landfill	1	IC	LFG	12/2009	0.65
SW Landfill	2	IC	LFG	12/2015	0.65
TOTAL					149.3

Source: GRU 2005 Ten-Year Site Plan submitted to the Florida Public Service Commission, April 2005.

Another perspective on demand growth is that in the near-term, at 2.1 percent peak demand growth, which is the GRU forecast growth rate, 12 MW of capacity requirements are added each year. At 3.3 percent growth per year, the ten year rolling average growth rate, GRU's demand grows 18 MW per year. Due to compound growth, the following is required:

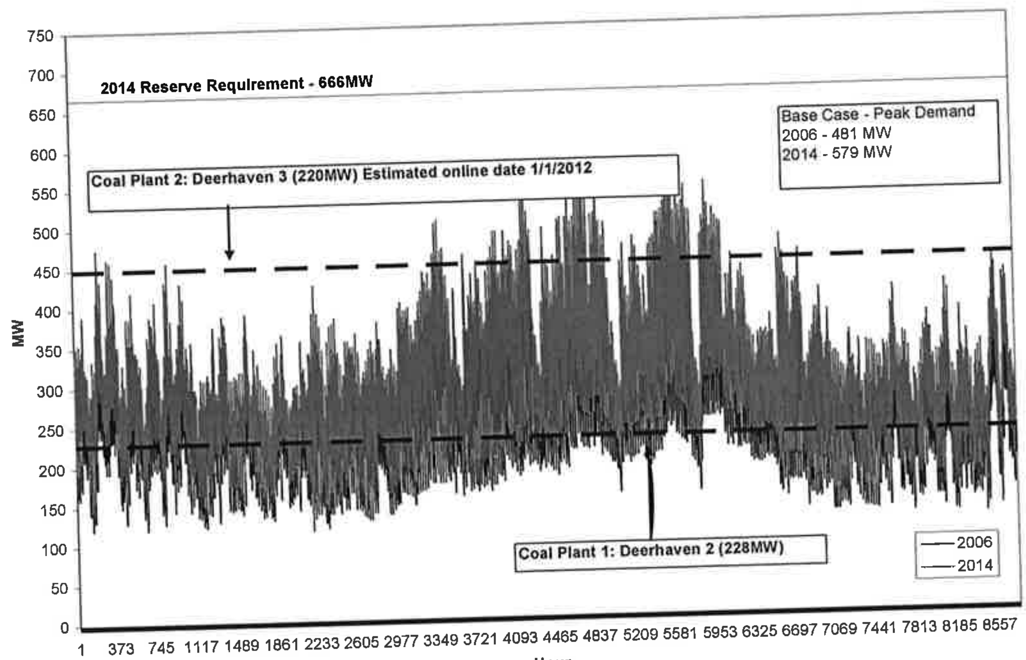
- Between 2006 and 2012, the first year a new unit can reliably be brought on line, GRU generation requirements growth equals 74 MW, all else equal. This assumes that the GRU grows at the forecast growth rate of 2.1 percent.
- At the historical annual growth rate of 3.3 percent, GRU requires an additional 120 MW between 2006 and 2012.

Thus, there is large potential growth in demand given the size of the plants being considered, especially if incremental DSM does not greatly decrease growth.

To illustrate the supply and demand situation facing Gainesville, a stack of two solid fuel plants is compared to: (1) hourly demand in 2006, (2) hourly demand in 2014, and (3) the 2014 reserve requirement of 666 MW (see Figure 2-14). As can be seen, by 2014, hourly demand in the summer exceeds the capacity of the two solid fuel plants and the reserve capacity requirement is well above this level.

This does not mean that new generation is required. However, the modeling calculates the cost consequences of growing hourly electrical energy and reserve requirements.

Figure 2-14
2006 and 2014 Base Demand Compared to Illustrative Potential Supply Stack



Source: Hourly load curves adjusted from GRU's forecasted 2006 load shape.

A similar graphic shows the effect of the high growth case (see Figure 2-15) where demand grows at 2.8 percent per year. In this example, the capacity requirements in excess of the two solid fuel plants is 773 MW (721 – 228 – 220).

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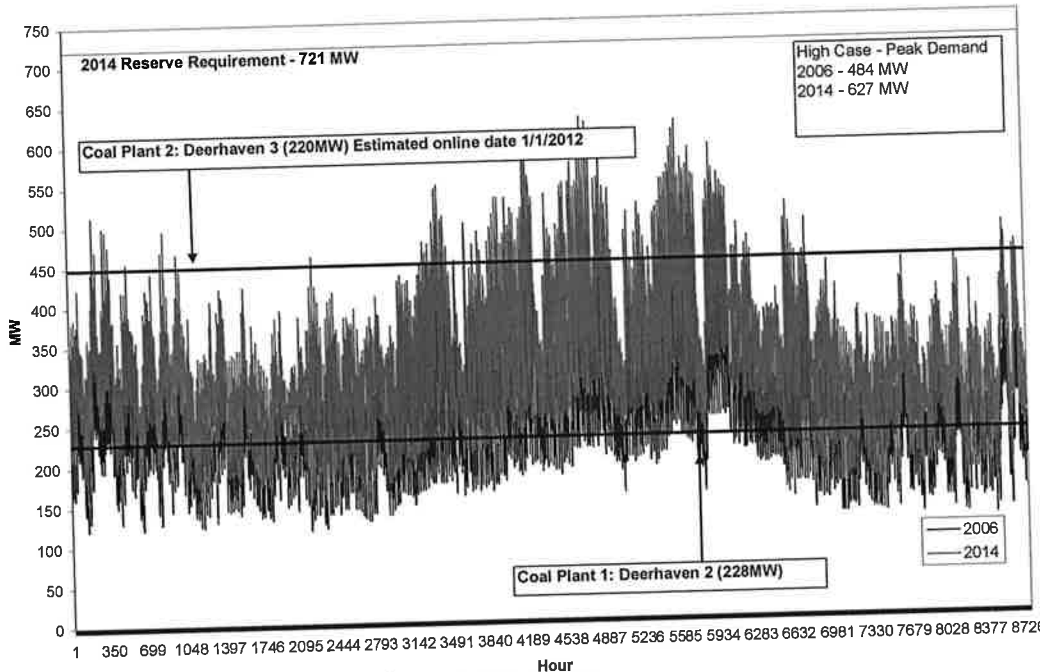
Figure 2-15
2006 and 2014 High Demand Case With Illustrative Potential Supply Stack



Source: Hourly load curves adjusted from GRU's forecasted 2006 load shape.

In 2020, cumulating demand growth raises the extent to which the second solid fuel unit is used on an hourly demand and capacity requirements.

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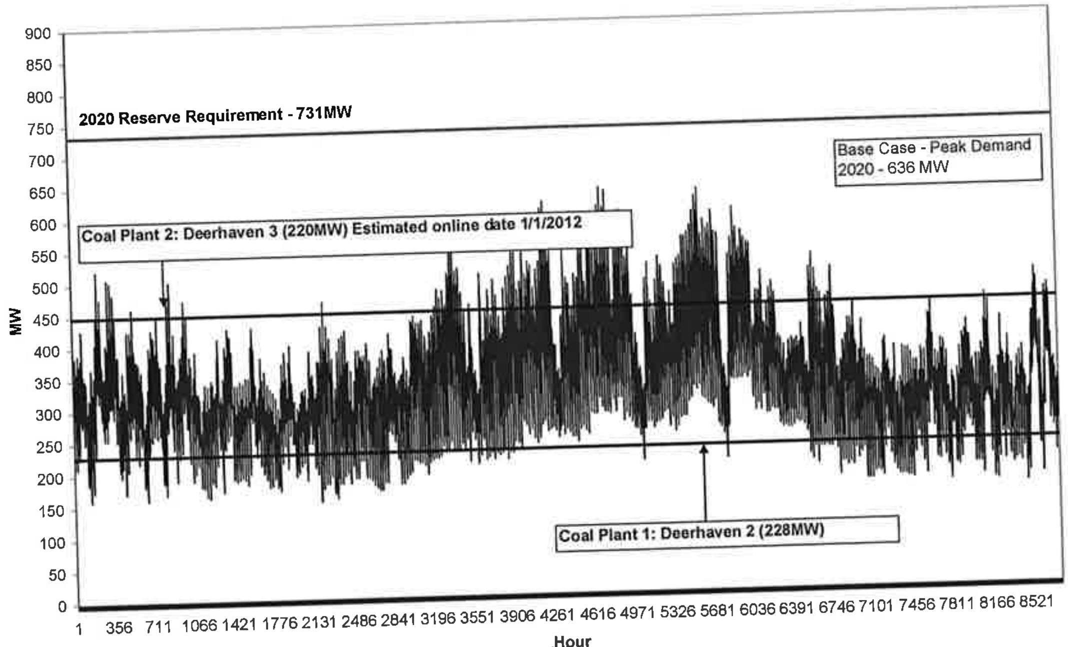
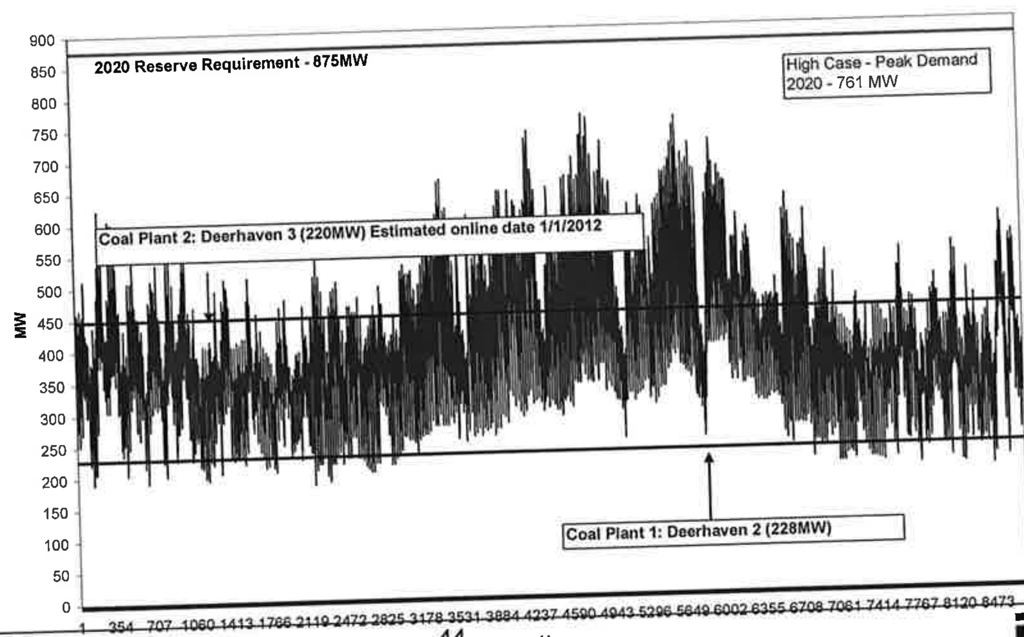
Figure 2-16
2020 Base Demand Case With Illustrative Potential Supply Stack



Source: Hourly load curves adjusted from GRU's forecasted 2006 load shape.

Figure 2-17
2020 High Demand Case With Illustrative Potential Supply Stack



Source: Hourly load curves adjusted from GRU's forecasted 2006 load shape.

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CHAPTER THREE
DEMAND SIDE MANAGEMENT

DSM Options Overview

To analyze the benefits of demand-side management ("DSM") programs, we characterized a broad range of potential DSM programs and performed an integrated analysis along-side the supply-side options using the IPM model. IPM was allowed to pick the most economic DSM programs as an alternative way to meet future electricity demand and reserve margin requirements. This analysis allows us to draw some important conclusions:

- Many of the potential DSM programs are less costly than the supply-side alternatives, with levelized average costs of only $30/MWh.
- Under the "Maximum DSM" scenario, which chooses all DSM programs which are economic assuming high natural gas prices and high $CO2$ prices, capacity requirements are reduced by 46MW by 2015 and 81 MW by 2025 (including reserve margins.)
- The Maximum DSM scenario results in GRU's annual spending on DSM doubling after two years, and growing to almost four times current levels within 10 years (approximately $7.0M/yr)[15]
- The Maximum DSM programs would cut GRU's annual load growth by approximately 55% in by 2015
- The incremental annual DSM program expenditures equate to an additional $15/customer immediately, increasing to an additional $60 per customer in nine years.
- The Maximum DSM level of expenditure and load reduction is comparable to that achieved by Austin Energy, and as such would require Gainesville to become a national leader in DSM program implementation.
- Significant short-term investments in the DSM infrastructure of both GRU and the community would be necessary to achieve these reductions.

[15] All dollars are in expressed in 2003 dollars

Figure 3-1 summarizes key statistics for all the 19 potential DSM programs analyzed, and shows their capital cost in dollars per coincident peak kW to range between $91[16]/kW (for A/C direct load control) and $32,211/kW (for solar water heaters.)

Figure 3-2 summarizes the load impacts for the 16 DSM programs that were chosen at some point in the planning horizon, and details the rise in peak MW reduction from these programs from 5.65MW in 2008 to 70.84MW in 2025. Figure 3-3 provides similar data for the annual energy or MWh reductions.

Figures 3-4 through 3-7 detail the impact of the Maximum DSM case programs on: Annual Costs; Reserve Margin Requirements; Base Case Demand Growth; and High Case Demand Growth respectively.

The remainder of this Chapter details our methodology for determining the magnitude and cost of the DSM programs, and illustrates how the results compare to those of other utilities.

[16] For an equitable comparison, the DLC cost should also reflect additional charges for incentives paid to customers and ongoing operations, maintenance, and switch replacement costs.

Figure 3-1
ICF Analyzed 19 DSM Programs

ICF Identifier Option – Gainesville DSM	Option Name	Capital Costs (2003$/kW)	CCR (%)	Life	Capital Costs Transformed to Yearly Payment (2003$/kW-yr)	First Year Capacity Factor
DSM 1	Residential CFL Program	161.44	14.81	8	23.92	32.6
DSM 2	Residential Fridge/Freezer Buyback	478.26	12.30	10	58.84	86.6
DSM 3	Home Performance with Energy Star (Marginally Cost-Effective Measures)	1,539.56	8.99	15	138.42	--
DSM 4	Home Performance with Energy Star (Cost-Effective Measures)	357.96	8.99	15	32.18	16
DSM 5	Comprehensive Water Heating Program	1,727.46	8.99	15	155.32	40.9
DSM 6	Residential Solar Water Heater	32,211.25	8.99	15	2896.17	--
DSM 7	Residential Appliance	2,782.41	8.99	15	250.17	75.3
DSM 8	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Marginally Cost-Effective Measures)	1,539.56	8.99	15	138.42	--
DSM 9	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Cost-Effective Measures)	357.96	8.99	15	32.18	16
DSM 10	Residential A/C Direct Load Control	90.44	6.70	25	6.06	58.6
DSM 11	Residential Water Heating Direct Load Control	891.71	6.70	25	59.74	100
DSM 12	Energy Star Homes	351.06	6.70	25	23.52	16
DSM 13	Commercial Cooling	1,543.37	8.99	15	138.77	--
DSM 14	Commercial Lighting – Exterior	788.17	12.30	10	96.97	51.6
DSM 15	Commercial Lighting – Interior	1,277.08	12.30	10	157.13	60.9
DSM 16	Commercial Office Equipment	1,039.65	19.18	4	199.45	77
DSM 17	Grocery and Restaurant Refrigeration Program	995.58	8.99	15	89.51	77.9
DSM 18	Commercial Ventilation	1,279.64	8.99	15	115.05	72.7
DSM 19	Commercial Water Heating	1,433.07	8.99	15	128.85	74.7
	TOTAL/AVERAGE					

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Figure 3-2
DSM Choice Under High Gas and CO2 Prices – Cumulative MW[1] Savings

ICF Identifier Option – Gainesville DSM	Option Name	First Year On-Line	2006	2008	2009	2010	2011	2013	2015	2020	2025
DSM1	**Residential CFL Program**	**2006**	0.04	0.15	0.23	0.33	0.45	0.74	1.07	1.69	1.89
DSM 2	Residential Fridge/Freezer Buyback	2006	0.03	0.13	0.19	0.27	0.37	0.61	0.87	1.39	1.55
DSM 3	Home Performance with Energy Star (Marginally Cost-Effective Measures)	Does Not Choose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DSM 4	Home Performance with Energy Star (Cost-Effective Measures)	2006	0.18	0.70	1.06	1.51	2.05	3.37	4.84	7.69	8.60
DSM 5	Comprehensive Water Heating Program	2006	0.03	0.11	0.17	0.24	0.32	0.52	0.75	1.20	1.34
DSM 6	Residential Solar Water Heater	Does Not Choose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DSM 7	Residential Appliance	2006	0.06	0.21	0.33	0.46	0.63	1.03	1.48	2.36	2.64
DSM 8	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Marginally Cost-Effective Measures)	Does Not Choose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DSM 9	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Cost-Effective Measures)	2006	0.43	1.62	2.48	3.53	4.79	7.86	11.29	17.93	20.06
DSM 10	Residential A/C Direct Load Control	2006	0.12	0.43	0.66	0.94	1.28	2.10	3.02	4.79	5.36
DSM 11	Residential Water Heating Direct Load Control	2011	0.00	0.00	0.00	0.00	0.05	0.16	0.29	0.55	0.63
DSM 12	Energy Star Homes	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.14	0.17
DSM 13	Commercial Cooling	2006	0.21	0.78	1.20	1.71	2.32	3.80	5.46	8.68	9.71
DSM 14	Commercial Lighting – Exterior	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.14
DSM 15	Commercial Lighting – Interior	2006	0.26	0.99	1.51	2.15	2.92	4.78	6.87	10.91	12.21
DSM 16	Commercial Office Equipment	2006	0.07	0.27	0.41	0.59	0.80	1.31	1.88	2.98	3.33
DSM 17	Grocery and Restaurant Refrigeration Program	2006	0.02	0.09	0.14	0.20	0.27	0.44	0.63	1.01	1.12
DSM 18	Commercial Ventilation	2006	0.02	0.08	0.13	0.18	0.25	0.41	0.59	0.93	1.05
DSM 19	Commercial Water Heating	2006	0.02	0.09	0.13	0.19	0.25	0.42	0.60	0.95	1.06
	TOTAL/AVERAGE		1.50	5.65	8.63	12.31	16.75	27.55	39.73	63.30	70.84

[1]MW at coincident peak.

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Figure 3-3
DSM Choice Under High Gas and CO2 Prices – Cumulative MWh Savings

ICF Identifier Option – Gainesville DSM	Option Name	First Year On-Line	2006	2008	2009	2010	2011	2013	2015	2020	2025
DSM1	**Residential CFL Program**	**2006**	116	437	667	951	1,291	2,117	3,042	4,832	5,405
DSM 2	Residential Fridge/Freezer Buyback	2006	95	358	547	779	1,057	1,734	2,492	3,957	4,427
DSM 3	Home Performance with Energy Star (Marginally Cost-Effective Measures)	Does Not Choose	-	-	-	-	-	-	-	-	-
DSM 4	Home Performance with Energy Star (Cost-Effective Measures)	2006	527	1,986	3,032	4,322	5,865	9,616	13,821	21,950	24,554
DSM 5	Comprehensive Water Heating Program	2006	82	309	472	672	912	1,496	2,149	3,414	3,819
DSM 6	Residential Solar Water Heater	Does Not Build	-	-	-	-	-	-	-	-	-
DSM 7	Residential Appliance	2006	162	609	930	1,326	1,799	2,949	4,238	6,731	7,530
DSM 8	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Marginally Cost-Effective Measures)	Does Not Choose	-	-	-	-	-	-	-	-	-
DSM 9	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Cost-Effective Measures)	2006	1,230	4,634	7,074	10,086	13,686	22,437	32,249	51,217	57,292
DSM 10	Residential A/C Direct Load Control	2006	329	1,239	1,891	2,696	3,658	5,997	8,620	13,690	15,314
DSM 11	Residential Water Heating Direct Load Control	2011	47	176	269	383	520	852	1,225	1,945	2,176
DSM 12	Energy Star Homes	2015	17	63	96	137	185	304	437	694	776
DSM 13	Commercial Cooling	2006	595	2,242	3,422	4,879	6,621	10,855	15,601	24,778	27,717
DSM 14	Commercial Lighting – Exterior	2015	14	51	78	112	152	249	357	567	635
DSM 15	Commercial Lighting – Interior	2006	748	2,819	4,304	6,136	8,326	13,651	19,620	31,160	34,856
DSM 16	Commercial Office Equipment	2006	204	770	1,176	1,676	2,274	3,729	5,359	8,512	9,521
DSM 17	Grocery and Restaurant Refrigeration Program	2006	69	260	396	565	767	1,257	1,807	2,870	3,211
DSM 18	Commercial Ventilation	2006	64	242	369	526	713	1,169	1,681	2,669	2,986
DSM 19	Commercial Water Heating	2006	65	245	375	534	725	1,189	1,709	2,713	3,035
	TOTAL/AVERAGE		4,363	16,439	25,097	35,780	48,552	79,600	114,40	181,70	203,25

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Figure 3-4
DSM Choice Under High Gas and CO2 Prices – Annual Costs

ICF Identifier Option – Gainesville DSM	Option Name	First Year On-Line	2006	2008	2009	2010	2011	2013	2015	2020	2025
DSM1	**Residential CFL Program**	**2006**	6.56	18.15	13.01	16.06	19.20	46.67	52.32	101.16	32.40
DSM 2	Residential Fridge/Freezer Buyback	2006	15.91	44.05	31.58	38.97	46.59	113.25	126.96	245.44	78.60
DSM 3	Home Performance with Energy Star (Marginally Cost-Effective Measures)	Does Not Choose	-	-	-	-	-	-	-	-	-
DSM 4	Home Performance with Energy Star (Cost-Effective Measures)	2006	66.07	182.85	131.10	161.77	193.40	470.14	527.07	1,018	326.32
DSM 5	Comprehensive Water Heating Program	2006	49.59	137.24	98.40	121.41	145.15	352.85	395.58	764.76	244.91
DSM 6	Residential Solar Water Heater	Does Not Choose	-	-	-	-	-	-	-	-	-
DSM 7	Residential Appliance	2006	157.49	435.87	312.51	385.60	461.01	1,120	1,256	2,428	777.85
DSM 8	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Marginally Cost-Effective Measures)	Does Not Choose	-	-	-	-	-	-	-	-	-
DSM 9	Residential A/C Rebate, Weatherization, & A/C Tune-Up Program (Cost-Effective Measures)	2006	154.16	426.66	305.90	377.45	451.27	1,096	1,229	2,377	761.41
DSM 10	Residential A/C Direct Load Control	2006	10.41	28.81	20.66	25.49	30.48	74.09	83.06	160.57	51.42
DSM 11	Residential Water Heating Direct Load Control	2011	14.58	40.36	28.94	35.70	42.69	103.77	116.34	224.90	72.03
DSM 12	Energy Star Homes	2015	2.05	5.67	4.06	5.01	5.99	14.57	16.33	31.58	10.11
DSM 13	Commercial Cooling	2006	321.57	889.95	638.07	787.32	941.29	2,288	2,565	4,959	1,588
DSM 14	Commercial Lighting – Exterior	2015	3.76	10.41	7.46	9.21	11.01	26.76	30.00	57.99	18.57
DSM 15	Commercial Lighting – Interior	2006	334.62	926.08	663.98	819.28	979.50	2,381	2,669	5,160	1,652
DSM 16	Commercial Office Equipment	2006	74.41	205.94	147.65	182.19	217.82	529.49	593.62	1,147	367.52
DSM 17	Grocery and Restaurant Refrigeration Program	2006	24.03	66.50	47.68	58.83	70.34	170.99	191.70	370.60	118.68
DSM 18	Commercial Ventilation	2006	28.72	79.50	57.00	70.33	84.08	204.40	229.15	443.00	141.87
DSM 19	Commercial Water Heating	2006	32.70	90.49	64.88	80.06	95.71	232.67	260.85	504.28	161.49
	TOTAL/AVERAGE		$1,297	$3,589	$2,573	$3,175	$3,796	$9,227	$10,34	$19,99	$6,404

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Figure 3-5
Comparison of GRU Demand Before and After DSM Chosen – Base Case Demand Growth (MW)

Year	Before DSM		After DSM		Change	
	Peak Demand	Peak Demand Plus Reserve Requirements	Peak Demand	Peak Demand Plus Reserve Requirements	Peak Demand	Peak Demand Plus Reserve Requirements
2006	470	541	469	540	1	1
2007	483	555	481	554	2	2
2008	495	569	489	563	6	7
2009	508	584	499	574	9	10
2010	520	598	508	584	12	14
2011	532	612	515	593	17	19
2012	544	626	522	600	22	25
2013	556	639	528	608	28	32
2014	569	654	535	616	34	39
2015	580	667	540	621	40	46
2016	592	681	548	630	44	51
2017	603	693	554	637	49	57
2018	614	706	560	644	54	62
2019	625	719	566	651	59	67
2020	636	731	573	659	63	73
2021	648	745	583	671	65	75
2022	659	758	593	682	66	76
2023	671	772	603	694	68	78
2024	683	785	614	706	69	80
2025	694	798	623	717	71	81

Figure 3-6
Comparison of GRU Demand Before and After DSM Chosen – Base Case Demand Growth (GWh)

Year	Before DSM Energy (GWh)	After DSM Energy (GWh)	Change in Energy (GWh)
2006	2,177	2,173	4
2007	2,233	2,229	4
2008	2,291	2,275	16
2009	2,349	2,324	25
2010	2,407	2,371	36
2011	2,460	2,411	49
2012	2,514	2,450	64
2013	2,570	2,490	80
2014	2,627	2,530	97
2015	2,679	2,565	114
2016	2,732	2,604	128
2017	2,783	2,642	141
2018	2,833	2,678	155
2019	2,883	2,715	168
2020	2,933	2,751	182
2021	2,984	2,798	186
2022	3,036	2,846	190
2023	3,088	2,893	195
2024	3,140	2,941	199
2025	3,193	2,990	203

Figure 3-7
GRU Supply and Demand Balance – High Case Demand Growth

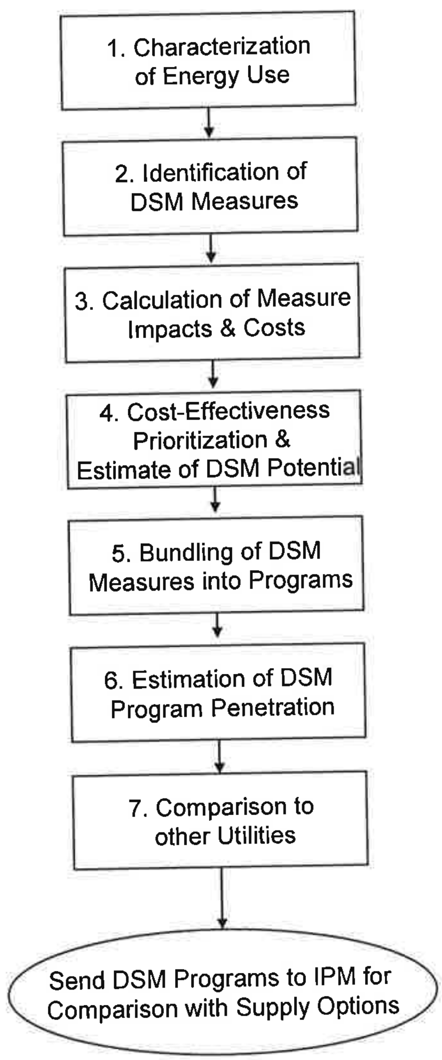
Year	Assuming No New Capacity Construction			Before DSM		After Maximum DSM	
	Existing Capacity	Retire-ments	Net Capacity	Peak Demand Plus Reserve Require-ments	Deficit Surplus	Peak Demand Plus Reserve Require-ments	Deficit Surplus
2006	611		611	541	71	539	72
2007	611		611	556	55	554	57
2008	611		611	571	40	565	46
2009	611		611	587	24	577	34
2010	611	9[1]	602	604	-1	589	13
2011	611	23	579	621	-41	601	-22
2012	611		579	638	-59	612	-33
2013	611		579	656	-76	624	-45
2014	611		579	674	-95	635	-56
2015	611		579	693	-114	647	-68
2016	611	1	579	712	-134	661	-83
2017	611		579	732	-154	676	-97
2018	611	28	551	753	-202	691	-140
2019	611	14	537	774	-237	707	-170
2020	611		537	796	-259	723	-186
2021	611		537	818	-281	743	-207
2022	611		537	841	-304	765	-228
2023	611	83	454	864	-411	786	-333
2024	611		454	889	-435	809	-355
2025	611		454	913	-460	832	-378

[1] Accounts for 8MW of capacity penalty for Deerhaven 3.

Summary of DSM Analysis Methodology

The primary goal of the DSM analysis is to characterize a wide range of potential DSM programs in a manner consistent with supply-side alternatives such that an "apples-to-apples" comparison can be made by IPM. Therefore, the primary output of the DSM analysis is an assessment of the amount and timing of load reductions (kW and MWh) that can be achieved in the GRU service territory, along with the cost of such reductions. In addition the analysis supports the assessment of DSM impacts on emissions, jobs, and average GRU rate levels as discussed elsewhere in this report. The basic methodology is outlined in Figure 3-8.

Figure 3-8
Overview of DSM Analysis Methodology



Each step in this process is summarized briefly below. The remainder of this section discusses each step, its assumptions, and its results in more detail.

Step 1. Characterization of Energy Use. In order to understand which technologies are most applicable to the customers of GRU, it is first necessary to understand how electricity is currently being used in the community. Therefore, this step estimates how much energy is being used by a range of customer types (e.g., offices, schools, residences, etc.) for a variety of end-uses (e.g., lighting, air-conditioning, etc.).

Step 2. Identification of DSM Measures. Informed by the results of Step 1, a list of approximately 125 potential DSM measures was developed using data from previous GRU studies, community input, experiences of other utilities, ICF experience, and other sources.

Step 3. Calculation of DSM Measure Impacts and Costs. For each of the DSM measures, an estimate of the cost of installation and maintenance was developed, along with the impact on electricity summer peak demand (kW) and annual energy (kWh.) For weather-sensitive measures, ICF performed approximately 1,280 residential energy simulation runs and 2,112 commercial runs using the Department of Energy's DOE-2 software to determine specific impacts under Gainesville's unique weather conditions.

Step 4. Cost-Effectiveness Prioritization and Estimation of DSM Potential. Based on the costs and impacts, a "Supply Curve" for DSM, showing how many Megawatts of DSM reduction are available at varying cost levels was developed. The measures were then prioritized based on their potential cost-effectiveness (under the TRC test) and an estimate of the amount of cost-effective DSM was developed.

Step 5. Bundling of Measures into Programs. Since DSM measures (e.g., attic insulation) are rarely delivered alone, but are typically packaged into programs with other measures to achieve economies of scale, measures passing the cost-effectiveness screening were grouped into programs for further analysis. This process resulted in 12 residential and seven commercial programs.

Step 6. Estimation of DSM Program Penetration. The estimated participation rate of GRU customers in the DSM programs was developed based upon the market size, growth rate, economics of the technologies, and related factors. Total program impacts and costs were also developed. Note that these impacts are over and above GRU's currently proposed DSM programs.

Step 7. Comparison to Other Utilities. The relative magnitude of the DSM programs (both in terms of dollars and load reduction) was compared to other utilities, including Austin Energy and an illustration of the relative aggressiveness of the potential portfolio of DSM programs was provided.

All the DSM Programs were then passed to IPM for integrated analysis alongside the supply-side options and evaluation of economic, rate, and emissions impacts.

Note that this process does not attempt to define in final detail the complete nature of the potential DSM programs, and that many decisions about qualifying technologies, how to deliver the programs, and removal of barriers would need to be made if the programs were to be implemented. Similarly, the analysis does not attempt to analyze the universe of technologies that might have some value in the programs in the future, even if their impact would be small. Nor does this analysis reveal whether these programs are a "good idea" or not, since a variety of policy issues, such as impact of the programs on average rate levels, equity between customers, perspectives on future markets for fuels and energy, emissions, and other issues need to be resolved to answer this question.

The process does, however, characterize the amount and cost of DSM that is reliably achievable with aggressive funding and cost-effectiveness assumptions. It permits a robust comparison with the supply-side options, and lays the foundation for an assessment of the trade-offs between various policy considerations.

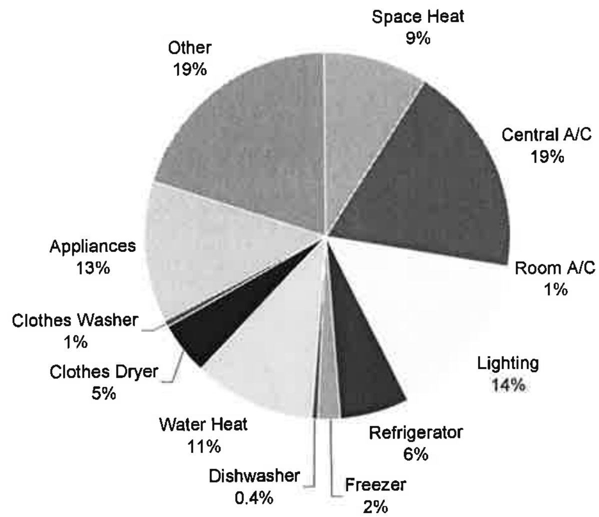
Step 1. Characterization of Energy Use

To establish a baseline profile of energy consumption by building type and end-use, a combination of current and historical GRU energy usage data, as well as Energy Information Administration (EIA) data was used. This type of detailed end use data is important since in many cases, DSM potential is estimated as a percentage reduction in the energy currently used by a particular technology.

Residential load was taken from the GRU 2005 Ten-Year Site Plan (Site Plan), and confirmed by EIA 2004 Form 861 data. The residential load of 878 GWh was segmented by end-use using regional average and percentages from GRU's 1994 Demand Side Management Base Planning Study (DSM Study). End-use load was then further segmented by technology type and is summarized in Figure 3-9[17]

[17] Data for the end-use consumption figures is provided in the Appendix

Figure 3-9
GRU Residential Electricity Load (MWh Share) by End-use



Commercial load was also taken from the Site Plan, and confirmed by EIA 2004 Form 861 data. The commercial load of 764 GWh was segmented by sub-sector and end-use using percentages from the DSM Study and from regional averages. End-use load was then further segmented by technology type (see Figure 3-10).

Residential and commercial peak demand were taken from the Site Plan, and confirmed by EIA 2004 Form 861 data. Residential demand was equal to 248 MW. Residential demand was segmented by end-use using regional averages and the DSM Study. Commercial demand was equal to 229 MW, and was segmented by building type and end-use based on the DSM study and regional averages.

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Figure 3-10
Share of Commercial Load (MWh) by Sub-sector and End-use

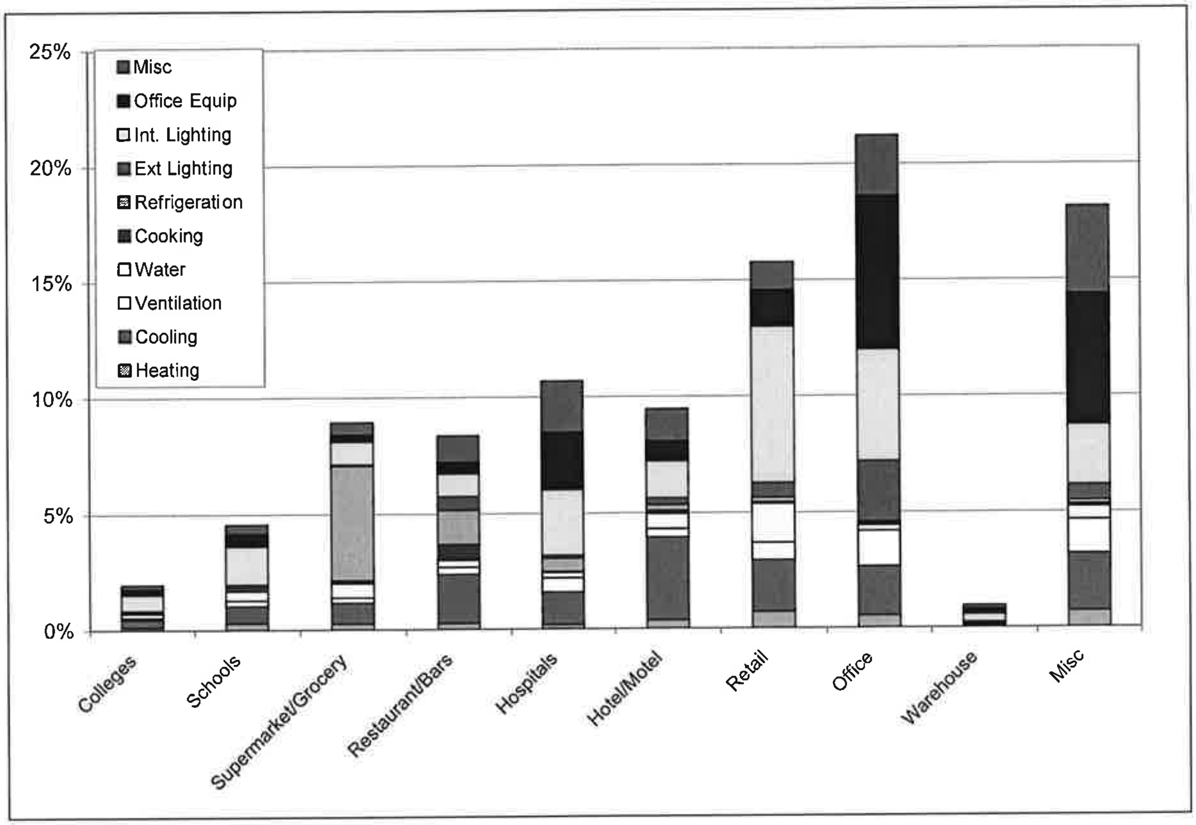
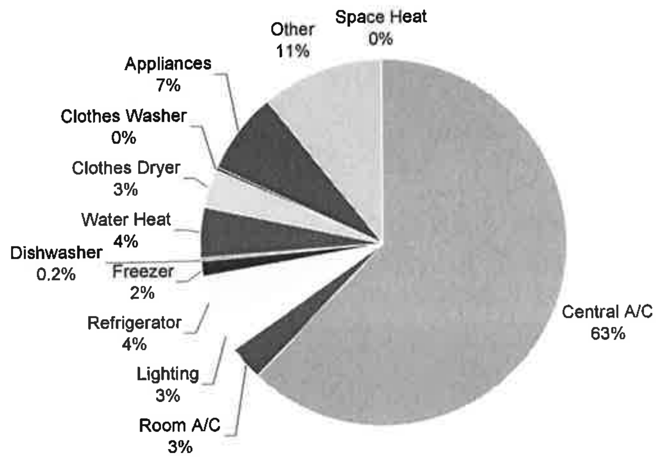


Figure 3-11
GRU Residential Peak Demand Share by End-use



To determine typical residential household electricity consumption for weather-sensitive end uses, we referred to the EIA's 2001 Residential Energy Consumption Survey. The finest level of geographic resolution available from this data set is for the state of Florida, which we assumed to be indicative of average end use consumption per household in Gainesville. As necessary, we made appropriate adjustments for Gainesville where specific data (such as the saturation of gas water heating) were known. In the commercial sector, end use consumption per square foot was taken from the EIA's 1999 Commercial Building Energy Consumption Survey data. The values for end-use consumption were taken from the South Census Region survey tables as the best available representation of Gainesville load.

In the residential sector, electricity consumption is dominated by the central air conditioning, lighting, water heating, and appliance end uses (Figures 3-11 and 3-13). Because of Gainesville's warm climate, air conditioning is the single largest energy consuming end use. Central air conditioning represents an even greater share of overall residential peak electricity demand and will be a primary target of the DSM technologies selected.

In the commercial sector, the office and retail building types make up the largest shares of overall electricity consumption and peak demand. Within these building types, cooling, lighting, and office equipment make up the largest shares (Figures 3-12 and 3-14). As is the case in the residential sector, peak demand more heavily favors cooling loads, which are at their peak coincident with the system peak.

Figure 3-12
GRU Commercial Peak Demand by Sub-sector and End-use

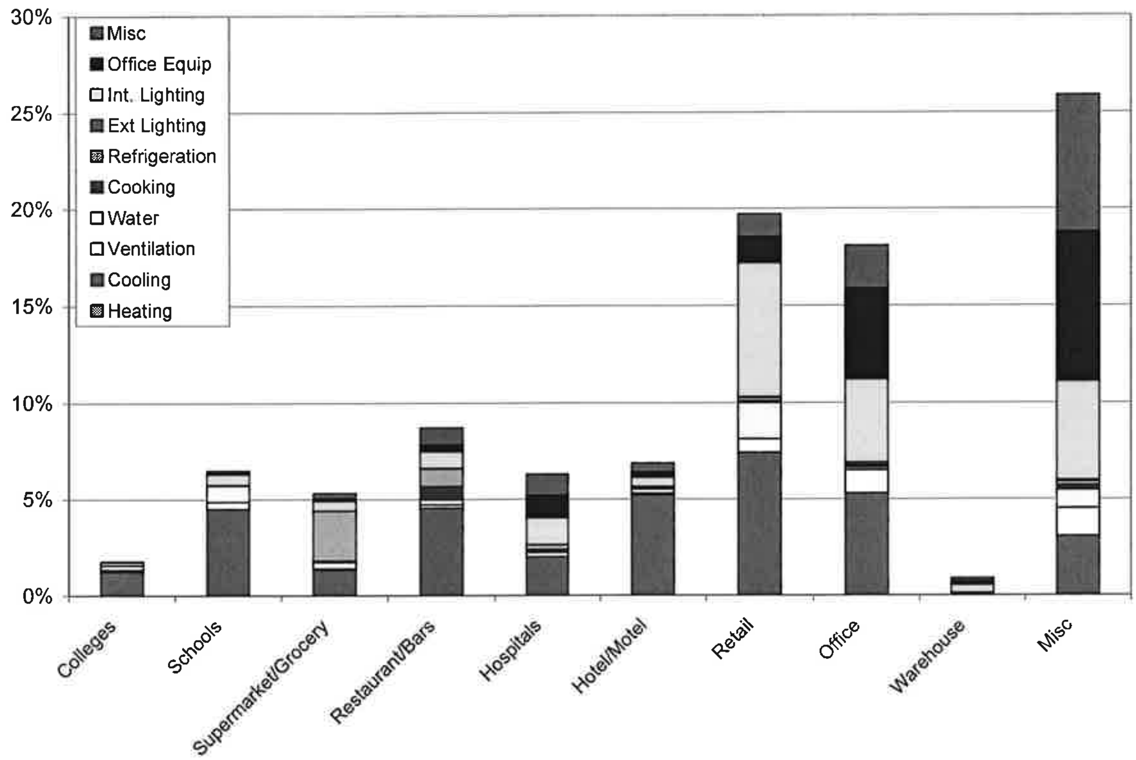


Figure 3-13
GRU Residential End-use Consumption

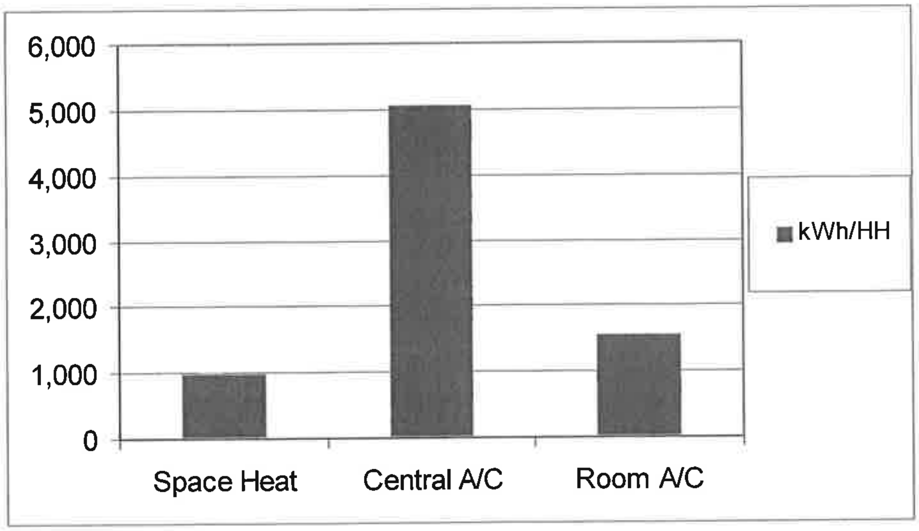
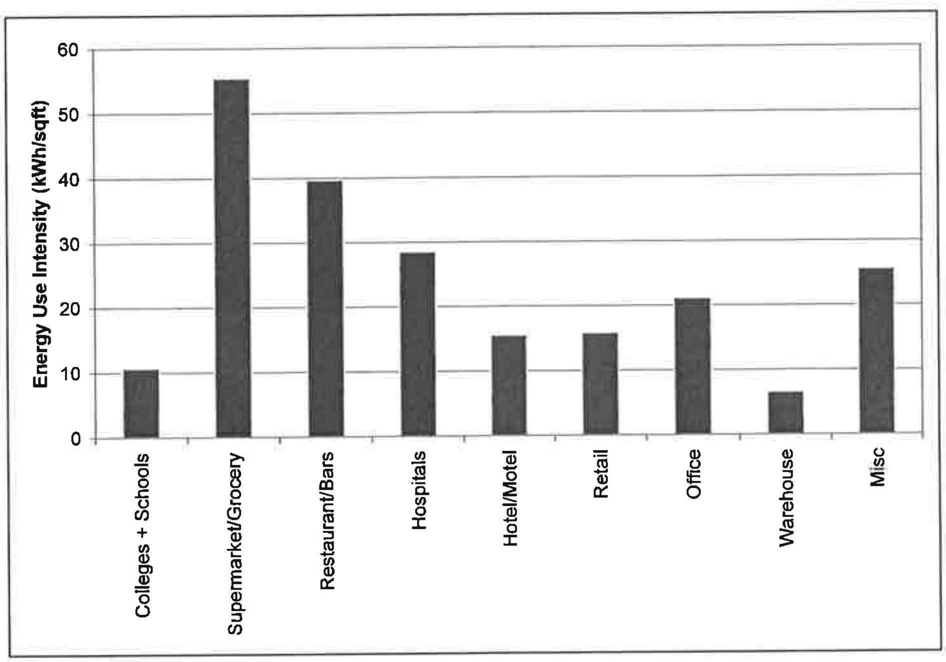


Figure 3-14
GRU Commercial Sub-sector Consumption Intensity



Step 2. Identification of DSM Measures

The measures selected for initial screening include measures from the 1994 GRU Demand Side Management Base Planning Study, review of the DSM programs of other utilities, community suggestions (although not all suggested measures were necessarily included), as well as additions from ICF's own database of energy efficiency measures. Note that due to the comparative lack of industrial customers a comprehensive list of industrial DSM measures and niche technologies (e.g., combined heat and power) was not evaluated. This is not to suggest that there is not potential for such measures, perhaps as an element of a "custom rebate" program, but rather to recognize their limited applicability given the customer base.

The list of measures is provided in Figure 3-15. While perhaps not inclusive of all measures that could possibly be incorporated in GRU DSM programs over the planning horizon, the below list provides a good representation of the applicable technologies and the potential for DSM.

Step 3. Calculation of DSM Measure Impacts and Costs

Because the data from the 1994 GRU DSM Study are in some cases somewhat dated, we updated energy savings and cost assumptions based on contemporary sources. Specifically, we used the 2004-2005 Database for Energy Efficiency Resources (DEER) Version 2.01 for updated cost information and savings information for non-weather-sensitive measures. DEER is a comprehensive and nationally-used measure database jointly developed by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC). We screened all measures for applicability and feasibility to the GRU service territory and to the residential and commercial sectors. Data elements associated with each measure include: incremental capital, installation, and O&M costs; the effective useful measure life; and per unit energy and demand savings. For the commercial sector, energy impacts were specified for each individual building type.

In addition, weather-sensitive measures (such as high-efficiency air conditioning and home weatherization) required evaluation based on Gainesville's own unique weather patterns and building construction practices. To determine the demand and energy impact of these measures, the Department of Energy's DOE-2.1E software was used. This software takes data about the size, construction, and equipment characteristics of buildings and uses local weather to estimate energy use.

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Figure 3-15
DSM Measures Included in the Screening Process

MEASURES	
Air sealing (caulking, weatherstripping, hole sealing)	Instanteous Water Heater <=200 MBTUH
Anti-sweat (humidistat) controls	Insulated metal or fiberglass doors
Attic Radiant Barriers (Elec)	Landscape Shading
Attic, roof, wall, perimeter, knee wall, underfloor insulation	LCD monitor
Automatic OA reduction control	LED Exit Signs
Ceiling Fan	Load Control - AC
Central A/C - various equipment retrofits (EER & tonnage)	Load Control - Electric WH
Chiller economizers (water side), or air side economizers	Low Flow Showerheads
Circulation Pump Timelocks	Low Flow Showerheads (Elec)
Compact flourescent lamp (modular)	Motion Detectors
Compact fluorescent lamps (CFLs)	Network power management enabling - monitor
Compressor VSD retrofit	Night covers for display cases
Convection Oven	Nighttime shutdown - printers
Cool (reflective) rooftops	Occupancy sensors for 4' fluorescent
Cool Storage	Occupancy sensors for 8' fluorescent
CV to VAV conversion	Optimize chilled water and condenser water setting
Demand defrost electric	Outdoor Floodlight
Demand hot gas defrost	Outdoor lighting controls for fluorescent (photocell/timeclock)
Duct Insulation	Outdoor lighting controls for HID (photocell/timeclock)
Duct Sealing	Outdoor lighting controls for incandescent (photocell/timeclock)
Efficiency compressor motor retrofit	Perimeter dimming for 4' fluorescent
Efficient Infrared Griddle	Perimeter dimming for 8' fluorescent
Energy management controls	Pipe Insulation
Energy Star Clothes Washers - All Electric	Pipe Wrap (Elec)
Energy Star Dishwasher - Electric DHW	Power Burner Fryer
Energy Star or better clothes dryer (Elec)	Power Burner Oven
Energy Star or better freezer	Power management enabling - copier
Energy Star or better heat pump upgrade	Power management enabling - monitor
Energy Star or better refrigerator	Power management enabling - PC
Energy Star or better windows	Premium-efficiency motors
Evaporator fan controller for MT walk-ins	Programmable Thermostat
External hardware control - monitors	Reducing minimum outside air requirements
External hardware control - printers	Reflective Roof Coatings
Faucet Aerator	Reflectors for 4' fluorescent
Faucet Aerators (Elec)	Reflectors for 8' fluorescent
Filter cleaning and/or replacement	Refrigerant charge testing and recharging
Floating head pressure controls	Refrigeration commissioning
Furnace upgrades	Remove 2nd Freezer
Ground Source Heat Pump	Remove 2nd Refrigerator
Ground Source Heat Pump - Elec Resis Heater	Room A/C - various equipment retrofits (EER & tonnage)
Heat Pipe Enhanced DX	Shade Screens
Heat Pump - Load Control	Shell insulation upgrades
Heat Pump - Maintenance	Shell insulation upgrades (Wall and Slab, Elec)
Heat Pump WH - Add On	Solar control glazing
Heat Pump WH - Integral	Solar gain controls such as exterior shades
Heat Recovery Water Heater	Solar Water Heater
Heat Trap - Water Lines	Strip curtains for walk-ins
Heater efficiency upgrade	T8 lamps with electronic ballasts (2L4')
High-efficiency chillers	T8 lamps with electronic ballasts (2L4')
High-efficiency fan motors	T8 lamps with electronic ballasts (2L8')
High-efficiency packaged DX A/C	Tank Insulation
High-intensity discharge lamps (incandescent to hi-pres sodium)	Tank temperature setback (Elec)
High-intensity discharge lamps (incandescent to metal halide)	Two speed Central AC
High-intensity discharge lamps (mercury vapor to hi-pres sodium)	Two speed Heat Pump
Improved maintenance and diagnostics	Two speed Heat Pump - Elec Resis Heater
Infiltration Reduction	Unoccupied OA reduction
Infrared Conveyor Oven	Vapor-compression cycle
Infrared Fryer	Variable-speed drives
Installation of low-E glass or multiple glazed windows	Water heat tank wraps and bottom boards (Elec)
Installation of nighttime pre-cooling controls and systems	Whole House Fan
Installation of outside air reset controls	Window Film
Installation of wall, roof, or ceiling insulation	Window treatment

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For the residential segment, analysis was conducted to determine the impact of energy efficiency upgrades on both existing home stock and new homes separately, reflecting the fact that existing homes often have significantly poorer energy performance than new homes. For the commercial segment, analysis included the six primary building types that make up a majority of the buildings located in the Gainesville region. The DOE-2 analysis uses Typical Meteorological Year (TMY2) weather data.

Each of the building types have a baseline determined by a typical set of architectural characteristics (e.g. foundation type, number of stories, conditioned floor area, window to floor area ratio), and a single set of energy-related characteristics (e.g., wall insulation, attic insulation, equipment efficiency, window U-value and SHGC). For a full set of characteristics modeled, see Attachment 3.

Note that these DSM impacts are still "draft" and we are awaiting certain Gainesville-specific data and otherwise performing QA/QC on all numbers. Adjustments and corrections may be made to some DSM measures based on this process.

Step 4. Cost-Effectiveness Prioritization and Estimation of DSM Potential.

DSM potential studies typically address three different concepts of "potential". First, **technical potential** quantifies the savings that could be realized if energy efficiency measures were applied in all technically feasible instances, regardless of cost. As is typical for such an analysis, we estimated technical potential assuming that this change-out occurs immediately. Technical potential is therefore useful as a broad gauge of the economy's inefficiency in the territory of interest.

Economic potential is the subset of technical potential that is cost-effective from a chosen benefit-cost perspective. For this initial screening we applied the Total Resource Cost or "TRC" test perspective as the primary measure. However, this is not to assert that the TRC perspective is necessarily the lone criterion which should be applied to establish "cost-effectiveness," nor to dismiss the value of other tests, such as the Ratepayer Impact Measure or "RIM" test. However, in order to not prematurely screen out potential DSM measures before they can be analyzed alongside supply-side options in IPM, and consistent with the Commission's directives favoring DSM, the TRC test was used.

As with technical potential, economic potential assumes that all relevant energy efficiency improvements occur instantaneously. For this study, we have further subdivided economic potential into measures that are cost-effective (with a TRC>=1) or marginally cost-effective (with a TRC between 0.5 and 1). That is, measures failing the TRC test, but with a benefit cost ratio greater than 0.5 were treated as "passing" for the purposes of this analysis. This was done to recognize that there is uncertainty in the screening of the measures, and that some of the screening assumptions (such as avoided costs) were by necessity based on previous GRU analyses and not the results