A TEXAS STUDY OF THE EFFECTS OF THE NATIONAL APPLIANCE ENERGY CONSERVATION ACT OF 1987

RICHARD BACHMEIER
Economic Analyst
Public Utility Commission of Texas
Austin, Texas

ABSTRACT

At the present time, no legislated efficiency standards exist in Texas for residential appliances. However, the National Appliance Energy Conservation Act (NAECA) of 1987 passed by the U.S. Senate in February, 1987, sets strict nationwide limits on the amount of energy which can be consumed by major new household appliances. The efficiency standards mandated by the NAECA will be phased in between 1988 and 1993 and will focus on space heating equipment, air conditioners, water heaters, refrigerators, and freezers.

The first section of this report presents a brief discussion of the appliance standards mandated by the NAECA. Then a statewide version of EPRI's Residential End-Use Energy Planning System (REEPS) set up at the Public Utility Commission of Texas (PUCT) is used to estimate the impact that the legislated standards will have on residential electricity consumption in Texas. Finally, utility-specific REEPS results are presented and these results serve as inputs to the PUCT's version of EPRI's Hourly Electric Load Model (HELM) to estimate the peak demand reductions which will result from the appliance standards.

THE NATIONAL APPLIANCE ENERGY CONSERVATION ACT OF 1987

The National Appliance Energy Conservation Act of 1987 is a compromise version of a similar bill passed by the 99th Congress in late 1986 shortly before adjourning. The original bill, which was the outcome of intense negotiations between appliance manufacturers and the Natural Resources Defense Council (NRDC), set national efficiency standards for large household appliances and required the Department of Energy (DOE) to periodically review and, if necessary, revise the standards. Although appliance manufacturers have historically preferred to let the market force gains in energy efficiency, most now prefer a national standard over the proliferation of differing state standards. Proponents of the Act also argued that it would have allowed utilities and energy commissions to forecast energy savings more accurately and provide a more reliable basis for planning future capacity requirements.

Although the 1986 bill initially won easy approval by both the House and Senate, President Reagan failed to sign it or return it to Congress with his objections before November 1, 1986. As a result, the bill died by a pocket veto. Reagan criticized the bill in a statement issued on November 1, saying that it "...intrudes unduly on the free market, limits the freedom of choice available to consumers who would be denied the opportunity to purchase low-cost appliances and constitutes a substantial intrusion into traditional state responsibilities and prerogatives." He further argued that the efficiency standards contained in the bill were proposed "...without regard to technological feasibility or the need for economic justification." He went on to say that the bill would have cost consumers an estimated 1.4 billion dollars a year on appliance purchases by eliminating lower-priced models, and would be especially harmful to low-income households (1).

After a compromise was reached with the White House, the Senate passed a new version of the 1986 bill by a 89-to-6 vote on February 17, 1987. The deal which was struck involved an amendment to the original bill which simply deleted the language concerning the periodic review of the standards by DOE. Although the new bill addresses none of the President's previous concerns, it was signed this time around.

What the NAECA does is basically the following:

- It sets minimum efficiency standards for central and room air conditioners, heat pumps, furnaces, refrigerators, freezers, direct heating equipment, water heaters, and pool heaters as well as design requirements for clothes washers and dryers, dishwashers, and kitchen ranges and ovens. These standards and design requirements are scheduled to be phased in from 1988 to 1993.
- It supersedes further state regulation of appliance efficiency past the effective dates of the various new federal standards but allows petition for exemption after a set period under defined state energy emergency conditions.
- It preserves existing state building codes affecting appliances and allows the adoption and revision of such codes as long as they do not require the installation of covered products with energy efficiencies exceeding the applicable federal standard.
- It retains the EnergyGuide labeling program.
- It gives appliance manufacturers adequate lead time to comply with the standards.

NAECA APPLIANCE STANDARDS IN REEPS

The Residential End-Use Energy Planning System (REEPS) developed by EPRI is particularly well-suited to investigating the effects of mandated appliance standards because minimum efficiencies of new equipment are input exogenously to the model by end use. Each standard, however, must first be normalized to the base year (presently 1980) mean efficiency of the appliance in question before it can be used in REEPS. The procedure of inputting mandated standard's consists of deciding on a value which best represents the 1980 "average" efficiency for each technology and end use, normalizing the standards to the base year values, and then entering the normalized values into the exogenous variable input file for the appropriate years.

Table 1 summarizes the values used for the 1980 average efficiencies, the NAECA standards, and the normalized NAECA standards used in the REEPS simulation.[1] Several caveats should be mentioned about these values. First, information concerning the actual efficiencies of the 1980 total stock of residential appliances in Texas either could not be located or is of questionable quality. As a result, the values used for the 1980 averages are the national shipment-weighted average efficiencies for new appliances which, assuming that older appliances are less efficient, will tend to overstate the average efficiency of the 1980 stock.

Also, even though the NAECA specifies a variety of standards for refrigerator-freezers, freezers, and room air conditioners depending on each appliance's capacity and features, REEPS allows only one efficiency for each end-use technology. Therefore, the standard used for the REEPS simulations are those which would correspond to the "typical" model sold in 1983 as judged by the shipment-weighted average capacity for each appliance. Implicit in this treatment is the assumption

[1] For a more complete summary of the appliance standards contained in the Act, see (2).

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TABLE 1

Appliance Efficiencies Used in REEPS Simulation

	1980[1] Average	NAECA Standard	Normalized Standard
Refrigerator-Freezer	1278 kWh/yr	950 kWh/yr	1.40
Freezer	883 kWh/yr	715 kWh/yr	1.27
Room Air Conditioner	7.02 EER	9.0 EER	1.28
Central Air Conditioner and Air Conditioning Heat Pump	7.55 SEER 7.51 SEER	10.0 SEER 10.0 SEER	1.32 1.33
Water Heaters			
Gas	47.9 EF	54.4 EF	1.14
Electric	78.3 EF	88.4 EF	1.13
Furnaces			
Gas Central Heat	65.9 AFUE	78.0 AFUE	1.18
Gas Hydronic	65.9 AFUE	68.0 AFUE	1.07
Oil Central Heat	78.6 AFUE	78.0 AFUE	.99
Gas Room Heat	65.9 AFUE	63.0 AFUE	.99

[1] These are 1980 sales-weighted averages for new appliances. Source: (3).

that the typical model sold in 1986 is of a size and style comparable to the typical model sold in 1983. For example, the 950 kWh/year standard for refrigerator-freezers corresponds to an automatic defrost model with a top freezer and an adjusted volume of 20.4 cu.ft. The shipment-weighted average adjusted volume for models manufactured in 1983 was 20.31. Since the average room air conditioner manufactured in 1983 had a capacity of 10,566 Btuh, the 9.0 EER corresponding to the 8,000 to 13,999 Btuh range is used for the standard. The standards used for water heaters are based on units with rated storage volumes of 40 gallons for gas and 50 gallons for electric.

Finally, the NAECA standards for dishwashers, clothes washers and dryers, kitchen ranges and ovens, and pool heaters could not be considered in the REEPS simulation. One reason is that the standards for most of these end uses concern design requirements (eg. no constant burning pilots in gas ranges), which cannot be modeled in REEPS, rather than minimum efficiencies. Also, clothes washers and dryers and pool heaters are not included in the end uses specified by REEPS.

The refrigerator and freezer efficiency standards summarized in Table 1 are in terms of the maximum allowable kilowatt-hours per year consumed by each appliance under specified test procedures. The standards cover products whose manufacture is completed on or after January 1, 1990.

The average new refrigerator-freezer produced in 1983 had an adjusted volume of 20.31 cu.ft. and consumed 1160 kWh per year. In comparison, the proposed standard for an automatic defrost refrigerator-freezer with an adjusted volume of 20.4 cu.ft. is 950 kWh per year. Although the proposed standard represents an eighteen percent decrease in yearly energy use from a similar model produced in 1983, the American Council for an Energy Efficient Economy (ACEEE) cites nineteen models available in 1986 of comparable size and style rated at less than 950 kWh per year (4). Therefore, while the 1990 standard for that type of appliance represents a significant improvement over the 1983 average,f it does not require the introduction of any technology not in existence in 1986.

Also, in 1983 the shipment-weighted average adjusted volume for new freezers was 25.32 cu.ft. which represents a freezer with total refrigerated volume of approximately 15 cu.ft. The ACEEE lists three upright manual defrost freezers of similar size available in 1986 which use less than the standard of 715 kWh per year and ten chest freezers which use less than the required 575 kWh.

The room air conditioner efficiency standards listed in Table 1 also cover products built on or after January 1, 1990. The 1983 shipment-weighted average capacity and efficiency for new room air conditioners were 10,566 Btuh and 7.29 EER, respectively. In 1986, at least 33 available models rated between 8,000 and 13,999 Btuh had EER's from 9.2 to 11.8, according to the ACEEE. Thus, the 1990 standard of 9.0 EER for an average size room air conditioner represents a 23 percent improvement over the average of those built in 1983 but is lower than many models which are technologically feasible in 1986.

The shipment-weighted average SEER's for central air conditioners (split and single package) and heat pumps manufactured in 1983 were 8.43 and 8.23, respectively. The ACEEE cites 47 central air conditioners produced in 1986 of various sizes which rate above the 1992 standard of 10.0 SEER and 35 heat pumps which surpass it. Therefore, while the proposed 1992 standard of 10.0 SEER represents an increase of more than 18 percent over units produced in 1983, it is well below that which is technologically feasible in 1986.

Water heaters manufactured on or after January 1, 1990 will be subject to efficiency standards under the NAECA. According to the ACEEE, at least 11 gas and 31 electric water heaters are presently available which exceed the 1990 standards.

Effective January 1, 1992, furnaces will be required to have an annual fuel utilization efficiency (AFUE), which is intended to represent the ratio of the annual useful heat output to the annual energy input of a furnace or boiler, not less than 78 percent, except for gas steam boilers which must not have an AFUE below 68 percent. According to the ACEEE, at least eight gas boilers, 68 gas furnaces, and 26 oil furnaces are currently available which exceed the standards. Standards for gas direct heating equipment apply to equipment manufactured on or after January 1, 1990.

Dishwashers, clothes washers and dryers, kitchen ranges and ovens, and pool heaters are other household appliances which will also be subject to standards. Effective January 1, 1988, dishwashers shall be equipped with an option to dry without heat, clothes washers shall include rinse cycles with unheated water, gas clothes dryers shall not be equipped with a constant burning pilot, and gas kitchen ranges and ovens equipped with an electrical supply cord shall not have constant burning pilots. As of January 1, 1990, pool heaters shall have a thermal efficiency of not less than 78 percent. However, as mentioned earlier, these standards and requirements could not be modeled in REEPS.

STATEWIDE REEPS SIMULATION RESULTS

The model used for the electricity consumption results which appear in Tables 2 and 3 is the PUCT's eight-zone statewide version of REEPS (5). In 1998, REEPS predicts that 3,683 GWH can be saved statewide as a result of the NAECA standards. If the price of electricity in 1998 is 10 cents per kWh, this represents a savings of more than $368 million for residential electricity customers in Texas for that year. If, as is projected,

there are 7.68 million households in the state in 1998, the average household will save almost 480 kWh in electricity $48 per year in utility bills.

A large proportion of the projected savings will go to new home buyers since current homeowners tend to replace appliances as they wear out rather than to upgrade efficiencies. Table 3 reports the simulation results on a per household basis for new houses. REEPS projects that a new house built in 1998 will use 794 kWh less electricity due to the appliance standards. This translates into monetary savings of almost $80 per year with electricity valued at ten cents per kilowatt-hour.

TABLE 2

Statewide REEPS Results for Total Residential Sector

Total Electric Use (GWH)

Year	Base Case	With NAECA Standards	Savings
1988	75,806	75,806	-------
1990	79,716	79,248	468
1992	85,241	83,875	1,366
1994	93,495	91,228	2,267
1996	99,261	96,259	3,002
1998	106,097	102,414	3,683
Average Annual Growth (%)	3.4	3.0	

TABLE 3

Statewide REEPS Results for New Housing

Mean Use per Household (kWh)

Year	Base Case	With NAECA Standards	Savings
1988	15,030	15,030	-------
1990	15,025	14,614	411
1992	15,725	14,943	782
1994	16,483	15,639	844
1996	16,712	15,876	836
1998	16,826	16,032	794

Table 4 presents the projected 1998 electric consumption and savings estimates by end use. The largest savings occur in conventional central air conditioning, although the savings corresponding to total air conditioning and total non-weather-sensitive end uses appear to be about equal.

Table 5 presents the 1998 projected differences in new appliance mean efficiencies and mean usage between the base case and the standards scenario. In all cases, the mean efficiency gains predicted by REEPS for new appliances purchased in 1998 are quite modest. In the case of electric water heaters, REEPS even predicts a mean efficiency in 1998 lower than the 1980 average. However, with the imposition of the standards, significant efficiency gains are predicted.

TABLE 4

Projected 1998 Electric Usage and Savings by End Use

Total Residential Sector (GWH)

End Use	Base Case	With NAECA Standards	Savings
Refrigerators	12,108	11,018	1,090
Freezers	5,370	5,313	57
Water Heaters	11,929	11,321	608
Total Above	29,407	27,652	1,755
Room Air Conditioning	1,494	1,390	104
Central Air Conditioning	19,516	17,981	1,535
Heat Pump Air Cond.	1,280	1,172	108
Total Air Conditioning	22,290	20,543	1,747

TABLE 5

1998 Differences in New Appliance Mean Efficiencies and Mean Usage

End Use	Mean Efficiency (1980=1) Base	Stds.	Percentage Difference Eff.	Mean Use
Refrigerators	1.02	1.40	37.2	-15.6
Freezers	1.02	1.27	24.5	-11.4
Water Heaters	0.99	1.16	17.2	-6.9
Room Air Conditioning	1.04	1.28	23.1	-8.8
Central Air Conditioning	1.09	1.32	21.1	-11.4
Heat Pump Air Conditioning	1.08	1.33	23.1	-10.8

Another interesting result which is apparent from Table 5 is that the efficiency gains are much greater than the resulting reductions in mean usage. This is because REEPS, being an integrated model, takes behavioral changes which result from changes in the real cost of an end-use service into account. Therefore, the net result of the efficiency standards is lower electric consumption due to higher appliance efficiencies along with increased comfort levels due to the decrease in the real cost of the end-use service.

UTILITY SERVICE AREA CONSUMPTION AND PEAK DEMAND RESULTS

This section reports consumption and peak demand results for seven generating utilities in Texas. Utility-specific REEPS models set up at the PUCT are used to estimate electricity consumption by end use under the alternative scenarios. These estimates are then used as inputs to EPRI's Hourly Electric Load Model (HELM) in order to generate estimates of the peak demand reductions which will result from the Act.

The seven utilities under study are the following:

- Texas Utilities Electric Company (TUEC)

- Houston Lighting and Power Company (HL&P)
- Central Power and Light Company (CP&L)
- City Public Service Board of San Antonio (CPSB)
- Gulf States Utilities (GSU)
- City of Austin (COA)
- West Texas Utilities (WTU)

In 1984, these seven utilities accounted for approximately 76 percent of total retail residential electricity sales in Texas.

ELECTRICITY CONSUMPTION RESULTS

Table 6 summarizes the utility-specific usage estimates obtained from REEPS for total electric consumption. Not surprisingly, utilities which are projected to experience high rates of growth, such as COA, CPSB, and CP&L, are also projected to experience relatively large reductions in growth rates due to the appliance standards. This is simply because of the fact that the standards will mostly affect usage in new housing and the service areas with higher growth rates will have a higher proportion of new construction in the total housing stock.

Of the three faster growing utilities, CP&L is projected to experience a 6.8 percent reduction in total electric use by 1998, compared to 5.4 and 4.3 percent for CPSB and COA, respectively. A major reason for the large savings in the CP&L service area other than the high growth rate is that much of the area served by the utility is in the rural Rio Grande Valley where natural gas is not as readily available as in more urban areas. Therefore, the saturation of electric appliances for end uses where gas substitutes are available should be relatively high. If these end uses are covered by the standards, a large percentage reduction in total use should result in an area with high electric saturations. For example, REEPS predicts a 60 percent saturation of electric water heating in new homes in the CP&L service area by 1998 while respective saturations of 28 and 35 percent are projected for CPSB and COA.

Electric usage results for new housing are presented in Table 7 on a per household basis. The largest savings are projected to occur in the CP&L service area where a new home built in 1998 is expected to use almost 10 percent less electricity because of the appliance standards. A possible explanation for this is the low personal income in the CP&L service area. Since efficiency choice in REEPS for central air conditioning, refrigerators, and freezers is a function of household income, the base case for a low-income region will reflect a lower average efficiency scenario than higher income regions, *ceteris paribus*. The lower base case average efficiencies imply that the low-income regions will have more to gain from the standards. The base case for CP&L projects normalized average efficiencies in 1998 for new central air conditioners, heat pump air conditioners, refrigerators, and freezers of 1.02, 0.93, 1.00, and .98, respectively. The base case for COA projects normalized efficiencies for the same appliances of 1.05, 1.03, 1.04, and 1.04 while HL&P's base case projects 1.03, 0.96, 1.03, and 1.03.

PEAK DEMAND RESULTS

Table 8 reports the residential sector peak demand results obtained from the PUCT's HELM models and Table 9 breaks the results into weather-sensitive and non-weather-sensitive components. Not surprisingly, even though the kWh savings between air conditioning and non-weather-sensitive end uses were about equal, the air conditioning standards contribute the most to peak demand reductions. The largest percentage reductions in residential peak are predicted for HL&P, CPSB, and CP&L with 1998 projected peak demand savings of 8.2, 7.6, and 7.5 percent, respectively. For the seven utilities combined, peak demand is reduced 1,321 MW by 1998. If, as with electric use, these seven utilities comprise 76 percent of statewide peak demand, a possible savings of 1,738 MW could be realized in Texas.

CONCLUSION

The results presented in this report indicate that substantial energy and monetary savings can be realized by residential electricity customers in Texas with the enactment of the National Appliance Energy Conservation Act of 1987. As a result of the efficiency standards contained in the Act, the PUCT's REEPS model predicts that a typical new house built in 1998 will use 792 kWh per year less electricity and save almost $80 in utility bills. Statewide, savings are expected to exceed 3,680 GWH in electricity by 1998, a savings of over $368 million for residential electricity customers in Texas.

Customers of some individual utilities within the state will benefit more than others. High growth service areas such as COA, CP&L, and CPSB should experience larger savings because most of the savings are concentrated in new homes. CP&L will benefit further because the service area is projected to have high saturations of electric appliances and experience the largest gains in appliance efficiencies.

All utilities are projected to experience significant peak demand reductions by 1998. Also, even though the kWh savings between air conditioning and non-weather-sensitive end uses were divided almost equally, the peak demand savings in air conditioning end uses are much larger. Combined savings for the seven utilities is projected to be 1,321 MW by 1998 and some rough calculations indicate that peak demand may be reduced by over 1,700 MW statewide by 1998.

REFERENCES

1. Washington press release, "Reagan Vetoes Appliance Energy Efficiency Rule Legislation," November 1986.

2. "Mfrs., Environmentalists Praise Minimum Stds.," Air Conditioning, Heating and Refrigeration News, August 26, 1986, pp. 3-4.

3. Science Applications International Corporation, Trends in the Energy Efficiency of Residential Electric Appliances, Prepared for Electric Power Research Institute, Palo Alto, California, EPRI EM-4486, Project 2034-9, March 1986.

4. American Council for an Energy-Efficient Economy, The Most Energy-Efficient Appliances, Washington, D.C., Winter 1986.

5. Bachmeier, Richard, "An Eight-Zone REEPS Model of the State of Texas with Conservation Analysis," Public Utility Commission of Texas, April 1986.

TABLE 6

Utility-Specific REEPS Results for Total Residential Sector

Total Electric Use (GWH)

	TUEC			HL&P			CP&L			CPSB		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	25,837	25,837	----	16,323	16,322	----	5,730	5,730	----	4,287	4287	----
1990	27,417	27,194	223	16,227	16,166	61	5,907	5,849	58	4,772	4,738	34
1992	30,237	29,659	578	17,357	17,153	222	6,539	6,343	196	5,089	4,972	117
1994	33,072	32,099	973	18,713	18,313	400	7,190	6,851	339	5,623	5,424	199
1996	35,894	34,612	1,282	20,644	20,040	604	7,917	7,455	462	6,084	5,804	280
1998	38,799	37,241	1,552	22,946	22,091	855	8,473	7,900	573	6,605	6,247	358
Average Annual Growth(%)	3.6	3.2		3.5	3.1		4.0	3.3		4.4	3.8	

	GSU			COA			WTU		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	3,367	3,367	----	2,537	2,537	----	1,400	1,400	----
1990	3,553	3,535	18	2,890	2,874	16	1,422	1,415	7
1992	3,753	3,708	45	3,171	3,111	60	1,467	1,450	17
1994	4,093	4,016	77	3,453	3,351	102	1,535	1,510	25
1996	4,459	4,347	112	3,799	3,654	145	1,584	1,548	36
1998	4,900	4,736	164	4,209	4,028	181	1,665	1,619	46
Average Annual Growth(%)	3.8	3.5		5.2	4.7		1.7	1.5	

TABLE 7

Utility-Specific REEPS Results for New Housing

Mean Use per Household (kWh)

	TUEC			HL&P			CP&L			CPSB		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	17,524	17,524	----	14,101	14,101	----	12,166	12,166	----	12,371	12,371	----
1990	17,563	16,975	588	13,257	13,217	716	10,942	10,478	464	12,667	12,337	330
1992	18,465	17,417	1,048	13,933	132173	716	11,416	10,288	1,128	12,196	11,256	940
1994	19,395	18,308	1,087	14,567	13,767	800	11,918	10,709	1,209	12,730	11,770	960
1996	19,868	18,760	1,108	15,794	14,807	987	12,114	10,913	1,231	12,733	11,794	939
1998	19,817	18,695	1,122	17,101	15,965	1,136	12,142	10,935	1,207	12,741	11,806	935

	GSU			COA			WTU		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	8,672	8,672	----	14 238	14,238	----	9,386	9,386	----
1990	8,241	8,072	196	14,300	13,985	315	8,999	8,790	209
1992	8,131	7,882	249	14,517	13,578	939	9,370	8,965	414
1994	8,332	8,063	269	14,625	13,720	905	9,692	9,232	460
1996	8,540	8,262	278	14,706	13,810	896	10,100	9,598	503
1998	8,563	8,276	287	14,694	13,799	895	10,315	9,862	453

TABLE 8

Utility-Specific HELM Results

Residential Sector Peak Demand (MW)

Coincident with Total System Peak

	TUEC			HL&P			CP&L			CPSB		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	5,664	5,664	—	3,603	3,603	—	1,317	1,317	—	1,511	1,511	—
1994	7,095	6,820	275	4,300	4,179	121	1,651	1,565	86	1,990	1,898	92
1998	8,159	7,691	468	4,956	4,560	405	1,953	1,806	147	2,343	2,165	178
Average Annual Growth(%)	3.7	3.1		3.2	2.4		4.0	3.2		4.5	3.7	

	GSU			COA			WTU		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
1988	780	780	—	608	608	—	312	312	—
1994	947	928	19	817	782	35	346	338	8
1998	1,137	1,094	43	994	929	65	378	363	15
Average Annual Growth(%)	3.8	3.4		5.0	4.3		1.9	1.5	

TABLE 9

Utility-Specific HELM Results

Residential Air Conditioning and Non-Weather-Sensitive Peak Demand (MW)

Coincident with Total System Peak

	TUEC			HL&P			CP&L			CPSB		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
Air Conditioning												
1988	2,862	2,862	—	1,785	1,785	—	811	811	—	950	950	—
1994	3,561	3,369	192	2,041	1,944	97	1,013	947	66	1,249	1,168	81
1998	4,040	3,689	351	2,497	2,131	366	1,198	1,079	119	1,471	1,309	162
Non-Weather-Sensitive End Uses												
1988	2,802	2,802	—	1,818	1,818	—	506	506	—	561	561	—
1994	3,534	3,451	83	2,259	2,235	24	638	618	20	740	729	11
1998	4,119	4,002	117	2,468	2,429	39	755	727	28	872	856	16

	GSU			COA			WTU		
Year	Base	Stds.	Savings	Base	Stds.	Savings	Base	Stds.	Savings
Air Conditioning									
1988	418	418	—	360	360	—	164	164	—
1994	507	494	13	483	453	30	183	177	6
1998	613	580	33	583	527	56	200	188	12
Non-Weather-Sensitive End Uses									
1988	362	362	—	248	248	—	148	148	—
1994	440	434	6	334	329	5	163	161	2
1998	524	514	10	411	402	9	178	175	3