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ORIGINAL

GULF POWER
A SOUTHERN COMPANY

November 21, 2001

Ms. Blanca S. Bayo, Director
Division of the Commission Clerk and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee FL 32399-0870

Dear Ms. Bayo:

RE: Docket No. 010002-EI

Enclosed are an original and ten copies of Gulf Power Company's "Residential Triple-Function Heat Pump Report" which is a Conservation Demonstration and Development Project. This report is filed in compliance with Order No. PSC-93-0361-FOF-EG issued in Docket No. 921108-EG.

Sincerely,

Susan D. Ritenour

Susan D. Ritenour
Assistant Secretary and Assistant Treasurer

lw

Enclosure

cc: Beggs and Lane
Jeffrey A. Stone, Esquire

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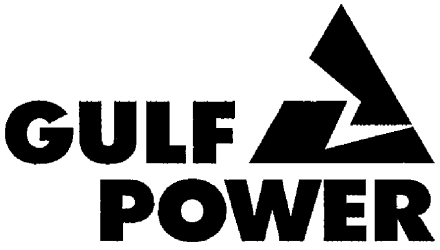
Residential Triple-Function Heat Pump Report

A Conservation Demonstration and Development Project



A SOUTHERN COMPANY

One Energy Place
Pensacola, Florida 32520
November 2001

Residential Triple-Function Heat Pump Report

Task

Gulf Power Company has undertaken this research in order to establish potential savings related to the use of a triple-function heat pump in a residential application. The heat pump was installed in a new single family home during initial construction of the home. Monitoring results have been compared to similar end-use monitoring completed during the Gulf Power Company Energy Efficient Home Study of 1985 (1985 EEHS).

Project and Technical Overview

This project is installed in a Pensacola area home built to GoodCents standards. The home is 2,150 square feet and was occupied by two adults during the study period. A triple-function heat pump provides for the heating, cooling and water heating requirements of the home. The 2.5 ton 11 SEER Nordyne Powermiser unit utilized in this study is comprised of an outdoor condenser coil, an indoor air handler and a compressor/control unit. The compressor/control unit houses the controls which allow the compressor to provide heating, cooling and water heating to the home. The heating and cooling aspects of the system function approximately the same as a standard heat pump split system and are rated in the same manner with HSPF and SEER. Water heating is accomplished with dual functionality. The system utilizes recovery of the waste heat off of the compressor during the cooling cycle and can also operate in a dedicated water heating mode with the compressor providing the heat input. The system utilizes a standard electric water heating tank for hot water storage. The electric elements are disabled allowing only the compressor and heat recovery systems to provide the heating input. Because of the similarity of the heating and cooling efficiency and rating methodology, Gulf's study focuses on the water heating savings potential.

Customer Energy Usage and Bill

The study home consumed a total of 14,632 kWh with a total cost of $1,010 during the monitoring period March 1996 through February 1997. The average monthly energy consumption was 1,219 kWh and the average monthly cost was $84.

End-Use Energy Consumption and Cost Breakdown

The occupants of the study home have a very high hot water consumption compared to typical consumption. Typical usage is 17.8 gallons per person per day. Study home occupants used an average of 32.8 gallons per person per day. Even with this unusually high usage, average energy consumption by end-use is similar to the consumption found in the 1985 EEHS.

Water Heating energy usage was compared on an actual versus estimated basis. The triple-function heat pump was monitored to determine the energy consumption required to heat the water in the study home. This was compared to engineering estimates of energy consumption necessary to heat the same amount of water with a standard electric water heater. Estimated energy consumption was 4,501 kWh compared to actual energy usage of 2,305 kWh. This results in estimated energy savings of 48.8% with the triple-function heat pump. In the study home, the savings is estimated at over $150 per year. The water heater consumed .096 kWh per gallon of water heated. This compares to an estimated consumption of .188 kWh per gallon for a standard electric water heater in the study home and .175 kWh per gallon as found in the 1985 EEHS.

Triple-Function Heat Pump Data

NORDYNE POWERMISER HEAT PUMP STUDY

PENSACOLA, FLORIDA

2150 sq ft home

			1	2		3				4		5		6		7	8	9	10	11	12	13
DATE	TIME	kWh/ DAY	TOTAL HOUSE kWh	BASE BILL lights, appl kWh	% of Total	WATER HEATER kWh	% of Total	actual kWh/ Gallon	kWh/gal std ele wh EEH study	5+6 TOTAL HP kWh	% of Total	INDOOR AIR HDL kWh	% of Total	A/C COMPR kWh	% of Total	Avg RETURN AIR TEMP	Min. SUPPLY AIR TEMP	Max. H2O TO WH from HP (HR) TEMP	Max. H2O from WH to HP (HR) TEMP	Max. H20 HOT WH TO House TEMP	Min. H20 COLD WATER to WH TEMP	HOT WATER GALS
JAN	1997	47	1463	744	50.9%	335	22.9%	0.138	0.209	384	26.2%	106	7.2%	278	19.0%	62	na	117	117	129	51	2426
FEB (1)	1997	31	870	483	55.5%	196	22.5%	0.124	0.208	191	22.0%	32	3.7%	159	18.2%	62	56	111	114	123	53	1579
MAR	1996	23	726	281	38.7%	207	28.5%	0.142	0.187	238	32.8%	35	4.8%	203	28.0%	69	62	115	117	131	59	1457
APR	1996	32	948	418	44.1%	313	33.0%	0.145	0.172	217	22.9%	37	3.9%	180	19.0%	69	56	121	120	134	62	2159
MAY	1996	36	1122	404	36.0%	162	14.4%	0.079	0.164	556	49.6%	92	8.2%	465	41.4%	72	56	124	122	131	68	2043
JUN	1996	43	1282	573	44.7%	50	3.9%	0.027	0.159	659	51.4%	106	8.3%	553	43.1%	74	56	126	123	123	76	1875
JUL	1996	50	1547	688	44.5%	30	1.9%	0.018	0.155	829	53.6%	128	8.3%	701	45.3%	76	55	131	128	122	79	1662
AUG	1996	48	1498	673	44.9%	44	2.9%	0.021	0.158	781	52.1%	128	8.5%	653	43.6%	75	56	124	120	122	78	2048
SEP	1996	45	1343	686	51.1%	96	7.1%	0.046	0.155	561	41.8%	95	7.1%	467	34.8%	74	58	122	117	129	73	2089
OCT	1996	36	1126	677	60.1%	251	22.3%	0.122	0.162	198	17.6%	36	3.2%	162	14.4%	70	56	116	117	131	63	2058
NOV	1996	31	943	536	56.8%	277	29.4%	0.134	0.170	130	13.8%	16	1.7%	115	12.2%	66		117	119	129	60	2061
DEC	1996	57	1765	1068	60.5%	344	19.5%	0.138	0.190	353	20.0%	95	5.4%	258	14.6%	64		114	116	129	63	2487
YTD TOTAL:			**14632**	**7231**		**2305**		**0.096**	**0.175**	**5097**	34.8%	**906**	6.2%	**4194**	28.7%							**23944**
MONTHLY AVG.:			**1219**	**603**		**192**				**425**		**76**		**349**								
YTD ANN. COST:			**$1,010**	**$499**		**$159**				**$352**												
YTD MO. COST;			**$84**	**$42**		**$13**				**$29**												
Percent of YTD:				**49.4%**		**15.8%**				**34.8%**												
kWh/sq. ft./YTD.:			6.8	3.4						2.4												
$/SQ.FT./YTD:			$0.470	$0.232						$0.164												

Est resistance water heating kWh for 23944 gals: 4501 kWh

Estimated resistance water heating annual cost: $311

Water heating saving for year,est.:48.8%

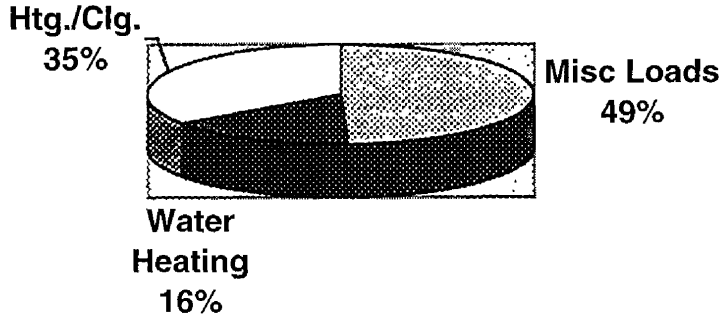
(1) data for 8- 28 Feb only. Repairs were made 7 Feb.

ann96b wk4

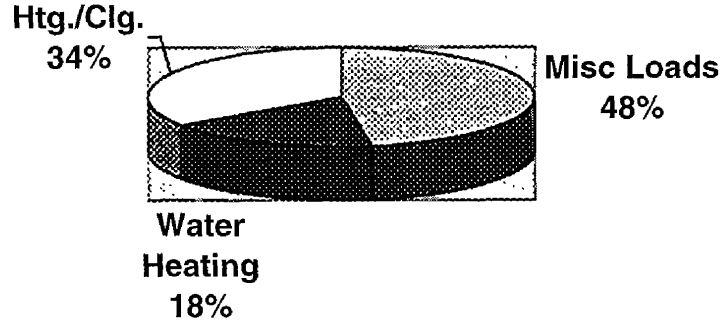
$/kWh: 0.069

Annual Energy Consumption Chart

Triple-Function Heat Pump Study



1985 EEHS



Conclusion

The residential triple-function heat pump study conducted by Gulf Power Company provided information that is beneficial to the utility and customers. This system demonstrated significant savings over a conventional electric water heating system. Its use of waste heat recovery and dedicated heat pump water heating resulted in annual savings of $152 or 48.8% when compared to an estimate of use by a standard electric water heater in the study home. The savings percentage should apply to other homes throughout our area. However, the annual savings amount will vary depending on the amount of hot water consumed by home occupants.