Florida Power Corporation

Residential Load Management

Profile #54

Executive Summary

Florida Power Corporation (FPC) is one of the leading utilities in the United States in regard to load management. In fact, approximately 490,000 of the utility's residential customers participate in FPC's Residential Load Management program, making it the largest residential load management program in the United States. Given Florida's reputation for hot weather, it is ironic that FPC is a winter peaking utility, a function of electric resistance space heating. FPC has achieved total winter peak demand savings of over 1,035 MW, with over 700 MW of demand savings resulting from the Residential Load Management program, thanks to the cooperation of its residential customers whose average winter peak demand reduction is calculated to be 1.87 kW per customer.

FPC's Residential Load Management program began on a full-scale basis in 1982 and is currently offered to all of FPC's 1,030,000 residential customers who have either an electric centrally-ducted HVAC system, a swimming pool pump, or an electric water heater. FPC pays for the installation of radio controllers on customer appliances and during peak periods FPC automatically turns off the customer's appliance for specified periods. In return, customers receive a credit on their monthly bill with the amount determined by the appliances enrolled in the program and the interruption schedule chosen. (Between 1982 and 1991 FPC spent approximately $280 million on the program, with 73% going directly to pay for customer credit payments.)

FPC's sophisticated marketing program is largely responsible for the program's widespread popularity and success. FPC typifies its customers by variables such as where they live, their income levels, marital status, number of children, etc., and then uses proven marketing strategies particular to that customer type to promote the program. This has resulted in tremendous program participation. Many customers have been enrolled for the entire 11 years that the program has been operating and less than 2% of all participants have dropped out of the program.

In addition to direct mail and bill inserts, FPC uses billboards, advertisements in television, radio, and print media, and telemarketing to market their program. FPC customer service representatives also market the program to customers during day-to-day transactions, such as while signing up a new account, or processing a request for an extension on an overdue bill. One customer service center signed up 6,000 customers in a single year! FPC has also used customer feedback and focus groups to refine the program over time and to modify its marketing strategies and has found that most customers have been attracted to saving money and contributing to environmental health. Thus FPC's marketing pieces emphasize these benefits with such slogans as "Get Credit for Being Naturally Resourceful," "I'm Happy Saving Money Today, and Energy for Tomorrow," and "Cash in on Energy Management and Save Some Green."

Residential Load Management

Utility:	Florida Power Corporation
Sector:	Residential
Measures:	Radio control of swimming pool pumps, electric water heaters, and centrally ducted HVAC systems
Mechanism:	Customers select the appliances that they want enrolled in the program. Appliances are controlled during peak periods with maximum control durations specified.
History:	Started in 1982.

1991 Program Data

Summer peak capacity savings:	62 MW
Winter peak capacity savings:	116 MW
Cost:	$50,490,000

Cumulative Data (1982 - 1991)

Summer peak capacity savings:	381 MW
Winter peak capacity savings:	712 MW
Cost:	$280,137,100
Participation:	37%

Conventions

For the entire 1993 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the U.S Federal Reserve's foreign exchange rates.

The Results Center uses three conventions for presenting program savings. **Annual savings** refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as the first full-year effect of the measures installed in a given year. **Cumulative savings** represent the savings in a given year for all measures installed to date. **Lifecycle savings** are calculated by multiplying the annual savings by the assumed average measure lifetime. **Caution:** cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

Florida Power Corporation (referred to throughout this profile as Florida Power or FPC) is the principal subsidiary of Florida Progress Corporation. Florida Progress was formed in 1982 and is a diversified utility holding company with revenues of more than $2 billion annually. The Electric Fuels Corporation, a coal mining and transportation company providing coal and other services to electric utilities, is also a subsidiary of Florida Progress. Florida Progress also holds the Mid-Continent Life Insurance Company, which has underwritten $11.3 billion worth of life insurance protection.[R#1]

Florida Power Corporation is involved in the generation, purchase, transmission, distribution, and sale of electricity. FPC was incorporated in 1899 and is currently the state's second largest electric utility (second to Florida Power and Light), providing electricity to about one-third of Florida's population. In 1992 FPC had 5,806 full-time employees.[R#1]

Florida is the fourth most populous state in the country and also has one of the fastest growing populations; the state's population is growing at a rate of 1.7% annually. FPC provides service in 32 of the state's 67 counties, covering approximately 20,000 square miles in central and northern Florida and along the west coast of the state. The utility's service area includes St. Petersburg (the site of FPC's headquarters), and Clearwater, as well as the areas surrounding Walt Disney World, Orlando, Ocala, and Tallahassee.

FPC had 1,182,170 electric customers in 1992. Florida Power added 23,000 new customers in 1992 for a customer growth rate of roughly 2%, which was lower than the average growth rate of 2.9% for the five previous years. A customer growth rate of 2.6% (almost twice the projected average for the electric utility industry) is projected for the next five years.[R#1]

In 1992 FPC's energy mix was 47% coal, 24% oil, 16% nuclear, and 13% purchased power. Retail electric sales totaled 25,414 GWh and total electric sales were 27,375 GWh in 1992. The residential sector accounted for 12,825 GWh in sales, while commercial sales totaled 7,544 GWh and industrial sales were 3,254 GWh. These energy sales accounted for $1.65 billion in 1992 utility revenues. Retail electric sales were up 3.9% in terms of kWh in 1992, and electric revenues were up 3.8%. FPC projects kWh sales to increase 4.5% annually in the next five years.[R#1]

FPC 1992 STATISTICS

Number of Customers	1,182,170
Energy Sales	27,375 GWh
Energy Sales Revenue	$1.6482 billion
Peak Demand	6,982 MW
Generating Capacity	7,002 MW
Reserve Margin*	15 %
Average Electric Rates	
Residential	6.73 ¢/kWh
Commercial	5.11 ¢/kWh
Industrial	3.97 ¢/kWh

* Reserve margin includes capacity from dispatchable DSM

Peak demand in 1992 was 6,982 MW and peak capacity was 7,002 MW. FPC calculates its reserve margin at 15%, which includes capacity available from load management, interruptible service, and other dispatchable DSM programs. FPC is a winter peaking utility as many homes use electric resistance heat as a backup or a primary heating source, causing large peaks on the coldest days of the year. Florida Power expects that its customers will need 50% more electricity in 10 years.[R#1]

FPC is adding 728 MW of capacity from eight new combustion turbines (peaking units). Construction of the first four units was completed in October 1992 and the remaining four units will be running in November 1993. Also planned is a 3,000 MW power plant complex to be located on 8,000 acres in Central Florida. The first generating units will be fueled by natural gas and are expected to be operational in 1998. ■

Utility DSM Overview

Florida Power has been involved with DSM programs since 1981 when the Florida Energy Efficiency Conservation Act (FEECA) was established. With this act the Florida Public Service Commission (FPSC) set numerical savings goals for public utilities. Since that time FPC has been promoting their DSM programs.[R#2]

CURRENT FPC DSM PROGRAMS

A) RESIDENTIAL
- Home Energy Check
- Home Energy Analysis
- Home Energy Fixup
- **Residential Load Management**
- Duct Check
- Insulation Check
- Air Conditioning Service Check
- Dealer Incentive
- Trade Efficiency

B) NONRESIDENTIAL
- Business Energy Check
- Business Energy Analysis
- Duct Check
- Interior Lighting Check
- Air Conditioning Service Check
- Business Energy Fixup
- Dealer Incentive Program
- Motor Efficiency Check
- Climate Control Check
- Innovation Incentive
- Cogeneration
- Interruptible Load Management
- Curtailable Load Management

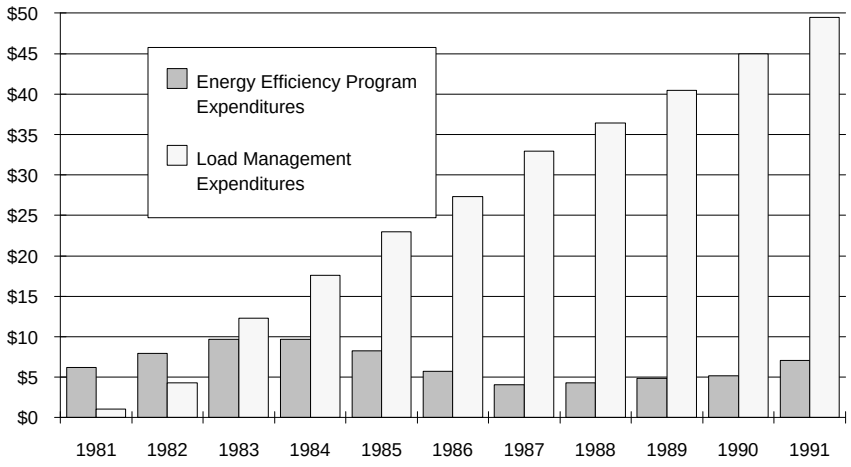
[R#2]

DSM Overview	*Annual DSM Expenditure (x1000)*	*Annual Energy Savings (GWh)*	*Annual Winter Capacity Savings (MW)*	*Annual Summer Capacity Savings (MW)*
1981	$6,225	100.1	31.0	31.8
1982	$7,990	85.5	24.7	22.0
1983	$9,684	201.3	51.0	53.8
1984	$9,732	59.1	39.3	25.5
1985	$8,281	68.1	26.4	22.3
1986	$5,713	47.0	25.7	25.2
1987	$4,076	46.1	16.4	10.4
1988	$4,273	30.3	13.9	12.5
1989	$4,861	136.4	13.9	10.5
1990	$5,185	12.4	12.9	6.6
1991	$7,081	19.7	12.8	12.8
Total	$73,102	806.0	267.8	233.3

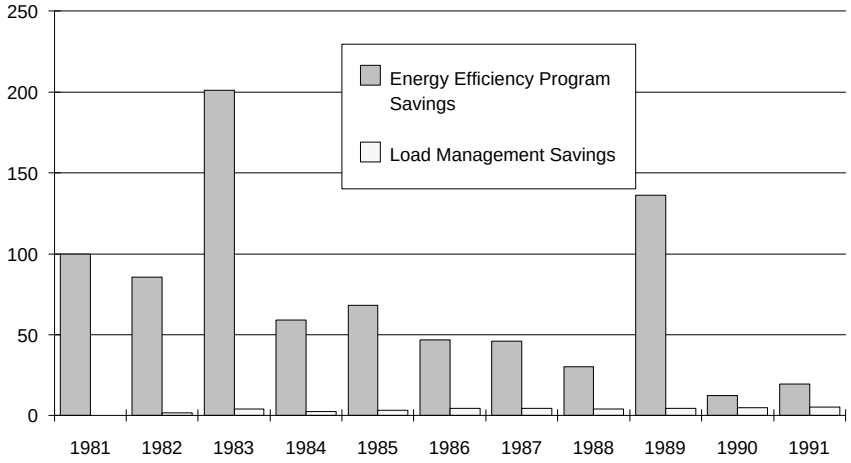
Above figures do not include costs and savings due to FPC's load management programs.

In 1993, Florida Power has 23 DSM programs. In addition to existing programs FPC has filed for additional DSM programs in the residential, commercial, and industrial sectors with the FPSC. FPC's comprehensive package of DSM programs for residential customers begins with its residential energy audit program, which is offered in three components: the Home Energy Check, the Home Energy Analysis, and the Home Energy Fixup Program. Eligible participants in FPC's energy audit programs are encouraged to participate in the Duct Testing and Repair program, (see The Results Center Profile #51), the Insulation Check program, the Air Conditioning Service Check program, and the Residential Load Management program, discussed in this profile. Thus, the residential energy audits form the primary marketing tool for FPC's other DSM programs for residential customers.[R#2] ☞

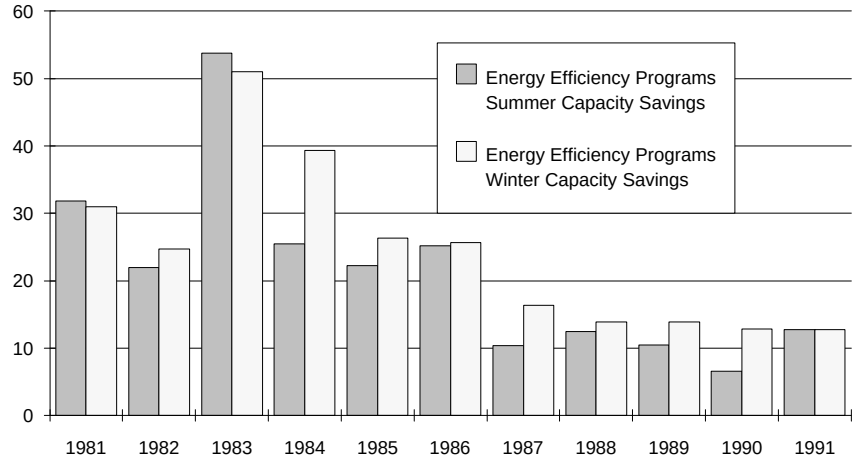
ANNUAL DSM EXPENDITURE ($1,000,000)



ANNUAL ENERGY SAVINGS (GWH)



ANNUAL CAPACITY SAVINGS (MW)



Approximately 490,000 of the utility's customers (more than any other load management program in the country) currently participate in the Residential Load Control program. By 2001 it is projected that FPC will have implemented an equivalent of 1,445 MW with its mixture of DSM programs (roughly the equivalent of the energy output from two large power plants).[R#1,2]

Between 1981 and 1992, Florida Power spent a total of $86,770,000 on energy efficiency programs and an additional $347,149,000 (80%) on load management programs. (Note that the tables in this section do not reflect 1992 costs and savings.) During this time (1981 - 1992), Florida Power's load management programs for residential and non-residential customers achieved energy savings of 47.1 GWh and winter peak demand savings of 1,035 MW; most of these energy and demand savings have been realized through the Residential Load Management program. Energy efficiency programs achieved (for the same period) 849.8 GWh of savings along with 283.7 MW of winter peak demand savings and 249.2 MW of summer peak demand savings.

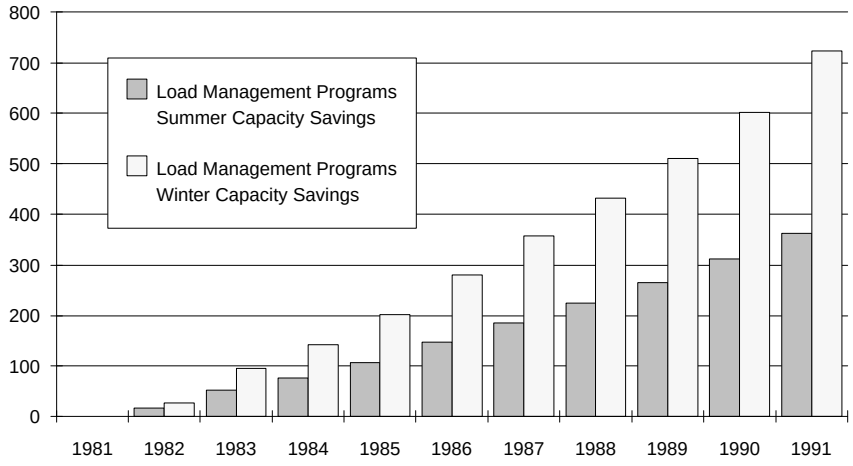
DSM Overview (Load Management)	*Annual DSM Expenditure (x1000)*	*Annual Energy Savings (GWh)*	*Cumulative Capacity Savings (MW)*	
			Winter	*Summer*
1981	$1,041	0.1	0	1
1982	$4,304	1.7	27	17
1983	$12,269	4.0	95	53
1984	$17,582	2.5	143	76
1985	$22,952	3.4	202	107
1986	$27,354	4.4	280	147
1987	$32,911	4.4	358	186
1988	$36,388	4.2	432	225
1989	$40,439	4.4	511	265
1990	$44,972	5.1	602	312
1991	$49,521	5.5	724	363
Total	$289,733	39.7		

The 1992 expenditure on energy efficiency of $13,669,000 was equivalent to 0.8% of Florida Power's 1992 energy revenues. When 1992 load management expenditures of $57,416,000 are considered, the utility's total 1992 expenditure of $71,085,000 represent more than 4% of its 1992 energy sales revenues, making it by this measure one of the most aggressive utilities in the country.

New demand reductions attained in 1992 by FPC's load management programs accounted for 311 MW of winter peak demand savings and 323 MW of summer peak demand savings, along with energy savings of 7.4 GWh. Energy efficiency programs produced energy savings for the year of 43.8 GWh, along with winter peak demand savings of 15.9 MW and summer peak demand savings of 15.9 MW.

Finally, FPC is working toward developing an integrated demand and supply-side management project. The information systems used by each of six departments in FPC, including the Load Management programs, would be integrated into one company-wide computer system. In this way, the various elements of each of the systems in use within FPC would be combined, improving usability and accessibility among the vast quantities of data and information generated by these programs. ■

CUMULATIVE CAPACITY SAVINGS (MW)



FPC's Residential Load Management program was approved by the Florida Public Service Commission in 1981 and implemented on a full-scale basis in 1982. The program is offered to FPC's 1,030,000 residential customers who have electric centrally ducted HVAC systems, a swimming pool pump, or an electric water heater. FPC pays for the installation of radio controllers on customer appliances and during peak periods FPC automatically turns off the customer's appliance for specified periods. In return, customers receive a credit on their monthly bill with the amount determined by the appliances enrolled in the program and the interruption schedule chosen.

Water heaters and swimming pool pumps may be interrupted for up to five hours during the specified peak period. For centrally ducted HVAC systems, customers may specify one of two maximum durations of interruption within a 30 minute period throughout the specified peak period.

FPC's sophisticated marketing program is largely responsible for the Residential Load Management program's widespread popularity and success. FPC uses demographic data to identify its customers as members of several marketing categories and targeted direct mail pieces are sent to each different group. This has resulted in tremendous program participation. Forty-four percent of all of FPC's residential customers are enrolled in the program. Peak demand reductions are approximately 1.87 kW per customer in the winter and 0.95 kW per customer in the summer.[R#9,16] Many customers have been enrolled for the entire 11 years that the program has been operating and less than 2% of all participants have dropped out of the program.[R#9]

FPC trains all contractors who install the load management devices on customers' equipment.[R#17] The installers wire the specified appliances with microprocessor-based radio switches. Proper operation of the radio controllers is essential to the success of the program, both in achieving the necessary demand reductions and in maintaining customer satisfaction with the program. Thus, FPC enforces precise guidelines regarding installation procedures and inspections.

To the credit of its early program planners and designers, the program has not changed substantially in its 11 years of existence. Naturally some refinements have been made over time. In 1987 some changes were made in program scheduling, including an increase in the number of minutes per hour that central air or heat could be interrupted, changes in the hours of the day that interruptions could occur, an increase in the management time period from five to seven days, and increase from four to five hours as the maximum time that water heaters and pool pumps could be interrupted.[R#6] ■

MARKETING AND DELIVERY

FPC has an advanced and highly sophisticated marketing strategy for the Residential Load Management program. Throughout the 11 years that the program has been operating, FPC has conducted several marketing studies and has convened several focus groups. FPC has used the marketing program ClusterPlus since 1986 to assist with its marketing strategy. ClusterPlus segments customers by quantifiable factors, such as where they live, their income levels, marital status, and number of children.

After each customer has been typified, specific marketing strategies are employed that have been identified as being most likely to succeed with particular groups. Thus, elderly people may receive a direct mail brochure that appeals to their need for comfort and security, while the piece mailed to a younger professional couple might highlight the positive social reasons for participating in the program. FPC has estimated that participation has improved significantly since the implementation of this marketing strategy.[R#11]

In addition to direct mail and bill inserts, FPC uses billboards, advertisements in television, radio, and print media, and telemarketing to market their program. FPC customer service representatives also market the program to customers during day-to-day transactions, such as while signing up a new account, or processing a request for an extension on an overdue bill. One customer service center signed up 6,000 customers in one year! However, direct mailings and bill inserts form the foundation of the marketing plan.[R#16]

Each direct mail piece contains a perforated postage-paid reply card that customers fill out with their name and address to indicate interest in participation in the Residential Load Management program. Upon receipt of the card at FPC headquarters the card is sent to the appropriate division office. (FPC's service area is divided into seven divisions.) From the division office an FPC marketing representative calls the customer to confirm interest and eligibility and explain the program details. If the customer is eligible for the program, the representative completes a "Load Management Request Form," which is signed by the customer. The form is submitted to the Energy Services office, where the information is entered into the program's tracking system.[R#3]

Some customers may be ineligible to participate in the program. Customers with code violations, low energy consumptions, or medical problems may not be good candidates for the program.

FPC assigns a licensed contractor to install the radio-controlled switch(es) on the customer's equipment. Electrical companies bid for the jobs, and each individual contractor who works for the installing company must be an electrical journeyman and has to complete an FPC training session before they install the system. The contractor calls the customer directly to arrange a convenient time for the installation. As part of their agreement with FPC, the contractors agree to be available on evenings and weekends in order to accommodate customers' schedules.[R#3]

Contractors use one of two different brands of microprocessor-based radio switches.[R#9] The switches are installed in accordance with standardized procedures, and appliances are labelled to identify them as being subject to power interruptions. Contractors fill out a "LM Installation Form" and submit the form and their invoice to the Energy Services division for payment.[R#3]

As soon as the switches are installed, the equipment will be subject to interruptions based on the agreed-upon schedule. Credits begin appearing on the customer's monthly bill after one complete billing cycle. Typically about two to four weeks elapse between the time a reply card is received by FPC and installation of the switch in the customer's home.

Interruptions are controlled from computers installed with the load management software and the participant database. The generation dispatcher uses a remote terminal unit to control the power interruptions. An audio analog message is sent over company-owned microwave to 21 transmitters located throughout the service area. The signal is then sent from the transmitters to the receivers located at the customer site and the appropriate devices are controlled.[R#16]

MEASURES INSTALLED

Through the Residential Load Management program, radio switches are installed on electric water heaters, electric pool pumps, and centrally ducted HVAC systems. Peak periods are defined during the winter months of November to March from 6:00 am to 11:00 am, and 6:00 pm to 10:00 pm, and during the summer months April through October from 1:00 pm to 10:00 pm. Power may be interrupted to customers' equipment for specified amounts of time during these peak periods.

For water heaters and swimming pool pumps, power may be interrupted for up to five hours continuously during the peak period. For electric heating or cooling sys-

tems, the customer may elect a maximum interruption of 10 minutes or 16.5 minutes in every 30 minutes during the peak period. Credits appear on customers' monthly bills in varying amounts, depending on their level of participation. Credit payments are shown in the Residential Load Management Credit Amounts table.

STAFFING REQUIREMENTS

The Residential Load Management program is primarily administered by a Program Coordinator. The coordinator typically spends 100% of his time on the program, providing support and assistance to all staff involved with the program. His responsibilities include working on marketing plans and program design changes and coordinating with the operations and marketing groups.

Varying numbers of individuals spend time marketing the program in each of the seven divisions. Division staff are either dedicated to marketing or split their responsibilities between marketing and other customer service duties. They may spend anywhere from 20% to 100% of their time on the Residential Load Management program, depending on the amount of program activity in their division.

The Operations Group is responsible for the day-to-day delivery of the program. This includes determination of switch inspection schedules, mainframe support, actual performance of the inspections, and maintenance of the dispatch system. Inspections are further described in the Monitoring and Evaluation section.

Finally, individuals in the marketing and evaluation sections are also involved in the Residential Load Management program.[R#16] ■

RESIDENTIAL LOAD MANAGEMENT CREDIT AMOUNTS

Interruptible Equipment	*Interruption Schedule*			
	A	*B*	*C*	*D*
Water Heater			$4.50	
Central Heating System	$3.00	$9.00		
Central Heating System with Thermal Storage				$9.00
Central Cooling System	$2.00	$6.00		
Swimming Pool Pump			$3.50	

Interruption Schedule Descriptions:

A: Interruptions will not exceed a total of 10 minutes in each 30 minutes during designated peak periods

B: Interruptions will not exceed a total of 16.5 minutes in each 30 minutes during designated peak periods

C: Interruptions will not exceed 5 hours during designated peak periods, except where a thermal storage system is installed, in which case water heaters may also be interrupted during periods when the thermal storage system is charging

D: The regular heating system may be interrupted continuously, with alternative heating provided by the thermal storage system

Designated Peak Periods:	
November through March	6:00 a.m. to 11:00 a.m. and 6:00 pm to 10:00 p.m.
April through October	1:00 p.m. to 10:00 p.m.

Monitoring and Evaluation

MONITORING

FPC's Residential Load Management program has a sophisticated monitoring system that ensures the proper operation of all program components. Several safety factors and checks are built into the system. One transmitter signals a light on the radio switches installed in customers' homes which verifies that communication is occurring. This measure is helpful upon initial installation of the switches and on service calls. If the radio switch installation is determined to be operating properly, failure of the verification light may indicate a problem with the nearby transmitter.

Each radio switch has a power loss detection circuit which enables the processor to reset itself in the event of a lockout. The main controller has a fail-over monitor which can detect a malfunction in the primary controlling computer and automatically switch over to the backup computer. Thus, the system can continue operating without interruption while the source for the failure is identified and rectified.

There are several integrated databases used by the Residential Load Management program. The program database may be accessed throughout FPC's offices by anyone with the proper security code. Varying security levels dictate the level of access allowed to different users.

The master database contains fields for customer data and participation levels. Radio information, including the serial number, the switch vendor, the voltage, the location within the home, and information on the appliances controlled is also entered into the master database.[R#9]

FPC keeps a separate customer inquiry database in which details concerning all customer contacts are recorded. The system is also capable of reporting current status of a particular customer's appliance. Thus, a customer service representative may access this information during an inquiry. This feature is especially useful in the event that a customer believes an appliance has failed, as they can call FPC first to ensure that the appliance is not being controlled. In fact, FPC asks Residential Load Management participants to always check with FPC first before calling a repair person, thus avoiding any unnecessary service calls.[R#9,16]

The analysis database is used by the evaluation and engineering staff to determine demand savings and design load control strategies. The database accepts information on feeder and system load minute data, submetered end-use data, weather data, and appliance models.

The parts inventory database is used to track all information for each switch. The database accepts information on switch installations, inspections, and failures. Additionally, the location of each switch is also tracked with this database; program staff can thus determine whether a particular switch is available stock, has been installed, was removed for repair, or has been retired. The inspection database contains the results of all completed inspections and includes fields to track switch reliability and specific contractor performance.[R#9]

FPC has a strict switch inspection schedule associated with the Residential Load Management Program. Two types of inspections are performed: Contractor Performance Inspections and System Performance Verification (SPV) Inspections. The Contractor Performance Inspection is performed on 10% of the previous month's installations. This inspection allows FPC to closely monitor the work of its contractors. The SPV inspection requires that a statistically valid random sample of the installation be inspected. The Operations group constantly analyzes this information to address maintenance concerns, loss of load reduction and overall reliabilities. Both inspections are issued by the operation group to the field and allow FPC to make enhancements to the program.[R#16]

EVALUATION

FPC has conducted several focus groups and customer surveys in an effort to confirm customer satisfaction levels and to help frame program revisions and enhancements.

Six focus groups were conducted in March, 1992, in order to determine customers' perceptions of the Residential Load Management Program. The results of the survey were used to enhance program marketing strategies in order to increase program participation. The focus groups were conducted with FPC residential customers with a variety of socio-demographic characteristics. Some

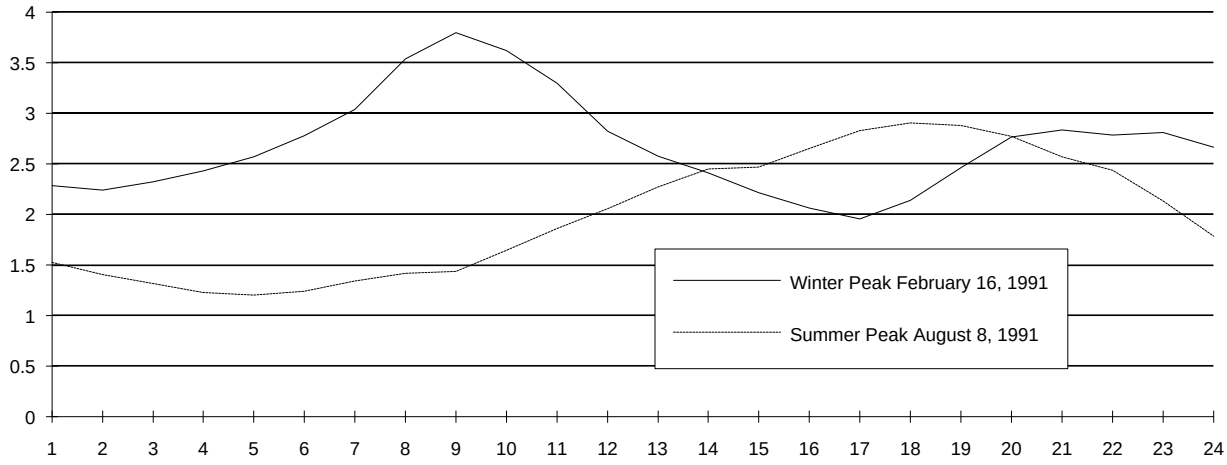
were retirees, some were young working individuals without children, and some had children living at home. A primary conclusion reached from these focus group sessions was that most respondents were attracted to the idea of saving money and contributing to environmental health. FPC's marketing pieces emphasize these benefits of participation in the Residential Load Management program, with such slogans as "Get Credit for Being Naturally Resourceful," "I'm happy saving money today, and energy for tomorrow," and "Cash in on energy management and save some green."

The focus group sessions also revealed that many customers were hesitant to lose control over their power. Most of the focus group participants did not understand the details of the Residential Load Management program prior to the sessions – they did not understand how often power would be interrupted or the times of day. This lack of knowledge about the program may also relate to the participants' preference of a large, descriptive bill insert over a smaller, less comprehensive marketing piece. The focus group participants wanted to know as much about the program as could be conveyed in a single bill insert.[R#5]

Another significant study was conducted in October 1987. FPC contracted a study of 150 Residential Load Management participants who had cancelled participation in the program between May and October, 1987. FPC had instituted some changes in the program in April and May, 1987, and had suspected that many program participants had dropped out as a result of the changes. However, the market study found that most customers had discontinued participation in the program due to unhappiness with the interruptions, rather than as a response to the program changes.[R#6]

In addition to these evaluation efforts, every two years FPC must sample every rate class that accounts for more than one percent of the utility's annual retail sales, (this evaluation must be completed in accordance with Florida Public Service Commission rules). The results of these load research studies are used to predict annual and seasonal peak demands, and are thus useful in planning for FPC's load management programs. During the winter system peak hour on February 16, 1991, demand (including load management) from the residential rate class was 62.7% of the total system demand. At the summer system peak on August 8, 1991, residential demand was 47.7% of the total system demand. For the months of January, February, March, November, and December, the system peak occurred on the same day and hour as the residential class peak, for a coincidence factor of 1.0. The coincidence factor for the remainder of the year for the residential class was 0.88 or greater, with June and October both having coincidence factors of 0.99.[R#8] FPC's load shape for residential customers on the winter and summer peak days during 1991 are shown in the accompanying graph.[R#8] ■

TOTAL HOURLY RESIDENTIAL DEMAND (GW)

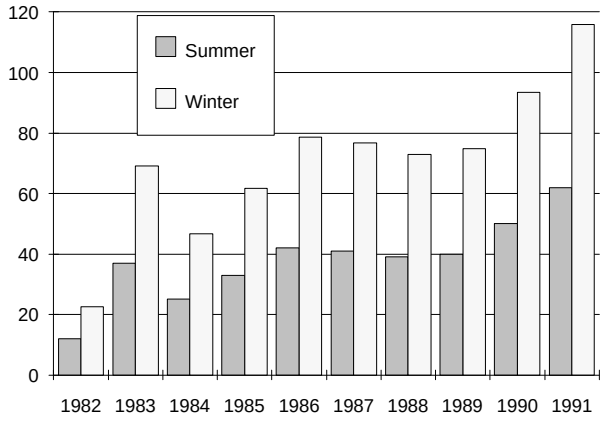


Program Savings

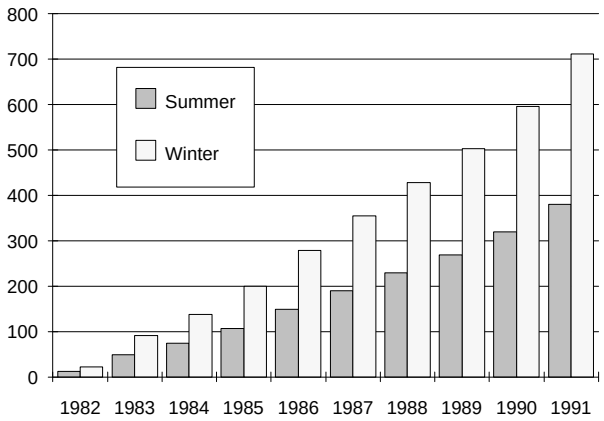
Savings Overview Table	*Annual Summer Peak Capacity Savings (MW)*	*Cumulative Summer Peak Capacity Savings (MW)*	*Annual Winter Peak Capacity Savings (MW)*	*Cumulative Winter Peak Capacity Savings (MW)*
1982	12.00	12.00	22.44	22.44
1983	37.00	49.00	69.19	91.63
1984	25.00	74.00	46.75	138.38
1985	33.00	107.00	61.71	200.09
1986	42.00	149.00	78.54	278.63
1987	41.00	190.00	76.67	355.30
1988	39.00	229.00	72.93	428.23
1989	40.00	269.00	74.80	503.03
1990	50.00	319.00	93.50	596.53
1991	62.00	381.00	115.94	712.47
Total	381.00		712.47	

Data Alert: Annual winter peak demand savings were calculated based on an average savings of 1.87 kW per customer, based on the results of test metering conducted by FPC.[R#16] Annual summer peak demand savings were calculated based on an average savings of 1.00 kW per customer.[R#9] Annual capacity savings shown in the Savings Overview Table are annual savings added each year due to new participants in the program; thus, the cumulative capacity savings in each year represent the total load reduction achieved in that year.

ANNUAL PEAK CAPACITY SAVINGS (MW)



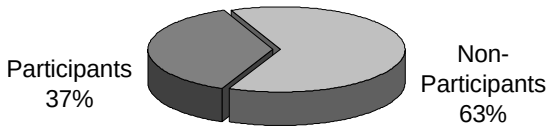
CUMULATIVE PEAK CAPACITY SAVINGS (MW)



In 1991, when 62,000 new participants signed up for the Residential Load Management program, new winter peak capacity savings of 115.94 MW were achieved. Cumulative winter peak capacity savings in 1991 — the total demand reductions due to all 381,000 participants in the program through 1991 — were 712.47 MW. Annual summer peak capacity savings in 1991 were 62 MW, and cumulative summer peak capacity savings due to all participants in 1991 were 381 MW.

PARTICIPATION RATES

Any residential customer in FPC's service territory is eligible to participate in the Residential Load Management Program. Of FPC's approximately one million plus residential customers, 381,000 were participating in the program by 1991, for an overall participation rate of 37%. Participation in the program has grown steadily, and FPC plans to add as many new participants each year as is necessary for the program contribution toward the system MW goals.



FREE RIDERSHIP

FPC does not believe that free-ridership is an issue for this program. Although some load management could feasibly occur through voluntary control, FPC would not have the same control over the time and amount of demand reduced as it does through this program. Additionally, the results of several focus groups conducted in conjunction with the Residential Load Management program revealed that customers require incentives to participate in the program, and would not be likely to allow control of their appliances or heating and cooling systems in the absence of an incentive.

Participation Table	*Participants*	*Annual Winter Peak Capacity Savings per Participant (kW)*
1982	12,000	1.87
1983	37,000	1.87
1984	25,000	1.87
1985	33,000	1.87
1986	42,000	1.87
1987	41,000	1.87
1988	39,000	1.87
1989	40,000	1.87
1990	50,000	1.87
1991	62,000	1.87
Total	381,000	

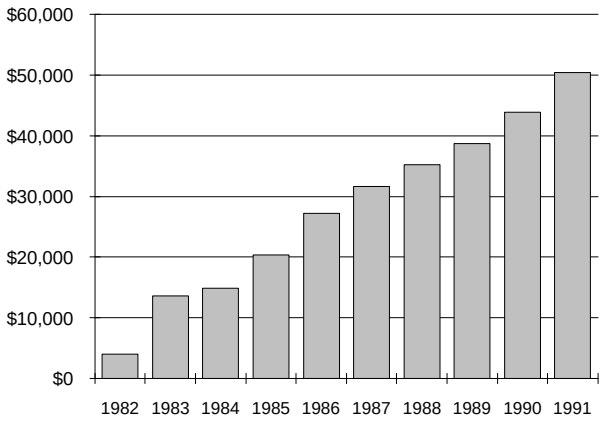
PROJECTED SAVINGS

FPC's system goal is to achieve 1,445 MW of peak demand reductions by 2001.[R#16] This goal encompasses all capacity reductions to be achieved by FPC's portfolio of DSM programs. While the Residential Load Management program can be counted on to contribute a significant portion of the demand reductions, the goal will be reached through the combined reductions from FPC's dispatchable and non-dispatchable DSM programs, including standby generation, the interruptible/curtailable rate programs, and FPC's energy-efficiency programs.[R#16] ■

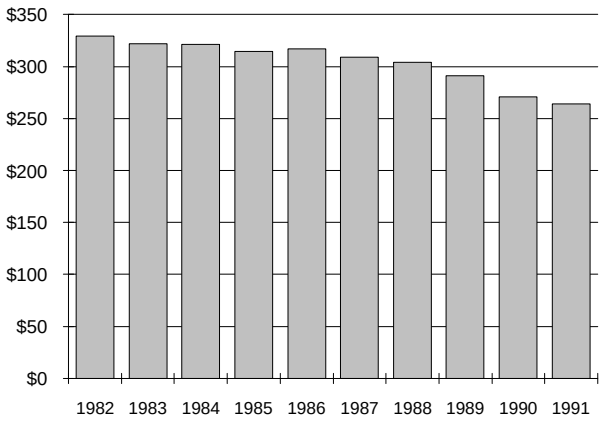
Cost of the Program

Costs Overview Table	*Installation Cost (x1000)*	*Operations and Management (x1000)*	*Credit Payments (x1000)*	*Total Program Cost (x1000)*	*Cost per New Participant*
1982	$2,031.6	$178.8	$1,739.1	$3,949.4	$329.12
1983	$6,069.2	$707.3	$6,880.1	$13,656.6	$322.10
1984	$3,931.1	$1,024.0	$9,960.4	$14,915.4	$321.41
1985	$5,010.6	$1,429.7	$13,906.9	$20,347.2	$314.75
1986	$6,260.7	$1,954.5	$19,012.3	$27,227.6	$317.16
1987	$5,896.5	$2,404.6	$23,390.2	$31,691.3	$309.24
1988	$5,386.0	$2,783.0	$27,071.4	$35,240.4	$303.85
1989	$5,270.2	$3,118.9	$30,338.2	$38,727.3	$291.40
1990	$6,250.0	$3,509.0	$34,133.0	$43,892.0	$271.08
1991	$7,423.9	$4,014.6	$39,051.5	$50,490.0	$263.82
Total	$53,529.6	$21,124.4	$205,483.1	$280,137.1	

TOTAL PROGRAM COST (x1,000)



COST PER NEW PARTICIPANT



Between 1982 and 1991, the Residential Load Management program spent a total of $280 million to implement the program. The primary cost each year is in credit payments to participants. This figure accounts for an average of 73% of the total program expenditures. Costs for the program have thus risen each year, as new participants sign up for the program.

COST EFFECTIVENESS

The Results Center determined overall average cost per kW for this program, based on a simple calculation of total costs divided by total savings for the period 1982 to 1991. Using this methodology, the demand savings due to this program have cost an average of $393/kW over the ten year period. This cost compares very favorably with the potential costs associated with new power facilities.

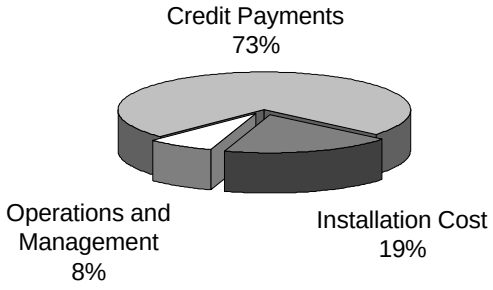
COST PER PARTICIPANT

Average credit payments to the approximately 381,000 customers participating in 1991 were $102.50 in 1991. The total average utility cost per new participant in 1991 was $814, however this cost includes the credit payments to old customers. Subtracting out those payments, the cost per new participant in 1991 for installation, operations and management, and credit payments, was $264.

COST COMPONENTS

Most of FPC's costs associated with the Residential Load Management program have been in credit payments to participants. These payments have totalled $205.5 million over the ten years 1982 to 1991, or 73% of the total program expenditure of $280.1 million. Switch installations account for a significant amount of the remaining expenditures, at a total of $53.5 million or 19% of the total program cost. Operations and management costs, including marketing, were $21.1 million for the remaining 8% of the total ten-year costs. ■

Cost per Kilowatt Calculation	*Total Program Cost (x1000)*	*Annual Winter Peak Capacity Savings (MW)*	*Cost per kW ($/kW)*
1982	$3,949.4	22.44	$176.00
1983	$13,656.6	69.19	$197.38
1984	$14,915.4	46.75	$319.05
1985	$20,347.2	61.71	$329.72
1986	$27,227.6	78.54	$346.67
1987	$31,691.3	76.67	$413.35
1988	$35,240.4	72.93	$483.21
1989	$38,727.3	74.80	$517.74
1990	$43,892.0	93.50	$469.43
1991	$50,490.0	115.94	$435.48
Total	$280,137.1	712.47	$393.19



LESSONS LEARNED

There is no doubt that FPC's Residential Load Management program has been successful at controlling demand during peak periods. FPC has designed a popular program in which many of its customers are happy to participate.

Much of the program's success can be attributed to the targeted marketing effort which has been responsible for attracting customers to the program. In addition, the practice of evaluating prospective customers helps to ensure their suitability before they begin participation in the program. In this way, FPC has developed a strong base of support for the program, resulting in few drop-outs and significant peak demand savings.

FPC has used the lessons learned while implementing the Residential Load Management program to improve the program over the course of its existence. FPC has recognized the benefit of word-of-mouth marketing of the program, and the importance of satisfied customers in promoting the program. In minimizing the number of dissatisfied customers, FPC realizes that Residential Load Management is not always appropriate for all customer types.

Most customers on the Residential Load Management program reported that they rarely noticed that their appliances were being controlled, indicating that the types of customers participating, and the amount of time which appliances are controlled are within appropriate ranges. Additionally, the high satisfaction rate indicates that the amount of the credit payments is sufficient to maintain interest and enthusiasm for the program.

TRANSFERABILITY

FPC's Residential Load Management program is by far the largest such program in the United States. However, many similar programs exist, and there are numerous individual methods for implementing such a program. United Power Association (UPA), a nonprofit generation and transmission electric cooperative headquartered in Elk River, Minnesota, has a load management program that uses a variety of incentives to encourage participation (see The Results Center Profile #56). Program participants are charged lower electricity rates in addition to the elimination of their peak demand charge. Customers selecting certain load management technologies receive rebates to help cover the initial costs. In addition, financing for the total costs of certain load management equipment is available to customers. Member cooperatives receive a lower peak demand charge from UPA if they have a particular number of customers who participate in the program. Finally, some cooperatives provide incentives to contractors for load management equipment installations.

Buckeye Power's Residential Load Management program (see The Results Center Profile #58) controls 82,000 electric water heaters and about 2,800 electric space heating appliances via a satellite communication network and radio base stations. Through Buckeye's program, deferrable loads may be controlled for up to five hours. Each participating cooperative receives a discount on their demand-related charges and reimbursements for the cost to purchase and install the radio switches. ■

Traditional utility ratemaking, where each and every kilowatt-hour sold provides profit, is a major barrier to utilities' implementation of energy efficiency programs. Several state regulatory commissions and their investor-owned utilities have been pioneers in reforming ratemaking to a) remove the disincentives in utility investment in DSM programs, and b) to provide direct and pronounced incentives so that every marginal dollar spent on DSM provides a more attractive return than the same dollar spent on supply-side resources.

The purpose of this section is to briefly present exciting and innovative incentive ratemaking mechanisms where they're applied. This we trust, will not only provide some understanding to the reader of the context within which the DSM program profiled herein is implemented, but the series of these sections will provide useful snapshots of incentive mechanisms being used and tested across the United States.

THE FLORIDA OVERVIEW

In Florida there is no integrated resource planning process per se. Utilities, however, are required to evaluate all their alternatives, including demand-side management, when they file a Determination of Need with the Florida Public Service Commission for the construction of new power plants. The state's investor-owned utilities are also required to file ten-year plans which must include their resource acquisition plans.[R#18,19,22]

Over the past decade there have been several changes in the goals set by the Commission with the state's utilities regarding demand-side management. In 1980 the Florida Energy Efficiency and Conservation Act was enacted by the state legislature and authorized the Florida Public Service Commission to set numeric goals for the state utilities' demand-side management programs. Later the Commission determined that the goals were unrealistic and hard to measure given changes in the weather, not to mention the population growth that characterizes Florida and quickly erodes savings,.. making them difficult to measure. Other factors also affected the numeric goals, and situations like a large industrial customer leaving a utility's service territory appeared to fulfill the intent of the numeric conservation goals, while not necessarily beneficial to the local economy. Thus numeric goals for energy efficiency were replaced for a time period by broad-based goals. Now the pendulum has switched back, and the Commission has ruled in March 1994 that utilities will again be required to submit numeric goals for efficiency in specific end-use areas. Once the Commission has approved the goals, then utilities will develop DSM program plans which will also require Commission approval.[R#18,19,22]

TECHNICAL, ECONOMIC, AND ACHIEVABLE DSM IN FLORIDA

Recently another piece of the demand-side management resource planning process has been completed in Florida. The Florida Energy Office hired Synergic Resources Corporation (SRC) to conduct a year-long study of the technical and economic potential for DSM in the state. Despite the fact that SRC was only evaluating summer peak demand and did not address the quite significant winter peak in the state, SRC found significant potential and when it compared the "best practices" for DSM using the RIM test (rate impact measure test) and the TRC (total resource cost test) as screening tools for cost effectiveness. Screening some 120 energy efficiency measures, SRC found a huge variation in the potential for DSM (11,526 GWh vs. 2,580 GWh in the year 2000 using the TRC test versus the RIM test as a basic screening tool). In terms of summer peaking capacity, SRC found that "best practices" using the RIM test for screening would result in 2,820 MW of savings versus 4,868 MW using the TRC test, or 9.5% of total projected summer capacity demands in the year 2000 versus approximately 16% with the TRC.[R#20,21]

SRC also found that the technical potential is 2-3 times the TRC cost effective potential, and 15 times the RIM potential on energy and 4 times the RIM potential on demand. Now the state's utilities will be responsible for addressing the cost effective efficiency potential in their future plans and taking the state overview and applying it to their service territories. The Florida Energy Office hopes that the SRC study will be used to help utilities in the state set aggressive targets for DSM. For instance, utilities may use SRC's potential for increasing the efficiency of new residential air conditioning, then determine what are realistic annual program participation levels, and file their DSM goals and plans accordingly.[R#20,21] ☞

Because of the state's capacity situation and lack of shareholder incentives, Florida's utilities are well-known for their emphasis on load management programs and have not been pursuing energy conservation as aggressively. Until recently energy efficiency programs have been screened for cost effectiveness using the RIM test, but now utilities may be using the TRC as well, thanks to a Commission directive contained in an order that utilities screen programs using both tests before the Commission makes a final ruling on a program by program basis. (For energy efficiency programs, the TRC tends to be more liberal than the RIM test, while the RIM test tends to favor load management over efficiency.) Florida's utilities might also be directed to adopt a "soft-RIM approach" whereby some programs that pass the TRC, but fail the RIM test, may still approved.[R#19,20,21]

ENVIRONMENTAL EXTERNALITIES

In November 1992, the Governor's cabinet ordered a comprehensive review of the state's Power Plant Siting Act. The review included an examination by the Department of Environmental Protection (DEP) of the costs and benefits of assigning monetary values to environmental externalities. The Governor and cabinet (all elected officials), sitting in one of their capacities as the Siting Board, has final approval over all new generation. However, before the Board can vote on new generating units, the Commission must approve a Determination of Need and an application must be made to the DEP. The DEP held public hearings on the issue in late November 1992. Hearings were held on externalities in mid-December 1992. The DEP report was issued in late July 1994 and provides guidance on how externalities will be factored into utility DSM planning.[R#18,22]

TREATMENT OF DSM EXPENDITURES

Utilities in Florida can capitalize and amortize specific DSM capital expenditures. Load management programs, and specifically their associated equipment costs, tend to be capitalized and amortized over five years. Other non-capitalized programs are recovered using a recovery clause. Over- or under-expenditures are tracked and reconciled every six months.[R#18,19]

LOST REVENUES

In Florida utilities are not allowed to recover lost revenues associated with DSM programs. This is for two key reasons. First, given the population growth it is very difficult to determine lost revenues. Second, the utilities have focused their attention on load management programs for which there are not the explicit lost revenues associated with energy conservation programs. Note, however, that at the time of this writing the Florida Power Corporation had recently filed a decoupling mechanism with the Commission. The petition calls for a three-year experiment based on a revenue/customer mechanism and an "equity kicker." The filing of the decoupling mechanism was a stipulation of FPC's last general rate case, which concluded in September of 1992, where the issue of decoupling was debated and then formally tabled for a separate filing which at this time has not been scheduled.

SHAREHOLDER INCENTIVES

In October 1990 the Commission opened a docket to explore shareholder incentives. Several subsequent workshops addressed the issue, but following the workshops the Commission declined to implement an incentive mechanism and closed the docket.

Then hearings were held in December of 1992 to discuss DSM program goals, and to discuss the shareholder reward/penalty mechanism. Note that as a result of its rate case earlier that year, Florida Power Corporation filed for a shareholder incentive mechanism with the Florida Public Service Commission. Currently Florida Power and Light, the largest utility in the state, does not have such a mechanism. Florida Power is the first in the state to file for this though the Commission at the time of this writing has not yet issued a ruling on the proposal. Workshops on decoupling are scheduled for late 1994 and the Commission is expected to make a ruling on decoupling in early 1995.[R#19,22] ■

References

1. Florida Progress Corporation, "Investing in Progress: 1992 Annual Report," 1993.

2. Shahla Speck, Marketing Development Engineer, Florida Power Corporation, personal communication, March 1993.

3. Florida Power Corporation, Marketing Services and Energy Efficiency, "Load Management Program Procedures and Standards," December 1990.

4. Florida Power Corporation, "Load Management Program."

5. Linda Lucas, "Energy Management Focus Groups," April 1992.

6. Market Opinion Research, "Florida Power Energy Management Study," October 1987.

7. Florida Power Corporation, Forecasting and Customer Research, "Market Study for Energy Management Systems (EMS)," July 1985.

8. Florida Power Corporation, "Load Research Study: January - December 1991" November 1992.

9. A. Scott Davis, "Florida Power Corporation's Load Management System," IEEE Computer Applications in Power, April 1990.

10. A. Scott Davis, "Florida Power Corporation's Load Management System," Florida Engineering Society Journal, October 1990.

11. "Target Marketing Boosts Participation in Florida Power's DSM Programs," Load Management News, Winter 1991.

12. Florida Power Corporation, Taze E. Lamb, "Winter Schedule E: Final Report on Pilot Program," May 1, 1992.

13. Florida Power Corporation, Taze E. Lamb, "Summer Schedule E: Final Report on Pilot Program," May 1, 1992.

14. Linda Lucas, "Advanced Energy Management Focus Groups," May 1992.

15. Florida Power Corporation, Dispatchable Demand Side Management and Research, "Schedule- "E" Load Management (Six Hour Continuous Interruption of Residential HVAC During the 1990/91 Winter & 1991 Summer Seasons: A Load Research Report," December 1992.

16. Kevan Dean, Program Coordinator, Florida Power Corporation, Residential Load Management Program, personal communication, April - July 1993.

17. "Florida Power Corporation's Residential Direct Load Control Program" excerpts from the "1991 EEI Residential Marketing Program Notebook," pages 10-49 - 10-54.

18. National Association of Regulatory Utility Commissioners, "Incentives for Demand-Side Management," Committee on Energy Conservation, 2nd edition prepared by Barakat & Chamberlin, Inc., March 1993.

19. Thomas Ballinger, Florida Public Service Commission, personal communication, June 1993.

20. Ross Burnaman, Legal Environmental Assistance Foundation, personal communication, June 1993.

21. Synergic Resources Corporation, "Electricity Conservation and Energy Efficiency in Florida: Technical, Economic, and Achievable Potentials," Briefing paper to the Florida Public Service Commission, June 2, 1993. (Plus comments to the study by Steven Nadel of the American Council for an Energy-Efficient Economy.)

22. Deb Swim, Legal Environmental Assistance Foundation, personal communication, June - July 1993.

☞ Special thanks to Kevan Dean and Denise Jordan for their guidance and support throughout the development of this profile.