Public Service Electric & Gas Standard Offer Program

Profile #96

Executive Summary

Public Service Electric & Gas Company's Standard Offer program is a revolutionary program for many reasons. First and foremost, rather than paying customers for energy savings either using prescriptive or custom rebates, the Standard Offer pays customers set amounts for actual energy savings at specific periods. Thus savings during summer peak periods for electricity, and during winter peak periods for gas, are rewarded at higher levels than savings during off-peak periods. Essentially, the Standard Offer is uniquely tailored to the needs of PSE&G and its customers.

A second prominent feature of the program is that savings must be verified in order to be eligible for incentives. The New Jersey Board of Public Utilities, along with utilities and other parties in the state, worked together to develop one of the nation's most comprehensive and rigorous verification protocols. Just as the output of power plants can be measured and verified within one or two basis points plus or minus, demand-side management savings in New Jersey must meet similar criteria, assuring the utility and its ratepayers energy and capacity savings that not only match its load profile but fulfill a similar level of confidence that has become expected on the supply-side.

A third feature of the program relates to its organization and structure. Virtually any customer, energy service company, or third party can earn Standard Offer payments for measured savings. To facilitate this process, PSE&G was allowed by the New Jersey Board of Public Utilities to set up a subsidiary, Public Service Conservation Resources Corporation (PSCRC), to operate with a dual mission. First, PSCRC was created to foster a competitive environment for energy services within PSE&G's service territory by providing financing for efficiency retrofits. Second, PSCRC was allowed to earn profits through its investments in energy efficiency services – which in turn flow to the company's shareholders – without directly performing retrofits but instead by hiring third parties to do the actual work.

In addition to providing financing for a range of energy service companies, PSCRC aggregates customers too small to apply directly to PSE&G for payments. It also works in hard-to-reach market segments such as schools and multi-tenant commercial situations. Like other participants in the program, PSCRC delivers energy efficiency services to customers and is then paid for savings by PSE&G through the Standard Offer mechanism. PSCRC earns a profit for its parent utility by delivering savings at costs below the Standard Offer prices and competing with private energy service companies in the open market. The result of each of these unique factors has been one of the largest DSM programs in the country, with literally hundreds of millions of dollars on the table.

PUBLIC SERVICE ELECTRIC & GAS
Standard Offer Program

Sector:	*Commercial & Industrial*
Measures:	*Custom electric and gas saving measures with a concentration on lighting, motors, water heating, and HVAC measures*
Mechanism:	*Standard ¢/kWh incentives paid monthly for verified savings delivered during specific time periods by customers, energy service companies, and PSE&G's subsidiary which also provides technical and financial assistance*
History:	*Program developed in 1989; formally begun in mid-1993 as a two-year program; ramped up in 1994; final project proposals due late-1995*

1993 PROGRAM DATA

Energy savings:	*20,419 MWh*
Lifecycle energy savings:	*204,190 MWh*
Capacity savings:	*6.31 MW*
Cost:	*$327,037*

CUMULATIVE DATA (1993-1994)

Energy savings:	*230,219 MWh*
Lifecycle energy savings:	*2,098,000 MWh*
Capacity savings:	*58.51 MW*
Cost:	*$1,102,037*

CONVENTIONS

For the entire 1994 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.

Public Service Electric & Gas (PSE&G), headquartered in Newark, New Jersey, is the principal subsidiary of Public Service Enterprise Group (Enterprise), a diversified public utility holding company. Enterprise Diversified Holdings Incorporated (EDHI) is a subsidiary of Enterprise and is the parent company of Enterprise's non-utility businesses. These businesses include Energy Development Corporation (EDC), Community Energy Alternatives Inc. (CEA), and Enterprise Group Development (EGDC). EDC, based in Houston, Texas, is an oil and gas subsidiary involved with exploration, development, and production. CEA is a developer of cogeneration and independent power projects. EGDC is a real estate development and investment business with investments in office and retail properties. Public Service Resources Corporation (PSRC) makes diversified investments in various sectors including leveraged leases, limited partnerships, and securities.[R#1]

PSE&G is the largest utility in New Jersey in terms of both customers and sales. The utility had 1,868,025 customers at year-end 1993 and had an average of 1,862,091 customers during the course of the year. The PSE&G service area encompasses a 2,250 square-mile area which extends from the northeastern section of the New York-New Jersey state line, southwest to the tip of Northwestern Gloucester County opposite Philadelphia, Pennsylvania. The service territory contains approximately 70% of New Jersey's population and includes the six largest cities in New Jersey. There is also a high concentration of research and development, high technology, and service-oriented firms in the utility's service area. Approximately 25% of all privately sponsored research and development in the country is located in New Jersey, most of which is in PSE&G's service territory.[R#1,8]

PSE&G 1993 STATISTICS

Number of Customers	*1,868,025*	
Number of Employees	*12,027*	
Energy Sales Revenues	*$3.26*	*billion*
Energy Sales	*38,261*	*GWh*
Summer Peak Demand	*9,147*	*MW*
Generating Capacity	*10,929*	*MW*
Reserve Margin	*19*	*%*
Average Electric Rates		
Residential	*9.97*	*¢/kWh*
Commercial	*8.36*	*¢/kWh*
Industrial	*6.96*	*¢/kWh*

PSE&G had revenues of $3.26 billion from electric sales to customers in 1993, up almost 9% from 1992. This increase was due to a rate increase and severe weather conditions. Energy sales to customers increased 3.8% over 1992 to 38,261 GWh in 1993. The number of employees at PSE&G dropped to 12,027 in 1993, the lowest number of employees since 1942, down from 12,761 in 1992. Electric energy sales to the residential sector totaled 10,631 GWh (28%), sales to the commercial sector equaled 18,096 GWh (47%), sales to industrial customers totaled 9,203 GWh (24%), and street lighting sales totaled 329 GWh (1%). The utility had a summer peak demand of 9,147 MW and a generating capacity at that time of 10,929, creating a reserve margin of 19%.[R#1,8]

Utility DSM Overview

Public Service Electric & Gas (PSE&G) currently offers a wide range of DSM programs under its Power Moves umbrella. There are essentially two types of programs implemented by the utility, "core" programs mandated by the Board of Public Utilities (BPU) and "performance-based" programs for which the utility is eligible to earn incentives discussed later in the Regulatory Treatment section of this profile. While PSE&G began its DSM efforts in 1982 with small-scale residential programs such as customer audits and other forms of weatherization assistance, the utility's DSM efforts were accelerated in 1991 when the BPU adopted rules that provide DSM incentives for the utility's shareholders.

DSM OVERVIEW	DSM EXPENDITURE (x1,000)	ENERGY SAVINGS (GWh)	SUMMER CAPACITY SAVINGS (MW)
1991	$26,832	26	99
1992	$25,995	31	177
1993	$35,776	73	165
Total	$88,603	130	441

PSE&G CURRENT DSM PROGRAMS

Residential

Home Energy Savings
Low Income Seal-Up
Low Income Direct Grant
Low Income Attic Insulation
Zero / Low Interest Energy Conservation Loans
ETH-Energy for Tomorrow's Homes / Super ETH
Energy Profile
High Efficiency Air Conditioner Rebate
Heat Pump Rebate
High Efficiency Gas Space Heating Rebate
Tankless Water Heater Replacement Rebate
Compact Fluorescent Bulb
Air Conditioner Cycling

Commercial/Industrial

Commercial & Apartment Building Conservation
DSM Bidding
Standard Offer
Green Lights
Small C/I C.A.S.H. Rebate

Information

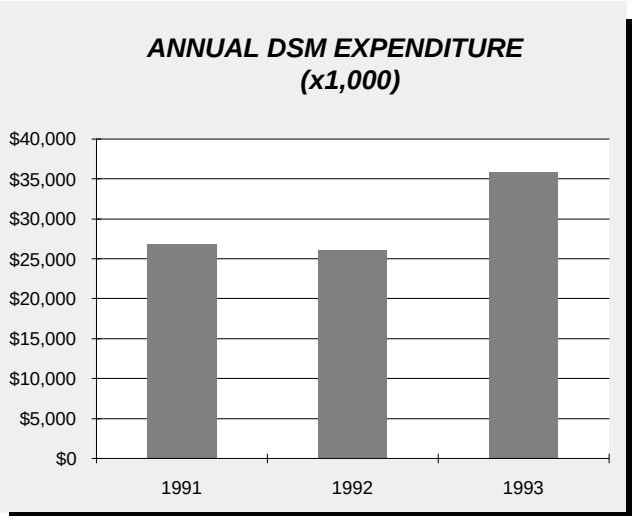
Energy Conservation Center
Low Income Conservation Workshops
Senior Programs
Large C/I Customized Audits
Large C/I Load Management Assessment
Cogeneration Feasibility Analysis and Information
Mobile Van / Presentations
Children & Youth Energy Conservation Education

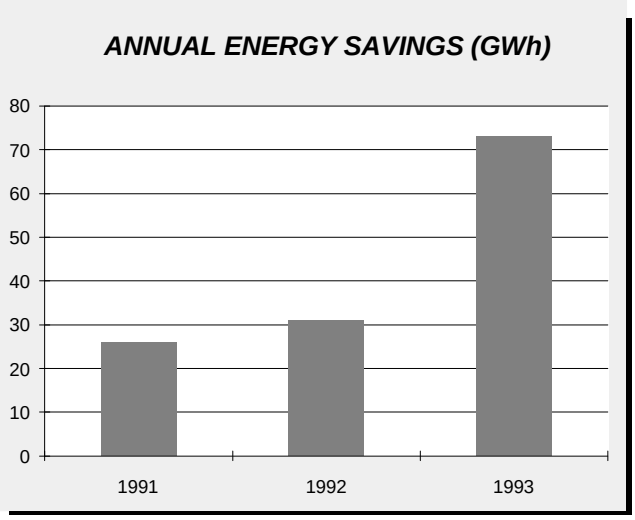
PSE&G's "core" programs are designed to fulfill important social agenda. For example, these programs provide energy efficiency services to low-income customers and to senior citizens. The utility also has several DSM information services which include an Energy Conservation Hotline and schools programs which educate children about energy efficiency. The accompanying table provides a complete list of PSE&G's DSM offerings.[R#10]

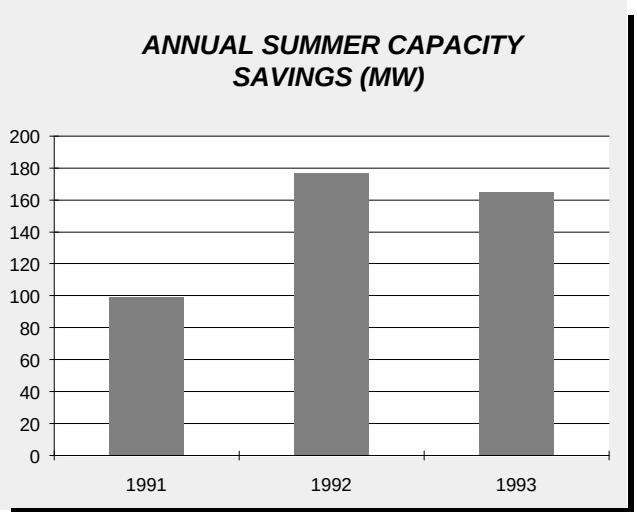
The Standard Offer program, a "performance-based" program, is one of the most progressive of its kind. It evolved out of PSE&G's experiences with its DSM Bidding program which began in 1991 after being originally proposed in 1989. (See also Profile #62: Public Service Company of Colorado, DSM Bidding Programs.) While quite successful in its own right, garnering the participation of seven energy service companies and an individual customer, PSE&G learned many lessons from the Bidding program that has allowed it to shape the Standard Offer program. (The Bidding program was formally terminated when Standard Offer began, but ESCOs are still fulfilling their Bidding contract obligations and looking for customers to satisfy their bid requirements.)[R#19]

Based on its experiences with bidding, PSE&G staff realized that participants in the program were getting paid different amounts for identical energy and capacity savings, a seemingly illogical situation. In addition, each participant had to negotiate individual contracts with PSE&G and in some cases this process took more than a year to complete, causing an unnecessary burden on customers and the utility alike.

To levelize the amounts of money paid to customers for their savings and to streamline the process, PSE&G developed the Standard Offer program. With the Standard Offer all participants receive the same amount per kWh and therms of gas,







with varying incentive payments to match the utility's needs and load profiles. There is also a single, standard contract for all participants which eliminates drawn-out contract negotiations and streamlines the process, encouraging greater participation and savings. To facilitate the Standard Offer program and to create a means for shareholder incentives, PSE&G established a wholly owned subsidiary called Public Service Conservation Resources, discussed in the next section.[R#10,18]

In 1993, 165 MW of capacity and 73 GWh of consumption was saved as a result of all of PSE&G's DSM programs. PSE&G spent $35.8 million in 1993 to run these DSM programs. This expenditure was a 38% increase from 1992's $26.0 million spent on DSM. From 1991-1993, PSE&G's DSM programs resulted in savings of 130 GWh and 441 MW of capacity.

Public Services Conservation Resources Corporation

In 1992 Public Service Electric & Gas established Public Service Conservation Resources Corporation (PSCRC), a wholly owned subsidiary to implement the Standard Offer program. PSCRC's profits and losses are separate from those of its parent utility. The dual mission of PSCRC is to facilitate a viable and enduring performance-based DSM marketplace in New Jersey and to do it on a profit-making basis. In PSCRC's promotional literature, a description of the Standard Offer is encapsulated by the slogan, "Changing energy consumers into sellers of energy savings." PSCRC's mission, in turn, is defined as, "Helping customers make the change."[R#2]

More formally, PSCRC participates in the PSE&G Standard Offer program in a manner consistent with the BPU order Adopting Stipulation of Settlement Docket No. EE92920105 dated December 15, 1992. The Stipulation of Settlement describes the business focus of PSCRC as one purchaser of energy savings and a facilitator to PSE&G's customers in identifying and selecting qualified DSM industry members to design and implement eligible projects. Essentially, PSCRC is in business to provide investment capital and sponsorship services to customers who want to save money and energy by participating in the Standard Offer.[R#2,4]

PSCRC provides three services for PSE&G's customers while providing a profit for shareholders. First, PSCRC assists customers with the Standard Offer program. Second, it supplies customers with services they need, from implementation assistance and project management to financing for projects. Third and of key importance, PSCRC was set up with the clear objective of providing a stable environment for the DSM industry to grow in PSE&G's service territory.[R#4]

This last objective is quite unusual for a utility subsidiary but addresses the broader issue faced by utilities related to market transformation. Just as utilities have promoted more energy-efficient products such that future sales and purchases are automatically energy-efficient, PSCRC is attempting to create an environment whereby energy efficiency service industries flourish and grow and can ultimately be incorporated into routine private sector activities. To foster this transition, PSCRC has developed an Energy Services Network comprised of energy service companies and contractors. These companies have been screened by PSCRC and have been trained to work with and promote the Standard Offer, including its software tools and monitoring and verification requirements.[R#4]

Given its unique market strengths and abilities, PSCRC also works to promote energy efficiency in under-served markets such as schools which have been generally passed over by energy service companies because of schools' relatively short hours of operation and complex contracting provisions. By bundling schools together, PSCRC has been quite successful addressing this customer segment and has already performed audits covering 50% of the "pupil square footage" in the state. Multi-tenanted office spaces are also a market niche with complex challenges that PSCRC has addressed. PSCRC staff emphasize that their work with these traditionally difficult-to-reach customer segments is not related to "nobility," instead these actions make good business sense, keeping industry in New Jersey and attracting companies to relocate to New Jersey, and thus assuring the long-term financial viability of the parent utility. Economic development is important to PSE&G; between 1990 and July of 1993, New Jersey as a whole lost more than 284,000 jobs.[R#3,4,5,18]

Similarly, the small commercial and industrial market, characterized by projects that save less than 50 kW, has provided a unique opportunity for PSCRC. To garner savings in this arena PSCRC established its Bright Investment program to promote lighting efficiency. Through the program an authorized PSCRC energy service representative performs an audit of the customer's existing lighting, followed up by a survey report which recommends lighting improvements. After customer approval to move forward, PSCRC pays up to 60% of the lighting upgrade costs (versus 100% in select small C/I programs operated in other utilities' service territories) and offers optional financing for the balance at competitive interest rates and repaid over a 24-month term. (Payments can even be made on customers' credit cards!) Provided that a customer's facility operates for more than 3,000 hours per year, customers enjoy positive cash flow and 25% savings for the two-year repayment period, and then 100% of the bill savings from there on. The Bright Investment program has been available to customers since May 1994. Through this program, PSCRC aggregates savings which it then sells to PSE&G through the Standard Offer.[R#2,4]

Finally, PSCRC performs project management and financing functions in traditional market segments as well, competing head-to-head with private sector energy service companies who generally serve the larger commercial and industrial customers who are able to deliver projects that save 50 kW or greater, what PSCRC calls its Large C/I program. By doing so, the utility subsidiary competes in the free market delivering energy services and extracting profit margins, just as other unaffiliated energy service companies do, providing a competitive environment for the delivery of energy efficiency services, thereby promoting quality retrofits at the lowest cost to consumers and society.[R#4,18]

OVERVIEW

The Standard Offer program which began in June of 1993 offers incentives for measured energy savings over a contractual term to customers and providers of energy-related services. Payments for electricity savings are based on time of day and seasonal requirements while gas savings are based on seasonal requirements. Contract terms and requirements and payments for savings are standard for all participants, hence the name Standard Offer.[R#3]

The program is aimed primarily at owners of commercial and industrial properties, including warehouses, stores, offices, and factories in PSE&G's service territory. Participating customers must guarantee to save a specific amount of energy over the contract term, which can be either 5, 10, or 15 years. Participants may sell savings directly to the utility or to a sponsor, such as an energy service company (ESCO), which in turn resells the savings to the utility. This latter option also allows customers that do not qualify on their own – generally because of their small size – to participate by signing up with a sponsor who pools the savings of other customers to meet the required electricity and gas thresholds. Typically the sponsor buys the future savings from the customer at a discount below what it will receive from the utility, then resells the savings to the utility at the original price. Other sponsors charge fees or share in the energy savings payback.[R#5,6]

DSM Standard Offer No. 1, as the program is officially called, is administered by PSE&G's DSM Resource Acquisition Department which issues program guidelines, maintains program regulations, screens eligible projects, tracks savings and performance compared to expectations, and makes payments for measured savings. The program has been given regulatory approval for a two-year period. After that time, necessary changes and program revisions – such as incentive payment levels – will be made for Standard Offer No. 2. If successful the program will be repeated every two years.[R#4,17]

The stated goal of the Standard Offer program is to purchase a total of 60-70 MW of savings to be delivered by March 31, 1996 for existing construction or May 31, 1997 for new construction projects. The minimum acceptable proposal must constitute at least 100 kW of "Summer Prime Period Average Demand" reduction (noon to 5 pm, weekdays, June through September, excluding holidays) for existing construction and 50 kW of Summer Prime Period Average Demand Reduction for new construction. These reductions must be for a minimum five-year period.[R#21]

Because Standard Offer's primary objective is to avoid the need for new power plant capacity, participation requirements are based on peak kW savings. However, customer incentives are paid on a ¢/kWh basis, based on the time that energy savings are achieved. These kWh payments are actually achieving peak capacity savings because the highest incentive levels occur during PSE&G's summer peak period. To participate in the Standard Offer for gas, participants must reduce their usage by 25,000 therms during the gas peak period which matches the winter heating season, November through April. To participate in the current Standard Offer program, project proposals must be submitted by December 31, 1995.[R#3,16,21]

While the Standard Offer provides attractive incentives for participants, there are also penalties for not delivering the energy savings stated in the agreement. Contractual obligations include penalties for not producing the expected energy savings by the appropriate installation deadline, and for not maintaining 80% of the reductions outlined for the summer prime period (electric) or winter peak period (gas).[R#2]

CUSTOMER OPTIONS FOR PROGRAM PARTICIPATION

Provided that an audit of a customer's facility reveals sufficient savings potential, there are three options for customer participation in the Standard Offer program. Customers can either work with a third party sponsor such as an energy service company; they can work with PSCRC; or if they are of the appropriate size and wish to do so they can participate in the program independently, working directly with Public Service Electric & Gas.

1. Third Party Sponsorship

Third party sponsors are generally energy service companies (ESCOs) that are used in three basic scenarios to facilitate program participation: First and most common, the use of a third party sponsor facilitates participation among customers who are eligible to participate in the program on their own, but want another party to handle the details. Second, commercial and industrial customers whose facility or group of facilities do not meet the minimum average demand reduction requirements, or who do not have the necessary resources or capital, can participate in the Standard Offer program through a third party sponsor. Finally and as of yet not exercised, third party sponsorship provide an avenue for program savings from residential customers. Since residential customers must meet the same minimum kilowatt and therm reduction requirements as commercial and industrial customers, it is impossible for an indi-

vidual residential customer to participate in the Standard Offer. Thus the only participation option for residential customers is through a sponsor that is willing and able to pool savings and provide the financing mechanism for residential retrofits.

When using an ESCO to participate in the Standard Offer, the ESCO conducts an evaluation of existing equipment and proposes a design for new equipment. The ESCO also determines the cost-effectiveness of the project and the profitability of the investment for the customer. A customer contribution may be required in the form of a fixed payment to the ESCO or a shared savings arrangement. PSE&G advises its customers to request proposals from more than one ESCO, and to weigh the advantages and disadvantages of all proposals before ultimately selecting an ESCO to perform the retrofit. Furthermore, the Board of Public Utilities maintains a list of eligible ESCOs that it provides to interested customers. (Note that PSCRC is also on the list of eligible contractors.)

Once a customer selects an ESCO, the customer signs a contract with them and also enters into a Standard Offer contract with PSE&G. The ESCO then becomes the party responsible for implementation, performance, and maintenance of the project. Upon delivery of measured savings, the ESCO receives Standard Offer payments from PSE&G.[R#2,3,6]

2. PSCRC Sponsorship

Customers also have the option to have Public Service Conservation Resources Corporation (PSCRC) sponsor them for participation in the program. Essentially, PSCRC serves a parallel function to third party sponsorship, and while PSCRC provides investment capital and sponsorship services to customers, the subsidiary typically works in cooperation with one of several ESCOs and contractors within its Energy Service Network (ESN) to actually perform the retrofit.

The Energy Service Network is a group of trade allies organized by PSCRC to develop and install conservation projects for the Standard Offer program. Members of the Energy Service Network were selected by PSCRC on the basis of their experience, professionalism, and commitment to customer service. Network members perform facilities audits, hire subcontractors, and manage the actual retrofits.

With this option, PSCRC not only purchases customers' energy savings, but handles all of the participation requirements required for the program including feasibility studies, project design, preparation of proposals for PSE&G, selection of installation subcontractors, and all the related paperwork. On a typical Standard Offer project, PSCRC and a member of the Energy Service Network work as a team, each contributing its expertise to facilitate the process and to complete the retrofit.[R#2,3,5,6]

Within the realm of PSCRC sponsorship, there are two basic customer options which determine the degree to which PSCRC is involved in the retrofit. For customers that want to take greater responsibility for project management, a "sponsorship-only" contract is available. For customers that seek comprehensive services and minimal involvement in the retrofit, PSCRC offers an "integrated services" contract.

Under the Sponsorship-Only contract, customers pay for and/or finance their retrofits independently while PSCRC handles all the contractual details with PSE&G including submitting the project proposal to PSE&G and then auditing and reporting for the project term of 5, 10, or 15 years. PSCRC also posts the required security and accepts liability for PSE&G penalties if the project fails to perform as projected. Furthermore, PSCRC agrees to install and maintain measurement equipment, provide all required performance reporting, and perform all billing functions. After receiving payment from PSE&G, PSCRC remits payments to the customer. Compensation to PSCRC by the customer is a combination of payments at project completion and capped rates over the term of the contract.[R#4]

A second customer option for PSCRC sponsorship is the Integrated Services Contract which provides the services listed above and also provides for additional project management. In this arrangement, PSCRC contracts for and manages the selected engineer or contractor. As such, under this integrated services contract PSCRC manages both the retrofit construction and administrative aspects of the project.[R#4]

PSCRC pays the customer, or credits the customer's account, an amount equal to the present value of future anticipated Standard Offer payments at a discount rate currently of 15%. In addition, fees are assessed by PSCRC for administering the contract with PSE&G. (These fees cover a range of activities from bonding the project, to guaranteeing the deliverability of savings, and typically represent 20% of the project cost.) While other lenders might provide customers with capital for 12%, PSCRC performs a range of additional functions for the higher interest rate that it garners from customers including a portion of the project risk and conducting a range of administrative tasks.[R#18]

3. The Customer Alone

The third option is for a customer to participate in the Standard Offer program independently. If the customer meets the savings requirements of the program, he or she agrees to a contract with PSE&G and then works directly with the utility to calculate, monitor, and maintain the savings agreed upon in the contract. After savings are confirmed, the customer bills the utility directly and within 30 days receives payment for the savings. While this may seem to be the most expedient and simple contracting form, it also has some disadvantages including having to arrange the necessary financing for the project, bearing all associated risks (including penalties for under-performance and non-delivery), and needing adequate internal resources and capabilities to perform a series of technical tasks including proposal development, comprehensive audit, engineering design, equipment specification and installation, construction management, installation of monitoring equipment, contractor preparation and management, billing and processing, and maintenance of equipment. While this option provides the greatest payments to the customer – since there is no middleman involved – it in turn requires the greatest level of involvement or what some DSM analysts call "transaction costs."[R#3,18]

PAYMENT OPTIONS: LEVELIZED OR UNLEVELIZED

As shown in the annualized payment charts in the Cost of the Program section of this profile, program participants have two types of payment options for electric savings available from PSE&G available: levelized and unlevelized. (Similar incentives are available for gas savings) The unlevelized payment varies for each year of the contract term and is based on each year's projected value of the energy savings to PSE&G. It varies annually due to energy escalation, inflation, and other factors. With the levelized payment, the customer receives the same amount for each year of the contract term. This payment assumes an 11.2% discount rate and is an average of the unlevelized payments, taking into account the time value of money. At the end of the contract period, the actual value of the total payment is roughly the same, regardless of type of payment chosen. Levelized payment plans are rarely utilized.[R#3]

MARKETING

While there are numerous provisions within the Standard Offer program – including third parties, sponsors, and customers engaged in a variety of contractual arrangements – Public Service Electric & Gas maintains primary responsibility for marketing the program. To do so, the utility relies on its existing marketing infrastructure that it uses for all it Power Moves programs. PSE&G's primary customer interface for marketing the program is through its field marketing personnel. These staff are in constant communication with customers and are responsible for advising customers of the range of options, including appropriate rate structures and demand-side management opportunities, that best suit their needs.

Field representatives inform eligible customers of the Standard Offer program and advise them on means of participating. For instance, they encourage customers to contact the New Jersey Board of Public Utilities (BPU) to receive a list of ESCOs with whom they can work directly and which can take complete responsibility for the retrofit projects. Concurrently, PSCRC contacts PSE&G customers to discuss the program and PSCRC's services.[R#11]

DELIVERY: THE STEP BY STEP PROCESS

Initial Commitment: First a customer must decide to commit to sell energy savings to PSE&G and must specify a set number of years that the savings will be available to the utility.[R#2]

Project Qualification: Based on a facility's operating characteristics and the types of efficiency measures being considered, it is determined whether a Standard Offer project is both technically and economically feasible. This determination is typically made by a third-party sponsor.[R#2]

Agreement to Proceed: If a customer uses the services of a third-party sponsor, an agreement is made setting out the terms of the customer's energy savings sale and the parties' performance obligations.[R#2]

Investment Grade Inventory: At this time a detailed inventory of customer facilities is performed to determine operating characteristics, to comprehensively identify existing energy-consuming equipment, and to recommend specific efficiency measures to be installed. Based on this inventory, which outlines the costs, revenues, and energy savings of the project, the scope of work is finalized. In addition, a detailed plan which complies with program requirements is developed for measuring and monitoring the project's energy savings on an ongoing basis. Another plan for assuring continued maintenance of the installed efficiency equipment is also required.[R#2]

Proposal to PSE&G: Then a proposal must be submitted to PSE&G which outlines the key elements of the investment-grade inventory and scope of work. This proposal includes a daily and seasonal schedule of energy savings.

In order to make the proposal process easier, PSE&G developed AESOP (Automated Entry/Standard Offer Proposal), a computer program which automates the submission process and performs all necessary calculations. AESOP is actually a Paradox database application which allows users to enter project information; validate the data; perform all calculations; generate kWh savings, cost effectiveness, and inventory reports; and create a proposal disk to be sent to PSE&G. Once the proposal disk is sent to PSE&G, the data on the disk is entered into a larger database which tracks all conservation projects.[R#2,6]

PSE&G Sign-Off: Once PSE&G accepts a project proposal, the seller of savings (either the customer or ESCO) executes a Standard Offer energy savings agreement with PSE&G. Contract terms are 5, 10, or 15 years.[R#2]

Construction: The contractors install the new efficiency equipment. The seller formally notifies PSE&G when construction is 50% complete. Once the installation is completed, the seller submits a report to PSE&G describing the installation and any deviations from the original project proposal.[R#2]

At this time PSE&G typically monitors project progress. Once the project is completed, a post-implementation audit is performed, which includes a visual inspection of all areas and systems associated with the project, and measurement of the power of a representative sample of circuits.[R#6]

Ongoing Obligations: Savings must be monitored on a regular basis to ensure that contract terms are being met. The seller must also bill PSE&G for energy savings on a monthly basis. All other continuing obligations of the seller must be administered for the life of the Standard Offer Contract. An increase or decrease in the hours of operation will result in higher or lower payments from PSE&G. However, there are some limitations and payment restrictions for increased hours and some penalties for decreased hours.[R#2,6]

Utility Fees: The party selling energy savings to PSE&G pays certain fees to the utility, including fees for PSE&G's audits before, during, and after construction; a $1/kW fee when a proposal is submitted; a damage deposit that floats at around $70/kW to ensure against a project not being completed on schedule; and monthly administrative fees.[R#2]

Ongoing Auditing: Throughout the development and following completion of a Standard Offer project, PSE&G may send auditors on site to monitor its progress. The first audit is performed once a proposal is submitted and sets the baseline of pre-construction energy use and existing conditions. During construction, auditors verify compliance with the project proposal and determine the new energy consumption levels. Throughout the life of the Standard Offer Contract, PSE&G performs up to 15 audits to monitor the continuing performance of the efficiency measures. Ongoing measurement and verification is required for the sponsor. If savings fall below contract specified levels, PSE&G reduces payments to the seller and may assess additional penalties.[R#2,9]

MEASURES INSTALLED

The Standard Offer covers any piece or system of equipment or material (electric or gas) which improves the energy efficiency of a new or existing, ongoing end-use such as lighting, drivepower, cooling, and heating and provides savings that can be measured and verified via the Monitoring and Verification Protocol discussed in the next section. If the level of service is decreased, for example footcandle levels or production output is lowered, the Standard Offer payment is prorated on a proportional basis. Eligible measures also include load management equipment that switches electric load from on-peak to off-peak periods, for example cool storage, as well as switching from electricity to another fuel, for example electric to gas absorption air conditioning. For new construction, an eligible measure is any one which exceeds the base standards outlined in the energy savings agreement. Stand-by generation and street lighting services on PSE&G's rate schedule SL are ineligible.[R#3]

To date most of the projects implemented have been lighting retrofits, but this picture is rapidly changing. Fuel switching projects have also been incented through the program, as have motor replacements (for applications such as elevators, pumps, fans, chillers, etc.), water heating upgrades, and a range of HVAC improvements. While most retrofits have occurred in the commercial and industrial sectors, domestic hot water heating measures have been implemented for condominium associations and in the hospitality sector. (The only "residential" activity has been related to condominium associations, although these customers do not fall into one of

PSE&G's residential rate classifications.) Currently PSCRC is seeking means of doing residential retrofits though this requires some extensive baseline analysis that has yet to be completed.

So far all but less than 5% of all program activity has been related to retrofits, though there has been some new construction activity lately. There have also been some chiller replacements (tied to the phase-out of CFCs) and some incented remodelling activity as well. To date no office equipment upgrades have been rewarded through the program.

While the Standard Offer program was set up to provide both electric and gas savings, gas savings have been minimal for a number of reasons. First and foremost, the BPU has not yet finalized monitoring and verification (M&V) requirements for gas savings. PSE&G has submitted its proposals for M&V provisions to the BPU but so far no final requirements have been adopted. This has placed gas savings on the "back burner." Since PSE&G's promotional literature for the program includes gas, it hasn't turned away gas proposals. Instead, these have been presented to the BPU on a case-by-case basis for preliminary check-off by the BPU. Proposals that meet the BPU's informal screen, and in which participants understand that they will have to meet whatever M&V requirements that are ultimately passed by the BPU, have moved forward. (Naturally PSCRC has not aggressively promoted gas projects given this regulatory hiatus.) A second reason that gas saving retrofits have not been aggressively pursued is simply that the utility is so busy processing electricity Standard Offer proposals, that it hasn't had the time to focus on gas savings.[R#19]

STAFFING REQUIREMENTS

The Standard Offer program involves a range of professionals at several companies. At Public Service Electric & Gas, the program's primary administrator, the program is managed by Jose Torres who reports directly to Charlie Coccaro. Both of these individuals devote their full time attention to the program. In addition, management above and staff below are involved in various aspects of the program. (Staff estimate that the program requires at lease five full time administrators.) The utility also has three auditors and six DSM specialists who devote all of their time to the Standard Offer program. In addition, PSE&G has 150 full-time marketing representatives who promote all of the utility's DSM programs to customers. The utility estimates each representative devotes approximately 10% of his/her time to Standard Offer, equal to 15 FTEs. Thus at the utility alone, there are approximately 30 full time equivalents assigned to the program.[R#4,10]

Virtually all staff at Public Services Conservation Resources Corporation are directly involved in the Standard Offer program. Currently there are approximately 22 full time equivalent staff involved, and PSCRC expects to add a few more positions to this roster of professionals and staff in 1995.[R#18]

In addition to PSE&G and PSCRC there are a number of companies involved in the Energy Services Network, though estimating their full-time equivalent staffing would be virtually impossible. Currently there are four primary full-service energy service companies – SYCOM Enterprises, Proven Alternatives, Performance Contractors, and Energy Options – which are involved using PSCRC financing. Then there are 3-5 firms that provide "turn-key" services such as project design, engineering, and installation functions. Additionally, there are trade allies involved, such as electrical supply houses, involved in the program whose capabilities PSCRC use while providing administrative services for their customers in a number of ways. Thus there are approximately a dozen firms involved in the Energy Services Network (ESN) on a regular basis. In addition there are other energy service companies, such as EUA Cogenex, that finance their projects independently and which are considered outside the ESN.[R#18]

CASE STUDY: JERSEY CITY PUBLIC SCHOOL DISTRICT

Currently a 24-school lighting retrofit is taking place which will reduce the Jersey City Public School District's electricity demand by 1.7 MW and create an annual net positive cash flow of $306,824.

The district-wide retrofit will cost approximately $1,819,000 which will be paid by PSCRC. The district is financing the project with a nine-year shared savings contract which will pay PSCRC 35% of the total bill savings of $473,687, equivalent to $165,790. Over the nine-year shared savings contract, PSCRC will be paid $1,492,114. The remaining $326,886 in costs will be more than covered by funds provided to PSCRC by PSE&G as part of the 10-year contract signed for the Standard Offer program.[R#9]

MONITORING

One of the most interesting aspects of the Standard Offer program relates to monitoring and verification. Retrofit savings that are incentivized through the program are required to be verified to a level of certainty unprecedented by most other DSM programs in the United States. This is not just the case for the Standard Offer, but for all performance-based DSM programs in New Jersey as required by the New Jersey Board of Public Utilities.

The BPU along with other vested parties has established a rigorous monitoring and verification protocol for DSM programs. As such, in order for utilities in the state to recover their DSM expenditures, and in some cases recoup lost revenues and earn shareholder incentives, a collaborative process in the State of New Jersey involving staff of the New Jersey Board of Public Utilities, New Jersey Department of Public Advocate, various New Jersey electric utilities (including PSE&G), ESCOs, and contractors was used to create a Measurement Protocol for DSM programs. This process resulted in a Protocol that is among the most advanced in the country and now serves as a model for other performance-based measurement systems for utilities and energy service companies. It requires extraordinary levels of assurance that savings are actually realized.

The Measurement Protocol came about in large part due to the desire on the part of New Jersey regulators, utilities, ESCOs, and others to be able to accurately measure the delivered results of DSM, thereby allowing demand and supply-side options to compete via performance-based DSM on a level playing field. In New Jersey, supply-side projects have historically been measured on an hourly basis with +/- 2% accuracy. Thus a similar goal for DSM projects was established. Presently, the requirements for DSM accountability in the New Jersey regulations are the most rigorous in the country, with the hope of creating a process that accounts for DSM expenditures and benefits on a parallel path with supply-side accounting.[R#7]

In conjunction with measurement plans contained in the utilities' DSM plans, the Protocol was designed to implement the measurement requirements contained in the DSM rules set forth by NJBPU. It describes what the collaborative parties believe are the most appropriate measurement technologies and methodologies, resulting in measured savings. It sets forth methodologies that describe the means and principles involved in determining savings from general classifications of energy savings measures. The Measurement Protocol is to be used in conjunction with additional measurement plans, sampling plans, and verification procedures used by individual utilities and is used by participants in the Standard Offer program to calculate savings. However, any supplemented utility plan must equal that of the Protocol.[R#6]

The Measurement Protocol's methods are grouped generally by usage patterns and the operating principles of the electric load controlled or modified. This Protocol also contains examples of how each methodology is to be applied to a specific technology or system improvement. The methodologies included are to be revised as new and/or better means of measurement become available. Changes and additions to this document are made on a case-by-case basis upon approval of BPU staff.[R#6]

The Protocol requires that all DSM initiatives, per the New Jersey State DSM Incentives Regulations, must consider such factors as free ridership, transmission and distribution line losses, capacity reserve margins, and must allocate savings to Utility Time Periods according to accepted procedure. Persistence must be measured for the life of claimed benefits.[R#7]

The following measurement methods are outlined in the protocol: Method 1 covers measures affecting constant load, constant operating hours, and non-weather sensitive end uses, but not those retrofit strategies affecting operating hours. This methodology generally estimates savings as the product of the change in connected load (or measured load of a partially loaded device) and the measured operating hours. Method 1 typically applies to lighting system conversions but also applies to constantly loaded motors. A group of tables was compiled to standardize lighting wattage ratings as well as for motor full load efficiencies. Measurement generally involves sensors detecting the hours of operation of a utility-specified sample of circuits for each group of appliances.[R#7]

Method 2 covers measures affecting operating hours of constant load, non-weather sensitive end-uses. This protocol addresses technologies that reduce operating hours of constant load end-uses. Method 3 addresses measures affecting variable end-use requirements. Technologies addressed involve a variable load before or after retrofit, and include adjustable speed drive applications, constant speed to adjustable speed conversions, installation of high efficiency variable speed mo-

tors, and improvement of manufacturing process efficiency. Method 4 covers other technology-specific measurement methodologies related to thermal energy storage and energy management systems and heat recovery systems. Method 5 addresses fuel switching and technologies involved in switching from electric to gas chillers. Method 6 addresses protocols for new construction.[R#7]

PSE&G monitors project savings in three phases at the sponsor's expense. The three phases are pre-implementation, implementation, and post-implementation. The pre-implementation audit consists of an on-site detailed inspection of the host facilities to establish a base usage against which energy savings will be measured.

In general, with the Standard Offer program the sponsor is required to invoice PSE&G for acquired energy savings, then PSE&G verifies the amount of energy savings delivered for all periods of each billing cycle during the contract period by paperwork or remote access. These savings determinations are made in accordance with the Measurement and Verification plan discussed above.

EVALUATION

Currently staff at Lawrence Berkeley Laboratory are conducting a process and impact evaluation of the Standard Offer program, an evaluation that is due to be completed by March of 1995. The evaluation was commissioned by the New Jersey Board of Public Utilities and will be paid for by Public Service Electric & Gas with some co-funding from the U.S. Department of Energy. The evaluation will incorporate interviews with stakeholders in the program, including 50-60 customers as well as bidders, prospective bidders, and company staff.

Staff at LBL will also examine the program's impact data through December of 1994. Then staff will present design recommendations and suggestions for the proposed Standard Offer 2. According to staff, one of the interesting aspects of the evaluation relates to market barriers which energy service companies are experiencing, and how even financially attractive retrofits for customers are difficult to realize in New Jersey. While early indications suggest that ESCOs like the program design, and that "there is certainly enough money on the table," LBL staff will be considering how and if the program will work in a more competitive utility environment and will make recommendations accordingly.[R#25]

Program Savings

Data Alert: The savings for 1993 represent annualized savings from June 30, 1993 — the program's start date — to December 31, 1993. The figures presented for 1994 include annualized energy savings for both completed and committed projects through December 15, 1994.

Total annual savings for the Standard Offer program through December 15, 1994 are 58.51 MW and 209,799.677 MWh. These figures represent approximately 18 months of program implementation. In the program's first six months, projects worth 6.31 MW of capacity and 20,419 MWh were saved. Then in 1994, savings jumped dramatically with 1994 values of 52.2 MW and 189,381 MWh. The ramp-up in savings has been most dramatic in the last month of recorded data, with nearly 10 MW of projects entering the system and coming on line. Cumulative energy savings for the program to date are 58.51 MW and 230,219 MWh. Assuming savings based on average ten-year measure lives, lifecycle energy savings are a dramatic 2,098,000 MWh.[R#10,18]

Of the projects involved in the program in 1994 representing a total of 52.2 MW and 189,381 MWh of savings, 13.1 MW and 47,781 MWh have actually been delivered to the PSE&G system while 39.1 MW of capacity and 141,600 MWh represent projects that have been approved but are still "in the pipeline" and as of yet have neither delivered savings to the PSE&G system nor have required incentive payments as discussed in the next section.[R#10]

PARTICIPATION RATES

To date 925 facilities have been involved in the program with more coming on line rapidly. Of the completed Standard Offer projects, PSCRC has been involved with approximately 70% in one way or another, providing either capital, sponsorship, or both. Through October 1994, PSCRC was directly involved in 44% of the 44 MW of committed program activity, and financed another 26%. PSCRC officials expect this proportion will lessen in time and for projects that have been approved but which are not yet completed, PSCRC has been involved with about 50%.[R#4,10,18]

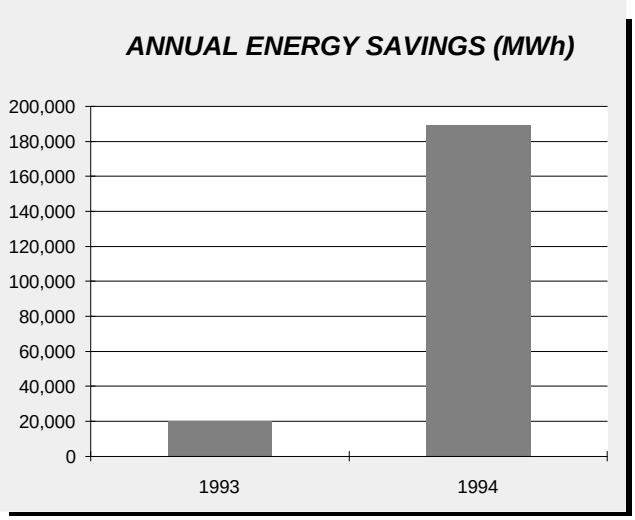
MEASURE LIFETIME

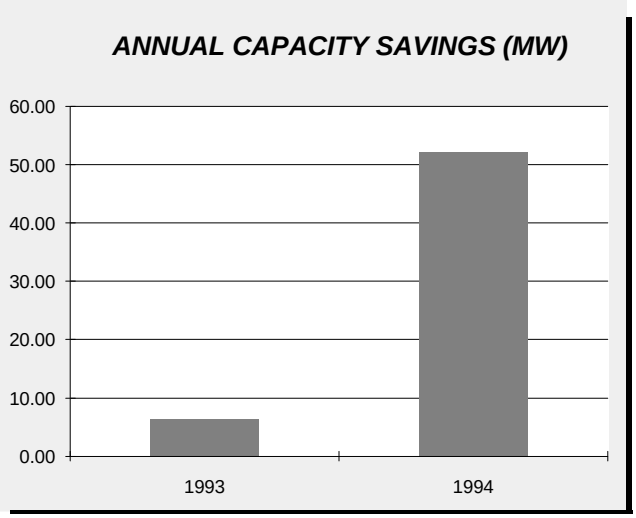
Each energy saving measure must have or maintain a life of at least five years to qualify for the program. Measures with demonstrated useful lives of less than 15 years are limited to a maximum 10-year Standard Offer payment. Measures with demonstrated useful lives greater than 15 years are eligible to receive a Standard Offer Payment for 15 years. Since most projects have been for lighting which have generally signed on for ten-year contracts, The Results Center and PSE&G staff assume an average measure lifetime for the projects of 10 years. While most contracts for lighting have been 10-year contracts, some projects have proceeded with 5-year contracts which can be renewed and upgraded to a 10-year contract after the third year. Other end-uses such as motor change-outs have typically contracted for 15 years.[R#6]

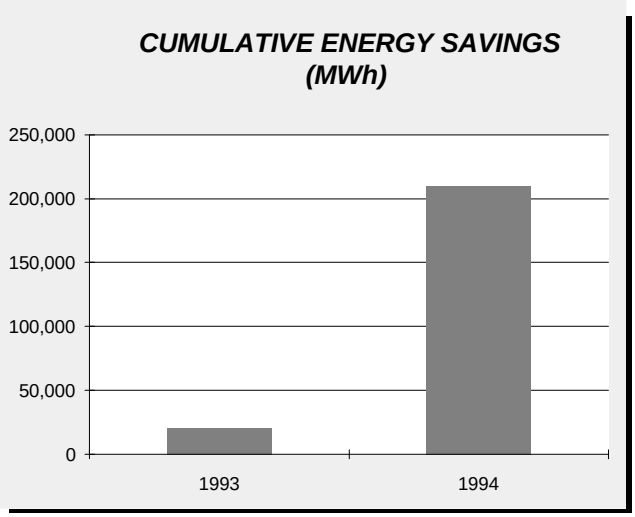
PROJECTED SAVINGS

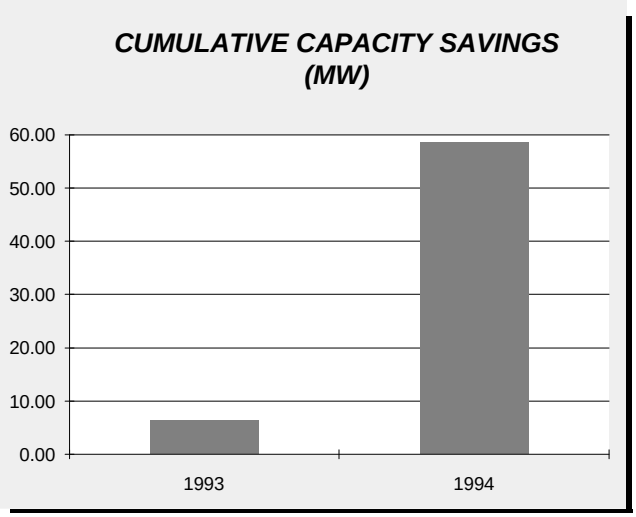
At the onset of the Standard Offer program power demand was projected to grow in PSE&G's service territory at an annual rate of 1-2% through the year 2002. In order to fulfill the upper bound of this demand growth and not to exceed load growth, PSE&G elected to set 150 MW of capacity savings as an upper limit for the program. Staff now anticipate a lower growth rate and expect the program goal to be revised downward to 60-70 MW of annual savings through the end of the decade.[R#10]

SAVINGS OVERVIEW	ANNUAL SAVINGS (MWh)	CUMULATIVE SAVINGS (MWh)	LIFECYCLE SAVINGS (MWh)	ANNUAL CAPACITY SAVINGS (MW)	CUMULATIVE CAPACITY SAVINGS (MW)
1993	20,419	20,419	204,190	6.31	6.31
1994	189,381	209,800	1,893,810	52.20	58.51
Total	209,800	230,219	2,098,000	58.51	









Cost of the Program

Through December 15, 1994 the Standard Offer program has cost a total of $1,102,036 including $674,927 in administrative costs and $427,109 in incentive payments. This marks a dramatic increase over costs for the first six months of 1993 which amounted to zero incentive costs and $327,037 in administrative costs.

The total value of incentive costs, however, is very preliminary for three reasons. First, the actual invoicing of projects is usually received several months after project completion, delaying incentive costs and pushing projects completed in late 1993 into a payment structure beginning in 1994. (Typically, when a project is completed it takes on average six months for PSE&G to receive a bill from the participant for the savings. This delay is usually due to a lag time in the verification protocol procedure.) Second, annualized incentive costs lag behind actual incentive payments. For instance a project complete and billing PSE&G late in a year only accounts for a fraction (say one, two, or three months) of the annualized value of the incentives. Third, many projects as discussed in the Savings section are in projects in the pipeline. These projects have been approved, but construction is not yet complete and thus invoicing has not yet taken place.[R#10]

While the Standard Offer program to date shows levelized costs just over one million dollars ($1,102,037), the actual magnitude of the program and financial liability to the company is much larger. The annualized value of projects approved for the program is fully $9,903,132. Furthermore, when this value is multiplied by an average ten-year contractual life (corresponding to measure lives) the program quickly becomes one of huge proportion, with nearly $100 million "on the table" representing the largest program ever documented by The Results Center. Taken yet a step further, if the program provides approximately 60 MW of savings each year for the next six years, the total program value will be approximately $600 million![R#10]

STANDARD OFFER LEVELIZED PAYMENT	SUMMER PRIME (¢/kWh)	SUMMER PEAK (¢/kWh)	SUMMER OFF-PEAK (¢/kWh)	SPR./FALL PEAK (¢/kWh)	SPR./FALL OFF-PEAK (¢/kWh)	WINTER PEAK (¢/kWh)	WINTER OFF-PEAK (¢/kWh)
1993	14.39	3.94	2.04	3.33	2.30	3.60	2.42
1994	15.58	4.36	2.28	3.80	2.61	4.06	2.75
1995	16.95	4.82	2.58	4.26	2.94	4.39	3.05
1996	18.04	5.33	2.92	4.77	3.33	4.81	3.42
1997	19.21	5.88	3.29	5.39	3.77	5.34	3.85
1993	16.60	4.86	2.63	4.29	3.00	4.42	3.11
1994	17.86	5.37	2.94	4.83	3.37	4.95	3.50
1995	19.20	5.89	3.28	5.34	3.75	5.38	3.86
1996	20.40	6.46	3.66	5.90	4.19	5.88	4.30
1997	21.65	7.04	4.07	6.50	4.64	6.42	4.76
1993	18.50	5.72	3.22	5.12	3.65	5.20	3.77
1994	19.77	6.24	3.58	5.66	4.05	5.69	4.18
1995	21.12	6.76	3.96	6.16	4.46	6.12	4.57
1996	22.33	7.31	4.37	6.69	4.91	6.58	5.02
1997	23.62	7.90	4.82	7.28	5.39	7.11	5.50

COSTS OVERVIEW	INCENTIVES PAID TO DATE	ADMINISTRATIVE COSTS	TOTAL PROGRAM COSTS PAID TO DATE	ANNUALIZED INCENTIVE COSTS FOR APPROVED PROJECTS
1993	0	$327,037	$327,037	NA
1994	$427,109	$347,890	$774,999	NA
Total	$427,109	$674,927	$1,102,036	$9,903,132

COST EFFECTIVENESS

Each project proposal in total must pass the Total Resource Cost test for cost effectiveness. Explicit values to be used in this determination are provided by PSE&G to customers, third parties, and PSCRC.

Payments to the participants ares based upon monthly savings accrued from the efficiency measures installed and verified. PSE&G pays savings to participants in the Standard Offer program on a ¢/kWh of saved energy basis generally ranging from 1.64 ¢/kWh for summer off-peak time periods to 30.24 ¢/kWh for energy saved during the summer prime period in the unlevelized scheme where the payment varies for each year as discussed in the Implementation section. The summer prime period for both schemes is an exceedingly short period, thus most payment rates range from 2-6 ¢/kWh. This ¢/kWh payment rate is derived from the combination of avoided costs, an environmental adder, and a 50% fixed erosion factor which accounts for lost revenues.

STANDARD OFFER UNLEVELIZED PAYMENT	SUMMER PRIME (¢/kWh)	SUMMER PEAK (¢/kWh)	SUMMER OFF-PEAK (¢/kWh)	SPR./FALL PEAK (¢/kWh)	SPR./FALL OFF-PEAK (¢/kWh)	WINTER PEAK (¢/kWh)	WINTER OFF-PEAK (¢/kWh)
1993	12.10	3.16	1.64	2.43	1.76	2.66	1.85
1994	12.82	3.63	1.80	3.13	2.14	3.59	2.34
1995	15.13	3.98	2.01	3.40	2.26	3.71	2.41
1996	16.03	4.37	2.28	3.64	2.58	3.86	2.67
1997	17.28	5.05	2.73	4.53	3.08	4.64	3.15
1998	17.97	5.21	2.91	4.76	3.32	4.85	3.50
1999	19.43	5.98	3.34	5.55	3.85	5.35	3.92
2000	20.68	6.59	3.74	6.00	4.24	5.81	4.30
2001	21.93	7.17	4.09	6.74	4.83	6.56	4.82
2002	23.19	7.78	4.47	7.29	5.17	7.07	5.29
2003	24.76	8.56	5.04	7.97	5.73	8.21	6.01
2004	26.06	9.16	5.44	8.47	6.15	8.35	6.37
2005	27.64	9.97	6.06	9.32	6.92	9.07	6.96
2006	28.78	10.31	6.63	9.46	7.22	9.09	7.39
2007	30.24	11.08	7.26	9.96	7.80	9.54	7.85

Environmental Benefit Statement

AVOIDED EMISSIONS BASED ON 230,219,00 kWh saved 1993 - 1994						
Marginal Power Plant	**Heat Rate BTU/kWh**	**% Sulfur in Fuel**	**CO2 (lbs)**	**SO2 (lbs)**	**NOx (lbs)**	**TSP* (lbs)**
Coal	**Uncontrolled Emissions**					
A	9,400	2.50%	496,352,000	11,776,000	2,380,000	238,000
B	10,000	1.20%	529,273,000	4,558,000	1,537,000	1,140,000
	Controlled Emissions					
A	9,400	2.50%	496,352,000	1,178,000	2,380,000	19,000
B	10,000	1.20%	529,273,000	456,000	1,537,000	76,000
C	10,000		529,273,000	3,039,000	1,519,000	76,000
	Atmospheric Fluidized Bed Combustion					
A	10,000	1.10%	529,273,000	1,393,000	760,000	380,000
B	9,400	2.50%	496,352,000	1,178,000	952,000	71,000
	Integrated Gasification Combined Cycle					
A	10,000	0.45%	529,273,000	937,000	152,000	380,000
B	9,010		476,093,000	339,000	114,000	23,000
Gas	**Steam**					
A	10,400		288,695,000	0	658,000	0
B	9,224		250,708,000	0	1,570,000	74,000
	Combined Cycle					
1. Existing	9,000		250,708,000	0	962,000	0
2. NSPS*	9,000		250,708,000	0	456,000	0
3. BACT*	9,000		250,708,000	0	63,000	0
Oil	**Steam--#6 Oil**					
A	9,840	2.00%	417,847,000	6,331,000	747,000	709,000
B	10,400	2.20%	443,172,000	6,280,000	940,000	456,000
C	10,400	1.00%	443,172,000	896,000	755,000	238,000
D	10,400	0.50%	443,172,000	2,634,000	940,000	145,000
	Combustion Turbine					
#2 Diesel	13,600	0.30%	554,598,000	1,104,000	1,714,000	94,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	658,426,000	1,697,000	2,234,000	496,000

In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

The environmental benefits of energy efficiency programs can include avoided pollution of the air, the land, and the water. Because of immediate concerns about urban air quality, acid deposition, and global warming, the first step in calculating the environmental benefit of a particular DSM program focuses on avoided air pollution. Within this domain we have limited our presentation to the emission of carbon dioxide, sulfur dioxide, nitrous oxides, and particulates. (Dollar values for environmental benefits are not presented given the variety of values currently being used in various states.)

HOW TO USE THE TABLE

1. The purpose of the accomanying page is to allow any user of this profile to apply Public Service Electric & Gas' level of avoided emissions saved through its Standard Offer program to a particular situation. Simply move down the left-hand column to your marginal power plant type, and then read across the page to determine the values for avoided emissions that you will accrue should you implement this DSM program. Note that several generic power plants (labelled A, B, C,...) are presented which reflect differences in heat rate and fuel sulfur content.

2. All of the values for avoided emissions presented in both tables include a 10% credit for DSM savings to reflect the avoided transmission and distribution losses associated with supply-side resources.

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals. We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

4. All the values presented represent approximations and were drawn largely from "The Environmental Costs of Electricity" (Ottinger et al, Oceana Publications, 1990). The coefficients used in the formulas that determine the values in the tables presented are drawn from a variety of government and independent sources.

*** Acronyms used in the table**

TSP = Total Suspended Particulates
NSPS = New Source Performance Standards
BACT = Best Available Control Technology

LESSONS LEARNED

The Standard Offer program represents a novel DSM approach which seems highly successful: Clearly the primary lesson learned from the Standard Offer program is that its mechanism appears viable. The program presents itself as a new model for DSM programs, one that eclipses standard incentives and pushes beyond bidding programs to allow any customer within PSE&G's service territory a means of recouping part of their costs of energy efficiency upgrades in a standard format and at a standard price.

Time-related energy savings are paid for commensurate with their value to the utility: A major success of the Standard Offer program is that it rewards energy savings on a time-related basis, providing the utility with value in the form of energy savings when it needs it. Inversely, the utility pays for what it needs, paying appropriate amounts for specific time periods. This means that "guess-timation" in energy savings is eliminated and thus the utility is not overpaying any customers for their savings.

Several avenues for participation add complexity to the program but seem to enhance its effectiveness: The Standard Offer program is unique in it encompasses several avenues for participation. For large firms such as AT&T which have strong energy and facilities management capabilities, lucrative opportunities exist for participation without middlemen that necessarily require payments from customers. On the other hand, for smaller firms and those not interested in bearing the transaction costs of such complex program involvement, easy means of participating are available. For those customers who seek its services, PSE&G's subsidiary PSCRC can provide invaluable services, all within a competitive environment, keeping costs to a minimum. This range of program participation options seems critical for such a complex but attractive program.

PSE&G has found that it needs dedicated staff to assist customers through the process despite the range of participation options if offers: PSE&G has discovered that in spite of the fact that program participants are typically helped through the Standard Offer process by a third party, some customers still want high levels of customer support from PSE&G throughout the project. Initially PSE&G did not have the resources to handle these needs, but now the utility has several DSM specialists who devote all of their time to assisting customers participating in PSE&G DSM programs.[R#10]

Lowering the thresholds for program eligibility has boosted participation: As of November 1, 1994 PSE&G lowered the 200 kW savings requirement with some caveats to 100 kW for retrofits and 50 kW for new construction projects to boost participation. The prior 200 kW requirement was viewed as preventing certain organizations from easily participating. Schools for example have very tight budgets and potentially could benefit from a program like Standard Offer. However, because schools have limited operating hours and are closed in the summer, they either do not qualify on their own for Standard Offer, or the PSE&G incentives they qualify for are low because of the payment setup which pays the highest amounts for summer peak savings.[R#12,21]

The level of Standard Offer incentives have stimulated significant retrofit activity: Clearly the Standard Offer program is not short on incentives and this has attracted a significant level of program participation and competition between providers of energy efficiency services. There is "a lot of money on the table" for the taking. Joe Fitzpatrick of EUA Cogenex claims that the Standard Offer program is one of the "most fertile DSM programs in the country." The program has gone from "zero to sixty" (megawatts!) in less than two years, an impressive ramp-up that signals a draw of energy service companies to New Jersey. In this aspect, the program has been highly successful.[R#25,26]

Rigorous monitoring and verification are central to the Standard Offer bringing the term "performance-based" to new levels: The program has also brought measurement and verification to a higher level in the industry through its use and promotion of the New Jersey Board of Public Utilities verification protocol. By requiring heightened measurement through the rigorous but cohesive protocol, program savings are assured. Furthermore, verification requirements become internalized for those delivering the program and routine aspects of all subsequent projects. Lynn Sutcliffe of SYCOM Enterprises, the most active ESCO in the program, believes that the Standard Offer M&V model makes sense and will be the wave of the future for energy efficiency programs in the future, especially in a more competitive utility environment. Sutcliffe does not believe the program is the "richest" of its kind (currently paying half of avoided cost and likely to go down, while some other utility programs in the past have paid up to twice avoided costs) but the "accountable dollars" in the program make sense, and represent an important and viable model for the future.[R#27]

An interesting interface has occurred between PSE&G's now-defunct Bidding program and the Standard Offer: One of the interesting lessons learned from PSE&G's DSM Bidding Program that preceded the Standard Offer (what staff

refer to as "Bid-89" and "RFP-89" marking the year it was proposed) is that bids prices proposed and rewarded varied quite dramatically. When PSE&G began the Standard Offer program it allowed contracts formally under the bid program to be terminated and transferred to the Standard Offer. Some ESCOs whose bid prices were lower than the Standard Offer accepted this provision, while others who's prices were higher than the Standard Offer understandably did not. (Another more complex factor related to contract provisions under the Bidding program whereby ESCOs were required to deliver specific peak and off-peak savings to fulfill their contracts. Based on ESCO's fulfillment of these requirements, retrofits were either assigned to one program or another.)[R#18,19]

Several energy service companies are marketing both Bidding program and Standard Offer program participation simultaneously: While the Bidding program was cancelled at the time the Standard Offer was begun, several energy service companies awarded bids are still working on fulfilling their contractual obligations to avoid costly penalties for not doing so. As such, vestiges of the Bidding program continue in parallel with the Standard Offer. Ironically, currently the Bidding program is competing to a certain extent with the Standard Offer. While not a major issue, PSE&G has found that some ESCOs are involved in both programs concurrently, assigning certain customers to the Bidding program's financial provisions while running other customers – notably those whose savings best match PSE&G's capacity needs – to the Standard Offer.[R#19]

A second program refinement for the Standard Offer is that energy service companies must have specific retrofit projects lined up in order to participate in Standard Offer. This was not the case for the Bidding program. Bidders, which were primarily ESCOs, bid for certain capacity savings without specific projects prearranged and in line. Once awarded the bids, they approached potential clients for retrofits, a situation that is still ongoing. This is not possible with the Standard Offer program. For the Standard Offer, energy service companies must have specific projects lined up and ready to go.[R#19]

At the onset of the Standard Offer there was some concern that "cream skimming" would occur; though this has generally not been the case: Cream skimming, whereby the easiest and most lucrative projects would be addressed first by energy service companies who were not interested in comprehensive retrofits, was a concern of DSM advocates when the Standard Offer program began. Clearly there was the potential for cream skimming, since all kilowatt-hours saved during specific time periods were equal in value. Thus the fear was that the cheapest retrofits would occur first, potentially in the absence of more comprehensive retrofits. In fact when the program was initially proposed, DSM advocates – notably the Mid-Atlantic Energy Project – were urging program planners and regulators to consider paying differing sums for simple lighting retrofits, for example, and more for comprehensive retrofits involving a variety of end-uses and garnering deeper energy savings in each facility.

While the opportunity existed for cream skimming, program experience to date shows that energy savings in customers' facilities have by and large been more comprehensive than feared, signalling strong competition between energy service companies and the rise of a sophisticated energy service company infrastructure in New Jersey, one of the program's primary intents.

While the Standard Offer program has been well received by energy service companies which generally give the program high marks, the role of PSCRC has drawn concern and some criticism: While energy service companies have no problem with PSCRC's activities serving as an ESCO and competing in free market energy service activities, there has been concern raised about its role with the Energy Services Network. Through the ESN, PSCRC has promoted an energy services infrastructure within PSE&G's service territory by providing financing to companies that could not get financial resources from other sources. This has raised concerns about competitiveness, underscoring a fundamental conflict with PSCRC's role. ESCOs don't mind going head-to-head with PSCRC's delivery of energy efficiency services, but don't want their competition to be bolstered by PSCRC as well.

Clearly, PSCRC has benefitted from its name and affiliation with PSE&G, a competitive advantage that program planners were fully aware of at the onset of the program – and which was considered inevitable – but which was at least partially addressed through PSCRC's dual mandate to foster an energy services industry while competing head-to-head in the free market. Because of the level of competition in PSE&G's service territory, some energy service companies have elected to reduce their program activity there and to move on to other market opportunities.[R#18,26,27]

Limiting entry into the ESN might have built a more solid foundation for a energy services infrastructure in PSE&G's service territory: Another similar concern raised is that PSCRC moved too quickly developing the ESN. This created a situation whereby lighting companies undercut deals that otherwise would have gone to full-service ESCOs with

more experience and higher levels of overhead, able and established to perform more comprehensive retrofits and which were keen on becoming key players in a solid ESCO infrastructure in New Jersey. According to at least one ESCO executive, these lighting companies were unaware of the margins they needed to create sustainable practices in New Jersey and thereby inadvertently undercut their own profitability while impacting the broader ESCO industry as well. This situation drove several ESCOs out of New Jersey, away from the program. [R#27]

Although the Standard Offer program design fundamentally makes sense, simplifying several aspects of the program would ease the process: Any first of a kind program suffers from some start up difficulties, and the Standard Offer program has been no exception. Its lighting monitoring and verification protocols, for instance, have been "inordinately complex." When the program began, systems were not fully debugged and program participants recommend that before rolling out similar programs that basic systems, such as computer tracking systems and other forms of information processing, are better sorted out. With Standard Offer, the monitoring and verification protocol was a political process, late and complex, causing confusion at the onset of the program.

Additional protocols are still needed to cover a broader range of technologies: When the program was put in place, it was done so in a highly political environment that made comprehensive protocols untenable. Motion sensors, for example, were not able to be addressed and thus are still not eligible for incentives, nor are energy management systems or weather-sensitive technologies because the protocol development process did not allow for consensus on weather adjustments.

TRANSFERABILITY

Fundamentally, utilities have choices in the programs that they elect to implement. Some utilities seek energy savings through incentives for customers (and manufacturers and vendors); while others seek to engage retrofits through education and financing opportunities for customers. DSM Bidding programs, whereby third parties bid their services at a range of prices, also have been successfully utilized. PSE&G, it seems, has taken this concept a step further, addressing its own needs as primary. Thus, it offers to pay set amounts for energy at specific times. Clearly this model rewards savings that best fulfill the utility's needs. As such Standard Offer appears to be a highly transferable program, one which fosters the creation and establishment of a viable energy service industry and which concurrently provides cost effective energy savings.

Whether or not the Standard Offer program will survive in a restructured utility environment is an open question. In the short term, avoided costs will drop in New Jersey, a situation that may reduce incentive payments provided through the program. Can energy service companies deliver for less cost? This is at the crux of the transferability of such a program to other jurisdictions. Will utilities offer attractive incentives to cut demand and save energy in a restructured utility environment? These questions and others will determine the transferability of the Standard Offer program in the coming years.

The future of the Standard Offer program and the viability of its transferability to other utility service territories depends very much on the incentives provided. Avoided costs have gone down in New Jersey in large part because of the cheap capacity being offered on the open market thanks to inexpensive natural gas and advanced generating technologies. In fact, avoided costs may decline by approximately 20%, although these prices are moving targets. In isolation this decline in avoided costs may negatively affect Standard Offer incentives for summer peaking capacity in particular. However there are other factors that will also affect and potentially bolster the incentive levels in New Jersey as well as other jurisdictions.

First, the next PSE&G Standard Offer will likely include regional transmission and distribution credits that have not been included in past incentives. PSE&G's southern territory, in particular, is in need of substation upgrades and additional transmission capacity. Thus T&D credits could boost the incentives paid there. Second, New Jersey's environmental adder for DSM programs may be upwardly adjusted, a politically motivated decision which could compensate for lower avoided costs. Third, the BPU has attached a "fixed cost erosion factor" to the Standard Offer incentives. This factor has cut incentive costs by 50% to compensate for program-induced lost revenues. If this factor is reduced to 40% or even 20%, incentive payments can be maintained despite drops in the avoided cost. Note that none of these three factors are in PSE&G's control, but instead are politically driven.

If incentive costs do drop substantially either in New Jersey or another jurisdiction, Standard Offer program managers are concerned that retrofits may well become less comprehensive and that more expensive retrofit measures such as motors and HVAC will simply not get done. One option for addressing this issue would be to establish different incentives for different measures. In such a scenario, incentives for lighting would be less than more complex and expensive retrofits which could be rewarded accordingly.

STATE OVERVIEW

In New Jersey, while no formal Integrated Resource Planning (IRP) procedure has been adopted, utilities have been required and strongly encouraged to invest in demand-side management as part of their overall resource plans. While a special study group made up of utility, industry, and other representatives was formed to address IRP, and subsequently recommended the formal adoption of IRP, to date the New Jersey Board of Public Utilities (BPU) has not drafted regulations for IRP to be issued for public comment and ultimately adoption. (Public Service Electric & Gas, however, has filed its own IRP in the absence of regulations to do so.) Instead, electric utilities in the state are required to submit biennial conservation plan filings which are reviewed as an informal IRP process and annual reviews of their long-term resource plans as required by the Board's competitive bidding guidelines. In addition, the BPU is currently in the midst of creating a state Energy Master Plan which includes all forms of energy use including electricity, oil, gas, etc., and which will encompass many of the key issues raised in formal IRP procedures.[R#15,17]

In terms of DSM costs and incentives, New Jersey has taken progressive steps to allow its utilities to recover their DSM investments and in some cases to recover lost revenues that result, plus shareholder incentives. In September of 1991 the BPU issued proposed regulations which were adopted in November of 1991 and provide utilities with incentives to invest in DSM measures. Subsequent approval of two utilities' DSM Resource Plans which included proposed mechanisms for incentives provide both PSE&G and Jersey Central Power & Light the ability to recover DSM program costs, lost revenues, and incentives. These utilities are allowed to recover DSM expenditures (expensed in the current year), lost revenues, and incentives through a tariff rider collected through a Demand-Side Adjustment Factor that is filed annually and incorporated into the Fuel Adjustment Clause. The cost of DSM activities are allocated to all customers via a uniform cents/kWh charge.

Utilities in the state have been mandated for some time to invest in "core" DSM programs. Core programs include energy-efficient construction, school energy programs, loan programs, and weatherization assistance. Utilities in New Jersey are allowed to recover their direct program expenses for core programs, but cannot recoup lost revenues or earn shareholder incentives in these cases.[R#15]

For "non-core" programs, utilities in New Jersey are able to earn incentives under either a shared-savings approach or a standard price offer approach. Under the shared-savings option, a utility is allowed to earn a return on its investment through a share in the net benefits resulting from the programs. Under the standard price offer option, a utility offers a predetermined price for the delivery of energy and demand savings. The utility's incentive is the difference between its cost to deliver savings and the standard price. Under either approach, incentives are based on measured savings.[R#15]

Net benefits for the shared savings approach and standard contract payment amounts are based on three components: 1. avoided energy and capacity costs; 2. an adder for environmental externalities; and 3. a deduction equal to 0.5 times the fixed cost erosion. (The fixed cost revenue erosion is determined on a per unit basis by dividing total test year retail revenues minus the sum of the test year of gross receipts and franchise taxes, fuel costs, and any other variable costs approved by the Board; by total test year retail sales.) The regulations state that environmental externalities shall be explicitly reflected in net benefit calculations, avoided cost savings studies, standard offer pricing, competitive offer pricing, and the Total Resource Cost test at the rate of 2¢/kWh and 95¢/MMbtu. These values are adjusted annually at a rate equal to the GNP deflator index.[R#15]

UTILITY OVERVIEW

PSE&G filed its DSM plan as a result of the DSM rules adopted by the Board in November 1991. The Board amended and then approved PSE&G's plan in 1992 after several months of negotiation among the regulatory staff, the Public Advocate, the New Jersey Department of Environmental Protection and Energy, energy service companies, residential commercial and industrial customers, and the Coalition for Fair Competition, an organization representing independent contractors. Under the adopted plan, PSE&G continued to provide core programs and then create Public Service Conservation Resources Corporation, a subsidiary, to implement its Standard Offer program. (In addition, PSE&G opted to run one, fairly small non-core program, for small commercial and industrial customers for which the utility would recover expenses and recoup lost revenue, but not earn shareholder incentives.) Using PSCRC, PSE&G shareholders are now able to earn any profits from the delivery of energy efficiency services – much like an energy service company – with profits accruing as the difference between the costs to deliver DSM and the standard offer price paid by PSE&G for savings. The BPU did cap PSE&G's earnings to satisfy its Rate Council, but the cap was anticipated to be high enough to provide sufficient incentives for the company to aggressively pursue energy and capacity savings.[R#15,17]

References

1. Public Service Enterprise Group Incorporated, "1993 Annual Report."

2. Public Service Conservation Resources Corporation, Promotional Materials for the Standard Offer Program, August 1993.

3. Public Service Electric & Gas, Promotional Materials for the Standard Offer program, 1993.

4. John Jensen, Director of Marketing, Public Service Electric & Gas, personal communication, July - December 1994.

5. Rachelle Garbarine, "It Pays P.S.E.& G. Customers to Conserve," New York Times, July 25, 1993.

6. Public Service Electric & Gas, "The Standard Offer Program," certified copy of the program handbook, 1994.

7. Christopher Siebens, Manager of Marketing Programs and Support, Jersey Central Power and Light Company, "New Jersey Measurement, New Standards in DSM Accountability," proceedings of The Integrated Resource Planning Conference, Denver, Colorado, March 1993.

8. Public Service Enterprise Group Incorporated, "Financial and Statistical Review 1993," 1994.

9. Kessel L. Nelson, "24 Jersey City Schools Receive Free Lighting Retrofits," Energy User News, June 1994.

10. Charles Coccaro, Manager DSM Resource Acquisition, Public Service Electric & Gas, personal communication, July - December 1994.

11. New Jersey Board of Regulatory Commissioners, "Stipulation of Settlement, Docket Number EE92020105, December 15, 1992.

12. Arthur Coughlin, President, Public Service Conservation Resources Corporation, personal communication, August 1994.

13. Chris Siebens, Manager of Marketing Programs and Support, Jersey Central Power and Light Company, personal communication, March 1993.

14. Don LaBelle, Director of Energy Services, Public Service Conservation Resources Corporation, personal communication, November - December 1994.

15. National Association of Regulatory Utility Commissioners, Incentives for Demand-Side Management, second edition, prepared by Barakat and Chamberlin, March 1993.

16. Decision and Order, Docket No. EE92020105, "Amendments to PSE&G's DSM Plan," November 1994.

17. Bill Barretti, Supervising Engineer, Electric Division, New Jersey Board of Public Utilities, personal communication, December 1994.

18. Rich Rathvon, Vice President for Operations and General Counsel, Public Service Conservation Resources Corporation, personal communication, November - December 1994.

19. Jose Torres, DSM Program Manager - Standard Offer, Public Service Electric & Gas, personal communication, December 1994.

20. Public Service Conservation Resources Corporation, Bright Investments promotional materials, contracts, etc.

21. Public Service Electric & Gas, "Important Standard Offer Policy Modifications," November 1, 1994.

22. Dan Rosenblum, Director, Mid-Atlantic Energy Project, personal communication, December 1994.

23. Chris Neme, Vermont Energy Investment Corporation, personal communication, December 1994.

24. Frederick Gordon, President, Pacific Energy Associates, personal communication, December 1994.

25. Charles Goldman, Staff Scientist, Lawrence Berkeley Laboratory, personal communication, December 1994.

26. Joseph Fitzpatrick, President, EUA Cogenex, personal communication, December 1994.

27. S. Lynn Sutcliffe, President and Chief Operating Officer, SYCOM Enterprises, personal communication, December 1994.

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