Portland General Electric
Energy Resource Center
Profile #55

Executive Summary

Portland General Electric (PGE) opened the Energy Resource Center (ERC) in November 1986 with the goal of "turning technology into competitive advantage" for its customers. Approximately 10,000 people have passed through the ERC doors since its opening. The ERC has blossomed into more of a regional center, helping interested commercial & industrial professionals from all over the Northwest. The increased "regionalization" of the ERC is a trend that PGE hopes to aggressively pursue. PGE believes that the ERC has helped the utility become much more directly involved with technology transfer and influencing energy choices. More specifically the ERC has helped PGE better reach its commercial and industrial customers.

The ERC is staffed by the Energy Resource Group (ERG), a collection of five full-time specialists in the fields of: lighting; electrical, mechanical and industrial applications; commercial food facilities; and a wide range of energy information. The capabilities of the ERG include seminars, workshops, classes, market development planning, and on-site technical support and training.

The ERC facility contains a lighting lab, demonstration kitchen, an exhibit area, a technical library, an auditorium, and an electric vehicle center.

In terms of promoting more or less electricity use, the ERC focuses on the needs of each individual customer. If energy efficiency is the top priority for a particular client, then the ERG presents that customer with energy efficiency options. If another customer is best served by a certain electrotechnology, (which might actually increase electricity use) the ERG will recommend that technology. In general, PGE seeks to achieve a balance between energy efficiency and beneficial usage of electricity.

The ERC has an annual operating budget of approximately $1,000,000 (nominal dollars), and PGE spent an estimated $983,083 on initial remodeling costs before opening the facility. In 1991 the ERC began charging for classes and seminars in order to help offset costs and meet the budget.

A major emphasis is placed on offering classes and seminars that are of interest and importance to commercial and industrial professionals. As a result the ERC is constantly examining which classes are popular, which are not, what areas the ERC might not be covering, and which classes or topics the ERC should drop.

Energy Resource Center

Utility:	Portland General Electric
Sector:	Commercial and industrial
Measures:	Lighting; electrical, mechanical, and industrial applications; commercial food equipment
Mechanism:	Seminars, classes, workshops, and consulting for commercial and industrial professionals
History:	Opened in November 1986

1992 Program Data

ERC visitors:	2,000
ERC costs:	$905,900

Cumulative Data (1986 - 1992)

ERC visitors:	10,000
ERC costs:	$6.04 million

Esitmated Start-up Costs

Tenant improvements:	$732,189
Equipment costs / other:	$250,894
Total costs:	$983,083

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 International Monetary Fund's International Financial Statistics Yearbook: 1991.

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.

In 1889 Portland General Electric (PGE) accomplished the first long-distance transmission of electricity in the country. The energy traveled 15 miles from a wooden dynamo house in Oregon City to light a downtown Portland street. PGE has grown a great deal since that first transmission in 1889, providing electric service to more than 600,000 retail customers in 1992.

PGE is the electric utility subsidiary of Portland General Corporation and is located in Portland, Oregon in the Northwest portion of the state. The city of Portland is located at the confluence of the Columbia and Willamette rivers. The Port of Portland is the highest ranked port on the West Coast in terms of total tons exported, ranked second in West Coast auto imports, and third in total tonnage of imports and exports on the West Coast. Oregon's high-technology industry is centered in Portland, with more than 75% of the state's electronics jobs located within the city. Major manufacturers in PGE's service area include paper mills, primary and fabricated metals, food products, ships, trucks, and rail cars.[R#1]

PGE's service area covers 3,170 square miles, contains a population of 1.3 million (45% of the state's population), and includes 60% of the state's economic base. In 1992 PGE's service area population increased by almost 2%, a rate that is twice the national average and a big reason that PGE expects a 2% annual sales growth. In fact, current regional projections forecast a population increase of close to half a million people by the year 2010 in the Portland area.

PGE's Trojan Nuclear Plant was permanently closed on January 4, 1993. Until new power resources come on line in late 1995 or 1996, PGE will replace much of Trojan's output with a mix of power purchases, increased thermal generation at existing plants, and acquisition of new resources to replace energy from Trojan. PGE's resource acquisition plan focuses on obtaining energy from a combination of natural gas-fired combined cycle combustion turbines, cogeneration units, energy efficiency, wind power, geothermal power, and repowering existing resources. PGE's ownership of 950 MW of transmission rights on the Pacific Northwest Intertie (a West Cost "electrical highway") provides flexibility to buy and sell power. Also, a power pooling arrangement allows PGE to rely on other Northwest utilities for a part of its reserve capacity.

Due to the closure of Trojan, PGE's reserve margin would be slightly negative at record peak demand. When necessary the Company will utilize secondary purchases to cover any deficit in 1993. PGE's winter peak demand was 3,161 MW in 1992, and their generating capacity was 3,561 MW, creating a reserve margin of 13%.

PGE 1992 STATISTICS

Number of Customers	610,566	
Retail Energy Sales	15,736	GWh
Energy Sales Revenues	$819	million
Winter Peak Demand	3,161	MW
Generating Capacity	3,561	MW
Reserve Margin	13	%
Average Electric Rates		
Residential	4.52	¢/kWh
Commercial	4.73	¢/kWh
Industrial	3.54	¢/kWh

Currently, PGE is also interested in renewable energy sources. The utility is a partner in a 50 MW wind project in eastern Washington and is looking at other wind sites in the Northwest. The Company is also considering potential geothermal sites in Oregon and northern California. PGE hopes to acquire at least 100 aMW of renewable energy over the next decade, focusing primarily on geothermal and wind energy.[R#1]

In 1992 PGE had electric operating revenues of $818,603,000 and employed 3,253 people. Energy sales totaled 18,475 GWh with 2,739 GWh in wholesale sales. Of the retail sales, the residential sector accounted for 6,226 GWh (39.6%), the commercial sector accounted for 5,717 GWh (36.3%), and the industrial sector accounted for 3,602 GWh (22.9%). Miscellaneous retail sales totaled 99 GWh (0.7%), while unbilled sales totaled 92 GWh (0.5%). On average each residential customer used 11,713 kWh.

At year-end 1992 PGE had 536,111 residential customers (87.8%), 73,591 commercial customers (12%), 186 industrial customers, 671 miscellaneous customers, and 7 wholesale customers. ■

Utility DSM Overview

Because of its capacity situation and a changing corporate culture, PGE plans to aggressively increase its DSM efforts. In 1992, PGE spent $12.07 million dollars, or 1.5% of energy sales revenues, on its DSM programs and saved 106 GWh. Based on 1992 levels, PGE plans to double its energy efficiency savings in 1993 and triple the 1992 savings in 1994.[R#1]

PGE DSM PROGRAMS

A) RESIDENTIAL
- Residential New Construction
- Efficient Water Heaters
- Housewarming - weatherization
- Low Income Weatherization
- Shower Head

B) COMMERCIAL/INDUSTRIAL
- "Energy Smarts" for Schools
- **Energy Resource Center**
- PGE Facilities Retrofit
- Nonresidential Energy Efficiency
- Process
- Motors
- Adjustable Speed Drives
- Customer Solutions
- Comrat
- Energy Services Funding Option

C) OTHER
- Streetlighting Program

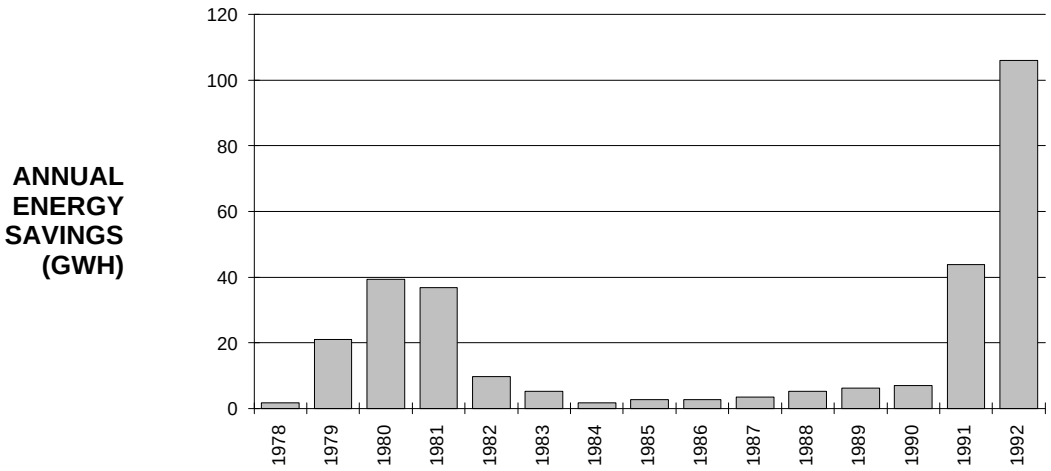
DSM Overview Table	*Annual Energy Savings (GWh)*
1978	1.7
1979	21.0
1980	39.4
1981	36.8
1982	9.6
1983	5.3
1984	1.7
1985	2.6
1986	2.6
1987	3.5
1988	5.3
1989	6.1
1990	7.0
1991	43.8
1992	106.0
Total	292.4

PGE has been involved with DSM activities on a limited scale since 1978 but their programs were ramped up significantly in 1991. From 1978 through 1990 PGE reported total annual energy savings of 142.8 GWh. In 1991 annual DSM savings reached 43.8 GWh, and in 1992 PGE reported annual DSM savings of 106 GWh.[R#2]

From 1978 through 1989 PGE achieved virtually all of its DSM savings through residential weatherization programs. In 1990 the number of DSM programs offered increased greatly, but only 7 GWh of energy savings were achieved. In 1991 PGE offered almost three times as many DSM programs as in 1990.[R#2]

For 1993 PGE offers a wide range of energy conservation programs covering the residential, commercial, and industrial sectors. PGE has several residential new construction programs under the Super Good Cents umbrella (see Results Center profile #7). PGE also provides a weatherization program to low income individuals and families.[R#2]

In addition to the more "standard" programs, PGE has some unique energy conservation offerings such as the Energy Resource Center (the subject of this profile) and the "Energy Smarts" for Schools program. The Energy Smarts program is a two-part program. The first component is designed to teach kids in the Oregon school systems the importance of energy efficiency by providing classroom materials and projects for grades K through 12. The other part of the program is a facilities equipment retrofit consisting of energy audits, maintenance training, and installations of new energy-efficient equipment.[R#2] ■



Program Overview

The Energy Resource Center (ERC or "the Center") is a state-of-the-art 20,000 square foot facility that opened in November 1986 and is located in Tualatin, Oregon just south of Portland. The Center is designed to complement and support PGE's Energy Resource Group (ERG). The goal of the ERC is to help commercial/industrial professionals in their evaluation of energy products and systems. More specifically, PGE states that the ultimate goal of the ERC is, "turning technology into competitive advantage."[R#3]

The Energy Resource Group (ERG) staff is made up of five full-time highly qualified specialists in the disciplines of: lighting; electrical, mechanical and industrial applications; commercial food facilities; and a wide range of energy information. The ERG provides expertise in energy efficiency, new electrotechnologies and products, product applications and demonstrations, and many other areas of electric usage. These ERG specialists provide a variety of services such as information gathering, problem solving, referrals, on site consulting, analysis of energy efficiency opportunities, and payback/life cycle cost. They also help clients sift through the many new products, processes, and technologies at trade shows and seminars held at the Center. In addition the Energy Resource Group helps customers explore new design ideas and production methods, evaluate the cost and quality of equipment and systems, and minimize risk by demonstrating a product before purchase.[R#9]

ERG SERVICES AND CAPABILITIES

The Energy Resource Group capabilities include seminars, workshops, classes, market development planning, and on-site technical support and training.

Seminars, Workshops, and Classes: ERG's seminars, workshops, and classes cover a wide range of energy and environmental topics including innovative food service equipment, energy-efficient measures in lighting, indoor air quality, commercial kitchen ventilation, merchandising with light, residential health care facilities, compressed air systems, building commissioning, electrical grounding, power quality, ground source heat pumps, cook-chill technology, infrared process heating, lighting for the VDT environment (visual display terminals for computers), CFC's, and lighting and productivity issues.[R#3]

Market Development Planning: The ERG staff assists utilities across the country in designing marketing programs to reach specific audiences, such as the commercial food service industry. Services range from individual training programs to design assistance for a utility's customer energy information center. (Note that PGE is paid for these services by the clients they attract thus shifting some of the burden of operating the Center from PGE's ratepayers to its direct users.)

On-Site Technical Support and Training: ERG consultants travel to locations around the region providing energy design assistance for utility companies and their clients. ERG also provides training for account representatives of utilities and their clients. The client list to date includes Southern California Edison, Washington State Energy Office, and EPRI.

THE ENERGY RESEARCH CENTER FACILITY

The ERC contains a lighting lab, demonstration kitchen, an exhibit area, a technical library, an auditorium, and the Electric Vehicle Research Network Office.[R#3]

Lighting Lab: Here clients can compare different types of lighting in a wide variety of settings. Services offered at the lab include color analysis booths, electronic ballast displays, office lighting alternatives, non-direct lighting for video display terminals, and new lighting technology.

Demonstration Kitchen: This area contains a fully-equipped food service display area with advanced cooking, dishwashing, and refrigeration equipment. It is used to demonstrate new food service technologies, for researching food preparation processes, and for food service product development.

Exhibit Area: This facility accommodates a wide range of equipment for small-scale trade shows and product demonstrations. Wired for a variety of power needs such as different voltages, and designed to cater to "hands-on" demonstrations, this area can handle everything from pizza ovens to heat pumps to building envelope systems.

Technical Library: The library is 2,000 square feet in size and contains 1,200 technical reports, 60 trade journals, EPRI reports, 16,000 manufacturers' catalogs (on mi-

crofilm) of energy-efficient equipment, along with various other information sources on architectural and engineering topics.

Auditorium: The ERC auditorium comfortably seats up to 100 guests for seminars, product demonstrations, and instructional classes. The stage is equipped with audio and video projection systems.

Electric Vehicle Network Research Office: This recently opened facility features displays of electric vehicles (EVs) and serves as a technology transfer point in the region, linking potential uses to the latest research from EPRI and other research centers on EVs, batteries and components.

OBJECTIVES, GOALS, AND ACCOMPLISHMENTS

Portland General Electric has as a main objective that the ERC will facilitate the utilization of new technologies by its customers. PGE believes that utilities must become more directly involved with technology transfer. Historically, utilities have not been particularly effective in influencing architects and designers, distributors, retailers, contractors, and salespeople who all have influence over energy choices. The ERC seeks to provide facilities and services that target these influencers of energy choices. By targeting this group, PGE hopes to facilitate technology transfer to their customer base allowing customers to make better informed electrical energy-related decisions. PGE considers the ERC a type of technology middleman in the diffusion of information.[R#7,8]

The ERC positions PGE as a more valued supplier by enabling customers to make intelligent energy choices. PGE believes the ERC influences manufacturers to create or refine energy-efficient products/services. The ERC provides another source of market intelligence as a result of its position as an intermediary between those who advance technology and those who use it.[R#7]

Regional needs are also intensifying in response to aggressive goals set by the Northwest Power Planning Council and the Bonneville Power Administration regarding energy efficiency. These organizations are aware of severe deficiencies in the region of trained personnel to implement energy-efficiency programs. BPA chartered a study entitled RETAC (Regional Education and Training Advisory Committee), which examined what energy-efficiency education and training were required for the region. The ERC is ideally suited to help fill this educational void and the regionalization of the ERC is an integral part of the future strategic planning for the Center.[R#13]

The Energy Policy Act of 1992 calls for 10 energy "centers" to be created throughout the country, one in each DOE region. PGE hopes the ERC will be a major component of the regional energy center for DOE Region 10 (Oregon, Washington, Idaho, and Alaska). PGE is considering informally joining with the Electric Ideas Clearinghouse, the Lighting Design Lab, the four regional state energy offices, and several interested regional colleges and universities to create the energy center required by the legislation. Ideally, these groups hope to create a "center without walls" which will meet the DOE criteria. Some funding may be provided by DOE.

In early 1993 an ERC "extension facility" was opened in downtown Portland in order to better serve the professional design community. This new 2,000 square foot facility features a branch library and mini-lighting lab and offers lunchtime classes on commercial and industrial energy applications and technology.[R#5]

Finally, the ERC has won many awards including: U.S. DOE National Awards Program for Energy Innovation, State of Oregon Governor's Energy Innovation Award, and first place in the Edison Electric Institute Commercial/Industrial Company Programs Award. ■

MARKETING

In 1985 PGE introduced a formal marketing strategy for reaching its commercial and industrial customers with demand side management programs and the ERC was viewed as a key to reaching this customer class.

The ERC has employed a wide variety of marketing tools. One of its primary marketing tools is a glossy folder containing individual fold-out fact sheets. These sheets describe the variety of services offered at ERC and also include case studies, and mini-biographies of ERG personnel.

A quarterly newsletter is sent to commercial/industrial professionals which describes recent activities and upcoming ERC seminars, technology transfer forums, classes, and workshops. A calendar of events is included which is sometimes accompanied by a registration form.

The Energy Resource Center publishes an annual seminar schedule. The front page of the schedule highlights a phone number to call for schedule updates and additional seminar information. Also included is a FAX response sheet for interested parties. The seminar schedule and the quarterly newsletter are sent to 10,000 commercial and industrial professionals. The ERC tries to focus their direct mail efforts on specific groups that would benefit most from certain classes or seminars.

In addition the ERC has received extensive newspaper and magazine coverage of its services ranging from the lighting lab to the ERC's involvement with electric cars. The ERC employs a public relations firm which operates in concert with PGE's corporate communications department to ensure that stories get placed in the appropriate industry newsletters and journals.

DELIVERY

The ERC contributes to the implementation and use of new technologies by addressing many of the factors that affect their rate of adoption by PGE customers. Through unbiased demonstrations, training, seminars, technical research, and referrals to other users, the ERC can help to determine the ability of new technologies to meet customer needs. Potential risk to the customer is reduced when the technology can be demonstrated and evaluated at the ERC. The independent credibility of the ERG staff plays a key role. Similarly, ERG consultants can, because of their expertise, reduce complex technologies to understandable components for customers and explain the relative advantages and disadvantages of a particular technology. ERG consultants can help customers analyze their energy costs related to a specific end-use, including the energy and financial returns on the investment for retrofits. Customers can also receive an unbiased presentation of technology alternatives, and training and seminars contribute to technologies' familiarity. The ERC provides energy solutions for improving customer competitive position through increased efficiency. The ERC hopes to sensitize customers to energy technology issues, and create a linkage between environmental awareness and PGE goals.[R#8]

In terms of promoting more or less use of electricity, the ERG tries to focus on the needs of each individual customer. If energy efficiency is the top priority for a particular client, then the ERG presents that customer with energy efficiency options. If another customer is best served by a certain electrotechnology, (which would increase electricity use) the ERG will recommend that technology. Overall, PGE seeks to achieve a balance between energy efficiency and beneficial usage of electricity by recommending the appropriate application for a given situation.[R#4]

THE LIGHTING LAB

The lighting lab was the country's first utility-based lighting laboratory when it opened in 1987. A primary goal of the lab is to help customers be more competitive by enhancing the workplace and reducing energy costs. This goal is different from some other lighting labs that just present lighting options. ERC's lighting lab tries to help customers light their facilities in such a manner that employees can be most productive, by providing optimal quantities and qualities of light for specific tasks.[R#6]

The lighting lab is probably the most popular area of the ERC largely because it contains so many technology demonstrations. It has attracted visitors from throughout the Pacific Northwest, even Montana. ERG lighting specialist Lark Lahart says the lab is beneficial because it "...takes the risk out of selecting lighting options for a building. Designers don't have to do it out of a catalog on faith or on someone else's word. Lighting is such a visual art that the math and science side of it just can't answer all the questions involved."[R#11]

The lab contains a continuously changing display of about 150 commercial lighting fixtures, as well as color-testing displays. In the color testing displays colors can be tested under a variety of incandescent, sodium, mercury

vapor, and fluorescent lighting. Another room is set up so that floor and wall coverings can be changed. The lab also has a room with a movable ceiling that can be raised and lowered from 7 1/2 to 10 1/2 feet to approximate lighting conditions found at the customer's facilities. Fixtures on a track system allow designers to test and compare the light intensity and beam patterns at distances from 0 to 7 feet from a wall with different coverings.[R#6,11]

Optical design and lens applications that show how reflector systems and light sources work together are also available at the lab. Computer simulations and hands-on assistance include reviews of plans and specifications. Mirror lighting is on display as is dimmable cold cathode and neon lighting.[R#11]

When stocking the lighting lab, ERG specialists compare newly submitted products with those already on hand. The lab's neutral relationship has been appealing not only to designers but to teachers and students of design theory. Classes from universities in Washington and Oregon have visited the lab and the ERC hosted a six-week credit class called "Lighting Design for Design Professionals" for Portland Community College.

Several lighting systems in various parts of the lighting lab simulate spaces that designers typically light. The spaces include an office hallway equipped with 12 independently controlled systems, a main office area with 18, and a retail showroom window with 10. Each system has quick disconnect cord-and-plug setups for fast and easy changes. The systems are installed with proper spacings and arrangements of fixtures, so a room, not just a fragmented space, is lighted. If a designer wants to see a fixture or lamp that is not installed in the lab, ERG staff will borrow the equipment from the manufacturer and install it in the proper system.[R#11]

In addition to its own designated areas, the lighting lab uses other parts of the center to demonstrate lighting effects, including areas devoted primarily to industrial processes, the design of commercial food service facilities, HVAC design, and other applications of electricity such as computer-grade power, rotating machinery, and energy management systems.[R#11]

ERG staff present lighting options to customers at the ERC before on-site reviews are performed and written recommendations are made. ERC lighting facilities are set up to meet a broad range of customer sophistication levels. One goal of the lighting lab is to take some of the perceived risk out of trying many of the newer products on the market.[R#6]

According to Lark Lahart, the primary goal of the lighting lab "...is good lighting decisions - concepts as well as equipment. We really do try to cover the bases of lighting: color, light sources, optical design. Then we go into actual application demonstrations. A factory based lab can't afford to spend a lot of time and effort on information that doesn't benefit it directly." (Note: factory based labs are demonstration labs owned and operated by manufacturers of lighting products.)

ELECTRIC VEHICLE RESEARCH NETWORK OFFICE

The ERC is very supportive of the development of electric vehicles as shown by the recent opening of its Electric Vehicle Research Network Office (EVRN) at the ERC. The EVRN is a consortium of 14 utilities which is the result of an EPRI project. Each utility has an EVRN office and the purpose of these offices is to educate the public and allow an exchange of knowledge between utilities. The EVRN office at the ERC offers a display of electric cars in addition to providing meeting space for the 20-plus member Oregon Electric Vehicle Association. The association meets every other month and holds additional technical sessions.

The ERC has teamed up with E-Motion, a company that specializes in electric car conversions, to increase customer acceptance of electric cars. Together, the two groups are trying to make customers aware of the benefits of electric cars and dispel many common myths surrounding electric cars.[R#12]

E-Motion specializes in converting standard cars to electric power. Virtually any vehicle with a manual transmission can be converted. Automatic transmissions can also be converted, but are less favorable as they waste a great deal of energy. Electric cars are beneficial to utilities because they charge overnight during off-peak hours. The payback period at which the savings of electricity over gasoline offset the conversion price is about seven years. It takes approximately 12 hours to charge an electric car and costs approximately $1 based on Portland's electric prices. With current technology electric cars get between 40 and 70 miles per charge, and they have no difficulty reaching speeds of 60 miles per hour. Thus E-Motion and ERC are marketing electric cars as the ideal commuter vehicle and PGE is currently considering converting part of its fleet to electricity. ☞

OTHER USES OF THE ENERGY RESOURCE CENTER

According to Gerry Kuhel, Manager of the ERC, there is no such thing as a typical visitor to the ERC. Some visitors come once to use the library, for example to gather information on a specific technology. Others come back repeatedly for different classes. A prime example of return customers are food service professionals on the managerial level. There tends to be a low turnover rate in this profession, and these managers might come to the ERC as often as every other month to attend classes.

There are a wide variety of classes provided by the center. Some classes meet one night a week for eight weeks, some meet for one day, some last all day for three consecutive days. Classes run all year and participation levels remain high year round with a slight drop typically during the end of the year holidays. A fee ranging from $25 to $375 is charged for all classes. With the class fees PGE is trying to offset ERC costs; any profits are used for improving the center and providing increased deliverables to the end user.

For 1993 the ERC is offering seminars covering commercial food facilities, along with industrial applications, electrical applications and information services, mechanical applications, and lighting applications. The ERC has already scheduled more than 20 seminars for the year and many more will be added to the schedule. The Center tries to focus its classes by gearing them towards very specific customer groups (e.g. a course on efficient lighting in schools as opposed to a course on efficient lighting in general). PGE customers are also encouraged to request seminars on specific topics. In addition PGE customers always have the option of visiting the ERC for new equipment demonstrations of the latest technologies. When customers go to the ERC to attend classes or seminars they often explore all of the facilities available at the ERC.

STAFFING REQUIREMENTS

Gerry Kuhel is the manager of the ERC, and has held that position for the past two years. In addition there are 5 technical specialists (ERG staff) and 4 support staff. All 10 of these ERC employees are full-time equivalents. On occasion the ERC will hire outside consultants to teach certain classes that cover an unusual topic. In 1992 approximately ten such consultants taught at the ERC. In addition, 3 interns from local colleges worked part-time at the center. ■

CASE STUDY: LIGHTING RETROFITS IN SHARI'S RESTAURANTS

Shari's is a chain of restaurants concentrated in Oregon and Washington with headquarters in Beaverton, Oregon. Shari's restaurants are open 24 hours daily and are considered in the "coffee shop" segment of the food industry. At the end of 1992 there were 27 company owned restaurants operating in Oregon, 25 operating in Washington, and a total of 8 licensed restaurants in California, Wyoming, and Colorado.

In 1992 Shari's considered performing lighting retrofits in several of its restaurants. Shari's representatives visited the ERC, going through the Lighting Lab and Demonstration Kitchen areas. Shari's Representatives also attended several ERC seminars.

Following up on information gained from the ERC and advice provided by the ERG staff, Shari's contracted with Taylor Electric to begin retrofitting many of its restaurants. Because the layout of all the restaurants is almost identical, the retrofits are similarly uniform. Typically 60W and 75W incandescents are replaced with 5W, 7W, and 13W compact fluorescents. In addition T12 lamps in the kitchen are replaced with T8 lamps.

To date 12 Shari's restaurants have been retrofitted in Washington, and 2 restaurants have completed retrofits in the PGE service area. In addition there are 17 Shari's restaurant lighting retrofits planned in the PGE service area. Shari's estimates that each retrofitted restaurant represents 70,000 kWh in annual energy savings, which is approximately $3,500 in electric bill savings.[R#16,17]

MONITORING

Trying to monitor and evaluate the impact of a Center such as the ERC is very difficult. Its affect is both direct and indirect, influencing both short term and longer term decision-making. Naturally ERC maintains a log of the number of attendants of various seminars that it has conducted, but monitoring the ERC's impact has necessarily been very informal.

Most feedback has been gained after ERC classes, when the instructors ask class participants whether the class was helpful to their jobs and whether the content of the course should be changed, and if so how. Occasionally written surveys are given to class participants. All of the five technical specialists that make up the ERG are very well connected in their respective fields and as a result they are able to get a good idea of the effectiveness of the classes and seminars through personal communications.

Trying to accurately monitor the energy savings attributable to the ERC would be difficult indeed, requiring accurate reporting on the part of all ERC visitors in terms of any energy efficiency measures they employed as a result of their visit to the ERC. The Field Marketing Department tracks the energy savings from all of PGE's DSM programs, and this department realizes that the ERC has a definite, although not quantifiable, impact on kWh savings.

EVALUATION

To date PGE has not performed any formal process or impact evaluations of the ERC. PGE's market research department is scheduled to conduct a formal evaluation of the ERC which will be based on extensive surveys of ERC visitors. Currently the Oregon PUC does not require any specific reporting on the ERC.

In a certain sense the ERC is constantly being evaluated both internally and externally because such an emphasis is placed on offering classes that commercial and industrial professionals want and need. The ERC is always examining which classes are popular and what areas the ERC might not be covering. ■

It is clear that the ERC is very popular in terms of both people coming to use the on-site facilities and to attend ERC classes and seminars. The ERC has affected energy savings in facilities ranging from restaurants to retail stores to office buildings. Unfortunately it is virtually impossible to attach any quantifiable energy or capacity savings to retrofits or new construction that incorporate energy efficiency that result from visits to the ERC facilities, or that are the result of visitors following the advice of ERG consultants. But clearly the ERC can have, and likely has had, an impressive impact on energy and dollar savings, complementing other more conventional, incentive-based PGE DSM programs.

PARTICIPATION RATES

All visitors to the ERC, whether they are simply browsing, attending a class, using the lighting lab, or taking advantage of any of the ERC resources, are considered "participants." Since the ERC opened in November 1986, approximately 10,000 people have come through the doors. (Note that participants may be first-time participants, or repeat visitors.)

The number of visitors (or participants) to the ERC has steadily increased since the Center opened. In 1987 there were 1,000 visitors and in 1991 2,000 people visited the Center. In 1992 the number of ERC visitors held steady at 2,000. The ERC predicts there will be 3,000 visitors to the Center in 1993.

Participation Table	*Participants*
1987	1,000
1988	1,500
1989	1,700
1990	1,800
1991	2,000
1992	2,000
Total	10,000

Data Alert: Participation figures for 1987 through 1990 are approximations.

FREE RIDERSHIP

Free ridership is not an issue at the ERC, as the goal of the center is to reach as many people as possible. It also seems clear that in the absence of the ERC it is highly unlikely that many people would have the time or patience to gather much of the information that is available through the many ERC channels.

PROJECTED SAVINGS

The ERC hopes to steadily increase the number and type of classes and seminars offered and in turn hopes to increase the number of ERC visitors. It is fair to assume that people attending ERC classes and seminars are likely to return to their businesses and recommend energy efficiency improvements learned at the ERC. Thus as the number of people attending ERC classes increases, so should the amount of energy savings indirectly attributable to the ERC. ■

CASE STUDY: LES SCHWAB TIRE STORE

The Les Schwab Tire Store had a problem: its 10' x 20' tire changing and balancing area was essentially unheated. The only heat source was a duct from the main furnace controlled by a thermostat in the office. With floor-to-ceiling glass on two sides and front swinging doors open most of the time, the space was cold and drafty.[R#3]

A PGE Field Marketing Representative referred the store to the ERC. The solution as recommended by the ERG staff was the installation of three (one 7.5 kW and two 5 kW) electric infrared heaters with beam patterns from two directions. A percentage timer input controller enables employees to dial in the exact amount of heat required throughout the day, providing comfort at minimal cost. From October through April, 1988 the total operating cost was $204, with the highest monthly cost $61, and the lowest $13. Employees describe the work space as "the most comfortable place in the store."[R#3]

"We believed that it would be cost prohibitive to heat this area with infrared, that the existing discomfort was something employees would have to live with. As it turns out, infrared heat doesn't cost much to operate. At $60 for the highest month this season, the cost is peanuts." *Arlan Kohler, Manager Lee Schwab Tire Store*

CASE STUDY: NORTHWEST EYE CENTER

The physicians at the Northwest Eye Center needed an instantaneous and constant supply of hot water during surgery and for scrubbing up before and after surgery. The solution as recommended by the ERG staff was installation of a hot water maintenance heater strip from the hot water heater along all the piping to the last hot water outlet. The strip, which is essentially a strip of resistance heat that is wrapped around the pipe, keeps the water temperature along the entire system at 120°F.

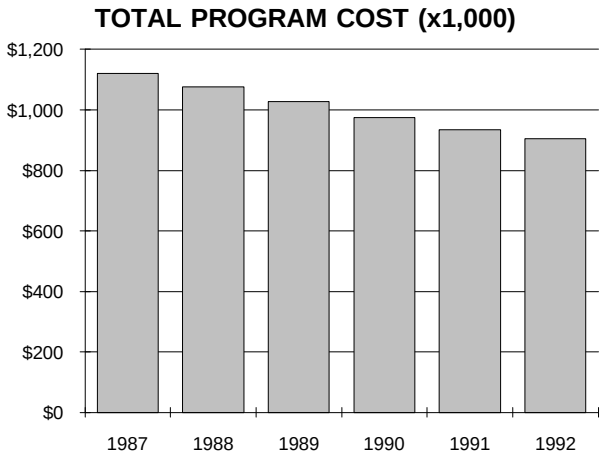
The cost of the installation was cut in half because no recirculation piping, pump, or balancing valves were required with this system. Maintenance costs are lower because there is only half the piping to maintain and no pump or balancing valves.

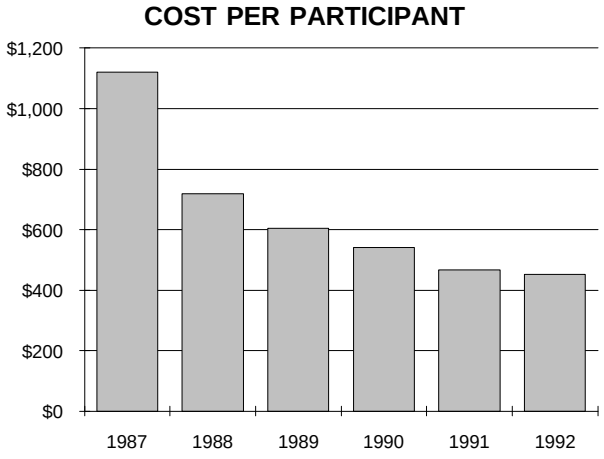
Operating costs are lower because heat losses from the recirculation system are eliminated; no energy is required to operate the recirculation pump; and the water does not have to be overheated at the water tank to supply a sufficiently warm temperature at the end of the line. The system operates at 5 watts per foot.

"The hot water system is carefree, and the water is always hot when you turn it on. We've performed 25 consecutive eye surgeries, and the hot water was still instantly available." *Michael Odell, Business Manager Northwest Eye Center*

Cost of the Program

Costs Overview Table	*Direct Labor (x1000)*	*Contract Labor (x1000)*	*Materials (x1000)*	*Professional Services (x1000)*	*Outside Services (x1000)*	*Employe Expenses (x1000)*	*Misc. (x1000)*	*Total Program Cost (x1000)*	*Cost per Partic.*
1987	$489.0	$23.0	$161.1	$115.1	$41.4	$51.8	$240.5	$1,121.8	$1,121
1988	$469.5	$22.1	$154.7	$110.5	$39.8	$49.7	$230.9	$1,077.2	$718
1989	$448.0	$21.1	$147.6	$105.4	$37.9	$47.4	$220.3	$1,027.7	$604
1990	$425.0	$20.0	$140.0	$100.0	$36.0	$45.0	$209.0	$975.0	$541
1991	$407.1	$19.2	$134.1	$95.8	$34.5	$43.1	$200.2	$934.0	$466
1992	$394.9	$18.6	$130.1	$92.9	$33.4	$41.8	$194.2	$905.9	$452
Total	$2,633.5	$123.9	$867.5	$619.6	$223.1	$278.8	$1,295.0	$6,041.5	





Data Alert: Please note that the ERC has had the same annual operating budget in nominal dollars for each year of operation, but per The Results Center convention of converting all dollar figures to 1990 U.S. dollar levels, the program costs presented gradually decline each year. In addition, the program costs are approximations, not exact figures. The ERC has received roughly $725,000 (nominal dollars) each year from PGE in funding. The ERC has attempted to raise the additional $250,000 (nominal dollars) required for the annual operating budget from class fees, seminar charges, and consulting projects.

Annual ERC program costs have ranged from a high of $1,121,800 in 1987 to a low of $905,900 in 1992. Total program costs from 1987 through 1992 are $6,041,500. In 1991 the ERC had revenues of $189,664 and in 1992 the ERC had revenues of $265,722. These revenues are put back into the ERC budget. In years when program costs exceeded funding, PGE made up the difference. From 1987 through 1990 the ERC was considered a "giveaway program" by PGE with no costs recovered from customer rates. Since 1991, the cost of the ERC has been recouped through customer rates.

COST EFFECTIVENESS

ERC management is not as concerned with cost effectiveness in the traditional sense as they are with providing quality services to their target audience. In the first quarter of 1993, the ERC held 31 events (seminars, demonstrations, meetings, and classes) with 857 total participants. ERC spent $15,000 (primarily on class materials, catering, and professional services) on these events; participant fees totaled $23,700. While revenues for the first quarter projected over the entire year fall far short of the annual ERC goals, ERC management stresses that they are more concerned with providing a quality service than generating revenues. The ERC maintains that by knowing their market and providing quality services, revenues will take care of themselves.

COST PER PARTICIPANT

Because visitors to the Center have increased greatly from 1987 through 1993 while annual program costs have gradually declined, the cost per participant has seen a large drop since the ERC opened. In 1987 the PGE cost per participant was $1,121 while the PGE cost per participant in 1992 was $452. The customer cost per participant for 1992 (class, seminar fees etc.) was $132.

COST COMPONENTS

Program expenditures from 1987 through 1992 total $6,041,500. Of this amount, $2,633,500 was spent on direct labor (the salaries of the ten ERC full time staff). Contract labor costs, which consist of expenditures on temporary employees and guest speakers, total $123,900. Dollars spent on materials such as notebooks and other supplies total $867,500. Expenditures for proposal writers, marketing consultants, audio visual consultants, and public relations consultants, which fall under the heading of professional services, total $619,600. The ERC has spent $223,100 on outside services such as catering, and electrical hook-ups. A total of $278,800 has been spent on employee expenses such as sending ERC staff members to seminars, and accompanying expenses such as rental cars, airfare etc. Finally, the ERC has spent $1,295,000 on miscellaneous items. The majority of these miscellaneous expenses go towards supporting outside projects (for example community college programs or electric vehicle demonstrations) that focus on energy-efficient technologies.

ERC Preliminary Capital Cost Estimate

Tenant Improvements	$732,189
General Furnishings	$82,878
Technical Library Furniture	$18,841
Technical Library References	$7,751
Personal Computers	$38,756
Audiovisual Equipment	$9,661
Security System	$7,989
Commercial Demonstration Kitchen	$20,630
Product Display Modules	$43,526
Word Processing Equipment	$10,965
Miscellaneous	$9,003
Lighting Lab Meter	$894
Total	$983,083

The table above provides estimates of the costs required of PGE to remodel the building that houses the ERC. Tenant improvement costs totaled $732,189 consisting of $112,115 for partitions, $23,529 for wall finishes, $60,886 for floor finishes, $27,163 for ceiling finishes, $46,534 for specialty work, $19,945 for the auditorium stepped floor, $18,499 for auditorium seating, $213,438 for mechanical expenses, $141,397 for electrical expenses, and $50,164 for general conditions expenses. Additional tenant improvement fees (architectural, engineering, lighting consultant) totaled $186,661, while PGE received $168,142 for its tenant improvement allowance. Tenant improvement costs combined with other equipment costs total $983,083. ■

LESSONS LEARNED

Clearly the ERC has done a good job of providing educational and consulting services to commercial and industrial professionals. The steady increase in visitors to the Center indicates a continuing, growing interest in the services provided. As the fields of energy efficiency and beneficial usage continue to expand so should the popularity of the ERC. The ERC has truly become a regional entity. Initially the ERC was designed only to serve the PGE service area.

One of the major changes which has taken place at the ERC was the decision in 1991 to begin charging for classes and seminars in order to help offset costs and meet the budget. Charging for classes also greatly reduced the number of no-shows.

ERC management has learned the importance of being flexible in the curriculum provided and constantly updating class offerings. The ERC staff really focuses on providing specific services that their visitors want and need. The ERC marketing efforts help with these goals by targeting very specific groups of professionals.

The ERC staff has also learned that walk-in visitors to the ERC can be a problem in that they have the potential to be very disruptive to the work environment. It is easy to get caught-up in entertaining visitors instead of performing office work.

TRANSFERABILITY

A facility such as the ERC is clearly transferable to utilities that are willing to invest significant sums of money to educate their customers and raise their awareness of energy efficiency and other electrotechnologies that can enhance their productivity and profitability. Utilities must be willing, and if regulated, their commissions must approve, this approach to energy efficiency, one that is difficult to quantify and empirically justify, but one that implicitly makes sense as a complement to other more conventional, incentive based programs.

As proof of the merit of transferring PGE's ERC, several West Coast utilities have implemented similar variations on the theme. The Northwest Lighting Design Lab (operated by Seattle City Light) is a prime example (See Profile #27), as is the Pacific Energy Center in San Francisco and the Customer Technology Applications Center operated by Southern California Edison. Georgia Power's Energy Planning Center, which complements its customer technology center, provides an east coast example. Finally, many utilities, including Consolidated Edison Company of New York, have smaller educational facilities for their customers, typically in the lobbies of their headquarters. ■

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.

OREGON OVERVIEW

The Oregon Public Utilities Commission has taken active steps to promote integrated resource planning (IRP) in Oregon and to remove the disincentives for the state's investor-owned utilities to invest in energy efficiency. The Commission formally adopted IRP in April of 1989. Then a few months later, in December of 1989, the Commission authorized special accounting practices for DSM, with all eligible conservation program expenditures subject to deferral and amortization over the useful life of the assets from the date placed in service. Some conservation costs, such as advertising costs and the costs of legislatively-mandated programs such as low income programs, are expensed.[R#14]

In 1992, the Commission directed the state's utilities to submit proposals for DSM program cost recovery, lost revenue recovery, and shareholder incentives. The intent of this docket was to break the link between sales and profits, to decouple sales and profits thus enabling the utilities to invest in energy efficiency. In February 1993, the Commission approved PGE's proposal. (More accurately, in 1991 the Commission had authorized PGE's original cost recovery mechanism for its SAVE program as a three year test. Thus by the time that the Commission opened its formal investigation of cost recovery and shareholder incentives, PGE's mechanism was already up and running. In February of 1993 it was formally approved with the addition of the "ratebase true-up" provision.) PGE and PacifiCorp took different approaches. The PacifiCorp's Energy FinAnswer umbrella program uses a novel energy service charge approach that is discussed at length in Profile #46.[R#14,18]

PGE'S TREATMENT OF DSM COSTS

In Oregon, rate cases are not regularly scheduled but occur whenever either the Commission or a utility requests one. For illustration, the last general rate case was in 1985, and was settled in 1986. Note that there is a proposal before the Commission that calls for regularly scheduled rate cases, say every three years, that might facilitate the decoupling process.

At the time of each rate case PGE submits its DSM plans. These include not only savings targets and cost projections, but indicate the level of lost revenues that will occur based on these plans. Rates for the future test years are then modified to cover the costs of ratebasing the DSM program costs and their associated lost revenues plus the incentives expected, based on the projected costs and savings. Portland General Electric allocates DSM program costs, lost revenues, and shareholder incentives to all customers via a uniform cents-per-kWh charge called the Energy Efficiency Adjustment.[R#14,15,18]

PGE'S LOST REVENUES

Lost revenues resulting from DSM activities are collected by Portland General Electric through a Lost Revenue Adjustment (LRA) component of the Energy Efficiency Adjustment. The LRA is applied to each kilowatt-hour sold to the rate classes in which the lost revenues originated. Lost revenues are calculated as the product of the reduction of kWh retail sales and the weighted average of the retail base rates for the respective program category less the sum of short-run avoided marginal cost and the wholesales sales margin.[R#14]

RATEBASE TRUE-UP MECHANISM

In February of 1993, the Commission approved a proposal made by Portland General Electric for an Energy Efficiency Investment True-Up Mechanism. The provision enables the utility to defer revenue requirements, for both DSM program costs and lost revenues, that exceed the level established in the utility's most recent general rate case. The mechanism was approved for all investments made on or after January 1, 1993. As such if the utility's programs exceed their targets as specified in the general rate case, and thus program costs and lost revenues are greater than anticipated, a "true-up" will occur, and the recovery of these costs are recovered in an automatic adjustment clause once a year.[R#14,15,18]

PGE'S SHAREHOLDER INCENTIVES

PGE originally proposed a shareholder incentive mechanism along with its rate filing in the spring of 1990. The proposal led to several months of discussion between the Commission, the Oregon Department of Energy, and Portland General Electric. Finally the incentive mechanism was separated from the rest of the provisions of the rate case to treat it separately. What the parties to the proceeding determined is that PGE can earn incentives of approved programs that fall under a "SAVE" umbrella. These programs are characterized as having clearly demonstrable savings. Thus PGE could earn an incentive on these investments.[R#14,15]

In January 1991 the Oregon PUC approved a shareholder incentive mechanism for PGE that allowed the utility to earn a share of the net benefits from DSM programs. The incentive was set for an initial term of three years at which time it will be reviewed and modified if necessary.[R#14]

PGE's incentive mechanism is a shared savings incentive that is recovered through the Energy Efficiency Adjustment tariff, or rate surcharge. The Shared Savings Incentive (SSI) is the total of incentive payments for all qualifying energy efficiency measures and is calculated for each of four program categories: residential space heat, residential non-space heat, commercial, and industrial.[R#14]

The SSI for each program category is determined by multiplying an incentive rate for the program category by the difference between annual kWh savings and the benchmark set by the Commission for that particular program category. Incentive rates are a function of program cost, total resource cost, and the utility's long run incremental costs. A penalty may result if the utility fails to meet a program category benchmark or if the utility's program category costs or levelized total costs exceed Long Run Incremental Costs.[R#14]

One of the key issues in determining that PGE incentive was that PGE requested 50% of the incentive payment up-front. The Commission rejected this, opting instead to allow benefits to flow to the utility as benefits accrue to the ratepayers, and allowed PGE to recover incentive payments over a 15-year time frame with a 25% up-front payment paid after the first year of the DSM programs' implementation and following evaluation.[R#14]

REGULATORY TREATMENT OF THE ERC

The ERC, as this profile describes in some detail, provides value to PGE and its customers, but a value that is difficult to quantify. Energy and capacity savings resulting from the Center's informational programs are indirect at best, and estimations of savings are thus highly problematic.

In 1990, as part of a general rate case, the Oregon PUC staff looked into how to account for the ERC from a financial accounting standpoint. Staff commented that the ERC really has two functions. The first is promotional and includes promotion of fuel switching to electricity, encouraging customers to use electric cook stoves, etc. The second aspect of the ERC, which does relate to cost recovery, has to do with the elements of the ERC that promote cost effective conservation. The Center's work with energy-efficient lighting is a prime example of this. Staff proposed to the Commission that 50% of the Center's activities, and thus annual operating expenses, were valid DSM expenditures for which rate recovery was appropriate. The other 50% of the costs would have to be disallowed by the Commission. After deliberations, the ratio was adjusted and 75% of the ERC's annual operating expenses were allowed to be recovered, and 25% were excluded from the ratebase and from any form of cost recovery.[R#15] ■

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