Seattle City Light
Lighting Design Lab
Profile #27, 1992

Executive Summary

The Lighting Design Lab (referred to as "the Lab" and "LDL") is a unique project in the Northwest, conceived by the Natural Resources Defense Council and the Northwest Conservation Act Coalition, funded jointly by the Bonneville Power Administration, Seattle City Light, and a growing list of other sponsors (including in-kind donations by manufacturers of energy-efficient lighting technologies). The lab is operated by Seattle City Light.

In 1986, Seattle City Light, the Natural Resources Defense Council, and the Northwest Conservation Act Coalition developed a proposal to Bonneville Power Administration for a 1.5-year pilot research and demonstration project to promote state-of-the-art lighting strategies for commercial buildings. The Lab was to be part of an $18 million program that would provide the region with a host of lessons on commercial sector efficiency, akin to BPA's Hood River Conservation Project. (See Profile#12) While the grand scheme was not ultimately accepted, negotiations resulted in a commitment by BPA to provide 70 percent of the Lab's $2 million cost while the remaining 30 percent would come from various other sponsors.

LDL is located in Seattle and was opened in 1988 with the objective of providing energy-efficient lighting information to a wide variety of lighting professionals in the commercial sector, and to conduct tours, consultations, classes, demonstrations, and other educational activities on state-of-the-art energy-efficient lighting strategies and design.

Unlike most Results Center case studies, the Lighting Design Lab is focused on education, acting as a centralized resource center on efficient lighting products for the Pacific Northwest. The Lab's product is information, conveyed through the physical demonstration of new technologies and strategies. LDL demonstrates a variety of products from over 40 different manufacturers. The information is presented functionally through free classes, demonstrations, displays, tours, consultations and simulations available to anyone in the region.

In 1991, BPA extended the Lighting Design Lab budget for an additional five years, (from 9/1/91 through 12/31/97) with a total cost of $3,917,933. While its effect is difficult to quantify, and an imprecise exercise at best, the success and competence of the Lighting Design Lab has sparked interest all over the world.

Lighting Design Lab

Utility:	Managed by Seattle City Light, funding from a number of sources with the majority by Bonneville Power Administration.
Sector:	Commercial (Residential)
Measures:	Lighting of all kinds including daylighting.
Mechanisms:	Education (tours, seminars, classes, etc.) coupled with Design Assistance.
History:	Planning began in 1985. Lab opened in 1989.
Facility:	Located on the fringe of downtown Seattle. An ~ 6,400 square foot facility that includes a 1,200 square foot mock-up room.

Program Data

BPA Cost:	$1,346,129
SCL Cost:	$555,854
Others Cost:	$487,051
Total Visitors:	> 16,000

Conventions

For the entire 1992 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.

Project Overview

The Lighting Design Lab, though managed by Seattle City Light staff, is really a regional venture. The original sponsors, described in brief below, have been joined by additional sponsors who hail from California to British Columbia.

NATURAL RESOURCES DEFENSE COUNCIL

NRDC is a nonprofit organization with 170,000 members and a diverse staff of lawyers, scientists, and other environmental specialists. Since 1970, NRDC has been involved in power planning, advocating conservation as an alternative to new power plant construction. NRDC has participated in the Northwest Power Planning Council's planning process since the early 1980's and has fought hard to convince utilities to "buy into" demand-side management as a viable energy resource that can be effectively delivered as an energy service.[R#12]

The original idea for the Lighting Design Lab was conceived by NRDC as a component of a larger efficiency program intended to be a type of commercial Hood River Conservation Project. (See Profile#12) The Bonneville Power Administration felt the project was too large and decided to fund only the Lab. (The original idea involved the possibility of retrofitting the lighting in all commercial buildings in a certain geographic area in a given year.) Since the Lighting Design Lab was opened in 1989, NRDC staffers have worked on the steering committee and served as program consultants.[R#2]

BONNEVILLE POWER ADMINISTRATION

BPA is a U.S. Government owned and operated wholesale electric utility company. It was created by Congress in 1937 as the marketing agent for power generated at the Bonneville Dam. Since then it has been organized as part of the Department of Energy and its mission expanded to market the power from the twenty-nine additional federal dams in the region. To accomplish this, BPA has designed and built a network of long distance high-voltage transmission lines which has grown over the last forty-seven years to become the backbone of the transmission system for the Northwest.

BPA serves the states of Washington, Oregon, Idaho, and Montana west of the Continental Divide, plus small adjacent portions of California, Nevada, Utah, and Wyoming. The service area covers approximately 300,000 square miles with a population of nearly 9 million people. BPA sells power to 173 wholesale customers made up of public systems, investor-owned utilities, industrial firms, federal agencies, and customers located outside of the region.[R#11]

In 1980, under the Pacific Northwest Electric Power Planning and Conservation Act, BPA was assigned the additional responsibility of meeting the future growth in demand for electricity in the region through the acquisition of new generating resources and conservation measures. Through its Office of Energy Resources, BPA develops programs that present financial incentives to generators, transmitters, and end users of electricity. These programs implement measures that increase the efficiency with which electricity is generated, transmitted, and used, and employ renewable resources to displace consumption of electricity at the point of end use.

The Lighting Design Lab, made possible by BPA funding, is a support service to the Energy Smart Design Program (See Profile#37), a region-wide commercial sector acquisition and design assistance program started by BPA in 1987. The Lab remains an important part of the program.

SEATTLE CITY LIGHT

Seattle City Light (SCL) is the largest municipal electric utility in the Pacific Northwest. It provides power to 332,339 customers. SCL's service area covers 131 square miles and contains a population of 669,394. Eighty-nine percent of SCL's customers are residential. These customers account for 38% of total electric sales and 39.6% of the total electric energy revenues. SCL's commercial customers purchase 39.9% of its total energy sales, accounting for 36.8% of total electric energy revenues. Industrial customers account for 16% of sales and 13.4% of revenue. Governmental customers account for 8.7% of sales and 8.6% of revenues.[R#13,14,16]

Seattle City Light is the second largest sponsor of the Lighting Lab. SCL operates the Lab, and was instrumental in supporting its development. Since the Lab opened, SCL has been under contract to cover 30% of the program cost.

NORTHWEST CONSERVATION ACT COALITION

NCAC is a policy advocacy group consisting of 60 organizations formed in 1981 to monitor implementation of the Pacific Northwest Power Planning and Conservation Act. NCAC includes individual members as well as utilities, consumer organizations, and public interest groups such as the League of Women Voters. The Northwest Power Planning and Conservation Act is a unique piece of federal legislation which prioritizes conservation, renewable resources and efficiency over fossil fuels as sources of electric power.

NCAC teamed with NRDC as the original sponsor of the Lab concept. The two groups and Seattle City Light approached BPA with the idea for the Lighting Design Lab late in 1985.

ADDITIONAL SPONSORS

British Columbia Hydro

California Energy Commission

Northwest Power Planning Council

Pacific Power and Light

Puget Sound Power and Light

Snohomish Public Utility District

Tacoma City Light

University of Washington

Washington State Energy Office

Pacific Power and Light

In 1991 these additional sponsors contributed a total of $150,467, or 24% of LDL's total expenditures of $615,829. In addition to their cash contributions to the Lab, their support gains them recognitions as well as the opportunity to provide guidance and expertise.[R#15,17]

LIGHTING DESIGN CASE STUDY #1

Le Tastevin Restaurant in Seattle is one business that has benefited from ideas promoted by the Lighting Design Lab. The challenge faced by this French restaurant was to reduce energy costs without sacrificing lighting quality. Good lighting, many chefs believe, is as important a part of the dining experience as flavor!

Lighting Concepts of Seattle, a lighting designer, was able to reduce energy consumption by 59,000 kWh/year at the restaurant while maintaining a high aesthetic quality. The savings were achieved by using low voltage halogen fixtures concentrated over the tables. While overhead lighting wattage increased, decorative, sixty-watt incandescent lighting was replaced with seven-watt florescent and 15-watt halogen lamps. Also, 36 standard magnetic fluorescent ballasts throughout the restaurant were replaced with electronic ballasts, which are 30 percent more efficient than standard models.

The largest energy saving feature in the restaurant is an eight-channel dimming control system which is programmed to decrease artificial lighting to take advantage of daylighting. The dimmer is programmed to account for seasonal shifts in daylighting throughout the year.[R#7]

Project History

The Lighting Design Lab (LDL) in Seattle, Washington, is a facility unique to the nation. Unlike other energy resource centers, the Lighting Design Lab is designed to benefit the entire region in which it is based. Its objectives are to provide energy-efficient lighting information to a wide variety of lighting professionals in the commercial sector, and to conduct tours, consultations, classes, research, demonstrations, and other educational activities on state-of-the-art, energy-efficient lighting strategies and design.[R#4]

In 1986, Seattle City Light (SCL), the Natural Resources Defense Council (NRDC), and the Northwest Conservation Act Coalition (NCAC), developed a proposal to Bonneville Power Administration (BPA) for a 1.5-year pilot research and demonstration project to promote state-of-the-art lighting strategies for commercial buildings. The proposal was based on the theory that commercial lighting technology had advanced tremendously in the past five years (studies by NRDC showed that commercial lighting savings are a huge conservation resource) but the new state-of-the-art equipment was not being incorporated into most retrofits and new buildings. A cooperative funding agreement was signed between SCL and BPA in August, 1988, for the Lighting Design Lab, effectively launching the project.[R#5]

PROJECT STARTUP TIMELINE

October 1985: The Natural Resources Defense Council (NRDC) and the Northwest Conservation Act Coalition (NCAC) approached Seattle City Light (SCL) about co-sponsoring a commercial lighting design project.

July 1986: The Sponsors (NRDC, NCAC, SCL) submitted an unsolicited proposal to Bonneville Power Administration (BPA) for a large-scale demonstration project which proposed an $18 million commercial lighting "Hood River" conservation project in the Pacific Northwest.

April 1987: BPA contracted SCL to do a scoping study of Phase 1A of the proposed project to determine the feasibility of a lighting mock-up facility. The scoping study surveyed efficient lighting demonstration projects, other lighting labs, and case studies.

July 1987: The scoping study was submitted to BPA. Dulce Setterfield of BPA noted that: " A national, independent review panel commented on the study and determined that the proposed facility would not duplicate other endeavors, and would provide an effective marketplace venue for technology transfer. Parameters set by BPA for BPA financial support of the project included: 1) integration of Lab operations with Energy Smart Design ; 2) handling of regional marketing by BPA; 3) service throughout the BPA region rather than limited to the Seattle City Light service area; 4) cost sharing by other sponsors."[R#15]

December 1987: BPA decided to do only the Lighting Mock-up Facility (Lighting Design Lab) as part of the Energy Smart Design Program. Negotiations determined that BPA would provide 70 percent of the $2 million project costs; the remaining 30 percent would come from various other sponsors.

Early 1988: BPA contract preparation began by SCL which included: research for budget; activities and staff needs; total scope of work; site search; solicitation of donations for 30 percent of budget.

April 1988: A focus group of seventeen architects, engineers, and manufacturers were asked, "What should be done in the Lab?" Their findings included the following strategic parameters for the Lab:

1. Focus on strategies instead of projects
2. Flexibility
3. An all-component generic approach
4. Quality of light
5. A proactive approach to catch the market in the concept stage
6. Act as regional facilitator and network

Site survey 1988: An outgrowth of focus group ideas, the site survey was done to clarify the optimal location.[R#1]

One thousand three hundred surveys were sent to architects, engineers, contractors, manufacturing representatives and designers in the Puget Sound Area, soliciting information on the siting of the facility. Fully 200 responded and suggested that the Lab have:

1. Easy access from the freeways
2. Parking
3. A location on the fringe of downtown Seattle

July 1988: An on-going Technical Advisory Committee began monthly meetings. Topics included:

1. Review of site search
2. Space plan review
3. The Lab's name
4. Instrumentation needs
5. Lighting control strategies

August 1988: The final contract ($2,099,155) was signed by BPA (70 percent) and Seattle City Light (30 percent). Other sponsors signed agreements with SCL to make up the 30% cost share. These sponsors included the California Energy Commission, Tacoma City Light, Snohomish Public Utility District, and the Washington State Energy Office.

At that time a steering committee developed the Lab's final mission statement. Design program development also began, including technical requirements of different spaces. A decision was made that all lighting equipment was to be donated.

September 1988: LDL began soliciting donations from manufacturers. In addition the design for the Lab was continued as was the development of the lighting strategies that would become the backbone of the Lab.

November 1988: Site selection was finalized.

February 1989: Lease for the Lab was finalized and construction budgets negotiated with building owners and contractors. Diana Campbell, who became the Lab's Project Manager, noted that the prospective building owners were happy to have the Lab. The initial lease was short term. SCL's need to negotiate a long term lease and take advantage of market conditions influenced BPA's willingness to pioneer a long term funding commitment in the 1991 extension. [R#1,15]

April 1989: Four staff were hired and the staff worked to develop promotional materials, graphics, interactive displays, and product screening criteria. At the same time the staff finalized design development drawings and construction began. (The initial space was bare.)

August 1989: Staff moves into the Lighting Design Lab.

December 1989: Grand Opening.

MARKETING

LDL's initial marketing approach was to establish the Lab in the lead position for lighting information and resources in the Northwest, and to display the broadest range of state-of-the-art efficient lighting products available in the region.

Since opening in 1989, LDL's successful marketing strategy has been to advertise to targeted markets and promote special events through direct mail. LDL's direct mail marketing is based on their quarterly newsletter, Lighting Design Lab News, which is sent to over 5,000 addresses and is a source of technology information as well as a marketing tool.

Each newsletter includes a Program of Events, which is a calendar of educational programs, lectures, and in-house promotions. Recently, LDL has found that hosting well known speakers is a relatively low cost strategy which generates considerable free media exposure. A visit by Amory Lovins for example, Director of Research at Rocky Mountain Institute, resulted in interviews with two newspapers, two radio talk shows, National Public Radio, and local TV coverage!

Full-page magazine and newspaper ads have been coordinated and produced through a Bonneville Power Administration regional ad campaign. These ads have been placed in architectural magazines with reader service cards. Readers who want more information on the Lighting Design Lab send in a pre-paid postcard. (The response from these cards has been mostly from out of the region.) The Lighting Design Lab also places small, inexpensive ads in targeted local newsletters and architectural journals.[R#5]

In addition to direct mail and magazine advertisement, LDL has found a number of other successful marketing techniques. One is offering free meeting space to targeted groups. Lab space may be used at no cost as long as the meeting is energy related and first-time users agree to tour the lab. Dulce Setterfield noted that: "Meetings are subject to brief interruptions by tour groups at times, because the Lab is first and foremost a demonstration facility. There are no closed-door meetings which bar tour groups from looking into a space to see the lighting strategies."[R#15]

LDL has also acquired a toll-free telephone line which was announced in their newsletter. Though lab directors initially feared overuse of the line, callers tended to be established customers. Other marketing projects include a BPA promotional campaign called "the First Visit's on Us" that paid travel costs for selected first time visitors. Popular free videos are available on request.[R#10]

DELIVERY

LDC is located at 400 East Pine Street, Suite 100, in downtown Seattle. The Lab is approximately 6,400 square feet. Available resources at LDC include reference materials, periodicals, room and technology displays, and lighting design tools.

SERVICES OFFERED

Unlike most Results Center case studies, the Lighting Design Lab is focused on education. Therefore, the following description of program implementation centers on Lab procedure rather than installed measures which are naturally very difficult to quantify. Installed measures are tracked through Energy Smart Design, a program for which the Lab acts as a support service. The Lighting Design Lab acts as a centralized resource center on efficient lighting products for the Pacific Northwest. The Lighting Design Lab's product is information, best conveyed through the physical demonstration of new technologies and strategies. LDL demonstrates a variety of products from over 40 different manufacturers. The information is presented functionally through free classes, demonstrations, tours, consultations and simulations available to anyone in the region.[R#5]

The most unique feature of the Lab is the mock-up room, a 1,200 square foot area which can be manipulated to imitate a customer's workplace. The mock-up room features two 18 foot by 18 foot movable ceilings. There is also a daylight modeling lab, thanks to the University of Washington, which includes an overcast sky simulator, a feature that allows customers to predict the amount of natural light contributed by windows and skylights.

LDL Services Performed	1990	1991
Total visitors	5,388	5,617
Consultations	132	113
Daylighting consultations/models	26	30
Tours		
Total number of tours	260	259
Number of visitors receiving tours	1,691	1,253
Classes		
By LDL	8	14
Off-site	6	13
By others	7	14
Forums	5	13
Mock-ups	11	27
Vignettes	2	3
Newsletters	4	3
Video subjects	5	1
Technology transfer / case studies	0	15
Steering committee meetings	4	4

[R#10]

"The Lab will not be competing with the professional lighting design market We will provide a range of options and recommend that our clients talk with a professional designer to nail down the final design." *Project Manager, Diana Campbell said in 1989.*

STAFFING REQUIREMENTS

As of September 1992, staff positions at the Lighting Design Lab numbered seven full time equivalents, plus student interns. A Project Manager administers all aspects of the Lighting Design Lab project. Two Lighting Specialists educate clients on energy-efficient technologies by teaching classes and consulting on lighting projects. (The second lighting specialist was hired in 1992.) A Technical Librarian oversees library operations, publishes the quarterly newsletter, and provides technical support. The Stage Technician coordinates mock-ups and installs lighting systems and displays. The Daylighting Specialist, currently working part-time, is involved with daylighting consultations, studies, and other forms of outreach. An Administrative Specialist serves as the receptionist, schedules appointments, and provides clerical support. Finally, student interns support the staff. The number of interns varies from one to three per academic quarter depending on funding availability. (Interns are drawn from all over the country through the IALD (International Association of Lighting Designers) program as well as from local community, state and private colleges.

Because LDL is open to walk-in clients and telephone questions, staff members work flexible hours, prioritize customer services such as tours and special events over work deadlines, and sometimes work evenings and weekends to accommodate clients.

In addition to the staff provided by SCL, NRDC has had an ongoing role with the Lab's development and operations. Note in the budget presented later that NRDC's contribution consists of salaried consultants who work with the steering committee to guide the lab, comment on reports and advise Lab organizers.

MONITORING

Attempting to estimate the savings that have accrued as a result of the Lab's presence is an imprecise exercise at best. The Lab was established to raise awareness, to demonstrate the benefits of using less wattage to provide better light, and ultimately to change attitudes regarding new technologies and strategies for energy-efficient lighting. Due to this informational emphasis, as well as inaccessible billing data and the lack of inspection of actual buildings whose owners had visited the Lab, attempting to estimate energy savings is simply not feasible.[R#4]

EVALUATION

To ascertain whether the Lab was meeting its objectives a two-phase evaluation by the Evaluation Unit of Seattle City Light's Energy Management Services was proposed as a part of the original Evaluation Plan. The first phase of the evaluation, which looked at overall users of the Lab, was based on a survey designed to assess user satisfaction and obtain background information on clients. The second phase was directed at lab users who had received consultations from lighting specialists at the Lab.

Phase one, which studied lab users over a four-month period in 1990, showed that 95% of Lab users (including participants in tours and classes as well as architects and lighting engineers) were very satisfied or satisfied with eight out of nine services offered at the Lab. (The nine services reviewed were tours, classes/seminars, design consultation, the technical library, the daylighting lab, mock-up room, product review, staff knowledge and staff service. Product review received a 92.5% approval rating.) The survey also showed that approximately eighty percent of LDL users were from Western Washington, with nine percent coming from other areas in the Pacific Northwest and the balance coming from outside the region. Almost one-half of survey respondents found out about the Lab from business contacts, while much fewer users were reached through brochures and newspaper advertisements.[R#8]

The second phase of the Lab evaluation targeted clients who had used the Lab's consultation services (the most intense service the Lab offers) with the goal of determining to what extent recommended strategies were actually implemented. The study was based on responses from samples of 64 telephone interviews and 34 written questionnaires drawn from the 147 consultations performed between August 1990 and July 1991.[R#17] The geographic breakdown from this second survey showed that 68.7% of the consultations were for projects in Western Washington, 21.9% were from Eastern Washington and bordering States, and 9.4% were from outside the region.

Over half of all respondents reported that consultations influenced their lighting decisions a great deal. In terms of satisfaction, clients gave a mean rating of 4 out of 5 (5 meaning a client was highly satisfied) to the consultation program. Ninety-five percent of all respondents reported using energy-efficient lighting after their consultation, though this number includes those who use efficient lighting through their own knowledge and additional information gained from the consultation. However, the telephone survey revealed that 31 of 64 respondents (48.4%) had completed their construction or retrofit project, and of these 31, 18 (58%) had installed efficient lighting measures. Also, most respondents (59% of partial consultation users and 65% of full consultation users) had not previously used the particular energy efficient lighting strategy installed as a result of their consultation. Only 18% of partial and 10% of full consultation recipients had frequently used that particular lighting measure prior to the consultation.

Few clients were aware of the watts/square foot savings of their new setups. Though clients were not asked whether they were aware of the paybacks of their installations, evaluation of the consultation program showed that the most frequent reason for selecting a particular lighting strategy was for aesthetics (33.3%) followed by 25.5% who gave energy efficiency as their reason. Cost or payback period was given as a reason for a lighting in 3.9% of the clients surveyed.

On the practical side, 62.5 percent of all respondents reported that barriers existed to implementation of design strategies recommended at LDL, and thus hampered their efforts to do energy-efficient retrofits and installations despite their raised awareness of the technologies. Common barriers were cost, unavailability of supplies, and client reluctance or indecision. Without consultation from the Lab, 38.1% of partial consultation users and 27.4% of full consultation users said they would not have used the energy efficient lighting strategies recommended at the Lab.

In contrast to the findings in Phase one of the evaluation, 42.2% of Phase two respondents said they found out about the Lab through a utility or the Bonneville Power Administration, with equal percentages (17.2%) coming from trade associations and business contacts.[R#4]

LIGHTING DESIGN CASE STUDY #2

Grade schools are used almost exclusively during the day and are therefore ideally suited for daylighting, the most efficient form of lighting in terms of watts/footcandle of light. Liberty Elementary School in Boise, Idaho, was designed to maximize the use of daylighting. High-tech reflective fabric shades placed under hallway skylights reflect 90% of the transmitted sunlight into adjacent rooms while allowing ten percent to pass through and light the hallway below. The result is free daylighting without the heat and glare from direct sunlight. Photocells in daylit rooms automatically adjust the electric lights, or "artificial light sources," to automatically compensate for natural light levels. When a cloud blocks the sun, lights turn on automatically. Though classroom lighting was installed at 1.7 watts/square foot, daylighting cuts the actual costs to only a fraction of that.[R#6]

As a result of the school's focus on lighting efficiency, Liberty's overall energy use is only 25,000 BTUs/square foot/year compared to over 40,000 BTUs/square foot/year for conventional schools in the area representing savings of 37.5%.[R#6]

LIGHTING DESIGN CASE STUDY #3

Computer simulated sunrises and an artificial metal cloud helped to make an airport shopping center seem like an outdoor mall. The $12 million remodeling of the Oregon Market in the Portland International Airport Main Terminal used computer models and full-scale mock-ups to save energy, increase sales, and invigorate what was once a rather sterile environment.

The most unique feature in the remodeling is the cloud, a curved white panel of perforated steel suspended beneath the long walkway skylight. On sunny days, the cloud filters sunlight and reduces glare. On overcast days and during the night, the cloud is used to reflect artificial light back into the marketplace.

Computer controlled dimmers use colored lights to imitate sunny days when it is overcast, including sunrises and sunsets over a 24-hour cycle. Designers used fluorescent and halogen lighting to achieve a lighting budget of 1.1 watts/square foot, much lower that the code requirement of 2.3 watts/square foot. Best of all, retail sales in the market have doubled since the remodeling![R#3]

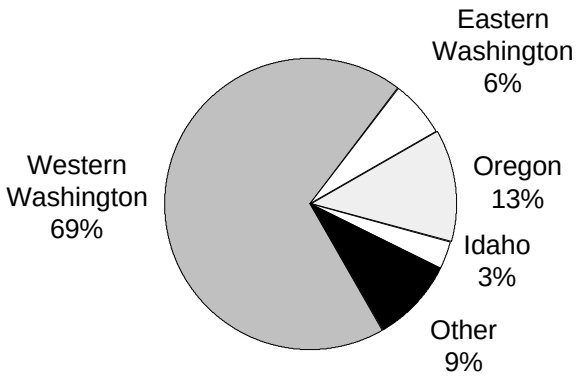
Program Savings

The Lighting Design Lab has the potential to influence lighting strategy in existing and planned structures that do not, or will not, use energy-efficient lighting. Thus, the energy and money savings the Lab can generate are far reaching. Real savings for which the Lab is directly responsible depend on the rate of participation and consequent rates of implementation, both of which are bound by time horizons over which the Lab has no control. In many cases implementation of energy saving lighting is fostered by financial incentives offered through utilities in the Northwest.

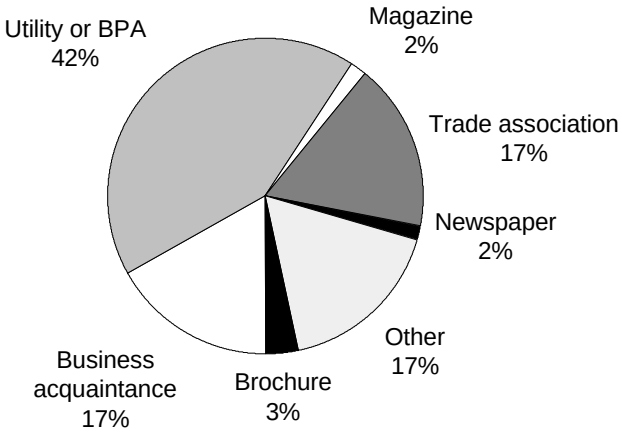
PARTICIPATION RATES

Since the Lighting Design Lab opened in 1989, over 16,000 visitors have passed through its doors. The accompanying charts give breakdowns of the Lab's user project locations and the means by which participants heard of the Lab.

LDL PROJECT LOCATIONS



SOURCE OF REFERRALS TO THE LAB



Cost of the Program

Costs Overview Table	Donations From Others (x1000)	SCL (x1000)	BPA (x1000)	Total Program Cost (x1000)	Percent SCL Contribution
1988	$0.0	$21.4	$3.1	$24.5	87.3%
1989	$259.2	$105.7	$530.3	$895.2	11.8%
1990	$130.8	$125.0	$281.3	$537.1	23.3%
1991	$133.2	$178.9	$311.5	$623.6	28.7%
1992 (3Q)	N/A	$88.7	$219.9	$308.7	28.7%
Total	$523.3	$519.7	$1,346.1	$2,389.0	21.8%

[R#1] N/A : Not Available

LDL is paid for by an agreement between Bonneville Power Administration and Seattle City Light. BPA has agreed to pay approximately 70% of the costs, while SCL is required to raise the balance through its own funds, contributions, and money from the Lab's expanding core of sponsors. The Lab is currently working to arrange sponsorship with Washington Water Power, Idaho Power, and Western Area Power Administration.

In 1991, the Lighting Design Lab won the blessing of the regional Long Term Commercial Acquisition Advisory Committee. The lab was seen as an essential support service for regional acquisition of conservation resources. BPA agreed to extend the Lighting Design Lab budget for the next five years.[R#2,10] LDL's annual budget is approximately half a million dollars based on annual expenditures from 1990 and 1991, years when startup costs were no longer being incurred.[R#5] The budget for the first full operating year was $895,161. This however, was cut back to $536,070 in 1990 and $624,754 in 1991.

COST COMPONENTS

The budget can be divided into the following categories: salaries (including temporary help and consultants), instrumentation (including testing equipment), tools, office equipment, audio-visual equipment, computers, furniture, phones, library materials, utilities, copy machine rental, and lease payments. The budget also covers travel costs, office supplies, and printing. The largest ongoing costs to the Lab are, in declining order, salaries,consulting contracts and lease costs.

The construction budget was estimated based on costs per square foot of other lighting labs (e.g. Lightolier's design center in Seattle) and site planning work. Construction costs totaling $418,578 came in below budget and savings went toward lease costs.[R#5]

LDL depends on lighting manufacturers to donate products to the lab. Over $100,000 in products have been donated since 1988. LDL has a product donation policy which screens products for energy efficiency and proper certification. [R#10]

LIGHTING DESIGN LAB BUDGET SUMMARY

Costs	1988	1989	1990	1991	4-Year Total
Utilities	0	4,806	6,408	6,408	17,622
Lease/Construction	48,102	559,817	60,000	60,000	727,919
Maintenance	0	5,625	7,500	7,500	20,625
Instrumentation	16,350	0	0	0	16,350
Tools	2,360		300	300	2,960
Typewriter/Ans. Machine	1,456	0			1,456
Audio-Visual Equipment	10,110	0	0	0	10,110
Computers	31,307	9,647	0	0	40,954
Furniture	30,000				30,000
Office Supply/Printing		3,300	3,650	3,650	10,600
Salaries		139,225	156,209	163,696	459,130
Temporary Librarian		4,767			4,767
NRDC Contract	2,100	6,300	8,400	8,400	25,200
NCAC Contract	5,368	11,072	17,262	18,125	51,827
Consulting Contracts		84,198	112,077	117,305	313,580
Travel	336	1,680	2,116	2,216	6,348
Phones		4,000	6,000	6,000	16,000
Copy Machine & AV Rental		7,700	8,600	8,600	24,900
Library Materials	4,400	4,400	4,500	4,500	17,800
Unbudgeted Costs Offset by Contributions					
UW Daylighting Lab		40,000			40,000
UW Daylighting Staff		12,800			12,800
Manufacturers' Donations		25,000	35,000	35,000	95,000
NRDC Salaries		24,000	25,200	26,460	75,660
TOTAL	151,889	948,337	453,222	468,160	2,021,608

[R#5]

Note: The table above reflects budgeted data, not actual costs.

Lessons Learned / Transferability

The following are the lessons learned by SCL staff as a result of the first four years setting up and operating the Lab.[R#5]

1. How and by whom products are selected and displayed in mock-ups is a highly complex issue, including questions of product selection (assuring fair comparisons), proprietary design (who gets to see the mock-up), and costs (in the event of limited viewing). A mock-up policy statement was generated to clarify responsibilities.

2. Need for an auditorium was clear from the outset. Seminar and class uses exceeded original projections. Lab personnel believe that any new facility should include an auditorium-type space.

3. Clarity in Partnership. Expectations of and between co-sponsors should be thoroughly thought out and made clear. Everyone involved needs to know who is expected to do what, when, and where in order to assure a common vision and equal dedication to product success.

4. Complete financial arrangements. Public sector sponsors are tightly constrained by inflexible budget processes, accounting requirements, and in the ability to receive and use financial contributions, class fees, etc. Depending upon project circumstances and local political conditions, financial and accounting creativity may be necessary. Consideration might be given to setting up a special corporate entity to operate the project.

Funders of other facilities based on the Lighting Design Lab should think long-term with regard to securing funding for a substantial period of time. Though BPA agreed to fund the lab for an additional five years after the initial three year pilot, this is considered fortunate. “Given the volatility of BPA revenues in 1992, the Lab would probably have received different treatment if the decision to extend for five years had been made at a later date.”[R#15]

5. Reliance on donations. Use of donated fixtures, controls, etc. was seen as a way to meet the project cost share requirements. This approach worked but not without considerable delays in product delivery. On the other hand, the use of donations resulted in investment and support by the manufacturer representatives in the region. Consideration should be given to establishing a fixture budget to allow outright purchase of most, if not all, equipment. Be sure to budget for future lamp replacement units.

6. Staffing. All staff at the Lighting Design Lab operate with exceedingly full work loads. Additional staffing needs are a half-time Assistant to the Stage Technician, a back-up receptionist to cover for lunches and breaks as well as keeping computer information current for the mailing list and evaluations plans.

7. Residential demand. Even though the Lighting Design Lab is intended to be used by the commercial sector, residential customers also periodically walk-in and inevitably take hours of the Lighting Specialist's time. As a result of this "pent-up demand," a residential lighting specialist has been hired part time. This allows the Lab receptionist to schedule appointments in advance to maximize the residential sector without compromising the mission of the lighting Design Lab.

8. Odd-hours use. Seattle City Light staff has found that they need to be prepared to work until eight or nine o'clock at night to meet the demand for the facility's use. Also, before-hours appointments have been necessary to schedule meetings with architects, engineers, and consultants. The Lighting Design Lab handles this by allowing staff flex-time arrangements. Staff can leave when the work is done. To date, staff volunteer to work odd hours and rotate if necessary.

9. One of the clear lessons from the Lab is that able staff are a better investment than interactive computer displays. Visitors would much rather talk to a real person than interact with a computer.

10. The original marketing and education budget should be increased to cover increased mailing costs and more advanced audio-visual equipment.

11. Rob Watson, editor of the original manual on the creation of the Lab, "The Cookbook", commented that in retrospect the lab would have benefitted from more space, in particular some "dedicated vignettes," permanant mock-ups comparing old-style inefficient lighting with new high efficiency lighting design.[R#2]

12. Dulce Setterfield,of the Bonneville Power Administration, noted that though the cumulative number of visitors is known, there is no data as to whether those are first time visitors, returning clients, or participants in business meetings. Though the Lab needs to count total visitors, this cumulative number needs to be supplemented with user breakdowns.[R#15]

13. If an organization that develops a Lab facility also runs other conservation programs, a plan for internal coordination (information sharing and teamwork) should be developed. The Lighting Design Lab was part of the Energy Smart Design program through BPA. Better coordination between programs can provide records of use from within the ESD program, and optimize availability of regional data.[R#15]

14. The mock-up room took longer to be completed than other components of the Lab. In order for a mock-up room to be ready for a Lab's opening, some up front planning may be needed to avoid conflicting priorities, such as a stage technician completing the installation of donated products and gettting the mock-ups underway.[R#15]

TRANSFERABILITY

In regard to the development of other labs as a result of the influence of Seattle Lighting Design Lab, Rob Watson felt that: "There is no question that LDL has spurred other technical application centers, such as those at Southern California Edison (Customer Technology Application Center) and Pacific Gas and Electric (Pacific Energy Center). Though these programs do not focus exclusively on lighting many of their features reflect lessons learned at the Lab." The Swedish State Energy Board and Stockholm Energi are building a replica of the Lab in Sweden.

Dulce Setterfield notes that, "Lighting is something visible and psychologically powerful; there is more to "show" with lighting than most other commercial building technologies. Utilities like Snohomish PUD have found that LDL's exhibits draw more ESD clients than anything else at a PUD tradeshow booth. The Lab becomes the conversation piece that draws commercial customers to utility programs."

The success and competence of the Lighting Design Lab program has sparked interest all over the world. The project and the lessons learned have been documented from the very begining in order to facilitate transferability and foster insight for use in new projects.

References

1. Diana Campbell, Project Manager, Lighting Design Lab, Seattle City Light, personal communication, September - November, 1992.

2. Rob Watson, Research Associate, Natural Resources Defense Council, personal communication, October 1992.

3. Lighting Design Lab, "Innovative Lighting Application in a Retail Mall," January 1992.

4. Julie Nelson, "Evaluation of the Lighting Design Lab's Consultation Program," Seattle City Light, 1991.

5. Diana Campbell & Rob Watson, "The Cookbook," Lighting Design Lab, Seattle City Light, 1990.

6. Lighting Design Lab, "A Daylighting Strategy That Makes the Grade," January 1992.

7. Lighting Design Lab, "Efficient Lighting for Elegant Dining," July 1991.

8. Brian Coates and Joan Weeda, "User's Perceptions of Lighting Design Lab Services," Seattle City Light, 1990.

9. Washington State Energy Office Dispatch, "High-Tech, High-Touch Ideas," July/August, 1989, Volume 13, #4, page 2.

10. Lighting Design Lab, "Lessons Learned 1992," Seattle City Light, 1992.

11. Bonneville Power Administration, "1990 Fast Facts."

12. Eric Hirst, "Cooperation and Community Conservation," Final Report, Hood River Conservation Project, DOE/BP-11287-18, June 1987.

13. Energy Management Services Division, Seattle City Light, "Energy Conservation Annual Report: 1991," 1992.

14. Seattle City Light, "1991 Annual Report", 1992.

15. Dulce Setterfield, Bonneville Power Adminstration, personal communication, October 1992.

16. Seattle City Light, "Fingertip Facts for the Year Ending December 31,1991." SCL, 1992.

17. Dennis Pearson, Energy Research and Evaluation Analyst, Seattle City Light, personal communication, November 1992.

Note: For further information and to receive copies of [R#5,10] contact the Lighting Design Lab at: 400 East Pine Street, Suite 100, Seattle, WA 98122. Toll free phone (800) 354-3864, out of state (206)325-9711, FAX (206)329-9532.

Special thanks to Diana Campbell, Dulce Setterfield, Dennis Pearson, and Rob Watson for their guidance in the development of this profile.