The Green Lights Program: Progress to Date and Lessons Learned

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Green Lights is a voluntary program sponsored by the U.S. Environmental Protection Agency. Its goal is to prevent pollution by encouraging major organizations to adopt energy-efficient lighting throughout their facilities nationwide within a five year period. Green Lights has recruited over 500 participants, and is supporting their implementation efforts with a variety of technical tools and support services. Several barriers to energy-efficient lighting were identified during the development of the Green Lights Program; the paper describes the program's method of surmounting those barriers, discusses the lessons learned, and identifies directions for future effort.

Introduction

The Environmental Protection Agency's Green Lights Program was launched in January 1991. The program's goal is to prevent pollution by encouraging major U.S. institutions--businesses, governments, and other organizations--to use energy-efficient lighting. Because lighting is such a large consumer of electricity (about 25% of the national total) and so wasteful (more than half the electricity used for lighting is wasted by inefficient technology and design practices), energy-efficient lighting offers a substantial opportunity to prevent pollution, and to do so at a profit (EPRI, 1990). Lighting upgrades reduce electric bills and maintenance costs and increase lighting quality; typically, investments in energy-efficient lighting by Green Lights Partners yield 20-30% rates of return per year.

To put the environmental benefits of energy efficiency in perspective, every kilowatt-hour of electricity not used prevents the emission of 1.5 pounds of carbon dioxide (the most important greenhouse gas), 5.8 grams of sulfur dioxide (a principal component of acid rain), and 2.5 grams of nitrogen oxides (precursor to both acid rain and smog), as well as the pollution attendant upon mining and transporting powerplant fuels, and disposal of powerplant wastes (ICF, 1992). If energy-efficient lighting were used throughout the Nation wherever profitable, the nation's demand for electricity in the year 2000 would be cut by over 225 billion Kwh, leading to 4-7% reductions in the emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides (U.S. Department of State, 1992). In terms of carbon dioxide, energy-efficient lighting offers the same pollution prevention opportunity as taking 42 million cars off the road, the equivalent of one-third of the U.S. fleet.

Green Lights promotes energy-efficient lighting by asking major institutions to sign a Memorandum of Understanding (MOU) with the EPA; in this MOU, the signatory commits to install energy-efficient lighting in all of their facilities nationwide over a 5-year period, but only where it is profitable and where lighting quality is maintained or improved. ("Profitable" is defined as an upgrade project that, from the end-user's perspective, provides a post-tax internal rate of return equal to or greater than the prime rate plus six percentage points.) EPA, in turn, offers program participants a portfolio of technical support services to assist them in upgrading their buildings.

The program operated with 2 full-time staff and $1.5 million in FY 1991; in FY 1992, the program had 3 full-time staff and $3.0 million.

Program Development

The World of Energy-Efficient Lighting in 1990

The environmental and energy crises of the last 20 years focussed considerable attention on the benefits of efficient lighting energy use. Manufacturers introduced a wide variety of efficient lighting products which offered comparable or superior performance compared with garden-variety hardware. Numerous governmental, utility, public-interest, and manufacturing organizations promoted the use of energy-efficient products, with some success. These programs typically included education of the public and the "trades", literature distribution, free or reduced-cost distribution of efficient products, increasingly sophisticated codes and standards, and legislative or regulatory initiatives to force the use of efficient technologies.

Despite these efforts, and in spite of the superior operation and lower life-cycle costs of efficient lighting

technologies, only modest inroads could be claimed by the end of 1990. For example, the 34W "energy saver" fluorescent tube had captured one-third to one-half of the 4-foot fluorescent market, but the higher quality (and more efficient) "T-8" lamp's market share lingered in the single digits. The standard magnetic ballast had been eliminated from production by Federal law, but the most efficient option remaining on the market--the high frequency electronic ballast--had captured only a small market share in competition with the cheaper efficient magnetic and hybrid cathode-cutout ballasts. Compact fluorescent lamp shipments were growing rapidly, but still represented a tiny share of the Edison socket market. Control technologies were increasing in popularity, but most end-users still considered them an unproven novelty (EPA et al., 1992). New construction continued to be dominated by a lowest-first-cost mentality, cookie-cutter design, and appalling maintenance practices.

Program Development: Finding the Formula

U.S. EPA's mandate is to protect the natural environment and human health from pollution. Increasingly, the Agency's approach to its mandate has focussed on "pollution prevention," as opposed to end-of-pipe pollution control. In 1989, EPA's Global Change Division identified lighting efficiency as a priority pollution-prevention opportunity; large percentage efficiency gains were possible (with all of their attendant life-cycle environmental benefits), and because the financial aspects of efficient lighting are so attractive, these savings could be realized at a profit. However, the programmatic puzzle remained: if the technology was so attractive, and so many other institutions were promoting it, why wasn't it more successful? How could EPA accelerate the process?

To answer that question, the EPA staff embarked on a series of interviews with major end-users of lighting: leading businesses, governmental agencies, property developers, utilities, etc. Personnel interviewed included senior executives, energy, environmental and facilities managers, maintenance staff, and financial analysts. In addition, consultant studies were commissioned (Barakat and Chamberlin, 1990). Several key barriers were identified:

(1) Low Priority: Lighting is not a high priority for the vast majority of U.S. institutions. Typically the province of facility management, lighting is viewed as just another overhead item. Because of the low priority assigned to lighting, most facilities are outfitted with the lowest first-cost (rather than the lowest life-cycle cost) lighting systems, and profitable opportunities to upgrade the system are ignored or passed over in favor of less lucrative, but higher visibility projects. As a result, institutions pay needless overhead every year, reducing their own competitiveness and that of the country. And, wasteful electricity use is a particularly senseless source of pollution.

(2) Information and Expertise: Lighting technologies and design strategies are diverse and sometimes complex. To arrive at an energy-efficient lighting solution for a particular space requires accurate, comparable information about dozens of lighting technologies, design ability, and an investor's eye for long-term profit. Unfortunately, information is often scarce or suspect, design is frequently overlooked in favor of outdated "cookie-cutter" solutions, and few institutions focus on lighting as a profit (rather than cost) center.

(3) Financing: In existing buildings, the lighting system is usually working, and any improvements are traditionally viewed as an expense, despite the fact that they are actually an investment that is frequently more profitable, and lower risk, than any other investment the company might make. Even where lighting investments are demonstrably more lucrative than other investments, companies will sometimes have different "hurdle rates" for different kinds of investments: a low one for core business investments, and a higher one (paradoxically) for lower-risk cost-cutting investments. Smaller businesses and governmental agencies frequently have no capital to spare for any cost-cutting investment, and accept paying a higher operating overhead year after year.

(4) Split incentives: There is often no incentive to upgrade lighting systems. For example, a typical lease in a master-metered building requires the tenant to pay a fixed rent, which includes a pro-rata share of the building's utility charges. If that tenant wanted to upgrade the lighting system and reduce their electricity consumption, the lease would need re-negotiation to allow pass-through of the savings. In addition, without direct metering, it is difficult to validate the exact amount of savings due to that tenant. Contrawise, with all of the utility charges passed through to the tenants, the owner rarely sees it in his interest to install more efficient lighting systems when the building is first built, especially if the building is to be sold soon after commissioning. Instead, the lowest first-cost system is chosen.

(5) Fragmented Selling: Most lighting manufacturers produce and market only one kind of product: lamps, ballasts, fixtures, and so on. However, the lighting purchaser needs systems composed of many different products, and need "system thinking" from their vendors. Vendors, in turn, are frustrated by the low priority

assigned to lighting by most major businesses, and by their lack of understanding of the importance of good lighting.

(6) Restricted Market: Because energy-efficient lighting has captured only a tiny fraction of the overall lighting market, unit prices have often been high compared with the "garden variety" products they replace. When new technology is introduced, R&D costs and new factories have to be amortized, and the unit marketing costs for low-volume products further raises the price. Distributors are often reluctant to reserve valuable shelf space for slower-moving products. Innovations are slow to penetrate the marketplace. As a result, energy-efficient lighting hardware has remained expensive, further slowing its penetration in the marketplace.

The size and complexity of the problem dwarfed the resources that EPA had available. A search was made for programmatic options that would play to EPA's strengths and offer the largest possible multiplier effect for our effort. EPA sought a catalytic or revolutionary impact.

In the course of discussions with lighting end-users, EPA developed a menu of programmatic options that could be used to promote energy-efficient lighting. Some--such as producing informational materials, working with the industry, or establishing demonstration centers--were deemed valuable, but offered little likelihood of a revolutionary change in lighting. Others--such as working for utility regulatory reform or improved tax treatment for lighting upgrades--offered substantial long-term benefits, but only at the price of years of arduous effort.

One proposed approach, however, promised revolutionary results: voluntary corporate leadership by major end-users. EPA Global Change Division had tested this program format during the phase-out of chlorofluorocarbons (CFCs). International treaties and U.S. law required producers of these chemicals to reduce their output of these ozone-depleting chemicals, but placed no restriction on consumers. EPA approached some of the largest end-users of CFCs and offered to work cooperatively with them, on a voluntary basis, to speed their exit from CFC-based technologies. The benefits of working with EPA were considerable: access to a cooperative research network, potentially reduced operating costs (replacement technology has often proved lower-cost than CFC-based technology), and recognition from the public as an environmental leader. The program was highly successful, with many of the largest CFC end-users joining the initiative.

The most important benefit of the corporate leadership approach is its ability to mobilize major organizations around parallel public and private goals. Given the massive impact that large organizations (such as top corporations or state governments) have on the lighting market, corporate leadership offered the opportunity to leapfrog the American lighting market into the 21st century.

Working from the CFC phase-out example, a Green Lights Memorandum of Understanding was drafted and offered to a small group of companies for review. Comments were offered, the MOU was modified, and circulated for further comment. After a few more review rounds, consensus emerged on the shape of Green Lights. Companies would be asked to do all of the efficient lighting that was profitable, thereby making it, in a quite literal sense, a no-lose proposition. (This simplified marketing to a considerable extent compared with other approaches, such as a Watts-per-square-foot type of test.) Secondly, companies would have complete discretion over technology choice; given the diversity of facility uses across the country, it was considered unwise to write prescriptions from Washington. Third, the MOU specifically urged the participants to do nothing that could compromise lighting quality; given the huge savings that were available with enhanced quality, there is no excuse for permitting quality to degrade. Finally, reporting requirements were kept simple: EPA asked the participants to submit an annual report which summarized the kind of information the company would be collecting anyway.

In the same MOU, EPA promised to remove the barriers that might stand in the way of successful implementation of the program. The specific solutions promised by EPA in the MOU (all of which were implemented in the program's first year) include:

(1) Priority: By signing the Green Lights Memorandum of Understanding, a corporation's senior management makes clear that energy-efficient lighting is now one of the business' high priorities. Authority is granted, budgets are approved, procedures are streamlined, and staff are assigned to make the upgrades happen. When top decisionmakers are involved, the traditional turfsmanship, bureaucracy, and diffusion of responsibility in large organizations can be avoided.

(2) Information/Expertise: On November 4, 1991, Green Lights released its Decision Support System, the most sophisticated lighting survey and economic analysis

software available (based on comparisons with 35 existing softwares available in 1991). The system allows a building surveyor to rapidly inventory the current lighting system, and choose from over a thousand different upgrade options to find the system that will be most energy-efficient. The financial analysis is done on a life-cycle basis, and allows the user to capture all relevant streams of costs and benefits, including taxes and depreciation, operation and maintenance expenses, and the potential benefits of improved lighting quality. The software is offered to Green Lights participants free of charge at a series of training workshops held twice a month around the country.

A second product created by Green Lights is the National Lighting Product Information Program (NLPIP), based at Rensellaer Polytechnic Institute's Lighting Research Center. NLPIP produces name-brand reports on lighting hardware, covering dozens of manufacturers and models. All data are gathered using standardized procedures and allow direct comparison between competing products for all relevant performance characteristics. These reports are sent free of charge to all Green Lights participants. By the end of 1992, "Specifier Reports" will be produced for electronic ballasts, power reducers, reflectors, compact fluorescent lamps, occupancy sensors, and parking lot luminaires.

Green Lights is also working with several lighting professional societies to build national certification programs for lighting professionals. This will permit individuals with true expertise in lighting to demonstrate their skills and distinguish themselves in the marketplace.

(3) Financing: Green Lights has developed a registry of financing resources. First offered in February 1991, it has since been updated twice. The registry provides detailed information on over 200 utility programs that offer lighting rebates and free installations to their customers. It also provides a directory of more than 75 companies that can finance lighting efficiency upgrades using leasing, shared savings, guaranteed savings, and other financing techniques. The registry is provided free of charge to all Green Lights participants and to the public via the Green Lights Bulletin Board.

(4) Split Incentives: Green Lights has initiated a project to develop standard lease language that will remove the split incentive barrier, and will encourage participants to use the model language in lease negotiations. The program is also working to accelerate the adoption of submetering by encouraging Partners to submeter their lighting upgrades.

(5) Fragmented Market: The Green Lights Allies programs have been developed to address this barrier. Green Lights Allies are members of the lighting manufacturing and service industries as well as electric utilities, who join Green Lights on terms very similar to those of the Green Lights Partners. However, in addition to committing to upgrade their facilities, Green Lights Allies also commit to assist EPA and the Green Lights Partners successfully implement the program. Allies have delivered on this commitment in a variety of ways: recruiting new Partners, providing data to the National Lighting Product Information Program, helping to design the Decision Support System, and advertising their membership in and allegiance to the principals of the Green Lights Program.

(6) Restricted Market: The program is catalyzing a rapidly increasing demand for energy efficient lighting products, with visible impacts on shipment volumes and prices. New competitors are entering the market, bringing innovative technologies and further price and service competition. Green Lights and other lighting efficiency program are projected to increase the market share of energy efficient lighting products from its current 5% to around 40% by 1995 (EPA et al., 1992). Prices of some products have been already been falling (by as much as 25% in the last 12 months), and are expected to continue declining as shipment volumes increase (Confidential manufacturer data, 1992).

Program Status

Recruitment

At the end of January 1991, Green Lights had 48 participants. As of May 26, 1992, 537 institutions had signed Memoranda of Understanding with EPA to join Green Lights (see Figure 1). This number includes 238 Corporate Partners, 21 Government Partners, 175 Manufacturer Allies, 53 Lighting Management Company Allies, and 37 Electric Utility Allies. (Signatory lists are found in Table 1.) In addition, 13 trade and professional organizations have endorsed the program. The current program participants collectively own or lease 2.2 billion square feet of facility space, about 3% of the national total. This is equivalent to all of the office space in New York, Chicago, Washington, Los Angeles, and Houston combined.

Implementation

Green Lights participants have five years to complete their lighting upgrades. The typical plan for most companies

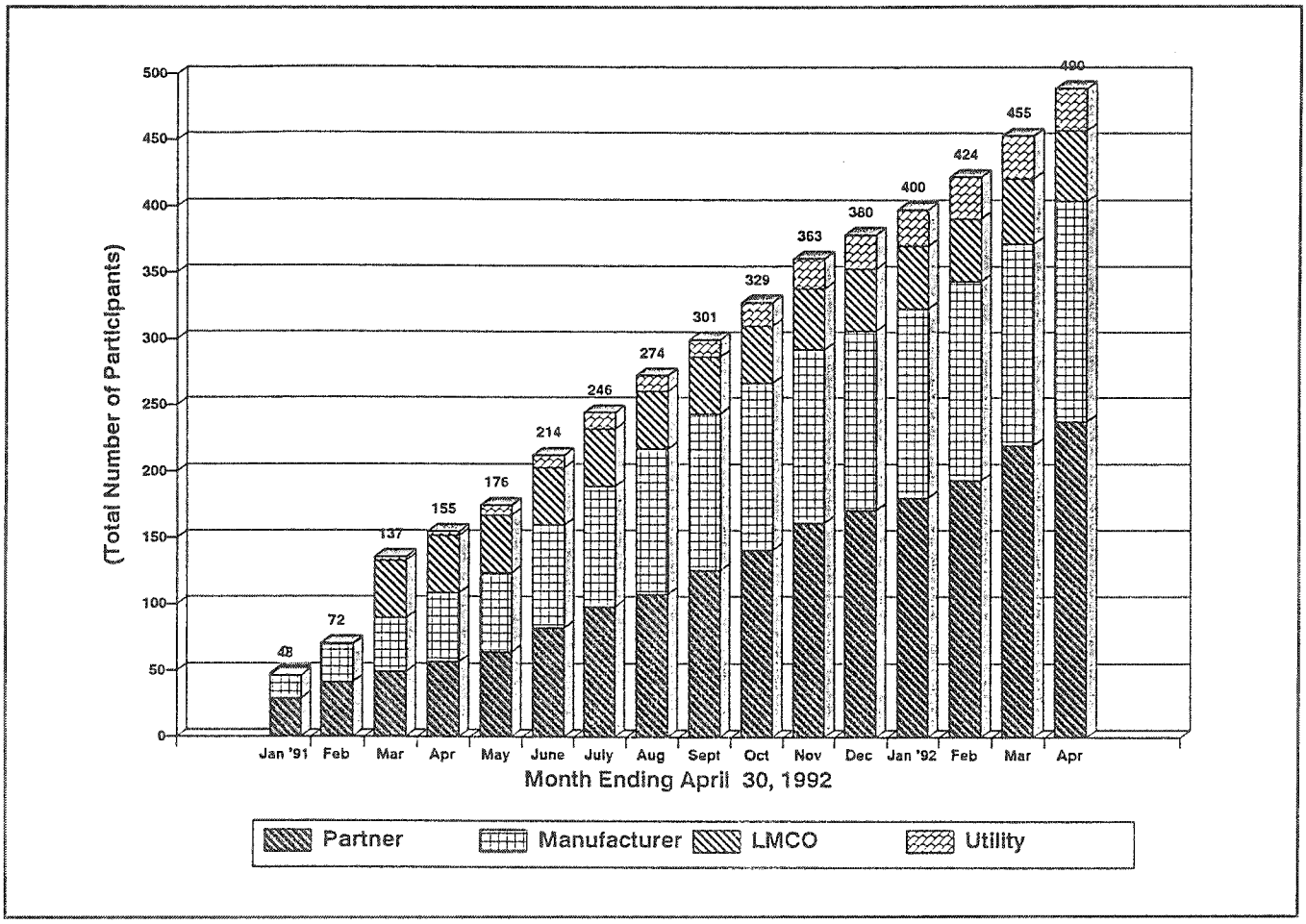

Figure 1. Recruitment of Green Lights Participants, by Month

has been to use the first year or two in surveying buildings, developing expertise, training staff, and acquiring budgets. The first two years also include, in most cases, some lighting upgrades; this helps with the training process, and allows staff to develop procedures for budgeting, procurement, installation, contracting, reporting, etc.

Years three and four will be the time of major upgrades by the Green Lights participants; several participants are planning national upgrade procurements to hire firms that will supply materials and installation labor for all of their facilities.

Green Lights staff and contractors assist participants in implementing the program. The program offers two-day training courses twice a month across the country. The training courses feature an intensive introduction to energy-efficient lighting, instruction on the use of the Decision Support software, and ideas on how to be an effective project manager. Green Lights staff and contractors have also conducted more specialized meetings at participants' buildings, either to help perform a lighting survey, or to help the company organize its resources to implement Green Lights. The program also operates two hotlines: the Customer Service Center answers general questions about the program, and mails out program materials (approximately 2000 envelopes per month), while the Lighting Services Group operates a hotline for Partners with technical questions. Participants also receive a monthly newsletter, The Green Lights Update. Finally, the Green Lights Electronic Bulletin Board came on-line on March 2, 1992.

Because program participants report their progress on an anniversary basis, only the signatory "classes" of January-April 1991 have reported thus far. Several non-anniversary participants have also submitted interim reports on their progress to date. All told, as of April 30, 1992, 435 buildings were in the officially-reported

Table 1. List of Green Lights Participants as of May 26, 1992 (537 Total)

CORPORATE PARTNERS
(238 total)

A & C Enercom
Abbott Laboratories
AES Corporation
Alaska Airlines, Inc.
Albany General Hospital
ALCOA
Alliance for Environmental Education
Alliance to Save Energy
American & Efird Inc.
American Council for an Energy Efficient Economy
American Express Company
American Public Power Association
American Standard, Inc.
Amoco
ARCO
Aristech Chemical Corporation
Ashland Oil, Inc.
Automatic Data Processing, Inc.
B.P. Exploration
B.P. Exploration-Alaska
Baldor Electric Company
Bank of America
Bath Iron Works
Bay Area Hospital
Baxter Healthcare Corporation
Bechtel
Bell Atlantic
Bellcore
BellSouth Telecommunications
Blue Cross & Blue Shield Mutual of Ohio
Boeing
Boulder Valley Public School District
E.J. Brach Corporation
Brooklyn Union Gas Company
Brown University
Browning Ferris, Inc.
The Bruce Company
California State University System
Canyon Ranch
Carnegie Mellon University
Carolina Freight Carriers Corporation
The Oliver Carr Company
Carrier Corporation North America
The Catalyst Group
Caterair International Corporation
Central Carolina Bank
Chemical Bank
Chevron
Childhelp USA
Citicorp / Citibank
Citizen's Photo
Cleveland State University
Colonial Pacific
Colonial Pipeline
Columbia University
COMPAQ Computer Corporation
Continental Insurance
Cox Newspapers
Cracker Barrel Corporation
Crestar Bank
CTEC Corporation
Data General Corporation
Dean Witter Realty
Defender Services, Inc.
The Dexter Corporation
Digital Equipment Corporation
DMB Associates, Inc.
Dock Resins Corporation
Domino's Pizza Corporation
Downtown Plaza Towers Associates
Dresser Rand
Duracell U.S.A.
Eaton Corporation
Electric Power Research Institute
Elkhart General Hospital
Energy User News
Enron Property Company
Environmental Defense Fund
First Data Resources, Inc.
First National Bank of Chicago
G.M. Popkey Company, Inc.
General Dynamics Corporation
Genovese Drug Stores, Inc.
Georgia Institute of Technology
Gerber Products Company
The Gillette Company
Gibson Speno Companies
The Goodyear Tire & Rubber Company
Government Development Bank of Puerto Rico
GPU Services Corporation
Grainger
Gross Enterprises
GTE
Grumman Corporation
Hasbro, Inc.
Haworth, Inc.
Hewlett-Packard Company
Hoechst Celanese
Home Box Office
The Home Depot
Honeywell Inc.
Hope Network
Horizon Air Industries, Inc.
Humana, Inc.
ICF International
IMS America Ltd.
INOVA Health Systems
IPS Electric and Midwest Gas
International Technology Corporation
ITT Corporation
Jaakko Poyry
Jantzen, Inc.
Jay Peak Ski and Summer Resort
Jewel Food Stores
Johnson Controls World Services
Johnson & Johnson
Karastan Bigelow
Kenyon Oil Company Inc.
Kerr-McGee Corporation
KinderCare
Kolar Management, Inc.
Leon County School Board
L.L. Bean, Inc.
LTV Aerospace and Defense Co.
Eli Lilly and Company
Lockheed Corporation
Lone Star Steel
Louisville & Jefferson County Metropolitan Sewer District
Louisville Resource Conservation Council
Lyondell Petrochemical Company
MagneTek, Inc.
Marriott Corporation
Martin Marietta Corporation
Maryland Science Center
Massachusetts Institute of Technology
Mattel, Inc.
Maytag
McKeesport Hospital
McNeil Real Estate Management
Meadowcreek
Medcenter
Medical College of Ohio

Table 1. List of Green Lights Participants as of May 26, 1992 (537 Total) (continued)

The Melville Corporation
Memorex Telex
Metropolitan Water Reclamation District of Greater Chicago
Fred Meyer, Inc.
Herman Miller, Inc.
3M
Mobil Corporation
Monsanto Company
Motorola Incorporated
NYNEX Corporation
National Semiconductor Corporation
National Service Industries, Inc.
National Westminster Bancorp, Inc.
National Wildlife Federation
Natural Resources Defense Council
NBD Bank, N.A.
New Canaan YMCA
Nestle USA
Nike, Inc.
North American Philips Corporation
North Carolina Alterative Energy Corporation
North Ottawa Community Hospital
Northern Arizona University
Northern Illinois Medical Center
Northwood School District
Odyssey of America
OECO Corporation
Okaloosa-Walton Community College
One Marconi Place, Inc
Oxford Properties Florida, Inc.
Palmer Bellevue Corporation
Pasadena City College
Perry Drug Stores
Phillips Petroleum Company
Pima Community College
Polaroid Corporation
Preston Trucking
Provident Life & Accident Insurance Company
Redlands Federal Bank
Reliance Standard Life Insurance
Richman Gordman Inc.
Ricoh Electronics, Inc.
SAIC
St. Elizabeth Medical Center
St. Michael Hospital
St. Paul Fire and Marine Insurance
Joseph E. Seagram and Sons, Inc.
Sealed Air Corporation
Service Merchandise Company
Shell Oil Company
Southwire Company
Stamats Communications, Inc.
State Farm Mutual Automobile Insurance Co.
Straub Clinic and Hospital
Student Loan Marketing Association (SALLIE MAE)
Sun Company, Inc.
Supermarket General Corporation
Super Valu Stores, Inc.
Tenneco Minerals
Tampa General Hospital
Texaco Inc.
Texas Air Control Board
The Old North Church
Thrift Drug, Inc.
Toshiba America, Inc.
Trade Press Publishing Corporation
Transamerica Corporation
Tufts University
Turner Broadcasting Systems
Underwriters Laboratories Inc.
Union Camp Corporation
Union College
University Corporation for Atmospheric Research (NCAR)
University of Georgia
University of Illinois at Chicago
University of Miami
University of Redlands
University of Southern Maine
US Bancorp
USF&G
US West, Inc.
USX
Wachovia Corporation
Walton Monroe Mills Inc.
Warner-Lambert Company
The Washington Times
Waste Management, Inc.
Western Digital Corporation
Westin Hotels & Resorts
Westminster College
Whirlpool Corporation
White Castle Systems, Inc
Wolverine World Wide
World Resources Institute
Xerox Corporation
Yellow Freight System, Inc.

GOVERNMENT PARTNERS (21 total)

The State of California
The State of Florida
The State of Hawaii
The State of Idaho
The State of Maine
The State of Maryland
The State of Massachusetts
The State of Missouri
The State of Nebraska
The State of Oregon
The State of South Dakota
Virgin Islands, Government of the United States
The City of Naperville, Illinois
The City of Houston, Texas
The City of Portland, Oregon
The Town of Northwood, New Hampshire
The City of Tallahassee, Florida
Broward County, Florida
Dade County, Florida
Douglas County, Oregon
Hillsborough County, Florida

MANUFACTURER ALLIES (175 total)

A.L.P. Lighting + Ceiling Products
Advance Control Technologies, Inc.
Advance Transformer Company
Amalco Metals, Inc.
American Electric
American Energy Management
American Illuminetics, Inc.
American Lighting Corporation
American Lighting Systems
American Louver Company
American Systems and Services
Appliance Control Technology, Inc.
Area Lighting Research
Art Directions Inc.
Badger USA, Inc.
Brayer Lighting, Inc.
Bright Side Lighting
Brownlee Lighting
Bryant Electric
Canterra Electronics International
Columbia Lighting, Inc.

Table 1. List of Green Lights Participants as of May 26, 1992 (537 Total) (continued)

Control Systems International
Cooper Lighting
C.E.W. Lighting, Inc.
CMB Associates, Inc.
CSL Lighting Mfg., Inc.
Dark To Light Inc.
Davis Controls Corporation
Dazor Manufacturing Corporation
Digecon
DuraLux Industries
Duray Fluorescent Manufacturing
Duro-Test Corporation
Dynamic Energy Products, Inc.
East Rock Manufacturing and Technologies
Edison Price Lighting
Elba USA, Inc.
Electronic Ballast Technology, Inc.
Emergency Safety Products, Inc.
Energy & Environmental Lighting Services
Energy Dezign Corporation
Energy Saving Products, Inc.
Enersave Company
Enertron Technologies
Enterprise Lighting, Inc.
Environmental Energy Group
ESCO International
Etta Industries
Exitronix Division of Barron Manufacturing
Fail-Safe Lighting Systems
Feit Electric Company
First Lighting
Flexiwatt Corporation
Flexlite Inc.
FTI
FulCircle Ballast Recyclers
GE Lighting
The Genlyte Group
Guardian Lighting Controls, Inc.
Harris Manufacturing, Inc.
Heath Company
Hetherington Industries
Holophane Company, Inc.
Honeywell Inc.
House O' Lite
Hubbell Incorporated, Lighting Division
Illumination Control Systems
Indy Lighting
International Conservation Equipment, Inc.
International Energy Conservation Systems
Janmar Lighting
Jedcor Energy Management Company, Inc.
Johnson Controls, Inc.
K-Lite Division of ICI Acrylics/K-S-H Inc.
Kenall
Kilowatt Saver, Inc.
Kim Lighting
The Kirlin Company
Lamar Lighting Company
LexaLite International
Light Energy Corporation
Lighting Resources, Inc.
LightMedia Corporation
Lightron of Cornwall, Inc.
Litetronics International
Lights of America
Lightway Industries
Litecontrol
Lithonia Lighting
Lorin Industries
Lumatech Corporation
Lumax Industries, Inc.
Magnaray International
MagneTek, Inc.
Megalite Corporation, Inc.
Mercury Recovery Services
MetalOptics, Inc.
3M
MirrorLight, Inc.
ML Systems
Moldcast, a division of USI Lighting
Mor-Lite
Motorola Lighting, Inc.
Mule Emergency Lighting
MyTech Corporation
National Lighting Company
Neonix
NOVA Conservation and Load Management
Novitas, Inc.
NRG Lighting Inc.
Omega Energy Inc.
Optical Coating Laboratory Inc.
Optilight, Inc.
OrEqual, Inc.
OSRAM Corporation
Paramount Industries
Parke Industries, Inc.
Parrish Lighting and Engineering, Inc.
Peerless Lighting Corporation
Peschel Energy, Inc.
Philips Lighting Company
Powerline Communication
Pre Finish Metals, Inc.
Prescolite, division of USI Lighting
Prescolite Controls, Inc.
Prime Ballast
Pritchett Wilson Group
Prolight
Progress Lighting, Inc.
RAB Electric Manufacturing
Reflect-A-Light
Reflective Light Technologies
Remtec Systems
Robertson Transformer Company
Roth Bros., Inc.
Ruud Lighting, Inc.
Salesco Systems USA
Scientific Component Systems
Sea Gull Lighting Products
Sensor Switch
Sharlin-Lite
Silverlight Corporation
Simkar Lighting Fixture Company, Inc.
Solar Kinetics, Inc.
Southco Metal Services
Spaulding Lighting, Inc.
SPI Lighting Inc.
Sterling, RMC
Sylvania Lighting Division
Tamarack Corporation
Tek-Tron Enterprises
Teron Lighting
Terralux, Inc.
The Robert Group
Thomas Industries, Inc.
Topaz Energy Systems
Toshiba America Consumer Products, Inc.
Triad Technologies
TrimbleHouse Corporation
TSAO Designs
U.S. Light Bulb, Inc.
Ulster Precision, Inc.
UNENCO
United Energy, Inc.

Table 1. List of Green Lights Participants as of May 26, 1992 (537 Total) (continued)

United Energy South
Valmont Electric
Venture Lighting International
Waldmann Lighting Company
Warner Technologies
The Watt Stopper, Inc.
Wellmade Metal Products Company
H.E. Williams, Inc.
Wismarq Light Company, Inc.
Xtra Light
X-Tra Light Systems, Inc.
Zumtobel Lighting, Inc.

UTILITY ALLIES (37 total)

Arizona Public Service Company
Atlantic Energy
Bangor Hydro Electric
Boston Edison Company
Central Maine Power
City of Georgetown, Texas
City Utilities of Springfield
Consolidated Edison of New York
Duke Power Company
Grant County Public Utility District
Greenville Utilities Commission
Idaho Power Company
Jersey Central Power & Light Co.
Kansas City Power & Light
Los Angeles Department of Water and Power
New England Electric Systems
New York Power Authority
O & A Electric Cooperative
Pacific Gas & Electric Company
Port Angeles Light Department
Portland General Electric Co.
PSI Energy, Inc.
P.U.D. #1 of Grays Harbor County
Public Service Electric and Gas Company
Puget Sound Power & Light Co.
Rockland Electric
Sacramento Municipal Utility District
Salt River Project
South Carolina Electric & Gas Company
South Carolina Public Service Authority
Southern California Edison Company
Springfield Utility Board
Tampa Electric
Tauton Municipal Lighting Plant
The UNITIL System of Companies
Wisconsin Electric Power Company
Wisconsin Power & Light Company

LIGHTING MANAGEMENT COMPANY ALLIES (53 total)

A-1 Lighting Service Company
ABD Lighting Management Company
Aetna Corporation
Allied Lighting Services
American Lighting Inc.
Amtech Lighting Services
Approved Lighting Corporation
Barney Roth Company
Broadway Maintenance Company
Cherry City Electric
Chicago-Edison Corporation
Colorado Lighting
Conserve Electric Company, Inc.
Continental Lighting Services, Inc.
Creative Lighting Maintenance
Efficient Lighting and Maintenance, Inc.
Energy Controls & Concepts
Eveready Electric Company
Fluorescent Maintenance Company (CO)
Fluorescent Maintenance Service, Inc.(FL)
Fluorescent Maintenance Service, Inc. (MS)
Fluorescent Maintenance & Sign Co. (AL)
General Lighting and Sign Service, Inc.
IllumElex Corporation
Imperial Lighting Maintenance
Innovative Lighting Services
LighTec, Inc.
Lighten Up, Inc.
Lighting Maintenance, Inc. Lighting Maintenance and Service, Inc.
Lighting Management Corporation
Lighting Systems Too!
Luminaire Service, Inc.
M E Energy Resources
Master Lighting Service
Mira Lighting and Electric Service, Inc.
Murphy Electric Maintenance Company
New Mexico Energy Consultants
Planned Lighting, Inc.
Primo Lighting Management
ProLite Lighting and Sign Maintenance
Puget Energy Management System
Reflections, Inc.
SICA Electrical & Maintenance
Stay-Lite Lighting Service
Suburban Lighting, Inc.
Superior Light and Sign Maintenance Co.
Sylvania Lighting Services
United Electrical Maintenance Corporation
Universal Lighting Services
USA Energy Corporation
Vista Universal, Inc.
Xenergy, Inc.

ENDORSERS (13 total)

Alliance for Environmental Education
American Public Power Association
Association of Energy Engineers
Association of Professional Energy Managers
Consulting Engineers Council of Metropolitan Washington
Council of State Governments
Consumers' Counsel Governing Board, State of Ohio
Illuminating Engineering Society of North America
InterNational Association of Lighting Management Companies
National Association of Regulatory Utility Commissioners (NARUC)
New Hampshire Business & Industry Association
Pacific Northwest Pollution Prevention Research Center
Wisconsin Center for Demand-Side Research

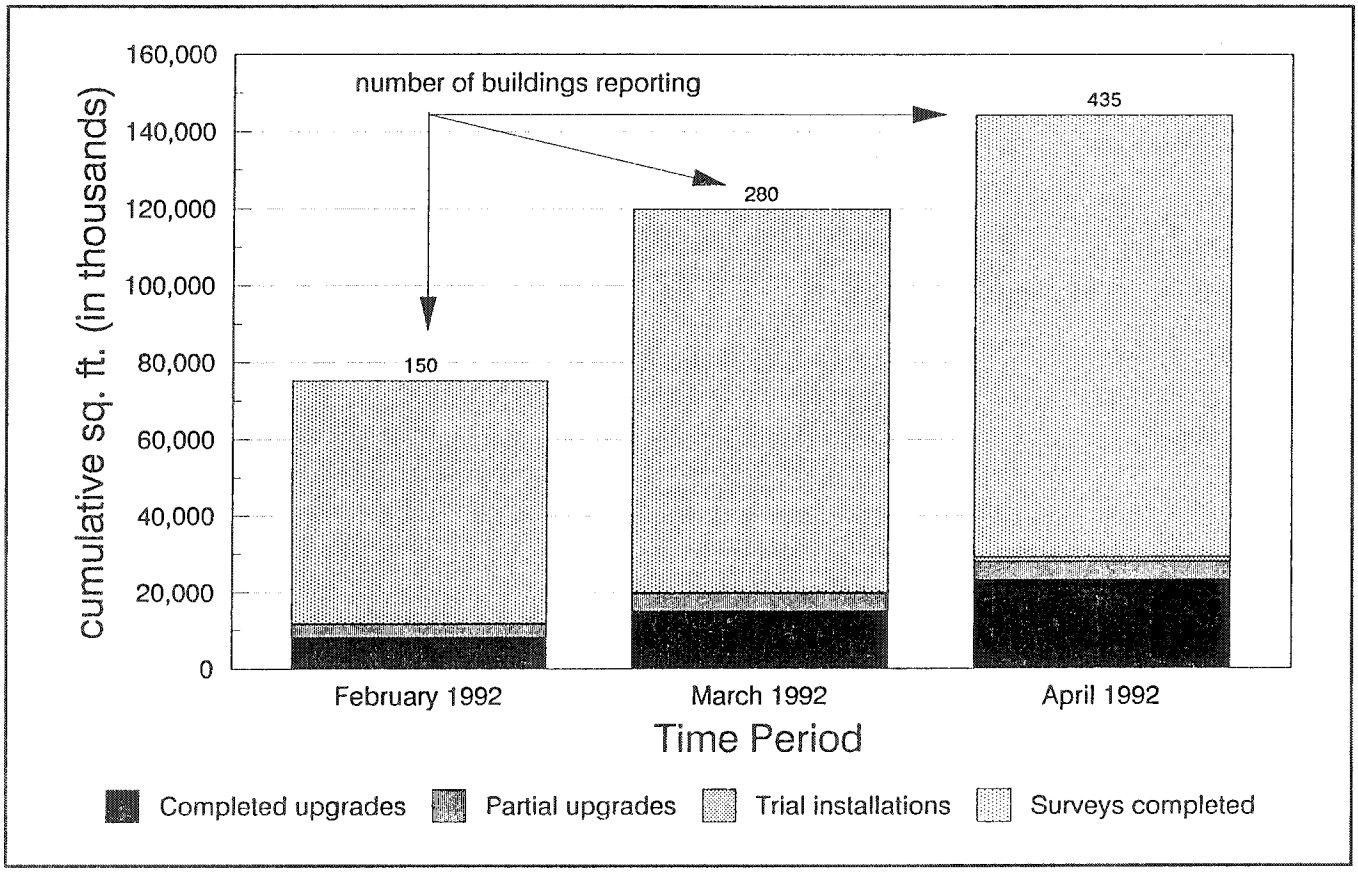

Figure 2. Early Implementation Efforts by Green Lights Participants

"upgrade pipeline," covering 145 million square feet of facility space (see Figure 2). About 22 million square feet have been fully upgraded, with an average reduction in lighting electricity use of 55% (see Table 2).

Lessons Learned

Several lessons are apparent from the EPA experience with Green Lights.

(1) Corporate leadership can be a powerful force in transforming a market.

(2) Money doesn't always talk, or at least not loud enough. The financial benefits of energy-efficient lighting have been known and publicized for years, yet most corporations ignored the opportunity. Environmental concerns spoke louder than money in at least this instance.

(3) The burden of marketing the program is diminished if contact can be made at the senior levels of an organization. This avoids the "trench warfare" of trying to sell the concept up the chain of command, and also translates the issue from being a "facilities" question into a strategic management opportunity for the corporation as a whole. It is rare for a lighting product manufacturer or service provider to have access at this level, but government agencies can usually arrange to meet with vice-presidential level executives and seek strategic decisions. The alternative--selling each facility on an individual basis--is not an option for an understaffed governmental agency.

(4) Allies can be found everywhere, and will help in different measures. The Green Lights Allies (and some non-Allies) have made a productive contribution for the most part, but the contribution has been uneven across companies. Some have been extraordinary advocates for the program and for the environment. Others are content to join us for the ride.

(5) Programmatic flexibility is essential. Rigid goals, analytical micromanagement, and burdensome reporting can stop a voluntary program in its tracks. Green Lights participants are unanimous is identifying flexibility as one of the best things about the program. They like being given a goal, but having the latitude to map their own road.

Table 2. Upgrade Progress as of April 30, 1992

Participants reporting	70*
Percentage of reporters' square footage in the "upgrading Pipeline"	31.4%
Range of lighting electricity reduction	6-92%
Range of internal rate of return	2-750%
Annual electric bill savings from completed upgrades	$4.5 million
Money invested in upgrades (includes rebates received	$10.5 million
Rebates received by participants	$4.7 million
Kilowatts avoided annually through completed upgrades	8,692.1
New utility power plant investments avoided (at $1500/kW)	$13 million
Kilowatt-hours avoided annually through completed upgrades	63.4 million

*Participants report on an anniversary basis.

HARDWARE INSTALLATIONS (cumulative to April 30, 1992)	
New Fixtures	2,667
T8 Lamps	99,652
Occupancy Sensors	7,219
Compact Fluorescent Lamps	5,728
Reflectors	12,570
Electronic Ballasts	58,872

The Future

The first year of Green Lights has validated the basic principles of the voluntary corporate leadership approach to energy efficiency. And, not surprisingly, it has raised tantalizing prospects for the year to come. The program has five goals for the coming years:

(1) Increase participation: The program's goal for 1992 is the recruitment of another 3-5% of the Nation's square footage through peer-group marketing, direct mail, public service advertising, telemarketing, etc.

(2) Support implementation: Green Lights participants have taken on a serious responsibility, and the program office is committed to making their implementation as profitable and quality-enhancing as is possible.

(3) Broaden program participation: Commercial, industrial, and institutional users account for 75 percent of the Nation's lighting electricity use; they were the natural first audience for the Green Lights Program. However, in the coming year the program will begin outreach to the residential sector, to broaden awareness of the pollution prevention benefits of energy efficient lighting.

(4) Accelerate market transformation: Green Lights will claim success when the program isn't needed anymore because a dynamic of continual improvement in the lighting marketplace will be set into motion. Lighting will be done "smart" without any extra effort or thought on the part of the customer, vendor or lighting consultant.

(5) Explore replication of the program in other technology areas: Green Lights will not be the last voluntary energy efficiency program; it will be the prototype for many

others. By the end of 1992, EPA hopes to offer a Green Buildings program and/or a Green Energy Corporation program to further the Nation's goal of preventing pollution.

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