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Environmental Protection
Agency

Air and Radiation
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EPA

Green Lights Program

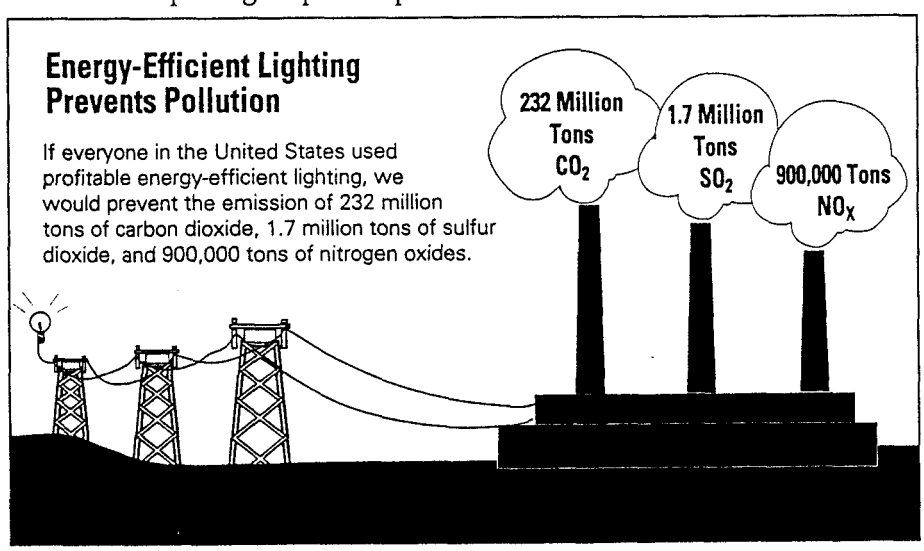
The First Year

Program Summary

The Environmental Protection Agency's Green Lights Program was officially launched on January 16, 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 percent of the national total) and so wasteful (more than half the electricity used for lighting is wasted by inefficient technology and design practices), the Green Lights program offers a substantial opportunity to prevent pollution, and to do so at a *profit*. Lighting upgrades reduce electric bills and maintenance costs and increase lighting quality; typically, investments in energy-efficient lighting yield 20 to 30 percent rates of return (IRR) per year.

EPA promotes energy-efficient lighting by asking major institutions to sign a Memorandum of Understanding (MOU) with the Agency; in this MOU, the signatory commits to install energy-efficient lighting in 90 percent of their space nationwide over a 5-year period, but only where it is *profitable* and where lighting *quality* is maintained or improved. EPA, in turn, offers program participants a portfolio of technical support services to assist them in upgrading their buildings (see opposite page). Sample MOUs are available upon request.

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 power-plant fuels and disposing of power-plant wastes.



If energy-efficient lighting were used wherever profitable, the nation's demand for electricity could be cut by more than 10 percent, leading to 4 to 7 percent reductions in the emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides. 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.

EPA's Commitments

When EPA signs the Memorandum of Understanding, it agrees to provide

- **Decision Support System** - a state-of-the-art computer software program that allows Green Lights corporations to survey lighting systems in their facilities, assess their options, and select the best energy-efficient lighting upgrade.
- **Training Workshops**– programs, scheduled nationwide, that feature comprehensive training on the Decision Support System as well as lighting fundamentals, technology, project management, and Green Lights reporting.
- **National Lighting Product Information Program**– an independent lighting information program that provides an objective source of name-brand product information.
- **Financing Registries**– computer databases containing information on utility-sponsored financial assistance (e.g., auditing and technical support, lighting design services, free installation, rebates, and loans), energy-service company programs, and government grants and low-interest loans.
- **Lighting Services Group**– offers technical support, problem solving, and training for Green Lights participants installing energy-efficient lighting.
- **Corporate Communications**– advertising and marketing materials designed to recognize participants for their commitment to the program and to keep them informed.
- **Ally Programs**–individual programs designed for manufacturers, lighting management companies, and utilities to ensure that the lighting industry is involved in the program and aware of the environmental and economic benefits of Green Lights.

Partner's Commitments

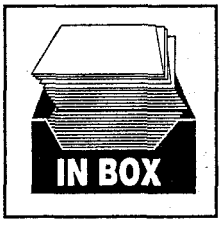
When a Green Lights Partner signs the Memorandum of Understanding, it agrees to

- ☐ Appoint an implementation manager to coordinate the program.
- ☐ Survey the lighting in all of its U.S. facilities.
- ☐ Consider a full range of lighting options to reduce energy use.
- ☐ Upgrade 90 percent of the square footage of its facilities with the options that maximize energy savings to the extent that the upgrade is profitable and does not compromise lighting quality. There are no technology prescriptions.
- ☐ Complete upgrades within 5 years of signing the agreement.
- ☐ Annually document the improvements it makes.
- ☐ Design all new facilities to meet most current building efficiency standards.
- ☐ Educate its employees about the benefits of energy-efficient lighting.

When companies sign the Green Lights Memorandum of Understanding, they agree to upgrade their facilities with energy-efficient lighting. In return, the EPA commits to provide a wide variety of products and services designed to make the job easier. Over the program's first year, the EPA has delivered on every one of its commitments.

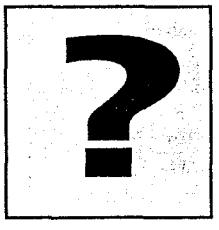
Why Green Lights?

An often-asked question runs, "If energy-efficient lighting is so profitable, and is so good for the environment, and delivers such superior lighting quality, why does the Federal Government have to get involved?" The answer lies in the haze between the ideals of economics and the reality of lighting today. Energy-efficient lighting technologies, design practices, and maintenance systems evolve over decades (if not centuries, if one considers the evolution from the open fire to the candle to the oil lamp to Edison's light bulb), and market penetration is often slow. The energy-efficient lighting technologies and design principals available today were introduced 5 to 10 years ago but have been rarely used, typically capturing between 1 and 5 percent of the market. There are six principal barriers, and Green Lights is attacking all of them:



- **Problem–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 an overhead item. Because of this, most facilities are equipped 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 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 becomes a particularly senseless source of pollution.

Solution: 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.



- **Problem–Information and Expertise:** Lighting is more complex than screwing in a light bulb, and the 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 "cookie-cutter" solutions, and few institutions focus on lighting as a profit (rather than cost) center.

Solution: Green Lights has created the institutions and tools to help overcome these barriers.

On November 4, 1991, Green Lights released its lighting Decision Support System, the most sophisticated lighting survey and economic analysis software available. The system allows a building surveyor to rapidly inventory the current lighting system and choose from more than 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 institution created by Green Lights is the National Lighting Product Information Program (NLPIP), based at Rensselaer 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.

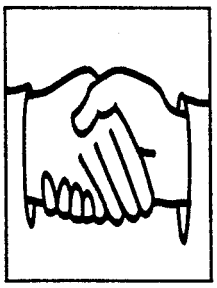
Green Lights is also working with several lighting professional societies to build a national certification program for lighting professionals. This will permit individuals with true expertise in lighting to demonstrate their skills and distinguish themselves in the marketplace.

- **Problem–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.

Solution: Green Lights has developed a unique registry of financing resources. First offered in February 1991, it has since been updated twice. The registry provides detailed information on more than 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.

- **Problem–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. Innovators are slow to introduce new technology. As a result, energy-efficient lighting hardware has remained expensive, further slowing its penetration in the marketplace.

Solution: Green Lights. 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 programs are projected to increase the market share of energy-efficient lighting products from its current 5 percent to around 40 percent by 1995. Prices of some products have been already been falling (by as much as 25 percent in the last 12 months) and are expected to continue declining as shipment volumes increase.



- **Problem–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. Conversely, with all of the utility charges passed through to the tenants, the landlord rarely sees it in his interest to install more efficient lighting systems when the building is first built. Instead, the lowest first-cost system is chosen.

Solution: Green Lights has initiated a project to develop standard lease language that will remove the split incentive barrier, and the program 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.

- **Problem–Market Fragmentation:** Buyers and sellers of lighting equipment and services often have trouble communicating. Most lighting manufacturers produce and market only one kind of product: lamps, ballasts, fixtures, and so on. Lighting purchasers need *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.

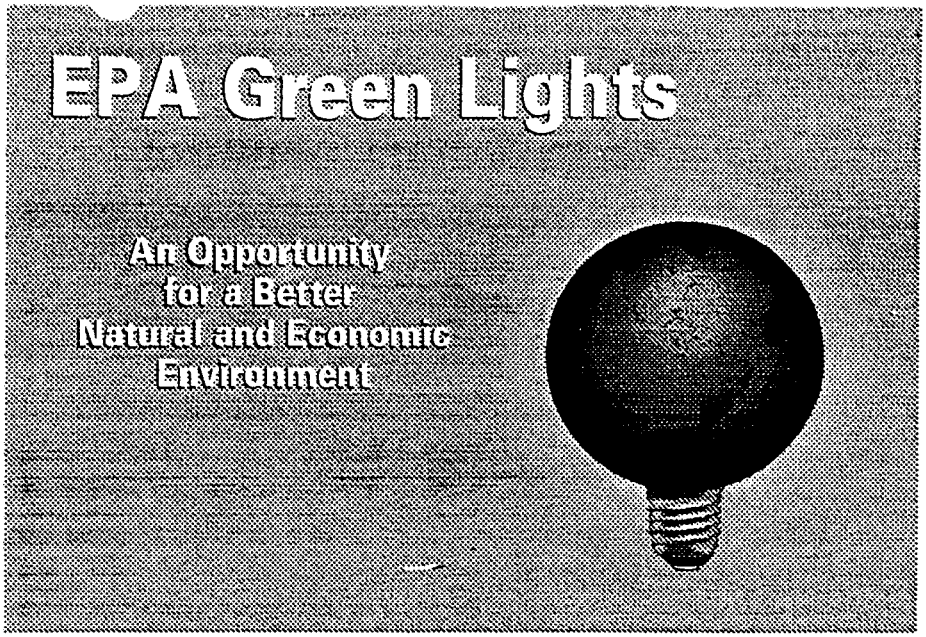
Solution: The Green Lights Allies programs. Green Lights Allies are members of the lighting manufacturing and service industries as well as electric utilities, who join Green Lights on terms very similar to those of the Green Lights Partners. However, in addition to committing to upgrade their facilities, Green Lights Allies also commit to help 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. While Green Lights does not endorse the products or services of the Green Lights Allies, the existence of the program has enhanced communication throughout the lighting industry on the subjects of energy efficiency, environmental protection, and lighting quality.

Program Highlights

Recruitment

Green Lights is a voluntary program. As such, the program must *persuade* lighting users that energy-efficient lighting is good for the environment, good for their bottom line, and a good opportunity to work in cooperation with EPA. The program office has used a variety of marketing tools to recruit new members to Green Lights.

- **Conferences:** Green Lights conducted three large marketing conferences in 1991 (Washington in January, Portland Oregon in May, and Atlanta in July), attended by representatives of 600 corporations.
- **Direct Visits:** Green Lights staff have visited dozens of corporate and governmental headquarters, a process that accelerated with the inauguration of a full-time travelling sales campaign in October 1991.

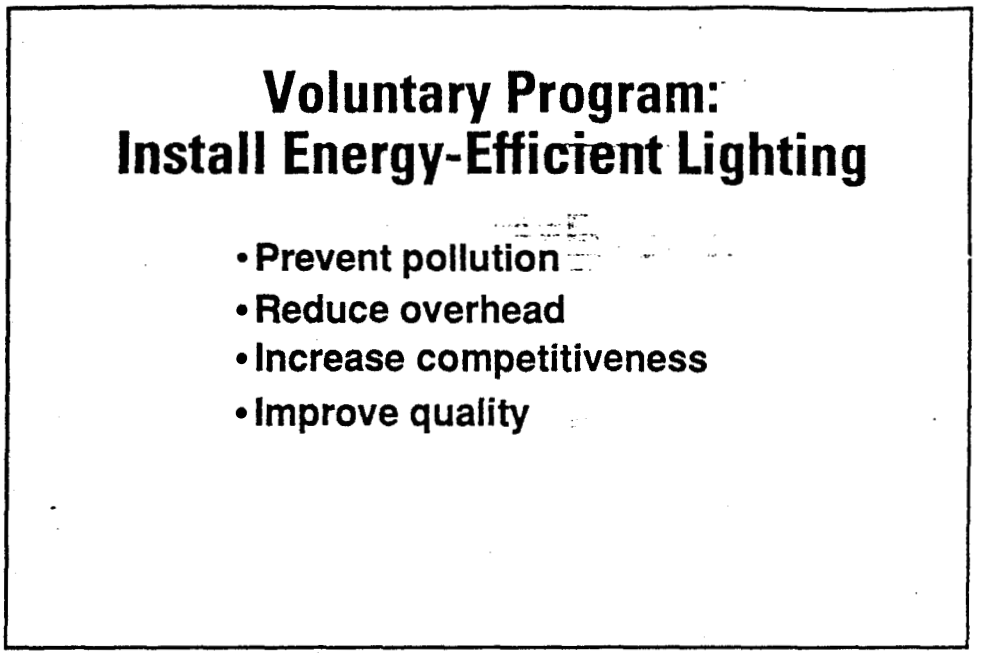


Green Lights Program

EPA Green Lights

Green Lights is an innovative, voluntary program sponsored by EPA to encourage the use of energy-efficient lighting technologies throughout the nation. Guided by the principle that energy-efficient lighting is "a bright investment in the environment," Green Lights addresses the critical national issues of energy efficiency, pollution prevention, and economic competitiveness.

Green Lights also reflects an evolution in EPA's approach to protecting the environment. Instead of relying solely on a strategy of "capture and control," which cleans up pollution, EPA now seeks opportunities to work cooperatively with industry to prevent pollution before it is generated. By using energy-efficient technologies and designs, less energy and electricity are demanded -- and less pollution is generated by power plants.

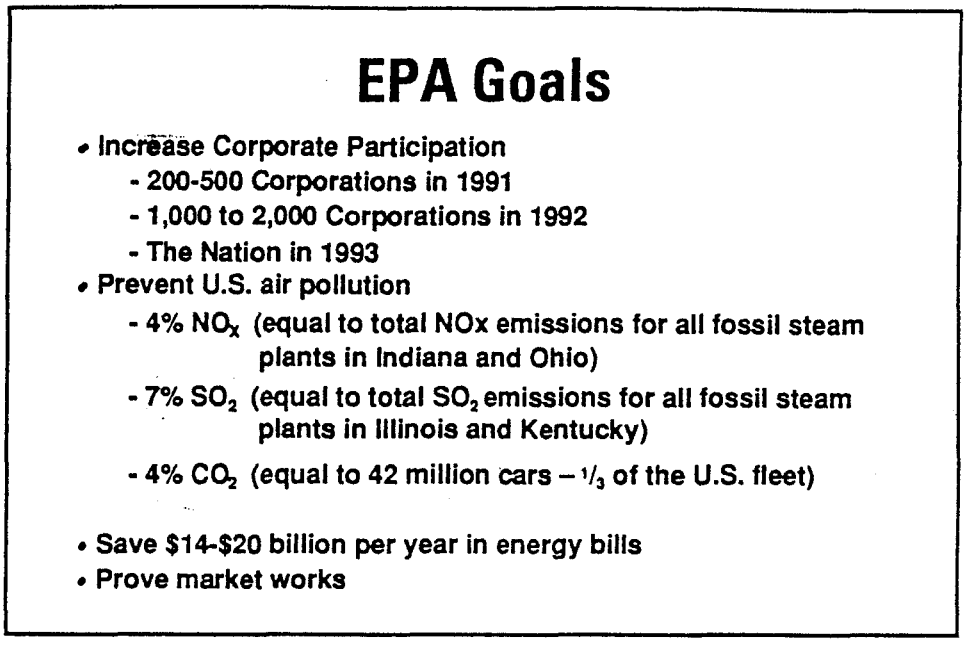


Voluntary Program: Install Energy-Efficient Lighting

The primary goal of this precedent-setting program is to raise the awareness of American corporations about how to protect the environment without sacrificing profits -- specifically, with energy-efficient lighting.

Lighting is a prime example of a mature technology that, for several reasons, has not adequately penetrated the market despite its potential to increase profits and prevent pollution. In fact, EPA estimates that if existing energy-efficient lighting technologies were used optimally, nearly $19 billion in electricity bills could be freed for more productive investment -- and air pollution in the United States would be reduced by 5 percent.

Green Lights demonstrates to corporate decisionmakers how preventing pollution can also reduce overhead, increase competitiveness, and improve the work environment. Successful participation in Green Lights will make corporations more aware of other opportunities that make sense environmentally and economically.



EPA Goals

EPA will be aggressively pursuing these goals to realize the significant reductions in air pollution and electricity consumption that can be achieved by Green Lights.

Green Lights has the potential to save nearly $20 billion per year in energy bills -- no small change towards improving our economy. Green Lights also has the potential to reduce total U.S. air pollution by 4 to 7 percent -- which may seem a small number but in fact represents tremendous reductions. For example, reducing nitrogen oxides (which turn up in our environment as smog and acid rain) by 4 percent is equal to eliminating all NOx emissions from all power plants in Indiana and Ohio.

EPA intends to have the entire nation participating in Green Lights by 1993. Green Lights will demonstrate government and business can work together with the market to solve environmental problems.

Corporate Commitment

To join EPA Green Lights, a corporation signs a brief Memorandum of Understanding (MOU) in which it agrees to do several things as a Green Lights Partner.

First, a corporation commits to survey the lighting in all of its U.S. facilities and consider a full range of lighting options to reduce energy use. The corporation then commits to upgrade 90 percent of its facilities' square footage with energy-efficient lighting technologies and designs only if they are profitable and do not compromise lighting quality. There are no technology prescriptions in the program. These upgrades will be completed within five years of signing the MOU.

A Green Lights Partner also agrees to design all its new facilities to meet the most current building efficiency practices, as outlined in the MOU. To promote the benefits of energy- efficient lighting, the Partner also agrees to provide EPA with case studies of successful upgrades, to educate its employees about the program and opportunities for efficiency in residential lighting, and to work with EPA to publicize the program. The corporation can leave Green Lights at any time without penalty.

Outdated Approach-1970's	Green Lights Approach-1990's
Sacrifice	Energy productivity
Savings at expense of quality and service	Higher quality and better service
Emergency installation of untested products	Careful planning and installation

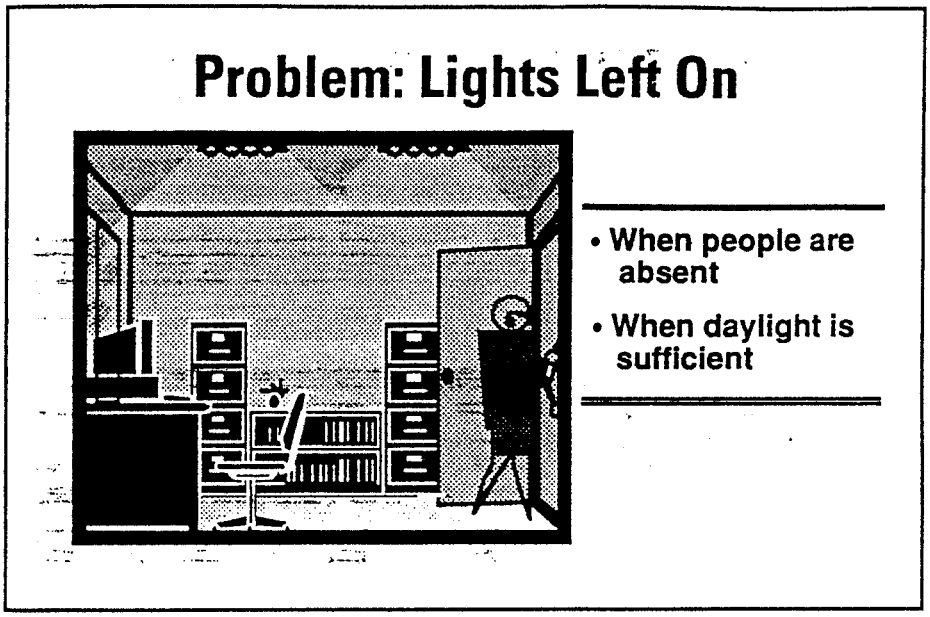
Approach

Everyone remembers the energy crises of the 1970s, and most notably, the approach: the call to conserve energy. Energy conservation in lighting meant reducing light levels; the principle was sacrifice.

In the 1990s, with better technologies, the approach is energy efficiency in lighting: better lighting quality, higher worker productivity, enhanced profitability, and reduced pollution.

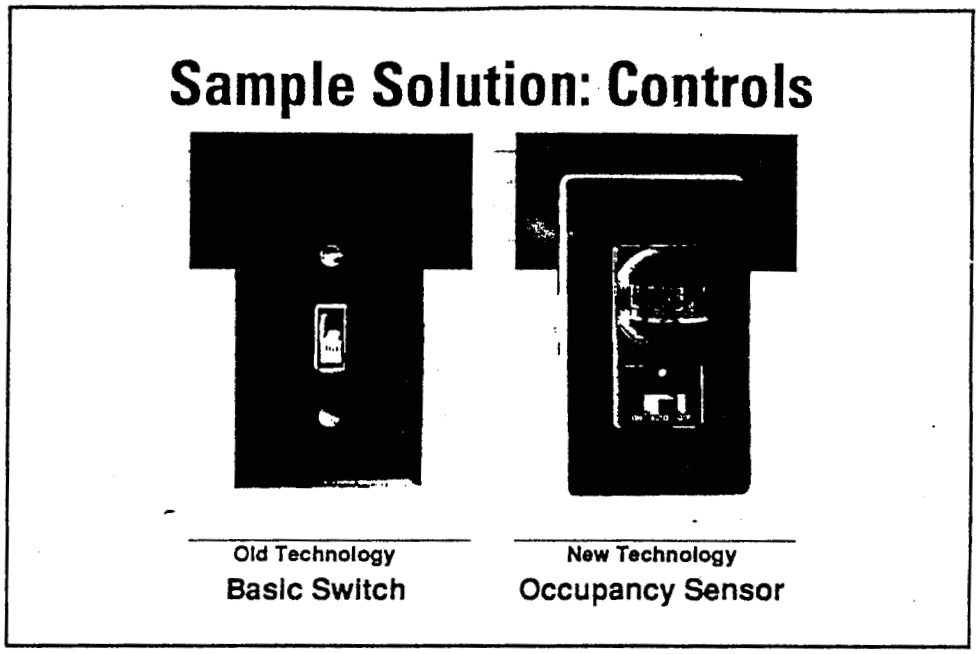
Waste

There are many ways your corporation may be burning valuable investment funds with inefficient lighting. Worse than just wasting money, these inefficient practices are actually converting money into pollution. The following slides show some common problems with inefficient lighting technologies, and sample solutions to these problems using the new generation of energy-efficient technologies.



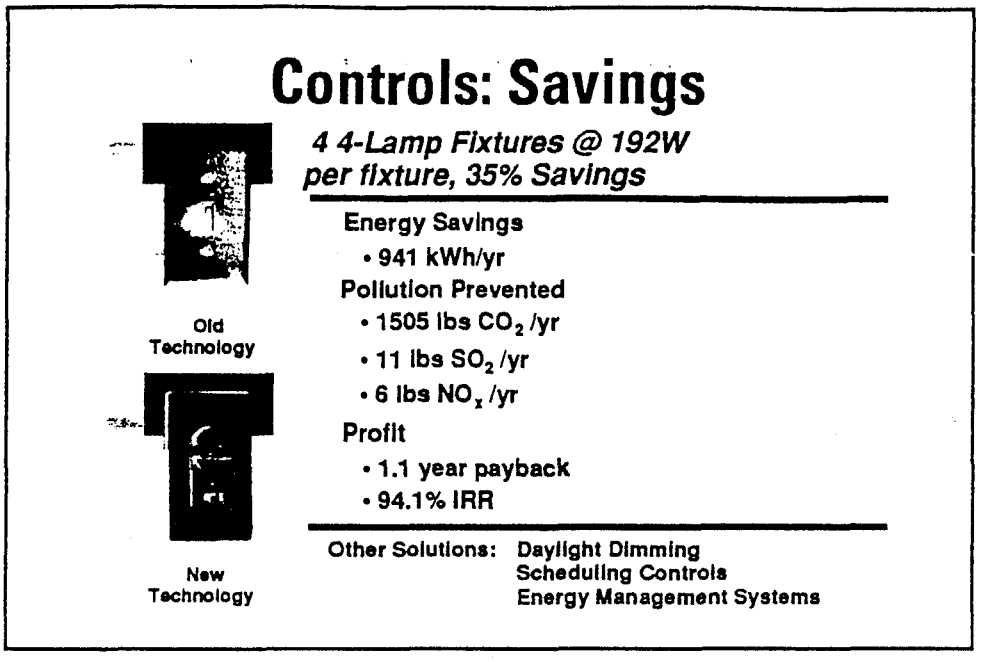
Problem: Lights Left On

No matter how often people are told to turn out their lights when they leave a room, lights are constantly left burning when they are not needed. This is especially true in offices where lights frequently remain on both day and night when they are not being used. For example, lights stay on continuously during the day in many rooms that are not in constant use, such as computer rooms, copier rooms, storage areas, lounges, hallways, and private offices. Many offices also receive sufficient light during the day, so lights don't need to operate at full brightness. At night, many lights remain on long after employees leave for the day and before cleaning or maintenance crews arrive, or are never turned off simply out of bad habit.



Sample Solution: Controls

One way to solve this problem is to replace a basic light switch with an occupancy sensor, which detects the presence of people in a room. An occupancy sensor turns lights on when a person enters a room and turns lights off a few minutes after he or she leaves. Several occupancy sensors can be placed in a large open space so that one area can be lit while it is in use without turning on all the lights in the area.

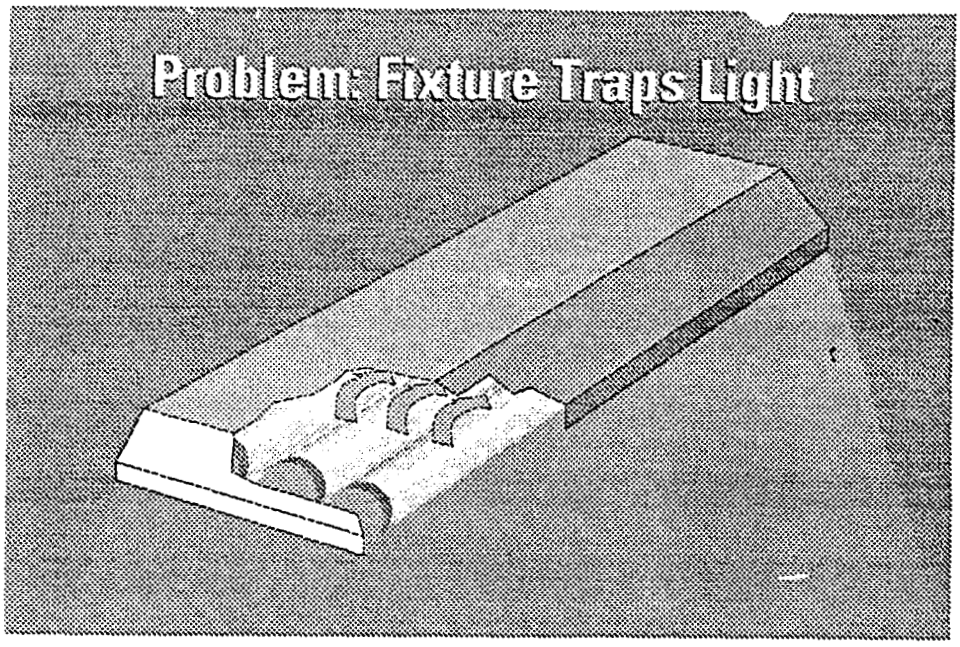


Controls: Savings

Here is an example of the savings in an enclosed office space using an occupancy sensor to control 4 four-lamp fixtures operating at 192 watts per fixture.

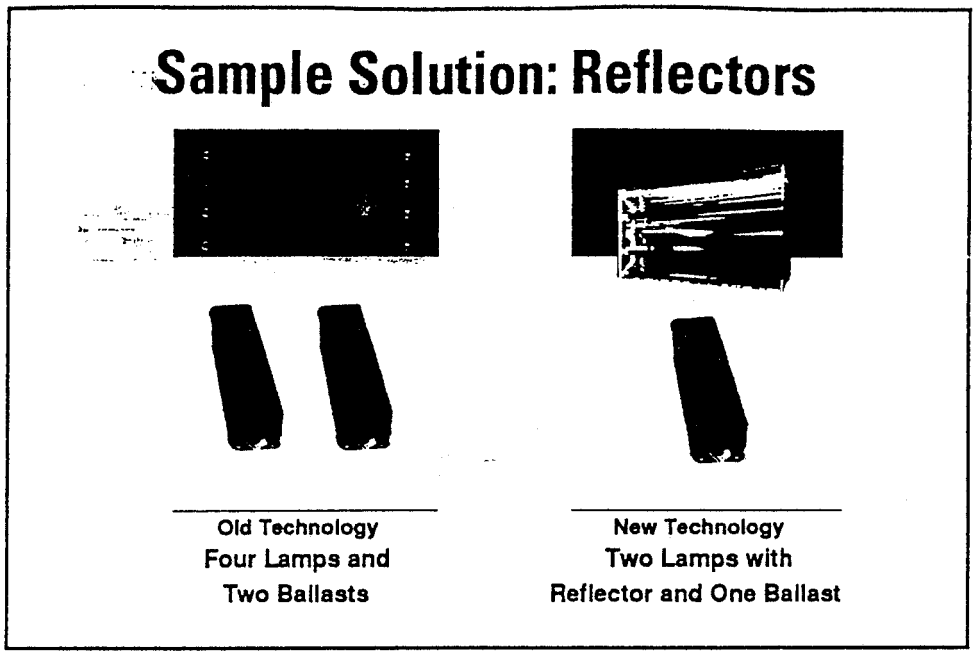
Energy use would be cut 35% simply by leaving the lights off when no one is in the room. These savings -- which are conservative -- pertain to a private office. Installing sensors in areas such as conference rooms, computer rooms, and bathrooms would yield even higher energy savings. These energy savings translate into a significant amount of pollution prevention, as illustrated by these numbers.

There are other solutions to this common lighting problem. Daylight dimming controls, scheduling controls, and energy management systems can be used to limit the use of lights when they are not needed, or needed at less than full brightness.



Problem: Fixture Traps Light

Although two, three, or four fluorescent lamps may be installed in a fixture, the full light output of those lamps may not necessarily reach the work surface, where you need it most. In fact, a significant amount of the light generated either is lost in the fixture, lights up the top half of your wall, or turns into glare on your VDT screen. As you may know, glare can interfere with productivity, hinder vision, and cause headaches.



Sample Solution: Reflectors

Replacing a four lamp, two ballast fixture with two lamps, one ballast, and a reflector can yield tremendous energy and cost savings. Reflectors focus the light onto the worksurface, minimize glare, and maximize the efficiency of the fixture. Although a reflector upgrade typically causes a small drop in light levels, it is frequently imperceptible, especially in areas that were overlit to start with.

Reflectors: Savings

Old Technology

New Technology

Per Fixture

Energy Savings
- 96W
- 336 kWh/yr

Pollution Prevented
- 537.6 lbs CO_2 /yr
- 3.9 lbs SO_2 /yr
- 2.1 lbs NO_x /yr

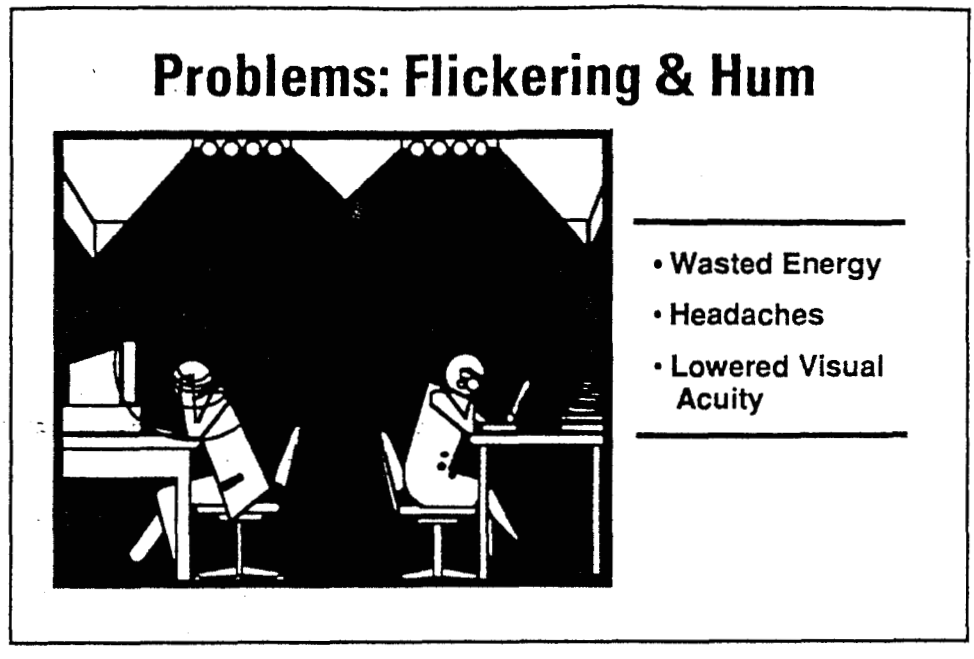
Profit
- 2.1 year payback
- 56.4% IRR

Assumes both cases use magnetic ballast and T-12 lamps

Other Solutions: Better New Fixtures

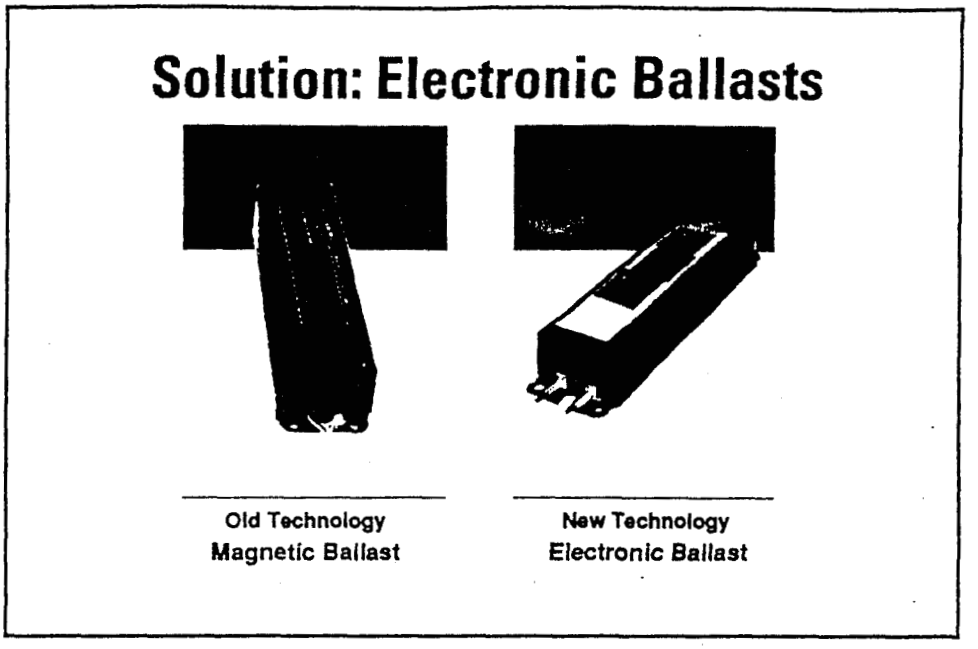
Reflectors: Savings

Here is an illustration of the energy and pollution savings associated with the upgrade of one fixture, consisting of the removal of two lamps and one ballast and the addition of a reflector. Another solution to this problem would be better new fixtures.



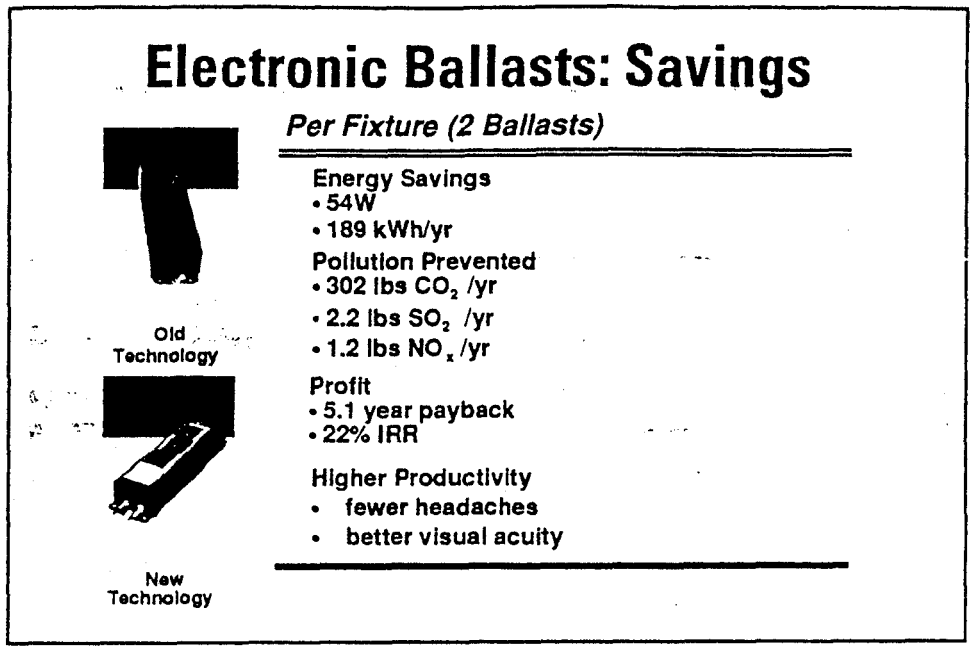
Problems: Flickering & Hum

We're all familiar with the humming and flickering of fluorescent lights. Though we try to ignore these annoyances during the course of a day, the headaches and tension that result from them are more difficult to ignore.



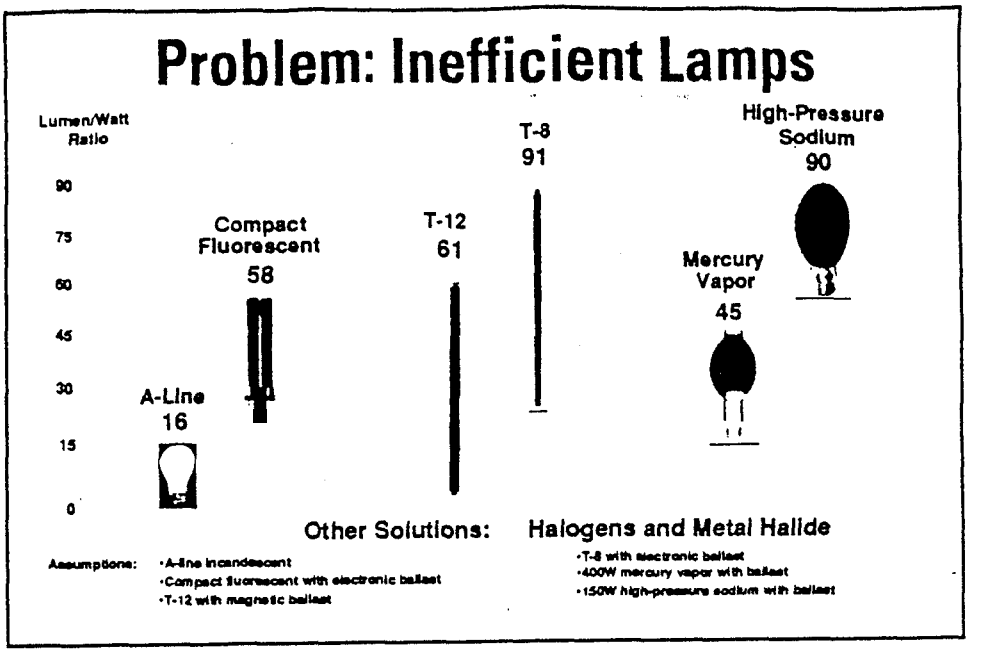
Solution: Electronic Ballasts

Ballasts regulate the current to fluorescent lamps. The electronic ballast, based on solid-state electronics, is far superior to the old magnetic core and coil ballast. The electronic ballast not only uses far less electricity, but also virtually eliminates lamp flicker and operates silently.



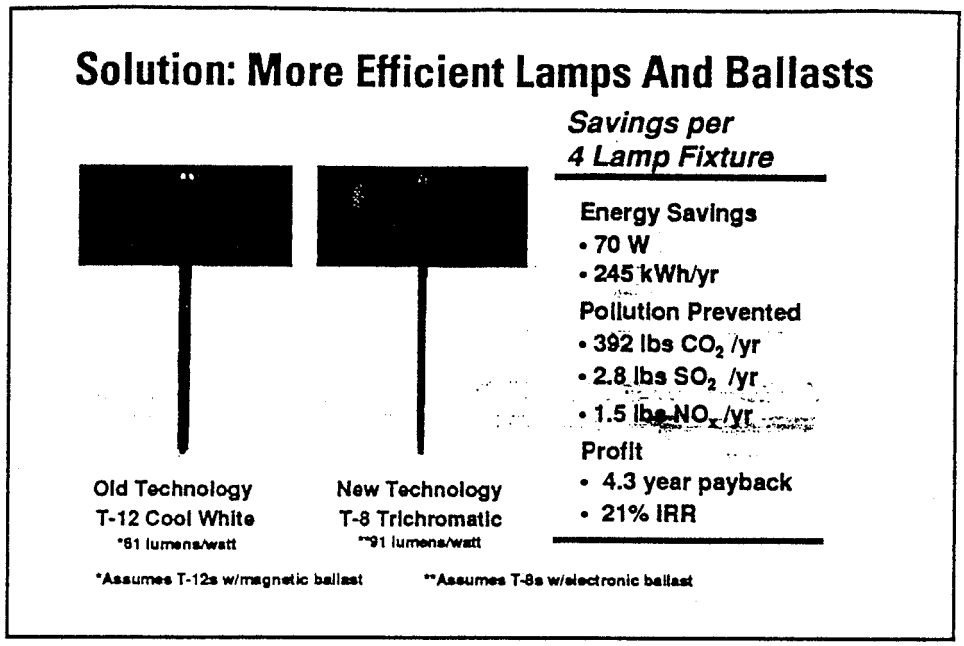
Electronic Ballasts: Savings

Replacing two magnetic ballasts with two electronic ballasts not only eliminates flicker and hum by better regulating the current to the lamp, but also increases worker productivity and the efficiency of the lighting system. As with the other state-of-the-art technologies discussed, it also has tremendous potential to reduce energy consumption, prevent pollution, and save money.



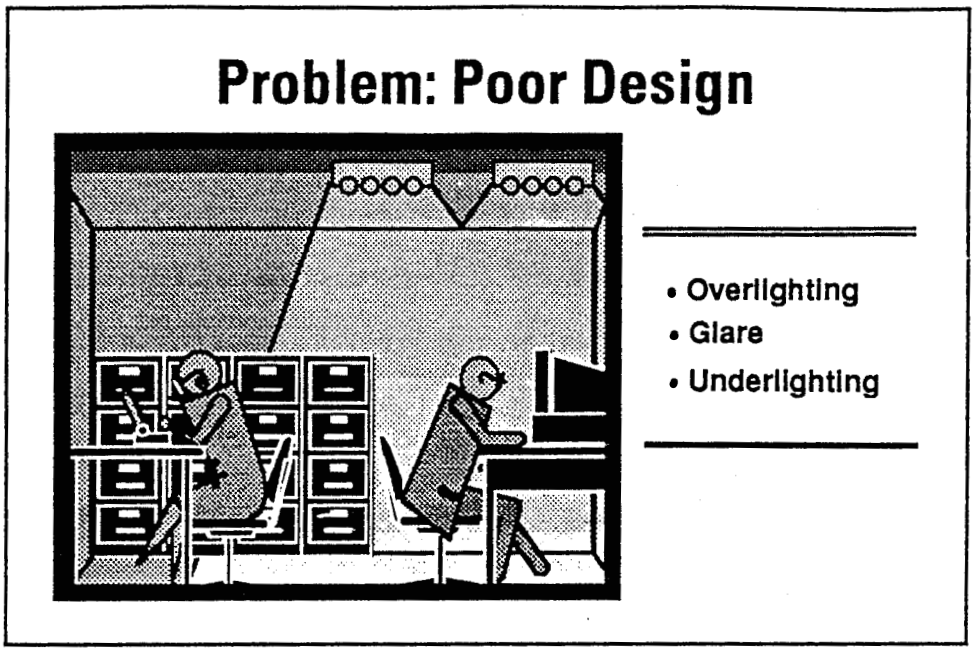
Problem: Inefficient Lamps

Most standard lamps now come in energy-efficient versions. Using lamps with higher lumen-to-watt ratios can allow you to reduce energy consumption while maintaining or improving light levels. For example, mercury vapor lamps have been standard for street lighting and parking lots, and in some industrial applications for several decades. Replacing a 400-watt mercury vapor lamp with a 150-watt high-pressure sodium lamp would maintain light levels and reduce energy consumption dramatically.



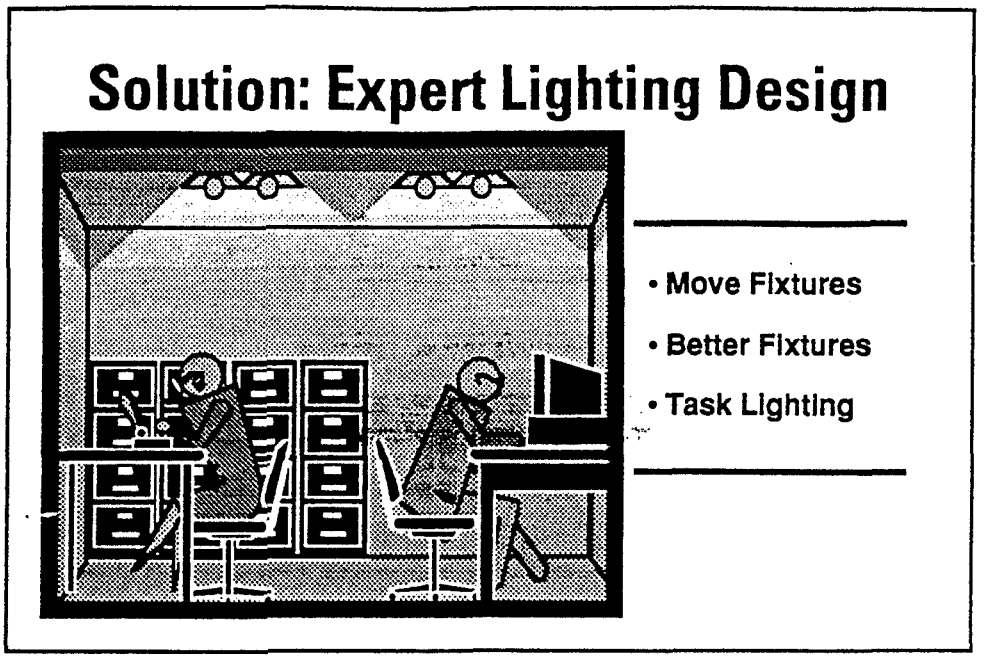
Solution: More Efficient Lamps And Ballasts

The most common lighting source in American offices is the T-12 cool white fluorescent. Recently, however, lighting manufacturers have introduced an innovation: the T-8 trichromatic lamp. The T-8, which is slightly smaller in diameter than the T-12, produces the same light levels as the cool white lamp, better color, and better maintained lighting levels over its operating life -- and uses less energy than the T-12.



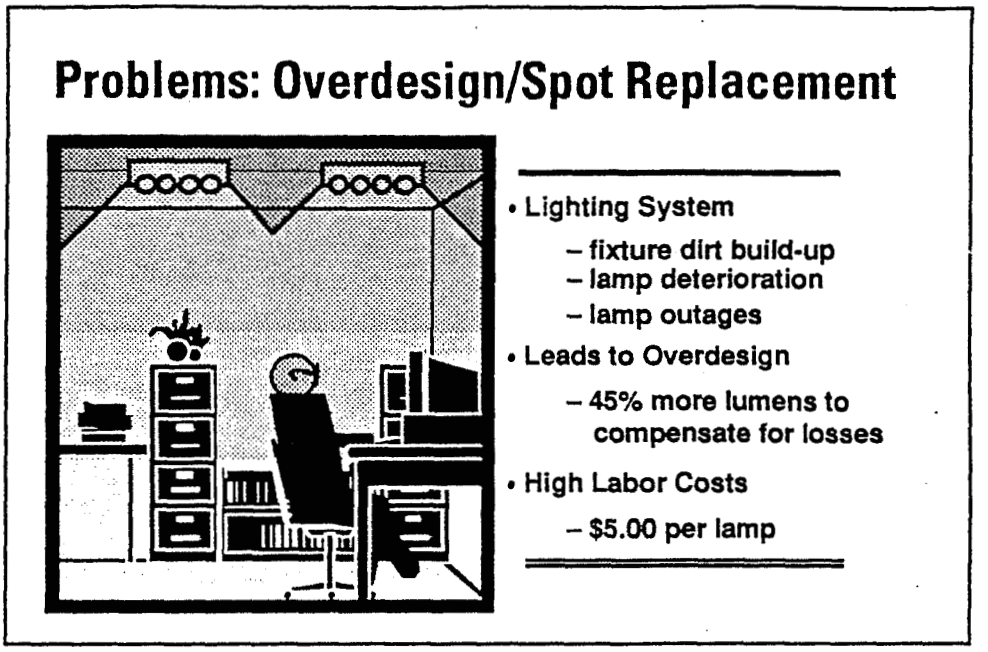
Problem: Poor Design

Lighting is often designed without regard to where tasks will be performed and the amount of light required for a specific task. As this picture shows, poor design can result in pools of light and darkness, and glare. Thus, an area may be overlit for one worker and underlit for another.



Solution: Expert Lighting Design

There are many solutions to this problem, including relocating fixtures or replacing fixtures with more appropriate ones which redirect the focus of the light to provide more even illumination and eliminate glare. Other solutions include using task lighting to provide illumination where it's really needed, lowering ambient light levels, or using indirect lighting with task lighting to reduce glare.

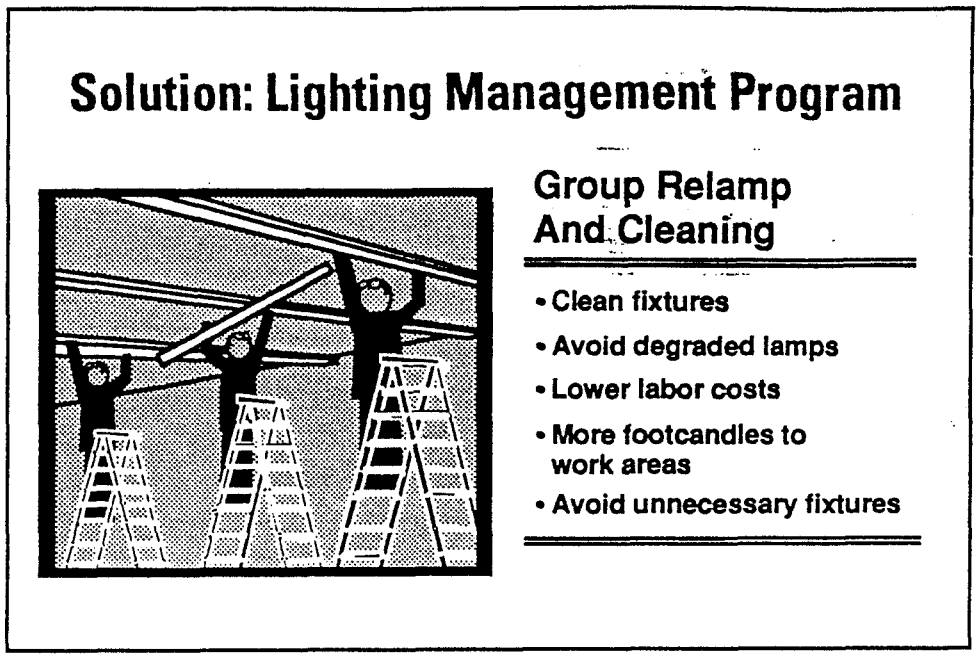


Problems: Overdesign/Spot Replacement

Generally speaking, people focus their attention on putting up a building, but don't give much thought to maintaining the structure once it has been completed.

For example, every time an office light burns out, a significant amount of resources are used to replace it. Typically, when a bulb burns out, a call is made to the maintenance engineer. The maintenance engineer then contacts a crew member; the lamp must be located in storage; the lamp, ladder and other tools must be transported to the scene; the lamp is changed; and all of the equipment then has to be returned to storage. This inefficient procedure actually costs significantly more than the price of the lamp itself.

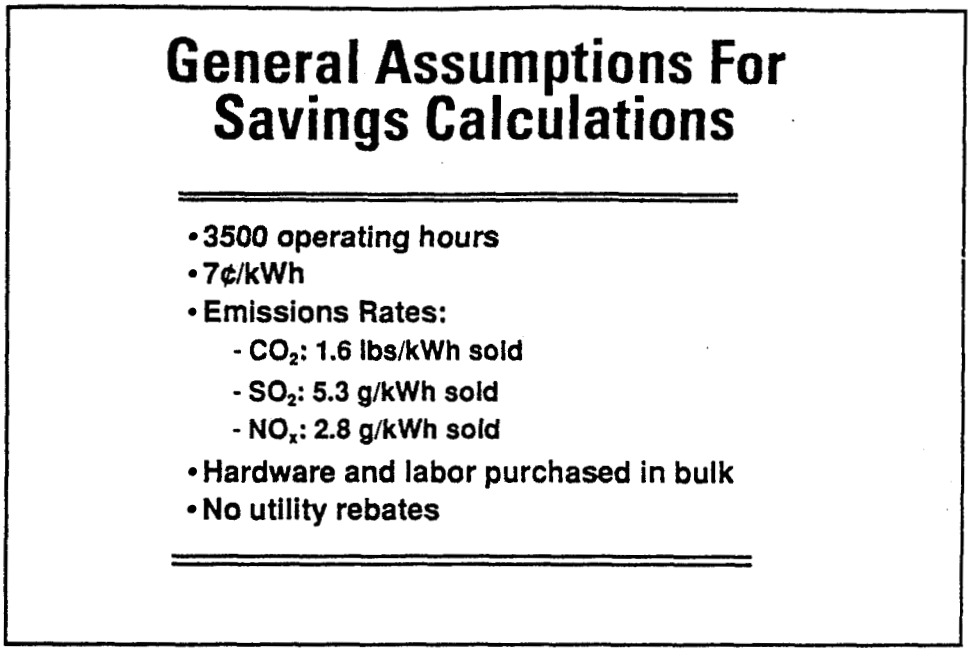
In fact, you pay for the degradation of your lighting system in numerous ways which you may not even be aware of. Lighting systems are frequently overdesigned by as much as 45% to compensate for deterioration of lamps and built-up dirt which reduce the efficiency of the fixture, wasting significant money and energy. So not only do you pay for additional fixtures (wiring and other hardware), but you also pay for additional labor (and lamps) to service these unnecessary fixtures.



Solution: Lighting Management Program

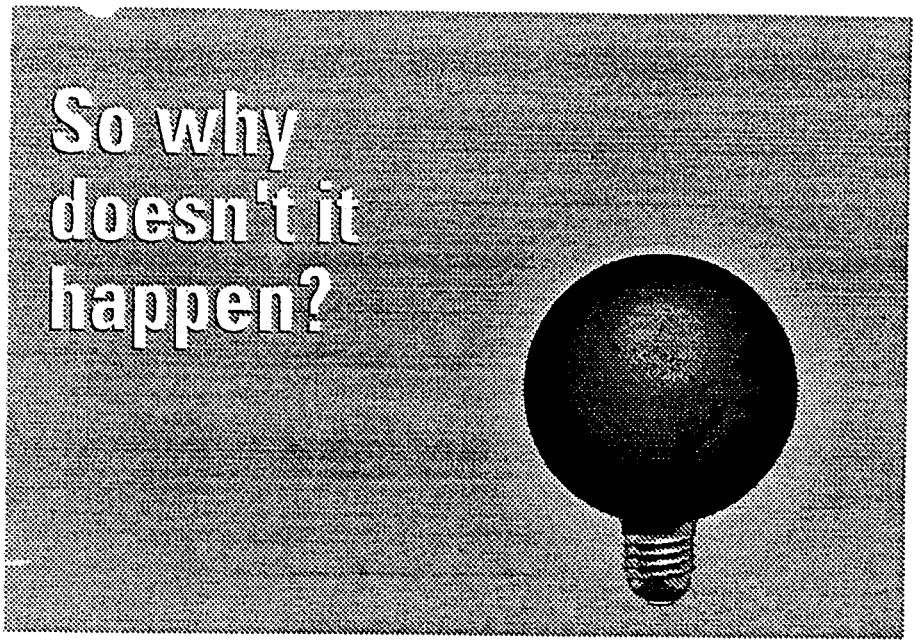
The expense of buying and operating those extra lighting fixtures can be avoided by "substituting" a lighting management program. Cleaning fixtures regularly, in combination with group relamping, can produce significant savings in design and lighting systems, as well as the best quality light from existing light fixtures.

Group relamping addresses the problem of wasted labor by creating an economy of scale. Specialized teams with specialized equipment replace all of the lamps in a facility on a regular cycle, minimizing the costs, dirt, and disruptions of spot relamping, as well as the incidence of lamp outages. Its benefits extend far beyond labor costs, though. In fact, group relamping, by replacing lamps before they age or burn out, assures constant light levels and constant color, which is critical in many industrial applications.



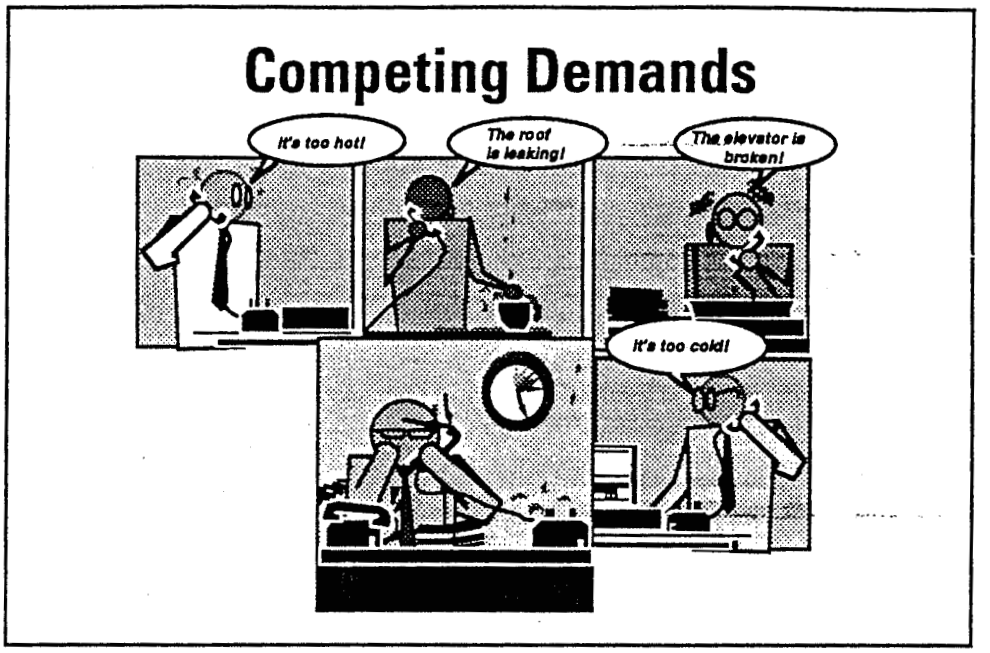
General Assumptions For Savings Calculations

Just so you know how the savings on the previous slides are calculated, here are the general assumptions we have made. The calculations are conservative and based on national averages. Savings will vary depending on utility rebate programs and the price of electricty in your area.



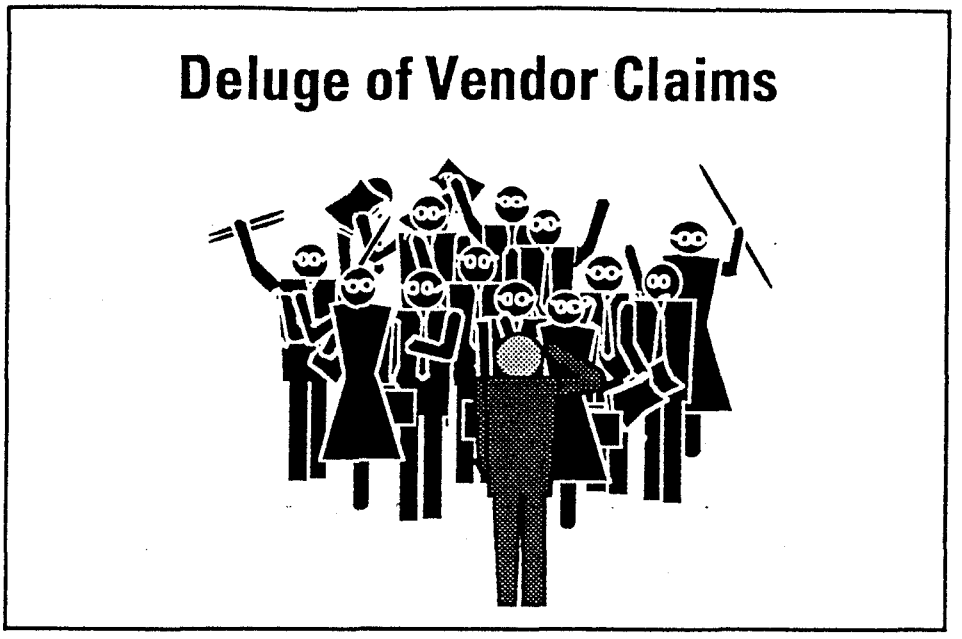
So Why Doesn't it Happen?

Since these new lighting technologies are so efficient, profitable, and environmentally favorable, why aren't they being installed in ceilings across the nation? The answers to this question are varied and complex -- and this is where EPA Green Lights can help.



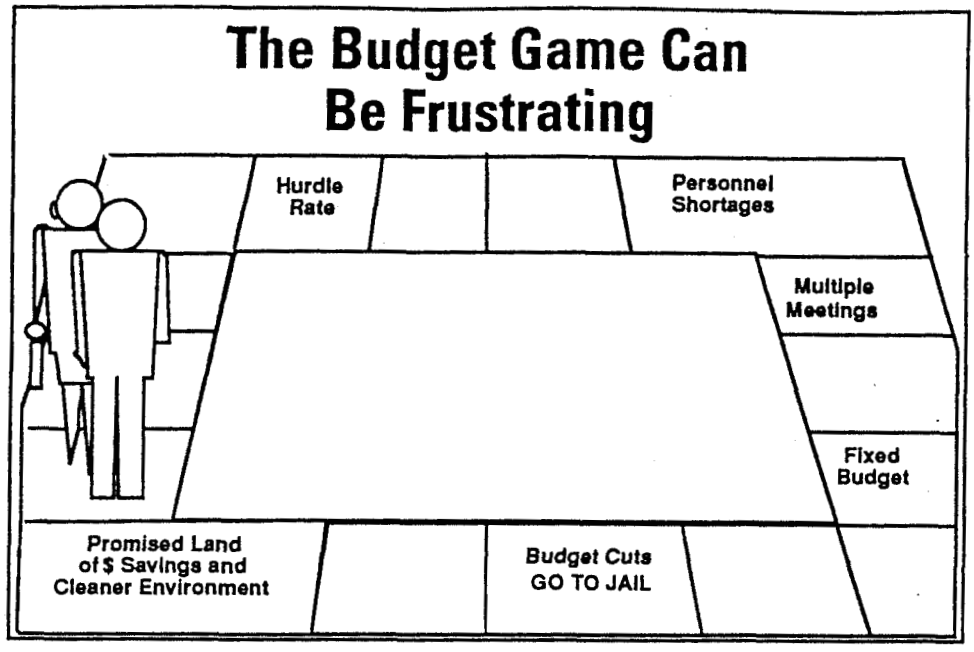
Competing Demands

Most facilities managers are aware of the opportunities offered by more efficient lighting. However, they face some serious obstacles. First among these is probably the constant attention required to address a variety of common, time-consuming complaints. As the slide illustrates, building maintenance is not a simple task. Time and human resources are not always available to attend to routine problems and maintenance, let alone to investigate new energy-saving plans, persuade management to adopt them, and then implement them.



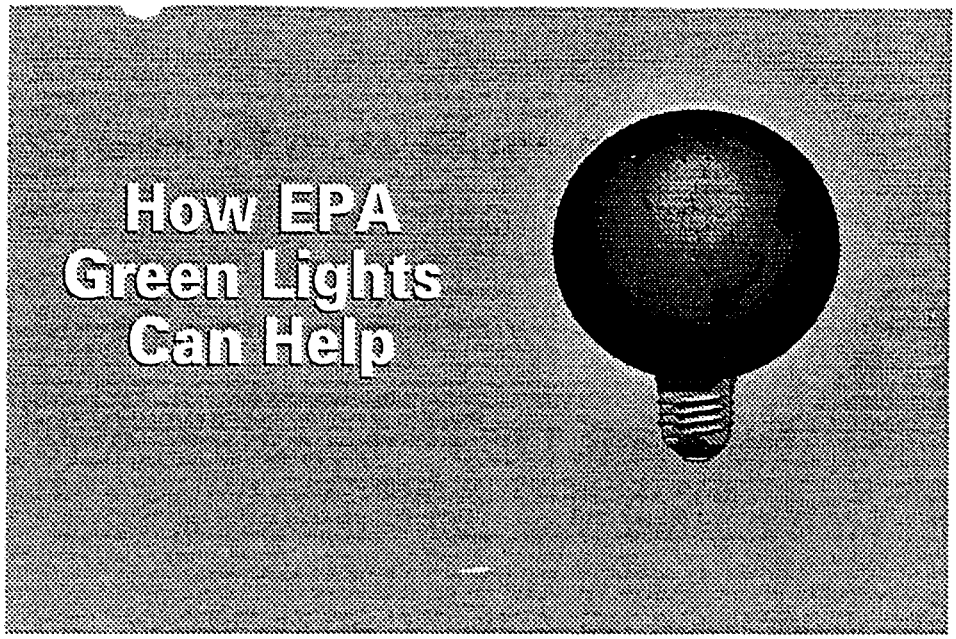
Deluge of Vendor Claims

Even if facilities managers are given extra human resources to explore efficient lighting options, they quickly can be overwhelmed by a deluge of information about products and services. Although there are many high quality lighting products, some products do not live up to their claims, and there is no easy way to evaluate them. In addition, the choices between products and types of systems are not always straightforward and can discourage someone who can't spend a lot of time investigating the many new lighting options.



The Budget Game Can Be Frustrating

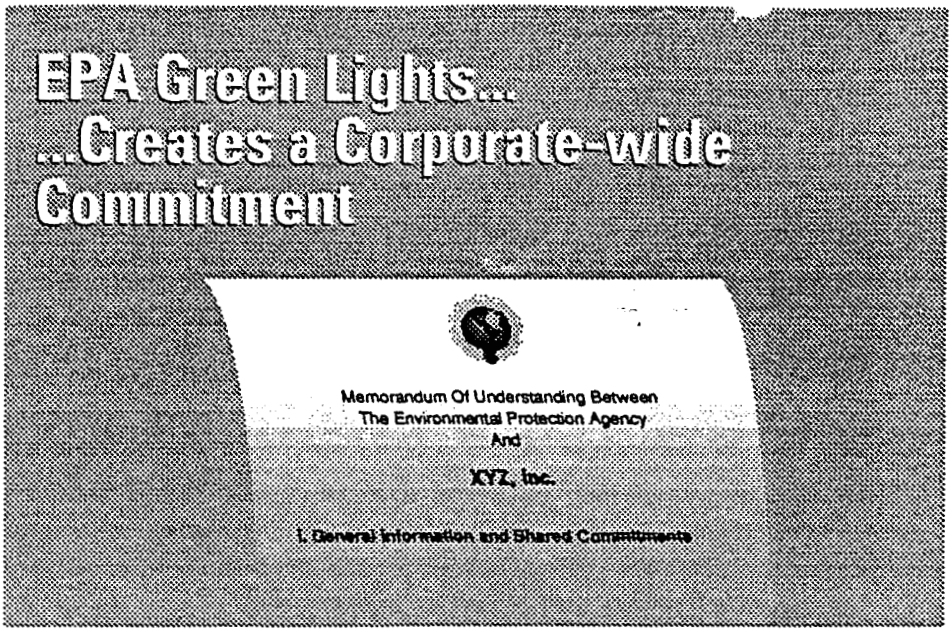
Similarly, even if human resources are available and technologies can be sufficiently evaluated, the budget game represents a final, and seemingly insurmountable, hurdle. There is a cost associated with upgrading to energy-efficient lighting, and these investments often do not meet the standard corporate hurdle rate designed for high risk ventures. Few corporations have alternate hurdle rates for evaluating low risk energy-efficiency investments. Previous failures with faulty or untested technologies and multiple meetings to make decisions can also often hinder the process of project approval. Finally, even if all of these hurdles can be overcome, facilities' budgets are usually cost centers and are often the first parts of the budget to be cut in times of fiscal austerity.



How EPA Green Lights Can Help

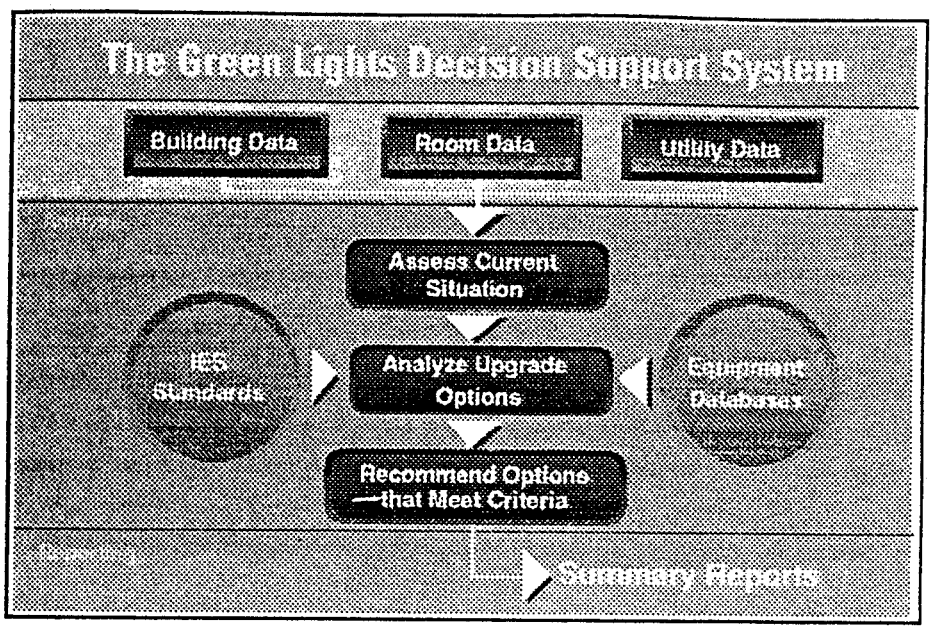
As you can see there are many factors working against rational decisions to invest in energy-efficient lighting. Because of these hurdles, many facilities managers and corporations are unable to realize the profits, energy savings, and environmental benefits of energy-efficient lighting.

The EPA Green Lights support program is an evolving, dynamic, and flexible program designed to meet its participants' changing needs. The following slides demonstrate the nuts and bolts of the support program.



EPA Green Lights...
...Creates a Corporate Wide Commitment

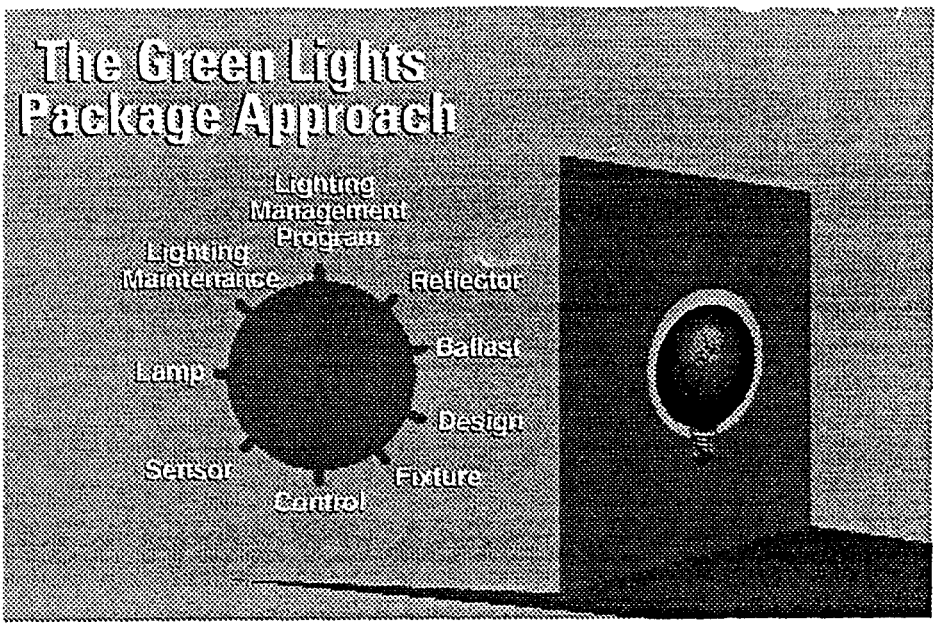
Most importantly by joining Green Lights your organization makes a corporate wide commitment to energy-efficient lighting at the most senior level. This gives everyone from facility managers to Chief Financial Officers the mandate they need to forge ahead and implement energy-efficient lighting.



The Green Lights Decision Support System

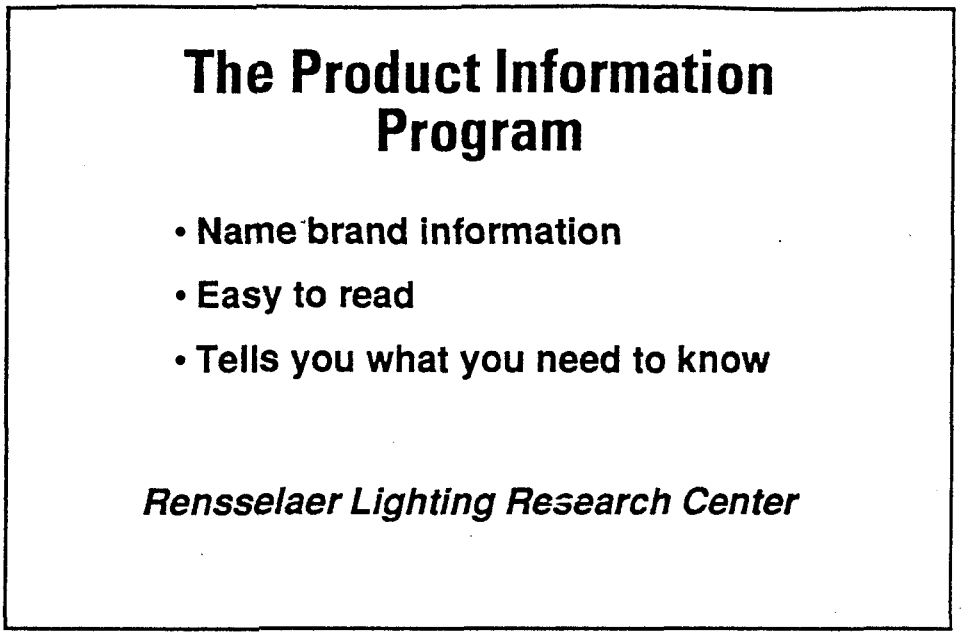
Beyond giving corporate-wide commitment, Green Lights is giving you solid products to make your transition to energy-efficient lighting smoother and provide you with the best information and experience available.

EPA will provide Green Lights corporations with a PC-based decision support system that will allow Green Lights participants to rapidly survey the lighting systems in their facilities, assess their upgrade options, and select the best energy-efficient lighting technologies and designs. The software produces reports tailored for facility managers, corporate financial staff, and senior management.



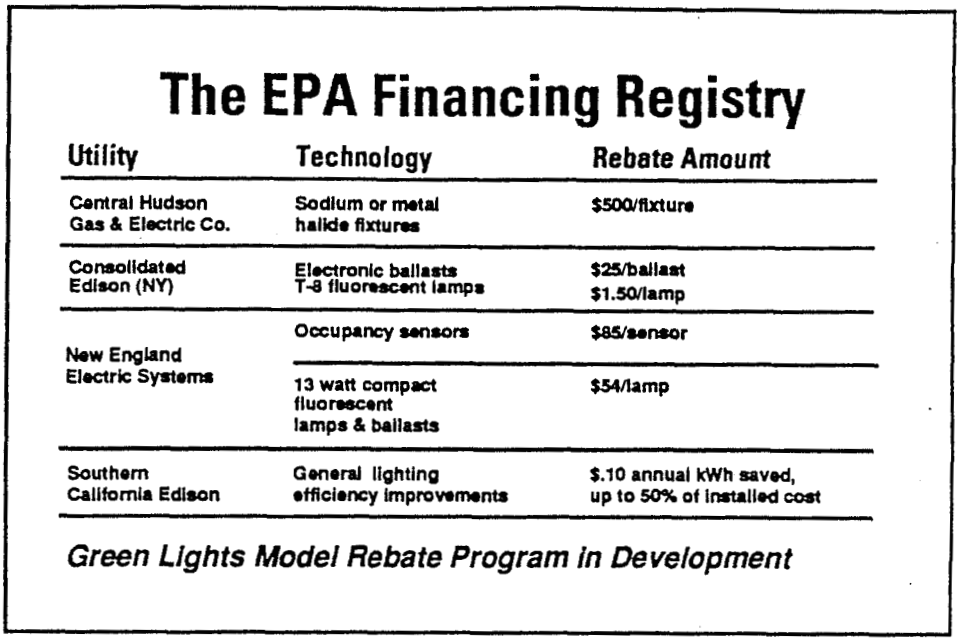
The Green Lights Package Approach

The basic philosophy underlying the Green Lights decision support system is what EPA calls the "package approach." The savings associated with each technology in isolation are impressive -- but with energy-efficient lighting, the whole is greater than the sum of its parts. The most significant cost savings, as well as the best quality light, will be realized with the adoption of integrated systems, rather than simply replacing lamps or adding controls. The decision support system is designed to reflect the most energy-saving packages, given the financial requirements of the user and the specific illumination needs of a given space. The program will generate generic package recommendations, but will not identify name brands.



The Product Information Program

One of the barriers that has prevented the widespread adoption of energy-efficient lighting is the lack of reliable information about new technologies. EPA's product information program is designed to provide name brand product information on various energy-efficient lighting technologies in a way that is clear, concise, and understandable to the lay person. This project will also allow innovative new technologies to be rapidly evaluated according to lighting industry consensus standards. EPA is currently working with several utilities and research laboratories to develop this program, which is managed by the Lighting Research Center at Rensselaer Polytechnic Institute.



The EPA Financing Registry

Utility	Technology	Rebate Amount
Central Hudson Gas & Electric Co.	Sodium or metal halide fixtures	$500/fixture
Consolidated Edison (NY)	Electronic ballasts T-8 fluorescent lamps	$25/ballast $1.50/lamp
New England Electric Systems	Occupancy sensors	$85/sensor
	13 watt compact fluorescent lamps & ballasts	$54/lamp
Southern California Edison	General lighting efficiency improvements	$.10 annual kWh saved, up to 50% of installed cost

Green Lights Model Rebate Program in Development

The EPA Financing Registry

EPA has developed a financing registry to identify and enhance financing resources for energy-efficient lighting. Green Lights Partners will be given rosters of financing resources, such as utility programs, energy service companies, government grants and low-interest loans, banks, and leasing programs.

Here is a simplified sample of the utility rebate registry which provides product-specific information on utility rebates across the country. The actual registry will also include information on utility contacts, type of programs -- such as commercial, industrial, or residential -- any applicable restrictions, and other program-specific details. The information is accessible by technology, state, or specific utility. The registry, which will be updated quarterly, already contains specific information for 98 utilities.

Green Lights Allies Program

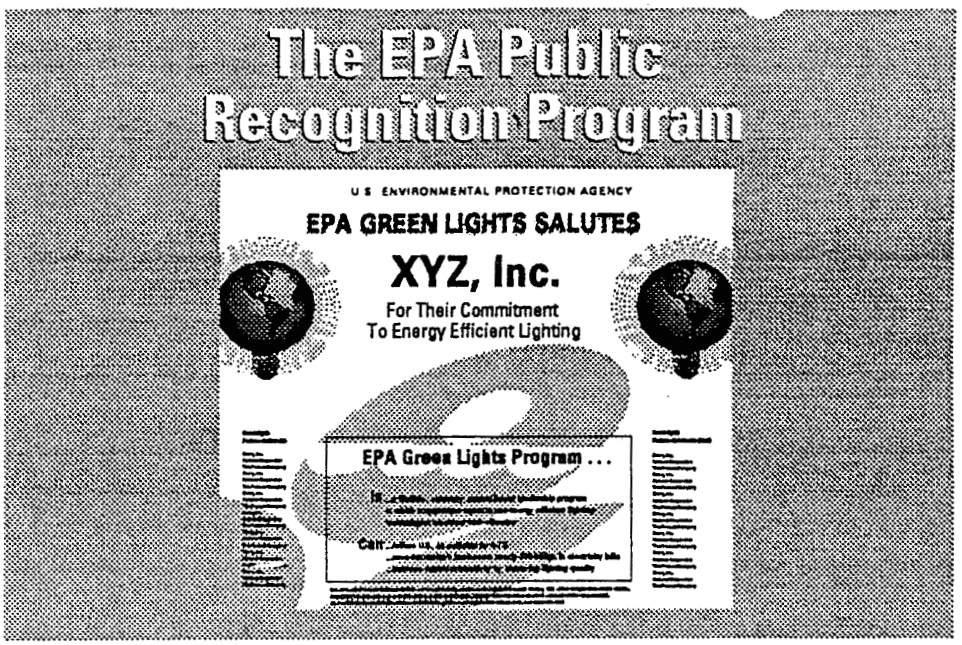
- Manufacturer Allies
- Lighting Management Company Allies
- Electric Utility Allies

Meet same lighting standards as Partners
+
Assistance to EPA Support Program

EPA does not endorse any Ally or its products or services

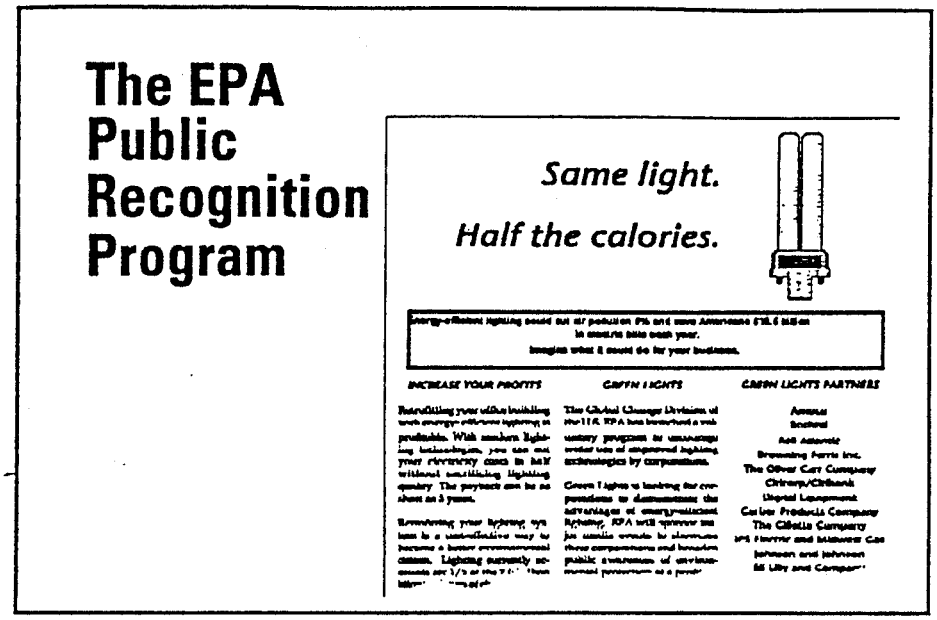
Green Lights Allies Program

In conjunction with the Partners program, EPA has developed several Ally programs to formalize its relationship with the lighting "community" and share their expertise. To date, there is a Manufacturer Ally program, a Lighting Management Company Ally program, and an Electric Utility Ally program. Corporations that join Ally programs agree to perform the same lighting upgrades as Green Lights Partners, and further to provide support to EPA in its development of technical and promotional projects. **EPA does not endorse any of these Allies, their products or services.**



The EPA Public Recognition Program

EPA intends to publicly recognize the pollution prevention accomplishments of its Green Lights Partners and Allies. EPA believes -- and the nation should know -- that Green Lights Partners are demonstrating significant leadership in protecting the environment through energy-efficient lighting.



The EPA Public Recognition Program

EPA hopes to work with corporations on an individual, regional, and national basis to place advertisements in major publications so that customers, shareholders, and the general public are aware of Green Lights participants' commitment to prevent pollution through energy-efficient lighting.

Green Lights is Making News

"In a rare Federal venture into electricity efficiency, the Environmental Protection Agency began a campaign yesterday to convince the nation's 1000 largest businesses that they can reduce pollution, and increase profits, by buying better lights."

-New York Times

"By using efficient new light bulbs, fixtures, and other new products, American business could save $18 billion per year and prevent millions of tons of additional air pollution..."

-Los Angeles Times

Green Lights is Making News

EPA Green Lights is receiving major media attention across the nation because of its voluntary and non-regulatory nature, its unique private-public cooperative approach, and its potential for preventing pollution. Stories about the program have appeared in newspapers such as The New York Times, The Los Angeles Times, The San Francisco Chronicle, and The Chicago Tribune.

How Much Money is Needed?

- 5 year period
- Only where profitable
- Between $1.00 and $2.00/ft^2 typical
- Costs decreased by
  - mass buying
  - reduced cost of selling
  - improved installer skills
- Costs likely to fall over next few years
- Rebates & ESCOs help
- Early profits reduce total needs

Program can be financed out of pocket

How Much Money is Needed?

Over the five-year period in which all profitable Green Lights upgrades are to be completed, a corporation can expect to spend approximately $1.00 to $2.00 per square foot. These costs will vary according to utility rates and rebates in your region, labor costs, and existing lighting technologies in your facilities.

In many instances, utilities will pay for a significant fraction of a project's costs -- and in some cases, 100 percent. Even where there are no utility financial incentives, third-party financing sources (such as energy service companies) can finance and perform the entire upgrade process, and they then are paid a fraction of the savings the new energy-efficient lighting system generates.

Why Prime + 6% Hurdle Rate?

- -Low risk investment
  - ➡-deserves low hurdle rate
- -Reduces overhead
  - ➡-lower hurdle rates for other investments
- -Reduces pollution
  - ➡-minimizes damage & future regulation

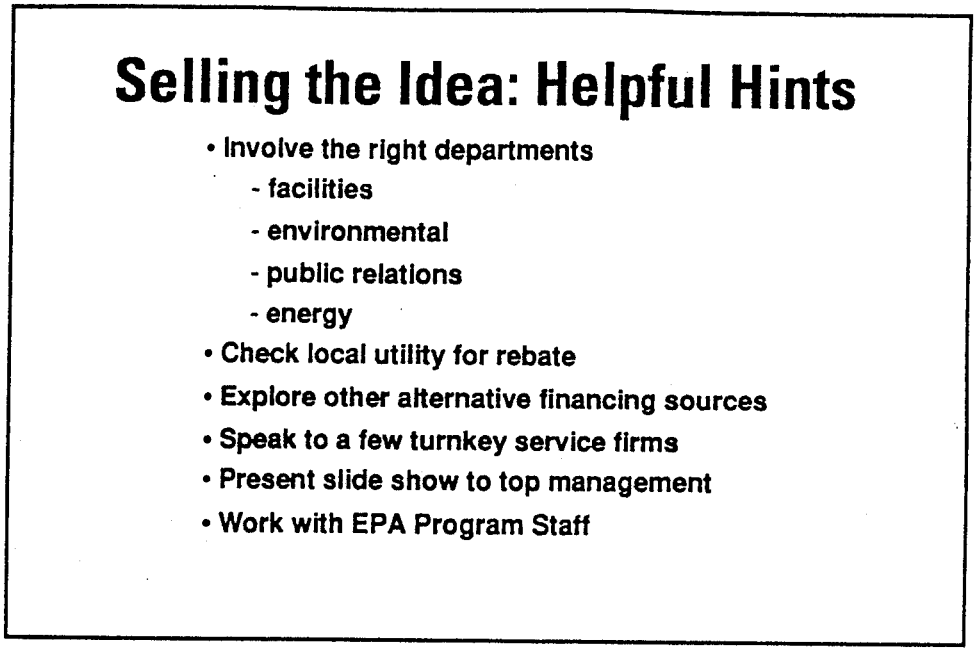
Consistent with profit maximizing

Why Prime + 6% Hurdle Rate?

Corporations typically haven't invested in energy-efficiency at a rate of prime plus six percent, and continue to pay for it year after year. Green Lights demonstrates that overhead should not be perceived as a fixed cost, but rather as an opportunity to increase efficiency -- and make your company more competitive.

Investing in energy-efficiency is a low risk venture; energy-efficient technologies are widely accepted. Moreover, money invested today lowers overhead in the future.

Most significantly, however, investment in energy efficiency today means cleaner air for everyone tomorrow and in the years to come.

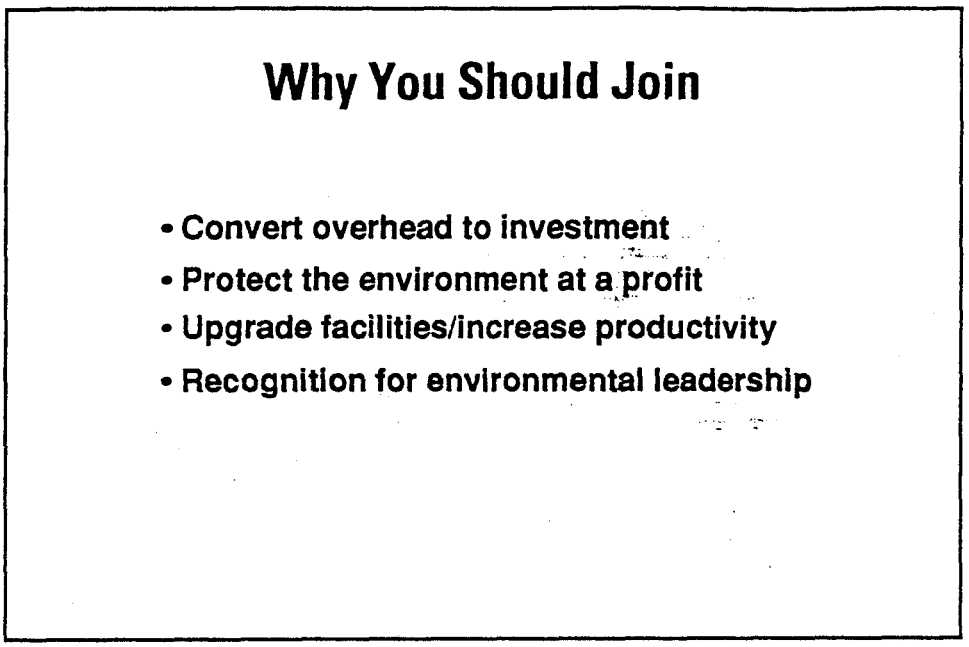


Selling the Idea: Helpful Hints

Here are some ways in which Green Lights participants have helped advance the program in their corporations. There are several "natural" constituencies within a typical company; the key is to reach out to these allies and work upward to a corporate-wide commitment.

Services and Products Available To Help You Make Your Decision

EPA has developed these marketing tools designed to help explain the program to your corporation. Please contact the Green Lights customer service department for more information on how you can obtain any of these products. The Green Lights staff is available to answer any specific questions you may have about promoting the program within your company.



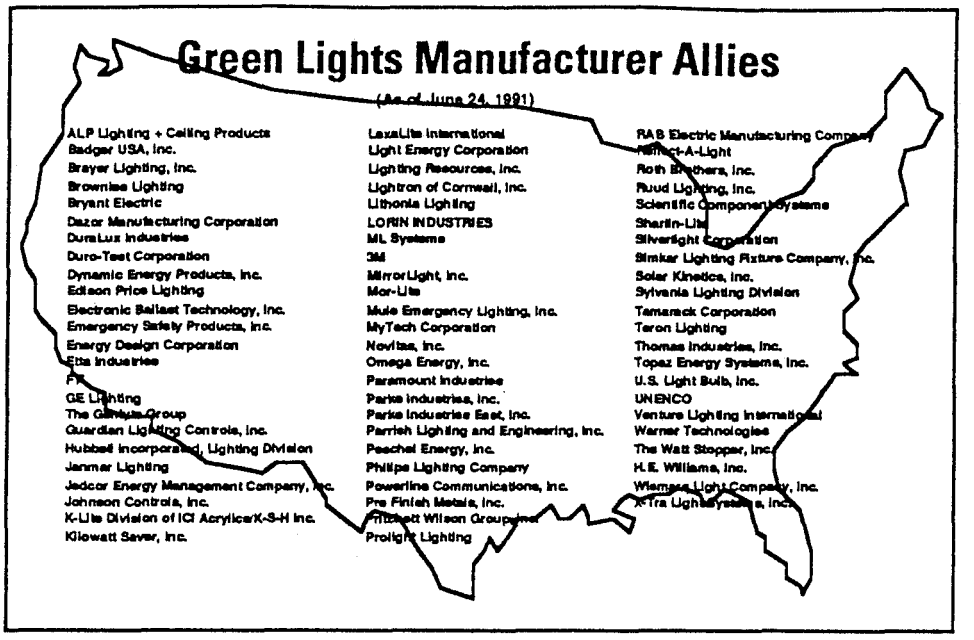
Why You Should Join

EPA Green Lights represents an unprecedented opportunity for your corporation to improve its energy efficiency, save valuable investment funds, improve the working environment and productivity of your employees, gain public recognition, and most of all, help reduce the pollution caused by inefficient use of our natural resources.

Join the Growing List of Partners

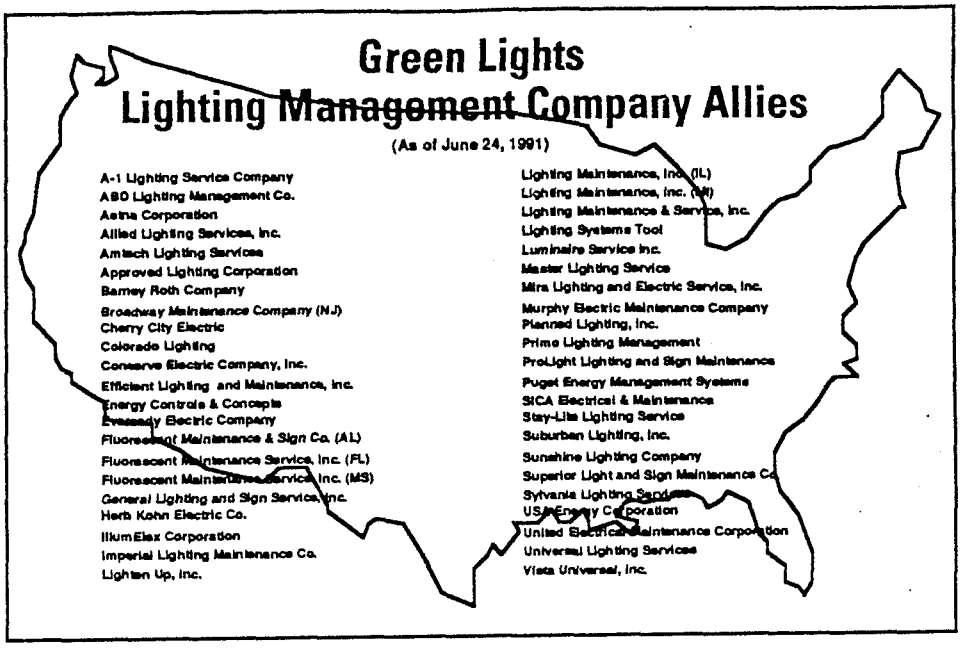
Green Lights is growing by leaps and bounds. On May 30th the states of California and Maryland joined the program as Green Lights State Partners. The estimated total of square footage commited for lighting upgrades is more than a billion square feet!

The next three slides list Green Lights participants as of June 24th, 1991. The time is right for your corporation to join the growing list of Green Lights participants who are working together to improve our nation's economy and environment.



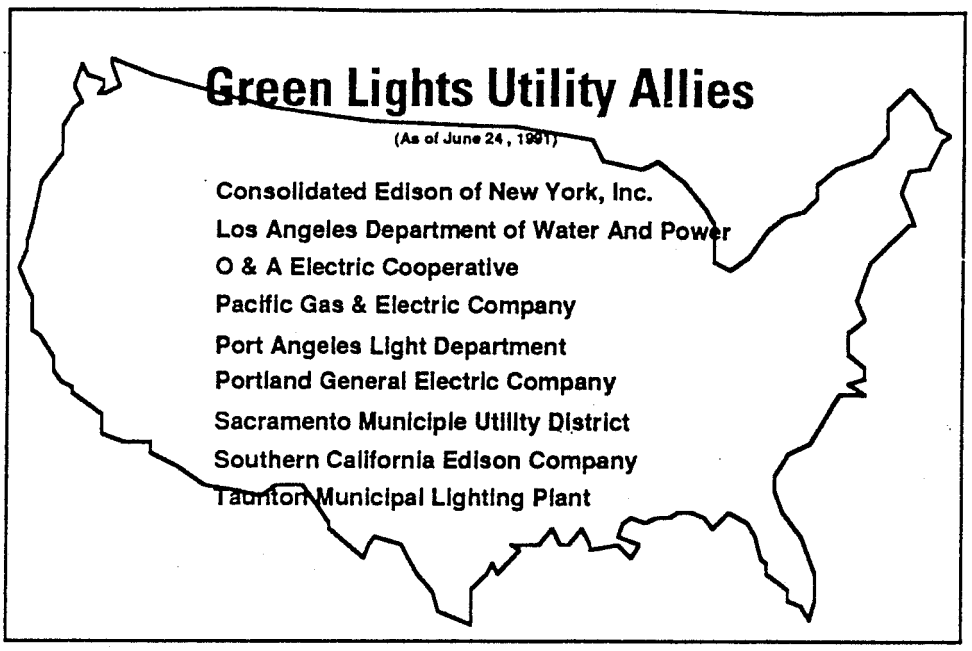
Green Lights Manufacturer Allies

More than 100 manufacturers of lighting technology and lighting management companies have volunteered to participate in this exciting new program as of June 24th, 1991.



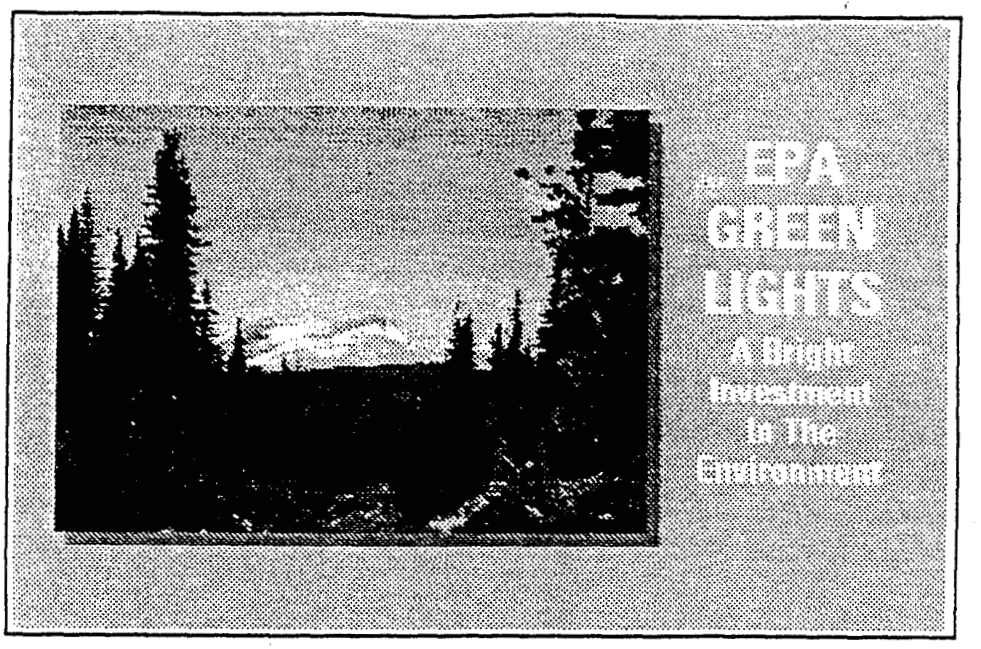
Green Lights
Lighting Management Company Allies

Green Lights allies have already begun promoting the program within their own communities and are working with EPA to recruit potential partners at EPA sponsored conferences around the country.



Green Lights Utility Allies

The list of electric utilities participating in Green Lights has more than doubled. As of June 24th, there were nine major utilities working with EPA to increase their customers' awareness of the opportunities to prevent pollution and save money with energy efficient lighting.



EPA Green Lights

A Bright Investment In The Environment

EPA's Green Lights goals are ambitious ones, and they require the best collective effort of the nation's government and its industry. Green Lights is already showing that it is possible to work together in a non-regulatory framework to prevent pollution before it is created. Green Lights continues to demonstrate that voluntary programs between government and business can benefit everyone.

To have the entire nation participating in Green Lights by 1993, to save $20 billion annually, to reduce air pollution by 4 to 7 percent -- these are the goals that Green Lights will be striving to meet -- and it is possible to realize these milestones with corporate participation around the nation.

Green Lights is an opportunity for you to prevent pollution at a profit -- and an opportunity for your company to share its concern for the environment with your employees and community. Green Lights makes good financial sense.

More importantly, however, Green Lights makes good environmental sense. Green Lights presents a unique chance for you to do something significant to protect the environment and let the nation know that you care about preserving our environment today. Reducing air pollution now means less greenhouse gases contributing to global warming, less acid rain, and less smog in our cities, our parks, and our lungs. Acting today to protect our environment preserves the world for the generations that follow. Committing ourselves to take a positive stance on environmental concerns now ensures that the children of tomorrow will have the chance to marvel at the natural wonders that have inspired people for generations.