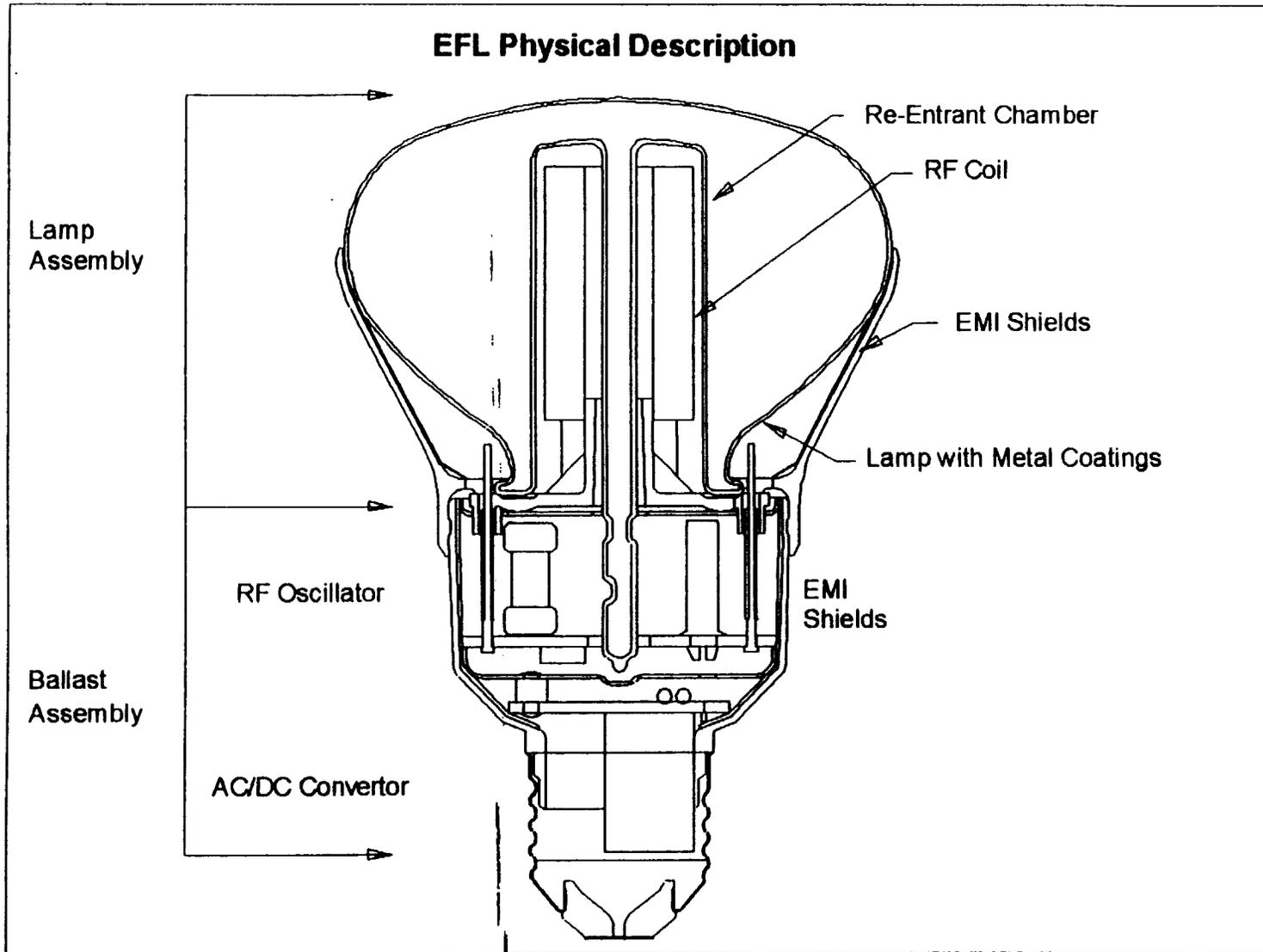
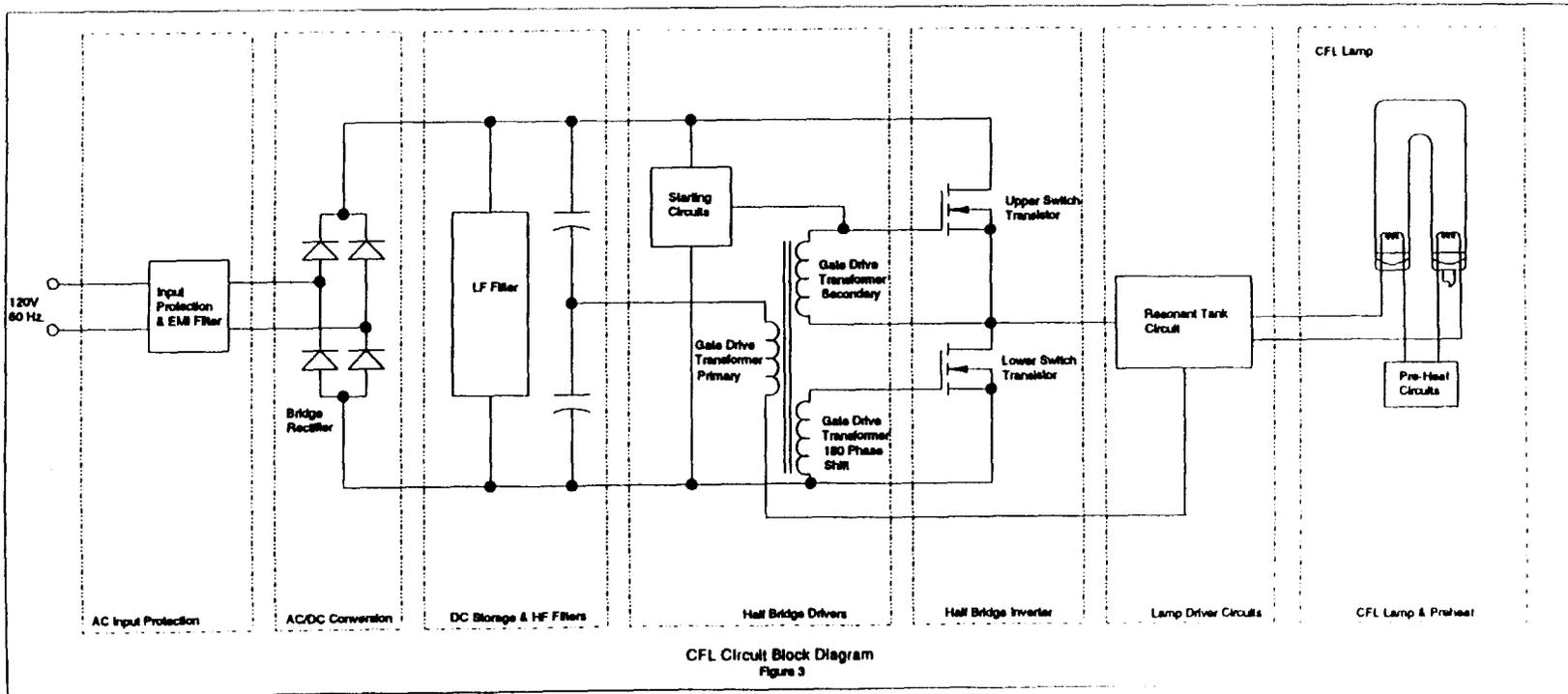
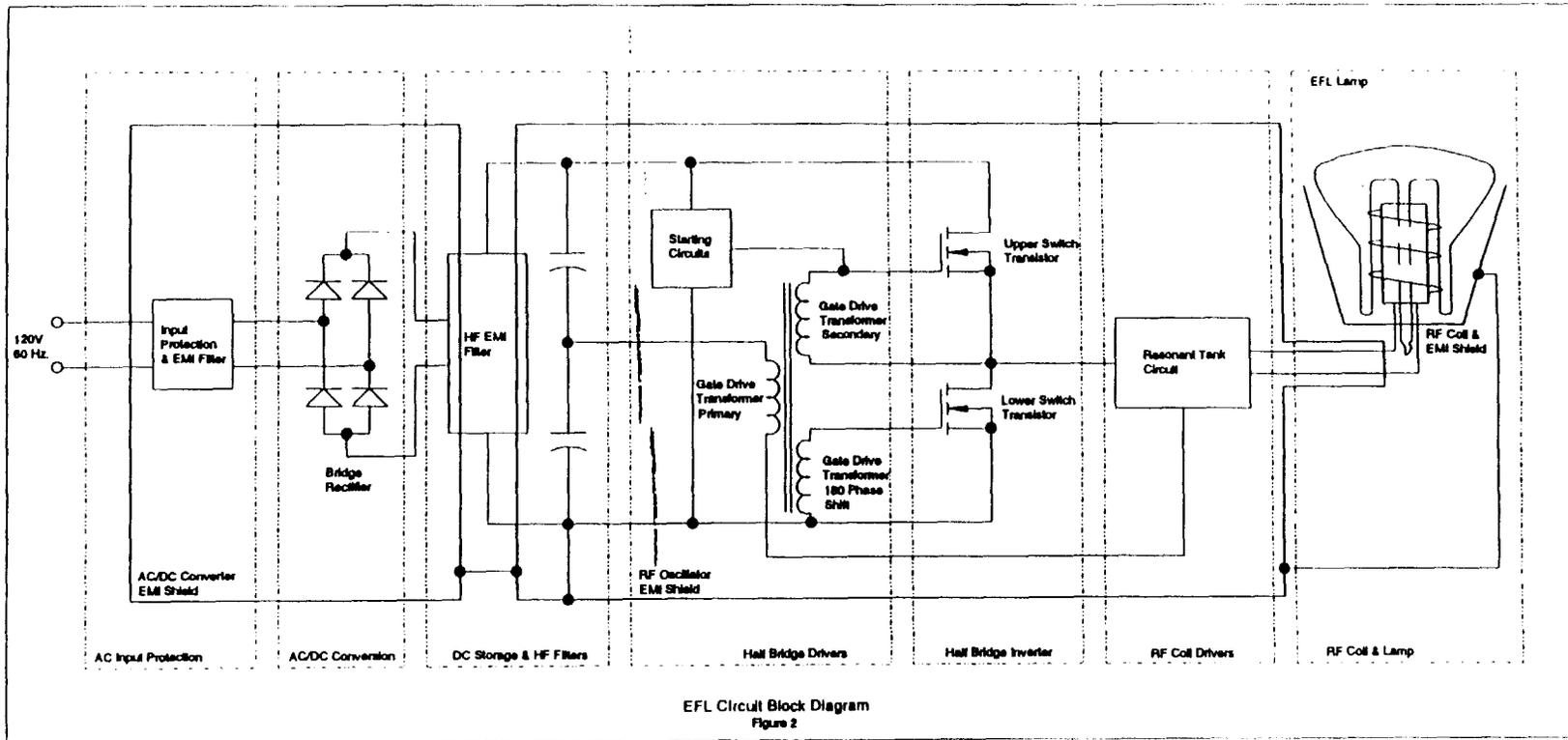


EFL System Operation



**Figure 1**

# EFL System Operation





# GE Lighting News

June 1994 • Vol. 20 No. 4

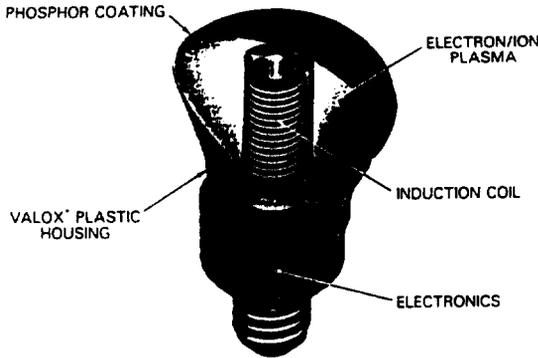
## GE's Genura™ - a lighting industry first - makes global debut

Amid much fanfare, GE Lighting recently introduced the world's first practical compact reflector lamp using induction high technology. Called Genura™, the lamp was introduced at a press conference at the start of the world-famous trade show in Hannover, Germany, this Spring by GE Lighting President John Opie, along with GE Lighting Europe President Chuck Pieper. Complementing the European event, the innovative new product was unveiled to North American journalists at a second press conference in New York at which

Vice President - Technology John Breen and General Manager - Discharge Product Management, Kevin McN McMullen spoke for GE Lighting.

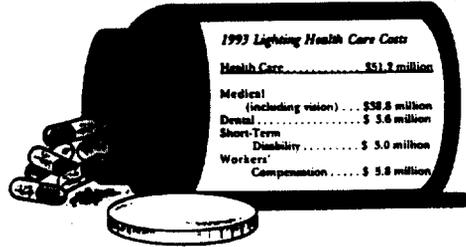
Genura is the inaugural product of a new generation of lamps that combines the energy efficiency and long life of a compact fluorescent with the aesthetic qualities of a standard incandescent reflector lamp. Available now for the European commercial and industrial (C&I) market, Genura will be available in the U.S. C&I market in the

*Continued on page 2*



### Here's how GE's Genura™ lamp works

Housed near the base of the lamp, the electronics convert low frequency, 120-volt (230/240-volt in Europe) power line voltage into high frequency voltage that produces electron-ion plasma via an induction coil. This plasma produces ultraviolet light that is invisible to the human eye. Then, like in conventional fluorescent lamps, a phosphor coating converts the ultraviolet light into visible light.



## Lighting's U.S. health care costs total \$51.2 million

GE employees would most likely agree that the company's health care benefits, including medical coverage, are among the best. Along with great benefits also comes a steep price. In 1993, health care for GE Lighting U.S. employees and their dependents cost the business more than \$51 million. The average cost for health care per employee was \$3,427.

The major objective of GE medical benefits has always been to protect employees and their dependents against high costs associated with catastrophic illnesses that could ruin families financially if they had to pay for this type of medical care on their own. The plan is designed to share the costs between the company and employees for routine, day-to-day health care expenses.

"Offering excellent benefits — sometimes called 'the hidden paycheck' — is an important aspect of attracting and retaining high-caliber, talented employees," said Harold Giles, manager - Lighting Human Resources. "and health care and medical benefits are an important part of the package."

"However, some employees may not realize that GE Lighting — not an insurance company — pays the company portion of doctor, hospital,

pharmacy, and dental expenses," he said. "GE-provided benefits represent a major cost to Lighting, affecting our competitiveness and profitability. While GE's goal is to continue to offer employees and their dependents quality health care... at the same time, it's important for all of us to be wise consumers of health care benefits to help control costs."

Participation in optional network care programs such as GE Health Care Preferred (HCP) and Prescriptions by Mail is one way to help control expenses because they offer quality care at lower cost to employees and the company.

To put the magnitude of GE's costs into perspective, Giles noted that the company, as a whole, paid out nearly \$1 billion to cover health care bills in 1993. Said Giles, "That's more than GE's combined purchases of steel, aluminum and copper for use in the products our company manufactures and sells to customers. Any way you look at it... from a personal, financial, quality, or business-competitive viewpoint... employee efforts that help Lighting control costs will ensure that quality health care benefits remain affordable for both GE Lighting and our employees."



# GE Lighting's Genura™ makes global debut

fourth quarter of 1994.

GE Lighting President John Opie told press conference attendees, "The lighting industry is going through a revolution, driven



GE Lighting President John Opie introduces Genura™ at a European press conference.

by new technology and advances in electronics. GE has a tradition of "firsts" in this industry, and the introduction of Genura ... and the potential for GE's induction technology in future products, including the opportunity to double or triple the life of these lamps, is very exciting."

Induction lighting — sometimes referred to as "electrodeless"

lighting — uses a magnetic field to induce a current in a gas discharge to produce ultraviolet light. This ultraviolet light excites a phosphor coating on the bulb wall and converts it into visible light, as in conventional fluorescent lighting. The revolutionary Genura features a 10,000-hour lamp life — which is about 10 times longer than standard European incandescent reflector lamps. The Genura, which has the shape of an incandescent reflector lamp and can be used in existing incandescent sockets, consumes only 23 watts to produce light similar to a 100-watt incandescent reflector lamp for about a 75% savings in energy. (Due to a difference in voltages in Europe and the U.S., in the United

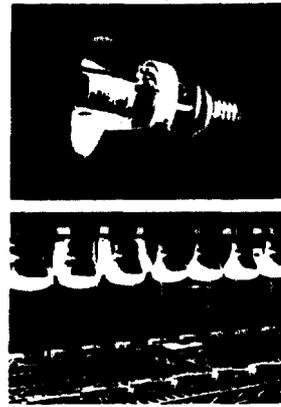
States, the 23-watt Genura offers light similar to a 75-watt standard incandescent reflector lamp.)

GE Lighting Europe President Chuck Pieper told reporters at the press conference in Germany that "one of the competitive advantages of being a global business is our ability to use the talents of employees in various parts of the world ... our global, multifunctional team has done a tremendous job in bringing this exciting new product to market."

Pieper noted that the GE global team of scientists and engineers represented multiple languages, three continents, and six time zones. The development program



GE Lighting Europe President Chuck Pieper chats with European reporters following a press conference in Hannover, Germany, to introduce Genura™



A cutaway version (top photo) of Genura™ shows the inside of the innovative new GE lamp — the world's first practical compact floodlight which uses induction lighting high technology. Above, Genura lamps are being tested in a Nela Park laboratory.

was conducted at GE Lighting's facilities in Enfield and Leicester in the United Kingdom, Budapest and Nagykanizsa in Hungary, and in Cleveland. The effort was supported by scientists at GE's Corporate Research & Development Center in Schenectady, New York. Pieper said, "In GE we talk about gathering around the water cooler to brainstorm solutions. But in the case of Genura development, the water cooler was the Atlantic Ocean."

In addition to the United States and many countries in Europe, GE's Genura received major attention in business publications around the world, including Malaysia, China, and Japan.

## Sedmak honored for achievements '... mentor, role model for women'

Among the 1994 "Women of Professional Excellence" honored at the YWCA of Cleveland's annual "Career Women of Achievement" celebration recently was Pamela Sedmak, GE Lighting general manager for New Product Ventures.

This annual awards program was established in 1977 to give public recognition to

women who have demonstrated exceptional career achievements, performed outstanding service in the community, and by virtue of their leadership and accomplishments, serve as mentors and role models for women," notes a proclamation from Cleveland Mayor Michael White. (The YWCA is a membership organization of women and girls whose mission is the empowerment of women and the elimination of racism.)

Sedmak leads a diverse GE Lighting team in identifying and introducing innovative, nontraditional lighting products with the goal of being fast, flexible and quick-to-market. With GE since 1984 in a variety of management positions, Sedmak has led the introduction of an unprecedented number of new lighting products, quadrupling the percent of total sales driven by new products in fluorescent lighting.



Pamela Sedmak, general manager - New Product Ventures.

## World briefs

### Hungary

Budapest — GE Lighting Foreign Service Employees (FSEs) at Tungsram donated more than \$500 for the Hungarian United Way to benefit food kitchens and "old age homes" in Hungarian villages. Vivian Soren, a GE Financial Management Program graduate and coordinator for the drive, said United Way is not yet well known in Hungary. She said she plans to have another drive within six months and hopes that the GE example of donations to charitable organizations will spread to other companies in Hungary.



A new MEMAS showroom in Beirut sells GE lamps that come from GE Lighting manufacturing facilities around the world.

Markets & Supplies S.A.R.L. The newly-built MEMAS showroom displays and sells GE lamps manufactured in the U.S., U.K., Hungary, and Italy, as well as fixtures produced by employees at GE Lighting Systems in Hendersonville, North Carolina.

### Lebanon

Beirut — Located in the commercial area of Beirut is new GE Lighting distributor MEMAS, which stands for Middle East

Continued on page 3

# Lighting employees tell what GE benefits mean to them

"The S&SP is a great way to build savings."

"What's nice about S&SP is that you can save as little or as much — up to the plan limits — as you want. With the company match, where else can you get a 50-cent return on the dollar?"

"... the ReditLoan feature is such a wonderful way to access your savings without incurring a tax liability."

"The GE Health Care Preferred medical plan is wonderful ... and it's a real money-saver."

The GE benefits package can add as much as 50% to an employee's total compensation — depending upon the benefits in which the employee chooses to participate. *GE Lighting News* asked employees at Lighting Systems in Hendersonville, North Carolina, and Austintown Products Plant in Ohio, to share their thoughts about the value of their GE benefits ...



**Gina Gilbert**  
team associate  
low bay products  
Lighting Systems

"The S&SP is a great way to build savings. And I like the ReditLoan feature. It's very convenient and easy to get a loan. You just call the 800 number and answer a few questions. I also like the annual Personal Share Statement I recently received in the mail. It shows me how much I've saved and all the benefits available to me ... and whether I'm taking advantage of everything I can."



**Sandra Kennedy**  
administrative assistant  
Austintown Products Plant

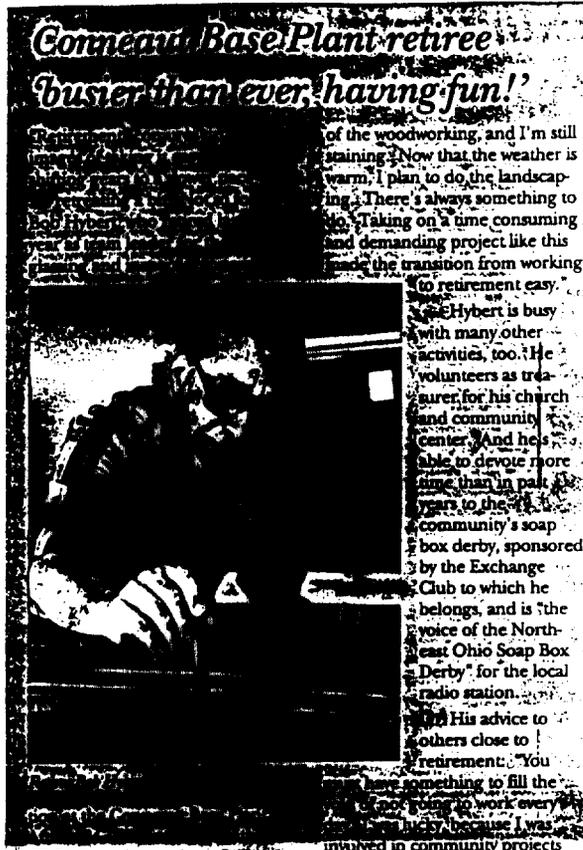
"I signed up for S&SP the first day I joined GE Lighting 22 years ago.

It's amazing how my savings have grown over the years. People ready to retire from GE, who never participated in S&SP, always tell me they're sorry they didn't participate in the company's savings plan. What's nice about S&SP is that you can save as little or as much — up to the plan limits — as you want. With the company match, where else can you get a 50-cent return on the dollar? And the ReditLoan feature is such a wonderful way to access your savings without incurring a tax liability. I used ReditLoan to borrow money from my savings to build a new home. I really appreciate all of my GE benefits ... they're great."



**Rita Bugzavich**  
shipping  
Austintown Products Plant

"The GE Health Care Preferred medical plan is wonderful ... and it's a real money-saver. I have three children who each see a doctor at least twice a year for one thing or another. Instead of \$35 or more, I pay only \$12 per visit. And there's no paperwork — which I love. I, personally, had an experience recently in which my HCP primary care physician recommended further testing by other doctors. The good news is that I found out I'm healthy and was experiencing only a muscle strain. But my doctor did not hesitate to recommend the proper testing to rule out anything of a more serious nature."



## Comenau Base Plant retiree busier than ever, having fun!

of the woodworking, and I'm still staining! Now that the weather is warm, I plan to do the landscaping. There's always something to do. Taking on a time-consuming and demanding project like this made the transition from working to retirement easy."

Hybert is busy with many other activities, too. He volunteers as treasurer for his church and community center. And he's able to devote more time than in past years to the community's soap box derby, sponsored by the Exchange Club to which he belongs, and is "the voice of the Northeast Ohio Soap Box Derby" for the local radio station.

His advice to others close to retirement: "You must have something to fill the time. I don't go to work every day because I was involved in community projects while I was still working for GE.

The difference is that I can now spend more time doing these activities and even take on new challenges."

As a matter of fact," he said, "I'm thinking about going back to school in the Fall. Maybe I'll take some classes to become a real estate home appraiser or inspector. Maybe I'll take a course in Spanish, too, so I can converse with my daughter who's studying Spanish in high school. And then again, maybe something else will come along to catch my interest."

GE Lighting in a variety of positions at several Lighting facilities in addition to the Comenau plant in Hendersonville, North Carolina.

With a second home in North Carolina, Hybert, who built a home west of Comenau, said he became committed to "to spend more time with my wife, E-Jay, and 15-year-old daughter — which I was able to do with my two older children. Cooking and chauffering are activities I enjoy, they let me spend more time with my family."

Hybert's most challenging recent activity was building his home. He said, "I always wanted to build a house, but couldn't do it while I was working full time. Once I made the decision to retire, E-Jay and I found a home we liked, redesigned the plan a little, and then worked with a contractor and subcontractor to make our dream come true."

Added Hybert, "All the decisions that had to be made during the building process, selection of every light fixture, door handle, tile, my gosh, it was overwhelming. I did most

## Pension Trust obligations

Currently, 175,000 GE retirees and beneficiaries receive pension payments from the company, helping people enjoy a more relaxed lifestyle during retirement years. The amount of pension payments depends upon an individual's GE earnings and years of service with the company. Employees can be confident that the GE Pension Trust is sound and — along with other retirement income such as S&SP, savings, Social Security, and other personal savings and investments — can provide a strong income base during retirement years.

## GE can help with loans for college

All across the nation, students are deciding which colleges to attend, while parents are grappling with how to pay for tuition. If you need help with college financing, GE offers two educational loan programs — the **Employees Educational Loan Program (EELP)** and **ConSern: Loans for Education**.

• **EELP loans** are available for full-time higher education for you or your dependent children. You may borrow up to \$2,500 per student per calendar year, have up to \$10,000 outstanding per student, and up to \$15,000 for two or more students. Repayment is made through payroll deduction. The current interest rate is 5.8%. To apply for an EELP loan, call 1-800-243-5626 for an application form.

• **ConSern loans**, sponsored by GE through the U.S. Chamber of Commerce, are available to employees, pensioners, and any of their family members. You may borrow from \$1,500 to \$25,000 per academic year. The current interest rate is 9.23%.

In addition, you may borrow up to \$3,000 per student to purchase a personal computer, software, and peripherals, provided you submit the dealer's invoice with your loan application.

To apply for a ConSern loan, call 1-800-767-5626.

### Did you realize . . .

## Study reveals GE employees pay less for higher value health care

GE employees pay much less for their health benefits coverage, on average, than employees of U.S. manufacturing companies. This is one of the facts reported in a national health care benefits study conducted by Foster Higgins, a well-known employee benefits consulting firm. As part of its data gathering, Foster Higgins surveyed 677 manufacturing employers, including GE. Using annual pay of \$30,000 as a benchmark, the results reveal that U.S. manufacturing employees contribute, through payroll deduction, an average of \$31 a month for employee medical coverage and \$80 a month for family medical coverage. But GE employees in the comparable pay range contribute an average of only \$13 a month for individual employee medical coverage and \$34 a month for full family medical coverage. Other statistics:

- 77% of the manufacturing employers surveyed cover 90% or less of hospital room and board expenses; GE pays 100%.
- 81% of manufacturing employers cover 80% of the cost of doctor visits, after the deductible is met; GE pays 85%.



## Company offers tuition refund programs, too

Under GE's Tuition Refund Program and the Individual Development Program, employees can be reimbursed for classes or courses they take that are related to their current job or future GE job opportunities. Both programs require written approval from the employee's manager prior to enrollment. For more information, read your GE Benefits Handbook or call the **Tuition Refund Center** at 1-800-992-0406.

## Lighting STARs, ACEs to receive scholarships

There will be 15 sons and daughters of GE Lighting employees in the U.S. and Canada entering institutions of higher learning next Fall with financial help from GE. The students are among 154 in GE being recognized with scholarships for their scholastic and extracurricular activities through the GE Foundation's STAR (Student and Teacher Achievement and Recognition) and ACE (Award for Career Education) programs.

The 110 STARs will each receive \$1,000 to help meet the first year's expenses at a four-year college or university. Their high schools will receive a \$500 award and each student has the honor of naming a teacher to select the use of the school's GE grant. The 44 ACE winners, who plan to go on to two-year colleges, will each receive \$500 toward their higher education, and their schools will receive a \$250 award.

This is the twelfth year for the GE Foundation's STAR program and seventh year for ACE. The programs are administered by the Citizens Scholarship Foundation of America, a nonprofit scholarship service organization. The winners were selected from among nearly 1,000 applicants.

GE and the GE Foundations contribute about \$44 million annually to educational, social service, and public policy organizations worldwide.

### And the Lighting winners are:

**STAR — Kenya D. Best**, daughter of Sarah B. Best, adhesive seal lampmaker, Lexington Lamp Plant, to study business finance at the University of Louisville in Kentucky.

**ACE — Lora M. Galloway**, daughter of Sue Galloway, assembler, Oakville Plant, Canada, to major in early childhood education at Sheridan Community College in Oakville, Ontario.

**ACE — Lynze T. Greenwood**, daughter of Randy Greenwood, quality control specialist, Mattoon Lamp Plant, to study environmental science at Lake Land College in Illinois.

**ACE — Dana M. Jenkins**, daughter of William Jenkins, maintenance mechanic, Lexington Lamp Plant, to pursue radiology at St. Joseph School of Radiology in Kentucky.

**ACE — Charles R. Keller**, son of Edwena Keller, mechanic glued seal, Lexington Lamp Plant, to study diesel mechanics at Northwestern College in Ohio.

**STAR — Sean M. Lynch**, son of Denis Lynch, Jr., team leader - Specialty Halogen New Products Team, Nela Park, to participate in Freshman Year of Studies Program, University of Notre Dame in Indiana.

**STAR — Julie A. Manieri**, daughter of William Manieri, N/C cell operator, Highland Road Glass Shop, to pursue marine biology at the University of Hawaii.

**STAR — Brian M. Narog**, son of Margaret Narog, general utility, Ohio Lamp Plant, to study pharmacy at Ohio Northern University.

**ACE — Scott L. Newcomb**, son of Jon Newcomb, national account manager — Kansas City, Missouri, to pursue business administration with an emphasis in marketing at Johnson County Community College in Overland Park, Kansas.

**STAR — Mary J. Owens**, daughter of Willie Owens, retired from Chemical Products Plant in Cleveland, to major in engineering at Dartmouth.

**STAR — Tracy A. Parsons**, daughter of John Parsons, manager - North American Production Cost Analysis, Nela Park, to pursue graphic design at Ohio State University.

**STAR — Michelle E. Roy**, daughter of Jennifer Roy, administrator - Human Resources, Oakville Plant, Canada, to study English and law at Queen's University in Kingston, Ontario.

**STAR — David M. Schick, II**, son of Kathleen Economakis, instrument control repair, Austintown Products Plant, to major in physics at the University of Rochester in New York.

**ACE — Aaron L. Sparling**, son of Jerry Sparling, machine adjuster, Mattoon Lamp Plant, to study agriculture business at Lake Land College.

**STAR — Jennifer M. Stevens**, daughter of Ronald M. Stevens, region specialist - Consumer Pricing, Nela Park, to pursue veterinary medicine and music performance at Ohio State University.

# Driving for inventory turns improves service at Circleville

If you ask the employees who make 4-foot fluorescent lamps at Circleville Lamp Plant about the connection between customer fill rates and inventory turns, you'll find they know the topic well.

For the last several months, employees involved in producing 4-foot SlimLines and 4-foot Hi Output fluorescent lamps have identified and implemented measures to manufacture in higher quality, at a competitive price, for delivery to the customer on time. These factors help to lower inventory levels of finished fluorescent lamps.

So, what does this mean to Circleville, to GE Lighting, and to GE? Less time in changeovers equates to less inventory needed on hand, which equates to less cash tied up in maintaining inventory.

"Inventory reduction 'frees up cash' which helps fund programs and improve quality," said Rufus May, Circleville Lamp plant manager. For the plant, the ability to more quickly change from one product line to another means better customer delivery schedules, better plant productivity performance, and improved product schedule attainment.

Marcia Speakman, a Circleville business team leader, looks at quick changes from another angle. "Everyone out here on the floor knew how much changeover time we could save if we could just do a few things differently."

With the expertise of team members, the support of plant management, and guidance from Corporate Business Development, Circleville employees identified three key areas that took the most time when changing from one product line to another.

Circleville changeover specialist Steve Fullen helped design a brush removal and replacement system that eliminated 20 minutes of changeover time on two machines—a total of 40 minutes saved.

Machinist Mike Mets helped install a new type of machine part that saved a total of 20 minutes.

Steve Montgomery, a process technician, and Russ Jacobs, a process engineer, worked together

to outline improvements on the wire positioner, which correctly aligns wiring in the lamp in order for the base to be properly affixed, and the welder, which welds the lead wire to the base for proper grounding. Their efforts resulted in a total changeover time improvement of 45 minutes.

Larry Blazer, a maintenance coordinator, found a way to save one hour of time on "seasoning," a process which removes contaminants from the lamp to ensure proper lamp longevity.

Correctly setting up the lampmaking machinery to run a new product line used to take five hours, but now, as a result of actions like the ones described here, employees accomplish the same task in one hour.

"To reduce inventory, you have to fill a customer order quickly," said May. The flexibility that employees at Circleville have created with their changeover time reductions have allowed us to increase our customer order fill rates significantly."

Attaining this success required looking beyond the status quo at Circleville. Employees and manag-



Marcia Speakman: "Everyone out here on the floor knew how much changeover time we could save if we could just do a few things differently."

ers alike first had to realize that doing things differently didn't always mean more work. "Making these changes has meant changing the way I've always done things... I realize we can't do things the way we used to," said Fullen.

Business team leader Shawn Conrad agrees. "Now, our preventative maintenance mechanics have the time to do preventative maintenance instead of always focusing on changeovers. Now we're faster and leaner."

Success at Circleville has also allowed plant employees to quickly assess changeover best practices and move the process to other areas of the plant.

"In CirLine, employees have found ways to cut changeover times from 75 hours to 35 hours, and in



Steve Fullen: "Making these changes has meant changing the way I've always done things... I realize we can't do things the way we used to."

Mod-u-line® fluorescent lamps, changeovers used to take 100 hours. Now they take 60 hours," said Mike Ayers, a Circleville manager of shop operations.

"Right now we have \$9 million in inventory. In order to reach our goal of 10 inventory turns in 1995, we must reduce our inventory value down to \$2 million. And Circleville can do it," Ayers said.

"To reach our goals, it will take people flexibility," said plant manager May. "We have to be flexible enough to hit the schedule every day, without exception. We have to be able to move people from one product line to another.

and everyone has to be involved in quick equipment set-ups and changes."

"We have to continue to look at ways to save time in Mod-u-line lamps and CirLine," Ayers said. "Running every size of low-watt and high-lumen Biac® compact fluorescent lamps every week, along with product and packaging consolidations, will also help us reach our goals."

"Our mission is to serve the customer well," May said. "And we all know that Circleville's success depends on us getting into the customer's hands a quality product, delivered on time, and at a fair price."

## World briefs (continued from page 2)

### The Netherlands

Eindhoven — Philips, the Dutch electronics manufacturer and parent company of Philips Lighting, in May announced plans to purchase AEG of Germany's AEG Lichttechnik — a lighting engineering company that focuses mainly on professional lighting equipment.

A recent article in *Financial Times* noted that AEG Lichttechnik has a plant near Hannover, Germany, and a subsidiary in Finland, Ikonan, Oy — which operates a factory in Mantala. About 1,200 people are employed by AEG Lichttechnik and the subsidiary. In the *Financial Times* article, a Philips spokesperson said that "the AEG business would continue to use its own brand names and would operate in parallel with the Dutch company's own lighting sector." The article pointed out that lighting is Philips' most profitable business and posted an operating

profit margin of 13% in the 1994 first quarter.

### United States

Washington, D.C. — At a White House Rose Garden ceremony recently, President Bill Clinton presented GE the "President's Volunteer Action Award." GE was one of only two corporate winners from among 5,000 nominations to receive this award, sponsored by the Points of Light Foundation and the Corporation for National Service. The GE Foundation and GE's Elfin Society were honored for their "College Bound" program, designed to double the number of college-bound students from selected low income and inner city schools. Accepting the award from President Clinton on behalf of GE were Phyllis McGrath, program manager for the GE Foundation, and Ray Mathieu, executive secretary of the Elfin Society — a volunteer organization of GE leaders.

### Glad you asked!

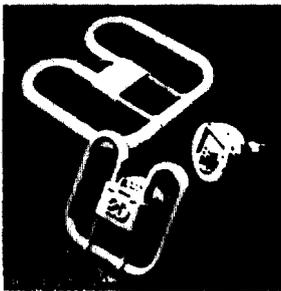
Inventory turns is a measure of how fast a business takes materials and components that it makes or purchases and turns them into products sold to customers. The higher the number of inventory turns per year, the more productive are the business' manufacturing and distribution processes. The goal for all GE businesses is 10 turns by 1995.

# New products, technology showcased at LightFair

GE Lighting introduced a number of new products at the recent annual LightFair trade show in New York. The annual exposition has become the industry forum for new product introductions and showcasing the latest lighting innovations. The show is attended by thousands of lighting users, designers, distributors, specifiers, and representatives from utilities.

New GE Lighting products and innovations displayed include:

- **Genura™** — the world's first commercially-feasible compact induction reflector lamp that features significant energy savings and retrofit advantages. (See Genura introduction feature, pages 1 and 2.)
- **Performance Biax™** — GE's exclusive new Performance Biax fluorescents are compact, lightweight, and fit in virtually any table lamp, wall sconce, post or down lighting application. This new compact fluorescent consumes only 28 watts of energy, yet delivers nearly as much light as a standard 100-watt light bulb.
- **GE Soft White Electronic Compact 2D Fluorescent System** — Two new GE-exclusive products, includ-



GE Soft White Electronic Compact 2D Fluorescent System

ing the highest light output compact fluorescent system available in the market today, were introduced — a 39-watt version that gives nearly the light of a 150-watt bulb, and a

22-watt product that provides nearly the light of a 75-watt bulb. When used in place of incandescent bulbs, this highly-efficient 2D system reduces electric costs 70% to 74% and lasts 13 times longer. The 2D system, with a screw-in adapter that allows it to fit into incandescent sockets, is recommended for table lamps, wall sconces, ceiling lights and security lights.

- **Electronic Ballast Systems** — A new line of co-branded GE Lighting-Motorola Lighting energy-efficient electronic linear fluorescent ballasts packaged into a light system that combines the technologies and products of both businesses is now available to commercial customers. The new line is a result of an alliance formed between the two businesses in March of this year.
- **Longer-Life Watt-Miser®** — GE's popular Watt-Miser "A-line" light bulb now has a 33% longer life. Compared to standard lamps, the new Watt-Miser offers 33% to 100% longer life and 10% to 15% lower energy costs, with 14% to 22% lower light output. Watt-Miser is popular in commercial, hotel/motel, retail, health care, restaurant and industrial applications.
- **GE Halogen-IR™ in "PAR30s" and "PAR38s"** — Now available in both PAR30 and PAR38 lamps, typically used for display and accent lighting, is GE's exclusive infrared reflective coating that provides a 35% efficiency advantage over standard halogen lamps.
- **Halarc™ Low-Watt Metal Halide** — This product "family" has been expanded to include both open and enclosed fixture styles and warm and cool color temperatures, offering flexibility in commercial and industrial applications and the widest array of low-watt metal halide lamps in the market.
- **PAR38 Metal Halide** — A new PAR38 Metal Halide, in various wattages, provides an energy-efficient alternative to traditional



The GE Lighting booth at LightFair.

PAR incandescent lamps.

- **Xenon Metal Halide** — A lamp created specifically for fiber optic lighting systems. Some applications include lighting for video displays, medical instrumentation, and underwater lighting.
- **High Performance Metal Halide™** — Designed to run on magnetic regulating ballasts, this GE product line has been expanded. GE's High Performance Metal Halide lamps offer the

highest efficiency and longest life 175-watt and 400-watt lamps in the industry.

- **Five-Filament Support for Survivor™ Bulbs** — Designed to last three to four times longer than standard light bulbs, GE's Survivor line has been enhanced. Filament supports have been increased from three to five to protect these commercial light bulbs from early burnouts caused by bumps, jars and vibrations, making the Survivor bulbs even more durable.

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## GE Lighting News

Published for GE Lighting employees and their families by Communications and Public Affairs.

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Exhibit 3

Exhibit 3

EXHIBIT 3

**ENERGY IMPACT RATIONALE, BASED ON MARKET PROJECTION  
AND IMPROVED ABILITY TO PENETRATE TARGET SOCKETS**

Electricity energy sales by major US national sector can be summarized as follows:

35% Residential	=	approximately 800 million kwh/year	
	=	800,000 Mwh/year	
27% Commercial			
34% Industrial			
4% Other			(1)

There are approximately 94 million households in the United States. Market research shows that the average number of lightbulb sockets per household is 31.9 sockets. This equates into a total opportunity base for new advanced technology lightbulbs of 2,998,600,000 sockets.

Market research has determined the following pattern of application for lamp types within U.S. households:

	<b>%Bulbs per household that are</b>	<b>Target Sockets for CFLs</b>
ALINE SHAPE	47.4%	1.42 B
Decorative	28.2%	.84 B
Reflector	10.3%	.31 B
PAR	8.3%	.25 B
Fluorescent	5.7%	.17 B

(2)

### **Rationale and Projected Energy Impact**

Fluorescent as a category has made only limited penetration into the residential market. Initially, there was a lack of products that made it easy to install fluorescent technology into the average home in an easy and cost effective manner. Generation I CFLs began to appear in the early to mid 80s that have resulted in a moderate acceptance of such products in the average household. But, Generation I products are limited in their ability to fit many of the ALINE, Decorative, and Reflector sockets. The fact that they look "different" has been demonstrated in customer focus groups to negatively affect their acceptance on aesthetic grounds as well. Generation I technology is cumbersome; it takes short, tubular shapes and tries to compact them by essentially bending or "folding" them into a configuration that approximates the general outline of a screw-in incandescent product. Such an approach is limited in how small the final package may become while still having high efficiency compared to the incandescent technology it replaces. The fact that traditional fluorescent lamps require electrodes in each end drives the optimum physical form to be long to minimize the losses associated with the electrode and end effects.

So, the Generation I CFLs which used small linear F lamps, "folded them up" and added either an older electromagnetic ballast or a 30-100 kHz RF lighting device/electronic ballast to the folded lamps basically have an ultimately plateaued penetration into the residential segment due to two limitations:

1. They physically do not "fit" into enough socket applications
2. Their aesthetic appearance makes them less attractive so they are less likely to be embraced for applications where aesthetics are a factor; the residential market being much more aesthetic-driven than the commercial and industrial market. (3)

The Second Generation electrodeless technology makes possible a new generation of RF lighting device that will be physically smaller without sacrificing the efficiency and performance of the First Generation CFL. These Second Generation RF lighting devices utilize the more familiar ~~shapes~~ already associated with the ALINE 75 and 100 watt incandescent lamp and the 75 watt incandescent reflector lamp. Thus they not only will fit many more applications, but they are much more aesthetic in appearance and much more closely resemble shapes that have historically proven acceptable in all type of residences. Overcoming the obstacles that limit the First Generation products will make it possible to penetrate much more heavily into the total residential socket population, and thus save significantly more energy and prevent significantly more pollution than the First Generation of CFL/RF lighting device.

If just 10% of the available ALINE and reflector sockets were converted over the next 5-years, that would represent an incremental 173 million sockets. GE's proposed RF lighting products would initially be targeted at replacing 75W incandescent lamps that would not normally be replaced with First Generation CFLs, so the net incremental energy savings would be determined by subtracting the power consumed by the new advanced technology EFLs that are the subject of this waiver from the power consumption associated with the targeted ALINE/REFLECTOR incandescent lamps to be replaced

$$75 \text{ Watts} - 25 \text{ Watts} = 50 \text{ Watts saved (avoided)} \quad (4)$$

The total connected load power savings can be calculated by multiplying the 50 watts per socket avoided by the targeted incremental socket volume of 173,000,000 sockets. This results in a total power avoidance of

$$50 \text{ Watts} \times 173,000,000 = 865 \text{ million watts}$$

or

$$.87 \text{ million kilo-watts}$$

A conservative projection based on residential usage patterns would result in a corresponding avoidance of

.87 million kW X 3 Hrs/day x 365 days/year

or

953 million kilo-watt hours.

Although the initial commercialization of such products would be limited to the range of several millions of lamps per year in order to prudently develop lowest cost manufacturing techniques, it is apparent that a relatively modest projection of ultimate potential represents a major opportunity to further reduce the nation's consumption of electrical energy. The above projection does not even include the parallel savings that would be reflected in the commercial and industrial sectors, but, instead concentrates on the residential sector where existing CFL products are still severely limited in their adoption by consumers.

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**References and Notes**

(1)

Energy Information Administration  
Monthly Energy Review, Aug 1991

(2)

GE MARKETING DEPT.  
Demand Side Management Support Package  
Residential Demand Side- Section D  
Proprietary Market Study  
National Family Opinion Study  
National Lighting Survey Letter from G.E. Gumz, Feb. 12, 1993,  
Proprietary to GE Lighting

(3)

Electric Power Research Institute  
EPRI TR-100734 Final Report July 1992  
Perceptions of Compact Fluorescent Lamps in the Residential Market [Based on 6 focus groups, 322 phone interviews, and 2 teleconference interviews with residential customers, lighting specialists, and managers of chain store lighting departments.]

(4)

Internal GE decision based on practical limitations to reaching a 100W equivalent in the near term and a conservative estimate of energy saved (75W-25W = 50W).

Exhibit 4

Exhibit 4

## EXHIBIT 4

### ENVIRONMENTAL IMPACT RATIONALE

EPA is responsible for implementing the Federal laws designed to protect the environment. EPA was created through Reorganization Plan #3 of 1970, which was designed to consolidate the Federal Government's environmental regulatory activities into a single agency. The Agency began operation on December 2, 1970. The Green Lights Program is sponsored by the Office of Air and Radiation<sup>(1)</sup>

The U.S. Environmental Protection Agency's (EPA's) Green Lights Program is a voluntary program that encourages the widespread use and adoption of energy efficient lighting. Green Lights participants, including corporations, environmental groups, electric utilities, and state, city, and local governments work together to promote the widespread use of efficient lighting technologies that reduce pollution. By investing in these technologies, Green Lights participants have realized average returns on their investments of 25 percent, and with average savings in lighting electricity bills of 50 percent or more. Through the use of such new energy efficient lighting technology, participants are reducing emissions of pollutants associated with global warming (carbon dioxide), acid rain (sulfur dioxide), and smog (nitrogen oxides).

If energy efficient lighting were profitably used everywhere today, the nation's demand for electricity could be cut by more than 10 percent. This would result in reductions of annual carbon dioxide emissions of 202 million metric tons — the equivalent exhaust emitted from 44 million automobiles. Reductions in annual emissions of sulphur dioxide would total 1.3 million metric tons, and reductions in annual emissions of nitrogen oxides would amount to 600,000 metric tons. By the year 2000, EPA estimates that its Green Lights program will save 226.4 billion kWh, resulting in total electricity demand savings of 39.8 million kilowatts. (7)

Electricity generation has a very significant impact on the generation of pollutants:

35% of all carbon dioxide (green house gas contributing to global warming) comes from electricity generation

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65% of all sulfur dioxide (major contributor to acid rain) comes from utility sources

36% of all nitrogen oxide (smog and acid rain) comes from electric utilities (8)

If we use the EPA data and relate that to the GE electrodeless lamp, we find that for every incremental incandescent lamp replaced by a 75 watt equivalent reflector or A-line product, the amount of pollution prevented, assuming an average use of 1000 hours per year is:

75W - 20W = 50W saved  
50W X 1000 HOURS = 50,000 Whrs = 50kWhrs

Carbon dioxide: 50 X 1.5 = 75 pounds/year  
Sulfur dioxide: 50 X 5.8 = 290 grams/year  
Nitrogen oxide: 50 X 2.5 = 125 grams/year (9)

If only 10% of the US residential A-line and reflector sockets were converted to the new technology, than the pollution prevented would become:

Carbon dioxide: 75# X 173,000,000 = 1,298 million pounds/year  
Sulfur dioxide: 290gr X 173 mil = 5,017 million grams/year  
Nitrogen oxide: 125gr X 173 mil = 2,163 million grams/year

(10)

**References**

(1,2,3,4,5,6,7)

U.S. Environmental Protection Agency  
EPA Green Lights Program Lighting Upgrade Manual  
EPA #430-R-93-001  
4th Edition, February 1993

(8)

U.S. Environmental Protection Agency  
EPA Green Lights Program  
Light Brief "Electronic Ballasts: Technology to Boost Your Lighting  
Efficiency"  
August 1992

(9)

GEL calculation based on a 50W energy avoidance when replacing a 75W  
incandescent A-line or incandescent reflector with a 2.2-3.0 Mhz EFL and using  
EPA data for pollution avoidance per kWhr of power

(10)

GEL calculation based on a conservative projection of incremental  
residential sockets that would not be compatible with generation one  
CFLs due to a combination of aesthetic and physical fit limiters.  
If the Marketing section eventually comes up with a different volume  
for incremental socket opportunity, then these numbers would be  
recalculated.

Exhibit

Exhibit 5

EXHIBIT 5

**ENERGY IMPACT/IMPLICATIONS  
OF THE WAIVER PETITION**

The amount of fuel needed to produce 1 kilowatt-hour of electricity in 1990 can be summarized for several of the common fuel sources as

Coal	.979 pounds
Oil	.070 gallons
Gas	10.5 cubic feet

This means that every EFL that replaces its incandescent equivalent will, over the course of one year of operation, save the following non-renewable resources

Coal	50 kWhrs	X	.979	=	48.95 pounds
Oil	50 kWhrs	X	.070	=	3.5 gallons
Gas	50 kWhrs	X	10.5	=	525.0 cubic feet

(assuming that the lamp is used in a geographical area that relies on each type of fuel exclusively).

In 1990, electric utilities consumed 608,559 short tons of coal, 186,653 42-gallon barrels of oil, and 2,418,822 million cubic feet of gas.

If one utilizes an ultimate incremental projection of 173 million sockets that would be converted to this new technology, that would translate into the following

savings for non-renewable resources assuming approximately the same mix of fuels is maintained:

Utility Fuel Mix		Projected Conservation per Year	
Coal	56.5%	$173M \times .565 \times 48.95$	= 478.5 Million Pounds
Oil	5.1%	$173M \times .051 \times 3.5$	= 3.1 Million Gallons
Gas	10.5%	$173M \times .105 \times 525.0$	= 954 Million Cubic Feet
Renewable	.4%		N/A
Hydro	3.0%		N/A
Nuclear	<u>24.5%</u>		Data not available
	100.0%		

This projection assumes that as awareness grows and conservation becomes ever more central to the average consumer lifestyle, the distribution of the 173 million incremental sockets converted to the Second Generation lamp would follow the same percentage as the fuel mix, projecting a uniform geographic penetration of the population. While a somewhat optimistic projection in 1994, it is more realistic for the period of time beyond the year 2000 as conservation makes inroads in all segments of consumers.

Electrical utility generation has increased 86% over the last 20 years since the energy crisis of 1974. Although the greatly increased use of all types of energy-efficient products has prevented this increase from being larger, clearly an even

faster pace of adoption and development of newer energy efficient products is required to ensure that non-renewable resources are conserved for future generations.

As can be seen in the above projections, even a relatively modest 10% conversion of only two categories of incandescent residential sockets can result in impressive incremental resource and energy conservation.

Economically, the conversion of an incremental 173 million sockets represents a considerable potential savings to residential users. Using a national average of 8.2 cents per kilowatt-hour rate, in one year consumers would save a total of

$$\underline{\quad\quad\quad} 50 \text{ kWhr} \times .082 \text{ per kWhr} \times \underline{\quad\quad\quad} 173,000,000 = \underline{\quad\quad\quad} \$71,000,000$$

Over the projected average life of 20,000 hours this would net a total savings of

$$\$71,000,000 \times 20 = \$1.4 \text{ Billion}$$

or

$$\$1.4\text{B} / 173 \text{ million} = \$82 \text{ per socket}$$

**References**

All fuel and rate information in this module come from

Edison Electric Institute  
30 Key Facts About Electricity and Electric Utilities  
Data is 1990, Publication is 1991

All information on the number of incremental sockets and kWhrs saved come from Waiver\_prep.mkt;4 and Waiver\_prep.EPA;3, GE LIGHTING, 1994