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SEIZING THE OPPORTUNITY

BREAKTHROUGH STRATEGIES FOR CREATING A COMPETITIVE ADVANTAGE IN THE DEREGULATED AGE.

A POSSIBILITIES BRIEF FOR END-USERS, UTILITIES, POWER MARKETERS, ESCOS AND OTHER INTERESTED PARTIES

IT TAKES ENERGY

TO COMPETE IN BUSINESS.

IT TAKES A BETTER UNDERSTANDING OF ENERGY TO COMPETE MORE EFFECTIVELY.

This publication is underwritten by **ELECTRONIC LIGHTING, INC. (ELI),** a leader in the design and manufacture of controllable lighting systems.

OUR MISSION is nothing less than to change the way the industry looks at, thinks about and uses lighting technology in the deregulated age. It is in our enlight-ened self-interest – as well as yours – to move the industry in the direction of using energy more effectively.

The information contained in this guidebook has been gathered from numerous industry sources, including the DOE, EPA, EPRI, E SOURCE, IES and others.

WELCOME TO THE AGE OF DEREGULATION.

It is a time of seismic change, bristling with challenges and ripe with opportunities.

There are those who will resist the forces of deregula-tion, and those who are set to embrace them. With electricity no longer being sent your way solely by the "invisible hand" of a benevolent utility, defenders of the status quo say that confusion will reign in this deregulated era. They would have you believe that new, *untested* ideas about energy and its distribution will unilaterally increase risk and negatively impact reliability and the price of energy.

There are others who say that 'opportunity' is what's reigning here. With deregulation, competition is breaking out all over, bringing with it greater choice. The future in the deregulated world belongs to those who choose to think critically and act decisively.

In short, the winners and losers will be determined by who takes action first.

It is to this second camp that we dedicate this book, a helpful compendium designed for those of you who've found yourselves with a sudden armload of energy choices – and no Buyer's Guide.

Yet this is no ordinary Buyer's Guide.

Within the next few pages, we will detail the power that already resides in your organization to harness these new choices and new opportunities – no matter how deregulation shakes out.

We will draw a straight line between strategies and savings, technology and ROI, the present and the future.

And we will confirm the existence of a "Killer Application" that has emerged to make the deregulated era a welcome place indeed.

The Age of Deregulation could well be your company's 'Age of Enlightenment.' Whatever course you choose, experts agree that this is no time to be a spectator. Ultimately, only consumers who control their energy usage judiciously and effectively will win. To that end, reading, understanding and acting upon the information contained in the next few pages will be well worth your time and energy.

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CONVERGENCE

THE INTERSECTION OF MOTIVE, MEANS & OPPORTUNITY.

PEER INTO THE BIGGER PICTURE.

F O R E W O R D

"SEIZING THE OPPORTUNITY" is equal parts history book, work-book, vision statement and industry guide. I hope that after examining its contents, a synthesis of current industry knowledge and prudent prognostication, you will find yourself and your company better prepared to capitalize upon the opportunities that technology can now make possible.

> **JOSEPH DESMOND**, *President, ELI*

Before you lies the open energy market. For the next few moments, consider this world of deliverable energy and your place in it. Whether you're involved in facilities, operations or asset management, you are now confronted daily with a multitude of imperative decisions that must be made. To succeed in the new age of energy, you should make room for a few more.

Consider some of the decisions that must be made going forward. Among them, *Who will my supplier be? What energy should I purchase? How risky is all this?*

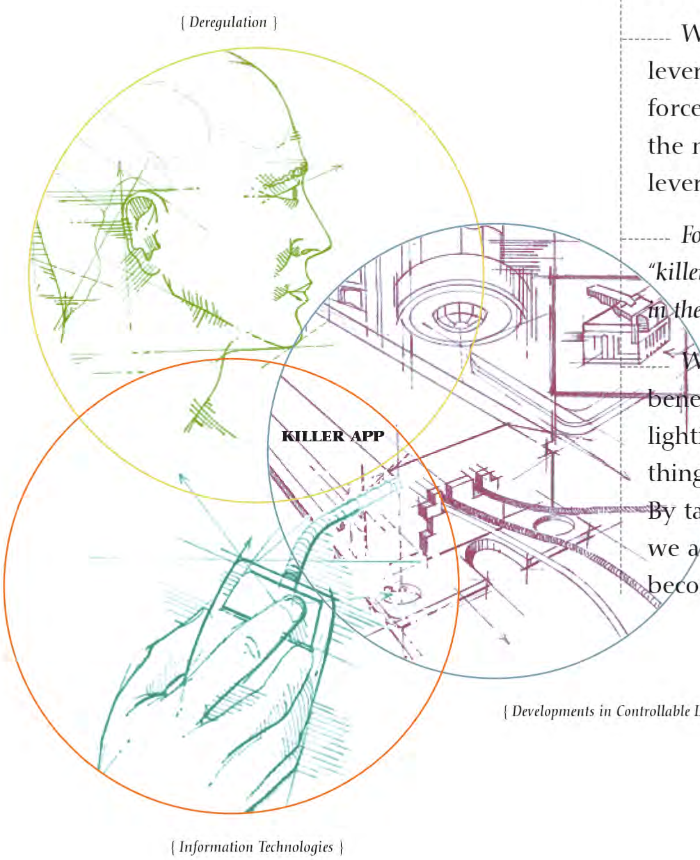
The open market can answer all. It is a place in which you can increase your range of energy options, giving you astonishing flexibility to achieve savings and enhance your competitive position. Only if you choose to do so.

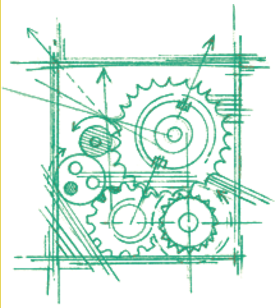
The way we see it, there are three driving forces at work shaping the competitive energy marketplace. They are, in no particular order, the deregulation of the electric utility business, the application of information technology in the metering and distributed building control industry, and advances in energy technologies. Together, they create conditions ideal for a forward-looking company to gain a meaningful competitive advantage.

What has been absent until now is the catalyst…the lever to capitalize upon the collective impetus of these forces…the application that gives clarity and focus to the near-term future. The news we bring is that this lever, this means to a breakthrough, is here now.

For the purposes of this book, we believe that the first so-called "killer application" is the use of controllable ballast technology in the service of a building-wide load management strategy.

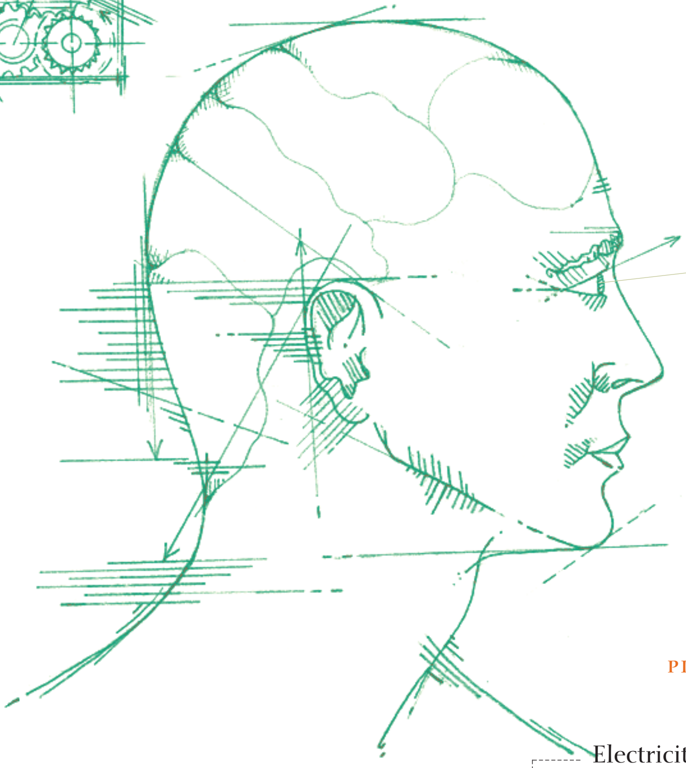
While we recognize and are prepared to cite the benefits of productivity gains accruing to controllable lighting, we understand that you're looking for something more hard-hitting to convince you of our premise. By taking the time to understand how costs are driven, we are certain that the validity of our argument will become self-evident.





DEREGULATION

UNDERSTANDING MARKET DYNAMICS.



As the industry shifts from a regulated monopoly to competition driven by the forces of the free market, one thing is certain. Nothing will ever be the same. The transformation is spinning off separate generation, transmission and distribution companies. Once hemmed in by regulated territories, suppliers are crashing through geographic boundaries in the search for new and more profitable business. More importantly, risks and rewards are being re–allocated among all of these players...and you.

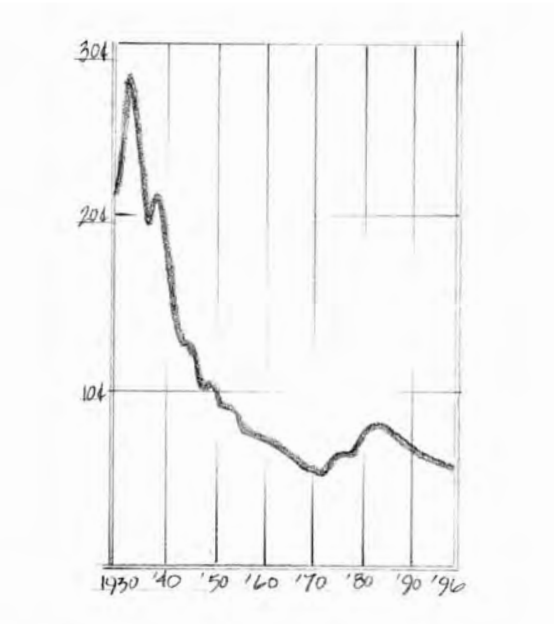
Electricity has become a commodity, to be bought and sold on the financial markets. Familiar financial hedging tools such as buys, calls, swaps and futures now apply as firmly to electricity as they do to other, more “tangible” markets. The old rules, it seems, no longer apply. But then, they never have.

Historically, electric energy has always been affected, to greater or lesser degrees, by dynamic market forces, de– and re–regulation, emerging technologies and energy consumerism. As far back as the 1890s, leaders in the emerging electric utility industry were debating the merits of alternating current vs. direct current, building larger generators, and identifying and exploiting various prime energy resources.

By the late 1920s, runaway growth had created huge energy–based conglomerates. Fully 50% of the nation’s power rested in the hands of three holding companies, with another 25% of the market divvied up among just thirteen more. To the customers’ chronic disservice, financial “sleight of hand” among these giants was the order of the day until the Crash of ’29 took many of them down.

Regulation suddenly seemed like a very good idea.

The American public turned to regulation to preserve financial stability and curb further corporate excess. Electricity was viewed by most as a natural monopoly; a product that by definition could not be delivered more cost–effectively through competition. “Obligation to serve” and “return on equity” became the industry’s buzzwords. They would steer the rate–setting machinery – and drive rates lower – for the next fifty years.



THE PRICE OF POWER

WHAT ARE THE GOALS OF REGULATION?

BROADLY STATED, THE FOUR OBJECTIVES OF RATE-MAKING POLICY ARE THESE:

MINIMIZE
the cost of electricity to consumers.

MAINTAIN
the financial integrity of the utility.

MINIMIZE
future costs.

BALANCE
social and environmental concerns.

WHAT ARE THE GOALS OF GOOD RATE DESIGN?

- Simplicity
- Understandability
- Public acceptability
- Freedom from controversy
- Fairness
- Stability
- Feasibility of application

The status quo remained that way until the 1970s as average costs continued to decrease. The template changed when nuclear power promised us energy "too cheap to meter" and OPEC actually delivered us an energy crisis, helping to fuel inflation. Suddenly, conventional wisdom ("Just build a bigger power plant and we'll have cheaper energy.") became unworkable.

Amid concerns about energy safety, reliability and national security came calls for more intensive regulatory oversight and comprehensive planning in the form of Integrated Resource Planning (IRP). IRP is a sophisticated balancing of supply-side and demand-side alternatives to meet the energy needs of the nation at the lowest possible cost.

On the heels of IRP, sometimes called "least-cost planning," was legislation targeting conservation and the use of renewable energy which had the practical effect of inviting non-utility generators (NUGs) into the market.

A BRIEF LOOK AT THE LAW.

The modern history of regulation can be summed up in two pendulum swings nearly a half-century apart. In 1935, the Public Utility Holding Company Act (PUHCA) regulated and limited the size of holding companies. Then, in the late 70's, with America still feeling the sting of the energy crisis early in the decade, the pendulum began to swing back.

The door to deregulation opened slightly in 1978 with the Public Utility Regulatory Policies Act (PURPA). PURPA encouraged private investors to build smaller production facilities using renewable energy sources. In 1992, the opening grew larger with Congress' passage of the Energy Policy Act (EPAct) which effectively loosened PUHCA's grip and allowed companies to diversify into areas such as independent power production.

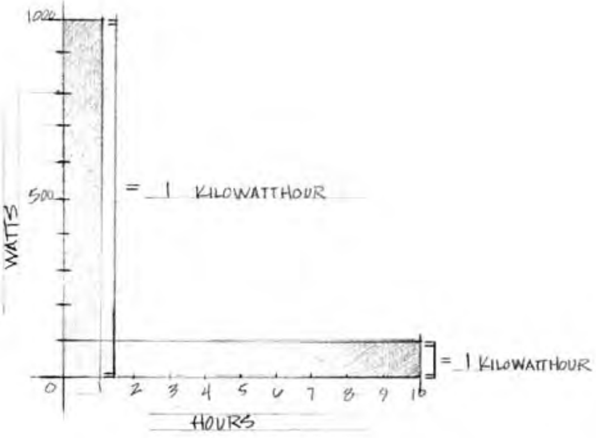
The practical effect of EPAct was the creation of a new class of competitors. It also paved a path, later widened by order of the Federal Energy Regulatory Commission – namely, FERC 888 – which required utilities to open the wholesale power markets to competition.

The goals of this and similar legislation:

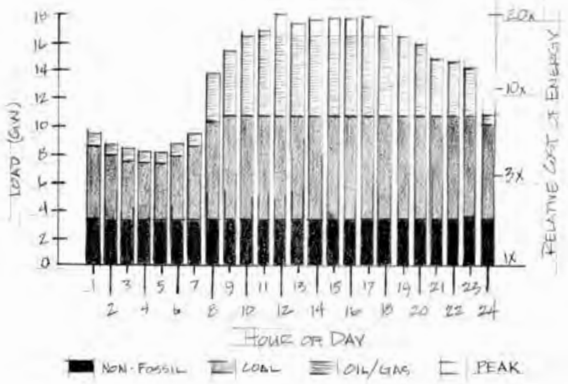
- To deliver lower costs
- To ensure reliability
- To provide for open and fair transmission access

FERC 888 also granted utilities full recovery of stranded investment costs (power stations and similar generation facilities built in the expectation of utilities remaining a monopoly). A later ruling, FERC 889, assured that transmission owners would never enjoy an unfair advantage over their new competitors.

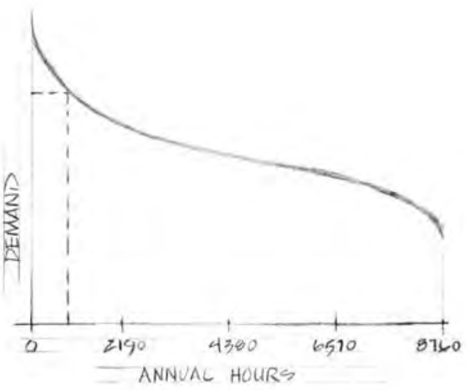
The ground rules set, deregulation achieved a tangible sense of momentum.



CAPACITY VS. ENERGY



UTILITY LOAD PROFILE



LOAD DURATION CURVE

THE MARKET NOW.

The energy industry is, and will continue to be, characterized by reliance on market forces for pricing, resource planning and delivery. The free market is driving down the cost of electricity, giving rise to a new class of energy marketers and a proliferation of different types of electric rate structures. Thanks primarily to new technologies, electricity is no longer viewed as a natural monopoly.

With supplier choice comes responsibility, one that is now being shifted to you to perform due diligence relative to your energy needs – to, in essence, conduct your own Integrated Resource Planning process.

THE FUNDAMENTAL DIFFERENCE BETWEEN CAPACITY AND ENERGY.

As in any industry in which supply and demand hold sway, energy producers strive to align capacity with demand to minimize production costs and maximize utilization. Utilities have developed rate structures that allocate these costs according to how you use your energy.

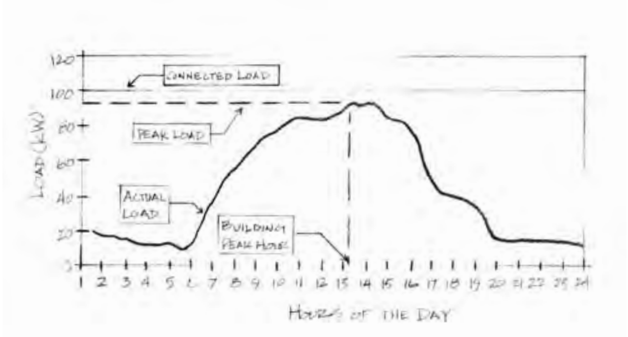
Consider the following example.

If you turn on one 100–watt lightbulb for ten hours, you would consume one kiloWatthour. If you turned on one 1000–Watt lightbulb for one hour, you would consume the same amount of energy. The difference? In the second example, the utility would be required to build a power plant big enough to meet the capacity of the 1000–Watt appetite, even though it would consume the same kiloWatthour.

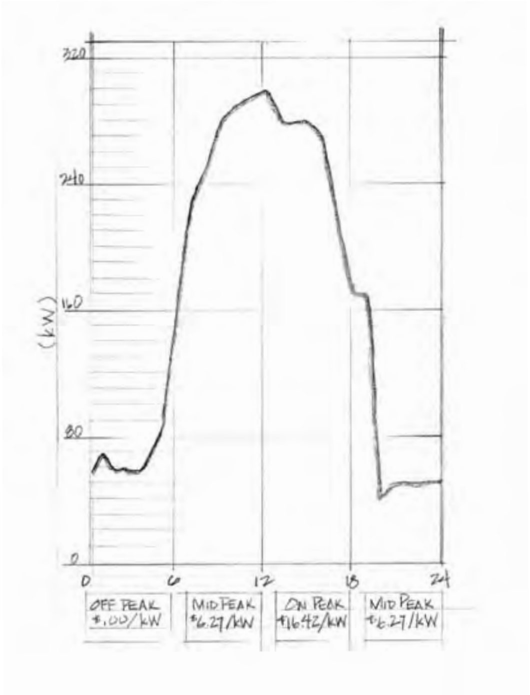
So it follows that rate structures are designed specifically to recoup the capacity costs of power generation during peak demand periods, i.e., costly generators and premium–priced energy bought on the spot market to meet demand.

Now consider the cumulative impact on a utility. Changes in consumption at various times of the day across all customer classes typically result in a load profile like this one, a graphical representation of energy consumption.

Put another way, the amount of hours that a utility operates at peak capacity on an annualized basis is shown on a load–duration curve. A small amount of time accounts for a large percentage of capacity required.



GENERIC OFFICE LOAD SHAPE (SUMMER)



DEMAND PROFILE (TIME OF USE/TIME OF DAY)

WHAT SHAPE ARE YOU IN?

There are those who believe that the very shape of deregulation will result in a windfall and that dramatically lower rates will simply come to them. This is unlikely to occur. For those interested in taking action, consider the relevance of load shapes. Drawn from metering data, load shapes offer a graphic representation of your facility's usage profile. Equipped with this information, you can begin to take steps to re-shape your energy demand, and with it the size of your energy bill.

It pays to understand how to read a load-profile curve, which details the level of energy used over a period of time. A company that can not flatten its load during peak hours will be penalized. At the same time, a company capable of exemplary utilization – exhibiting a better ratio of average usage to peak demand – will be commensurately rewarded.

It stands to reason that the degree to which your reduced demand coincides with a utility peak demand corresponds precisely with the magnitude of savings you can expect. The lesson is clear. As the market structure has changed, the risk has shifted. To you. Welcome the opportunity. For in the history of electric energy production and transmission, there's never been a better time to be an activist.

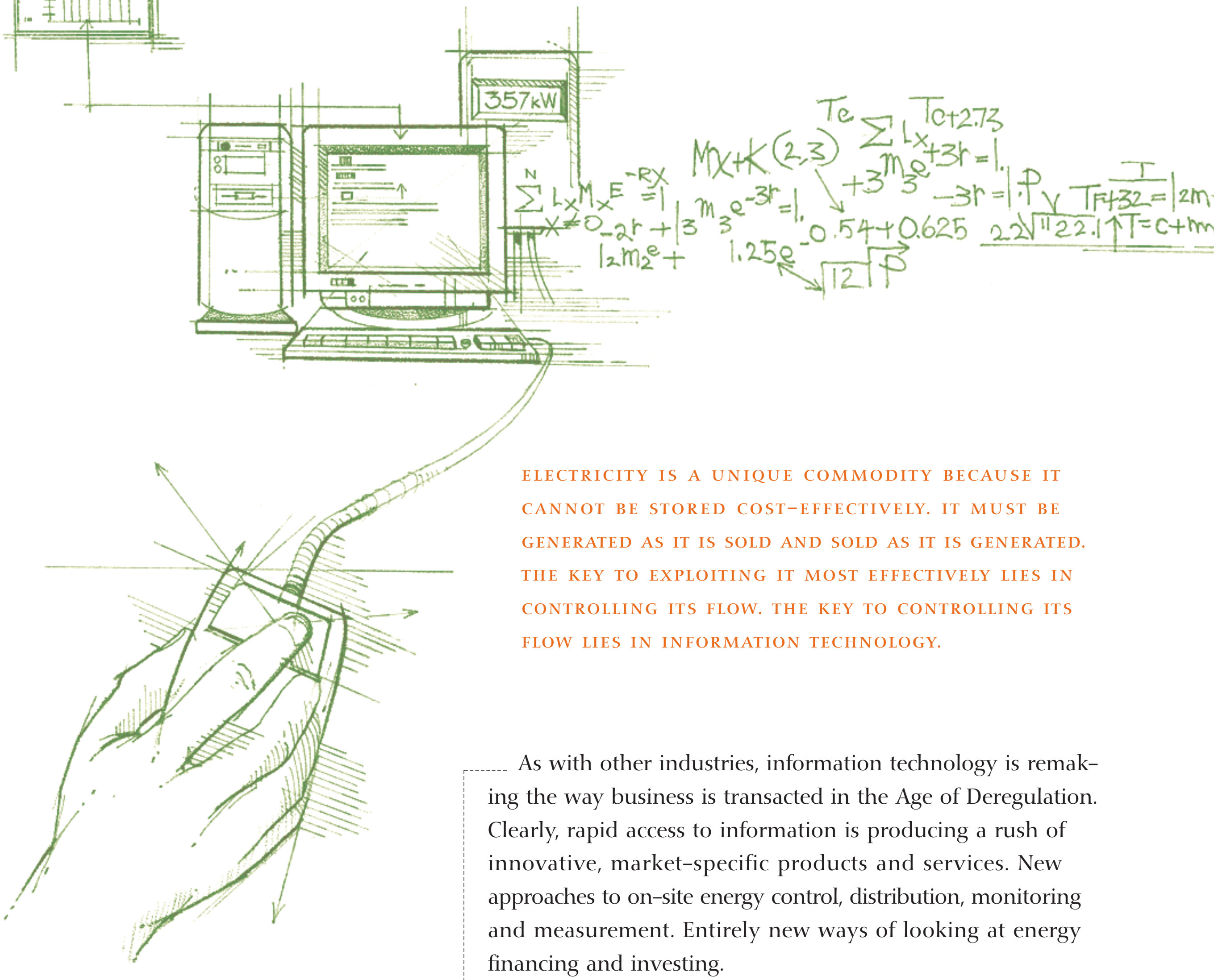
THE SHAPE OF RATES TO COME.

Risk/reward. In the new world of energy usage, the two are inextricably linked. Switch to a rate schedule such as time-of-use or interruptible that is meant to reflect the true cost of capacity, and utilities will immediately reward you for it. Manage your load prudently and you'll also see the effect on your variable-block rate, another tariff methodology in which your rate actually decreases when you use more energy.

In addition, new rate tariffs such as real-time pricing represent a mechanism by which utilities send a price signal to you, in real time, conveying that 'the cost of electricity is now X,' effectively passing on price fluctuations. Think of the control you'll need, as well as the rewards you could reap. And only recent advances in information technology make it possible.

INFORMATION TECHNOLOGY

LEARNING TO PROFIT FROM KNOWLEDGE.

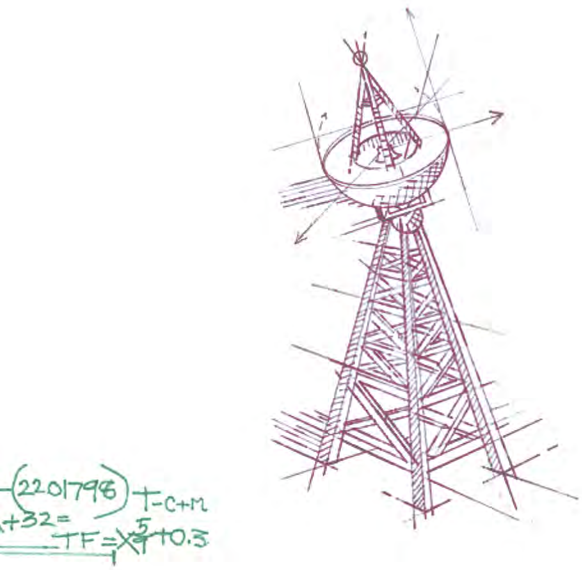


ELECTRICITY IS A UNIQUE COMMODITY BECAUSE IT CANNOT BE STORED COST–EFFECTIVELY. IT MUST BE GENERATED AS IT IS SOLD AND SOLD AS IT IS GENERATED. THE KEY TO EXPLOITING IT MOST EFFECTIVELY LIES IN CONTROLLING ITS FLOW. THE KEY TO CONTROLLING ITS FLOW LIES IN INFORMATION TECHNOLOGY.

As with other industries, information technology is remaking the way business is transacted in the Age of Deregulation. Clearly, rapid access to information is producing a rush of innovative, market–specific products and services. New approaches to on–site energy control, distribution, monitoring and measurement. Entirely new ways of looking at energy financing and investing.

No market sector will go untouched. Confronted with smaller margins, suppliers of electricity have taken up the innovation banner to offer new methods of energy purchase and delivery and contracts with varying time frames.

New significance is being accorded to the “intelligent” electric meter. Long considered strictly the cash register in the “download” of energy to the customer, the meter is now regarded as the primary interface between supply and energy–services functions.

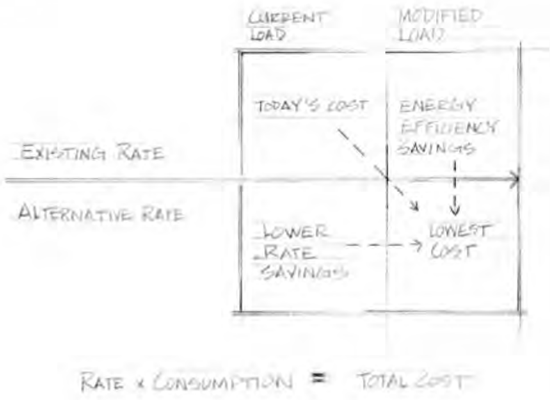


EXPECT TO
SEE IT.
UNDERSTAND IT.

CAPITALIZE UPON IT.

When it comes to outlining the next steps that technology is set to take, the future looks exceedingly bright. With energy consumption data available on demand, you'll be able to compute your bill in seconds against a previously unfathomable variety of alternatives, all while expending no more personal energy than it now takes to navigate the Web.

Electronic energy trading systems will include on-line bulletin board services, next-hour energy services, bid/ask systems, computerized matching services, and 24-hour real-time services.



COST REDUCTION STRATEGIES

As a customer, you will face a bewildering array of offers, similar to the choices you first faced in the confusing world of long-distance phone service. The sobering news is that you – and perhaps you alone – are your company's point person in this brave new world. To achieve success in this arena, it is incumbent upon you to make valid comparisons of complex rate and pricing offers. You'll need the proper tools to succeed. Tools that allow you to use the energy-usage data you generate to negotiate the best possible deal with your supplier of choice. Tools capable of supplying a simple interface to complex load profiles and price interactions.

These analysis tools are here today, and available from a variety of industry sources.

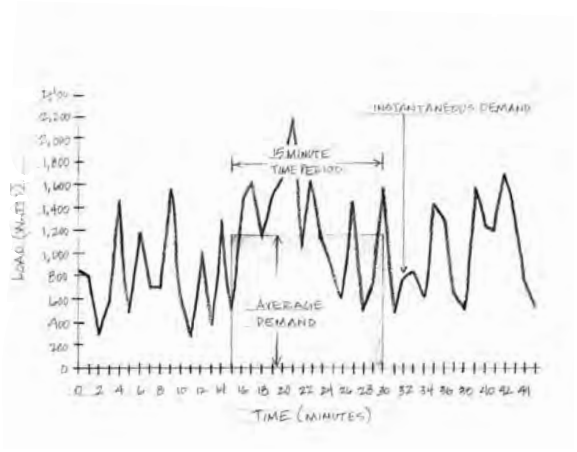
Watch your variables. With a blizzard of competing offers headed your way, it is crucial to have something to stand on, a rock-solid way to evaluate savings in price and savings in consumption. Remember that your electric bill is simply the product of Total Consumption times Rate.

THE METER GETS SMARTER. THE CUSTOMER WINS.

The contemporary electric meter is set to become "communications central," delivering a vast range of services far beyond those of previous generations. Automated Meter Reading (AMR) is one reason why. In the short term, utilities look to AMR as a means of reaching hard-to-read meters and improving customer service. Longer term, customers will look for information to drive a better energy deal. The view from here is that both sides will get what they want.

With intelligent metering in force, you'll know what you're paying for. Working closer than ever with your suppliers, you'll know exactly when they are about to charge expensive peak rates – and be able to shift your load accordingly. Suppliers, meanwhile, will be able to pull data such as hourly use, daily use and load profiles to develop more attractive pricing strategies and provide you with more detailed information.

In the drive to reduce costs on both sides of the energy transaction, information is the Great Leveler. The meter is the ideal conduit for that information.



INTERVAL LOAD DATA

THE BENEFITS OF CONSOLIDATED BILLING.

Whoever ultimately wins your heart, mind and account must prove over time that they can deliver the most added value. Services such as consolidated billing, a management service designed to accommodate customers who receive multiple utility bills, can offer significant cost reductions:

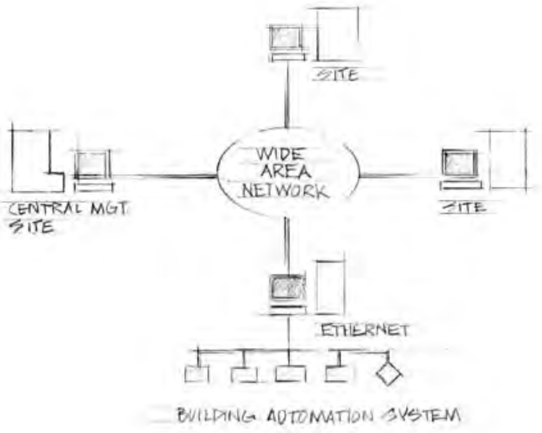
- combine multiple bills from numerous sites into one convenient statement.
- isolate areas of potential savings.
- highlight energy consumption data to help make smarter energy management decisions.

Consolidated billing offers you a "big–picture" look at your various assets, and often yields valuable insights in managing them more effectively.

NEW TECHNOLOGIES. ON THE SCALE OF THE ENTERPRISE.

As it has occurred elsewhere in the computer industry, customer demand is creating new standards of interoperability in distributed systems. Technologies are rushing to meet the needs of customers on an enterprise–wide basis in the form of scalable, geographically distributed measurement and control systems. Such systems will facilitate seamless integration of information from sensors and actuators to the data and communications networks of enterprise systems.

Key to these systems' acceptance is the fact that the industry itself has replaced a patchwork of proprietary protocols and pseudo–standards with a minimum number of genuine standards today enjoying wide recognition. Among them are LonWorks, BACNet and CEBus, each of which operate on open protocols. As a result, a number of highly configurable, flexible and robust systems bring new and enduring value to the enterprise. Expect all of the connectivity. And none of the roadblocks.



BUILDING AUTOMATION SYSTEM

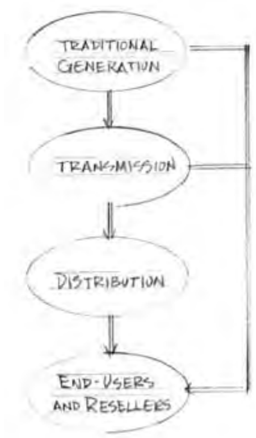
INFORMATION & THE INTERNET: THE NEW WAY TO DO BUSINESS.

With the industry's cast of characters expanding to include supply coordinators, load aggregators and power marketers, the industry's historical template – the vertically–integrated business model – no longer makes much sense. In a deregulating environment, the mission–critical need to communicate across organizational boundaries securely, economically and efficiently is already assuming pre–eminence. Under the new rules of engagement, there will not only be the requirement to include customers in the game, but the obligation to exchange information in real time between many of the other entities in the supply chain.

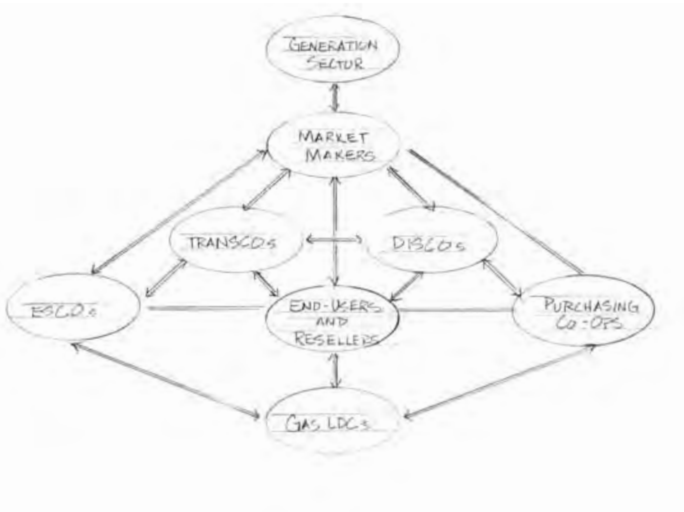
The Internet is well suited to helping you make smart decisions within this shifting landscape, gathering information into a single virtual location and making it available in real–time to those who have access or have subscribed to information delivery channels. The Internet is uniquely capable of ensuring that all participants get all the data they need – precisely when they need it.

Going forward, this environment provides the global network and communication links necessary to deliver a new generation of services – such as a Web–enabled outage management system – within an infrastructure similar to client–server applications. The Internet represents the incubator by which the market will create even more technologies to enhance information flow, improve responsiveness, and develop new services.

OLD POWER STRUCTURE

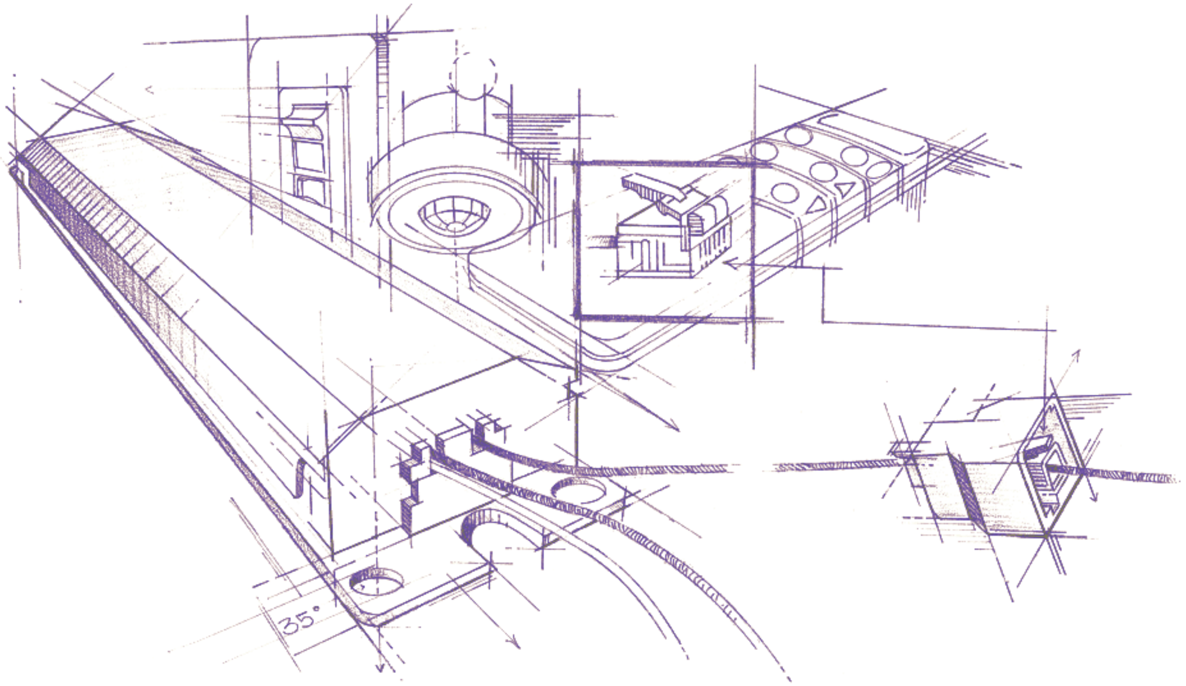


NEW POWER STRUCTURE



DEVELOPMENTS IN CONTROLLABLE LIGHTING TECHNOLOGIES

TAKE CONTROL. WITH LIMITLESS FLEXIBILITY.



FACT: *Many companies still control their lights by turning them on and off at the circuit breaker, which effectively gives them no control at all.*

OPINION: *What in the world are they thinking?*

In many ways, the dimmable ballast and enabling control technologies have delivered us to a world as far beyond the compact fluorescents of the 1980s as electric light was from gas light. However, they can only work if implemented. How can you best take advantage of these advancements? By understanding where we've come from...and where we're going.

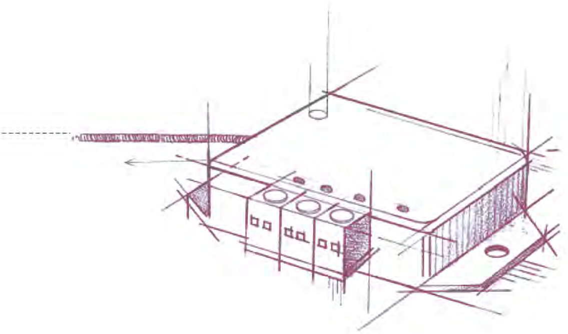
THE EVOLUTION OF LIGHTING CONTROL SYSTEMS.

Historically, lighting control systems have been held hostage somewhat by their centralized orientation. With all control devices hard-wired to a single point, their cost-effectiveness, flexibility and even their physical range have been limited.

Today, new control technologies have given rise to a more open, decentralized model. Working seamlessly within a facility, distributed control systems organize hardware and software as a network over standard PCs and can control everything from HVAC to elevators. In addition, they offer you a wealth of information, including real-time reporting on energy usage and occupancy. This instantaneous reporting capability gives facilities managers the ability to make faster decisions and more well-informed choices.

THE VIEW OF THE BOTTOM LINE THROUGH LIFE-CYCLE COSTING.

Cost-effectiveness cannot be evaluated as a snapshot. That's why more companies are subjecting the controllable lighting initiatives to the scrutiny of life-cycle costing. Life-cycle costing allows you to evaluate several scenarios by looking at key inputs - such as initial investment, cost of energy, maintenance and replacement costs - over a pre-designated time period.



THE FORMULA:

{ I - S + Y (M + R + E) = LIFE-CYCLE COST }

I = one time INVESTMENT cost in a controlled lighting program

S = one time SALVAGE value of controlled lighting components

Y = life of system in YEARS

M = annual non-fuel operating MAINTENANCE and repair costs

R = annual REPLACEMENT costs

E = annual ENERGY costs

Recent advancements in lighting technology have been no less spectacular. A standard lighting retrofit, utilizing existing T8 lamps and fixed-output electronic ballasts, reduces lighting energy costs an average of 25% compared to existing systems. Using technology developed, designed, engineered and commercialized by companies such as Electronic Lighting, Inc., as part of a larger load-management strategy, you can expect savings of 50–60% over existing systems.

THE COMPONENTS OF CONTROL.

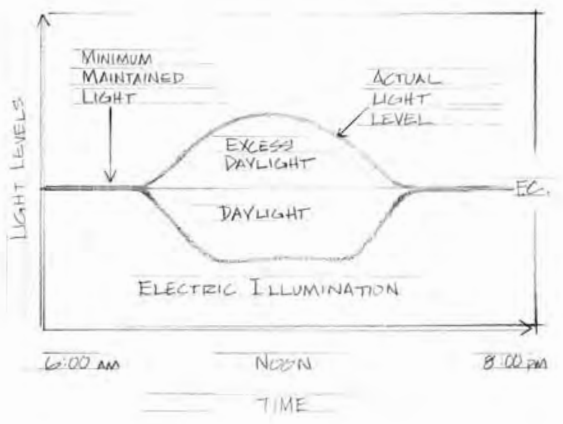
A building automation system owes much of its ability to produce savings to a process known as scheduling, a technique made possible by programmable lighting controls. Scheduling refers to the customer-directed setting of priorities in the operation of electrical loads, which makes your lighting truly parameter-based. By definition, parameter-based scheduling allows you to adjust schedules any way you want, according to virtually any variable. Lighting schemes can be "tuned" to occupancy patterns, time of year or amount of available daylight, the latter by a process known as daylight harvesting.

SPECIALIZED CONTROL DEVICES.

To an extent never before attainable, dimming photosensors make natural light a "no-cost" ally. Here's the way it works: A dimming photosensor sends a signal to the control network indicating how much light it is detecting. The controllable lighting system acts upon this information, dimming lamps in response to increasing available light, while maintaining desired light levels.

Occupancy sensors interface with other building automation systems to optimize the internal environment, sending a signal when an office is unoccupied to turn off the lights.

Where should you place such devices or initiate such strategies? Anywhere they make sense. Schedules can be programmed on the level of a single fixture or a group of fixtures, commonly called a zone. Deploying the proper lighting products in a zoned configuration puts you on the threshold of lasting savings.



DAYLIGHT HARVESTING

CONTROL STRATEGIES AND PRODUCTIVITY.

A controllable system enables you to take advantage of the cumulative impact of multiple control strategies. Intelligent use of scheduling, occupancy sensors, daylight harvesting, task dimming and lumen maintenance allows you to realize a myriad of qualitative employee–related benefits. Load management lessens the strain on HVAC systems. Proper light levels – at the proper times – have been linked to increased worker output. With better light comes improved outlooks, and a meaningful boost in overall productivity.

TO CONTROL YOUR BUILDING, CONTROL YOURSELF.

Perhaps you're a facilities manager charged with optimizing project value. Without question, you're facing the temptation – powerful in its own right – to opt for the lowest initial cost. After all, "lights are lights." While such a statement is impossible to refute, keep in mind that the lowest cost today may cost more in the final analysis, particularly when you attempt to sell a given property.

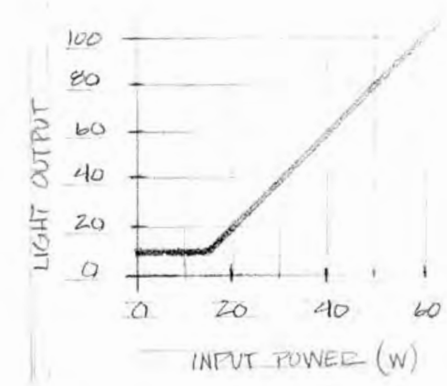
Establish non–negotiable criteria upfront, and make sure that the control and lighting system in question hits every spec. Make sure that it works in its intended environment and with all existing control systems. Insist that it's easy to maintain, reliable and capable of being programmed to do exactly what you want it to do.

No matter which lighting system you choose, due diligence is the order of the day. Prudent investing will yield the highest returns.

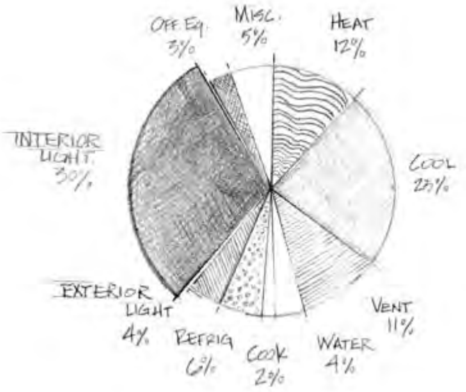
EFFECTIVE ANNUAL LIGHTING HOURS BY BUILDING TYPE

Small office	3,624
Large office	3,624
Restaurant	4,957
Retail	4,064
Grocery	6,019
Warehouse	3,739
School	2,462
College	3,249
Health	7,955
Lodging	8,572
Miscellaneous	4,005

Average hours that a fluorescent lamp is on in a building that uses this type of lamp.



POWER INPUT VS. LIGHT OUTPUT



COMMERCIAL ELECTRICITY SHARES BY END USE

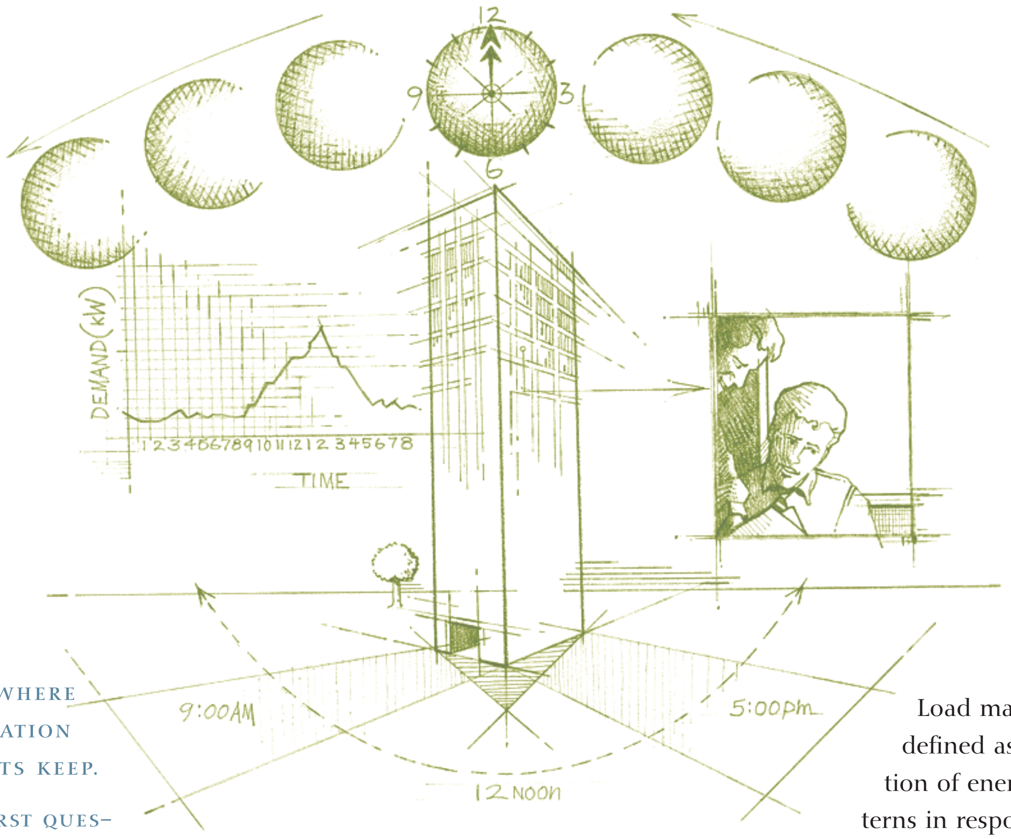
CONTROL STRATEGY	RANGE OF SAVINGS	
Load Management *(Demand Control)*	20–50%	*Depending on utility rate schedule*
Daylight Harvesting	40–60%	*Averaged over an entire year*
Occupancy Recognition	10–50%	*Depending upon space type and usage*
Scheduling *(Timing)*	10–40%	*Depending on occupancy patterns*
On/Off	10–50%	*Compared to no switching*
Task Dimming	10–50%	*Depending on occupant preference*
Adaption Compensation *(Balancing light levels)*	10–40%	*Depending on facility nighttime lighting requirements*
Lumen Maintenance	10–20%	*Depending on lamp lumen depreciation*

CONTROLLED LIGHTING BENEFITS

- Energy Savings (kWh, kW)
- Electric Cost Savings ($)
- Increased Worker Productivity
- Pollution Prevention
- Error Reduction
- Expanded Space Flexibility
- Improved Aesthetics & Image
- Better Space Marketability
- Space Savings
- Heightened Security
- More Effective Facility Management
- Improved Worker Morale

THE KILLER APPLICATION:

USE OF LIGHTING SYSTEMS AS A LOAD MANAGEMENT STRATEGY.



HERE'S WHERE INFORMATION EARNS ITS KEEP.

YOUR FIRST QUESTION IS A LOGICAL ONE. WHAT EXACTLY IS A KILLER APPLICATION? SIMPLY PUT, IT IS ANY TECHNOLOGICAL ADVANCE THAT CHANGES THE RULES OF AN INDUSTRY IN A POSITIVE WAY, AND BY EXTENSION THE LIVES OF THAT INDUSTRY'S CUSTOMERS. UNDER THIS HEADING, THE USE OF CONTROLLED LIGHTING AS A LOAD MANAGEMENT STRATEGY QUITE PRECISELY FILLS THE JOB DESCRIPTION OF A "KILLER APP."

Load management is defined as the modification of energy usage patterns in response to external conditions. Historically, it was focused on interruptible loads, e.g., air conditioners, hot water heaters. As such, it was seen by building managers and occupants as inconvenient or uncomfortable. Lighting was never considered.

That was then. With the marginal cost of electricity today reaching more than 20 times the cost of electricity at off-peak hours, load management, re-framed as the building-wide application of controlled lighting, has emerged as a dynamic, proven energy strategy. It comprehensively addresses changes in energy costs. By employing leading-edge technologies to reduce lighting energy costs, it reduces, under certain rate structures, the average cost of energy for *every* kiloWatthour used throughout the entire facility. It is the first application to make utility deregulation pay off big for businesses.

LOAD MANAGEMENT IN ACTION: HELPING END-USERS WIN.

In a typical building, lighting represents 30–40% of the total electric load. As such, it offers the greatest single opportunity to affect savings, profitability and rate of return.

With the proper controllable ballast technology in place, a load management strategy yields even greater savings during peak load periods. In its "active mode," it enables you to work pre–emptively to secure the most attractive pricing. More quietly, it will convince you of the benefits of daylight harvesting – day after day after day.

Whole–building dimming takes into account such hot–button issues as cost–containment, flexibility, deregulation and control. It yields savings far beyond what can be expected from traditional efficiency improvement efforts. It puts you in a better position to negotiate with brokers of power, to realize the benefits of real–time pricing, and to effect better control and management of the building.

"SOMEBODY GET THE LIGHTS!"
(with controllable-ballast technology, somebody already has.)

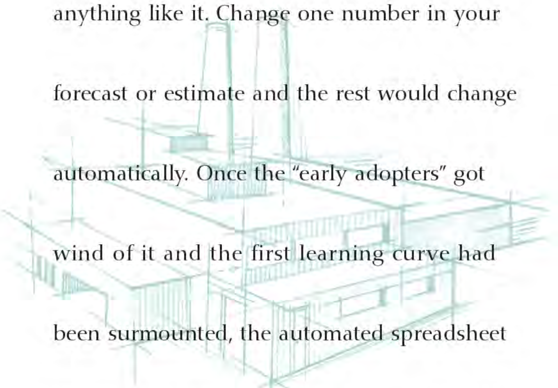
From the darkest to the brightest conditions, the human eye can operate over roughly a ten–trillionfold (10^{13}) range of illuminance.

Not only is this a remarkable feat of adaptability, it also carries with it significant implications for energy efficiency. Here's how it occurs:

- Change in pupil size. In response to varying light levels, the muscles of the iris expand or contract to change the exposed diameter of the pupil by a maximum ratio of 8:1, varying the area of the pupil by a factor of 64.
- Photochemical adaptation. The eye's rods and cones contain pigments which, when absorbing light energy, change composition and release ions that are then translated into an electrical signal sent to the brain.
- Logarithmic perception. When a typical three–way 50–100–150 watt incandescent lamp is turned on its 50–watt setting, the perceived change from a dark room to the 50–watt light is dramatic. Switching to the 100–watt setting adds an equal amount of additional light, but the change in brightness is not perceived to be as great. Moving to 150–watts creates even less of a perceptible light–level change.

How much can you lower light levels before occupants recognize it? Research indicates that levels can be gradually dimmed 30% over 5–15 minutes without occupants perceiving any change.

Great Killer Apps in History



Remember the first automated spreadsheet? No one had ever seen anything like it. Change one number in your forecast or estimate and the rest would change automatically. Once the "early adopters" got wind of it and the first learning curve had been surmounted, the automated spreadsheet became an indispensable business tool, making the life of business easier, moving commerce to a new, more productive plane, and practically putting eraser companies out of business.

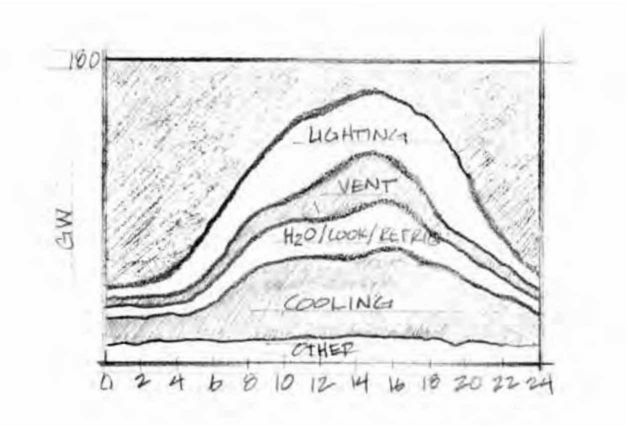
SAVINGS BONUS: HVAC

The net effect of the Killer App on a facility's HVAC depends primarily upon such variables as building type, local climate, size of systems and size of loads. In several meaningful instances, however, the savings are dramatic indeed.

Large buildings dominated by internal loads, using more air conditioning than heating, typically experience site energy bonuses of 40% or more. Translation: Every kWh of reduction in annual lighting energy use yields an additional 0.4 kWh of annual reduction in HVAC energy.

In the United States, lighting accounts directly for nearly 12% of summer peak demand and 10% of winter peak. The reduction in summer peak cooling demand made possible by efficient lighting is often even greater than the net HVAC energy bonus. With daylight dimming as part of your system, many lights will use less energy for much of the morning and early afternoon, reducing heat build-up in the hours approaching the peak.

A collateral benefit of efficient lighting is often the reduced reliance on air conditioning. Another is the potential for the entire cooling system to be downsized, which yields capital as well as energy savings.

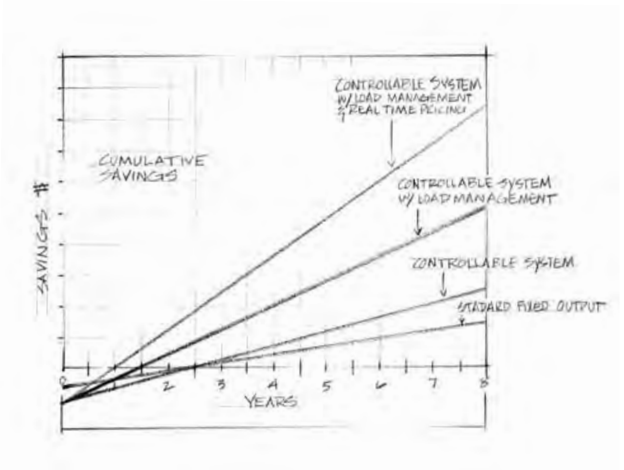


SUMMER PEAK AVG. OF ALL U.S. COMMERCIAL BUILDINGS

HOW THE KILLER APP AFFECTS YOUR BILL.

Expect savings far in excess of those you could realize by simply implementing traditional efficiency strategies. Load management, combined with real-time pricing, can result in paybacks approaching one year on an ELI controllable lighting system. The ramifications of full implementation, however, run much deeper. Combined with the latest in facilities information technology, an ELI system becomes what is in essence a pre-emptive risk management tool, enabling a manager both to modify usage and take advantage of more attractive rate tariffs as they become available.

Looking for rules of thumb? Savings can average $.75 per square foot per year. In terms of load shedding, expect a reduction of 10 watts per 4' fluorescent lamp.



CUMULATIVE SAVINGS

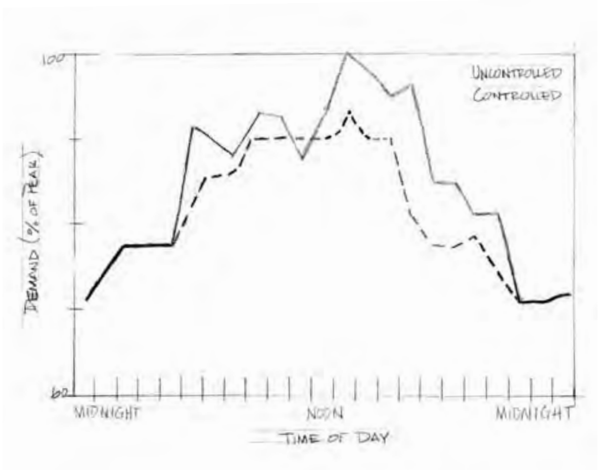
THE KILLER APP AT WORK IN REAL ESTATE.

Consider what the killer app brings to the table in terms of downstream benefits for commercial real estate properties.

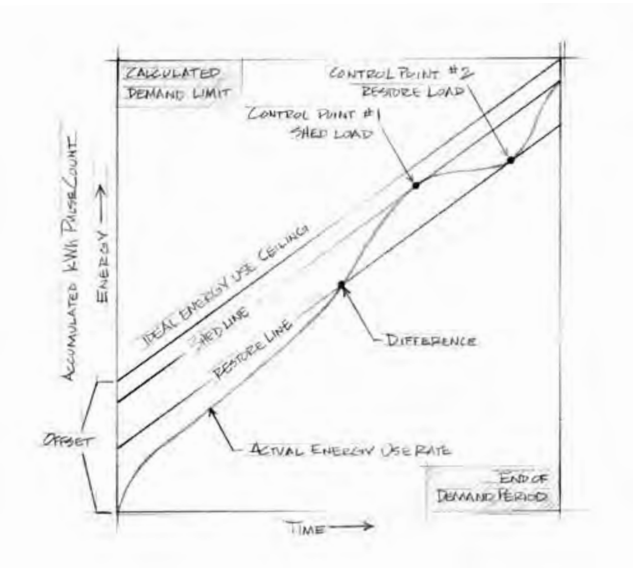
Controllable lighting technology can improve operating income, resulting in an increase in asset valuation. For example, take a 200,00 square foot office building. By reducing the operating expenses by $.75 per square foot, net operating income would increase annually by $150,000. Assuming a capitalization rate of 10%, the building's value would increase an amazing $1,500,000. (The math : $.75/10% = $7.50 per square foot *x* 200,000 square feet.)

With a 75% loan–to–value ratio, asset managers and building owners could apply the available funds in any manner deemed fit – whether to fund capital improvements, hire additional personnel or bankroll business expansion.

Keep in mind that when the killer app is analyzed as an investment relative to an increase in building value, its payback can be expressed in months rather than years.



CONTROLLED/UNCONTROLLED LOAD



LOAD SHEDDING LOGIC SAVINGS

BENEFITS FOR EVERYONE

WHAT'S IN IT FOR
ESCOs,
BROKERS,
CONTRACTORS,
UTILITY AND
DISTRIBUTION
COMPANIES
& OTHERS.

AS A BREAKTHROUGH STRATEGY, BUILDING–WIDE LOAD MANAGEMENT IS A CONCEPT THAT SATISFIES EVERY CONSTITUENCY WITHIN THE ENERGY MARKETPLACE, FITTING IN VIRTUALLY EVERYWHERE AND WORKING TO THE ADVANTAGE OF EVERY STAKEHOLDER.

HOW ESCOS WIN.

For energy service companies, a load management strategy is a *bona fide* competitive weapon, one that is already differen–tiating ESCOs as competition heats up.

Lighting system load control is easily integrated with all other building system improvements, which reduces costs and improves overall project economics. Furthermore, it delivers higher kiloWatthour savings throughout the length of the performance contract – which creates more savings for the customer. In effect, the breakthrough strategy makes longer–term contracts more desirable and works hard to increase an ESCO's standing in the eyes of its customers.

HOW AGGREGATORS & BROKERS WIN.

A breakthrough load management strategy enables brokers to work more closely than ever with customers, creating an energy partnership that strengthens over time.

In concert with the ability to remotely control usage on a real–time basis, load management affords retail energy providers the ability to offer customers competitive prices in a commodity market. Monitored by means of a new generation of information technology, a building's lighting system can function as a dispatchable load, freeing up valuable capacity while allowing the customer substantially more flexibility to choose lower–cost rate structures.

HOW PROPERTY MANAGEMENT COMPANIES & CONTRACTORS WIN.

With every innovative concept comes dynamic new products that make it possible. Replacing standard electronic ballasts with new dimming technology will help both property management companies and contractors deliver enhanced value to their respective clients.

For management companies, the appeal lies in the ability to offer tenants a more productive, attractive and ultimately more desirable place to work.

For contractors, the ability to market a new and demonstrably better, "full–featured" technology will relieve downward pressures on margins and simultaneously discourage less sophisticated competitors from entering the business.

HOW TRANSMISSION & DISTRIBUTION COMPANIES WIN.

For a metropolitan distribution network straining at the very edge of its capacity, load management can be employed to reduce peak demand and thereby allow a utility to defer substantial capital outlays.

From a marketing perspective, transmission and distribution companies can leverage the technology by offering incentives to managers of older buildings to effect significant demand reduction.

OTHER AUDIENCES, OTHER UPSIDES.

Data unexamined is not worth collecting. It stands to reason, then, that data collated, weighed and investigated must be exploited to the fullest.

For information technology companies, building–wide load management represents further cost justification for customers to invest in their systems. For architects and engineers, it's a cost–effective, value–added component to present to new and existing accounts. And for anyone to whom environmental conservation is a critical issue, the strategy's emphasis on reduced peak demand puts forth a winning argument.

At its core, controllable lighting as a load management strategy is a fundamental breakthrough – with nothing but upside.

ACTION PLAN

SEIZE THE DAY. AND POSITION YOUR COMPANY FOR YEARS TO COME.

IN THE DEREGULATING MARKETPLACE, COMPETITORS FOR YOUR BUSINESS WILL CREATE COMPETING BLIZZARDS OF INFORMATION. FORTUNATELY, THE TOOLS AND TECHNOLOGIES WHICH ENABLE YOU TO ASSESS AND MANAGE AN EFFECTIVE LOAD MANAGEMENT STRATEGY ARE NOW READILY AVAILABLE.

First things first. Be critical of the big savings numbers that many energy marketers will doubtless toss your way as competition heats up. The only way to properly evaluate alternative pricing is to first know beyond doubt your consumption pattern at the interval level under the proposed rate. Take as your cue the approach already being used by the people who sell you your cell phone service. Ascertain and evaluate actual usage patterns, rather than react to the blandishments of slick promotions.

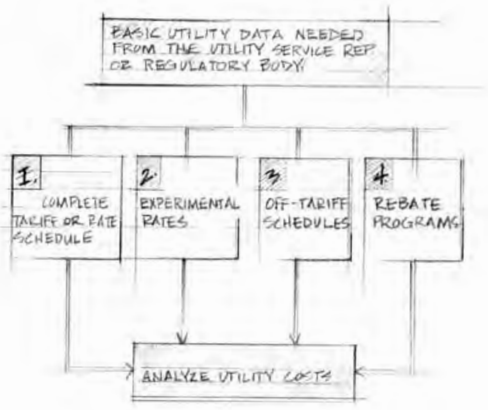
To analyze your bill when switching among rates, you'll need the proper tools. A complete load profile analysis, plotted across a year's full 8760 hours, will give you a much better handle on your usage. Load profile information can come from your utility or your metering equipment.

To put your plan in motion, begin by requesting a metering inventory. (Comprehensive documentation of each metering site will be necessary.) Then, ask your utility for metering data and analysis. Finally, request interval data, which will furnish you with consumption patterns at any given site.

YOUR SAVINGS BEGIN THE SECOND YOU DO.

Hedge your bets. Launch a pilot project, a load management effort on a limited basis. What you'll find are savings roughly double those of a lighting program featuring "last-generation" electronic ballasts. When you take into account efficiencies and rate structures, you'll also achieve a markedly shorter payback.

Keep in mind, however, that implementing even a minor effort will require detailed calculations and the assistance of a trusted consultant. The implementation of end-use metering studies, for example, is best left to your power marketer, broker or ESCO. Consult with them to begin the process of discovery.



BASIC ELECTRIC UTILITY DATA NEEDED

STEPS YOU CAN TAKE. A CAPSULE SUMMARY.

> Collect metered load data for all your facilities
> View load profile information
> Compare costs from rate and price offers
> Calculate bill estimates from "what-ifs"

TAKE ACTION FURTHER:

The Killer App on the Web.

WHAT ARE "WHAT-IFS"?

> If you're switching from one rate schedule to another
> ...or one supplier to another
> If you're moving on-peak usage to off-peak periods
> If you're reducing on-peak consumption (for example, through load shedding)
> If you're aggregating individual billing accounts for volume discounts

AS WITH ALL KILLER APPS,
THERE IS HARDLY ROOM WITHIN THE
PAGES OF THIS GUIDE
TO CONTAIN A COMPLETE DISCUSSION OF
controllable lighting
as a breakthrough
load management strategy.

ELI INVITES YOU TO ITS WEB SITE

WWW.ELINET.COM

HOME TO HUNDREDS OF LINKS
TO RELATED TOPICS
AND ADDITIONAL RESOURCES.

IF YOU HAVE MORE THAN ONE FACILITY, CONSIDER A PLAN THAT WOULD:

> Analyze your metered interval load data and billing information for multi-locations
> Compare energy usage information among similar facilities
> Examine cost breakdowns by region, building type and energy cost components
> Establish accurate benchmarks for energy spent in multiple facilities
> Measure the effectiveness of various energy efficiency efforts

CONCLUDING THOUGHTS

WHERE DO YOU GO FROM HERE?

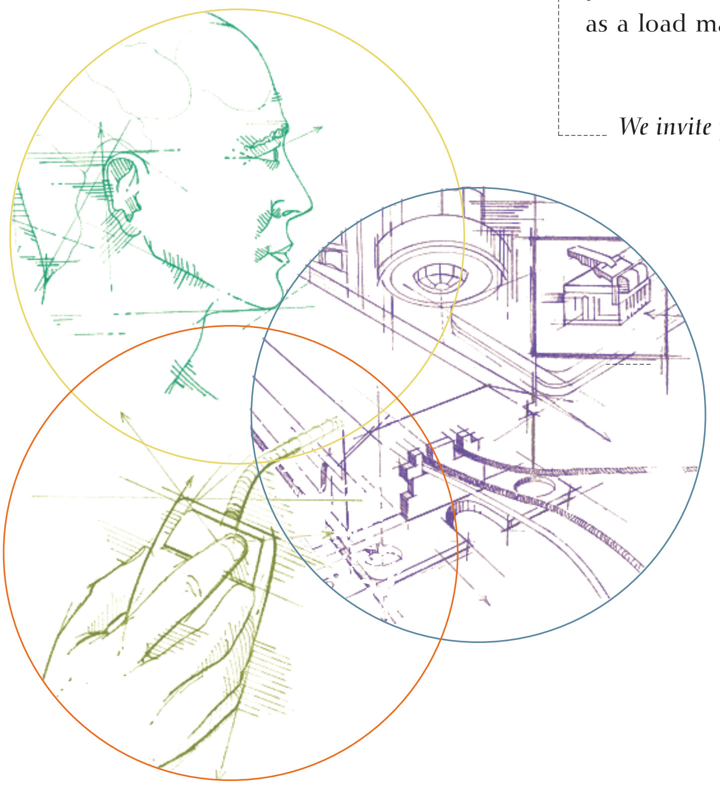
To this point in history, information has been owned by the utility. From this point forward, it belongs to the market. In an evolutionary eyeblink, the ratepayer has become the customer, and the customer a free agent; a stunning reversal in the accepted "power relationship."

That said, capitalizing upon this new relationship and exercising the choices that go with it will require fore–thought and effort.

The convergence of deregulation, information technology and controllable lighting systems presents you with a powerful opportunity at a unique moment in time. Deregulation is creating myriad opportunities to save. By controlling peak demand, rate tariffs such as real time pricing are allowing end–users to save even more. The resulting re–alignment has created a universe of new opportunity whose promise is well within the grasp of consumer and supplier alike.

Within the pages of this book, we hope we have given you some sense of the possibilities that controllable lighting as a load management strategy makes available to you.

We invite you to see for yourself.



GLOSSARY

COMING TO TERMS WITH THE FUTURE.

ACTUAL LOAD
The hour average load of equipment at any period of time.

AUTOMATIC ADJUSTMENT CLAUSE
Allows utility to increase or decrease its rates to cover costs of specific items without a formal hearing before a Commission.

AVERAGE DEMAND
The demand on, or power output of, an electric system over any interval of time, as determined by dividing the total number of kilowatthours by the number of units of time in the interval.

AVOIDED COST
The cost an electric utility would otherwise incur to generate power if it did not purchase electricity from another source.

BALLAST
A current limiting device that provides necessary circuit conditions to start and operate an electric discharge lamp.

BALLAST EFFICIENCY FACTOR
The Ballast Efficiency Factor (BEF) is the Ballast Factor (See Below) divided by the input power of the ballast. The higher the BEF within the same lamp–ballast type the more efficient the ballast.

BALLAST FACTOR
The Ballast Factor (BF) for a specific lamp–ballast combination represents the percentage of the rated lamp lumens that will actually be produced by the combination.

BASE LOAD
The minimum quantity of electric power or gas delivered over a given period of time; minimum demand on the system. Excludes peak usage.

BASE LOAD CAPACITY
Generating capacity which serves the base load, usually the utility's largest, most efficient facilities with the lowest operating cost.

BASE RATE
Component of utility rates—a fixed amount charged each month for any of the classes of utility service provided to a customer.

BASELINE USAGE (Demand, Energy & Water)
The calculated energy or water usage (demand) by a piece of equipment or a site prior to the implementation of the project.

BRITISH THERMAL UNIT (BTU)
The standard unit for measuring quantity of heat energy. The amount of heat energy needed to raise the temperature of one pound of water one degree Fahrenheit.

BUILDING AUTOMATION SYSTEM
A computer that can be programmed to control the operations of energy consuming equipment in a facility.

BUNDLED RATE
Several services combined into one tariff offering for single charge.

BYPASS
Use of transmission facilities, which avoid local utility company network.

CANDELA (CD)
A unit of luminous intensity (strength) from a light source or a lighting system in a given direction.

CAPACITY
Refers to the ability of a power plant to produce a given output of electric energy at an instant in time. Electric capacity is measured in kilowatts or megawatts.

CAPACITY COST
Fixed costs of facilities required for the utility to provide service.

CLASSIFICATION OF SERVICE
A group of customers with similar characteristics (i.e., residential, commercial, etc.) which are identified for the purpose of setting a rate for utility service.

COEFFICIENT OF UTILIZATION (CU)
The ratio of lumens delivered from a luminaire to the work plane to the lumens operated by the luminaire's lamps alone.

COINCIDENCE FACTOR
The fraction of peak load that is being utilized during a given time period.

COLOR RENDERING INDEX (CRI)
An evaluation of how colors appear under a given light source. Expressed as a two–digit number. The higher the number, the better the light source in rendering colors naturally.

COLOR TEMPERATURE
The absolute temperature at which a black–body radiator must be operated to have chromaticity equal to that of that light source.

COMMISSIONING
A process for achieving, verifying and documenting the performance of buildings to meet the owner's functional criteria, including preparation of operator personnel.

COMMODITIES FUTURES CONTRACT
A contract to buy or sell a specific amount of a commodity at a specific future date.

COMMODITY CHARGE
A customer charge for utility service that is proportional to the amount of natural gas or electricity the customer actually purchased.

COMPACT FLUORESCENT
A small fluorescent lamp that is often used as an alternative to incandescent lighting. The lamp life is about 10 times longer than incandescent lamps. Also referred to as PL, Twin–tube, CFL, or BIAX lamps.

COMPETITIVE BIDDING
Refers to a process that energy companies utilize in many states to select suppliers of new capacity and energy.

CONNECTED LOAD
For a system, such as a building or electrical circuit, the connected load is the sum of the nameplate capacities of the energy consuming devices connected within the system.

CONTRACT UNIT
Generally refers to the total, overall megawatthours of a particular electricity futures contract.

CUSTOMER CHARGE
A component of electric rates designed to cover those costs (such as metering and billing costs) that are related to the existence of the customer rather than to both the size and extent of the facilities needed to serve him or the quantity of electricity the customer uses.

DEATH SPIRAL
A so–called death spiral occurs when a company attempts to respond to a price–induced loss in sales by charging higher prices in an attempt to maintain revenues. This action often prompts further load loss.

DECLINING BLOCK RATES
As more energy is consumed the unit price goes down. For example, the first 500–kilowatthours cost 8 cent each; the next block of 500 kWh is priced at 6 cents each; etc.

DELIVERY PERIOD
Generally refers to the period in which delivery of a commodity contract may occur.

DEMAND
The maximum rate at which energy is delivered to a specific point at any given moment.

DEMAND COST
The actual unit cost of a level of electric power (i.e., $/kW)

DEMAND FACTOR
The ratio of the maximum demand over a specified time period to the total connected load on any defined system.

DEMAND RATE
A method of pricing under which prices vary according to differences in usage or costs.

DEMAND SAVINGS
Peak period baseline electric demand (kW) less peak period post–installation electric demand (kW).

DEMAND SIDE MANAGEMENT (DSM)
The concept of achieving overall energy use reductions through the use of conservation techniques at the end of use equipment, rather than changing or controlling the supply of the energy source.

DEMAND/CAPACITY COST
The expenses incurred by a utility on behalf of an individual customer in providing sufficient capacity to meet the customer's maximum demand on an as needed basis.

DETAILED ENERGY SURVEY
Often referred to as an energy audit. A complete inventory of the energy consuming equipment at a given facility.

DIFFUSE
Term describing dispersed light distribution. Refers to the scattering or softening of light.

DIRECT BILLING
Refers to lump–sum charges that are unrelated to the current level of service taken by the customer being billed.

DIRECT LOAD CONTROL (DLC)
When the utility has the ability to directly control a customer's devices and can turn them on or off as necessary to control loads.

DISPATCHABILITY
Describes the ability of a generating unit to increase or decrease generation or to be brought on–line or shut down at the request of a utility's system operator.

DISTRIBUTION
Delivery of electricity from the transmission system to the end–user and regulated by state governments.

DIVERSITY FACTOR
Diversity refers to the fraction of connected load being utilized amongst a group of appliances or buildings during a given time period if they do not all peak at the same time.

EFFICACY
A measure used to compare light output to energy consumption. Efficacy is measured in lumens per watt.

ELECTRIC UTILITY AFFILIATE
An affiliate of an electric utility is a subsidiary (or arm) of an electric utility. Many electric utilities develop, own and operate independent power facilities, for instance, which are referred to as affiliates.

ELECTRONIC BALLAST
A ballast that uses semi–conductor components to increase the frequency of fluorescent lamp operation – typically in the 20–40 kHz range. Fluorescent system efficiency is increased due to high frequency lamp operation.

ELECTRONIC BULLETIN BOARD (EBB)
An electronic posting system, which, among other things, gives vital information concerning energy sales and purchases, including price, terms and conditions under which sales and purchases will occur.

EMBEDDED COSTS
Money already spent for investment in plant and in operating expenses.

END-USER
The ultimate consumer of energy. An end–user is the opposite of a customer purchasing energy for resale.

ENERGY
Output of generating plants in kilowatthours. Energy price does not include the cost of delivery.

ENERGY CHARGE
A component of rates that covers the cost of the energy actually used. See also Commodity Charge and Customer Charge.

ENERGY CONSERVATION MEASURE (ECM)
Installation of equipment systems, or modifications of equipment or systems, for the purpose of reducing energy use and/or costs.

ENERGY COST ADJUSTMENT CLAUSE
The utility may adjust its rates to offset changes in the cost of fuel used to produce electricity.

ENERGY MANAGEMENT SYSTEMS (EMS)
See Building Automation System.

ENERGY PERFORMANCE CONTRACTING
A performance contract that specifically pertains to providing services that result in energy and/or operating cost reduction.

ENERGY POLICY ACT OF 1992 (EPACT)
The act was designed to promote economic development and the wise use of energy and to encourage greater wholesale competition in the electric utilities industry.

ENERGY SAVING BALLAST
A type of magnetic ballast designed so that the components operate more efficiently cooler and longer than a standard magnetic ballast. By US law, standard magnetic ballasts can no longer be manufactured.

ENERGY SAVINGS PERFORMANCE CONTRACT (ESPC)
A contract where the cost of ECM implementation is recovered through savings created by the ECMs.

ENERGY SERVICES COMPANY (ESCO)
A firm that provides a range of energy efficiency and financing services and guarantees that the specified results will be achieved.

EXCESS CAPACITY
The amount of energy available over and above the amount of energy needed, plus reasonable reserves, at any given period.

FACILITIES CHARGE
Component of rates which reimburses the utility for investment in facilities which benefit the ratepayer.

FAIR RATE OF RETURN
The rate of return a utility is entitled to have the opportunity to earn on either its rate base or its common equity.

FERC (FEDERAL ENERGY REGULATORY COMMISSION)
Federal agency established in 1977, concurrently with the creation of the Department of Energy, charged with regulating sale, transportation and price of natural gas and of wholesale electric power moved in interstate commerce.

FIRM POWER
Delivery of utility service on a non–interruptible, always–available basis.

FIXED COSTS
Also known as embedded costs, fixed cost entail that portion of the total cost of any business activity that cannot be reduced by lowering the level of service.

FLAT RATE
A rate structure in which everyone within a customer class pays the same price per unit for all energy consumed.

FOOTCANDLE
The units of illuminance equal to 1 lumen uniformly incident upon an area of 1 square foot; also, equal to the illuminance at a point 1 foot distant from a 1 candela source.

FORCE MAJEURE
A condition permitting a company to depart from the strict terms of a contract because of an uncontrollable event or effect.

FUEL FACTOR
A component of rates designed to recover changes in the cost of fuel; differs from automatic adjustment in that it requires prior Commission approval.

FULL LOAD HOURS
The amount of time that a piece of equipment or end–use would operate in a given time period if it were operating at peak load conditions.

FUTURES
Contracts whereby an agreement is made to deliver a quantity of goods, generally commodities, at a specific price at a certain time in the future. Futures exchanges allow parties to transfer price fluctuations risks from people who don't want the risk to speculators who are willing to take on those risks. Those taking on the risks have the potential of earning large profits.

G&T
Generation and Transmission. Identifies a utility, which both generates and transmits electricity as distinguished from an entity which provides transmission only.

GENERATING PLANT
A facility where electricity is generated.

GIGAWATT (GW)
A unit of electric power equal to one billion watts, or one thousand megawatts.

GLARE
The effect of brightness or differences in brightness within the visual field sufficiently high to cause annoyance, discomfort or loss of visual performance.

H.I.D. (HIGH INTENSITY DISCHARGE)
A group of lamps generally consisting of mercury vapor, metal halide, high pressure sodium and low pressure sodium.

HEDGING
A popular method of selling for future delivery whereby a dealer is protected from declining prices between the time the dealer buys a product and the time it is resold.

HIGH OUTPUT (HO)
A lamp or ballast designed to operate at higher currents (800mA) and produce more light.

HIGH POWER FACTOR
A ballast with a .9 or higher rated power factor, which is achieved by using a capacitor.

HIGH-BAY
Pertains to the type if lighting in an industrial application where the ceiling is 20 feet or higher. Also describes the application itself.

HOLDING COMPANY
A company whose principal assets are the securities it owns in companies that actually provide goods or services. The Public Utility Holding Company Act sets a strict definition of a holding company for electric utilities.

ILLUMINANCE (E)
The quantity of light (foot candles lux) at a point on a surface.
Formula: Illuminance = Lumen/Square Foot

INCREMENTAL COSTS
The additional amount of money it takes to generate or transmit energy above a previously determined base amount.

INCREMENTAL PRICING
A method of charging customers for energy consumption based on the incremental costs involved in energy production.

INDEPENDENT POWER MARKETER
Also referred to as IPMs, these are power marketers that are not classified as Affiliated Power Marketers. IPMs are generally not affiliated with utilities, but rather independent entities.

INDEPENDENT POWER PRODUCERS
IPPs generate electric or thermal energy for sale to a utility or industrial user, usually under long–term power contracts.

INSTANT START
A fluorescent circuit that ignites the lamp instantly with a very high starting voltage from the ballast.

INTEGRATED RESOURCE PLANNING (IRP)
IRP is a process by which an electric utility plans for its future resource needs. Key characteristics of IRP include a long–term forecast of power needs; a comprehensive evaluation of all resource options, both supply–and–demand side; and public review of the process.

INTERRUPTIBLE RATES
Special rates for energy consumers who are willing to have their energy deliver service interrupted by the utility when necessary.

INVERTED RATE STRUCTURE
A rate design in which the unit price increases with usage.

INVESTMENT GRADE AUDIT
Detailed energy or water survey with sufficient detail to allow for project value with respect to financing.

INVESTOR-OWNED ELECTRIC UTILITY (IOU)
An IOU is a form of electric utility that is owned by a group of investors. Shares of IOUs are traded on public stock markets.

IPP (INDEPENDENT POWER PRODUCER)
As defined by FERC under PURPA, a generating entity, other than a qualifying facility (QF) and not a utility, that is: (1) unaffiliated with the utility purchaser and (2) lacks significant market power. The facility must not be in the utility's rate base.

KILOVOLT (KV)
One thousand volts; measure of electromotive force.

KILOWATT (KW)
One thousand watts; measure of electric capacity or load.

KILOWATTHOUR (KWH)
1,000 watts of consumption for one hour. Electric bills are measured in kilowatthours.

LAMP LUMEN DEPRECIATION
The fractional loss of lumen output over a period of operating time.

LENS
Transparent or translucent medium that alters the directional characteristic of light passing through it. Usually made of glass or acrylic.

LIFE-CYCLE COSTING
Refers to a technique employed to evaluate the merits of a particular investment by which consideration is given to the costs and the benefits of that investment over its entire serviceable, usable life.

LIFELINE RATES
A ratemaking arrangement under which a minimum amount of gas or electricity found to be essential to life is provided to residential customers at rates below average system costs.

LIGHT-LOSS FACTOR (LLF)
The product of all considered items that contribute to a lighting system's depreciated light output over a period of time.

LOAD
The amount of electric power or gas delivered at any specified point or points on a system. Load originates primarily at the power-consuming equipment of customers.

LOAD FACTOR
The ratio of average-to-peak day use calculated over the course of a specified amount of time (day, month, or year).

LOAD MANAGEMENT
Refers to techniques used by utilities to reduce wide daily and seasonal fluctuations in customer demand and thereby improve load factors.

LOCAL DISTRIBUTION COMPANY (LDC)
A local or region-wide public utility that retails purchased natural gas to end-users. LDCs are usually regulated by a state or provincial public utility commission.

LOUVER
Grid type of optical assembly used to control light distribution from a fixture. Can range from small-cell plastic to the large-cell anodized aluminum louvers used in parabolic fluorescent fixtures.

LUMENS/WATT (L/W)
A ratio expressing the luminous efficacy of a light source.

LUMINAIRE
A complete lighting unit consisting of a lamp (or lamps) together with the parts designed to distribute the light, to position and protect lamps and connect them to the power supply.

LUMINAIRE EFFICIENCY
The ratio of total lumen output of a luminaire and the lumen output of the lamps, expressed as a percentage

LUMINANCE
Practically, the brightness of an object; that which the eye perceives: reflected, transmitted, and generated.
Formula: Luminance = Illuminance x Reflectance Factor.

M&V TECHNIQUE
An evaluation tool for determining energy, water and cost savings.

MARGINAL COST
The extra cost of producing one or more units at any production level.

MARKET POWER
The ability to influence prices. Generally, market power is a market-based mechanism for pushing prices above variable cost.

MARKET SHARE
The percent of end-use load which utilizes a given fuel (electric, natural gas, propane, etc.).

MARKET-CLEARING PRICE
The price at which supply and demand are in balance with respect to a particular commodity at a particular time.

MASTER METERING
Installation of one bulk power meter for multiple tenants.

MEGAWATT (MW)
A unit of electric power equal to one million watts, or 1,000 kilowatts.

MERCHANT PLANT
Power plants that are outside electric utility rate bases and are without power purchase agreements. Merchant plants are built to sell power in an unregulated wholesale power market without long-term power purchase agreements.

METAL HALIDE
A type of high intensity discharge (HID) lamp in which the major portion of the light is produced by radiation of metal halide and mercury vapor in the arc tube.

METERING
Collection of energy and water consumption data over time at a facility through the use of measurement devices.

MONITORING
The collection of data at a facility over time for the purpose of savings analysis

NEW YORK MERCANTILE EXCHANGE (NYMEX)
The third largest U.S. futures exchange, founded in 1872. In early 1996, NYMEX launched an electricity futures contract designed to service the merging competitive energy market.

NON-COINCIDENT PEAK
When one customer class reaches maximum energy use. This peak may or may not coincide with the peak for the total system.

NON-UTILITY GENERATOR (NUG)
A facility that produces electric power and then sells it to an electric utility most usually under a long-term contract. NUGs also sell thermal energy and electricity to nearby industrial customers.

NON-VARIABLE LOADS
Power consuming equipment that has steady, non-changing energy consumption over time.

OCCUPANCY SENSOR
Control device that turns lights off after the space becomes unoccupied. May be ultrasonic, infrared or other type.

OFF-PEAK PERIOD
Period of relatively low system demands.

ON-PEAK PERIOD
Period of relatively high system demands.

OPEN ACCESS
Access to the commodity market through unbundled transmission capacity on substantially equal terms for all.

OPTICS
A term referring to the components of a light fixture (such as reflectors, refractors, lenses, louvers, etc.) or to the light emitting or light controlling performance of a fixture.

OPTIONS
A financial instrument (derivative) that gives the buyer the right to purchase or sell a security at a predetermined price.

OUTAGE
The period during which a generating unit, transmission line, or other facility, is out of service.

PEAK DAY
On an annual basis peak day is the day of highest customer demand.

PEAK DEMAND
The maximum level of operating requirements placed on the system by customer usage during a specified period of time.

PEAK HOUR
The hour of the day, for the day on which the peak load occurs.

PEAK LOAD
The maximum load as calculated by the metering device for a given time period.

PEAK LOAD PRICING
Pricing which reflects different prices for system peak periods or for hours of the day during which loads are normally high.

PEAK LOAD STATION
Generating station normally in operation only to provide power during maximum load periods; usually a high operating cost facility or facility which cannot be operated for long periods of time.

PEAK SHAVING
Means by which an electric utility lowers the peak demand on its system.

PERFORMANCE BASED RATES
Rates based on standards of service and reliability with incentives to improve service and lower costs.

PERFORMANCE CONTRACTING
A contract between two or more parties where payment is based on achieving specified results; typically, guaranteed reduction in energy consumption and/or operating costs.

PERFORMANCE-BASED RATEMAKING (PBR)
PBR is intended to reward regulated companies on the basis of independent standards of price or productivity changes, for example, comparison of their prices with those of other utilities, or with the general price level.

PHYSICAL RISK
In commodity trading, physical risk generally refers to the risk that the physical, tangible commodity will not be a suitable grade.

POST-INSTALLATION ENERGY USE (DEMAND)
The calculated energy use (or demand, e.g. in kWh) by a piece of equipment or a site after implementation of the project.

POWER BROKER
Power brokers, in contrast to power marketers, are not currently regulated by the Federal Energy Regulatory Commission. Power brokers, like power marketers, arrange bulk power transactions. However, unlike power marketers, power brokers bring together a willing seller and buyer without taking title to the power. Thus, power brokers, unlike power marketers, assume no risk.

POWER MARKETER
Power marketers, like power brokers, arrange bulk power transactions. The difference, however, is that power marketers actually take title to the power – and thus the risk – associated with "owning" the power for a time. Power marketers, once taking title to the power and "owning" it for a time, resell it on the open market.

POWER POOL
Two or more interconnected electric system planned and operated to supply power in the most reliable and economical manner for their combined load requirements and maintenance programs.

POWER PURCHASE AGREEMENT
An agreement entered into between a buyer and a seller of energy. The agreement specifies the terms and conditions under which electric power will be generated and purchased.

PRICE RISK
The exposure a company has to changes in the spot or forward price of a given commodity.

PRUDENT INVESTMENT METHOD OF EVALUATION
Historical cost less any amounts found to be dishonest or obviously wasteful.

PUBLIC UTILITY COMMISSION (PUC)
An administrative or quasi–judicial body at the state provincial or municipal level, whose functions include regulation of public utilities.

PUHCA (PUBLIC UTILITIES HOLDING COMPANY ACT)
Enacted in 1935, its intent was to prevent electric and gas utilities from using complex corporate structure to evade regulatory oversight.

PURPA (PUBLIC UTILITY REGULATORY POLICIES ACT)
Part of the National energy Act of 1978, it requires State regulatory agencies to consider a variety of issues affecting electric and gas utility customers. The intent is to establish standards and policies that promote energy conservation, encourage the efficient use of facilities and resources, and provide equitable rates for consumers. Public Law 95–617, 92 Stat. 3117.

QF (QUALIFYING FACILITY)
Cogenerator who satisfies Section 201 of PURPA (among other things, the owner must not be primarily engaged in generation or sale of electric power, the facility also must meet certain size, fuel use and fuel efficiency requirements).

RATE BASE
Investment in operating plant, less depreciation, upon which a regulated utility is entitled to earn profit.

RATE BASE REGULATION
Method of regulation in which a utility is limited in operations to a revenue level which will recover no more than its expenses plus an allowed rate of return on its rate base.

RATE CASE
Procedures followed by a regulatory authority so that a utility may present and justify its need for a rate change.

RATE DESIGN
A utility's rate design consists of the rules and methodology used to convert a utility's revenue requirement into specific rates for specific categories of customers and service.

RATE OF RETURN
Percentage allowed by the Commission as a fair and reasonable profit. May refer to rate of return on rate base or overall rate of return.

RATE STRUCTURE
The design and organization of billing charges by customer class to distribute the revenue requirement among customer classes and rating periods.

RATEPAYER
Refers to a retail consumer of the electricity distributed by an electric utility. This includes residential, commercial, industrial and wholesale users of electricity.

REFLECTANCE
The ratio of light reflected from a surface to that incident upon it.

REFLECTOR
The part of a light fixture that shrouds the lamp and redirects some of the light emitted from the lamp.

RENEWABLE ENERGY
Energy characterized as renewable is any energy source that is constantly replenished through natural processes. Sunlight, moving water, geothermal springs, biomass and wind are all examples.

RETAIL WHEELING
The transmissions of power to an individual customer from a generator of electricity other than the host utility.

RETROFIT
Refers to upgrading a fixture, room, building, etc., by installing new parts or equipment.

ROOM-SURFACE DIRT DEPRECIATION (RSSD)
The fractional loss of task illuminance because of the accumulation of dirt on a room's surface.

SEASONAL RATES
Rate designed to encourage conservation during time of the year when energy consumption is high.

SERVICE TERRITORY
Territory in which a utility is required or has the right to supply service to ultimate customers.

SPECULAR
Mirrored or polished surface. The angle of reflection is equal to the angle of incidence. This word is used to describe the finish of the material used in some louvers and reflectors.

STAKEHOLDERS
The major players or interested parties of a utility or regulatory agency and their actions. Examples of stakeholders include shareholders, management, employees, suppliers, customers and competitors.

STANDBY SERVICE
A class of service wherein the utility does not serve the customer on a regular service basis, but only when called upon to do so by the customer.

STRANDED INVESTMENT
Also sometimes referred to as "stranded costs", refers to fixed costs–usually related to investment in generation facilities incurred by a utility which would no longer be paid by customers who have opted to buy their power elsewhere. Stranded investments can be recovered from a utility's departing customers.

SUPPLEMENTAL POWER
This is power (energy or capacity) that an electric utility may supply to a qualified facility for in–house load requirement or outages.

SUPPLY-SIDE MANAGEMENT
Generally refers to the utility's management of its generating and transmission facilities for maximum efficiency. Demand and Supply Side Manage– ment techniques are combined in Integrated Resource Planning (IRP).

SYSTEM EFFICIENCY
$$SE = \frac{\text{System Lumens x LLF x CU}}{\text{System Watts}}$$
(LLF) Light Loss Factors : Ballast Factor – Thermal Factor – Lamp Lumen Depreciation – Luminaire Dirt Depreciation – Room Surface Dirt Depreciation

SYSTEM PEAK HOUR
The hour on which the electric utility system produces the largest quantity of power for the period in question. The value is commonly quantified on either a seasonal (e.g., summer and winter) or monthly basis.

TANDEM WIRING
A wiring option in which a ballast is shared by two or more luminaires. This reduces labor, materials and energy costs. Also called "master–slave" wiring.

TARIFF
A statement that sets forth the services offered and the rates, terms and conditions for the use of those services.

THERM
One–hundred thousand British thermal units.

TIME-OF-USE RATES
Rate designs which price energy consumption higher during peak usage times. Used to encourage energy conservation.

TRANSMISSION
The movement or transfer of electric energy in bulk. Ordinarily, transmission ends when the energy is transformed for distribution to the ultimate customer.

UNBUNDLING
The separation of various industry functions for purposes of offering and billing for services.

UTILIZATION FACTOR
The ratio of the peak demand of an electrical generation system to the rated capacity of the generating system.

VARIABLE COST
Refers to the portion of a utility's cost of service which varies with the volume of sales.

VARIABLE LOADS
Power consuming equipment that has a changing energy consumption level over time.

VCP (VISUAL COMFORT PROBABILITY)
A rating of a lighting system expressed as a percent of people who, occupying a specified location, and looking in a specified direction, will be expected to find it visually acceptable.

WATT (W)
The unit for measuring electrical power. It defines the rate of energy consumption by an electrical device when it is in operation.

WHEELING
The Energy Policy Act of 1992 (EPAct) requires electric utilities to allow outside wholesale electricity generators to have access to their power lines.

WORK PLANE
The level at which work is done and at which illuminance is specified and measured. For office applications, this is typically a horizontal plane 30 inches above the floor (desk height).

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