HOVEY ELECTRIC

Business Owners Guide to Energy Efficiency: Lighting Solutions

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Who is Hovey Electric?

Hovey Electric, Inc. is a 32 year old family business founded by Jim and Rita Hovey located in Midland, MI and Guthrie, KY. Hovey Electric specializes in Industrial Electrical Construction and maintenance. Our customers include companies on the Fortune 50 and Fortune 500 list. We have completed numerous commercial jobs as well such as Menards stores, and the Dow Diamond, a minor league ball team in Midland, MI.

Hovey Electric has to maintain the highest safety and quality standards in order to complete work for their sophisticated client base. Employees undergo continuous training and are both drug tested and background checked before they can become an employee of Hovey Electric. Many of Hovey Electric's employees have more than 20 years with the company and some have over 30. The company has numerous family members involved in the day to day operations including Jim and Rita, as well as their daughter Jeannine and son Jimmy. Grandsons Jacob and Joshua will be helping out for the summer. Hovey Electric main office can be contacted at (989) 631-2023.

New Guthrie, Kentucky Office

Our new satellite office is located at 129 Commerce St. in Guthrie, KY. Our new location is located just a few miles north of the new Hemlock Semi-Conductor plant in Clarksville, TN.

Hovey Electric began looking for growth areas around the country and settled on the center of the country in the upper Tennessee area near Clarksville, TN. Our new office is near the new Hemlock Semi-Conductor Facility and Fort Campbell Army base.

Ben Thomas is our leader in that area and can be reached at bthomas@hoveyelectric.com or by phone at (931) 553-2392.

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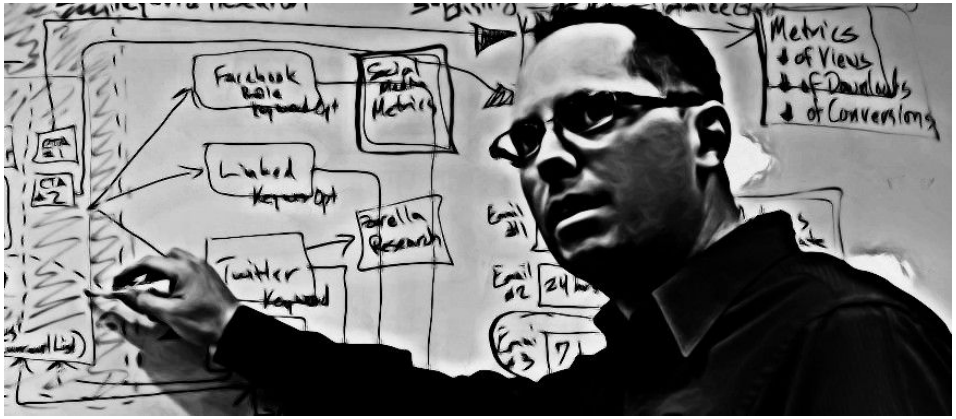
Author: Jimmy Hovey, MBA

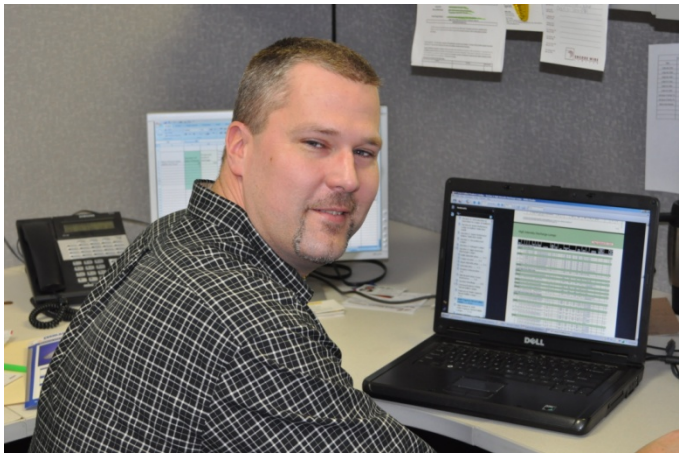
Jimmy is the son of Hovey Electric founders Jim and Rita Hovey. He has been involved in the family business since he was 8 years old.



Within Hovey Electric, he has held virtually every position from "Dad's helper", warehouse grunt, apprentice electrician, sales development and a variety of management positions. He has ventured out on his own at times and has started numerous entrepreneurial ventures and held management positions in other businesses.

In 2005, he earned a Masters of Business Administration degree from Northwood University, DeVos Graduate School of Management. Jimmy created the energy efficiency services division after discovering the numerous benefits of energy efficiency. He currently authors 3 blogs, www.hoveyelectric.com, www.power4consulting.com, and www.inboundprofessor.com as well as ghost writing for other blog authors.

He is passionate about helping business owners find ways to save money and become more profitable through energy efficiency. Jimmy lives at Lake Isabella, Michigan with his wife Nicole and 4 children. Jimmy can be contacted at jimmy@hoveyelectric.com or by phone at (989) 317-1117.



Contributor: Dave VanTol, Energy Efficiency Consultant

Dave is a Journeyman Electrician that has worked for Hovey Electric over the past 4 years. Dave has a background in electrical sales and has become the backbone of technical specification of energy efficiency projects. Dave is the go to guy for figuring out the specifics of energy efficiency design and layout.

Dave is a regular contributor on the Hovey Electric "POWER" blog. He loves working with energy efficiency projects and is a self proclaimed "Computer Geek". Dave lives with his wife Tonya and 2 children in Essexville, MI. He can be reached at dvantol@hoveyelectric.com or by phone at (989) 317-1019.

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Chapter 1-Reducing Expenses through Energy Efficiency

In today's economy where every dollar counts and electricity costs are only rising, upgrading your lighting system is one of the best business investments you can make into your company.

The return on investment is relatively quick, usually under 2 years. Pair that with much longer life and you can continue to reap the benefits year after year.

Adding municipality rebates and tax credits into the formula can have a huge impact on your payback timeline.

The cost of electricity is only going to go up, why not invest in your company today and reap the savings for years to come!

Understanding Your Utility Bill

One of the most confusing things we have to figure out when doing an energy audit is deciphering the utility bill. There are charges for this and that.

Before we started working with energy efficiency, I never paid attention to all the detail on the bill. I just looked at the total amount and paid it. You are likely the same way. Just look at the amount, and if it's not TOO far out of line, we just pay it.

It took me awhile to understand what kWh and watts and all of the other terms related to an energy bill were. One day, I finally got it; calculating energy cost is really a simple math problem. I figured that I would show you in the next section how I finally got it. Maybe then you will pay a little closer attention to all the little writing on those bills and save yourself some serious money.

Chapter 2 - So, "Watt's" a Watt?

Yes, I know I spelled What wrong above. I will likely get in trouble for the spelling from my wife, the teacher. But it is for a good reason, energy efficiency. First let's define a watt.....

watt (wät)

The basic unit of electric, mechanical, or thermal power in the SI and MKS systems, equal to one joule per second or 10 ergs per second (of a horsepower): for electric power it is equal to one volt-ampere.

OK, that's the official definition; now let's focus on defining this in a way that makes sense to you. The watt is the starting point for how you are charged for energy, so a watt is tied directly to your wallet.

Taking a few minutes to learn about how watts relate to energy efficiency is an important exercise for those who don't understand electricity. Counting watts is the key to lowering the cost of energy in your home or place of business.

Most people don't realize that energy efficiency is as simple as a mathematical subtraction problem. Determining the difference in wattage can have a significant impact. Understanding this concept will help you make more informed buying decisions when purchasing products that use electricity in your home or business.

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For an example, we are going to compare two bulbs. The images on this page show a 100 Watt standard incandescent bulb on the left and a 23 Watt compact fluorescent bulb on the bottom and to the right.

Both of the bulbs above are suitable replacements and can be utilized for the same application. While the old style 100 Watt bulb will likely be cheaper to purchase upfront, over time the compact fluorescent will save you money. How much difference?

This is where the simple subtraction problem comes in. Using the two bulbs above, we utilize the wattages to do a simple mathematical problem.

Take the 100 Watt incandescent and Subtract the 23 Watt Compact Fluorescent and you find a difference of 77 Watts

(100 Watts - 23 Watts = 77 Watts Difference).

With this information we can now determine how much each of the bulbs will cost us annually.

You're likely saying to yourself "but my energy company charges me per kilowatt hour (kwh)".

Now the math gets a little more complicated, but still manageable.

In order to determine the cost difference between the two, we utilize the wattages to determine the kwh.

We do this with the following equation:

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Fixture Quantity x Fixture Wattage = Total Watts

Total Watts / 1000 = Kilowatts

Kilowatts x (Hours of Usage) = Kilowatt/Hr

Kilowatt/Hr x (Cost of Energy) = Annual Cost

Let's assume you have the following:

You have 10 Lights (Fixture Quantity)

The 10 lights have 100 Watt Bulbs (Fixture Wattage for Each) and you want to replace them with 10- 23 Watt Bulbs (Fixture Wattage for Each)

2000 Hours (Hours of Usage)

$.10 Per Kilowatt/Hr (Average Energy Rate Charged)

How much does it cost annually for 10 - 100 Watt Bulbs?

10 (Fixtures) x 100 (Watts Each) = 1000 Watts

1,000 Watts / 1000 = 1 kw

1 kw x 2000 hrs per year = 2000 kwh (Kilowatt)

2000 kwh x .10 = $200 to operate 10 lamps with 100 Watt Bulbs

$200 to operate 10 100 Watt Incandescent light bulbs

So how does that compare to operate 10 - 23 Watt Bulbs?

10(Fixtures) x 23 (Watts Each) = 230 Watts

230 Watts / 1,000 = .23 Kw (Kilowatt)

.23 Kw x 2000 hrs per year = 460 kwh (Kilowatt Hour)

460 kwh x .10 = $46 to operate 10 lamps with 23 Watt Bulbs

$46 to operate 10 23 Watt Compact Fluorescent light bulbs

"Watt's" the difference?

100 Watts - 23 Watts = 77 Watts

-Or-

$200 - $ 46 = $154 Annual Savings

$154 / 10 Bulbs = $15.40 per bulb

You could spend up to $15.40 per bulb and get 100% payback in the first year.

Many of the bulbs last up to 4 years. If the bulbs pay for themselves in year 1, that gives you 3 more years of savings, or $462 of savings from years 2, 3 and 4.

You invest $154 and in 4 years you get $462 in return. That is a 300% return on your money.

How much would you have in a bank account if you placed it in a regular savings account? I can guarantee you it won't return 300%, maybe 3%.

"Watt" are you going to buy next time?

Start With Lighting Upgrades

We chose lighting upgrades as our target of opportunity. Lighting has the greatest opportunity for rapid paybacks and is easy for business owners to understand.

Motors are another opportunity but can be more confusing then lighting. The process for determining the effectiveness of motor upgrades takes a significant amount of time. This is a good process to start at the same time as lighting, but due to the popularity of upgrading motors, manufacturers are limited on the time required to complete the projects. Motor efficiency upgrades should be planned 6 months to 12 months ahead of time.

HVAC upgrades also can have a major impact on the energy consumption of a facility. The heating load from a 400 Watt Metal Halide is near 1000 degrees Fahrenheit. A comparable replacement for the 400 Watt Metal Halide operates closer to 200 degrees Fahrenheit. If you have 200 of the 400 Watt Metal Halides, you can see that there will be a significant reduction in heat generated from your fixtures. This can reduce your cooling load, but may also increase your heating load in the winter. That is why we suggest starting with lighting first.

Lighting is simple to calculate, will have a significant impact on your annual energy costs and can be implemented in a very short period of time. Once installed, take a look at your HVAC systems for energy efficiency upgrades. Let's look at the benefits of energy efficiency and why you should consider implementing energy efficiency into your business.

Chapter 3 - Energy Efficiency Benefits to Business Owners

Benefit #1-Tax Deductions

Owners love to find ways to save on taxes. The Energy Policy Act of 2005 (Epact) was signed into law to do just that, reduce tax burden.

Haven't heard of it?

Don't assume that your Accountant is keen on all of the deductions out there. Most people I contact have never heard of the program.

I have even asked several Accountants and they don't even know there are incentives and deductions out there.

What is it?

The Energy and Policy Act of 2005

The Energy Policy Act of 2005 was originally put into place in 2005 by President Bush as an incentive to get businesses to invest in energy upgrades to slow down the continual increase in demand on the country's aging electrical grid infrastructure.

The act was renewed in 2009 by President Obama through the Economic Stimulus act which extends the program until 2013.

There is very little knowledge of the system throughout industry and even accountants are unaware of the deduction until someone asks them to research the deduction.

The core feature of the act is the ability of an owner to take advantage of a tax deduction. The main functions of Epact are as follows:

- **Allows a building owner to take a straight tax deduction of $1.80 per square foot on your facility.**
- **The deduction is divided into three areas; Electrical, HVAC and the Building envelope.**
- **Each of the areas qualifies for a $.60 per square foot deduction if area that has been upgraded is at least 50% below the ASHRAE* standard.**
- **There is a sliding scale beginning at 25% of the ASHRAE standard for electrical upgrades which may qualify the facility for even a partial deduction.**

*(*What is ASHRAE? Founded in 1894, is an international organization of over 50,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. ASHRAE sets the standards for lighting specifications to qualify for Energy Policy Act of 2005).*

After identifying the systems within your facility, we are then able to determine the potential tax deduction benefit from an energy system upgrade.

If the upgrade is electrical, we will determine the square footage of the area to be upgraded and calculate the square footage by $.60 per square foot.

Example-

100,000 square foot facility Qualifies for Epact.

The facilities Tax Deduction would be $60,000 that could be written off in the year of the improvement.

(100,000 square feet x $.60 per square foot = $60,000.)

If the building does not qualify for the full potential tax savings, there is a sliding scale starting with a 25% tax deduction depending on the facility.

Don't just assume based on the example above that your facility will qualify. There are some calculations involved in determining if your facility will meet the minimum requirements. Some buildings don't qualify, especially offices because they are lit up too bright.

Benefit #2-Energy Savings

Energy savings is always the big surprise when I make a presentation selling energy efficiency. Any building that is more than 10 years old is a candidate for upgraded lighting systems. I say 10 years, but we still see facilities specifying old inefficient equipment into new facilities today.

Don't count yourself out if your facility isn't yet 10 years old. Even newer facilities can save thousands of dollars. Not sure what you have? Just send us a photo, we can tell you.

We upgraded one facility, Crippen Automotive in Lansing, Michigan even though many of his lights were newer than 10 years. It just made sense when we did the math. He is now saving over 12,000 kwh per month. The exterior lighting alone saves Crippen 75% over what he spent a year ago without the upgrade.

When you figure out your energy savings (or we can do that for you...) be sure to multiply your annual savings by the life of the system. After all, you are making an investment now, so you need to look at how long you can expect those savings.

Some people don't get excited when we show them that their annual savings is $10,000. When we multiply that $10,000 by 20 years or $200,000, then it becomes very exciting.

The one fact that will remain true is if you don't change anything with your system now, you will continue to pay the same amount each year. Do nothing and you will be giving your savings to your utility every month. That is a fact!

Benefit #3-Utility Cash Rebates

Many utilities have millions of dollars set aside to give facility owners cash incentives to upgrade.

Why do the Utilities have so much money?

The utilities have figured out that for every $10 they would spend on building a new power plant, they can give you one dollar and get the same impact.

Reducing energy consumption and the load on the power grid is the same benefit as increasing the load.

Most utilities are under pressure from the federal government to reduce the total electricity consumed.

Hovey Electric has customers who took advantage of the utility incentive programs last year. Here is just ONE example of just ONE utility Consumers Energy posted the facts today from the 2010 program.

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In 2010:

Total Utility Energy Efficiency Incentives:

2,450 Businesses took part in the program.

Those 2450 Businesses received $11,300,000 in incentives.

That is an average of $4,612 per business.

Total Annual Energy Savings

2,450 Businesses will save total of $15,400,000 annually.

That is an average of $6,285 per business.

Saving 124,700,000 kwh annually and *322,000* Mcf of natural gas annually.

Total Utility Incentives paid out by Consumers Energy over the life of the program: $17,000,000

Energy Efficiency Incentive Money available for 2011:

$36,000,000 available for energy efficiency upgrades.
(Source: Consumers Energy)

What could you do with an extra **$523.75** (Average Energy Savings of $6,285/12=$523.75) in your pocket?

Benefit #4-Reduced Maintenance Cost

New lighting and HVAC systems are far superior to technology that is even five years old.

We used new technology called inductive fluorescent fixtures in one facility Crippen Automotive, Lansing, MI that have a 100,000 hour life or 20 years at the level of usage this facility.

Each year, the owner spent $2500-$3500 per year to replace worn out ballasts and change burnt out light bulbs. Since they upgraded to new inductive fluorescent fixtures that have a 100,000 hour life, he will not need to spend that money each year.

If he didn't replace his old 1000 Watt Metal halides, he would continue to spend $2500 a year. Over 20 years he would have spent over $50,000 in the next 20 years just on maintenance.

By upgrading the fixtures, they eliminated the need for routine annual maintenance which saves $2500 a year or $50,000 over 20 years.

That is an expense he won't have to pay out, money in his pocket.

Benefit #5-Better Productivity

Better productivity relates to lighting quality. This improvement is predictable, but until you flip on the new lights, you won't believe that there would be that much difference between old and new.

There are many studies about the increase in productivity from better lighting quality.

This concept is difficult to monetize, but smiles of employees and owners of these facilities is very satisfying.

The owners and employees are always surprised at how much better the lighting is after the lighting upgrade.

Chapter 4- How to Calculate Energy Savings in 7 Steps

Why Save Energy?

Energy savings can come from small changes, but the most significant impact comes from retrofitting existing electrical systems such as lighting.

There are a number of ways to have the improvements pay for themselves.

As a business owner or a contractor involved in energy efficiency, you will be able to see or show all of the monetary benefits of calculating energy efficiency. OUR GOAL: *ROI

**(What is ROI? Return on Investment. We utilize a ROI formula because you should consider what your return will be from any investment in your business including any long term building upgrades. If you put money in a savings account, your ROI would be the interest earned over a determined period of time. Measuring ROI helps you make better business decisions. We include ROI calculations in all of our Energy Efficiency Proposals because we believe you should consider Energy Efficiency as a business decision. ROI is one of the best ways to measure your investment.)*

Consider the following example;

Step 1- Determine Building Dimensions

You own a building that is 20,000 Square Feet and it is more than 10 years old (may apply to newer buildings as well).

You have a quote of $25,000 to upgrade the lighting in the building.

Let's assume you are upgrading 120 400Watt Metal Halide fixtures.

Your cost of energy is .08 per kilowatt hour

Step 2- Determine Energy Saving Tax Deduction: 2005 Epact

The Energy Policy Act of 2005 –

This allows a building owner to take a straight tax deduction of $1.80 per square foot on your facility.

The deduction is divided into three areas;

1. Electrical
2. HVAC
3. The Building envelope

Each of the areas qualifies for a $.60 per square foot deduction.

In the case of lighting, consider the following example;

Calculating Tax Savings:

To calculate your potential tax savings from The Energy Policy Act of 2005:

You would simply take 20,000 x $.60 per square foot to get a $12,000 tax deduction.

That means any improvement up to $12,000 would be a straight write off in the year you make the improvement.

(There are many variables that determine the actual cash benefit of the Energy and Policy Act; you must consult your tax attorney for exact amount)

But your cost for the improvement is $25,000; you need an additional $13,000.

Step 3- Calculate Energy savings From Upgrading to Energy Efficient Lighting

Upgrading the 400 Watt Metal Halide with a High Bay Fluorescent will net a 50% savings in energy consumption.

This will save your company $11,400 per year.

So of the $13,000 left, after considering energy savings for the first year, you would still have a payout of

($13,000-11,400) or $1,600.

Step 4- Calculate Utility Incentives

Assuming this project is within one of my own local utilities, the installation qualifies for a rebate of $80 per fixture.

So, 120 x 80 = $9,600.

At this point you only needed $1600, so now you actually have a surplus of $8,000 from doing your energy upgrade.

Step 5- Calculate Maintenance Savings

New lighting products and systems have much longer lives than old technologies.

So it would be reasonable to assume you won't have to relamp these new fixtures for up to 10 years.

What would that save you in labor?

What would that save you in not having to purchase 120 bulbs every 3 years?

What would that save you in the equipment needed to relamp the fixtures?

For this example, let's assume you would save $1000 per year, would that be fair?

Energy Savings Numbers; It's the Real Deal.

Step 6- Put the Numbers together

So, let's recap the project;

Your upgrade is going to cost $25,000.

Your building qualifies for a $12,000 tax deduction.

Your energy savings from year 1 is $11,400.

You qualify for $9600 in local utility incentives.

You save $1,000 in maintenance in year 1.

Step 7- Determine Energy Efficiency ROI

$25,000 – 9600 = $15,400 actual payout in year 1.

$15,400-$11,400=$4000 Balance after energy savings.

$4000 - $4800 (Cash Value of Tax deduction assuming 40% Bracket) = $800 Positive Cash Flow.

$1000 Savings in Maintenance + $800 Positive Cash Flow = $1800 positive cash flow Year 1.

A LIGHTING UPGRADE WILL PAY FOR ITSELF IN LESS THEN A YEAR.

What is the life of the new system?

New lamp technologies last up to 42,000 hours of service. You use the lights 4200 hours per year = 10 year life.

9 years (We used Year 1 above) * $11,400 = $107,100 that you would put in your pocket OR if you do nothing, that is how much you would pay to your utility.

So if you invested $25,000 and only considered the savings, you would net $114,000 over 10 years

($114,000/$25,000)= 456% ROI.

But since you only had to pay out $15,400 your ROI would be ($114,000/$15,400) = 740% ROI.

Comparing Investments

How does this type of investment compare to your stock portfolio?

How about compared to real estate investments?

An investment in energy efficiency is a great investment. The disappointing part of this process is that people are skeptical, think it is a scam or don't think it is possible to save that kind of money.

If you do nothing, you will still pay the utility all of that money.

The utility is going to continue to raise rates and that cost will get higher.

So, those who believe the possibilities of energy savings are those who will be rewarded with a solid investment.

Are you interested in saving money? Take a look at some facilities who have already taken advantage of energy efficiency programs to take advantage of the benefits we have listed above.

Chapter 5 - Energy Efficiency Case Studies

The following is a story about a project that Hovey Electric completed for Northwood University. This is a case study with all the details of the reasons and benefits of upgraded a system that was less than 10 years old.

Northwood HACH Gymnasium

400 watt to T-5

Northwood's Hach Gymnasium was only 8 years old, but it was time to upgrade the lighting. At least that was the conclusion the administration came to when they were shown the potential savings of a lighting retrofit.

"The metal halide lamps were original when the gymnasium was built about 8 years ago," explains Ron Dubrul, director of the physical plant department for Northwood University. We were beginning to have some burnout, and when you replace a burned-out lamp, it is noticeably brighter. We weren't too happy with that, so we decided to do something about it."

The problem with metal halide lamps is that they lose about 60% of their light output over time. That means that within 2-3 years, metal halides are near the end of their life and much dimmer than when they were first installed.

Not only that, but because the metal halides had a cool-down period of about 30 minutes during which they wouldn't re-fire, they had to be left on all day (16 to 17 hours total), whether or not the building was being used. This further increased the costs of lighting the gymnasium.

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Consulting with Graybar (an electrical products supplier for the institution) and Hovey Electric about the issue proved to be a tremendous financial boon for the institution.

In addition to recommending a lamp that would last longer while providing better light quality, the new lighting would keep more cash in

Northwood's bank account increased saving them money in a variety of ways. The lamps chosen to replace the metal halides were high bay T5 fluorescents which offered several key benefits over the old lamps:

- **The lifespan of a metal halide is approximately 2-3 years or about 20,000 hours. By contrast,**
- **T5s last 4-5 years or approximately 42,000 hours, which means replacements are far less frequent.**
- **Metal halides require 458 total watts but the T5s use only 216 watts, reducing the wattage by more than half.**
- **Metal halides lose 60% of their rated light output over their 2-3 year lifespan, where as T5s lose only 5% over their 4-5 years, this improves the long-term light quality of the space.**
- **The time needed for metal halides to re-fire after being turned off is approximately 30 minutes.**
- **T5s, on the other hand, have instant re-strike capability, meaning they illuminate immediately rather than taking time to return to maximum brightness.**

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"We actually improved the light levels while using half of the energy," says Jeff Fifield of Graybar. This was achieved in two important ways. First, the wattage was reduced by more than half, resulting in direct energy savings. And second, because of the instant re-strike capability of the new T5s, the lights can now be turned off while not in use rather than being left on all day long. Though the lighting in the gym is not separately metered from other systems on the campus, Graybar and Hovey estimated reductions in energy costs as a result of the lighting retrofit close to $16,000 annually.

The color of the light also improved. "The foot candles readings before the retrofit were about 23, but after we replaced the lighting with T5s, we achieved a foot candle reading of about 60," explains Fifield. That's because as metal halides age, they become warmer which makes them appear dimmer.
In fact, initial Kelvin readings of metal halides range from 3,700-4,000, but as time passes, that number can dip to 2,700 Kelvin.

The new T5s measured at 5,000 Kelvin after they were installed in the gym, a temperature that appears brighter than what Northwood previously had and should not degrade over time. "Everyone was impressed by the change in light levels," comments Jimmy Hovey of Hovey Electric. Northwood will recoup additional savings because of the reduction in maintenance costs. Since the T5s last between 1 to 3 years longer than the metal halides, replacements are less frequent, which lowers both parts and labor costs.

What's more, air conditioning costs will also be reduced because of the lighting change-out. Metal halide lamps run at about 1,000degrees Fahrenheit (F), adding to the building's cooling load. T5s on the other hand put out only about 200 degrees F of heat, which will have a much smaller impact on the indoor temperature.

For Northwood, the need to save energy is important, but so is the desire to reduce the institutional carbon footprint. This lighting retrofit will certainly cut their greenhouse gas emissions and lower waste, but one additional environmental benefit is the reduction in mercury. Metal halides contain almost double the amount of mercury compared to T5s, which further improves their eco-credibility.

Though there was an up-front investment to Northwood for swapping the metal halides for T5s, the payback period is impressive. The total cost of the project was $31,171 (parts and labor included), but with a Consumer Cash Back Incentive of $8,500, that cost was reduced to $23,300. With direct energy savings of $16,000 annually, the payback period for Northwood is approximately 17 months. Assuming a 5-year lifespan, Northwood will recoup another $56,700 in energy savings over that period of time, plus additional savings with lower maintenance costs. Not many banks will give you that kind of return on investment.

“Think of it this way,” explains Hovey. “If Northwood hadn’t made the change, they were going to pay $16,000 more than they had to pay every single year for electricity—guaranteed. And with forecasted energy cost increases of 6%, that number would likely have gone up drastically. If you really look at all of the factors, the case for upgrading is pretty compelling.”

Northwood LED Lighting Upgrade

What started as a project to boost security by increasing outdoor lighting on the Northwood University (Midland, MI) campus soon developed into an energy and money saving endeavor. Following the recommendation of their service providers, Graybar and Hovey Electric, Northwood University soon discovered the multitude of benefits afforded them with the choice of light-emitting diode (LED) lighting for their outdoor illumination requirements.

When the issue was first broached, comments from a variety of groups were being fielded by Northwood staff concerned for their safety. Energy considerations weren’t really a central concern, so no one realized the role power-saving LEDs would have in increasing campus security and decreasing energy costs.

“We had been receiving requests from students and staff to increase light levels along walkways and in parking lots,” explains Dr. Long, Northwood’s Michigan Provost. “So we determined to raise the amount of light in the affected areas by adding more fixtures.”

Deliberations over how to cope with the below-standard lighting issue along walkways, in parking lots, and outside dormitories began in April 2009. Graybar, an electrical products distributor and long-time supplier for the institution, became aware of the need and determined to approach the institution with some options.

Weighing the Installed Costs of Various Lighting Choices

Peggy McLeod, a lighting consultant with Graybar, and Jeff Fifield, a sales representative for the company, presented Northwood with several options for both retrofitting and replacing the existing lighting systems. “We detailed the positive and negative aspects of each choice,” comments Fifield. “We felt it was best to present all of the options to Northwood so that they could make the decision that was right for them, though we had our suspicions as to which choice would be the most beneficial for them in the long run.”

The two front-running technologies were metal halide lamps and LEDs. Metal halides had several benefits, not least of which was familiarity. Northwood maintenance staff members were already well-equipped to spot and remedy lamp deficiencies and had the equipment and training needed to replace lamps and ballasts and to fix problems. Replacing these with light-emitting diodes would require re-training staff to deal with LED problem-solving.

Additionally, there was the issue of capital cost. Adding a few new posts with metal halide lamps throughout the campus to increase overall lighting coverage would be less expensive than choosing a new technology in the short term.

But it didn’t take long for Northwood to see the disadvantages of staying with the old technology. With so many benefits over the older metal halides, LEDs won out early; the decision to go with this energy-saving technology was made within a month. “We began the process early in April and then made our decision within about four weeks,” explains Dr. Long.

At first glance, the cost of installing LED lighting technology didn’t look good. Installed cost, including both labor and parts, would run nearly $235,000 for an expanded metal halide system. LEDs on the other hand would top out at close to $260,000. Even with fewer total fixtures, LEDs would cost more.

“With LEDs, you need fewer lights to provide the equivalent perceived illumination as with metal halides,” says Fifield. “But per lamp, LEDs just cost more.” But it is precisely LEDs lower numbers that make them more cost-effective in the long term. That and the way they use energy. LEDs have lower wattages per fixture than metal halides, ranging between 79

watts to 306 watts per fixture compared to the 185 watts to 458 Watts of the metal halides, yet they are perceived as brighter. That meant that the team could put together a new lighting design that would require fewer lamps per square foot.

Not only did this mean a smaller bill for parts, it saved significantly when it came to retrofitting the Dubois parking lot. Jimmy Hovey of Hovey Electric: “If we had stayed with metal halides, we would have had to put a row of lamps down the center of the parking lot to achieve the same light levels that we achieved with LEDs. That would have required that we tear apart the parking lot to install the new row of fixtures.”

Instead, with the LEDs, the Hovey team was able to eliminate the center row of lighting, saving time, and lowering the budget for parts and labor costs, yet finishing the project with light quality superior to that achieved with metal halides. “That attests to the quality of light and the ability to direct it,” concludes Hovey.

Drawing on their considerable experience with projects like this, Hovey was able to garner additional savings for Northwood by recommending the installation of a secondary parallel conduit for security. “At the time of installation, Northwood had yet to determine where they would place security cameras,” explains Hovey. “By integrating conduits for the security system, Northwood is now able to locate cameras anywhere there’s an LED pole, which will significantly reduce future installation costs for the institution. The addition of the LED lighting further enhances the effectiveness of these cameras.” All told, although per-lamp the up-front investment for LEDs is higher, there were some dramatic installed savings achieved over metal halides.

Measuring Long-Term Benefits of More Efficient LEDs

But the greatest savings Northwood will achieve will come now that the installation is complete. “We will experience probably a 15 to 18 month cost return on investment over the metal halides, after which we’ll see annual energy savings with these new fixtures,” praises Dr. Long.

That’s because LEDs are widely acknowledged as the most energy-efficient lighting technology available today. Fifield did some calculations to project the energy savings Northwood would see with their new LED fixtures. Using an average energy rate of $0.1 per kWh, and assuming total operating time for both types of fixtures of 3,650 hours per year, Fifield was able to estimate electricity bills for metal halide fixtures at $3,240 annually. That’s a figure more than double what Northwood will now pay for electricity with LEDs: approximately $1,456 every year.

And that doesn’t take maintenance costs into consideration, either. “Our maintenance people had to hire lifts to go out and change bulbs and there were of course costs to all of that, so this will be lessened with the LEDs,” Dr. Long explains.

In addition to the rental of equipment and labor, there’s the cost of parts incurred with every metal halide replacement. Metal halide lamps and ballasts need to be replaced typically every two and three years respectively, with lamps running between $20 and $35 each and ballasts $30 to $50 each. LEDs on the other hand have a rated life expectancy of approximately 100,000 hours each. This means over 20 years, the maintenance costs will be next to nothing.

And LEDs are much more durable than metal halide lamps, too. Light-emitting diodes are solid-state lights, which means they’re virtually indestructible. This is important for an institution like Northwood where spirited students can sometimes break lamps accidentally. With LEDs, Northwood staff will no longer have to worry about this problem.

So, though installing new LED fixtures would be more expensive than going with old metal halide lamps and ballasts, the energy, labor, and replacement parts savings they will realize with LEDs will make the slightly higher investment extremely worthwhile.

Admiring the Quality of LED Lighting

LEDs also have a significant advantage over metal halides in terms of light quality. “There’s a huge difference in how LEDs appear. It’s hard to explain—it’s almost like daylight and allows you to see true colors,” explains Hovey.

With metal halides, the light shines straight down, and though reflectors are often employed in the housing of these lamps to spread out the illumination, you end up with a hot spot on the ground right below the fixture.

The LEDs chosen by Northwood, however, are made up of 144 tiny points of light, each aimed in a different direction to spread the light out evenly and avoid hot spots. This quality was the reason the design team could reduce the total number of fixtures required, and will also enhance the security of the grounds. With fewer contrasts between illuminated and non-illuminated areas, deep shadows and glare are both minimized; resulting in lighting that is safer for all involved.

Additionally, LEDs experience lower levels of lumen degradation. Metal halides decline in terms of lumen quality over the two to three years they are in service, and usually require replacement before they burn out due to this factor. LEDs do not suffer from this problem.

“So far, both students and faculty have been pleased with the quality and levels of lighting now provided in our outdoor spaces,” reflects Dr. Long. And with additional upgrades proposed by the Graybar-Hovey team, Northwood hopes to implement even more lighting retrofits in the near future.

Crippen Automotive-Dealership Saves 75% on Exterior Lighting

Inductive Fluorescent provide Greater Savings than LEDs

We have found consistently that one of the most cost-effective, quickest energy improvements buildings can undertake are lighting retrofits. And one of the most innovative and energy saving options available right now are the inductive fluorescent lighting systems. We've been using this technology with many clients to date with excellent results, both in light quality and performance as well as hard energy savings.

Inductive fluorescent lighting offers many advantages, making them, in some ways, superior to even LED (light-emitting diode) lighting options. Here's how the Everlast Inductive Lighting, one of our preferred products, compares to some competitor's LED lighting:

- **The Everlast lighting provides 50% higher energy efficiency compared to some LEDs**
- **Clients find their lighting energy bills drop by up to 60% compared to metal-halide lamps and similar technologies**
- **Comparing light distribution, Everlast's provide 25% better coverage**
- **These inductive fluorescent lighting systems cost about one-fifth that of LED lighting systems**
- **Everlast lighting comes with a 10 year warranty, which is double that of many LED lights, and covers approximately 100,000 hours**
- **Inductive fluorescents provide two times more light output, with 6400 lumens compared to 3208 lumens of**

some LEDs, and they maintain lumens superbly with 70% retention over 10 years

- **This lighting provides instant re-strike with unlimited on/off cycles, reducing always-on energy costs**
- **In many cases, inductive fluorescents can replace metal halides one-for-one and are easy to install and retrofit existing systems**
- **Inductive fluorescents also operate up to 700 degrees cooler than HID light sources, which helps to reduce indoor cooling costs**

In our experience, these savings and advantages prove true again and again, demonstrating that smart, energy efficient lighting is not only good for a company's green reputation, they're also excellent for the bottom line.

Exterior Inductive Fluorescent Lighting

Take any parking lot area and you will see either high pressure sodium or metal halide fixtures lining the rows.

It's not because the owner likes to pay for ridiculously high energy usage, up until recently it was due to lack of options.

Inductive fluorescent provides a means to cut power usage in parking lots by 50 % and in some case as much as 75%!!

Auto dealerships, parking lots, and anywhere else that illuminates an outdoor space can all benefit greatly from this technology.

Inductive Reduces Maintenance Costs!

I thought that heading would get your attention! Getting your attention is one thing, but that is the fact with Inductive Fluorescent fixtures.

In reality no equipment is truly maintenance free. In some applications, we have used fixtures from Everlast Lighting, based in Jackson Michigan. We like them because the fixtures are backed with a 10 year warranty and offer 100,000 hr lamp life.

In the world of lighting fixtures that's as close to maintenance free as you can get, especially in places with existing Metal Halide High Bays.

If you have your fixture lit for 4000 hours per year that is 25 YEARS of lamp life!! You won't find that in many other types of fixtures.

The chart below show you some of the costs differences between different lighting technologies.

EverLast® Induction Lighting vs. HID Lighting

Patent Pending EverLast® Induction Lighting Technology			
SPECIFICATIONS	**EverLast® Induction Lighting**	Metal Halide High Bay	High Pressure Sodium High Bay
Watts - Electrical Usage	**200w**	400w	400w
Kelvin Temp	**5000k**	3700k	2100k
CRI	**90+**	65	22
Rated Lamp Life	**100,000 hours**	20,000 hours	21,000 hours
Fixture S/P Factor	**2.0**	1.26	0.76
Fixture Lumens - Photopic	**20,500**	28,800	40,800
Visual Acuity Lumens	**41,000**	36,288	31,008
Visual Acuity Lumens Per Watt	**191**	79	67
Operating Temperature	**200° F**	900° F	900° F
Annual Operating Cost	**$183.96**	$478.21	$477.46

Even Better.....You get Better Light!

The last point that needs mentioning is CRI or Color Rendering Index.

Simply put, it's a rating showing how close artificial light is to natural sunlight.

The higher the CRI number the better color is rendered in that light. Higher CRI allows the eye to see with better definition as well as reducing eye strain.

Inductive: Higher Upfront Cost....but Long Term Benefits....

Induction lighting does have more of an upfront cost; however the labor to install it is the same as lighting used today.

When you start weighing the benefits of induction lighting such as energy savings, reduced maintenance and upkeep, and better lighting quality, your return on that initial investment will be recouped relatively quickly.

Chapter 6 - Need Some Help?

The only way to find out which application is right for you is for us to come take a look at your site. The objective of this E-book is to introduce you to the concept that significant savings is a possibility. It is a not a scheme or a scam, just straightforward facts.

Is all of this still confusing?

Allow us to come to your facility and we will help you sort it out. Leave the thinking to us.

We utilize licensed Journeyman who has years of experience working with a variety of electrical systems and have been trained in lighting design with energy efficiency as top priority.

We can complete the entire project from initial analysis all the way through to completing your upgrade. By utilizing professional tradesman trained in systemic management, we will transform your facility with as little impact to your operations as possible.

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