

MISC-pt 03d 24

Security Lighting. Let's Have Real Security, Not Just Bad Lighting.

Information Sheet 24, March 1990



International Dark-Sky Association
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Clearly what we all want and need is security and safety at night, at home and when we are away from home, for ourselves, our families, our homes and property, and for all others. The task is to *be* safe, not to just feel safe. This means that we need effective and efficient lighting. Visibility is the goal. We want to be able to see, not just have the criminal be able to see. This goal exists for us at home, on the streets, in parking lots, at work, wherever. Good lighting can be a help, poor lighting always compromises safety.

Most crime actually occurs during the day, or inside buildings. However, we want the feeling and the reality of being safe outside at night. That does *not* mean putting in the brightest light we can find, blinding everyone in the area, creating light trespass and lighting up the sky. What we do need is effective lighting, lighting that puts light where we need it (and no where else) and where it will help visibility. That means: no glare, no light trespass, no up light, no harsh shadows, no steep transitions from light to dark, etc. Lighting in itself does not insure safety. Is there more crime in the "well lit" centers of large cities or in smaller towns with much less lighting? A cynic would derive a positive correlation of crime with light: the more light, the more crime. We don't think so. current and past studies by competent law authorities can be summarized as follows: "The paucity of data preclude any definitive statement regarding the relationship of lighting and crime, but there is a strong indication that lighting decreases the fear of crime." Quality lighting rather than poor lighting is essential for any real security.

Here are some examples of bad security lighting, lighting that often compromises safety. These poor quality fixtures can give the illusion of safety or the feeling of security, but in reality they don't add to security at all; they may even make things worse. They are beacons to the criminal: "Come and get me, my lighting will help you, not me."

1. The 175 watt dusk-to-dawn "security light". This fixture was designed in the old days when energy was cheap, when there were no good lighting fixture designs, and when the adverse effects of bad lighting were not well appreciated. It sells for \$29.95 or less, but uses over 200 watts of power. That means it costs about \$70 per year to operate in most locations, much more in high electricity cost areas. Much of the light output is wasted, going up or sideways where it does no good at all. It has a great deal of glare, often blinding the homeowner and others. It splatters light everywhere, alienating neighbors. It casts harsh shadows behind trees and buildings, allowing criminals plenty of dark areas to hide in. It is a prime example of bad lighting. But it is in use by millions throughout the country. Why? It's cheap, and bright. We see lots of glare so we think there is lots of light. But it's a most ineffective and inefficient light. (See *IDA Information Sheets #3* and *#26* for more information.)
2. Globes. again, light is splattered everywhere. Because it wastes so much light, one must put a high wattage lamp inside to get any light on the ground. That means a great deal of glare is produced, so much that often one can't then see the ground! Why are so many of these inefficient fixtures used? Mainly because they look good in the daytime! If one likes that look, then one should put only a very low wattage lamp in (as in the days of gas lighting), preserving the daytime appearance. One can install a separate, quality, lighting system to light the ground. There's no glare or light trespass from

this good system, so it doesn't detract from the looks of the globes. One gets the desired attractiveness and also good lighting and safety. It costs more, but there is good lighting.

3. Poorly shielded "wall packs" or similar fixtures. These also splatter light everywhere, some getting where needed, but most is wasted. They also have lots of glare. Well shielded wall packs can be excellent light sources, but one must be sure of what one is buying. Some wall packs have good light control, some nearly none.
4. Poorly designed or installed flood lights. Flood lights can be good, as they often have good light control. But they must be well designed and installed to take advantage of their pluses. Often they are poorly installed, aimed at what seems a random direction, or worse, right at the street (causing terrible glare for motorists) or at the neighbors yard or bedroom window. We have all seen many examples of such bad lighting at night.

Here are some examples of good quality security lights:

1. A well shielded low pressure sodium (LPS) fixture (65636 bytes): well controlled light, energy efficiency, no glare. A lack of color rendering is not a disadvantage for most security lighting. Visibility is excellent with LPS lighting.
2. A similar full cut off high pressure sodium (HPS) or metal halide (MH) fixture, or even the new low wattage PL lamps in good fixtures: no up light no glare.
3. Well controlled and installed flood lights or spot lights.
4. The infrared sensor spot lights that come on only when someone walks through the beam of the infrared source (They can activate an alarm too, if wanted). These are very cost effective and are most effective security lights. They scare intruders away, they offer good visibility when needed to the homeowner (when taking out the garbage, or when there is an intruder). They should be installed so as to put the light only where it is needed, not shoot it up into the sky or into neighbor's property. Under the eaves is a good location usually.

To see well, we need adequate light, but not too much. Too much can ruin our adaptation to night lighting, blinding us just when we need to see. When we go from too bright to too dark or vice versa, we have poor visibility for a while. This effect is called "transient adaptation", and good designs should minimize its adverse effect on visibility.

To see well, we need to minimize any glare. Glare *never* helps visibility. To see well, we need to minimize dark areas near well lit areas. This means good lighting design is required. Think too about energy savings. We should not waste light nor use inefficient lighting sources. We waste far too much energy and money (over a billion dollars in the U.S.A.) throughout the world due to poor lighting. Use light, don't waste it.

What else can we do to maximize safety at night? Here are some ideas (consult libraries, the local police, and others for details and for other ideas): Use good locks, use a peep hole in the door to see who is there before answering the door, have an effective alarm system, including motion sensors (such as are used in the IR spotlight mentioned above). have good phone sense (what you say when answering the phone or on your answering machine's tape), play the radio when gone and put indoor lights on a time, switch, put good labels on your property (and put security labels on your windows), have a dog, join or promote a neighborhood watch program (one of the best ideas: promote quality outdoor lighting through such a group too!), and so forth.

Some Lighting Myths

Information Sheet 42, January 1991



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1. **The more light the better:** "The more light the better" is the same type of reasoning as saying the more salt on your food the better, or the more fertilizer the better, or the more medicine the better. Obviously, there comes a point where you can have too much of a good thing. Eventually, it becomes wasteful or even harmful. nighttime lighting is the same way. We all need well lit main streets, security lights, and parking lot lighting. However, we do not need glare, clutter, confusion, light trespass, and energy waste. Excessively bright, and numerous, unshielded lights cause exactly these things.

You only need enough light to perform the task at hand. For example, low wattage colored bulbs are used for Christmas tree lights, and a 100 watt bulb for a porch light. If more light were better, why are night lights in a bedroom dim instead of bright? The next time you are at an airport at night look at the brightness of the taxi lights (blue color) or the runway lights (white color). They are relatively dim so as to not harm the pilot's night vision and cause confusion. Even the rotating airport beacon is not especially bright. The strobe lights on tall chimneys and radio towers are of low wattage, yet visible for miles. Those who claim the more light the better often are salesmen or manufacturers more interested in sales than effective, safe, environmentally sound lighting.

2. **Light pollution only affects astronomers:** Light pollution affects all of us. It robs the professional astronomer of his or her livelihood and hinders the amateur's enjoyment of his or her hobby. It deprives us all of one of nature's grandest wonders - the night sky. Many persons who claim this is of no importance have never gone far out of town to see what they are missing. Those who grow up in an urban environment may never see the Milky Way. How can someone miss something he has never seen?

The loss of this part of nature desensitizes us to other insults upon the environment. It's the same as saying the loss of a virgin forest is of no concern because most people don't get to see it anyway, and there are plenty of trees for lumber. The loss of wildflowers, polar bears, wolves, whales, and other threatened species, to be honest, don't affect the average person. Their loss only directly impacts biologists. After all, mankind has done very well without mammoths, mastodons, and passenger pigeons. However, no one supports the extinction of magnificent animals.

Why should we permit the loss of our skies? Not only does light pollution dim the stars for the astronomer, but it dims them for all persons. Everyone has a right to the stars. Light pollution takes away one of mankind's oldest heritages. And it represents visible destruction of the environment in several ways: the dome of light hanging over most cities blots out the stars; electricity is generated and wasted to light the night sky -- light needs to be on the ground, not up in the sky; the wasted electricity represents wasteful burning of coal, oil, and natural gas; the byproducts of these wasteful burnings show up as acid rain, smoke, and carbon dioxide emission; strip mining and underground mines ravish the land to produce the coal for the wasteful burnings; runoff from this mining pollutes rivers and streams. Thus, light pollution is far more than some astronomers being inconvenienced. It

is a most harmful assault on the environment. It affects us all, and all of us ought to be concerned about it.

3. **Just Go Out Of Town Away From The Lights:** This is equivalent to saying why worry about the loss of trees and flowers in our cities. Why have urban parks? Just go out of town to see some grass, flowers, or trees. It shouldn't be necessary to go out of town to see these. If we can't have enough sense to plant trees, shrubs, and flowers all around our cities, we can at least have enough sense to plan for parks and preserve those green areas left. Why not have the same attitude toward dark skies? We are not asking people to turn off their lights. We are asking them to shield the lights, use proper wattage for the task, and turn off unneeded lights.

In any event, it is no simple task to get away from the lights. Urban sky glow, the dome of light hanging over all cities of any substantial size, extends for miles and miles. For example, it is easy to see the sky glow of Phoenix, Arizona, from more than 100 miles away. The sky glow from Los Angeles, California, is visible from an airplane 200 hundred miles away. How many dark spots are left in the urban corridor in the northeastern part of the United States? Even in the most remote portions of North America, there are dusk-to-dawn lights blaring into the darkness. The light from one of these causes significant light trespass a mile or more away. I challenge anyone reading this column to find a mountaintop or plateau in the continental United States where there is no trace of light pollution visible somewhere on the horizon.

4. **It's Too Late To Do Anything About Light Pollution; There Are Too Many Lights:** This is a frequent response when I ask people why they are not more active in the light-pollution struggle. It's a tough response to answer adequately. Yes, the problem is enormous, growing in many areas, and very difficult to grasp fully. This doesn't mean it isn't worthy of effort.

We have barely begun to fight. Just because we have a very big problem on our hands and presently few resources to bring to bear doesn't mean we can't ultimately win. It's way too early in the struggle to say it's impossible to do anything about light pollution. Only recently has a small fraction of the public and astronomical community awakened to the problem. Only recently have we realized there are solutions to most lighting difficulties. There are now excellent fixtures available for all lighting needs. This is one of those few problems whose solution is eminently sensible, available, and saves money in both the short and long terms. If you expect to rid a city of its sky glow in the next year, then you will be very disappointed. If you want to get rid of local sources of light trespass, such as a dusk-to-dawn light next door or an unshielded streetlight on the corner, then you have a very good chance of accomplishing your goals with persistent but not obnoxious effort. You also have a reasonable chance for changing laws and instituting proper lighting techniques in your community.

Over a long period good lights will replace the bad and the ugly ones. There will be a gradual slowing of the loss of dark skies and then an actual darkening of skies in some areas. This will not happen quickly, but it is possible. It will take incredible amounts of work and determination, but it can be done.

5. **Low Pressure Sodium (LPS) Causes Headaches:** This is just one of hundreds of ill-founded rumors about LPS lighting. Low-pressure sodium is the most energy-efficient lighting available. LPS is favored by professional astronomers because it is an essentially monochromatic light source, more easily filtered than other light sources. It produces a bright, yellow light to which the eye is very sensitive. Therefore, it is very good for streetlights, parking-lot lighting, and security lighting. Ask those in San Diego, San Jose, Long Beach, and Glendale, Arizona, where it is used extensively.

Why isn't it used more often? The answer is complex. Several large lighting manufacturers do not make LPS fixtures or bulbs and campaign against them. LPS has no color rendition, which bothers many persons, especially when they first see it, and it should not be used for any lighting application that needs good color. LPS fixtures and ballasts are expensive and not readily available, even though LPS use quickly saves money. LPS lighting does not produce headaches any more than any other type of outdoor lighting. In fact, it tends to produce less glare than mercury-vapor lights or high-pressure sodium lights (HPS) and is probably less likely to give headaches. LPS bulbs are no more dangerous to dispose of than any other type of light bulbs.

In fact, consider the toxic substances that are found in other bulbs. Mercury-vapor lighting contains mercury. In the metallic form, mercury is not especially toxic, but many of its salts are quite poisonous. HPS bulbs contain metallic sodium just like LPS bulbs; therefore, they have the same disposal problems as the LPS bulbs -- mainly the metallic sodium, which is highly reactive. If HPS or LPS bulbs are carefully broken under water, the sodium reacts with the water to give sodium hydroxide, everyday lye, the same substance as in drain cleaners. How about all the glass? Well, this is a problem with disposing of any light bulb. Metallic halide bulbs contain all sorts of toxic metallic salts. The bottom line is that the disposal of a large number of light bulbs is an environmental problem no matter the bulb type.

6. **Security Lights Prevent Crime:** Does outdoor nighttime lighting prevent crime? The answer is that nobody knows. In some cases, lighting seems to deter crime and make people feel more secure, even if they are really no more secure than without lighting. In some cases, it probably increases crime because it draws attention to a house or business that could otherwise escape attention. Most crimes, violent and otherwise, take place during the day. After all, criminals need light to do their work. A dusk-to-dawn light shining all night in a rural area probably is an inducement for robbery and vandalism. A passerby would not otherwise know the farmhouse was even there.

An infrared motion sensor security light that comes on only when someone steps into the beam makes a lot of sense. It is only on when needed, thereby conserving energy. Its sudden illumination serves to frighten away the criminal. These lights are now beginning to replace dusk-to-dawn 170-watt mercury-vapor lights. This makes good sense from the economical, environmental, and crime-prevention points of view. The motion security lights can cause light pollution and light trespass if too high a wattage spotlight is used and if they are not aimed down toward the ground. They should also have some shielding.

Do streetlights, parking-lot lights, and security lights prevent crime? Maybe yes, maybe no. If they are overly bright and glary, they actually make it easier for a criminal to hide in the shadows and encourage crime rather than discourage it. Well-lit streets with even lighting, low glare, and fully shielded fixtures probably have lower vehicle and pedestrian accident rates. How about bright lights in a parking lot? How many people do you know whose car has been broken into during the day? One speaker at a recent lighting symposium recounted how his car was robbed at a local mall. It sat near a store entrance and was directly under a bright light!

There are simply no good scientific studies that convincingly show the relationships between lighting and crime. Our cities are far more brightly lit than ever. Yet, the crime rate soars. Maybe lights directly lead to crime. One study at a small eastern college showed that almost all violent nighttime crimes took place in well-lit places. This study, while informative, can not be generalized to other locales because of the somewhat unique nature of the college and the surrounding town. Crime is a very complex sociological phenomenon controlled by many factors, and it will vary considerably from place to place.

Our own personal opinion is that crime is little affected by nighttime lighting for better or worse. Main streets should be well lit to reduce automobile and pedestrian accidents. Busy malls should have good lighting to reduce accidents and perhaps deter crime. After business hours this lighting can be reduced or even turned off. Security lighting can be relatively low level. This saves money, and not much light is needed to find your way to a door or find your way out to your car. Not much light is needed to see a suspicious looking person loitering around. No matter the lighting situation, the proper wattage, not overkill, should be used, and all lighting should come from full cut-off shielded fixtures. LPS lighting is ideal for many of these applications because of its economic nature.

7. **Only Astronomers Care About Light Pollution (Those Persons Fighting Light Pollution Are Just Crazy Idiots):** This is the right diagnosis for the wrong reason! Many of the friends, relatives, working associates, and acquaintances of **IDA's** executive director (Dave Crawford) and president (Tim Hunter) have considerable evidence we are "crazy idiots." Nonetheless, this is only true because of our personal idiosyncrasies. It is not true because we (and many others as well) are concerned about light pollution, light trespass, radio pollution, and space debris. After all, the night sky is part of everyone's environment, enormous amounts of energy are wasted lighting the night sky, radio astronomers have to struggle to find useful portions of the electromagnetic spectrum for their work, and space debris is a rapidly growing problem.

Why should someone be considered a nut because he or she is concerned about the environment? However, persons involved in environmental causes must carefully define the problem they want to solve, learn the facts, appreciate the legitimate perspective of their opponents, and offer people solutions rather than complaints. This is **IDA's** philosophy and modus operandi. Light and radio pollution can be controlled if the facts are properly conveyed to the public. Light pollution is the one form of pollution whose solution immediately saves money. Not just astronomers care about light pollution and light trespass.

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7/25/99

'Dark-sky' movement aims to bring back starry, starry nights

By Andy Hall
Wisconsin State Journal

It's known around the world as the "dark-sky" movement. It led to the launch 11 years ago of the International Dark-Sky Association in Tucson, Ariz., where light pollution threatened research at nearby Kitt Peak National Observatory.

But in Wisconsin, where concern about crime runs high and astronomers wield little political clout, most backers of this campaign don't talk much about darkness.

They emphasize less-volatile terms, such as "sensible lighting" and "energy conservation."

And they're winning some converts in America's Dairyland.

UW-Extension recently joined the 3,100-member International Dark-Sky Association and has begun developing a statewide educational program illustrating the effects of various types of outdoor lighting on the night sky and on people. About 60 Wisconsin residents are members of the Tucson-based dark-sky group.

The village of Ashwaubenon, near Green Bay, approved an outdoor-lighting ordinance last year and the village of Williams Bay now is updating its lighting ordinance to protect the University of Chicago's Yerkes Observatory in Walworth County.

In Madison, some residents are signaling that they, too, want to crack down on light pollution. A citywide group recently began meeting to encourage neighbors to install proper lighting. And the Vilas Neighborhood Association printed a May article by

By Andy Hall
Wisconsin State Journal

The outcome of the dark-sky debate will affect the quality of UW-Madison astronomy research both in Arizona, where the university helps run the WYNN Kitt Peak National Observatory, and in Dane County, said Jim Lattis, director of UW Space Place.

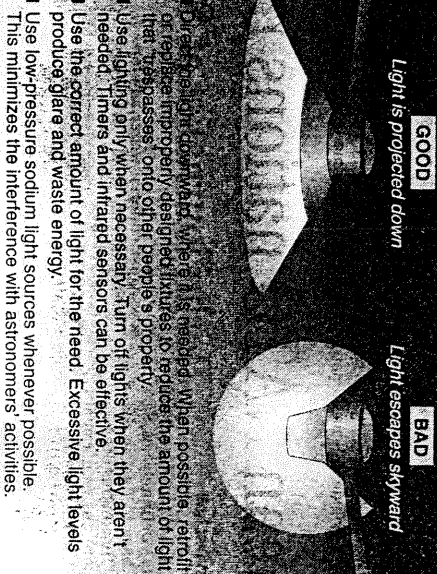
The amount of manmade light visible in the sky at the Wisconsin observatory, between Pine Bluff and Cross Plains, is triple the level at Kitt Peak, researchers have found.

Local astronomers note that the view of the skies from UW-Madison's Washburn Observatory, which is used for teaching, has deteriorated significantly because of light pollution on the campus and in the city.

UW-Madison astronomy Professor Eric Witlois said two things are obvious as he travels to state

Are you a light polluter?

Tips on minimizing light pollution:



- Use low-pressure sodium light sources whenever possible. This minimizes the interference with astronomers' activities.
- Use the correct amount of light for the need. Excessive light levels produce glare and waste energy.
- Use timers and infrared sensors can be effective.
- Use lighting only when necessary. Turn off lights when they aren't needed. Timers and infrared sensors can be effective.
- Use low-pressure sodium light sources whenever possible. This minimizes the interference with astronomers' activities.

SOURCE: International Dark-Sky Association

resident Don Sanford, who criticized light pollution from a convenience store and Camp Randall Stadium and urged his neighbors to "set the standard as Madison's best, not overit, neighborhood."

State legislation to regulate outdoor lighting in Wisconsin has been proposed since the early 1990s, and a chief proponent, Sen. Jim Baugart,

D-Sheboygan, pledges that he'll introduce a bill soon. Five other legislators signed onto the legislation when Baugart, backed by a coalition of environmental groups, introduced it in 1997.

In the Midwest, few states and communities have taken measures to reduce light pollution, but nationwide, more than 100 communities

WSSJ graphic

Pollution hampers UW astronomy research

parties to run the Universe in the Park program, which offers visitors a chance to see the night sky through telescopes.

First, he said, the program is popular, often drawing 80 people a night and up to 300 at Devils Lake near Baraboo.

Second, he said, humans' effect on the nighttime landscape is growing fast in Wisconsin.

At Mirror Lake, he said, "the view to the south is terrible because you're looking over Baraboo, and if you look to the east you're looking over Wisconsin Delis." Stars must be nearly overhead to be visible there, he said.

He's also noticed a dramatic contrast between his home and his workplace.

"I live in Fitchburg and the stars I can see in my back yard are amazing compared to campus," he said. "I can always make out the Little Dipper. It's hard to see it on campus."

have adopted lighting ordinances and Arizona, New Mexico, Maine and, most recently, Texas have approved dark-sky legislation.

Some backers of these energy-saving, view-saving measures believe that Wisconsin may be primed to join that list.

"We're really getting rolling on this, I think," said David S. Lieb, a UW-Extension pollution prevention specialist who was drawn to the issue a year ago after hearing a local farmer moan the loss of star views.

Lieb is developing the UW-Extension's educational program, which will be shown to groups and individuals around the state. The program will emphasize lighting options that can brightly illuminate the right areas while minimizing the amount of energy wasted into the sky, he said.

Commonly used cobra-style street lights, for example, can send nearly half of the light to the side or upward, where it's not needed.

Last winter, longtime Madison activist Carolyn Beche founded the Good Neighbor Lighting Group.

Beche, a homemaker and retired custodian who's lived in Madison for 30 years, said 13 people attended the first meeting and half a dozen show up for a typical monthly meeting.

Most members, she said, are irritated by intrusive lighting from a neighbor or a business.

"I think Madison, with its lakes, we could have the starriest sky, especially in winter," said Beche, who has promoted her views in several letters

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Can you see the Little Dipper?

Witlois said the effects of light pollution can be assessed by anyone.

He suggested hunting for the Little Dipper. First, find the Big Dipper.

The stars on the side of dipper's bowl, opposite the handle, are known as the Pointer Stars. An imaginary line drawn from the bottom to the top pointer star, and extended about five times that distance, points to the North Star.

This time of year, in the evening, that line will point to the right and will be roughly horizontal. The North Star is the end of the handle of the Little Dipper.

Depending on conditions, Witlois said, people in a setting uncluttered by light pollution should be able to find six or seven stars in the Little Dipper.

Sources of information

David S. Lieb, a UW-Extension pollution prevention specialist developing a statewide educational program on outdoor lighting, can be reached in Madison at (608) 265-2360.

Information about the Good Neighbor Lighting Group is available from Carolyn Beche in Madison at (608) 246-0222.

The International Dark-Sky Association, which offers a wide range of information, including tips on dealing with neighbors' irritating lights, may be contacted in Tucson, Ariz., at (520) 293-3198 or www.darksky.org.

What do you think?

Do you support or oppose Sen. Jim Baugart's efforts to regulate outdoor lighting in Wisconsin? Why? Do you believe light pollution can be curbed without cutting essential lighting? Do you support Carolyn Beche's call for Madison to reclaim its stary nights?

We'll publish comments from readers on this topic in an upcoming edition of Your Forum. You can voice your opinion by

- Calling: Call 1Dares, 283-3123 in the Madison area or (888) 696-6675 toll-free outside the metro area, 24 hours a day.
- Writing: Wisconsin State Journal, Box 80358, Madison, Wis 53708
- E-mail: wsj@p1-ne.wiscnondot.com

With all electronic forms, please include your name, phone number and address.

SKY

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published in Madison newspapers.

"Madison would be a good place to set an example for the rest of the state."

She recalled that when she came to Madison, she could view the shimmering Northern Lights, even from the heavily developed Isthmus. Now such displays are wiped out by light pollution.

"I want the Northern Lights back, that's all," she said.

Beebe said a return to darker skies would offer "beauty, security, good night vision. You hit a light, the iris constricts and you lose night vision."

The resident of Merry Street on the east end of the Isthmus contended that crime begin hitting her street after outdoor lights were added in 1993. She said that cars have been vandalized, and their contents stolen, three times. However, Madison officials have ample evidence that unlike Beebe, most residents are afraid of the dark.

Two years ago, residents and police objected to Mayor Sue Bauman's suggestion that the city could save \$50,000 a year by turning off 1,200 street lights in neighborhoods and along busy streets.

Although no block would have gone dark, Bauman was forced to drop the proposal amid protests that public safety would be jeopardized.

Today, that episode serves as a powerful reminder of the passions that residents attach to outdoor lighting.

City Engineer Larry Nelson recalled that he was stunned at a

public meeting when Beebe made a plea for dimmer lighting.

"I've been so used to being beat up for not having enough lighting for nighttime security that I didn't believe what I was hearing," Nelson said.

"There's a strong belief on the part of the citizens that their security is enhanced with higher lighting levels."

He noted that in troublesome areas such as State Street, police have requested brighter lights to improve their views of facial features.

A 1998 U.S. Department of Justice study illustrated Madisonians' perceptions that lighting and crime are linked. Twenty percent of Madison residents said poor lighting made them feel less safe. The average across the 12 cities surveyed was 8 percent.

Also, 27 percent of Madisonians said they'd added outside or automatic lighting to protect themselves from crime in their homes. Only watching out for other people's safety received a higher percentage among 10 listed actions.

David Dryer, city traffic engineer, said Madison recently surveyed cities of a similar size and found that its lighting levels are lower than two-thirds of the other cities.

"We certainly couldn't be accused of over-lighting," Dryer said.

Dryer and Nelson said that gradually, Madison is adopting many of the lighting practices Beebe is seeking. For example, mercury vapor lamps are being replaced with sodium lighting outfitted with shields to direct light down.

They said city officials are caught in the middle as some resi-

dents want to reduce lighting levels while others, including Ald. Tim Bruer, 14th District, want to boost it. "Tim never met a fixture he didn't want," Dryer said.

At the state level, Baumgart said he considers himself a "tree hugger" but amateur astronomers' complaints about the loss of viewing opportunities didn't sell him on the need for legislation. He was persuaded to join the crusade by the need for energy conservation in a state that runs short of electricity.

"I think it's smart," he said.

Baumgart, a freshman senator who in past sessions introduced outdoor-lighting legislation as a member of the Assembly, said that he'll propose a similar measure after work on the state's biennial budget is complete.

He is undecided whether he'll push for mandatory regulations, as he did unsuccessfully in 1997, or whether he'll settle for voluntary guidelines instead.

His measures have been supported by such environmental groups as Citizens for a Better Environment, the Sierra Club, the Madison Audubon Society and Wisconsin's Environmental Decade.

The state Public Service Commission estimated that roughly \$33.5 million is spent each year on street and outdoor lighting, not including signs, porches and storefronts. However, state officials shied away from offering detailed estimates of how much energy—and money—Baumgart's measure would save, because regulations would need to be developed first.

"If we can burn a little less fuel, that's a little less sulphur in the air, a little less mercury in the water," Baumgart said.

"Would (the savings) be huge? No. But it would be at no cost to anyone if we do this correctly."

The state Department of Commerce, which would develop and enforce the regulations, didn't take a position on the bill but Louis Cornelius, the agency's policy and budget director, cautioned that the bill could have a significant impact on the agency and businesses.

"Rules promulgated under the provisions of this bill would be broad in scope and at this time have the appearance of undue restraint of trade," Cornelius wrote in a 1997 fiscal estimate attached to the bill.

In a recent interview, Cornelius explained that the potential restraint-of-trade issue arose because the bill would permit the 1,800 local governments in Wisconsin to enact stricter outdoor-lighting rules than those approved by the Department of Commerce. This, he said, might prompt businesses to file lawsuits alleging that their ability to engage in trade was being unfairly harmed. Baumgart, though, predicted there's a "strong chance" that an outdoor-lighting package could be approved this year in Wisconsin—if it's not derailed by "silly things" he's heard in the past such as that it'll keep people from turning on Christmas lights or keep farmers from working in their fields at night.

Baumgart said he won't ever give up on his bill, and neither will backers of it.

Although they're quiet, they're determined, he said, and because they're highly educated, and skillful at using the Internet and other means to organize support, "as a group they will probably outshine many groups."

LIGHTS OUT!



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They emphasize less-volatile terms, such as "sensible lighting" and "energy conservation."

And they're winning some converts in America's Dairyland.

■ UW-Extension recently joined the 3,100-member International Dark-Sky Association and has begun developing a statewide educational program illustrating the effects of various types of outdoor lighting on the night sky and on people. About 60 Wisconsin residents are members of the Tucson-based dark-sky group.

■ The village of Ashwaubenton, near Green Bay, approved an outdoor lighting ordinance last year and the village of Williams Bay now is updating its lighting ordinance to protect the University of Chicago's Yerkes Observatory in Walworth County.

■ In Madison, some residents are signaling that they too want to crack down on light pollution. A citywide group recently began meeting to encourage neighbors to install proper lighting. And the Vilas Neighborhood Association printed a May article by

Are you a light polluter?

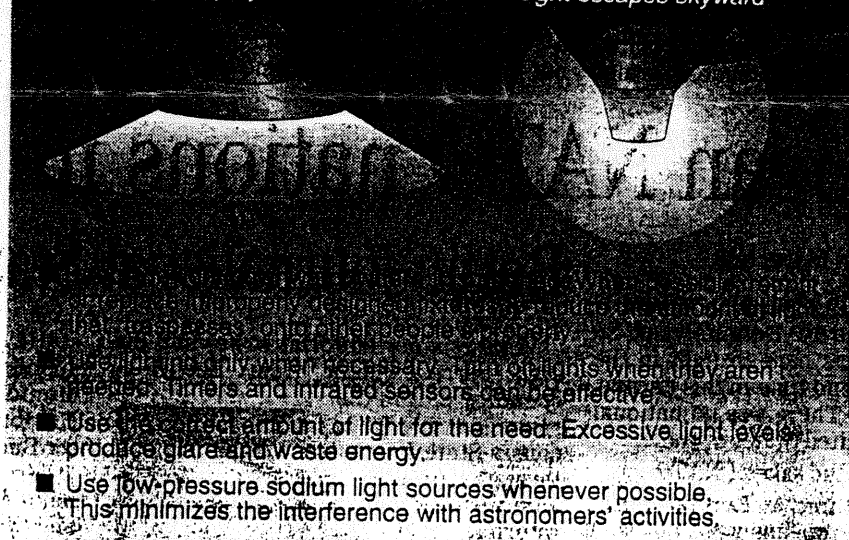
Tips on minimizing light pollution:

GOOD

Light is projected down

BAD

Light escapes skyward



SOURCE: International Dark-Sky Association

WSJ graphic

resident Don Sanford, who criticized light pollution from a convenience store and Camp Randall Stadium and urged his neighbors to "set the standard as Madison's best-lit, not overlit, neighborhood."

■ State legislation to regulate outdoor lighting in Wisconsin has been proposed since the early 1990s, and a chief proponent, Sen. Jim Baumgart,

D-Sheboygan, pledges that he'll introduce a bill soon. Five other legislators signed onto the legislation when Baumgart, backed by a coalition of environmental groups, introduced it in 1997.

In the Midwest, few states and communities have taken measures to reduce light pollution, but nationwide, more than 100 communities

starry, starry nights

have adopted lighting ordinances and Arizona, New Mexico, Maine and, most recently, Texas have approved dark-sky legislation.

Some backers of these energy-saving, view-saving measures believe that Wisconsin may be primed to join that list.

"We're really getting rolling on this, I think," said David S. Liebl, a UW-Extension pollution prevention specialist who was appointed a year ago after his former employer, a farmer mourned the loss of his farm.

Liebl is developing the UW-Extension's educational program, which will be shown in groups and individuals around the state. The program will emphasize lighting options that can brightly illuminate the right areas while minimizing the amount of energy wasted into the sky, he said.

Commonly used cobra-style street lights, for example, can send nearly half of the light to the side or upward, where it's not needed.

Last winter, longtime Madison activist Carolyn Beebe founded the Good Neighbor Lighting Group.

Beebe, a homemaker and retired custodian who's lived in Madison for 30 years, said 13 people attended the first meeting and half a dozen show up for a typical monthly meeting. Most members, she said, are irritated by intrusive lighting from a neighbor or a business.

"I think Madison, with its lakes, we could have the starriest sky, especially in winter," said Beebe, who has promoted her views in several letters

Please see SKY, Page 4B

Sources of information

■ David S. Liebl, a UW-Extension pollution prevention specialist developing a statewide educational program on outdoor lighting, can be reached in Madison at (608) 265-2360.

■ Information about the Good Neighbor Lighting Group is available from Carolyn Beebe in Madison at (608) 246-0222.

■ The International Dark-Sky Association, which offers a wide range of information including tips on dealing with neighbors' irritating lights, may be contacted in Tucson, Ariz. at (520) 293-3198 or www.darksky.org.

What do you think?

Do you support or oppose Sen. Jim Baumgart's efforts to regulate outdoor lighting in Wisconsin? Why?

Do you believe light pollution can be curbed without cutting essential lighting?

Do you support Carolyn Beebe's call for Madison to reclaim its starry nights?

We'll publish comments from readers on this topic in an upcoming edition of Your Forum.

You can voice your opinion by:

■ **Calling:** Caller Ideas, 283-3123 in the Madison area or (888) 696-8675 toll-free outside the metro area, 24 hours a day.

■ **Writing:** Wisconsin State Journal, Box 8058, Madison, Wis. 53708.

■ **E-mail:** wsjopine@madison.com

With all communications, please include your name, phone number and address.

published in Madison newspapers.

"Madison would be a good place to set an example for the rest of the state."

She recalled that when she came to Madison, she could view the shimmering Northern Lights, even from the heavily developed Isthmus. Now such displays are wiped out by light pollution.

"I want the Northern Lights back, that's all," she said.

Beebe said a return to darker skies would offer "beauty, security, good night vision. You hit a light, the iris constricts and you lose night vision."

The resident of Merry Street on the east end of the Isthmus conceded that crime began hitting her street after outdoor lights were added in 1993. She said that cars have been vandalized, and their contents stolen, three times. However, Madison officials have ample evidence that unlike Beebe, most residents are afraid of the dark.

Two years ago, residents and police objected to Mayor Sue Bauman's suggestion that the city could save \$50,000 a year by turning off 1,200 street lights in neighborhoods and along busy streets. Although no block would have gone dark, Bauman was forced to drop the proposal amid protests that public safety would be jeopardized.

Today, that episode serves as a powerful reminder of the passions that residents attach to outdoor lighting.

City Engineer Larry Nelson recalled that he was stunned at a

public meeting when Beebe made a plea for dimmer lighting.

"I've been so used to being beat up for not having enough lighting for nighttime security that I didn't believe what I was hearing," Nelson said.

"There's a strong belief on the part of the citizens that their security is enhanced with higher lighting levels."

He noted that in troublesome areas such as State Street, police have requested brighter lights to improve their views of facial features.

A 1998 U.S. Department of Justice study illustrated Madisonians' perceptions that lighting and crime are linked. Twenty percent of Madison residents said poor lighting made them feel less safe. The average across the 12 cities surveyed was 8 percent.

Also, 27 percent of Madisonians said they'd added outside or automatic lighting to protect themselves from crime in their homes. Only watching out for other people's safety received a higher percentage among 10 listed actions.

David Dryer, city traffic engineer, said Madison recently surveyed cities of a similar size and found that its lighting levels are lower than two-thirds of the other cities.

"We certainly couldn't be accused of over-lighting," Dryer said.

Dryer and Nelson said that gradually, Madison is adopting many of the lighting practices Beebe is seeking. For example, mercury vapor lamps are being replaced with sodium lighting outfitted with shields to direct light down.

They said city officials are caught in the middle as some resi-

dents want to reduce lighting levels while others, including Ald. Tim Bruer, 14th District, want to boost it. "Tim never met a fixture he didn't want," Dryer said.

At the state level, Baumgart said he considers himself a "tree hugger" but amateur astronomers' complaints about the loss of viewing opportunities didn't sell him on the need for legislation. He was persuaded to join the crusade by the need for energy conservation in a state that runs short of electricity.

"I think it's smart," he said. Baumgart, a freshman senator who in past sessions introduced outdoor-lighting legislation as a member of the Assembly, said that he'll propose a similar measure after work on the state's biennial budget is complete.

He is undecided whether he'll push for mandatory regulations, as he did unsuccessfully in 1997, or whether he'll settle for voluntary guidelines, instead.

His measures have been supported by such environmental groups as Citizens for a Better Environment, the Sierra Club, the Madison Audubon Society and Wisconsin's Environmental Decade.

The state Public Service Commission estimated that roughly \$33.5 million is spent each year on street and outdoor lighting, not including signs, porches and storefronts. However, state officials shied away from offering detailed estimates of how much energy—and money—Baumgart's measure would save, because regulations would need to be developed first.

"If we can burn a little less fuel, that's a little less sulphur in the air, a little less mercury in the water," Baumgart said.

"Would (the savings) be huge? No. But it would be at no cost to anyone if we do this correctly."

The state Department of Commerce, which would develop and enforce the regulations, didn't take a position on the bill but Louis Cornelius, the agency's policy and budget director, cautioned that the bill could have a significant impact on the agency and businesses.

"Rules promulgated under the provisions of this bill would be broad in scope and at this time have the appearance of undue restraint of trade," Cornelius wrote in a 1997 fiscal estimate attached to the bill.

In a recent interview, Cornelius explained that the potential restraint-of-trade issue arose because the bill would permit the 1,800 local governments in Wisconsin to enact stricter outdoor-lighting rules than those approved by the Department of Commerce. This, he said, might prompt businesses to file lawsuits alleging that their ability to engage in trade was being unfairly harmed.

Baumgart, though, predicted there's a "strong chance" that an outdoor-lighting package could be approved this year in Wisconsin.

"If it's not derailed by 'silly things' he's heard in the past such as that it'll keep people from turning on Christmas lights or keep farmers from working in their fields at night.

Baumgart said he won't ever give up on his bill, and neither will backers of it.

Although they're quiet, they're determined, he said, and because they're highly educated, and skillful at using the Internet and other means to organize support, "as a group they will probably outshine many groups."

An Introduction to the Issues of Light Pollution



We all win

by correcting the problems of inefficient outdoor lighting at night.

- Many types of outdoor lighting designed for advertising, security and visibility are actually wasteful, invasive and a source of disabling glare.
- "Light trespass", the poor control of outdoor lighting which crosses property lines, detracts from our quality of life, and confuses the instinctive daily and seasonal cycles of animals and plants.
- Although perceived as a deterrent to crime, studies by the US Department of Justice* and the National Institute of Justice* show no conclusive evidence that lighting actually prevents crime.
- Public hazards have been created by the use of glaring, high-wattage floodlighting along roadways and business parking lots, shining directly in the driver's line of sight.
- Public safety is also being compromised by businesses competing with light levels to attract business. The eye's inability to adjust quickly to drastic changes from light to dark, leaves a driver temporarily blind when exiting an overlit business area at night. It is not uncommon to see businesses using 3 to 6 times the recognized, lighting industry recommendations for site lighting (IESNA).
- The recent awareness of global warming concerns, due in a large part to power plant emissions, now demands an effort to reduce our consumption of electricity.
- Because of this unnecessary condition, many of our children today have already lost much of the starry night sky behind the glow of wasted light, limiting their imaginations to the man-made boundaries around them.
- By correcting these outdoor lighting problems for the future we can save money and electricity, improve public safety and increase visibility, while reducing air pollution and green house gas emissions.

* "Study of Streetlighting And Crime" 7/77 by James M. Tien / US Dept. of Justice • www.darksky.org/ida/ida_2/info63.html
"Preventing Crime, What Works, What Doesn't, What's Promising" A report to the US Congress / The National Institute of Justice • www.ncjrs.org/works/wholedoc.htm

International Dark-Sky Association

3545 N. Stewart, Tucson AZ 85716 U.S.A.

Some Lighting Myths

SOME LIGHTING MYTHS:

1. **THE MORE LIGHT THE BETTER:** "The more light the better" is the same type of reasoning as saying the more salt on your food the better, or the more fertilizer the better, or the more medicine the better. Obviously, there comes a point where you can have too much of a good thing. Eventually, it becomes wasteful or even harmful. Nighttime lighting is the same way. We all need well lit main streets, security lights, and parking lot lighting. However, we do not need glare, clutter, confusion, light trespass, light pollution, and energy waste. Excessively bright, numerous, unshielded lights cause exactly these things.

You only need enough light to perform the task at hand. For example, you use low watt colored bulbs for Christmas tree lights, and a 100 watt bulb for a porch light. If more light were better, why are night lights in a bedroom dim instead of bright? The next time you are at an airport at night look at the brightness of the taxi lights (blue color) or the runway lights (white color). They are relatively dim so as to not harm the pilot's night vision and cause confusion. Even the rotating airport beacon is not especially bright. The strobe lights on tall chimneys and radio towers are of low wattage, yet visible for miles. Those who claim the more light the better often are salesmen or manufacturers more interested in sales than effective, safe, environmentally sound lighting.

2. **LIGHT POLLUTION ONLY AFFECTS ASTRONOMERS:** Light pollution affects all of us. It robs the professional astronomer of his or her livelihood and hinders the amateur's enjoyment of his or her hobby. It deprives us all of one of nature's grandest wonders -- the night sky. Many persons who claim this is of no importance have never gone far out of town to see what they are missing. Those who grow up in an urban environment may never see the Milky Way. How can someone miss something he has never seen? The loss of this part of nature desensitizes us to other insults upon the environment.

It's the same as saying the loss of a virgin forest is of no concern because most people won't get to see it anyway, and there are plenty of trees for lumber. The loss of wildflowers, polar bears, wolves, whales, and other threatened species, to be honest, won't affect the average person. Their loss only directly impacts biologists. After all, mankind has done very well without mammoths, mastodons, and passenger pigeons.

However, no one supports extinction of magnificent animals. Why should we permit the loss of our skies? Not only does light pollution dim the stars for the astronomer, but it dims them for all persons. Everyone has a right to the stars. Light pollution takes away one of mankind's oldest heritages and it represents visible destruction of the environment in several ways: the dome of light hanging over most cities blots out the stars; electricity is generated and wasted to light the night sky -- light needs to be on the ground not up in the

sky; the wasted electricity represents wasteful burning of coal, oil, and natural gas; the byproducts of these wasteful burnings show up as acid rain, smoke, and carbon dioxide emission; strip mining and underground mines ravish the land to produce the coal for the wasteful burnings; runoffs from this mining pollutes rivers and streams. Thus, light pollution is far more than some astronomers being inconvenienced. It is a most harmful assault on the environment. It affects us all, and all of us ought to be concerned about it.

3. JUST GO OUT OF TOWN AWAY FROM THE LIGHTS: This is equivalent to saying why worry about the loss of trees and flowers in our cities. Why have urban parks? Just go out of town to see some grass, flowers or trees. It shouldn't be necessary to go out of town to see these. If we can't have enough sense to plant trees, shrubs, and flowers all around our cities, we can at least have enough sense to plan for parks and preserve those green areas left. Why not have the same attitude toward dark skies? We are not asking people to turn off their lights. We are asking them to shield the lights, use proper wattage for the task, and turn off unneeded lights.

In any event, it is no simple task to get away from the lights. Urban sky glow, the dome of light hanging over all cities of any substantial size, extends for miles and miles. For example, it is easy to see the sky glow of Phoenix, Arizona, from more than 100 miles away. The sky glow from Los Angeles, California, is visible from an airplane 200 hundred miles away. How many dark spots are left in the urban corridor in the Northeastern part of the United States? Even in the most remote portions of North America, there are dusk to dawn lights blaring into the darkness. The light from one of these causes significant light trespass a mile or more away. I challenge anyone reading this column to find a mountain top or plateau in the continental United States where there is no trace of light pollution visible somewhere on the horizon.

4. IT'S TOO LATE TO DO ANYTHING ABOUT LIGHT POLLUTION - THERE ARE TOO MANY LIGHTS: This is a frequent response when I ask people why they are not more active in the light pollution struggle. It's a tough response to answer adequately. Yes, the problem is enormous, growing in many areas, and very difficult to grasp fully. This doesn't mean it isn't worthy of effort. We have barely begun to fight. Just because we have a very big problem on our hands and presently few resources to bring to bear, doesn't mean we can't ultimately win. It's way too early in the struggle to say it's impossible to do anything about light pollution. Only recently has a small fraction of the public and astronomical community awakened to the problem. Only recently have we realized there are solutions to most lighting difficulties. There are now excellent fixtures available for all lighting needs. This is one of those few problems whose solution is eminently sensible, available, and saves money in both the short and long terms.

If you expect to rid a city of its sky glow in the next year, then you will be very disappointed. If you want to get rid of local sources of light trespass, such as a dusk to dawn light next door or an unshielded street light on the corner, then you have a very good chance of accomplishing your goals with persistent but not obnoxious effort. You also have a reasonable chance for changing laws and instituting proper lighting techniques in your community. Over a long period good lights will replace the bad and the ugly ones. There will be a gradual slowing of the loss of dark skies and then an actual darkening of skies in some areas. This will not happen quickly but it is possible. It will take incredible amounts of work and determination but it can be done.

5. LOW PRESSURE SODIUM (LPS) CAUSES HEADACHES: This is just one of hundreds of ill-founded rumors about LPS lighting. Low pressure sodium is the most energy efficient lighting available. LPS is favored by professional astronomers because it is an essentially monochromatic light source, more easily filtered than other light sources. It produces a bright, yellow light to which the eye is very sensitive. Therefore, it is very good for street lights, parking lot lighting, and security lighting. Ask those in San Diego, San Jose, Long Beach, and Glendale, Arizona, where it is used extensively. Why isn't it used more often? The answer is complex. Several large lighting manufacturers do not make LPS fixtures or bulbs and campaign against it. It has no color rendition, which bothers many persons, especially when they first see it, and it should not be used for any lighting application that needs good color. LPS fixtures and ballasts are expensive and not readily available, even though LPS use quickly saves money.

LPS lighting does not produce headaches any more than any other type of outdoor lighting. In fact, it tends to produce less glare than mercury vapor lights or high pressure sodium lights (HPS) and is probably less likely to give headaches. LPS bulbs are no more dangerous to dispose of than any other type of light bulbs. In fact, consider the toxic substances that are found in other bulbs. Mercury vapor lighting contains mercury. In the metallic form, mercury is not especially toxic but many of its salts are quite poisonous. HPS bulbs contain metallic sodium just like LPS bulbs; therefore, they have the same disposal problems as the LPS bulbs, mainly the metallic sodium which is highly reactive. If HPS or LPS bulbs are carefully broken under water, the sodium reacts with the water to give sodium hydroxide, everyday lye, the same substance as in drain cleaners. How about all the glass? Well this is a problem with disposing of any light bulb. Metallic halide bulbs contain all sorts of toxic metallic salts. The bottom line is the disposal of a large number of light bulbs is an environmental problem no matter the bulb type.

6. SECURITY LIGHTS PREVENT CRIME: Does outdoor nighttime lighting prevent crime? The answer is nobody knows. In some cases, lighting seems to deter crime and it makes people feel more secure, even if they are no more secure than without lighting. In some cases, it probably increases crime because it draws attention to a house or business that would otherwise escape attention. Most crimes, violent and otherwise, take place during the day. After all, criminals need light to do their work. A dusk to dawn light shining all night in a rural area probably is an inducement for robbery and vandalism. A passerby would not otherwise know the farmhouse was even there.

An infrared motion sensor security light which comes on only when someone steps into the beam makes a lot of sense. It is only on when needed, thereby conserving energy. Its sudden illumination serves to frighten away the criminal. These lights are now beginning to replace the all night dusk to dawn 175 watt mercury vapor lights. This makes good sense from the economical, environmental, and crime prevention points of view. The motion security lights can cause light pollution and light trespass if too high a watt spot light is used, and if they are not aimed down toward the ground. They should also have some shielding.

Do street lights, parking lot lights, and security lights prevent crime? Maybe yes, maybe no. If they are overly bright with much glare, they actually make it easier for a criminal to hide in the shadows and encourage crime rather than discourage it. Well lit streets with even lighting, low glare, fully shielded fixtures probably have lower vehicle and pedestrian accident rates. How about bright lights in a parking lot? How many people do you know whose car has been broken into during the day? One speaker at a recent lighting symposium recounted how his car was robbed at a local mall. It sat near a store entrance and was directly under a bright light!

There are simply no good scientific studies that convincingly show the relationships between lighting and crime. Our cities are far more brightly lit than ever. Yet, the crime

rate soars. Maybe lights directly lead to crime. One study at a small eastern college showed almost all violent nighttime crimes took place in well lit places. This study, while informative, can not be generalized to other locales because of the somewhat unique nature of the college and the college town. Crime is a very complex sociological phenomenon controlled by many factors, and it will vary considerably from place to place.

My own personal opinion is crime is little affected by nighttime lighting for better or worse. Main arterial streets should be well lit to reduce automobile and pedestrian accidents. Busy malls should have good lighting to reduce accidents and perhaps deter crime. After business hours this lighting can be reduced or even turned off. Security lighting can be relatively low level. This saves money, and not much light is needed to find your way to a door or find your way out to your car. Not much light is needed to see a suspicious looking person loitering around. No matter the lighting situation, the proper wattage, not overkill, should be used, and all lighting should come from full cut-off shielded fixtures. Low pressure sodium lighting is ideal for many of these applications because of its economic nature.

7. ONLY ASTRONOMERS CARE ABOUT LIGHT POLLUTION (THOSE PERSONS FIGHTING LIGHT POLLUTION ARE JUST CRAZY IDIOTS): This is the right diagnosis for the wrong reason! Many of the friends, relatives, working associates and acquaintances of IDA's Executive Director (Dave Crawford) and President (Tim Hunter) have considerable evidence we are "crazy idiots." None the less, this is only true because of our personal idiosyncrasies. It is not true because we (and many others as well) are concerned about light pollution, light trespass, radio pollution, and space debris. Afterall, the night sky is part of everyone's environment, enormous amounts of energy are wasted lighting the night sky, radio astronomers have to struggle to find useful portions of the electromagnetic spectrum for their work, and space debris is a rapidly growing problem.

Why should someone be considered a nut because he or she is concerned about the environment? However, persons involved in environmental causes must carefully define the problem they want to solve, learn the facts, appreciate the legitimate perspective of their opponents, and offer people solutions rather than complaints. This is IDA's philosophy and modus operandi. Light and radio pollution can be solved if the facts are properly conveyed to the public. Light pollution is the one form of pollution whose solution immediately saves money.

Not just astronomers care about light pollution and light trespass. IDA's Board Of Directors consists of a professional astronomer, a physician and amateur astronomer, a lawyer and amateur astronomer, a business women, a science writer, a public relations expert, and a lighting engineer. Many IDA members are not astronomers or particularly interested in astronomy. They are concerned about energy conservation, preservation of our environment, and proper nighttime outdoor lighting. They include housewives, scientists, lawyers, pilots, doctors, engineers, retired persons, and so forth. Much of IDA's strongest support comes from professional lighting engineers, lighting suppliers, and lighting manufacturers.

"Porch Light," an Article by Justin Isherwood

I am of the porch light generation. For me, the glare of sodium and mercury vapor is discomforting, it makes me itch. I was raised on a farmstead that invited night with a more fundamental embrace. Strange as it sounds, once we trusted darkness.

I am sufficiently traveled to think it was nicer then. I realize this is a silly sentiment, though I remember exactly how it was. How when evening came, the neighboring farms gradually disappeared into the convening darkness. How we sat on the porch, quite fearless, and watched it happen. I know this sounds hopelessly old-fashioned.

From the porch we heard the sounds of the day change over to those of the night: crickets, catbirds, the owl's mysterious vowel drifting away and we on the porch were alone, only propelled toward another day by the ripple of moths against the light bulb.

It took a person with good eyes to distinguish the porch lights from the blanket of stars that overthrew that country. Night was a refreshment then, like a drink of water on an afternoon of baling hay. The porch light dispelled something in the darkness. The harsh reality of the farm disappeared. For some reason, and I do not know why, all of the effort, the relentless labor, was worth seeing from this angle on the evening porch. If there was sweat and endless task, and everything we did was priced cheap and unappreciated, it did not matter. Healed we were by those starlike glints of the neighborhood, the home constellations.

The world, of course, is different now. Night is no longer safe. Farms are lit up like small cities and it is a sure bet there are farmers out there working... working after dark because a light fixture says so. As if Creation isn't generous enough with a long summer day, here, the most overworked and universally abused penitent in the economy is still working because mercury vapor makes it possible.

Vapor lights might not be so hideous, so cruel and despoiling of agriculture's best product, were they equipped with a switch. They are not. Instead, a photocell on the approach of shade closes the circuit. Never mind that the sky is only the gloaming, the prettiest hue this side of lingerie. Mercury vapor glares its ugly, sucked-out light, embalmed and ghoulish. It drains the blood from the victim without biting the vein.

A green tractor under mercury becomes a purple tan, yellow is turned white, red is brown, people with freckles resemble Martians or some other extraterrestrials.

Sodium vapor lights are said to correct this, they are the bile-yellow ones. Maybe green tractors are once again green but at the price of ghastly yellow spread over every visible thing.

I do not mind so much that modern cities are afraid of darkness. Fear is, after all, an urban propensity. They must light the city the same as they illumine the prison yard, or else criminal behavior would seep from every manhole and crevice. The only thing saving downtowns from the demonic are the lights: those security lights, those walls, those towers, those fortresses of light. Illumination is what keeps people tame short of outfitting squad cars with machine guns.

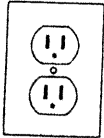
Why must farm country be the same? Why wreck the farmsteads with beady-eyed, monster-proofing lights?

I know, I'm hopelessly biased. I truly think the farm scene compares with the best the Rockies have to offer and it doesn't cost anything to get there. Besides, farmers aren't fraidycats and are fundamentally saner than "them."

I have a recipe for a healthier, prettier farm country. Actually, it's more a cure than a recipe. Get a big Crescent wrench from the shop bench, the 12-incher will do. Go to the mercury vapor light and throw the wrench at it. Do so as many times as it takes until a satisfactory result is gained. Instantly, farm country will be back where it belongs, at a pace that is our own measure and not someone else's. Farm people who are and must be at peace with every rotten thing on earth can make do. Whether storm, flood or drought, we work harder, die younger, and are likely as not to be chewed to death by our machines. We, of all people, should be comfortable with the dark.

Justin Isherwood watches the setting sun from his farmstead in Plover, Wisconsin.

Reprinted from Wisconsin Natural Resources, June 1993, pp. 20-21.



THIS IS COPY FROM ASHRAE/EIS 90.1 (NEWER VERSION) COMPLIANCE MANUAL. FROM THIS INFO YOU CAN SEE THE LIMITATIONS ON WHAT IS CURRENTLY COVERED BY THE STANDARD (AS WELL AS OUR CODE)

EXTERIOR LIGHTING POWER

Form
401.3.1

A building or facility complies with the exterior lighting power requirement if the total exterior connected lighting power (CLP) does not exceed the exterior lighting power allowance (ELPA). The 90.1 Code separates the maximum power requirements for exterior and interior lighting systems.

Scope and Application

Most exterior lighting is covered by the 90.1 Code, including all permanent lighting fixtures intended for lighting the building and its grounds.

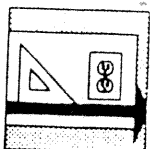
- *Building-Mounted Exterior Lighting.* All lighting mounted on the building, less specific exceptions as noted below, is governed. This means that all lanterns, soffit lights, floodlights, step lights, wall packs, and additional decorative lighting such as neon outlining, low-voltage light strips, and ornamental pendants and globes must be included in the ELPA calculation.
- *Grounds, Roads, Parking Lots, and Other Exterior Lighting.* All lighting on the building site, less specific exceptions as noted below, is governed. This generally includes pole-mounted lighting, landscape lighting, bollards, step lights, wall packs, and all other lighting for the roads, walks, parking lots, gardens, trees, and other portions of the site. Note that lighting not powered by the building electrical system, such as municipal street lights, is exempt.
- *Parking Areas.* Open-air parking lots, rooftop parking, and carports are included in the exterior lighting requirements. Covered, enclosed parking areas, such as garages are part of the interior lighting requirements and are *not* included with the exterior lighting.

Form
401.3.1
<u>Exceptions</u>

Exceptions

The 90.1 Code does not regulate lighting used for safety, security, or exterior manufacturing or similar commercial needs. Lighting over which the designer has little choice or control is also exempt. The following are specific exceptions to the exterior lighting power requirements.

- *Lighting for Outdoor Manufacturing, Commercial Greenhouses, and Processing Facilities.* This exemption applies to outdoor commercial, agricultural, and industrial work areas, such as refineries.
- *Sports Lighting.* Lighting for outdoor athletic facilities of all types is exempt.
- *Exterior Lighting for Public Monuments.* All exterior lighting intended primarily for the display of public monuments, statues or other items of historical interest or importance is exempt.
- *Code-Required Lighting and Lighting for Designated High-Risk Security Areas.* If a local code or ordinance requires lighting for safety or security, then it is exempt. It is not exempt if it is used for safety or security *and* for non-mandated lighting. An emergency light is exempt if it is normally off and switched through life-safety controls; however, if the light also serves as a general light source, it is not exempt. Typically exempt lighting also includes exit signs, security lights (such as for automatic teller machines), and other lights required by national, state or local security or safety standards. Lighting



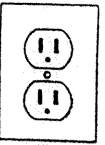


Table 401C Exterior Lighting Power Allowance

Area Description	Allowance
Exit (with or without canopy)	25 W/lin ft of door opening
Entrance (without canopy)	30 W/lin ft of door opening
Entrance (with canopy):	
High traffic (retail, hotel, airport, theater, etc.)	10 W/ft ² of canopy area
Light traffic (hospital, office, school, etc.)	4 W/ft ² of canopy area
Loading area	0.40 W/ft ²
Loading door	20 W/lin ft of door opening
Building exterior surfaces/façades	0.25 W/ft ² of surface area to be illuminated
Storage and non-manufacturing work areas	0.20 W/ft ²
Other activity areas for casual use, such as picnic grounds, gardens, parks and other landscaped areas	0.10 W/ft ²
Private driveways/walkways	0.10 W/ft ²
Public driveways/walkways	0.15 W/ft ²
Private parking lots	0.12 W/ft ²
Public parking lots	0.18 W/ft ²

for safety or security that is required by the most current version of the National Electrical Code typifies lighting that is considered by the 90.1 Code to be exempt.

- *Sign Lighting.* Both self-contained and exterior illumination for signs are exempt.

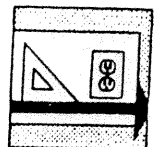
Lighting for Retail Storefronts and for Exterior Enclosed Display Windows. Lighting used to illuminate enclosed displays or other examples of retail merchandising lighted from outside the building is exempt. *Exits* are doors or groups of doors to a building not ordinarily used as an entrance and primarily used as an emergency, nighttime, or convenience exit.

Entrance (without canopy) refers to a door or group of doors to a building ordinarily used by tenants or the public to enter or exit the building for normal use or business, but having no ornamental or functional canopy or shelter.

Entrance (with canopy) means a door or group of doors to a building with an exterior awning, soffit, canopy, or ornamental or functional structure generally signifying a "main" or "proper" entrance to a building. A canopy does not have to be shelter; the major issue here is identification or marketing.

Public Driveways, Walkways, and Parking Lots are defined in Section 100 as those exterior transit areas that are intended for use by the general public. Typical examples would include parking, driveways, and roads for hotels, airports, shopping centers, and other areas used primarily by the occasional and/or unfamiliar user of the building. Other examples include roads leading to a private building, such as an office building, as well as the visitor parking, and all walks leading into the main entry.

Private Driveways, Walkways, and Parking Lots are defined as exterior transit areas that are associated with a commercial or residential building and intended for use solely by the employees or tenants and not by the general public. Typical situations include private driveways, walkways, and parking lots.



ANNIE

4-14-98

WOTB HAYWARD -

ERIC SCHUBERTING - ANTIPODAN

ENERGY - SPRING

APRIL 30TH - ON AIR - PUBLIC RADIO

8:10 DARK SKIES

OBSTACLES

HACK BOB

GREG FULTMAN -

SEMI PROFESSOR W.W. OBSERVATION

TEACHES PHYSICS -

LOAN -

1. - JIM TO CONVICT ENERGY
~~FOR~~ ASSOCIATION
- 2 ANNIE TO dig out ERIC
- 3 RADIO PROGRAM
8:10 A.M
APRIL 30TH } PUT ON
SCHEDULE
4. SEND ERIC FAX 715-634-3906
INCLUDE HISTORY
2 BILL

ASTRONOMERS

- GREG.

ENERGY POOR STATE II /
NO COAL, OIL, GAS
Some H₂O & AIR, SOLAR
STATE SHOULD DEVELOP DIRECTOR
ON STANDARDS 4-5 BILLION LEAVE
(3-7)

NASA SATELLITE PHOTO

- 30% OF ALL OUTDOOR LIGHTING
LOST - DIRECTED UPWARDS
- CONSERVATIVE ESTIMATES
\$1.5 billion IN WASTED ELECTRICITY
- MEANS ABOUT \$6,000,000 TON
OF COAL

PUBLIC HAZARDS CREATED BY
GLARING, HIGH-WATTAGE
FLOODLIGHTING ALONG ROADWAYS
& BUSINESS PARKING LOTS

EXCESS - NOT UNCOMMON TO SEE SOME
BUSINESSES USING 3-6 TIMES
THE AMOUNT OF LIGHT RECOGNIZED
BY THE LIGHTING INDUSTRY -
PASS THE COST ON TO THE
CONSUMERS

MY HOUSE - I USE A LIGHT SENSOR AT
MY PLACE - ONLY WHEN
I LEAVE OR MY CAR
COMES DRIVES IN.

\$ BILLIONS LEAVE THE STATE

MARY REHWALD →

FAX. 715-682-1691 X

STAT

LIGHT + CALME

Ashland

PATRANEGO through DARK SKY

FILE: FAX MARY THINGS

LIKE: - ENERGY SAVING INFO

- MY BILL - SUMMARY

- OTHER SWFT - SEE