Agenda Item: 6 (b)

Background Information: At the July 18 Planning Commission meeting, Planning Commission Member Wilson and Vice-Chair Birch requested information be included regarding the Night Sky Initiative. Staff has provided information obtained online regarding the International Dark-Sky Association.

Exposure to artificial light at night is unnatural.

In less than 100 years, humans have radically altered our nighttime environment, putting our health at risk. Due to the rapid growth of artificial light at night, most of us spend our nights bathed in light. But basking in all this light at night is not natural and it may be taking a serious toll on our health.

We are only just beginning to understand the negative consequences of this swift change in our environment. A growing body of scientific research suggests that artificial light at night can have lasting adverse effects on human health.

> "The power to artificially override the natural cycle of light and dark is a recent event and represents a man-made self-experiment."
> —The American Medical Association

WHY DARK SKIES?

The need to protect and restore the natural nighttime environment is more urgent than ever. Light pollution, defined as light where it is not wanted or needed, affects our health, the environment, wildlife, and our ability to find awe in the natural night. Research indicates that light pollution is increasing at a global average rate of two percent per year.

ABOUT IDA

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HELP US PROTECT THE NIGHT

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Light Pollution Can Put Your Health at Risk

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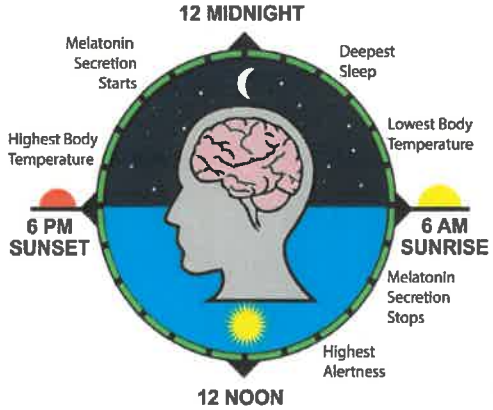
HUMANS NEED THE NATURAL DAY/NIGHT CYCLE

Our Biological Clocks Help Keep Us Healthy



WHAT IS CIRCADIAN RHYTHM?

Humans evolved with the rhythms of the natural light-dark cycle of bright days and dark nights. Before the advent of artificial lighting, we spent our evenings in relative darkness. Like most life on Earth, humans adhere to a circadian rhythm — our master clock, which is crucial for our overall health. It interacts with our body systems, changes our hormone levels and even modifies our genetic code. Natural light helps keep our clock in tune with Earth's 24-hour cycle.

WHAT IS CIRCADIAN DISRUPTION?

When our master clock is out of sync with the day-night cycle, it's called circadian disruption. Altering or interrupting our normal circadian rhythm can put us at risk for physiological and behavioral impacts. Shift work almost always causes circadian disruption because it puts the internal body clock at odds with the shift schedule.

EFFECTS OF CIRCADIAN DISRUPTION

Circadian disruption may increase our risk of obesity, diabetes, mood disorders, reproductive problems and cancers.

Numerous studies have linked working the night shift and exposure to light at night to increased risks for breast and prostate cancers and other health problems.

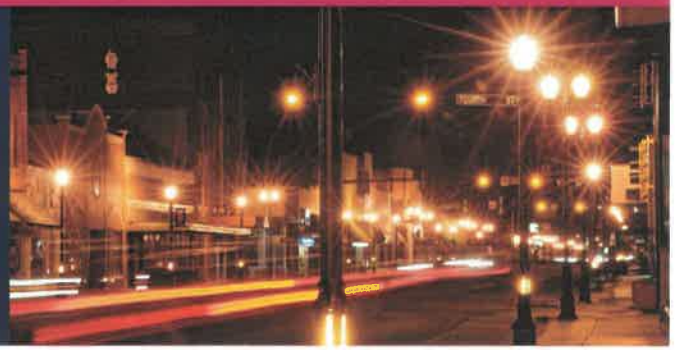
Circadian disruption can affect our natural sleep patterns, too. A good night's sleep helps reduce weight gain, stress, depression and the onset of diabetes.

WHAT IS MELATONIN?

We don't know why light at night appears to be so bad for us. But we do know that exposure to light at night – even if it's dim – can suppress the body's natural production of melatonin, a hormone that is important for our health including regulating our sleep-wake cycle, metabolism and immune system.

Glare Impairs Vision

Overly bright and poorly shielded outdoor lighting can create blinding glare. Aging eyes are especially at risk. The effects of glare are cumulative, meaning that every light source in view impacts our vision. Blue light, like that in many newer LED streetlights, is more likely than conventional light sources to impair our vision.



SAFE LIGHTING SOLUTIONS

- Use only fully shielded, IDA dark sky certified fixtures for all outdoor lighting, so lights shine down, not up.
- Use only the right amount of light needed. Too much light is wasteful and can create harsh shadows that impair vision.
- If you must use devices at night, install a color temperature app that automatically limits blue light at night based on your time zone.
- Keep your bedroom dark by using blackout curtains and cover or remove light sources such as clock radios and charging stations.
- If you need a nightlight, use one with dim red or amber light. Red light is least likely to be disruptive.
- Use indoor light bulbs that emit warm white light with a color temperature of 3000K or lower. All packaging for new CFL & LED light bulbs provide this information.
- Work with your neighbors and local government to keep light on the ground and the night skies natural.

Visit darksky.org for more information.

Bright outdoor lights are not as safe as they appear.

A U.S. National Institute of Justice study concluded: "We can have very little confidence that improved lighting prevents crime." In fact, poor or too much lighting can actually have the opposite effect.

Real security depends on the wise use of lighting. Visibility should always be the goal. Instead of more and brighter lights, we need smart lighting that directs light down where it is most useful. It is possible to protect the natural nighttime environment without compromising safety.

> "[W]hen risks are carefully considered, local authorities can safely reduce street lighting saving both costs and energy ... without necessarily impacting negatively upon road traffic collisions and crime."
>
> — 2015 study published in the *Journal of Epidemiology and Community Health*

WHY DARK SKIES?

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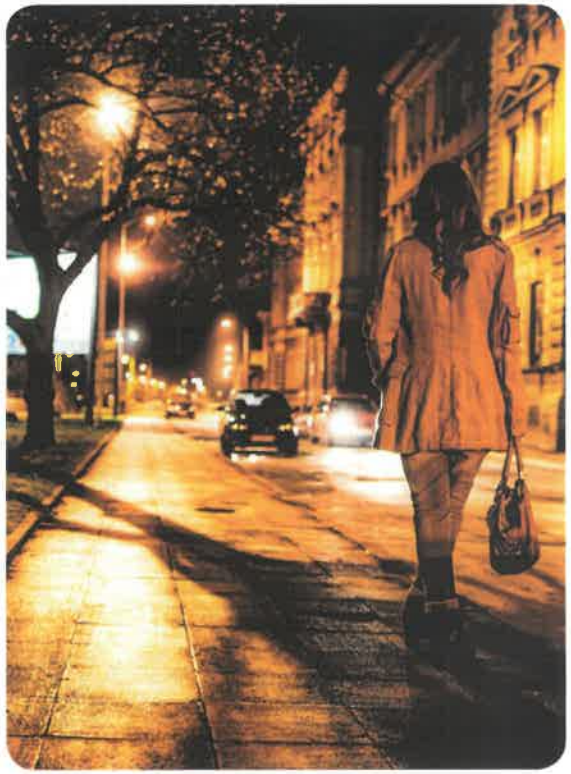
Outdoor Lighting, Crime, and Safety



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BRIGHTER DOES NOT MEAN SAFER

Lighting up the nighttime environment does not necessarily improve safety or security. This may seem contradictory, but there is no clear scientific evidence that increased outdoor lighting deters crime and increases safety.

AT HOME: POOR LIGHTING CREATES A FALSE SENSE OF SECURITY

Keeping yourself and your property safe from theft and vandalism is a major priority. However, badly designed outdoor lighting can actually make you less safe because bright and poorly aimed lights can hide danger. Bad lighting creates deep shadows where criminals can hide.

Some crimes like vandalism and graffiti actually thrive on night lighting. For example, bright dusk-to-dawn lights allow criminals to see the contents of parked cars.

AROUND TOWN: LIGHT FOR LIGHT'S SAKE DOES NOT EQUAL SAFETY

Towns, cities, and businesses often install lighting in parks, shopping areas, parking lots, and other public places to improve safety.

Improperly aimed and poorly shielded lights can actually attract criminals and allow them to see what they're doing. Property damage may be exacerbated by too many lights, particularly dawn-to-dusk lighting. A study by the city of Chicago actually found a correlation between increased crime and brightly lit alleyways.

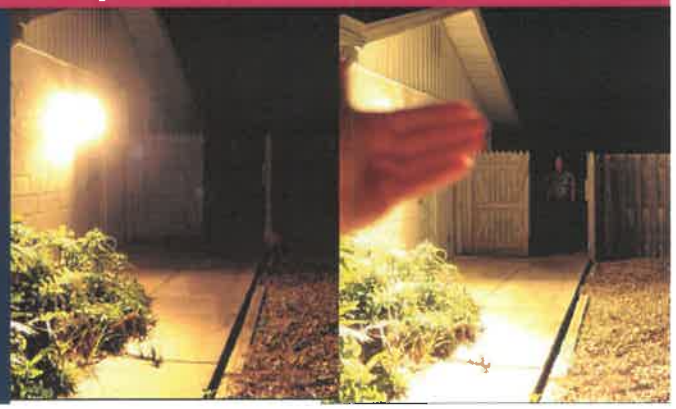
ON THE ROAD: BAD LIGHTING CREATES UNSAFE DRIVING CONDITIONS

Poorly designed lighting on roadways and highways contributes to tragic accidents. Motorists and pedestrians can be temporarily blinded by glare from unshielded streetlights and electronic signs. The problem is more acute for older individuals.

A 2015 study published in the *Journal of Epidemiology and Community Health* found that streetlights don't prevent accidents or crime, but do cost a lot of money.

Poor Lighting Reduces Safety and Security

Glare from bright, unshielded lights actually decreases safety. See how glare in the closest photo makes it hard to see the man at the gate? Glare creates deep shadows, making it more difficult to see. The bright light shines into your eyes, constricting your pupils. This diminishes your eyes' ability to adapt to low-light conditions. So, is that bright light really making this area safer?



SAFE LIGHTING SOLUTIONS

Effective lighting that helps people be safe – not just feel safe – is a win-win situation for everyone. You can create a safer environment while preserving the natural night. Here are some simple rules to follow:

- Use fully shielded, dark-sky friendly fixtures. That means lights shine down, not up, and don't create glare and contrasts.
- Only use lights when and where needed. Install timers and dimmer switches, and turn off lights when not in use. If you must have security lighting, use motion sensors.
- Use the right amount of light. Too much light is wasteful and impairs vision.
- Use long-wavelength lights with a red or yellow tint to minimize negative health effects.
- Good lighting design can mitigate glare. Cities and towns can restrict the use of bright signs and flashing lights near roadways.

Visit darksky.org for more information.

Light Pollution is destroying our night...

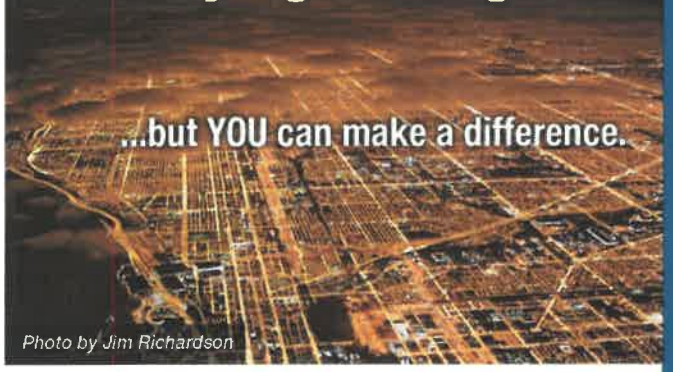


Photo by Jim Richardson

What is Light Pollution?

Most of us are familiar with air, water and land pollution, but did you know that light can also be a pollutant?

The inappropriate or excessive use of artificial light – known as light pollution – can have serious environmental consequences for humans, wildlife and our climate.

By joining IDA you help us protect our planet, save billions of dollars in wasted energy and connect future generations to starry skies.

Light Pollution is Reversible!

A stunning example of the effects of light pollution. Photos taken before and during the 2003 Northeast blackout, a massive power outage affecting 55 million people. *Photos by Todd Carlson.*

Take Action!

Light Pollution affects us all. 5 ways you can make a difference!

1. Install lighting only when and where it's needed.
2. Use energy saving features such as timers, dimmers and motion sensors on outdoor lights.
3. Make sure your lighting is shielded so light shines down, not up. Encourage good lighting at your workplace, too.
4. Educate your friends and neighbors about the importance of good lighting for our health, economy and environment.
5. **Join IDA and visit darksky.org for more information and free resources.**

About IDA

The International Dark Sky Association, a 501(c)(3) nonprofit organization based in Tucson, Ariz., is dedicated to preserving the natural nighttime environment by educating policymakers and the public about night sky conservation and promoting eco-friendly outdoor lighting.

Our Mission

To preserve and protect the nightime environment and our heritage of dark skies through environmentally responsible outdoor lighting.

Our Goals

- **Advocate** for the protection of the night sky
- **Educate** the public and policymakers about night sky conservation
- **Promote** environmentally responsible outdoor lighting
- **Empower** the public with tools and resources to help bring back the night

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Protecting night skies for present and future generations

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www.darksky.org

5 Ways Light Pollution Hurts our Planet

Artificial light not only prevents city dwellers from seeing the stars, it also harms the environment and human health.

Light Pollution Devastates Wildlife

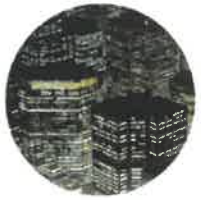
Plants and animals depend on Earth's daily light and dark cycle to govern life-sustaining behaviors. Research shows that artificial light at night has negative and even deadly effects on many species.

Light Pollution May Harm Your Health

Studies suggests that artificial light at night negatively affects human health by increasing our risks for obesity, sleep disorders, depression, diabetes, breast cancer and more.

Light Pollution Can Make You Less Safe

There is no clear scientific evidence that increased outdoor lighting deters crime. In fact, poor outdoor lighting can decrease personal safety by making victims and property more visible to criminals.



Light Pollution Wastes Energy and Money

As much as 50 percent of outdoor lighting is wasted, which increases greenhouse gas emissions, contributes to climate change, and renders us all more energy dependent.

Light Pollution Robs Us of Our Heritage

Our ancestors experienced a night sky that inspired science, religion, philosophy, art and literature. Now, millions of children across the globe will never know the wonder of the Milky Way.

Join Us in Protecting the Night!

Your dues and donations help us...

- **Protect Wildlife and Ecosystems**
  We work with conservation experts and park officials to minimize the ecological impact of artificial lighting in natural areas, protecting habitats and wildlife.
- **Promote Eco-Friendly Outdoor Lighting**
  Our Fixture Seal of Approval program certifies outdoor lighting fixtures that protect the night sky.
- **Recognize and Preserve Dark Sky Places**
  The International Dark Sky Places conservation program recognizes and promotes excellent stewardship of the night sky. We have certified dozens of Places worldwide.
- **Foster Education and Outreach**
  We educate communities and public officials about light pollution and provide specific solutions for minimizing its negative effects through our public outreach programs.
- **Assist Parks and Protected Areas**
  IDA helps parks replace their bad lighting by providing eco-friendly options depending on need, and in some cases for free.

We need YOUR help!

IDA is working to preserve the night sky for future generations.

Join IDA

Name: _____

Address: _____

_____

City: _____

State: _____ Zip: _____ Country: _____

Email: _____

Phone: _____

Pay by: ❑ Check (payable to IDA) ❑ Credit Card ❑ Cash

Card Number: _____

Expiration Date: _____ Security Code _____

Card Holder: _____

Signature: _____

Membership Level:

❑ $35 ❑ $250
❑ $50 ❑ $500
❑ $100 ❑ $1,000

❑ I would like to make an additional donation.

$ _____

Donate

❑ I would like to make a one-time donation.

$ _____

Your IDA membership is a tax-exempt donation.

Together we can save the night.

Thank you for your support!

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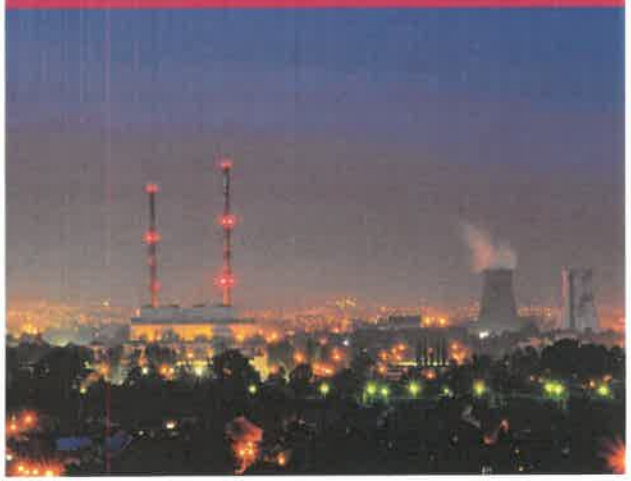
Energy use and its impact on our environment has become one of the top concerns facing humanity.



Poorly designed outdoor lighting wastes energy by not being shielded, emitting more light than necessary or shining when and where it's not needed. Wasting energy in this way has huge economic and environmental consequences.

Leaving lights on overnight – such as those in office buildings – wastes energy and contributes to the general skyglow of the city. Dark sky friendly lighting does not mean "no light." It means using the light that you need for a specific task in the most efficient manner possible.

> "We can create a more sustainable, cleaner and safer world by making wiser energy choices."
>
> — Robert Alan Silverstein, children's science book author

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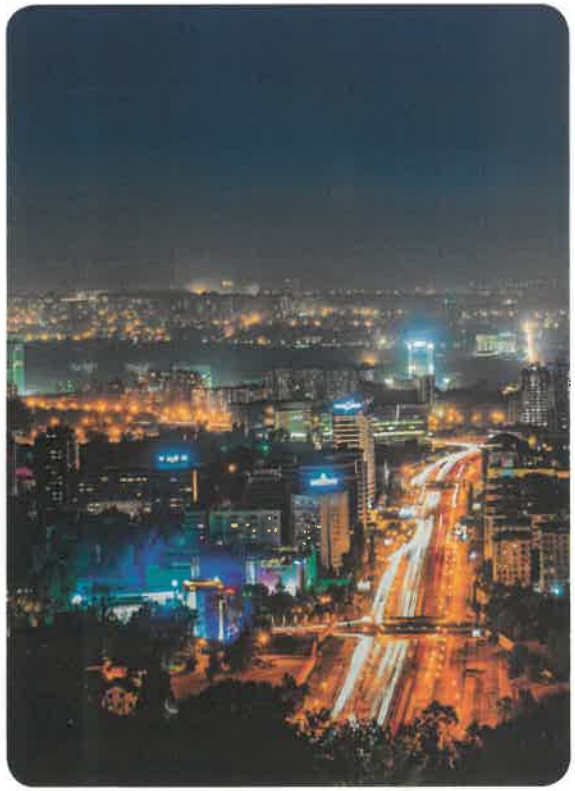

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LIGHT POLLUTION COSTS MONEY AND WASTES RESOURCES

HOW DOES ENERGY WASTE HARM THE ENVIRONMENT?

Excess lighting pumps millions of tons of carbon into our atmosphere every year, and also causes light pollution.

Light pollution:

- Increases greenhouse gas emissions
- Contributes to climate change
- Increases our energy dependence

WHAT ABOUT OUR CARBON FOOTPRINT?

In the U.S. alone, about 15 million tons of CO_2 are emitted each year to power residential outdoor lighting. That equals the emissions of about 3 million passenger cars and adds up to 40,000 tons per day. To offset all that carbon dioxide, we'd need to plant about 600 million trees annually!

WHAT DOES LIGHT POLLUTION COST?

About $3 billion dollars per year of energy is lost to bad lighting. This is about $10 a year for every man, woman, and child in the U.S.

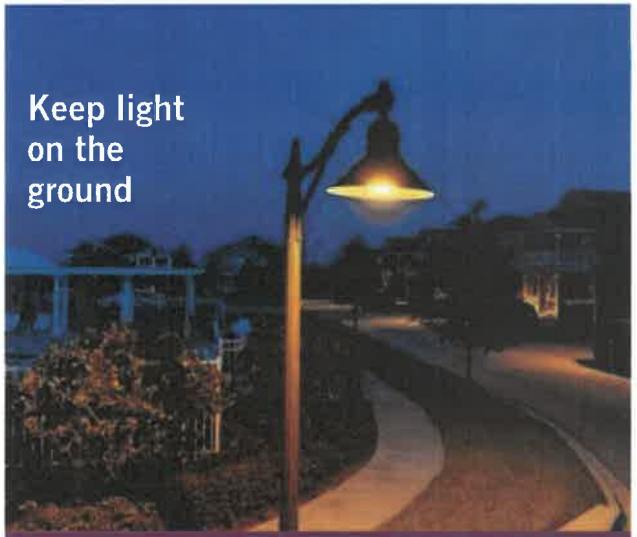
HOW MUCH ENERGY AM I WASTING?

The average house with poorly designed outdoor lighting wastes 0.5 kilowatt-hours (kWh) per night. A kilowatt-hour is a unit of energy equivalent to one kilowatt of power for an hour. It's enough energy to power a 50-inch plasma TV for one hour or run one load in your dishwasher!

It just takes small changes to save energy, money and our night skies. You can make a difference today.

Good vs. Bad Lighting

This photo (right) shows examples of good and poor lighting design. The unshielded light fixture on the left throws light into the sky and creates glare, impairing visibility. The shielded light fixture on the right directs light to the ground where it is needed and does not create lighting pollution. To learn about light fixtures that are environmentally friendly, energy efficient and certified with the IDA Fixture Seal of Approval, visit darksky.org.



ENERGY EFFICIENCY SOLUTIONS

Shielding outdoor lighting saves energy and money, reduces our carbon footprint and helps protect the natural nighttime environment. The solutions are easy. Work with your neighbors and local government to keep the light on the ground and the skies natural. It's a win-win for everyone. You save money while preserving a valuable natural resource.

Tips to help you conserve energy and use light efficiently:

- Install quality outdoor lighting to cut energy use by 60-70%, save money and cut carbon emissions.
- Fully shield all outdoor lighting — light should go down on the ground where it's needed, not up into the sky.
- Be aware that fully shielded fixtures can provide the same level of illumination as unshielded fixtures, but with lower cost and less energy waste.
- Turn off indoor lights in office buildings or homes when not in use to save money and energy.

Visit darksky.org for more information.