Light-Efficient Communities

Above: Light Pollution at Meadowlark Mall and Road – Edmonton, AB

ADSA

Alberta Dark Sky Association

Web Site: AlbertaDarkSky.ca

Introduction

Alberta, particularly the Edmonton region, is one of the most highly light-polluted areas in Canada, indeed in North America. ***Light Pollution*** is defined by The International Dark-Sky Association as ***"….any adverse effect of artificial light, including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste."*** Much of the light pollution is produced by inefficient, light and energy-wasting streetlights, yardlights and advertising lights.

The only type of streetlighting fixture which has IDA approval and is a 'flat lens' or 'full cut-off' fixture, **not** the 'sag lens' types currently being installed. Sag lens steetlights still waste much light and energy, while producing glare, thus reducing safety and increasing the possibility of breast and prostate cancers and health problems related to sleep deprivation. (The body produces the cancer-fighting drug melatonin at night. Light reduces the body's ability to create this chemical.) Sleep deprivation is the cause of many health, work-related and relationship problems.

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The American Medical Association, concerned about the effects of light pollution on health, safety and environmental pollution, have adopted policies against light pollution. (The Canadian Medical Association has been prompted to follow suit.) As well, wasted light results in increased use of fossil fuels in the power plants. This ultimately increases the amount of pollution of air, land and water, affecting all life.

To address health, safety and environmental concerns the Alberta Dark Sky Association developed and advocates the concept of 'Light-Efficient Communities (LEC's).

What is a Light-Efficient Community?

A Light-Efficient Community (LEC) is one that uses lighting intelligently and responsibly. It uses the most effective, efficient artificial lighting available to minimize energy waste, glare, light trespass and light pollution. A Light-Efficient Community employs sound planning, designs, measures, legislation, fixtures, technologies and good lighting practices to reduce its energy costs and carbon footprint while preserving the natural environment and ensuring health, safety, security and a high quality of life for all.

Advantages of a Light-Efficient Community

1. Lower energy use and associated costs
2. Smaller carbon footprint and reduced air, land and water pollution from power plants.
3. Decreased glare – reduced irritation while improving visibility and driver/pedestrian safety.
4. Reduced light trespass – keeping unwanted light from properties and homes to improve safety and health.
5. Improved health – decreasing the chances of breast and prostate cancer and sleep-deprivation-related health and relationship problems
6. Improved safety for drivers and pedestrians while reducing crime and vandalism through good lighting
7. Reduced negative effects on humans, flora and fauna
8. Reduced negative effects on the environment/night sky
9. Improved quality of life for all living organisms

Examples of Light-Efficient Communities

1. Tucson, Arizona – Tucson has long had a light abatement bylaw which has substantially reduced its light pollution and carbon footprint while improving the quality of life for its citizens
2. Calgary, Alberta – Calgary has already changed over 37,500 street lights to full cut-off for a savings of $1.7 Million per year
3. Municipal District of Foothills No. 31 – This Alberta municipal district has just brought in a bylaw which will improve its environment by adopting Light-Efficient Community approaches.

Basic Principles of Outdoor, Night-time Lighting

1. Only light what needs to be lit. Avoid "feel good" lighting that does nothing practical and wastes energy.
2. Only light where light is needed. Don't light up your neighbors' property or the night sky.
3. Only use as much light as is necessary. Brighter isn't necessarily better and can cause additional problems.
4. Use light only when it is needed. Use timers, motion detectors and photocells to have light when needed and to reduce your power bills.
5. Use only full cut-off (flat lens) fixtures. Eliminate sag-lenses and up-directed light. Shine all light downwards.
6. Shut off business lights, flood lights and advertising after hours. This prevents light pollution while reducing business costs.

Five Steps to a Light-Efficient Community

Light pollution is a health, safety, environmental and quality-of-life issue that must be addressed by authorities as well. Many municipal governments or organizatins do not know where to start in reducing light pollution although many others have already done so.

The Alberta Dark Sky Association developed the following five simple steps which will make a significant impact on light pollution and help save energy and money while reducing light and environmental pollution and associated health problems. (In the following list "lighting" means outdoor, night-time lighting.)

1. Adopt a lighting policy stating that no ***new lighting*** (especially street lighting) will be installed by the jurisdiction unless it uses complete cut-off (flat lens) fixtures (which are now readily available at equivalent costs). Sensors and timers will also be used when appropriate to save energy and money.

2. Adopt a lighting policy stating that any ***lighting to be replaced*** by the jurisdiction will be replaced with complete cut-off fixtures and timers or sensors where appropriate.

3. Adopt a lighting policy stating that ***a program will be established*** to replace all community lighting with complete cut-off fixtures within a specified period of time (i.e.; five to ten years)

4. Initiate ***a public education program*** as to why the jurisdiction is undertaking the Light Efficient Community program and what this means for government buildings, businesses and private citizens in its jurisdiction in terms of actions, associated costs and savings.

5. ***Adopt a by-law*** to ensure that all municipal, public, commercial and private outdoor lights will adhere to Light-Efficient Community standards. This will mean that no new outdoor lighting will be allowed unless it is of the complete cut-off, flat-lens variety. Upward lighting fixtures will be eliminated. Old fixtures will be replaced, when necessary, with complete cut-off fixtures. Specific timelines must be stated.

Choosing this approach will give time to make appropriate changes to outdoor lighting fixtures and will reduce light pollution over time. As well, the bylaw must include a section dealing with light trespass, giving citizens the option of complaining about light trespass and ensuring that bylaw officers can order the owner to change his fixtures or they will take appropriate action.

The first three steps are the easiest to undertake as they only concern of the jurisdiction. Items 4 and 5 may be undertaken with time and should be carefully planned and implemented. Help is available. Many other jurisdictions throughout North America have already undertaken these initiatives and expertise and examples are readily available. A variety of organizations offer assistance and samples of successful legislation from other cities and municipalities. Governments can no longer afford to ignore the light waste and its effects.

Only complete cut-off (flat lens) fixtures meet the criteria for Light-Efficient Communities.

Urban Centres Waste Light and Electrical Energy

In any city, one does not have to look far to see the effects of artificial light on the night environment. Streetlights, yardlights, and business lights all contribute to the enormous amount of energy wasted on lighting. Instead of opting for responsible lighting, most cities and citizens have chosen inexpensive, wasteful fixtures which spew light out in all directions while wasting huge amounts of energy.

The solution is thoughtful, prudent purchases of full cut-off or flat lens fixtures of the right wattage for the job, directed where they need to be and only used when necessary.

Effects on health, safety and the environment are great and need to be curtailed. With the deep concern for global warming, it is necessary to take action now.

Barely visible amid the glare produced by 'cobra head' and 'sag lenses,' a flat lens streetlight (arrow) directs its light downward onto the street and sidewalk where it's needed.

Notice that there is virtually no glare from the flat lens fixture, making the street safer for drivers and pedestrians alike.

The flat lens also produces less light trespass and wastes no energy into the night sky.

A small shopping mall at night.

Note that the advertising lights of a closed business have been left on.

Also, note that exterior wall lights use decorative lights which have been left on, directing light upward, downward and outward.

As well, the whole area is brightly lit by inefficient, semi-cut-off mercury light fixtures which bathe the mall in light that extends upward into the sky. Much energy is being unnecessarily wasted in this shopping mall.

A quiet suburban neighborhood.

The light trespass from a 'sag lens' streetlight fixture not only brightly lights the area, causing much glare, but produces unwanted 'light trespass' over adjacent yards.

In the background, closer to the horizon, the brightness of city lights light up the night sky, masking the stars above. Just visible over the house tops are 'farmyard' light fixtures which spew light in every direction, wasting over half of their energy into the darkness.

Streetlights:
The Good, The Bad, The Ugly and the Totally Ridiculous!

The 'LED Streetlight – IDA Approved

Now the preference of environmentally-friendly communities and LEC's, the IDA-approved LED streetlight saves 50% or more of the energy of regular streetlights and directs the light only where wanted - streets and sidewalks. This dramatically reduces municipal lighting costs while meeting environmental and health concerns.

LED Roadway Lighting Photo

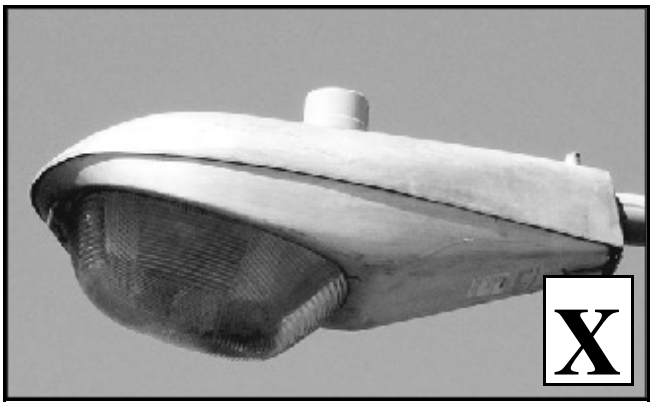
The 'Sag Lens' Streetlight

This fixture wastes **2-5%** of the light it creates into the night sky. Unfriendly to health, safety and the environment it produces much glare and light trespass.

Wasting less than the cobra head, ***it is still not an acceptable alternative.***

The 'Cobra Head' Streetlight

This common fixture wastes approximately **33%** of the energy it uses into the night sky. Unfriendly to health, safety and the environment, it produces much waste, glare and light trespass. It is found in most communities throughout North America and is gradually being replaced by the two fixtures above.



The 'Farmyard' Streetlight

Worst fixture of all, it wastes approximately **50%** of the energy it uses into the night sky! Unfriendly to health, safety and the environment it produces much waste, glare and light trespass. It is found in most communities throughout North America, usually as back alley lights and in farmyards.