

Testimony of Robert A. Burgess in support of LD 1845 – As Amended

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Senator Brenner, Representative Gramlich and Members of the Joint Standing Committee on Environment and Natural Resources

My name is Robert Burgess and I am President of Southern Maine Astronomers. We are located in Brunswick but our members reside in all the communities of greater Portland, including out to the Lakes Region and into midcoast Maine. We are a group of about 90 members and are the largest amateur astronomical society in the State. SMA was established in 2004. We offer monthly meetings on topics in astronomy as well as an active outreach program to individuals, schools and civic groups through our monthly star parties. Over the years we have partnered with environmental organizations, land trusts, LLBean, and others to provide these opportunities to the public and have engaged more than 20,000 individuals through our all-volunteer efforts.

Preserving dark Maine skies is part of our club's Mission Statement. We have been an advocate for preserving dark skies in Maine since 2008 when we had six Maine schools participate in the Globe at Night project, a citizen science effort to measure light pollution from ground-based observations. We have been active in myriad other ways since then including evaluating local zoning ordinances on lighting, advocating for the eco-tourism benefits of dark skies, making presentations to environmental organizations on light pollution, participating in local communities streetlighting committees, and promoting steps individuals can do at home to reduce light pollution.

The problem of light pollution is growing more rapidly than was recently understood. It is now estimated that light pollution is increasing at close to 10% per year through economic development and electrification of parts of the planet to growing use, and overuse, of LEDs. It has been estimated by The New World Atlas of Artificial Night Sky Brightness that 99% of American and European populations live under light-polluted skies and that more than 80% of Americans cannot see the Milky Way. Maine still has the largest area east of the Mississippi of extremely dark skies for the use and enjoyment of our citizens and as a draw for eco-tourists. We need to, and can, preserve this vanishing resource.

You will no doubt hear from other knowledgeable presenters today of all the deleterious effects of light pollution including on human health, wildlife habits, on birds and pollinators, astronomical research and on the shared cultural heritage of our night sky, so I will not repeat them here.

Our biggest concerns are these:

- 1) the uncontrolled use of LEDs that contain too much blue light in their spectrum;
- 2) the use of improperly shielded lights; and
- 3) uncontrolled upgrades or retrofits of existing lighting systems.

Our proposed amendments to LD 1845 address all three.

The biggest contributors to light pollution are commercial lighting and streetlighting. As I'm sure you are aware, many Maine towns are in the process of converting their streetlights to LEDs to reduce their consumption of electricity and lower the costs of municipal lighting. Those are wonderful motivations. That same economic incentive is there for existing businesses to change their outside lighting to LEDs. The problem is that because of the durability and reliability of LEDs, the decisions being made today will be in place for the next 20 years – the estimated lifetime of an LED. If we install the wrong kind of LED lighting today we will have to live with it for a full generation.

So what is "wrong" exactly with LEDs? Simply, it is the amount of blue in the spectrum of the light being emitted. LEDs, like other light "bulbs," come in a variety of Correlated Color Temperatures, ranging from 2200 Kelvin to more than 5000K. The higher the correlated color temperature the greater the amount of blue light in the spectrum. A 2200K or 2700K bulb would emit a soft white light, akin to living room lighting, whereas a 5000K lamp would be more like full-on daylight. Because of its higher frequency, blue light scatters, and with scattering, particularly in a nighttime setting, it creates glare and sky glow. (We've all squinted at on-coming blue headlights, right?) Both lights deliver virtually the same amount of illumination on the ground. Let me repeat that – a fixture with a lower Kelvin rating delivers virtually the same amount of light as one with a higher Kelvin rating, so it is not "dimmer," nor does it affect public safety. Color temperature is not wattage. It's all about the spectral content of that light. Lower Kelvin ratings mean less blue, less scattering, and less impact on the immediate environment, which is why we recommend setting the maximum Correlated Color Temperature at 3000K or less.

I have served on the Brunswick Planning Board for the last five years. While we do not yet have a 3000K limit in our ordinance we can only suggest to an applicant coming before us to voluntarily limit their outside lighting to 3000K or less. Every applicant has willingly agreed to do so, in many instances not realizing the impact on light pollution that fixtures with higher CCT values have. This has been a positive for new developments in our town.

However, since there is no formal standard that deals with upgrades or retrofits of existing outdoor lighting bad things can happen. The out-of-state owners of a large local shopping center in Brunswick upgraded their entire parking lot area to new LEDs. They installed lamps of 5600K, rich in blue and subject to scattering and glare. No permit was required because they were simply upgrading an existing lighting system. There is a new 181-unit apartment development going in right next door. Those residents will now be subject to this intense daylight-level lighting for probably the next 20 years, with all its effects on sleep patterns and human health, let alone the loss of seeing starry skies. We need to address not only new installations, but also upgrades to existing outdoor lighting. LD 1845, as originally drafted, and in our redraft, would do that.

Finally, we are also concerned with shielding of lights, and making sure that whatever fixture the bulb, or LED, is housed in is full cut-off, meaning no light will extend above horizontal. Instead, light will be directed down to the ground where it's needed, and not up into the sky, or into the surrounding environment (including onto a neighboring property), where it's not needed, or wanted. LD 1845 does that.

We know there are competing versions of rewrites to the original LD 1845. While we support the good intentions of the competing amendments, we recommend that we do something specific today – now – because developments is happening all around us, and the rapidly increasing expense in electricity is

accelerating the pace of upgrades and conversions. If we do not adopt the changes our suggested revision to 1845 proposes now and instead wait a few years we fear that the firetrucks will arrive after the house has burned down.

Thank you for your consideration today.

Proposed Amendment to LD 1845 by Southern Maine Astronomers

An Act to Preserve Maine's Dark Skies

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 5 MRSA §1769, sub-§2, ¶B, as enacted by PL 1991, c. 481, §1, is amended to read:

B. The luminaire's maximum illuminance does not exceed the minimum illuminance recommended for that purpose by the Illuminating Engineering Society of America or the federal Department of Transportation; and

Sec. 2. 5 MRSA §1769, sub-§2, ¶B-1 is enacted to read:

B-1. In the case of a permanent outdoor luminaire installed to illuminate a building owned or leased by the State or the grounds of such a building, the luminaire's illuminance is consistent with relevant lighting zone illuminance recommendations of the Illuminating Engineering Society; and

Sec. 3. 38 MRSA c. 35 is enacted to read:

CHAPTER 35

LIGHT POLLUTION

§3131. Outdoor lighting

This section governs outdoor lighting fixtures. Nothing in this section limits the application of Title 5, section 1769 or Title 23, section 708 governing the use of state funds to install or replace outdoor lighting fixtures.

1. Definitions. As used in this section, unless the context otherwise indicates, the following terms have the following meanings.

A. "CCT" (Correlated Color Temperature): the equivalent color of a heated black body radiator as defined by the Illuminating Engineering Society in section 4.6.4.2 of ANSI/IES RP-16, as amended.

B. "Fixture": An assembly of a housing, optics and light source or just a light source.

C. "Full cut-off" fixture: an outdoor lighting fixture, that emits no light above a horizontal plane running through a point immediately below the emitting light.

D. "Glare": intense and blinding light within the field of vision that is greater than the brightness to which the eyes are adapted and that reduces visibility.

E. "Kelvin", or the symbol K: a unit of measurement of temperature and is equivalent to one degree Celsius referenced to absolute zero (-273° C).

F. "LED" (Light Emitting Diode) lighting: a solid state light source that emits light from a semi-conductor, light emitting diode junction (die) when voltage and current are applied.

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G. "Lumen": a unit of measurement of the total quantity of visible light emitted by a lighting source. Lumens are measured by laboratory instruments integrating the total luminous flux output from a lamp or fixture. Lumen output is listed by a luminaire or lamp manufacturer in specification sheets or packaging.

H. "Outdoor lighting fixture": an outdoor artificial lighting device, whether temporary, portable or permanently installed, including but not limited to, a streetlight, searchlight, spotlight, floodlight or other device for lighting a landscape, advertisement, structure, parking lot, street or roadway.

I. "Place" means, with respect to a temporary or portable outdoor lighting fixture, to place and use outside.

J. "Replace" means, to replace an outdoor lighting fixture with a new outdoor lighting fixture.

2. Prohibition. Beginning January 1, 2024, except as provided in subsection 3, a person may not:

A. Place or install an outdoor lighting fixture unless the fixture is full cut-off or replace an outdoor lighting fixture unless the replacement is full cut-off;

B. Place, install or replace an outdoor lighting fixture that utilizes light emitting diodes unless the correlated color temperature of the fixture is 3000K or less and the fixture utilizes an optic design that spreads the light over a larger area through use of reflectors, diffusers or wave guides so that the dies within the fixture are shielded from direct view to reduce glare.

3. Exemptions. The following are exempt from the requirements of subsection 2:

A. Fixtures with less than 1800 lumen light emittance;

B. An outdoor lighting fixture installed for residential use;

C. An outdoor lighting fixture used to illuminate signs on the Maine Turnpike or an interstate highway as defined in Title 23, section 1903, subsection 3;

D. Outdoor lighting fixtures used at an airport or otherwise dictated by the FAA for aircraft safety, such as tower lighting;

E. An outdoor lighting fixture used at a farm for the safety of agricultural labor as defined in Title 26, section 1043, subsection 1;

F. An outdoor lighting fixture used intermittently for nighttime sports lighting;

G. Holiday and other temporary lighting;

H. An outdoor lighting fixture used to illuminate places of worship; and

I. An outdoor lighting fixture used to illuminate flagpoles at any Maine Veterans' Cemetery or other flagpoles of up to fifty feet in height displaying the American flag.

4. Ratemaking; public utilities. A public utility regulated by the Public Utilities Commission under Title 35-A that prudently incurs costs to comply with the requirements of subsection 2 or an ordinance described in subsection 5 is entitled to recover those costs in rates.

5. Application; enforcement. This subsection governs the application and enforcement of this section.

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A. The provisions of subsection 2 do not apply in a municipality that has adopted an ordinance that includes the requirements of subsection 2 or requirements stricter than those in subsection 2. The ordinance must include the exemptions specified in subsection 3 and no other exemptions. A municipality that has adopted such an ordinance shall notify the department and provide to the department an electronic link to the ordinance. The department shall post on its publicly accessible website a link to each such ordinance. This paragraph places express limitations on municipal home rule authority.

B. The department shall enforce the requirements of this section in any area of the State not governed by an ordinance described in paragraph A.

6. Violations. Whenever it appears, after investigation, that there is or has been a violation of subsection 2, the commissioner may, after holding an enforcement hearing in accordance with section 347-A, subsection 2:

A. For a first violation, issue to the violator an order to take such action as is necessary for the violator to come into compliance, including but not limited to ceasing use of an outdoor lighting fixture in violation of subsection 2 or replacing an outdoor lighting fixture with one that complies with subsection 2; and

B. If the commissioner finds that an order issued under paragraph A has not been complied with after 30 days, or finds that the violator has committed another violation of this section, assess the violator an administrative penalty not to exceed \$25 for each outdoor lighting fixture that is the subject of the violation. The commissioner shall reduce the penalty, but not below \$0, by any cost the commissioner finds the violator incurs to replace an outdoor lighting fixture with one that complies with this section.

SUMMARY

This bill regulates outdoor lighting fixtures for the purpose of reducing glare and sky glow and preserving Maine's dark skies. Reducing light pollution of any kind is beneficial to human health, animal habitats and the prudent use of our electrical resources. By reducing light pollution Maine's quality of place in the nighttime realm is preserved for Maine residents and makes the state more attractive as an eco-tourism destination.

Beginning January 1, 2024, the bill imposes, with some exceptions, certain requirements related to the installation and use of non-residential outdoor lighting fixtures. It prohibits a person from placing or installing an outdoor lighting fixture unless the fixture is of a full cut-off design to direct the light downward. Importantly, the bill addresses the growing use of light emitting diodes, or LEDs, that are increasingly being used in municipal streetlight conversions and in commercial establishments and parking lot lighting. The bill prohibits the use of such fixtures with a correlated color temperature above 3000 Kelvin and requires that the fixtures be designed in a way to minimize glare. These provisions apply in the absence of a municipal ordinance that provides the same or more restrictive requirements. Where there is no such ordinance, the Department of Environmental Protection has authority to enforce the requirements. The bill also requires outdoor luminaires for buildings owned or leased by the State to be consistent with certain standards established by the Illuminating Engineering Society.