

On the IDA MLO Version 2004.1

(as obtained from the International Dark Sky Association by e-mail, via its page ...)

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Introduction

The draft of the Model Outdoor Lighting Ordinance issued for public review in 2004 is a surprising document. Instead of being based on the experience from the pioneer areas where the most efficient restrictions on future (and sometimes even on existing) lighting are a part of legislation, it seems to be based on the current lighting practice. It seems to be based on it in such an extent, that it demands almost no alterations of the current lighting practice!

However, if the specific pollution of the night environment (i.e., pollution by man-made light; any change of natural night environment by such light *is pollution* by definition) should be diminished to some 50 years old, perhaps tolerable values, profound changes of the current lighting practice have to be implemented. In the pioneer areas, the most important of them are employed, and, as anecdotal reports say, they work. As the first step in the restoration of healthy night environment, they apparently suffice.

The rules needed for night environment restoration are as follows, the most important being mentioned at the beginning:

1. allowing no light going horizontally and upwards for vast majority of light emissions,
2. allowing no stronger illumination than demanded by safety standards,
3. allowing no appreciable shortwave component for lighting where colour distinction is not the prime concern,
4. limiting the rise of total emissions (of municipality) and changing it into a secular decline ultimately.

The reviewed draft offers none of these rules and therefore is misleading the readers completely. It discontinues the long-year IDA's educational efforts giving an entirely wrong signal to the world (we meant that... but the lighting industry knows better, so let's believe them).

The whole draft is so bad, that it's impossible to improve it in its current structure to a level in which it could be useful. Obeying my further recommendations on its parts could just make it no so much harmful as it is now.

Ad I. Preamble:

Security should be not mentioned among the purposes. Feeling of security is provided by artificial lighting, but real security (against criminal acts) is not. In spite of a large interest of lighting industry to demonstrate such an outcome, it has been never done so outside studies paid for by lighting industry; even these have been proven to be entirely bad science. The MLO should not perpetuate the myth that lighting helps security. This myth is the most damaging one, being behind many, if not most instances where light amounts have been increased. See <http://amper.ped.muni.cz/light/crime> for more information; from the second part of Dr. Clark's paper you may learn that the correspondence of lighting and crime seems to be positive, if any (i.e., more manmade light at night results via various mechanisms in more crime, over years and decades).

Ad II. Regulations:

B. Applicability

*Municipal street lighting is the primary source of pollution of the night environment and should be covered by legislation as the first one. There are no sufficient other codes and policies which would be sufficient to ensure a steady decline of pollution made by municipal outdoor lighting. **This section should be discarded.***

C. Use of Lighting Zones

The concept of Lighting zones has not been formulated by environmental protection agencies or experts, but by the representatives of current lighting practice. It helps by no means to the conservation or restoration of natural night environment. On the contrary, I suspect it has been invented as a means to resist the emerging night-conservation efforts.

It's completely absurd to have more liberal rules for lighting in the most polluted environments. In analogy to other types of pollution, the measures have to be most draconic around those areas, where the imissions are the largest, or in those from where most emissions come from.

Fortunately, people living in the most lighted areas have not suffered eye damage due to more lighting, and don't need more light for the same visual tasks then people living in less polluted areas.

If any zoning should exist, then it should resemble those in the laws of the three Italian provinces, Lombardy, Marche and Emilia-Romagna. There are sites which are extremely dependend on restoration of natural night conditions: sites from where people observe the sky and where the wildlife is protected. No man-made light should be visible from there.

Around such areas, often quite far from them, the rules for artificial lighting should be very restrictive, as are the rules for human activities in the protected wildlife areas (the difference in the case of lighting is in the fact, that it has long-ranging impacts and should be regulated up to 200 km from the protected sites).

Consequently, **if any zones with differing demands on regulation should exist, their number should be 3 at most: the sensitive sites themselves (all wildlife protection areas and all astronomical observing sites serving the public), areas around them (reaching kilometres to tens of kilometres from them; no strong direct light should be allowed to go the the core zones and the light amounts should be kept below the usual ones) and the remaining areas.**

I don't agree with the present Table 1 as a whole, as its present contents harms the purpose of the ordinance. For those who insist on adhering to it, I have just two recommendations. *All wildlife preserves* are especially sensitive to the changed night environment (or would be, if not damaged by existing lighting), so they *belong to the most protected zone (LZ 0)*. And, as increased amounts of light do not help against crime (and may promote it instead), **words "urban districts with especially high security requirements" should be discarded** from definition of LZ 4.

C. Exempt lighting

Signs should be not exempted. They are often very polluting, and it's easy to regulate their lighting. Regulation helps their readability and helps road safety (by avoiding glare).

Demanding (not just recommending) no uplight is a matter of course, easy to obey. Just those faint sources, which are exempt from regulation anyway, should be used for their uplighting, if needed. It's a necessary demand to prevent glare and skyglow increase.

Limiting light amounts can be done in two ways. The legislation valid in Lombardy treats signs over 6 m² as ordinary surfaces (with an upper limit for luminance of 1 cd/m²), the smaller ones are left to common sense. My proposal puts some limits, far more liberal than the above one, to all signs (http://www.astro.cz/darksky/eu_law).

F. Luminaire lamp wattage etc.

The Table 2 is the key wrong part of the draft. It's overly complicated, relying on non-available data of luminous properties of the luminaires. And it fails to limit the almost horizontal light (which is the most harmful in all respects) anywhere close enough to the needed values.

All efficient legislation limits the **use of lamps in non-fully-shielded luminaires** to the lamp output below three thousand lumens, mostly at or **below two thousand lumens**.

However, **the watt limits in Table 2 allow, outside LZ 0, values over three thousand lumens (and up to over thirty thousand lumens for LZ 4)!** I can't believe it's a coincidence. For me, it's a proof of total incompetence of the MLO team, if not of the bad will of some of its members.

Keeping at least the common limit of maximum 2000 lm output for lamps outside fully shielded luminaires is an absolute necessity. The rest of the table is secondary and may be discarded as it brings hardly any advantage. If the queer metrics for lighting, watts, should be maintained, then they have to be pairs of values. The one for incandescent (and other solid-state light sources) can be at the present ones, with exception of LZ 4 (**100 W is a maximum for all purposes using non-FS luminaires**). Then a new **value for discharge sources is to be put there: four times lower than the first one.**

Then the lower actual limits than 2000 lm for LZ 1 and LZ 2 could help the preservation and restoration of night environment.

G. Height limits

The section is obsolete in my view. Even with repaired Table 2 it would bring hardly anything (as far improvement of night environment is concerned, just maybe a bit less conspicuous poles in daylight), it's unneeded bureaucracy.

Low pole heights may contribute to rising the utilance – the proportion of the light hitting the very target (e.g., the road surface). The real solution to the problem is however not the pole height, but the appropriate luminaire optics (aiming the light just in the needed direction and blocking it from going elsewhere, using mirrors and baffles).

To reduce light trespass, strict enough limits for non-FS luminaires contained in the changed preceding section are the key. If a complying luminaire is too close to another property, then the owner or user of that property should have a right to get no direct light from such luminaire. If there is such light which he/she objects to, the owner of the luminaire should be obliged to install an additional shield to avoid any direct light going onto that neighboring property.

The pole height or distance rule can help only to avoid the *usual* luminous intensity maxima from fully shielded luminaires falling onto a neighbouring property, it's no guaranty there would not be far too much direct light.

If the light-trespass purpose of the section should be preserved, then instead of discarding it altogether, it may be renamed to **“G. Light Trespass”** and written something like:

“If any direct light goes onto a neighboring property, than, upon a demand from the user/owner of that property made within one year after the luminaire's installation, the offending light is to be blocked completely, e.g., by an additional shield close to the luminaire. Such shielding is to be working within one month.”

In fact, the same possibility to demand additional shielding for existing lights would be the softest form of “sunsetting” – improving the old lights not because of some general anti-pollution law, but because somebody really needs it.

Direct light from luminaires is namely the largest obstacle preventing people from enjoying the starry heavens (apart from causing many other problems, more earthly and often more serious ones). I should remember that common **bright stars** (of the “first magnitude”) **are no brighter than a candle in a 1 km distance!** Even a full-cutoff light with a 2000lm bulb can shine (= is allowed, by definition) as much as that one candle horizontally.

H. Total site power limits

The **power limits presented in this section are absurdly large** and could help reduce the rise of emissions just in extraordinary cases. On the contrary, publishing such large limits could move some municipalities and the owners of premises to increase the amounts of light, to be not so far below these numbers as they are now.

(Before I start with Table 4, just a remark on misspellings in 4. a): the section letters are to be D and E – were these errors a check if the reviewer read the text thoroughly?)

To gain a feeling about the magnitude of the power density used in real circumstances, let me give an example from my own city, Brno, and a neighbouring capital of Austria, Vienna.

Brno uses 4 MW for its outdoor lighting (it has just below 0.4 million inhabitants). With its area of 270 km², the power density (INCLUDING ballast and transmission losses) is 0.017 W/m², i.e., some 0.0016 W/ft².

Vienna uses 14 MW for outdoor lighting (having 1.5 million inhabitants). With its area of 450 km², the power density amounts to 0.003 W/ft². It’s twice more than in Brno from two reasons: not so many forest areas belong to the city area, and Vienna uses old white linear fluorescent lighting a lot, whereas in Brno almost all lighting is by more efficient high pressure sodium lamps.

Taking the Vienna numbers as more representative, and assuming whole half of Vienna’s area having no near luminaires on them at all (I don’t know the true proportion), I can’t see any reason why power density for an urbanised area (esp. when using most efficient technologies) should be over 0.005 W/ft². Assuming modest 40 lm/W for the emissions from luminaires, this would translate to two lux of average illuminance, ten times over the full moonlight. Many streets can be illuminated at ten lux (that’s a plenty of light), some even at thirty lux, when another areas are not directly lighted.

Remembering the papers using the DMSP imaging photometry, I guess that power density for outdoor lighting is seldom larger than 0.005 W/ft².

Now, another example. Sidewalks and bikeways have a recommended intensity of illumination of two lux in the current Czech standard. Even the number for LZ 0 in Table 4 (0.02 W/ft^2) would commonly lead to as much as eight lux; for LZ 2 (typical for residential areas) thirty lux, for LZ 4 to 80 lx. For what sake could anybody need so much light outdoors?

Last example: Big Ben tower in London is, no doubt, a famous building. In the evening, it is illuminated, and its luminance is about one candela per square metre. The probable intensity of illumination is about ten lux. With a good technology, 0.04 W/ft^2 should be sufficient for that. Why does Table 4 allow 0.18 W/ft^2 to 0.50 W/ft^2 ?

IDA should not offer lots of bureaucracy to cities. It should help them to restore the night environment. Any model ordinance should limit amounts of light, and this should be done in such a way that the limits can be easily verified in the field, by anybody, who is interested in them. And it should be limits, which keep the light amounts at modest levels.

The only way to accomplish it is renaming the section to something like “**H. Light Amounts Limits**” and say simply, following the law valid in Lombardy, that **the illumination should not be stronger than safety standards demand, if they exist, and if no safety standard applies, that the luminance should not be over of 1 cd/m^2 (or, for those who prefer measuring/computing illuminances, not over ten lux, i.e., over one footcandle).**

Conclusion

The draft version 2004.1 of the Model Lighting Ordinance by the International Dark Sky Association contains major flaws, which cannot be resolved simply by some changes of its current text. It fails to offer any help in protection of the night environment against man-made light. Instead, it presents a tremendous menace to all true activities at this field.

I urge the IDA (also as its member and a head of the Czech section) to discontinue the current work on the draft with the current team. If any activity should follow it, I ask for a completely rewritten version of MLO to be submitted to a new public review.

Jan Hollan, Dec 31, 2004