

RECOMMENDATIONS INSTEAD OF PROHIBITIONS

the Swiss approach against negative light emissions

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Preliminary remark on “light emission”

In most cases the English term “light pollution” was and still is interlinked with the term “light emission”. The literal translation into German might give the false impression that the term denotes polluted light. When used excessively, however, it is the light itself, which is the source of pollution. In this case, light is a disturbing factor and is referred to as negative light emission in this article (i.e. harmful or undesirable light emission).

From the sky as a natural source of light to the sky darkened by artificial light

Over thousands of years, the night sky inspired poets to write numerous poems. The firmament bore clues for astronomers and their theories. Without astronomy the discovery of new countries and continents would have been even more complicated. Furthermore, lovers enjoyed the sight of the Milky Way. In addition, natural light emitting from the sun, the moon, and the stars is an integral part of the landscape. In the Swiss landscape concept¹ the term landscape is defined by “present and future natural factors such as underground, soil, water, air, light, climate, fauna, and flora in combination with cultural, social and economical factors”. The light of the stars enables people to visualize the landscape at night. Dusk and darkness change this visual experience in a natural way. Our sense organs react to this optical variety in a particular way, e. g. our impressions are

different from those perceived in bright daylight.

Artificial light, however, detracts from this natural phenomenon and compromises our perception. For instance, in the highly illuminated sky of the Swiss Mittelland, only a few dozen of the 2000 stars which would be visible to the naked eye can actually be seen. The fascination of the universe is lost in the sea of lights. As a result, we suffer a cultural loss. Great



Figure 1. The Milky Way – soon only visible to a few chosen people? (photos: Kobler).

importance is attached to undisturbed natural backlight, wherever the natural landscape makes for a true experience, e. g. in national and natural parks, in preserved areas or regions with tourist potential.

Man is about to turn night into day. As soon as the night falls millions of artificial lights are switched on. The atlas of artificially lit night sky shows that 20 % of the world population – half of which are Western European – is no longer able to see the Milky Way with the naked eye.

Frequently, light emissions are signs of progress, prosperity and, prestige. Today, light emissions snowball worldwide. Everything is being illuminated, illumined, and visualized. The emissions result in drastic changes to our natural environment. The negative consequences on nature and environment are manifold:

- Destruction of the natural night landscape (incl. the space above us). This may for example result in the disappearance of the visible starry sky (scenic and cultural aspect).
- Influence on circadian and endocrine systems of men and animals (biological and medical aspect).
- Impairment of natural habitat of nocturnal animals, which has far reaching, even fatal, consequences for innumerable animals (ecological and ethical aspect).
- Increase of disturbance by men through glare and flare in populated areas (physical and psychological aspect).
- Waste of energy due to light spill (energetic and technical aspect).
- Blunting and estrangement concerning visual values of intact natural night landscapes and adaptation to the uncontrolled light spill (emotional and aesthetic aspect).

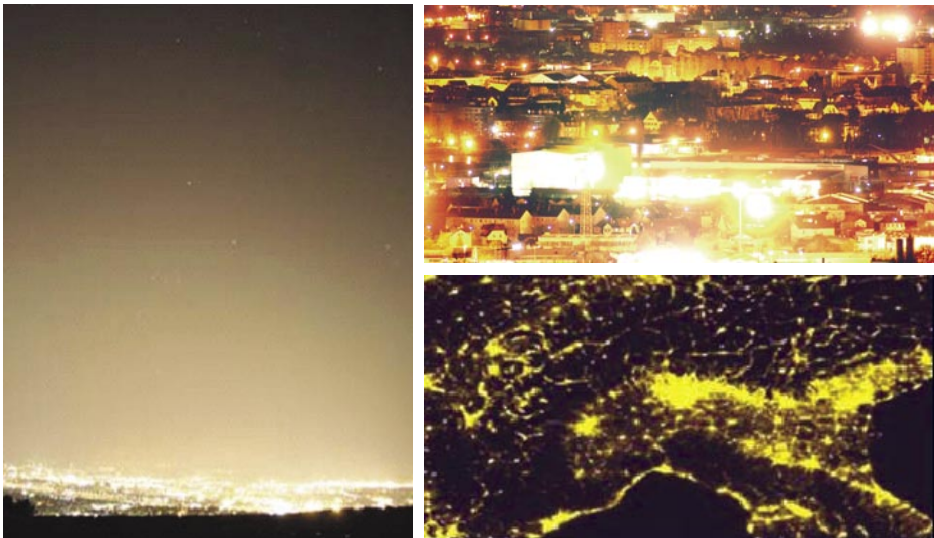


Figure 2. Artificial light changes our landscape. (photos: Kobler and RSGB/NOAA, down to the right)

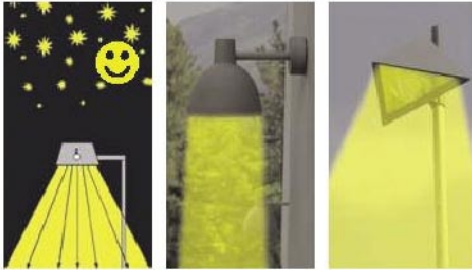


Figure 3. Illuminants with a good sealant, illuminating specific objectives only, without dispersing remaining light skyward.

A broadly targeted publication with recommendations as signposts for a sustainable usage of artificial light

Against the publication described above, the Federal Office of Environment decided to publicize a report on this topic in 2005. The aim of this report is to point out the causes and the consequences of environmental pollution caused by undesirable light emissions.

Furthermore, the publication contains recommendations and inputs on how to avoid light emission without the loss of comfort and security. The recommendations are primarily meant for owners, operators, planners (esp. architects and electro planners), manufacturers of exterior lighting systems, departments for the protection of nature, landscape and environment as well as for communal, cantonal and federal authorities responsible for issuing permits. A further aim of the report is to sensitize the public to this complex problem. The recommendations given in the report follow a simple principle: light should only be used where needed. It is absolutely useless to direct light towards the sky or into ecologically sensitive regions. This undifferentiated direction of light wastes energy, harms creatures and devalues the experience of the landscape. In detail this means:

- *The necessity for illumination has to be proven:* In most cases there is no actual need for exterior lighting. This applies especially to situations, where there is enough light already. In case of constructional changes, superfluous illumination should be removed.
- *Technical possibilities to reduce negative effects should be used:* many luminaries can be shielded in order to direct the light to a specific area. In this case, the light source can be shielded or its light beam can be systematically converged with help of integrated optical installations (e. g. mirrors and reflectors). Basically, the light beam should have a limited angle. Furthermore, objects should only be illuminated to a certain extent and not more than necessary. Often, dim light can have a better effect than glare. In addition, illuminants with a low percentage of short wave light should be used. Sodium steam high pressure lamps and particularly sodium steam low pressure lamps treat insects relatively conservatively, are energy-saving and have to be maintained less frequently. Finally, a sealant can help to prevent insects and spiders from encroaching upon the illuminant.
- *Illuminants should be arranged in a target-oriented way:* generally, each illuminant should be directed towards the floor. Especially streetlights should be

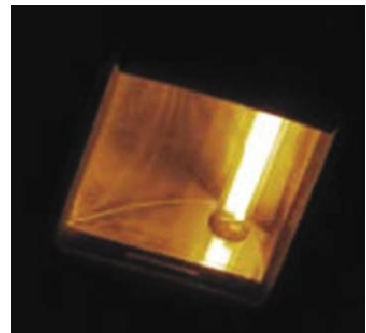


Figure 4. Sodium steam low pressure lamps: the best ecological and economical solution.

installed in such a way that they do not illuminate the surroundings, e. g. bedrooms or ecologically sensitive areas.

- *Wherever possible, the duration of illumination is to be limited:* luminous intensity could be regulated analogue to noise control in which lower permissible values from 10 p.m. through to 6 a.m. have been sanctioned. For example, provided that security regulations allow this action, light should be switched off after 10 p.m. in ecologically sensitive areas.

Actions can also be taken in the surroundings of lights, in order to indirectly diminish the negative consequences of light emission. If the ground has to be illuminated strongly, one needs to pay attention that the floor is not coloured in a bright or even reflecting hue. When choosing a light system, one should watch out for a system that can easily be maintained and cannot be reached by passers-by.

Besides the level of planning and technique, the publication also contains references to legal means which help to reduce or avoid negative light emission. In this respect, the following proposals are formulated as an “invitation” and primarily address the cantons, which are responsible for the implementation of the existing legal remedies.

In this context, the cantons are invited to:

- Review and formalize their regulations on buildings and environment and the herewith associated rulings concerning light emissions in order to enforce a proceeding of building licence for all lighting equipment of big constructions and large facilities as well as for historical buildings and facilities.
- Enact a ban on the operation of installations, which are directed skyward and do not meet security or illumination requirements of buildings (e. g. Sky beamer, laser spot light, spot lights for advertisements or similar artificial light sources), which are meant to protect species, biotopes or the landscapes. If the enactment of a ban is not feasible due to technical, operational or economical reasons, the handling should be restricted as far as possible.
- Inspect existing light installations of big constructions and large facilities, including historical buildings and facilities, in order to avoid light emissions and to renovate these installations. Sky beamers are an exceptionally aggressive form of light emission. All of the light dissipates into the sky.



Figure 5. Sky beamers are an exceptionally aggressive form of light emission. All of the light dissipates into the sky. (photo: Haenel)

Basically, a reduction of light emission is possible. The moment this aim is achieved, one can safely speak of a “win-win-situation”. In other words, there are no disadvantages for neither man nor nature and landscape, but only lots of advantages such as:

- *Economical benefit:* in order to avoid negative light emissions light must be prevented from radiating into the universe. As a result, energy use and energy costs can be reduced.
- *Ecological benefit:* an elaborated exterior lighting lessens interferences. Consequently, there is enough space for ease and recreation at night time. It must be borne in mind that the latter are important factors regarding the preservation and the improvement of the quality of life for men, flora and fauna.
- *Creative benefit:* artificial light is an important factor for the arrangement of exterior spaces. However, this implies that the surrounding is as dark as possible to ensure contrast.
- *Aesthetic benefit:* we are about to lose the night as a beauty of nature. The unhindered sight of the starry sky has fascinated people ever since. Fewer light emissions enable us to enjoy the natural landscape by night without any interference.

First encouraging experiences

Despite being published only a little over a year ago, the recommendations have been proven successful. The topic is basically more present. Initiatives regarding the reduction of negative light emissions were taken on all levels. Producers of electricity are actively trying to find solutions. Manufacturers of lamps promote products, which attract insects to a lesser extent. Communities enact regulations, which prohibit or at least constrain the unnecessary use of light for advertisements. Furthermore, organizations eventually develop standards, which are meant to regulate the use of light effectively. – However, it will be a long journey and numerous challenges are waiting for architects, planners, manufacturers, and all of us who use artificial light in any form.

References

1. 1998, Publisher Federal Office for Environment/Federal Office for Spatial Development/purchase order number 412.708.

Figure 6. Legal requirements on the prevention of light emissions of the Coldrerio City Council (February 2007).



COMUNE DI COLDRERIO

ORDINANZA MUNICIPALE

RIGUARDANTE LA PREVENZIONE DELLE EMISSIONI LUMINOSE

IL MUNICIPIO DI COLDRERIO,

La problematica dell'inquinamento luminoso sta diventando sempre più un tema meritevole di attenzione.

La luce artificiale eccessiva, oltre ad uno spreco di energia, ha effetti negativi sull'ambiente in generale. L'ordinanza è volta a prevenire l'uso di illuminazioni moleste e dirette verso spazi dove l'illuminazione non è necessaria ai sensi della documentazione dell'UFAM "Prevenzione delle illuminazioni luminose, Raccomandazioni, Entità, cause ed effetti sull'ambiente, 2005".

A livello federale le basi giuridiche che possono regolare la problematica sono dettate da:

LF 1.7.1966 sulla protezione della natura e del paesaggio (LPN, RS, 451): art. 1 a 3, 18 e 20 cpv 1.

LF sulla protezione dell'ambiente (LPAmb, RS 814.01): art. 1, 6 cpv 1 e 4, 11, 12, 14.

LF sulla caccia e la protezione dei mammiferi e degli uccelli selvatici (LPC, RS 922.0): art. 1, cpv 1 e 7 cpv 4.

LF sulla pianificazione del territorio (LPT; RS 700): art. 1 e 3.

Ordinanza sulla segnaletica stradale (RS 741.21): art. 96 cpv 1 e 5 e 98 cpv 2.

Conformemente a queste basi e agli articoli 107 della Legge organica comunale del 10 marzo 1987 e 23 del relativo Regolamento di applicazione, art. 146 regolamento comunale, le immissioni luminose private sono limitate come segue:

Sono soggetti a questa ordinanza i proprietari privati e pubblici di edifici o impianti, i gestori e i responsabili.

1. Sul territorio comunale è vietata la posa ed installazione di show luminosi o skybeamer, fasci di luce fissi o rotanti rivolti verso il cielo poiché rappresentano un pericolo per la sicurezza pubblica, la protezione dell'ambiente ed anche ostacolano il regolare traffico aereo.
2. Le installazioni luminose di grandi edifici o impianti di illuminazione esterne particolari, devono essere notificate al Municipio. Le misure specifiche previste a tutela delle immissioni luminose vanno chiarite nell'ambito della procedura di autorizzazione.
3. Le illuminazioni di qualsiasi genere e delle insegne pubblicitarie devono essere spente dalle ore 24.00 fino alle ore 06.00. Il Municipio può concedere deroghe per situazioni commerciali particolari.
4. Fanno inoltre stato le raccomandazioni sulla prevenzione delle emissioni luminose emanate dall'UFAM.
5. Il Municipio si riserva la possibilità d'intervento per casi particolari presenti sul territorio comunale.
6. I contravenitori delle disposizioni sopra indicate saranno puniti con una multa fino a Fr. 1.000.- e il Municipio ordinerà gli interventi necessari al rispetto della presente ordinanza.
7. La presente ordinanza entrerà in vigore alla scadenza del periodo di pubblicazione;
8. Periodo di pubblicazione: dal 1 febbraio 2007 al 14 febbraio 2007 ed entro questo termine è data facoltà di ricorso al Consiglio di Stato.

PER IL MUNICIPIO DI COLDRERIO

Il Sindaco:

Corrado Solci

Il Segretario:

Pierantonio Bianchi