

# Light Pollution as a recognised Degradation of Environment

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Ladies and gentlemen,

it's a pleasure for me to speak to such a forum, so devoted and qualified to reduce and prevent light pollution. From the previous lectures it became quite clear to me that I have to learn Italian, to be able to use fully the wealth of knowledge on this topic in your language.

**Czechia had to adopt the EU rules for protection of the atmosphere.  
The best way: a Clean Air Act including the previous and new rules.**

As a part of the access procedures, my country had to implement the environmental laws valid in the EU. On the other side, in some respects the level of legal protection of the atmosphere in Czechia has been on a good level already. A synthesis of these standards into a single law has been prepared by the Ministry of Environment in 2000 and submitted by the Government to the House of Representatives in spring 2001.

The bill contained a important novelty for the Czech legislation: the greenhouse gases have been declared as pollutants at last, and a process of curbing their emissions by the law had to be started this way.

**The idea to include the light pollution into the Clean Air Act came from the House of Representatives, June 2001.**

Stanislav Fischer, a member of Parliament who became a reporter on this law for the Committee for European Integration, got an idea, that protection of atmosphere should include prevention of the light pollution as well.

**A strange idea? An excellent one!**

At first, this idea seemed a bit strange to me. Traditionally, as a pollution of atmosphere, just man-made input of chemical compounds and aerosols has been considered. Light is of another nature. However, as I studied the proposed Clean Air Act, it became clear to me, that the light could be included there very well. For the purpose of the law, it suffices to treat the light produced artificially at night as a polluting stuff, with just minor changes in units compared to chemical pollutants.

**The most visible pollution at night: by light from artificial sources.  
To have a clean air, it should be avoided!**

In fact, there is a non-obvious serious psychological reason, why light pollution should be prevented when protecting the atmosphere against “classical pollutants”. The light pollution is a nighttime analogy of smoke and anthropogenic haze in the daytime: the visible form of pollution. In many cases, the only visible one at night.

Visitors of our observatory often attribute the poor visibility of the stars and invisibility of the Milky Way to the “smog over the city”. Well, the air over Brno is not perfectly void of locally produced polluting particles, but it is not at all so bad. People just perceive it to be dirty, due to the fact that it is so strongly illuminated. So they perceive the air over any city, when they are approaching it at night. The “light cap” over the town (or even over a village full of light-emitting globes etc.) is thought to be a bulk of poisonous, ugly air. It is surely unpleasant to return there from a cleaner countryside... And seeing the air to be more and more dirty as the years pass by.

Avoiding the light going upwards (and mainly just a bit upwards, as it is the most polluting component) would help tremendously. With little (or negative, in the long run) costs, the air would seem much cleaner. A more positive attitude of the citizens toward their towns could be expected – they would be proud of living in a much cleaner environment than before.

**All the background info in Czech prepared by the astronomers, including the draft new articles of the law. A Lombardy law from 2000 as a model!**

During the summer, I have prepared the possible wording of the new parts of the law and the reasoning behind them. I believe, that the most influential part of it has been the translation of the Lombardy law 17/2000 – the proposed measures to be demanded by the law were taken from it.

All the texts have been submitted to the key persons, to the two Committees involved and then to all Representatives, introduced by an endorsement letter signed by all the leading astronomical institutions in Czechia.

The grave concern expressed by the leading Czech scientists representing a discipline most damaged by light pollution has been taken seriously. The very good rep-

utation of astronomy in Czechia and a tradition of showing the sky to a substantial fraction of the population at tens of observatories contributed as well. Our arguments have been general environmental ones, just our personal concern stemmed from our personal experience. The astronomers acted not to defend themselves, but rather as citizens who are most aware of the extent of damage caused by unlimited artificial outdoor lighting.

**Positive reactions from the Members of the House of Representatives and the Minister of Environment.**

The idea of including the prevention of the light pollution into the law has been welcome by the Minister Kužvart and by many Representatives. They were aware of the lost beauty of the night and of the many cases where the nighttime lighting is very obtrusive. The reporter of the main Committee (the environmental one), Jiří Drda, a former mayor of Liberec (a capital of North Bohemia), demanded installation of non-polluting lighting from the municipal utility long ago already, seeing no use of light going almost horizontally and upward, but the lighting people responded him it is not possible to avoid it. So, the idea of demanding such a feasible alternative by the law, to overcome the inertia of the bad practice, came to much understanding from him. It has been the case with another former mayors in th House as well.

**The only question: how much it will cost?**

**The answer: almost nothing, if needed.**

In the original version of the new parts of the bill, a time span for adapting the horrible lighting towers with many luminaires over the railway stations on the whole territory of Czechia has been given, like in the Lombardy law. Unlike Austria or Hungary, which adhere to the best railway tradition, we have already these exceptionally strong pollutants, like in Italy. They are dangerous for planes, for drivers, and for the railway itself! Shielding them properly, to direct all their light down to the rails, would be a blessing for everyone.

However, it would cost something at the beginning. If it would be an obstacle in including the prevention of the light pollution into the law, we agreed to leave it out. Then there would be no general costs following from this part of the law, just some limited ones from the pilot territories where the lighting should be made better within four years – as low as needed, if those territories would be made small enough.

**Due to lack of time, the final inclusion has been quite short, detailed rules postponed to the Government order.**

The House chose another way of including the man-made light into the law: almost everything should be written later, in the implementing regulations to be issued by the government.

In fact, the approach is very similar to the prevention of greenhouse gases emissions, in their case most of the concrete measures is upon the executive as well (apart from a payment of 30 euro per each ton of methane emissions, a result of a pressure of a couple of environmentalists including me to do something with these quite obsolete releases immediately). The reason is probably that even the climate protection is a very new issue for our country.

**But: a definition is there, and a general obligation for everybody to avoid pollution as much as possible:**

## **Act from Feb 14, 2002**

on Protection of the Atmosphere and Amendment of Some Other Acts  
(the Clean Air Act)

The Parliament of the Czech Republic has adopted this Act of the Czech Republic:

### **§ 1 Scope of regulation**

(1) This Act provides

- a) the rights and obligations of persons and the scope of administrative authorities in the course of protection of the outdoor air against input of pollutants by human activities and in the course of manipulating the regulated substances which damage the ozone layer of the Earth and manipulating the products containing such substances,
- b) conditions for further reduction of the amount of emitted pollutants affecting adversely the life and health of people and animals, the environment or the tangible property,
- c) tools to reduce the amount of substances affecting the climate system of the Earth,
- d) *measures for lowering the light pollution of the air.*

### **§ 2 Principal concepts**

(1) For the purpose of this Act in the domain of protection of the air it is understood by

- a) outdoor air the tropospheric air, with exception of the air on workplaces designated by a special legal regulation and in confined space (hereinafter referred to as the “air”),
- ...
- r) *light pollution every form of illumination by artificial light which is dispersed outside the areas it is dedicated to, particularly, if directed above the level of horizon.*

### § 3 Obligations of legal and natural persons

(1) *Everybody shall be obliged to limit and prevent the air pollution and reduce the quantities of pollutants specified by this Act and relevant implementation rules and discharged by himself/herself.*

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Then there are some paragraphs demanding the issuing of the implementing regulations of the light pollution by the Government and enabling the municipalities to fine the offenders (with fines up to 5000 euro).

#### **Strong support within the House and the Ministry.**

Such a basic inclusion has been regarded as completely non-contradictory by everybody involved. As a new topic, it has been at least started to deal with, even the very mentioning it at the beginning of the law is an important step. Even the officers of the Ministry, who are generally (and understandably) unhappy with the Representatives changing the coherent proposals of the laws they prepare, became proud to have such an important issue within this environmental law.

#### **Opposition from some uninformed people from the lighting practice: light pollution? What’s this? We don’t need any law, our outdoor lighting is excellent already!**

All of a sudden, some letters from the people involved in the lighting business came to the Senate, strongly opposing the idea of doing anything against the light pollution now. They argued with tremendous costs, mostly due to not understanding the proposed rules at all. On the other side, no arguments in favour of this part of the bill came to the Senate – I have prepared them for the House version of the bill for the Ministry, but the key person has been ill during that time, and the texts remained untouched for three months...

We have reacted by just another endorsement letters, but due to a lack of time (the Senate had just some three weeks for the whole huge bill), most of the Senators thought that preventing the light pollution should be postponed to another law in

the future. They have been simply misled by the misinformation from a couple of exponents of the current lighting practice.

The controversy in the Senate triggered an interest from the media. Thanks to the opposition and a public debate, most people heard or read about the issue the first time. This is an important point, as no law would help much, if nobody knew anything about light pollution and if people would not care.

**However, all politicians who studied the problem a bit, came to the conclusion: A legal protection of nighttime environment is needed, all the measures are no-regret ones.**

The Senate set of proposals to change the bill have been rejected by the House, which found the needed absolute majority to accept its original version. Light pollution played a minor role here, the controversy between the House and the Senate have been rather on issues costing really billions of Czech crowns. But, probably, the Representatives already liked the idea of introducing the light pollution prevention into the Czech legislation, and it helped in overcoming the Senate version of the bill.

One objection of the Senate has been understandable, and it has been an objection of the President as well: it would be better to include the the main measures into the law itself, not leaving a large degree of freedom to the executive. Yes, it would, our original proposal has been exactly such.

However, prevention of pollution is the ultimate goal, so even an incomplete step into an open future is vast better as none at all. This has been sure the reason why the bill has been signed by President Václav Havel on February 27.

**(Skybeamers hated by everybody.)**

Just a note on the issue of skyward directed reflectors illuminating just the air itself. Some careful people said, that perhaps we should not ban them at once, just no new should be sold and bought. Freedom of commerce is so precious...

However, all the Representatives when giving some clear example of light pollution, mentioned the skybeamers at the first place. There is an unequivocal public demand to switch them off, now. A dubious advantage for one entrepreneur (and a disadvantage for his competitors) is a nightmare for everybody else. All skybeamers not serving as air transport signal lights should be banned immediately.

**The draft of the Government order is being prepared, no real argument against the Lombardy-like rules appeared.**

My original draft of the regulations for the Ministry of Environment is subject to a public debate. It follows the Lombardy law closely, just the pilot territories are envisaged as very small, for the beginning. There is an advisory commission called up by the Ministry to prepare a final version of the draft. Some representatives of the current lighting practice are included there, arguing against all the main points of it: no light above horizon, dimming the lights at night (switching them off is of course a cheap alternative). But, they have no arguments, just saying they don't agree.

**More and more people are looking forward to a much better and less polluting outdoor lighting.**

Many people have realized the first time, that a lamp or a lit facade shining into their bedroom windows is no inevitable fate, but just an example of careless, wasting lighting. There are so many of them! Also, many drivers and pedestrians note the glaring lights before them, knowing already that the illumination of their path can be done much better.

Especially, the journalists made an excellent job mostly. The arguments in favour of the continuation of current lighting practice found no advocates – how could they, understanding how the quality lighting looks like instead is so simple.

**In Brno, we agree in some issues with the lighting company already. Some adaptations will be made even before the legal enforcement.**

We have a lot of good lamps in Brno centre already. All of them are with a flat glass at the bottom, a type called Victor by Thorn Lighting. They are perhaps too strong, but rather well aimed. Still another are replacing the old lamps during years.

**(regulation, shielding)**

With the lighting utility we agreed to begin replacing the prismatic or sag acrylic refractors of the new lamps (GE M250) with flat glasses, which are an option for these fixtures. At first just on a couple of places, to see the result. I am sure that more will follow, also on the public demand of people who will compare the non-glaring areas with the glaring ones.

One process is running already: installation of the phase regulation of the power into the lamps. Some streets in Brno are dimmed to perhaps one third already late in the evening, another should follow. We may just support the utility in this outstanding project by explaining the public that low lighting levels are not worse, but mostly better than the high ones.



This is one scene from our city. Just the main lamps going toward the church are the correct, i.e., fully shielded ones. There are also some very bad examples, as the light poles around the statue of the first Czechoslovak president, Tomas Garrigue Masaryk, also the globes around the church are annoying. The difference between the luminaires which serve the people and those ones, which are just obtrusive (they have been evaluated by the city commission just during the day of course...) is even more conspicuous in reality than in the picture.

**All the documents for the House and the Ministry have been public all the time, see [1],**

and so are they further on. Of course, most of them just in Czech. But the key ones, like the text of the Clean Air Act (or at least its light-relevant parts) are available there in English as well.

We are looking to further collaboration worldwide, but even more important are the examples from the surrounding countries, say, from the former Austro-Hungarian space. The detailed instructions from Lombardy[2] are the best present resource. Our heritage is very similar in many cases, so should be the future in the EU. The best examples from Italy are an inspiration and a standard which should be implemented in the whole central Europe, thank you for all your help and leadership.

## **References**

[1] IDA Czechia, 2002, English web site, [www.astro.cz/darksky](http://www.astro.cz/darksky)

[2] Cielobuio, 2001, Visual Regolamento, in [www.vialattea.net/cielobuio/arc-lr117.htm](http://www.vialattea.net/cielobuio/arc-lr117.htm), either [www.vialattea.net/cielobuio/lr117/visualreg17.htm](http://www.vialattea.net/cielobuio/lr117/visualreg17.htm) or preferably the type-set pdf version in [www.vialattea.net/cielobuio/lr117/visualreg17.zip](http://www.vialattea.net/cielobuio/lr117/visualreg17.zip)

## **short biography of the author**

Born 1955 in Brno, Czechia, finished studies of physics at the local university in 1980. Since then employed at the N. Copernicus Observatory and Planetarium in Brno. Works in meteor astronomy in the 70' and 80', devoting to the didactics of astronomy and education of the youth since mid-80'. Active in environmental education since 1990, mainly on global warming, energy fluxes in everyday life, including less obtrusive and wasteful outdoor lighting. Author of majority of Czech texts on this issue and of some software computing the light fluxes.