

Will all filament bulbs, i.e. incandescent and halogen bulbs, be banned in the near future?

18 November 2013

Abstract

LightingEurope, the association representing lighting manufacturers and national lighting associations, stated that Stage 6 of 244/2009 has to be reconsidered and that 2019 would be a more realistic date for the ban of halogen lamps, rather than the deadline of 2016. The reasons are among others:

- Affordability: LEDs are still too expensive compared with halogen lamps.
- The quality of LEDs has to be improved. It would be detrimental to phase out halogen bulbs when only low-quality LEDs would be available in the lower price categories.
- The benefits are not always obvious to the consumer when not frequently used rooms are equipped with LEDs.

[<http://ledsmagazine.com/features/10/10/10>]

On 25 November 2013, the Ecodesign Consultation Forum will be held in Brussels where a Commission Staff Working document will be discussed. It changes the entry into force of the stage 6 requirements from 1 September 2016 to 1 September 2018.

In preparation to that Forum, the Dutch engineering consultancy VHK (Delft, the Netherlands) and VITO (Belgium) drew up a review study which however shows some fatal shortcomings and even a miscalculation.

We give an overview of the recent ban on incandescent light bulbs and its consequences. More information is provided about the current features of the LED technology.

- Lamps of distinct types are supposed to be interchangeable! This is complete nonsense. Our eyes are very sensible to the different spectra of these lamp types.
- The authorities wanted to get rid of the incandescent and halogen light bulbs, because these lamps should emit too much CO₂! This is not true.

For the lamp manufacturers, the ban on the incandescent light bulbs did not provide the expected sales volume of CFLs because the light spectrum is very different from that of the incandescent lamps. Now, they want no repetition of this nasty story regarding halogen lamps. The question is however, if a postponement until 2018 will be enough.

Our conclusion is that incandescent light bulbs and halogen bulbs have to remain on the market as long as no real alternative exists.

Will all filament bulbs, i.e. incandescent and halogen bulbs, be banned in the near future?

Event:

On 25 November 2013, the Ecodesign Consultation Forum will take place in Brussels. Participation in person is restricted to national experts from each Member State and designated members of the Consultation Forum, which have been selected in an open call for interest during the establishment of this forum.

More information about this item:

- <http://freedomlightbulb.org/2013/10/eu-to-delay-ban-for-2-years-on-halogen.html>
- <http://freedomlightbulb.blogspot.be/2013/11/eu-commission-light-bulb-ban-review-2.html>

Documents:

- Commission Staff Working Document. Report to the Ecodesign Consultation Forum on the Review of the Stage 6 Requirements of the Commission Regulation (EC) No 244/2009
[\[http://www.eceee.org/ecodesign/products/domestic_lighting/Commission%20Staff%20Working%20Document.pdf\]](http://www.eceee.org/ecodesign/products/domestic_lighting/Commission%20Staff%20Working%20Document.pdf)
(...) *the Commission proposes to begin the revision procedure with the aim of adopting amendments to Regulation 244/2009 and Regulation 1194/2012. The recommended regulatory changes include:*
 1. *changing the entry into force of the stage 6 requirements to 1 September 2018, allowing LED technology to mature further and reach an optimal time point in terms of monetary and energy savings;*
 2. *removing the current loophole by extending the stage 6 requirements to halogen lamps with G9 and R7s socket;*
 3. *and introducing a provision that luminaires sold after 1 September 2015 should be compatible with LED technology to prevent future obstacles to efficient lighting.*
- Review study on the stage 6 requirements of Commission Regulation (EC), No 244/2009. Final Report. Editing: the Dutch engineering consultancy VHK (Delft, the Netherlands) and VITO (Belgium).
[\[http://www.eceee.org/ecodesign/products/domestic_lighting/Technical%20Review%20Study%20by%20VHK%20VITO.pdf\]](http://www.eceee.org/ecodesign/products/domestic_lighting/Technical%20Review%20Study%20by%20VHK%20VITO.pdf)

This study contains annexes such as:

- Minutes of the Technical Stakeholder meeting on the review of Stage 6 Requirements of Commission Regulation (EC) No. 244/2009
Date and time: Friday 26 April 2013
Place: Berlaymont building, Room S7, Brussels
- List of attendants

But numerous statements in this report can be questioned. Examples:

- p. 17: "*Currently the average EU mercury emission of power generation is around 0.016 mg Hg per kWh electricity.*" This is an unacceptable statement. In the EU, the mercury emission from power generation was found to be about 0.0074 mg/kWh in 2007, evolving to 0.0054 mg in 2011. Moreover, the footnote shows a conclusion based on a miscalculation! (See Annexes)
- p. 41: "*Both CFL's and LED's can replace halogen lamps.*" This is untrue (CRI, PF, spectrum...).
- p. 42: Health risks related to mercury exposure from accidental breaking of CFLs: '*short peak inhalation exposures to peak Hg-concentrations in air occurring as a*

result of accidental breakage of CFLs and intakes of Hg above the tolerable daily intake (TDI) for a very limited time are unlikely to pose a health risk. The endangering of the health of children is unacceptable, even within the slightest level.

- p. 53: "*there is mounting evidence suggesting that exposure to light at night while awake (especially during shiftwork), may be associated with an increased risk of breast cancer and also cause sleep, gastrointestinal, mood and cardiovascular disorders possibly through circadian rhythm disruption. Importantly, these effects are associated with light, without any specific correlation to a given lighting technology.*" The last sentence is wrong! The blue light is more harmful than red light. Due to the fact that CFLs and white LEDs show a greater blue factor, makes them more dangerous. See further: study from Maria de los Angeles Rol de Lama (Spain).
- p. 57: "*However, important issues like the modification of the emitted spectrum with time after switching on, with progressive aging, and from one to the other manufactured batch are not currently assessed. In view of the large number of patients affected by photosensitive diseases it may be advisable to make sufficient information on the emitted spectrum for individual lamp models available to the healthcare professionals and their patients to allow them to choose their lighting solutions optimally.*" The spectrum of incandescent and halogen lamps is almost the same and no special information is needed. As long as the spectrum of modern lamps is not similar to the banned lamps, incandescents and halogen lamps have to remain available.
- Not a single word is said about the resources needed to manufacture CFLs and LEDs, nor is mentioned what is the price to recycle these lamps. If these new lamps are much better than the old ones, why not give the full responsibility to the consumer and let all lamps available on the market?

So, the ban on halogen lamps, scheduled for September 2016, will in all probability be postponed until September 2018.

Overview of the preceding facts

It is incomprehensible how consumers and even some 'green' organizations still believe some statements coming from the authorities.

- Lamps of distinct types are supposed to be interchangeable! This is complete nonsense. It is obvious that our eyes are very sensible to the different spectra of these lamp types.
- The authorities wanted to get rid of the incandescent and halogen light bulbs. Why? Because these lamps should emit too much CO₂! This is another lie.

A. Lamps are not interchangeable.

Episode One: The end of the lamp with very good quality of light and the failure of its "substitute": the CFL

Our ancestors lightened their houses with torches or candles. It was Thomas Edison who developed a practical incandescent lamp. The spectra of the light of the setting sun, of the candle and of the incandescent lamp are all very similar. So, this switch from a candle to a bulb presented no problems to the eyes.

1. Incandescent light bulbs have remained for decades our most important source of light. The pros are:

- This light has a rich and continuous spectrum,
- a CRI of 100,
- a power factor of 1,
- and does contain neither mercury nor rare earth metals.
- The manufacture is very easy and the disposal needs no special measures.
- The light has predominantly a red component, which makes it apt to use it at the evening.
- The UV-emission is very low. This makes the lamp very pleasant, even to light sensitive patients.
- Can be used at close distances.
- No warming up time.
- Is dimmable.

There is one negative side effect:

- The luminous efficiency of a 100 W tungsten incandescent lamp (230 V) is about 2.0%. The other part can generally be regarded as a welcome supplementary source of heat. This rather low light efficiency is the price the consumer will pay for the better quality of light. Candles have a luminous efficiency of about 0.04%.

[https://en.wikipedia.org/wiki/Luminous_efficacy#Overall_luminous_efficacy]

The production and sale of incandescent lamp bulbs was prohibited since September 2012 in the European Union.

2. Compact Fluorescent Lamps (CFLs)

Lighting manufacturers such as Philips, succeeded to transform a linear fluorescent lamp into a compact fluorescent lamp. However, the lamps needed the very toxic **mercury** to produce UV radiation, needed to fluoresce the **phosphor**-coated glass and to let emit visible light.

We immediately recognize three basic flaws of CFL type lamps:

- a. Mercury is a global pollutant. Household products must be mercury free.
- b. UV radiation: UV radiation is carcinogenic and must be prevented as much as possible.
- c. REEs: it is unwise to use the limited stock of rare earth elements for our lighting. REEs are associated with radioactive waste, environmental damages and health hazards in the surrounding of the exploitation places.

But other disadvantages are obvious:

- This light has a poor and discontinuous spectrum,
- a CRI of only 80-85,
- a power factor of 0.5 – 0.9 for lamps lower than 25W.
- Generally not dimmable
- These lamps contain mercury and rare earth metals.
- The manufacture is very complex and the disposal needs special measures. Where mercury is used, mercury vapor will be produced that potentially will expose the worker.
- The light has predominantly a blue component, which makes it unsuitable to use it at evening. Our eyes are since generations accustomed to blue light by day (the sun high on the sky) and to red light at the evening (the setting sun). Medical research indicates that blue light is very effective in reducing naturally occurring human melatonin levels. Biological clock rhythms are found in all living things. Stephen M. Pauley "Lighting for the Human Circadian Clock" (2004): *Indoor nighttime lighting should be dim, eliminate wavelengths in the blue, and employ lights with wavelengths shifted toward the yellow and orange. Reading by incandescent lights rather than fluorescent lights will reduce exposure to blue color emissions.*
[\[http://www.darkskysociety.org/handouts/pauley.pdf\]](http://www.darkskysociety.org/handouts/pauley.pdf)

SCENIHR shows the following opinion: *Despite the beneficial effects of light, there is mounting evidence that suggests that ill-timed exposure to light (light-at-night), possibly through circadian rhythm disruption, may be associated with an increased risk of breast cancer and also cause sleep disorders, gastrointestinal, and cardiovascular disorders, and possibly affective states. Importantly, these effects are directly or indirectly due to light itself, without any specific correlation to a given lighting technology.* (SCENIHR, 2012, p. 59) We disagree with this last sentence.

- The UV-emission is a very tedious characteristic of this lamp type. This emission is harmful at wavelengths from 180 to 340 nm. Research found the cause of the significant and seriously damaging effects of high UV emission from CFLs: it originates from cracks in the phosphor coatings, present in all bulbs studied. [Tatsiana Mironava, Michael Hadjiargyrou, Marcia Simon, Miriam H. Rafailovich, *The Effects of UV Emission from CFL Exposure on Human Dermal Fibroblasts and Keratinocytes in Vitro*, Photochemistry and Photobiology, June 2012] This makes the lamp very unpleasant and harmful to light sensitive patients. *The number of all light-sensitive patients in the European Union, who might be at risk from the increased levels of UV/blue light radiation generated by CFL is difficult to estimate. However, a preliminary rough estimation of the worst-case scenario yields a number of around 250,000 individuals in the EU.* (SCENIHR, 2008) The Spectrum Alliance estimates that the true number of people affected in the UK could be as many as 2 million. The scale of the problem is not insignificant.

- In this context, one has to caution against the use of single enveloped CFLs. “*Our research shows that it is best to avoid using them at close distances and that they are safest when placed behind an additional glass cover.*”
[http://commcgi.cc.stonybrook.edu/am2/publish/General_University_News_2/SBU_Study_Reveals_Harmful_Effects_of_CFL_Bulbs_to_Skin.shtml]

A similar conclusion can be found in

<http://onlinelibrary.wiley.com/doi/10.1111/bjd.12457/abstract>. (L. Fenton, J. Ferguson, S. Ibbotson, H. Moseley, *Energy-saving lamps and their impact on photosensitive and normal individuals*, in *British Journal of Dermatology*, Volume 169, Issue 4, p. 910-915, October 2013) “*A preliminary investigation showed that ultraviolet radiation (UVR) emissions from compact fluorescent lamps (CFLs) can pose a risk to the skin of photosensitive individuals.*”

- The complaints of consumers regarding CFLs are growing, especially about the long warm-up time, shorter life times than indicated on the packaging and the harmful effects from overheating and broken CFLs.

One positive effect of CFLs:

- The luminous efficiency of a 9-32 W compact fluorescent lamps is 8-11.45%.
[https://en.wikipedia.org/wiki/Luminous_efficacy#Overall_luminous_efficacy]

N.B.: On which grounds did the Commission admit lamps with the dangerous pollutant mercury? (Comparison of the mercury emission from incandescent lamps and CFLs) See annex 1.

Moreover, it was unwise to impose a ban on the favorite lamp of the consumer:

- Lack of precautionary measures: Even SCENIHR (2012) warned: *The scientific rationale has identified a number of areas where relevant data are lacking regarding the effects of specific lighting technologies on medical conditions.* This means that at this moment, all effects of the modern lighting on our health is not known and that, in the meantime, the precautionary principle should be applied in lighting applications. *Carlin wrote: "Writing in Rachel's Environment & Health Weekly, editor Peter Montague states that 'scientific uncertainty should be cause for caution, not for plunging ahead recklessly...better safe than sorry. That is the philosophy of precaution.'* (Stephen M. Pauley, *ibid.*)
- The rights of the consumer haven been neglected: An environmentally friendly lifestyle cannot be imposed from above but does require a degree of responsibility of the consumer. Commissioner Oettinger, who defends the new regulations, makes a dangerous assumption: that consumers are too stupid to act responsibly. This is especially dangerous in the middle of a crisis in which EU citizens are asked to accept to give up part of their wealth. It's just such decisions that drive a wedge between European politicians and citizens. The consumer must not be led by the hand, even if it is the hand of a Commissioner.
- In 2011, the Swedish newspaper ‘Dagens Nyheter’ made a similar remark: *'Citizens have nothing to say in all this. Admittedly, it did not happen all behind closed doors, but one can conclude that the future of the light bulb was a matter for experts, businesses and interest groups, in which any public debate where the pros and cons were compared, remained totally absent. The list of EU decisions taken in this way is growing...'* [<http://www.express.be/joker/nl/platdujour/over-gloeilampen-en-stofzuigers-de-kloof-tussen-europa-en-de-burger-ten-voeten-uit/197790.htm>] Example: The Ecodesign Consultation Forum is not open for public debate. Several interesting citizens wanted to attend to the EU-meeting of 25

November 2013, but were not admitted. Why did the Commission not announce the Forum to all citizens who earlier had worded complaints about modern lighting? In such vital issues, a broad social debate is inevitable.

- As long as incandescent and halogen light bulbs have no real substitute, they have to remain accessible on the market. The consumer rights are neglected.

Conclusion

Given the fact that

- the health of hundreds of thousands of patients in the EU *is* affected,
- mercury used in the production phase (mostly in China) was disastrous to the health of the workers and to the environment, it caused accidents in homes, recycling problems are documented in several countries,

we may conclude that the CFLs did never meet the ecodesign requirements, stated by the Commission Regulation (EC) No 244/2009, paragraph 14:

“The ecodesign requirements should not affect functionality from the user’s perspective and should not negatively affect health, safety or the environment.”

The reason is obvious: CFLs are bad technology. After years of research by the manufacturers, it has to be acknowledged that the CFL technology is a total failure. No new developments are to be expected in the field of CFLs because the new research by the lighting manufacturers is exclusively on the LED technology which is more lucrative than CFL technology.

Consulting firms agree that it was unwise to recommend CFLs only by walking in the ways of the lowest cost. The spectrum of light has to be valuable and this was the sore point of CFLs. [<http://ledsmagazine.com/features/10/6/5>] The Czech President Milos Zeman made it clear to Barroso in April 2013 when he stated that Europe should stay out of certain things. In particular, he cited the decision to abolish the old incandescent bulbs. "I know what I'm talking. I recently screwed one of the new EU-compliant bulbs in my cottage. Since then, the room looks like a morgue." [Die Welt, 3 April 2013, "[Schande" - Wut der Tschechen auf die EU-Fahne](#)] CFLs have a poor light and therefore are unpopular.

[<http://ledsmagazine.com/features/10/10/10>]

Moreover, the European Commission did not follow the precautionary principle (scientific uncertainty should be cause for caution, not for recklessness), rejected the free choice of consumers and neglected a public debate regarding the lighting technology. The Commission takes a great responsibility in this matter and has to acknowledge that artificial light has a fundamental impact on our health. Risks should be avoided as much as possible.

N.B.: The Commission has no power to implement any restriction of production. However, there is one exception: environment related products. So they used this power when they pronounced a ban on incandescent bulbs and now they can use it again regarding halogen bulbs.

Episode Two: The imminent end of the halogen lamp with a very good quality of light and the current failure of its “substitute”: the LED

1. **Halogen light bulbs** show about the same characteristics as the incandescent type. The luminous efficiency of a 100W tungsten glass halogen (230V) is assumed at 2.4%. [https://en.wikipedia.org/wiki/Luminous_efficacy#Overall_luminous_efficacy]

The production and sale of halogen lamp bulbs was scheduled to be banned by the EU from September 2016 on. Debates are going on in preparation of the Ecodesign Consultation Forum to be held on 25 November in Brussels. Participation in person is restricted to national experts from each Member State and designated members of the Consultation Forum, which have been selected in an open call for interest during the establishment of this forum. The question is if this “open call for interest” was sufficiently open and known by the public.

2. Light-emitting diodes

- This light has a continuous spectrum,
- a CRI of only 80-85. Nick Faraway, international sales manager at Soraa, wants a CRI of 95 or greater. But he agrees that it will be difficult and at high costs. [<http://ledsmagazine.com/features/10/10/10>]
- a power factor of 0.5 – 0.9 for lamps between 5W and 25W.
- These lamps contain rare earth metals.
- The manufacture is very complex and the disposal needs special measures.
- Spectral imbalance within the blue: The white light of LEDS has generally a blue peak, which makes it unsuitable to use it at evening. Medical research indicates that blue light is very effective in reducing naturally occurring human melatonin levels. The real impact of light depends on three features: color, intensity and duration. Melatonin secretion is reduced to 50% after:
 - 403 hours of exposure to an monochromatic RED light at 100 lux
 - 66 min to a candle
 - 39 min to a 60W incandescent bulb
 - 15 min to a 58W daylight fluorescent lamp
 - 13 min to a pure white high-output LED(Angeles Rol de Lama, e.a., Contaminación lumínica y salud: El lado oscuro de la luz, Dpto. Fisiología, Universidad de Murcia)
- SCENIHR shows the following opinion: *Despite the beneficial effects of light, there is mounting evidence that suggests that ill-timed exposure to light (light-at-night), possibly through circadian rhythm disruption, may be associated with an increased risk of breast cancer and also cause sleep disorders, gastrointestinal, and cardiovascular disorders, and possibly affective states. Importantly, these effects are directly or indirectly due to light itself, without any specific correlation to a given lighting technology.* (SCENIHR, 2012, p. 59) We disagree with this last sentence.
- When dimming a LED, some problems may arise. (More information in Review study, p. 71-72)
- The lifetime of the LEDs depends on the temperature of the junction and the electric current intensity, without forgetting the quality of production and

integration. At present, the definition of the lifetime of a LED and the measuring method are not standardized. (Effets sanitaires des systèmes d'éclairage utilisant des diodes électroluminescentes (LED), Rapport d'expertise collective, Octobre 2010, p. 40)

The heat is "enemy No. 1" of LEDs, more specifically of white LEDs. LED operation at too high a temperature (and therefore high junction temperature of the semiconductor) has a dramatic effect on efficiency but also on other characteristics and performance of LEDs such as the flux, the spectrum (and thus the color), the polarization voltage, and the life. To take advantage of the interesting properties of LED (flux, efficiency, durability, quality of light emitted), integrators must take into account the heat generated by the LED and qualities of this component to evacuate the heat. (Ibid., p. 207)

- High luminance: (i.e. the high brightness density per surface unit emitted by these very small sources.) LEDs are point sources of light that can be aggregated in lighting units to achieve high luminous flux. Because the emission surfaces of LEDs are highly concentrated point sources, the luminance of each individual source produces very high luminance, at least 1 000 times higher (107 cd/m²) than that from a traditional lighting source.
- Stroboscopic effect: Depending on their architecture, the electrical power supplied to LED lighting systems can vary, causing fluctuations in the intensity of the light produced that are more or less perceptible to the naked eye. (Opinion of the French Agency for food, environmental and occupational health & safety in response to the internally-solicited request entitled "Health effects of lighting systems using light-emitting diodes (LEDs)" 19 October 2010)
- *The number of EU citizens with light-associated skin disorders that would be affected by exposures from CFLs was estimated in the report to be around 250,000. Clearly, the risk for this group of patients is not limited to CFLs, but includes all light sources with significant UV/blue light emissions. The lack of proper data precludes any improvement of the estimate of the size of the affected group.* (SCENIHR, 2012, p. 11) It is a shame that without further knowledge of the effects of LEDs, the precautionary principle is not applied.
- Because the lemon and primrose yellow are extra sensitive to blue and green, it is risky to illuminate some artworks with LEDs due to the high proportion of blue light. LEDs can damage the paintings of great masters! (Dutch newspaper De Volkskrant, 4 January 2013)
- The luminous efficiency of LEDs was estimated between 4.2 and 14.9%.
[\[https://en.wikipedia.org/wiki/Luminous_efficacy#Overall_luminous_efficacy\]](https://en.wikipedia.org/wiki/Luminous_efficacy#Overall_luminous_efficacy)

The scheduled ban on halogen lamps would further decrease the choice available to those who are suffering from short exposure to CFLs and to long exposure to LEDs. Marina Yannakoudakis, MEP, UK, submitted a question about this imminent threat to the EC (11 July 2013). The answer given by Mr Oettinger, on behalf of the Commission was for the most part:

- Approximately 250,000 people in the EU are suffering from illnesses accompanied by light sensitivity;
- Suitable light sources exist for every light sensitive patient.
- The Commission is not aware of any scientific research in contradiction to these findings.

- The Commission is currently reviewing the impact of the requirements of Regulation 244/2009 on consumers (to be completed in 2013).
- Furthermore, the recent Regulation 1194/2012 requires manufacturers to provide publicly available information on the spectral power distribution in the wavelength range 180-800nm, covering the visible spectrum up to ultra-violet and down to infrared radiation. This requirement provides useful information for light sensitive patients and their healthcare professionals to choose a product according to their needs."

Why does the Commission not admit that it was wrong to ban some types of lamps? Not only light sensitive patients but all consumers would be relieved. It is a shame that the Commission makes it so difficult to these patients to choose a new lamp while it was so easy previously. Why do they take decisions in place of doctors and the medical staff by banning incandescent and halogen lamps? Who gave the power to the EC to decide once for all concerning artificial lighting? Why does the EC only relies on studies which do not contradict their aims. SCENIHR also has to be blamed in this matter. Why the Commission is experimenting with our eyes, the most precious sense we have? Remember the words of the legendary American president Abraham Lincoln: 'If once you forfeit the confidence of your fellow-citizens, you can never regain their respect.'

N.B.: The *Review study on the stage 6 requirements of Commission Regulation (EC), No 244/2009. Final Report*, p. 17 shows a fatal flaw. Is it the intention of the Commission to back the mercury in CFLs on a miscalculation? The (wrong) conclusion was: *For the same number of hours (6 000h) you need 50W halogen lamps for the same light output, emitting 480 mg Hg or almost 5 times more.*

[Annex 2 gives more information.](#)

LightingEurope wants to postpone the ban on halogen lamps. The ban on the incandescent light bulbs did not provide the expected sales volume of CFLs. They want no repetition of this nasty story regarding halogen lamps. The question is however, if a postponement until 2018 will be enough.

Conclusion

A ban on halogen lamps in 2016, 2018 or 2019 is no option. Incandescent and halogen lamps must remain available as long as no real alternatives exist.

B. Development of the CO2 argument

The question is if it is ethically allowed to ban qualitative better lamps, such as incandescent and halogen lamps, and admit more polluting lamps only because these modern lamps are more energy efficient? Is it justifiable to endanger the eyes of the consumers because modern lighting is more profitable to the lamp manufacturers? We conclude that this measure is doing more harm than good and has to be lifted immediately.

In 2007, residential lighting represented

- 10.5% of the residential electricity consumption;
- 3% of the total electricity consumption;
- 0.63 of the total energy consumption.

1. The used type of power plants is the cause of the CO2 emission.

The lighting manufacturers used the argument of the CO₂ emission to justify the ban. They succeeded to link the CO₂ emission, not to the power plants, but to lamps!! The message was that more efficient lighting could reduce the CO₂ emission. It is known that CO₂ and mercury emission is mainly due to the widespread use of coal fired power plants. Greenpeace choose to ignore the negative effects on the environment from CFLs and backed the proposal of the big light companies, crushing 10,000 incandescent bulbs in Berlin on 20 April 2007, made at their disposal by big lighting companies. If CFLs had been used, a whole quarter should have been evacuated!

2. Only a small percentage of the energy production is intended for residential lighting. A large-scale use of CFLs will not lead to a reduced cost. Lamps are on, even when the residents are not present. Illnesses as a consequence of modern lighting does increase the medical costs. The damage inflicted to the environment (mercury, rare earth materials) can hardly be calculated.

3. It would be better to focus on residential heating. The cost of all residential heating systems is much more important than light bulbs. Much more energy would be saved if authorities are focusing on that item.

4. Most important is to reduce the CO₂ emission from power plants. Now we see the opposite trend. Due to the cheap coal from the United States, more countries are building coal fired power plants, what results directly in more CO₂. People does not accept that unbearable burdens are laid on their shoulders while the authorities are setting bad examples to others.

Annex 1

On which grounds did the Commission admit lamps with the dangerous pollutant mercury?

In “*Preparatory Studies for Eco-design Requirements of EuPs, Final Report, Lot 19: Domestic Lighting*”, VITO, 2009, the conclusion was that the mercury emitted over lifetime per lumen per hour was

- 1.51 ng for a frosted incandescent lamp,
- 1.45 ng for a clear incandescent lamp and
- 1.34 ng for a compact fluorescent lamp (p. 172).

The difference between the three lamps is not fundamental. But this was the result of the false assumption that the mercury emitted to air for the production of 1 kWh was 0.016 mg. Today, in 2013, the European Commission still relies on this same number!

How can be calculated the real emission data from the power plants in the European Union?

1. The data concerning the pollutant releases of mercury can be found on the webpage of E-PRTR (European Pollutant Release and Transfer Register)
[\[http://prtr.ec.europa.eu/PollutantReleases.aspx\]](http://prtr.ec.europa.eu/PollutantReleases.aspx)

Data are available for the years 2007 to 2011.

Specifications to fill in:

- Country: EU-27
- Year: ...
- Region
- Pollutant Group: Heavy metals
- Pollutant: Mercury and compounds (as Hg): Releases to Air, Water, Soil.
- Activity: Industrial activity
- Sector: 1. Energy sector
- Activities: 1.(c) Thermal power stations and other combustion...
- Search, Contents, Activities

Date of consultation: 2 November 2013

| | Facilities | Air (tons) | Water (tons) | Soil (tons) | Total Hg (tons) |
|------|------------|------------|--------------|-------------|-----------------|
| 2007 | 218 | 18.3 | 4.36 | 0.0027 | 22.663 |
| 2008 | 220 | 20.0 | 0.109 | 0 | 20.109 |
| 2009 | 204 | 16.2 | 0.246 | - | 16.446 |
| 2010 | 215 | 16.0 | 0.243 | - | 16.243 |
| 2011 | 213 | 16.3 | 0.149 | - | 16.449 |

2. The net electricity generation in the EU-27 can be found in http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Electricity_production_consumption_and_market_overview. For the year 2008, 3,203 TWh is given.
3. A correction has to be made regarding the data supplied by E-PRTR. No Hg emission is given for countries such as Austria, Bulgaria, Hungary (and Sweden) while these countries do have coal fired power plants. So, a supplementary Hg emission of 0.885 tons has been added (= estimate), proportional to the emission in the other countries using coal fired power plants. The total Hg emission by power plants amounts then to $(20.109 + 0.885 =) 20.994$ tons.

What's then the amount of the Hg-emission per kWh? $(20,994,000,000 \text{ mg}) / (3,203,000,000,000 \text{ kWh}) = 0.00655 \text{ mg/kWh}$ (instead of 0.016 mg/kWh)

Evolution of the Hg emission in EU-27 from 2007 to 2011

| | Hg emission (kg) | Correction 4.4% (estimate) | Sum Hg emission (kg) | Net electricity generation (TWh) | Hg emission/kWh (mg) |
|------|------------------|----------------------------|----------------------|----------------------------------|----------------------|
| 2007 | 22,663 | 997 | 23,660 | 3,196 | 0.0074 |
| 2008 | 20,109 | 885 | 20,994 | 3,203 | 0.0065 |
| 2009 | 16,446 | 724 | 17,170 | 3,045 | 0.0056 |
| 2010 | 16,243 | 715 | 16,958 | 3,181 | 0.0053 |
| 2011 | 16,449 | 724 | 17,173 | 3,180* | 0.0054 |

(*) This number is a good estimate but has still to be validated.

To elucidate this question, on 23 April 2013, the Belgian MEP Frank Vanhecke asked the Commission:

"In connection with mercury in energy-saving light bulbs, mercury emissions from power stations are being greatly overestimated, the Commission website(1) indicating a level of 0.016 mg/kWh. On the basis of this inflated figure, the report by VITO and the Commission concluded that the mercury content of energy-saving light bulbs, with their lower power consumption and longer duration, was more than offset by the reduction in mercury emissions from coal-fired power stations. However, mercury emissions from power stations are in fact much lower, which means that the use of energy-saving light bulbs cannot be justified on the basis of the VITO report.

How many years is it necessary to go back to arrive at the emission levels quoted by the Commission?

Was it justified to defend the use of energy-saving light bulbs on the basis of outdated values?

At the Minamata Convention, the UNEP took steps to have certain types of energy-saving light bulb banned by 2020. Should the EU not follow suit by banning all energy-saving light bulbs containing mercury?"

(1) http://ec.europa.eu/health/scientific_committees/opinions_layman/mercury-in-cfl/en/mercury-cfl/l-2/3-emissions-risk-environment.htm

The answer was:

Answer given by Mr Oettinger on behalf of the Commission

The ban laid down in Regulation (EC) No 244/2009 was based on the most up to date data available at the time. These were drawn from the 'European Reference Life Cycle Database'⁽¹⁾ (ELCD) developed by the Joint Research Centre, together with other Commission services. The life cycle data used as one input to the decision (taken in 2009) were valid for the period 2002-2010 and they still constitute the official EU-level information available. A publication of new energy data in the ELCD is foreseen for 2013.

The regulation is to be reviewed by 2014. That will be the time to consider how the EU framework for energy-saving lighting should be further developed. In the meantime, the Commission would draw the Honourable Member's attention to the fact that, under Directive 2011/65⁽²⁾, the mercury content of Compact Fluorescent Lamps (CFL) in the EU was halved as from January 2013 to a maximum of 2.5 mg (compared to 50 milligrams in cell batteries and 500 milligrams in amalgam dental fillings).

In many countries outside the EU, the mercury content of compact fluorescent lamps is unregulated or allowed to be considerably higher. The Minamata convention does not aim to ban all compact fluorescent lamps but to establish a worldwide ban of certain types of CFL — types which are already banned in the EU under the legislation mentioned above.

(1) <http://elcd.jrc.ec.europa.eu/>

(2) Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, OJ L 174,1 pp. 0088-0110.

I conclude that an artificial high number has been maintained only with the purpose of justifying the use of mercury in certain lamps. This is a manipulation of history and is unacceptable. One ascertains that the Hg emission has a reducing trend due to EU legislation. The mercury emission in 2007 was much higher than the emission in 2011. But, due to the larger use of coal fired plants (e.g. Germany), it is possible that the Hg emission will grow again during the next years.

It must be clear that nothing is wrong concerning the incandescent light bulbs. They do emit neither CO₂ nor mercury. The authorities are responsible for the production of clean energy. If they do not succeed, they are to be blamed, not the lamp types. In a country such as Sweden, only 2.5 % of the electricity was generated by fossil fuels. In these conditions, each use of mercury containing lamps is directly hazardous to the environment. Also, the CO₂ story has no significance in this country.

Annex 2

Comparison of the mercury emission from halogen lamps and CFLs

Review study on the stage 6 requirements of Commission Regulation (EC), No 244/2009. Final Report, p. 17, (footnote):

“Currently the average EU mercury emission of power generation is around 0.016 mg Hg per kWh electricity. For a 10 W CFL, operating 600 h per year (5 kWh/yr) during 10 years this means a mercury emission from electricity generation of 96 mg, to which a maximum of 3.5 mg needs to be added (if no mercury is recovered, which is not usually the case) to come to a total of 99.5 mg Hg. For the same number of hours (6 000h) you need 50W halogen lamps for the same light output, emitting 480 mg Hg or almost 5 times more.”

One finds two mistakes in this short text.

1. In the “*Preparatory Studies for Eco-design Requirements of EuPs, Final Report, Lot 19: Domestic Lighting*”, VITO, 2009, p. 112-113, the proposed “rule of thumb” is an equivalence of 4:1, i.e. a 40W *incandescent* lamp will be replaced by a 10W CFL. And Osram applies the rule that a *halogen* lamp is about 20% more efficient than an incandescent lamp. A halogen lamp of 32W is thus equivalent to an incandescent lamp of 40W. Instead of 50W halogen = 10W CFL, the real equivalence should be: a 32W halogen = 10W CFL.
2. A miscalculation is found.

Calculation using the values assumed by VITO

| | CFL | Halogen |
|--|---|---------------------------------|
| Watt | 10 | 50 |
| Duration (hours) | 6000 | 3 lamps, each 2000 h (= 6000 h) |
| Mercury emission from power plants | 0.016 mg/kWh | |
| Mercury emission from electricity generation dependent on the type of lamp | 60 kWh x 0.016 mg/kWh = 0.96 mg | 300 kWh x 0.016 mg/kWh = 4.8 mg |
| Mercury content in the lamp | 3.5 mg | 0 mg |
| Total mercury emission | 0.96 mg + 3.5 mg = 4.46 mg | 4.8 mg |
| Conclusion | The emission of Hg using halogen lamps is only a little more than the emission of Hg from CFLs. | |

The error has to be found in this calculation:

- CFL: 60 kWh x 0.016 mg/kWh = 0.96 mg (NOT 96 mg!)
- halogen: 300 kWh x 0.016 mg/kWh = 4.8 mg (NOT 480 mg!)

Calculation with the real equivalence (32 W halogen = 10W CFL)

| | CFL | Halogen |
|--|---|-------------------------------------|
| Watt | 10 | 32 |
| Duration (hours) | 6000 | 3 lamps, each 2000 h (= 6000 h) |
| Mercury emission from power plants | 0.016 mg/kWh | |
| Mercury emission from electricity generation dependent on the type of lamp | 60 kWh x 0.016 mg/kWh = 0.96 mg | 192 kWh x 0.016 mg/kWh = 3.07 mg |
| Mercury content in the lamp | 3.5 mg | 0 mg |
| Total mercury emission | 0.96 mg + 3.5 mg = 4.46 mg | 3.07 mg |
| Conclusion | The emission of Hg using halogen lamps is much lower than the emission of Hg from CFLs. | |

Calculation using the real values of mercury emission (0.006 mg/kWh) and the real equivalence (32W halogen = 10 W CFL)

| | CFL | Halogen |
|--|---|-------------------------------------|
| Watt | 10 | 32 |
| Duration (hours) | 6000 | 3 lamps, each 2000 h (= 6000 h) |
| Mercury emission from power plants | 0.006 mg/kWh | |
| Mercury emission from electricity generation dependent on type of lamp | 60 kWh x 0.006 mg/kWh = 0.36 mg | 192 kWh x 0.006 mg/kWh = 1.15 mg |
| Mercury content in the lamp | 3.5 mg | 0 mg |
| Total mercury emission | 0.36 mg+ 3.5 mg = 3.86 mg | 1.15 mg |
| Conclusion | The emission of Hg using CFLs is more than three times higher than the emission of Hg from halogen lamps! | |

The conclusion of VHK/VITO was: “For the same number of hours (6 000h) you need 50W halogen lamps for the same light output, emitting 480 mg Hg or almost 5 times more.”

This should be: “For the same number of hours (6 000 h) you need 32 W halogen lamps for the same light output, emitting 1.15 mg Hg, or less than one third of the Hg emission as the consequence of the use of CFLs.”

More information about this calculation can be found in http://users.skynet.be/fc298377/EN_EU.htm.

Rik Gheysens