Position Statement on the Phasing-out of Fluorescent Lamps

December 2021

About the Global Lighting Association

The Global Lighting Association (GLA) is the voice of the lighting industry on a global basis. GLA shares information on political, scientific, business, social and environmental issues of relevance to the lighting industry and advocates its position to relevant stakeholders in the international sphere

Introduction

This document outlines the global lighting industry's position in relation to the 4th Meeting of the Conference of the Parties to the Minamata Convention on Mercury (specifically, COP-4.2 scheduled for March 2022).

Because of the widespread transition to LED technology over recent decades, the world's lighting industry has considerably reduced the content of mercury in fluorescent lamps[1]. In 2015, the amount of mercury in lamps placed on the global market represented just 1% of total anthropogenic mercury emissions (see UNEP reports[2,3]). This figure has reduced even further because of the ongoing transition to solid state lighting. The Global Lighting Association is firmly committed to further reductions of mercury, where it is feasible to do so.

LED replacement lamps

Lighting innovations based on LED technology over the last decade have proven to be a credible alternative for new lighting installations. However while LED plug-and-play replacement lamps can be a temporary bridge technology towards more efficient LED fixtures, it is not yet feasible to exchange traditional non-integrated lamps (LFL, CFL.ni) for a majority of existing installations (see GLA regional status, Annex 1). This is because such lamps are either not technically compatible[4], not warranted by manufacturers[5], or not permitted due to non-compliance with certification and safety related building requirements[6] (see Annex 1).

In the absence of functioning plug-and-play alternatives, users will need to rewire or replace a majority of existing fixtures world-wide, involving certified and skilled installers to ensure the safety and quality of the LED replacement [6]. These adaptations or replacement of fixtures will be the predominant society costs of the transition to solid state lighting (see Annex 2). The financial, human and supply chain resources associated with such an enormous operation require careful long-term planning (see Annex 2).

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[1] LightingEurope Minamata position paper, July 2020

[2] UN Global Mercury assessment, 2018 (page 12)

[3] UN Mercury Supply trade and demand study, 2017 (table 12, page 46) 2017

[4] The sensitivity data set on the level of compatibility included in the recent OEKO report July 2020 table 2.2 represents a realistic approach for Europe as it includes all performance and application requirements as well as non-warranty warnings of manufacturers for many installations (see Annex 1)

[5] See technical specification company documentation of brands such as PHILIPS, OSRAM, Tungsram

[6] UNEP Review Annex AB Compilation report UNEP/MC/COP.4/INF/3 - Aug 2021 – LEDVANCE/ JLMA contribution

Importance of a smooth transition to LED lighting

A gradual and manageable transition to LED-based lighting is recommended in order to avoid disruptions and shortages in the supply chain. An abrupt transition will make it extremely challenging to ramp up production of critical components such as power transistors and integrated circuits, particularly in view of current supply chain problems. A gradual transition will also provide more time for innovation to improve LED plug-and-play compatibility. In addition it will provide customers the right to repair and service their existing lighting equipment. In the absence of a gradual transition customers may be driven to highly inefficient incandescent lighting[1] or sub-standard LED products which persist in many markets.

Abruptly phasing out LFL lamps, as proposed for consideration at the Minamata COP 4 convention[7], is premature and currently unrealistic for many regions. Should the ban be implemented, it would cause significant problems for the existing installed fixture base and for the supply chain, as linear LED plug-and-play replacement alternatives are technically not compatible for a majority of fluorescent lamp fixtures world-wide (see Annexes 1 and 2). It would make plug-and-play servicing with LED replacement lamps unfeasible for a majority of existing installations in all regions. The Global Lighting Association is promoting a sustainable transition to more energy efficient LED fixtures to replace fluorescent lamps.

A possible roadmap to reduce demand for LFL lamps is to restrict or discourage by national law new traditional fixtures intended and certified for these lamps, while allowing LFL spare part lamps for existing installations. GLA members have ceased offering these fixtures in many regions. Such an initiative is likely to accelerate the transition to more efficient LED fixtures, similar to the current transition to electric vehicles that makes significant progress but takes time to effectively implement.

Proposed amendments to Minamata Convention text

The Global Lighting Association has evaluated the proposals[7] of the African-region and the European Union to phase out CFL.i, LFL and CCFL/EEFL[8] lamps, and recommends revising the current wording[9] of Part I of Annex A of the Minamata Convention (2013) by adding the following (revisions in italics):

Mercury-added products	**Date after which the manufacture, import or export of the product shall not be allowed (phase-out date)**
Compact fluorescent lamps (CFLs) for general lighting purposes that are ≤ 30 watts *(a) integrated compact fluorescent lamps (CFL.i)* *(b) non-integrated compact fluorescent lamps (CFL.ni) with a mercury content exceeding 5 mg per lamp burner*	*2026*
Linear fluorescent lamps (LFLs) for general lighting purposes: (a) Triband phosphor < 60 watts with a mercury content exceeding 5 mg per lamp; *(b) Halophosphate phosphor ≤ 40 watts with a mercury content exceeding 5 mg per lamp*	*2025*

[7] Proposals submitted by the European Union and the African region to amend Annex A: Part I

[8] Cold cathode fluorescent lamps (CCFL) and external electrode fluorescent lamps (EEFL) are (non-integrated) lamps used for niche applications such as electronic displays, instrumentation and monitoring equipment.

[9] UN Minamata Convention Text and Annexes, 2013

ANNEX 1

Electrical compatibility ratio and suitability of LED plug-and-play replacement lamps

A LED replacement lamp designed for plug-and-play must have the following features:

- be compatible with the fixture's electronic driver or ballast and fits properly in the fixture
- use permitted in the installed fixture and application
- delivers a comparable quality of light appropriate for the application
- can be used for servicing without adaptations or replacement of the fixture

LED replacement lamps can only be used in combination with certain compatible drivers/ballasts, installed inside the fixture, and for certain permitted applications.

The electrical compatibility ratio indicates the ratio of existing installed fixtures/drivers/ballasts which can be serviced with LED plug-and-play replacement lamps without adaptation or replacement of the fixture. The Global Lighting Association has undertaken a survey of its members to determine the compatibility ratio across regions.

1. Regional electrical compatibility of LED plug-and-play replacement lamps

Results of GLA's survey appear in the table below and demonstrate that the electrical compatibility ratio for typical LED plug-and-play lamps varies significantly. Non-compatible lamps are either not technically compatible[4] , not warranted by manufacturers[10], or not permitted due to non-compliance with certification and safety-related[6] building requirements from insurance companies.

Region	Electrical compatibility status of LED plug-and-play lamps for installed fixtures and applications
Europe[4]	50%
USA	10-50 %
Brazil	< 10 %
India	nearly 0%
China	30-50 %
Japan	< 10 %
Africa	unclear
Rest of Asia	unclear

Table 1: GLA regional survey on the electrical compatibility ratio across regions

Reasons for non-compatibility include:

- Performance issues (e.g. failure to start, constant flickering, abnormal temperatures, lifetime failures, electromagnetic interference)
- Technically not possible or not permitted for use in certain installations (e.g. dimming, serial circuit and emergency lighting fixtures due to IEC 62776, IEC 60598-2-22 standards and building requirements)
- Not warranted by the manufacturer's LED lamp specification documents on driver compatibility10

[10] See technical specification company documentation of brands such as PHILIPS, OSRAM, Tungsram.

Recommendation

It is recommended that LFL, CFL.ni and CCFL/EEFL lamps be retained to enable customers plug-and-play servicing of a majority of existing fixtures, electronic displays etc.

2. Electrical compatibility ratio definition

GLA's definition of the electrical compatibility ratio of LED plug-and-play replacement lamps when combined with installed fixtures/drivers/ballasts includes the following conditions:

Basic performance requirements*

- No failure to start, no constant flickering [11], no abnormal temperature rises of driver or lamp
- Meet relevant standards e.g. safety standard IEC 62776 and IEC 60598-2-22, electromagnetic interference standard EMC CISPR 15
- LED lamp manufacturer publishes a list of compatible drivers, where warranty does apply.

Application requirements*

- Non-permitted applications should be considered in the calculation of compatibility ratio (e.g. emergency lighting, dimming, serial circuits, see for example IEC 62776 and IEC 60598-2-22 standards, and building requirements).
- Ensure availability and suitability in the market and no rewiring should be required.

*** Note:** According to GLA's definition, testing for performance, maximum temperature and EMC of LED plug-and-play replacement lamp is performed with selected drivers/ballasts, representative of a family with similar electrical circuits, to be determined by the LED lamp manufacturer, where warranty applies. Installers must be skilled and are required to use compatible and certified LED lamps in order to comply with performance, maximum permitted ambient temperatures and safety requirements of the particular application (to avoid, for example, overheating[6] in narrow, closed or multi-lamp fixtures).

[11] Light flickering is light modulation which is annoying and fatiguing for humans.

ANNEX 2

Affordability and socio-economic impact of LED alternatives

As LED replacement lamps are not available for a majority of existing installations, the Convention should consider affordability an important factor. Clearly affordability will differ across regions and applications.

The results of a GLA survey with typical price index differences for replacement options for non-integrated LFL lamps are listed in the table below. The survey was based on lamps with comparable light output and publicly available information from several retail chains across different regions.

GLA survey of typical price indices - 2021	
Application replacement options	**Typical cost index (LFL-halophosphate = 100%)**
1. LFL halophosphate (36 W)	100%
2. LFL triband (36 W)	200%
3. Linear LED plug-and-play lamp (18 W) (no rewiring of fixture needed)	400%
4. Linear LED-mains-lamp (18 W) (including rewiring/adaptation of fixture)	1500%

Table 2: GLA survey across regions of typical price indices for various LFL replacement options

- Option 1: LFL – halophosphate: Use of original spare part as certified by the fixture manufacturer
- Option 2: LFL – triband: Phasing-out LFL-halophosphate lamps would force users to take a cost increase of a factor 2 for LFL triband lamps which contain more expensive and scarce rare earth minerals[12] while no energy saving is gained (power for both lamp options is the same e.g. 36W).
- Option 3: Linear LED plug-and-play lamp: Exchanging LED plug-and-play lamps for LFL triband would entail a significant price increase of a factor 4 where a plug-and-play compatible product exists. However, as is the case for a majority of existing installations, LED plug-and-play alternatives do not function[4,6] (see Annex 1) and option 4 is required.
- Option 4: Fixture rewiring and use of a linear LED mains type lamp: The need to adapt/rewire the luminaire to make it suitable for a specially-designed linear LED mains type lamp imposes an even greater cost increase of a factor 15, due to the need for engagement of a certified installer to assure safety[6], certification and warranty. This results in substantial additional costs and much longer payback periods. These high investment costs will especially impact consumers who will experience even many times longer payback periods as they use the lamp less intensively (consumer applications, such as homes, 2-3 hours a day compared to professional applications, such as offices, 8-10 hours a day).

[12] The lifetime of both LFL lamp types is similar and depends on the brand. Additionally, it may be difficult for authorities at customs to determine whether halophosphate or triband phosphors are used in a lamp type.

The foregoing demonstrates that the total costs and payback periods of a majority of the LED transitions go far beyond the actual cost/payback of the lamp, due to the cost of fixture adaptations/rewiring or due to the need to exchange the fixture. In addition, avoidable waste is generated.

The associated societal costs are difficult to determine for every region. However several socio-economic impact assessments relating to the EU market show variations in investment costs of between 65[13] – 133[14] Billion Euro. For other countries and regions, costs will depend on the ratio of non-compatibility of LED plug-and-play alternatives to the locally installed lighting equipment. At stake here are private users in homes, hospitals, schools, public transport and municipalities, among many others.

Recommendation

Phase-outs should preferably be aligned to fixture replacement cycles to enable users to service the fixture and allow time to allocate sufficient resources to transition to the alternative LED technology.

The Global Lighting Association calls for a gradual and manageable transition to LED technology as repeatedly expressed by a number of users in markets which are well underway to LED transitioning. A gradual transition will avoid potential society problems caused by incompatible products, component shortages (e.g. ICs, transistors), price increases, sub-standard products and unnecessary waste. It will also avoid significant numbers of frustrated consumers and professional users.

[13] OEKO study on socio economic impact of substitution of certain mercury-based lamps, July 2020

[14] UNEP Review Annex A-B compilation report UNEP/MC/COP.4/INF/3– Aug 2021 LightingEurope contribution