



Mercury Policy Project

Environmental NGOs Feedback on draft Delegated Directive for RoHS Exemption Categories 1a-1e Single-Capped Compact Fluorescent Lamps for General Lighting Purposes

21 July 2021

The European Environmental Bureau, the Mercury Policy Project, and the Responsible Purchasing Network¹ welcome the draft proposals from the European Commission to finally revise the annex of the RoHS directive concerning lighting, despite coming with a [5-year delay](#).

As per our letters sent in December 2019 and January 2020², February 2020³ and February 2021,⁴ we strongly urge the European Commission and DG Environment to review and remove exemptions for virtually all fluorescent and most high-intensity discharge (HID) lamps under the Restriction of Hazardous Substances for Electric and Electronic Products (RoHS) Directive, which based on the evidence, we conclude are no longer needed or justified. Phase-outs should take place at the earliest possible date, mainly for the larger categories including compact fluorescent lamps (CFLs), linear fluorescent lamps (LFLs), and low-wattage HID lamps used for general lighting applications.

Although the validity of the existing exemptions expired in July 2016, the delay in an actual decision by the Commission has led to these lamps still being allowed on the EU market, contributing to mercury pollution as well as much more expensive lighting. While more energy efficient mercury-free alternatives are available.

Mercury and its compounds are highly toxic to the developing nervous system as well as harmful to ecosystems and wildlife. Methylmercury, its most toxic form, has the capacity to bioaccumulate and bioconcentrate, especially in the aquatic food chain.

The EU via its 2005 mercury strategy, accompanied measures and as Party to the Minamata Convention on Mercury has as its objective to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

¹ NGOs include the **European Environmental Bureau, (EEB)**, www.eeb.org, is a federation of more than 170 environmental citizens' organisations based in over 35 countries in Europe. These organisations range from local and national, to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

The **Mercury Policy Project (MPP)**, a project of the Tides Center, www.mercurypolicy.org, works to promote policies to eliminate mercury uses, reduce the export and trafficking of mercury, and significantly reduce mercury exposures at the local, national, and international levels. We strive to work harmoniously with other groups and individuals who have similar goals and interests.

The **Responsible Purchasing Network**, www.responsiblepurchasing.org, is a non-profit organization based in the United States that helps government agencies, institutions, and businesses to specify, evaluate and purchase environmentally preferable goods and services.

² <https://eeb.org/library/making-the-case-for-a-ban-on-mercury-lamps/>

³ <https://eeb.org/library/mercury-containing-lamp-exemptions-to-rohs-directive/>

⁴ <https://eeb.org/library/why-hasnt-the-european-commission-banned-wasteful-lamps/>

Furthermore, most recently, under the European Green Deal, the EC has pledged 'to ensure a toxic-free environment', to 'help to protect citizens and the environment better against hazardous chemicals and encourage innovation for the development of safe and sustainable alternatives'.

Given the global implications of the RoHS directive, making definitive decisions without further delay to end the exemptions for compact and linear fluorescent lamps, will confirm and demonstrate the EU's commitment to the health and environmental objectives described above.

1. Introduction

As explained in our comments below, equivalent products with no mercury are widely available in the European marketplace and around the globe as lamp makers often advertise. They are listed in the online catalogues of multiple large and small lighting manufacturers such as Osram, Tungsram and Philips. Most importantly, drop-in replacement light-emitting diode (LED) *mercury-free* lamps, retrofit kits and fixtures are not only widely available but are also more energy-efficient and have a longer rated life than most types of fluorescent and HID lamps used for general lighting applications. In addition, LEDs are now cost competitive, giving consumers the opportunity to save money when cut energy, replacement, and waste disposal costs are considered.

It is clear that the lighting sector is a fast improving one in term of availability, performance, and price of LED lamps; therefore, policy decisions can and should go beyond of the current market as relevant.

Moreover, LEDs are more acceptable to consumers than CFLs and other types of mercury-added lamps because they are more easily dimmable and give off a higher quality of light. They also last longer, which benefits consumers' pocketbooks because LEDs don't have to be replaced as often. In addition, they don't break as easily. According to *Business Matters Magazine*⁵, there are many benefits to using LEDs, including:

1. LED lights last far longer than incandescent or halogen bulbs.
2. They are highly energy-efficient, converting most of their energy into light, rather than heat.
3. They are ecologically sound because they are mercury-free and have a long life, reducing the user's carbon footprint.
4. LEDs are very tough and durable, making them able to "stand up to harsh weather, vibrations, shocks, and abrasions."
5. LEDs are a safe light source, that can offer excellent colour rendering and great quality light; they have almost no UV emissions, making them good options for museums and food pantries,
6. LEDs offer great design flexibility: "LED light arrays can be placed and combined in an infinite number of ways to produce efficient – but also controllable – illumination. The colour, shade, brightness and distribution of light can be controlled to perfection, which makes for not only technically-useful lighting, but also soothing, uplifting, or energising mood lighting."
7. They work well in extreme temperatures, including freezers, unlike most fluorescent lamps.
8. They work instantly with no warm-up time and can be turned on an off many times without reducing their performance.
9. They work on low-voltage power, so they can be used outside.

⁵ "The Top Nine Benefits of Using LED Bulbs," *Business Matters Magazine*, 10 November 2016, <https://www.bmmagazine.co.uk/in-business/top-nine-benefits-using-led-bulbs/>

2. Analysis and recommendation

Our comments below refer to draft delegated acts concerning the following lamp category:

Exemption 1(a-e): Revoking Exemptions for Mercury in Single-Capped Compact Fluorescent Lamps for General Lighting Purposes within 12 Months

"Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):

(a) For general lighting purposes < 30 W: 2.5 mg

(b) For general lighting purposes ≥ 30 W and < 50 W: 3.5 mg

(c) For general lighting purposes ≥ 50 W and < 150 W: 5 mg

(d) For general lighting purposes ≥ 150 W: 15 mg

(e) For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm", 5mg

COM proposals for Exemption as per Directive 2011/65		COM proposals	EEB/ RPN/MPP Recommendation
Category 1: "Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):			
1(a)	<i>For general lighting purposes < 30 W: 2,5 mg</i>	<i>Expires on [PO: 12 months after the adoption of the Delegated Directive]</i>	<p>We strongly support the Commission's proposal to revoke RoHS Directive Exemptions for these categories of CFLs, on the basis that more energy-efficient and long-lasting compact LED lamps are widely available for all of these categories of lamps.</p> <p>We do agree and recommend that all of these exemptions be revoked with a 12-month transition period, especially pin-based models.</p>
1(b)	<i>For general lighting purposes ≥ 30 W and < 50 W: 3,5 mg</i>	<i>Expires on [PO: 12 months after the adoption of the Delegated Directive]</i>	
1(c)	<i>For general lighting purposes ≥ 50 W and < 150 W: 5 mg</i>	<i>Expires on [PO: 12 months after the adoption of the Delegated Directive]</i>	
1(d)	<i>For general lighting purposes ≥ 150 W: 15 mg</i>	<i>Expires on [PO: 12 months after the adoption of the Delegated Directive]</i>	
1(e)	<i>For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm: 5mg</i>	<i>Expires on [PO: 12 months after the adoption of the Delegated Directive]</i>	

Summary – 4000 characters text

The European Environmental Bureau, the Responsible Purchasing Network and the Mercury Policy Project, strongly support the Commission's proposal to revoke RoHS Directive Exemptions for these categories of CFLs on the basis that more energy-efficient and long-lasting compact LED lamps are widely available for all of these categories of lamps.

We agree and recommend that all of these exemptions be revoked with a 12-month transition period, especially pin-based models, also as per our earlier submissions [in 2015](#) and [2020](#), and additional reasons below.

- As confirmed by the European Commission's consultant Oeko Institut⁶ (July 2020), there are significant environmental and socio-economic benefits by a 2021 phase out of fluorescent lamps:

- €29.9 billion Euros net savings for Europe
- 309 TWh electricity savings (92.1 million metric tonnes CO₂)
- 2.9 metric tonnes of Hg in lamps (+2.48 metric tonnes power station).

- Taken together, this category of single-capped linear fluorescent lamps was estimated to account for approximately 33% of the mercury use in all lighting products in Europe. [Oko-Institut, 2016](#).

- Mercury emissions reductions from phasing out CFLs result from the avoidance of mercury releases into the environment from broken and improperly disposed lamps as well as from the lowering of electricity demand, which prevents mercury from being released into the environment from coal-burning power plants.

- There are already thousands of direct, drop-in *mercury-free* LED retrofits available on the market, especially for screw-based CFLs. In addition, according to the [Sweden-CLASP report \(see pages 86-93\)](#), 85% of CFLni sockets can be replaced by an available LED lamp. (https://www.clasp.ngo/wp-content/uploads/2021/01/SEA-CLASP-Clarifications-on-Industry-Comments_final.pdf#page=87).

- There are important financial and mercury savings that have been lost due to delays already relative to [Oko-Institut report](#) published in July 2020, as estimated in the most recent [June 2021 CLASP study \(https://www.clasp.ngo/research/all/how-many-years-does-it-take-the-european-commission-to-change-a-toxic-lightbulb/\)](#) with a delay likely to be 2 years relative to Oko-Institut report calculation. Continuing to allow CFLnis (as well as T8 and T5 fluorescent lamps) on the market, will cost bill-payers an estimated €16.8 million per day in lost efficiency savings for the next 2 years.

- Industry had ample time to adapt to these changes given that already the 2016 Oko institut report had recommended a phase-out of these lamps by January 2018. Furthermore, it is regrettably clear that industry is [promoting a strategy to keep fluorescent lamps on the market for as long as possible](#), and thereby profiting from these delays, contrary to their sustainability claims from their own websites.

Therefore, it is imperative that no more delays occur in the decision-making process; otherwise, mercury will keep being added to the environment, additional CO₂ will be emitted into the atmosphere, and millions of Euros will be lost each day as [recent studies show](#).

We strongly support the Commission's proposal to phase out single-capped compact fluorescent lamps, revoking Exemptions 1(a) – 1(e) in 12 months. This action is consistent with the EU's Ecodesign Directive, which includes a scheduled phase-out of screw-based CFLs on 1 September 2021 because of their notoriously poor energy efficiency rating.⁷ LED replacements for pin based CFLi's are found in

⁶ https://ec.europa.eu/environment/pdf/waste/rohs_eee/Study%20on%20the%20socio-economic%20impact%20of%20substitution%20of%20certain%20mercury-based%20lamps%20-%20Update%202020.pdf

⁷ <https://eeb.org/library/making-the-case-for-a-ban-on-mercury-lamps/>

comparably prices while CFLni lamps have “very attractive payback periods between 1.3 and 3.0 years.” ([SEA/CLASP Report](#), 12 December 2019)

We concur with the Commission’s conclusion in its [Draft Delegated Directive](#) that, “the scientific and technical assessments, including stakeholder consultations, detailed that none of the exemption criteria are met with regard to exemption 1(a) to (e). In particular, the assessments concluded that mercury-free alternatives are already widely available. The availability of substitutes has furthermore been documented and calculations based on this evidence on the socioeconomic impacts of substituting mercury have shown to result in overall savings and overall benefits in terms of environmental, health and consumer safety.”

Compact LED lamps are not only more energy-efficient than CFLs, they also last much longer. For example, while CFLs typically have a rated life of 6.000-12.000 hours, compact LED lamps typically have a rated life of 15.000-50.000 hours. The [SEA/CLASP report](#) found LED replacements for CFLs has 2,7-5 times longer than the CFLs they are replacing.

We support the Commission’s proposal to revoke the 1(a) – 1(e) exemptions with a 12-month transition as per our earlier submission [in 2015](#) and [2020](#), and for the following reasons:

1. As confirmed by the European Commission’s consultant Oeko Institut⁸, there are significant environmental and socio-economic benefits by a 2021 phase out:
 - €29.9 billion Euros net savings for Europe
 - 309 TWh electricity savings (92.1 million metric tonnes CO₂)
 - 2.9 metric tonnes of Hg in lamps (+2.48 metric tonnes power station).
2. Taken together, this category of single-capped compact fluorescent lamps was estimated to account for approximately 33% of the mercury use in all lighting products in Europe. [Oko-Institut, 2016](#).
3. According to the [Sweden-CLASP report: Clarifications on Europe’s Comments to the RoHS Committee A report for the Committee on the Restriction of Hazardous Substances \(RoHS\) addressing Lighting Europe’s Comments of 20 May and 9 June Relating to the Exemption Application for Fluorescent Lighting](#), there will be significant environmental and financial impacts if the Commission delays the phase-out of Exemptions for T8, T5 and CFLni fluorescent lamps, including:
 - Significant benefits with a 2021 phase-out for CFLni, T5, and T8 fluorescent lamps (avoided mercury use and CO₂ emissions, energy/lamp, and electricity savings); and
 - Mercury from lamps is released, pollutes environment and is a health risk (including 50-83% incorrect disposal)
 - The Environmental benefits from a phase-out of CFLni fluorescent lamps, alone, are detailed in the table below, which is excerpted from the [SEA/CLASP report](#).

⁸ https://ec.europa.eu/environment/pdf/waste/rohs_eee/Study%20on%20the%20socio-economic%20impact%20of%20substitution%20of%20certain%20mercury-based%20lamps%20-%20Update%202020.pdf

Table 34. Environmental Benefit from Phase-Out of CFLni fluorescent lamps in Europe⁵⁶

Benefits of CFLni phase-out in Sept 2021	Cumulative Savings (2021-2035)
Electricity Savings and Avoided CO ₂ Emissions	28.4 TWh (8.4 MT CO ₂)
Mercury Savings – Lamps and Power Plant Emissions (kg Hg)	856 kg – lamps 227 kg – power plant 1083 kg - TOTAL

Source: Electricity and mercury in lamps from Öko-Institute report, 10 July 2020; CO₂ and mercury emissions from power plant estimates by SEA/CLASP.

4. There are already thousands of direct, drop-in *mercury-free* LED retrofits available on the market, especially for screw-based CFLs. In addition, according to the [Sweden-CLASP report \(see pages 86-93\)](#), 85% of CFLni sockets can be replaced by an available LED lamp. (https://www.clasp.ngo/wp-content/uploads/2021/01/SEA-CLASP-Clarifications-on-Industry-Comments_final.pdf#page=87)

Some examples include:

- There are currently nearly 12,000 models of single-capped compact fluorescent lamps with an integrated driver (i.e., CFLi's) on the [ENERGY STAR list](#), which is maintained by the US Environmental Protection Agency. These products are available in a wide array of lamp and base types, shapes, sizes, wattages, and color temperatures. See screen shot showing variety of CFLs on the ENERGY STAR list. (In comparison, only 10 models, total, remain on the ENERGY STAR list.)

<input type="checkbox"/> A15 (125)	<input type="checkbox"/> CFL Bare Spiral (10)	<input type="checkbox"/> PS30 (4)
<input type="checkbox"/> General Purpose (A19) (3304)	<input type="checkbox"/> F10 (2)	<input type="checkbox"/> R14 (5)
<input type="checkbox"/> A21 (640)	<input type="checkbox"/> F15 (4)	<input type="checkbox"/> R16 (10)
<input type="checkbox"/> A23 (55)	<input type="checkbox"/> G16.5 (245)	<input type="checkbox"/> R20 (347)
<input type="checkbox"/> B10 (434)	<input type="checkbox"/> G25 (484)	<input type="checkbox"/> R40 (1)
<input type="checkbox"/> B11 (306)	<input type="checkbox"/> G30 (6)	<input type="checkbox"/> S14 (3)
<input type="checkbox"/> B13 (66)	<input type="checkbox"/> G40 (24)	<input type="checkbox"/> ST (35)
<input type="checkbox"/> BA10 (103)	<input type="checkbox"/> MR16 (587)	<input type="checkbox"/> ST12 (6)
<input type="checkbox"/> BA11 (90)	<input type="checkbox"/> MRX16 (6)	<input type="checkbox"/> ST18 (4)
<input type="checkbox"/> BR30 (832)	<input type="checkbox"/> PAR16 (681)	<input type="checkbox"/> ST19 (93)
<input type="checkbox"/> BR40 (385)	<input type="checkbox"/> PAR20 (641)	<input type="checkbox"/> T10 (6)
<input type="checkbox"/> C11 (35)	<input type="checkbox"/> PAR30 (131)	<input type="checkbox"/> T8 (8)
<input type="checkbox"/> C7 (1)	<input type="checkbox"/> PAR30L (565)	
<input type="checkbox"/> C9 (15)	<input type="checkbox"/> PAR30S (355)	
<input type="checkbox"/> CA10 (199)	<input type="checkbox"/> PAR38 (1103)	
	<input type="checkbox"/> PS25 (14)	

To the right is a screenshot of the ENERGY STAR list of LED lamps, showing the wide range of lamp bulb types that are certified. Many of these products are general purpose omnidirectional lamps (e.g., A19, A21, A23, G25/30/40 globes, B10/11/13 bullets) or directional lamps (e.g., reflector floods such as PAR 38/30/20/16, MR 16, BR30/40).

ENERGY STAR-certified lamps come in a variety of wattages, replacing incandescent lamps with wattages ranging from 10W - >150W. See excerpt of ENERGY STAR list sorted by wattage equivalent.

<input type="checkbox"/> 10-24 (27)	<input type="checkbox"/> 75-99 (2243)
<input type="checkbox"/> 25-39 (369)	<input type="checkbox"/> 100-124 (1450)
<input type="checkbox"/> 40-59 (3572)	<input type="checkbox"/> 125-149 (79)
<input type="checkbox"/> 60-74 (3478)	<input type="checkbox"/> 150+ (324)

While the ENERGY STAR database does not cover Europe, the European market is expected to have a similarly large sample of models for sale. Also, Many of the

manufacturers on the ENERGY STAR list also offer products in Europe.

- There are approximately 800 models of 4-pin-based LED compact lamps that can replace 4-pin CFLni's on the US-based Design Lights Consortium (DLC) Qualified Products List. The DLC is a collaboration of utilities and lighting manufacturers based in the United States (See www.designlights.org/search/).

Moreover, according to the [SEA/CLASP report](#), 85% of sockets for CFLs with a non-integrated driver (CFLni) can be replaced by an available LED lamp.

- According to the websites of various European lamp manufacturers (e.g., Signify/Philips, LEDVance/Osram Sylvania, and Tungsram/GE), there are already thousands of direct, drop-in mercury-free LED retrofit lamps available in the European marketplace that can easily replace a CFLs⁹, including models with an integrated driver (CFLi) as well as models with a non-integrated driver (CFLni). Examples include:
 - [Tungsram \(GE\)](#), a major EU lighting equipment manufacturer, offers a variety of LED lamps that can replace single-capped CFLs, including CFLi (omni-directional, non-directional, and square shaped models) and CFLni fluorescent lamps (both 2-pin and 4-pin plug-in models). See screenshot below showing the types of single-capped LED lamps in its offering.

⁹ <https://storage.googleapis.com/clasp-siteattachments/SEA-and-CLASP-analysis-of-RoHS-exemptions-for-fluorescent-lamps.pdf>

LED Lamps

FILTER [clear all](#)

Product category

Shipment:

Base:

Bulb shape:

Wattage (W):

Lumens (lm):

Color temperature (K):

Voltage (V):



Stik



GU10



MR16



WarmDim
Candle/Spherical



GLS/Snowcone



PAR/Reflector



Plug-in



TU-D



LED HID & Mercury



Tube



Pygmy



Capsule



LED Filament

- According to Tunsgam, its LED plug-in lamps are compatible with most 4-pin CFL ballasts; see [compatibility table](#), below.



Innovation is our heritage
EST. 1896



LED Plug-in 4pin Ballast Compatibility

7.5W and 10W - GEN2

	Ballast Brand	Ballast List		Compatible	
		Single	Dual	Single	Dual
7.5W (18Weq)	TRIDONIC	PC PRO 18 FSQ b101		PC 2X18 TCO PRO	
	TRIDONIC	PC 1X18 TCD PRO		PC 1/2X18 TC PRO	
	TRIDONIC	PC 1/2X18 TC PRO		PCA 2X18/24 TCL_EXC EL one4all c	
	TRIDONIC	PCA 1/ 18 TCD ECO			
	TRIDONIC	F-CA 1/ 18 TC ECO			
	Philips			HF-P 218 PL-T/C 220-240 9137 001 553	
	Philips			HF-P 218 PL-T/C 220-240 99137 001 203	
	OSRAM	QT-M 1X26-42/230-240 S		QTP-T/E 1X18, 2X18 T/E-D/E	
	OSRAM	QT-T/E 1*18/230-240		INTELLIGENT QTI-T/E 2X18-42 DIM	
	OSRAM	QTP-T/E 1X18, 2X18 T/E-D/E			
	OSRAM	QT-D/E 1*18/230-240			
	OSRAM	QTI-T/E 1/18-57 DIM			
	HUGO	06 6975 18W TC-DEL/TEL		18W 220-240V 097554	
	HUGO			09 6955 2X18 T -DEL/TEL	
	HELVAR	EL 1/2X18DIM-C		EL 1/2X18DIM-C	
ELT	BE218-TC-5		BE218-TC-5		
VOSSLOH			TYPE ELXC 218.832		
VOSSLOH	Type ELXCc 142.835		Type ELXc 242.837 2x26-42W		
VOSSLOH	Type ELXc 142.872		Type ELXe 142.872		
TRIDONIC	PC 1/ 26/ 32/42 TCT PRO		PC 2/26/32 TCT PRO		
TRIDONIC	F/C 1/ 2X26-42 TC PRO		PC 1/2X26-42 TC PRO		
TRIDONIC	PC 1/ 2X26-42 TC PRO sr		PC 1/2X26-42 TC PRO sr		
TRIDONIC	PC 1X26W		PC 2X26-42 TC PRO		
Philips	HF-R 1 26-42 PL-T/C EII				
Philips	HF-R 126 PL-T/C 220-240				
OSRAM	QT-M 1X26-42/ 230-240 S		INTELLIGENT Qti-T/ E 2X18-42 DIM*		
OSRAM	Qti-T/ E 1X18-57 OIM		Qti-T/E 2X18-42 DIM		
OSRAM	QTP-T/E 1X26-4 2,2X26		PROFESSIONAL QTP-T/E 1 x26-42,2x26		
OSRAM	PROFESSIONAL QTP-M 1X26-42*		QT-D/E 2X26/230-240		
HUGO	26W TC-OEL/TEL 096976				
HUGO	18-42W 220-240V 097535				
HELVAR	EL 1/ 2X18-42 TCs		EL 1/2X18-42 TCs		
		* 240v flicker	* A73220400DG Not compatible * AA3945302DG Compatible		

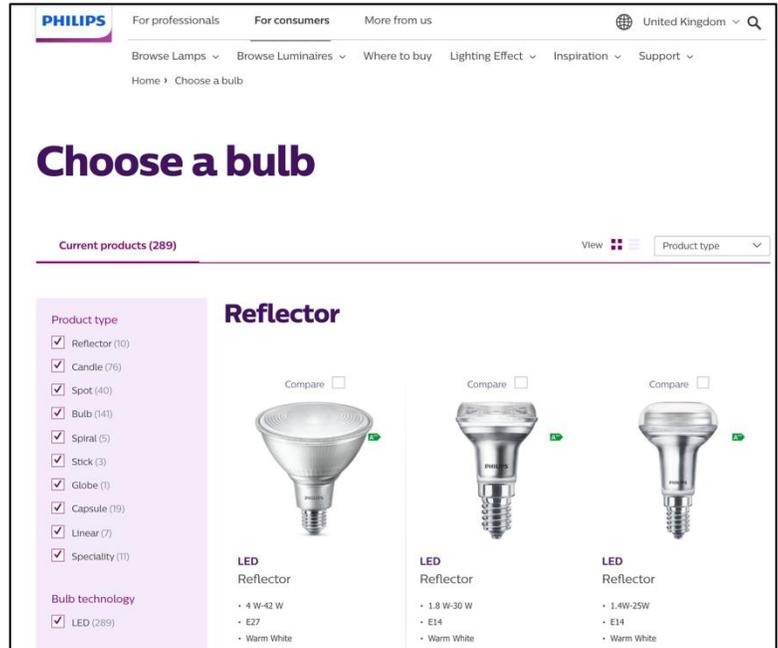
Compatible

Not compatible

NOTE!
Further ballast compatibility tests can be completed with other brands and models in case physical samples provided!

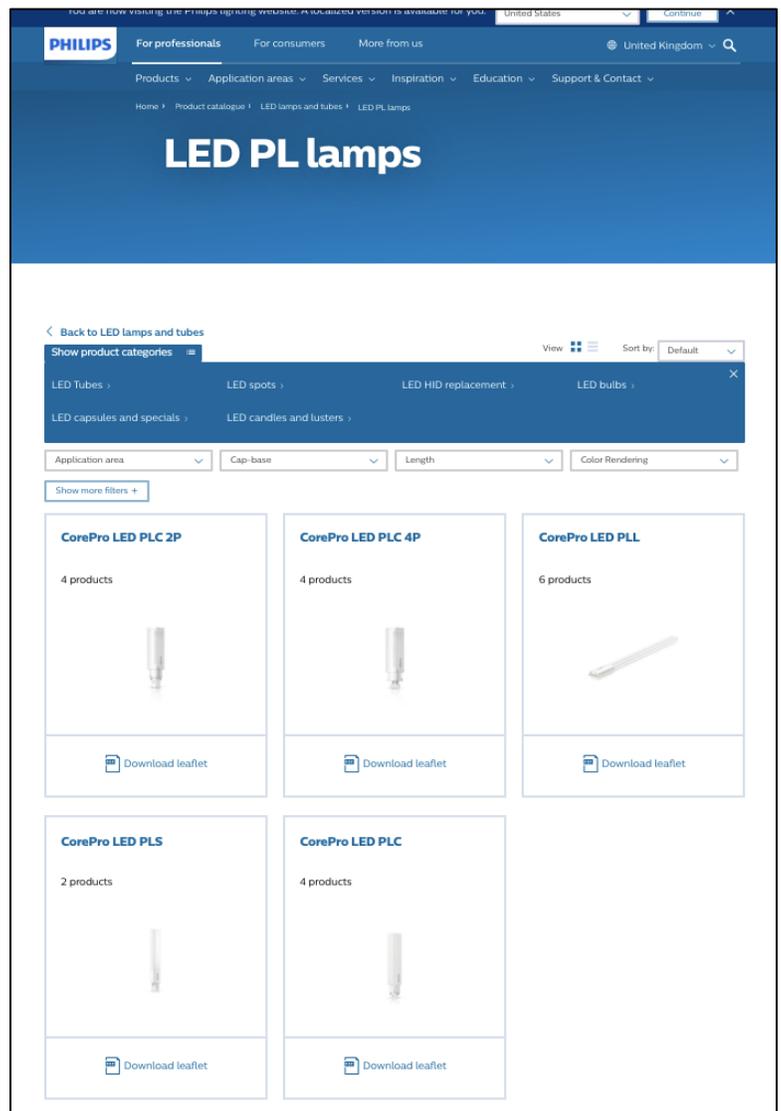
* Signify/Philips offers a wide array of LED lamps that can replace single-capped CFLs. Below are examples of these products, which include both consumer- and professional-grade LEDs. Its nearly [300 models of consumer-grade LED single-capped lamps](#) include reflector floods, globes, A-shaped lamps, etc.

See excerpt from this company's e-Catalogue, right.



Philips' professional-grade single-capped LED lamps include replacements for both CFLi and CFLni fluorescent lamps. These include replacements for 2-pin and 4-pin CFLs (e.g., its family of [CorePro PL lamps](#)), which have a "conventional form factor to fit into existing luminaires" and are the "fastest and easiest way to upgrade existing way to upgrade existing luminaires to LED technology. Its PL lamps "can be used in hospitality, retail, office, industrial and home applications and are easy to install."

See excerpt from this company's e-Catalogue showing examples of these products, right.



- LEDVANCE (Osram Sylvania) has hundreds of models of single-capped fluorescent lamps for consumer and professional applications. These include CFLi and CFLni fluorescent lamps. According to the [LEDVANCE's September 2020 LED Lamps Catalogue](#), "LEDVANCE boasts an extensive portfolio of LED lamps designed for the most varied applications and requirements of lighting professionals and customers. There are many good arguments in favour of LED lamps under the OSRAM brand in the LEDVANCE product range: up to CRI 97, VDE-certified products and a guarantee of up to five years. See screenshots of LED single-capped lamps from this catalogue, below.

OSRAM LED LAMPS FROM LEDVANCE | LED LAMPS PORTFOLIO HIGHLIGHTS

04 **OSRAM PARATHOM® PAR16**
LED reflector lamp in an attractive glass design. Design, dimensions and luminous flux comparable to an incandescent or halogen bulb, very high colour rendering index $R_a \leq 97$.
Page 77

05 **OSRAM PARATHOM® MR16**
Excellent LED replacement for low-voltage halogen reflector lamps. In a glass design, very durable and with very high colour rendering $R_a \leq 97$.
Page 80

06 **OSRAM PARATHOM® CLASSIC A 150 DIM**
First dimmable 150 W classic LED lamp in full glass. Can be operated with many common dimmers.
Page 54

07 **OSRAM HQL LED PRO**
Perfect replacement for HID lamps. In a new design, CCG-compatible, with high protection class (IP65) and a life of up to 50,000 hours.
Page 37

08 **OSRAM DULUX® F LED**
Traditional design made of full glass. CCG-compatible and can be operated on mains voltage.
Page 36

09 **OSRAM PARATHOM® SLIM LINE R7S**
Especially slim LED replacement for conventional tubular halogen lamps. Also suitable for small design luminaires thanks to compact design.
Page 52

10 **OSRAM LED SPECIAL T SLIM DIM**
First dimmable LED replacement for halogen lamps with B15d base. Ideal especially for many small design luminaires. Easy to replace thanks to compact design.
Page 48

11 **OSRAM PARATHOM® SPEZIAL T26**
Special LED lamp for fridges, design luminaires or sewing machines, for example. Very compact dimensions, good all-round light distribution.
Page 46

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

OSRAM DULUX D LED EM & AC MAINS^{1,2}

LED replacement for CFLni, 2 tubes, with 2-pin G24d base for CCG and AC mains operation

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

OSRAM DULUX F LED EM & AC MAINS^{1,2}

LED replacement for flat CFLni, 2 tubes, with 4-pin 2G10 base for CCG and AC mains operation

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

OSRAM DULUX D/E LED HF & AC MAINS^{1,2}

LED replacement for CFLni, 2 tubes, with 4-pin G24q base for ECG and AC mains operation

Compatibility list also online: ledvance.com/compatibility

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

LED PIN 12 V DIM¹

Dimmable low-voltage 12 V LED lamps with retrofit pin base

Compatibility list also online: ledvance.com/compatibility

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

LED SPECIAL T SLIM DIM¹

Dimmable slim LED lamps

Compatibility list also online: ledvance.com/compatibility

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

LED GX53^{1,2} CIRCOLUX LED^{1,2}

OSRAM LED LAMPS FROM LEDVANCE | SPECIAL LED LAMPS

LED PIN 12 V DIM¹

Dimmable low-voltage 12 V LED lamps with retrofit pin base

Compatibility list also online: ledvance.com/compatibility

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Therefore, it is imperative that no more delays occur in the decision-making process; otherwise mercury will keep being added to the environment, additional CO2 will be emitted into the atmosphere, and millions of Euros will be lost each day as [recent studies show](#).

For more information please contact:

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