

A photograph of five young children, three girls and two boys, sitting at a desk in a classroom. They are all smiling and looking towards the camera. They are wearing pink school uniforms. The classroom walls are decorated with colorful drawings and posters. A modern, circular, recessed light fixture is visible in the upper right corner of the frame.

Clean  
Lighting  
Coalition

**Let's end toxic lighting together.**

# Speakers



**Michael Scholand, LC**  
CLiC Technical Lead

- 25 years experience working on lighting technologies and policies / programs
- Served as a policy advisor to Canada, Chile, EAC, ECOWAS, Europe, Jordan, Philippines, SADC, SICA, South Africa, Tunisia, USA & more
- Supported US DOE's SSL R&D Program from 2001-2012; UNEP en.lighten/U4E 2012-2018
- MSc and BSc in Engineering and Environmental Studies



**Nyamolo Abagi**  
CLiC Partnerships Lead

- 15 years experience in Project Management, Business Development, and Operations in renewables and energy-efficiency
- Led a large private sector strategic investment in Zambia
- Managed multi-million dollar contracts promoting clean energy access in Africa
- BSc in Electrical Engineering and Mathematics





**Clean  
Lighting  
Coalition**

**The Clean Lighting Coalition (CLiC) is a coalition of industry, public health authorities, mercury experts and NGO partners who are working together to eliminate toxic mercury in lighting through the Minamata Convention on Mercury.**

# Minamata Convention on Mercury



- Named after a city in Japan that experienced extreme mercury poisoning in the 1950's
- Launched in 2013 with the goal to “**Make Mercury History**”, currently has 131 Parties to the Convention
- Seeks to eliminate mercury in products and processes worldwide, but **includes exemptions for mercury-based fluorescent lamps**.
- Rapid development and increasing accessibility and affordability of mercury-free LED lamps means those exemptions are now unnecessary
- Phasing out fluorescent lighting products by 2025 will accelerate a transition to LED lighting
- Conference of Parties (COP4) is launched in November 2021 with in-person negotiations in Q1/Q2 of 2022

# Four Key Benefits of Clean Lighting



## Health

- Remove Hg to protect public health and the environment
- Pregnant women, infants and children



## Economics

- Payback often less than 1 year, and T8 can be as low as 4 months<sup>1</sup>
- Lower utility bills and fewer lamp changes (2-3x longer life LED)



## Environment

- Eliminates mercury from the supply chain / living space / landfills
- 3.5 gigatons of CO<sub>2</sub> savings
- Equity: No dumping of old technology



## Technology

- Mercury-free LED lamps can retrofit into existing fixtures
- Over 90% of stock, no need to rewire or replace
- 50% energy savings
- High quality lighting

<sup>1</sup>[OSRAM/LEDvance website](#): “Payback of acquisition and replacement costs possible after only four months”

# Campaign Activities



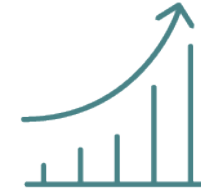
## Engage governments

- Engage government agencies with locally relevant evidence of the benefits of a lighting transition
- Support a network of “champions” and voting blocs



## Activate advocates & public

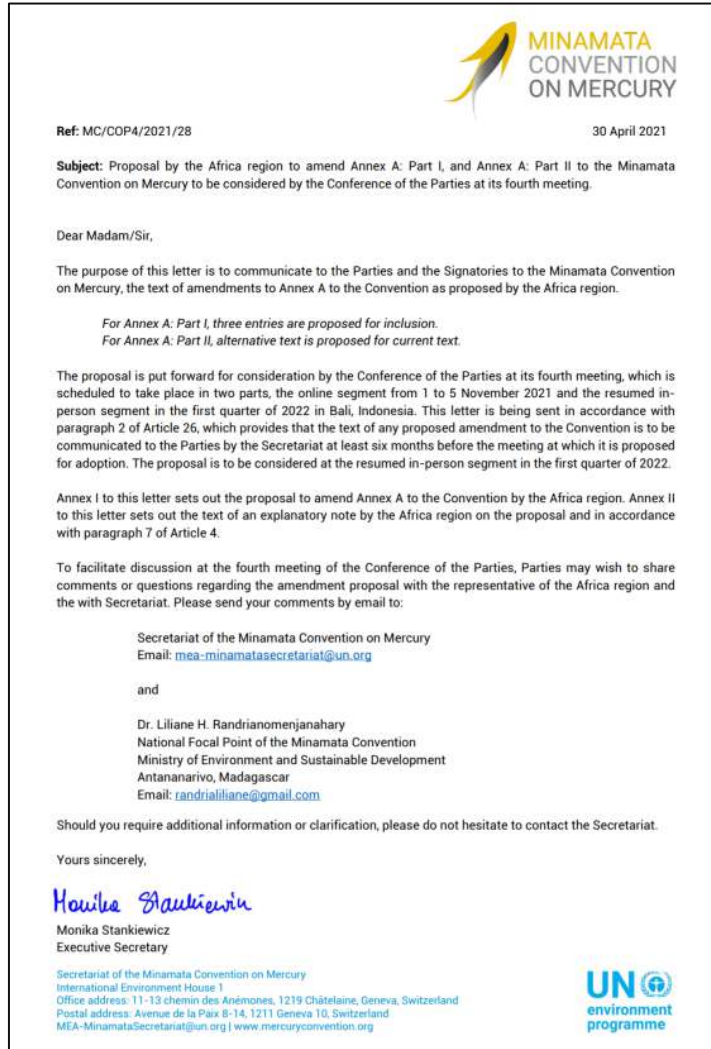
- Coordinate public health and environmental advocates and consumer groups to advance national campaigns
- Build public awareness and pressure for accelerated action



## Involve the private sector

- Work with progressive lighting companies, component makers, distributors, etc., to make an LED-only pledge
- Highlight the private-sector benefits of the transition

# The Proposed Amendment to Minamata



- 30 April 2021 – the African Amendment on Lighting was circulated to all 131 countries
- African region – 36 countries, all Parties to the Convention
- Proposes to Amend the fluorescent lamp exemptions to phase-out the following:
  - **Integrally ballasted CFLs by the end of 2024**
  - **Linear fluorescent lamps by the end of 2025**
  - **CCFL and EEFL by the end of 2024**
- CLiC Team is working to support this amendment from the African region



# Minamata and Recent Developments in Europe

	Minamata Convention Annex A	African Amendment to Annex A	EU Ecodesign for Lighting	EU Restriction of Hazardous Substances
Published	Oct 2013	April 2021	Dec 2019	June 2021
Status	Final	Final	Final	Draft
Link	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	See links below
Compact Fluorescent Lamp – integral ballast (CFLi)	CFLs for general lighting purposes that are ≤ 30 watts with a mercury content exceeding 5 mg shall not be allowed after 2020.	CFLi for general lighting purposes that are ≤ 30 watts. The manufacture, import or export shall not be allowed after <b>2024</b> .	Sets efficacy requirement that phases out CFLi on <b>1 Sep 2021</b> .	<a href="#">Click here</a> . Proposes to revoke exemptions for CFLs (all types, category 1(a) to (e)) in <b>12 months</b> . Expected phase-out: mid-2023.
CFL – non-integral ballast (CFLni)			N/A	<a href="#">Click here</a> . Proposes to revoke exemption for 20k hour CFL (category 1(g)) in <b>18 months</b> . Expected phase-out: late 2023.
Linear Fluorescent – T12	LFLs for general lighting purposes: (a) Triband phosphor < 60W with a mercury content exceeding 5 mg; (b) Halophosphate phosphor ≤ 40W with a mercury content exceeding 10 mg shall not be allowed after 2020.	LFLs for general lighting purposes, (a) Triband phosphor ≤ 60W; (b) Halophosphate phosphor ≤ 40W. The manufacture, import or export shall not be allowed after <b>2025</b> .	Sets efficacy requirement that phases out T12 on <b>1 Sep 2021</b> .	<a href="#">Click here</a> . Proposes to revoke exemptions for T12 (Cat. 2(a)(4)) in <b>12 months</b> . Expected phase-out: mid-2023.
Linear Fluorescent – T8			Sets efficacy requirement that phases out 2, 4 and 5 ft. T8 on <b>1 Sep 2023</b> . Other lengths allowed.	Proposes to revoke exemptions for T8 LFL (category 2(a)(3)) in <b>18 months</b> . Expected phase-out: late-2023.
Linear Fluorescent – T5			N/A	Proposes to revoke exemptions for T5 LFL (category 2(a)(2)) in <b>18 months</b> . Expected phase-out: late-2023
Cold Cathode and External Electrode Fluorescent Lamps (CCFL & EEFL)	CCFL and EEFL for electronic displays: (a) short length (≤ 500 mm) 3.5 mg; (b) medium length (> 500 mm and ≤ 1 500 mm) 5 mg; (c) long length (> 1 500 mm) 13 mg per lamp shall not be allowed after 2020.	CCFL and EEFL for electronic displays of all lengths. The manufacture, import or export shall not be allowed after <b>2024</b> .	Sets efficacy requirement that phases-out CCFL and EEFL on <b>1 Sep 2021</b>	<a href="#">Click here</a> . Proposes a <b>5 year extension</b> . No phase-out date.
Linear Fluorescent Lamps – Other	N/A	N/A	T2 phased out on <b>1 Sep 2021</b>	<a href="#">Click here</a> . Proposes to revoke exemptions for long life linear fluorescent lamps (cat. 2(a)(5)) in <b>12 months</b> . Expected phase-out: mid-2023.  <a href="#">Click here</a> . Proposes a <b>3 year extension</b> to non-linear fluorescent lamps (cat. 2(b)(3)) No phase-out date.



# Phasing out Fluorescent aligns with Eight of the UN's Sustainable Development Goals



# Why Join CLiC?

## CLiC aims to promote:

- The **elimination of mercury-containing lighting** through the Minamata Convention on Mercury
- Market transformation to energy-efficient **non-toxic lighting**
- **Build public awareness** and sensitization on the availability of superior alternatives to CFLs

## Regional partners benefit from:

- **Joining a broader network of stakeholders** all over the world working towards the transition to energy efficient and mercury free lighting.
- Joining the **global dialogue** towards a potential phase-out of inefficient lighting
- **Creating synergies** towards the achievement of common objectives
- **Access to a large database** with information on technical, environmental and economic feasibility of LEDs

# How to Join CLiC



Membership is free. The only obligation is to sign the partner pledge signaling:

- Commitment to **supporting the global transition** to clean and efficient lighting, protecting people and the planet from toxic mercury
- Commitment to the **phase-out/ advocate and support the phase-out** of the manufacture, sale, distribution, and/or installation of fluorescent lighting
- Commitment to advocating for and supporting an **equitable clean lighting transition**



# Partners



Lightwest





“With the proposed amendment to the Minamata Convention and implementation of national-level regulations to phase-out fluorescent lighting by 2025, countries can accelerate the transition to LED lighting technology to benefit people and the planet.”

**Professor Shuji Nakamura, Nobel Prize for Physics (2014), Inventor of Blue Light LED**

# Contact Information

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CLiC overview video: <https://www.youtube.com/watch?v=bx7xL-RthF4>





# Supporting Information / Backup Slides

# Annex A: Mercury limits for Compact Fluorescent Lamps

Mercury Added Products	Year
Compact fluorescent lamps (CFLs) for general lighting purposes that are $\leq 30$ watts with a mercury content exceeding 5 mg per lamp burner	2020

- Minamata Annex A defines CFL by wattage;  $\leq 30$  watts represents the highest sales volume of CFLs
- Mercury content per lamp is generally between 2.0 – 8.0 mg/lamp  
In Europe, RoHS limits the level to 2.5 mg/lamp
- CFLs struggled to gain consumer acceptance – long warm-up time, fragile, not easily dimmed, light colour, toxicity – mercury
- Two types of CFLs covered by Minamata:
  - Screw/Bayonet base => integrated ballast, or **CFLi**
  - Pin base => non-integrated ballast, or **CFLni**



CFLi (ballast is integrated)



CFLni (ballast is non-integrated)

# Are there mercury-free alternatives to CFLs?

- Yes, there are literally **thousands of mercury-free alternatives** to CFLi
- LED replacements come in different colour temperatures, different base types and offer both diffuse light (frosted) or not (sparkle effect).
- LED lamps were **designed as a retrofit product**
  - 100% of CFLi sockets are retrofittable
- LED has longer service life, instant full brightness, double the efficiency of CFL
- LED replacement lamps are highly cost effective, and offer the least life-cycle cost





# Are LED mercury-free alternatives to CFLi cost-effective?

- **Yes**, LED lamps are highly cost effective
- Cost-effectiveness is driving the market transition
- In South Africa, payback period was already <2 months in October 2018
- Least life-cycle cost (10 years), the LED retrofit lamp is:
  - 85% less expensive than halogen
  - 50% less expensive than CFL



Item	Halogen	CFL	LED
Life	2000 hrs (2 yrs)	6000 hrs (6 yrs)	15000 hrs (15 yrs)
Price each*	21.99 Rand	29.99 Rand	29.99 Rand
Power	60 W	15 W	8 W
Use (3hr/day)*	65.7 kWh/yr	16.4 kWh/yr	8.8 kWh/yr
Elec cost.*	82.10 Rand/yr	20.50 Rand/yr	11.00 Rand/yr
<b>10-year cost</b>	<b>953.20 Rand</b>	<b>265.30 Rand</b>	<b>139.50 Rand</b>
Payback period		7 weeks	6 weeks

\* Lamp prices from Pick n Pay in Rosebank, 26 Oct 2018. All regular prices, no special offers or discounts. Usage assumptions are: 3 hours/day, 365 days/year. Electricity is R 1.25/kWh.

## Are there environmental benefits from switching to LED?

- **Yes**, by removing CFLs from the market, risk of mercury exposure and releases to the environment is eliminated
- No more breakage risk in homes, schools, all buildings
- Very small percentage of CFLs are disposed of safely, thus virtually all mercury ends up released to the environment
- Importing a toxic substance that then becomes hazardous waste and liability for governments



- If CFL is phased out in 2025, there are significant benefits - **44.35 tonnes of Hg** (cumulative, 2025-2050)
  - **35.6 tonnes of Hg** avoided in the bulbs
  - **8.7 tonnes Hg** emissions avoided from coal-fired power stations
- Total energy savings from efficiency gains:
  - **1002 TWh** of electricity savings (2025-2050)
  - **350 million tonnes CO2**

# Principal reasons to choose LED over CFL

## Summary of Key Points for phasing out CFL:

- **Overview:** CFL is an outdated, inefficient, expensive technology which contains mercury
- **Choice:** Mercury-free retrofits are available for all regular sockets and virtually all pin-base sockets; a wide selection of light output levels and white light colours
- **Economic:** LED retrofits are highly cost-effective, payback in 6 weeks compared to halogen; LEDs cost 50% less than CFL to buy and use; LED is the least life-cycle cost option
- **Technology:** LED continues to improve, getting cheaper and more efficient each year
- **Waste:** most fluorescent bulbs are not disposed of safely at end of life, even in Europe
- **Business:** Africa has many new local manufacturing companies producing LED lamps, but there is no manufacturing of fluorescent on the continent
- **Policy:** Some African countries are phasing out CFLs based on energy savings and cost
- **Equity:** Risk that suppliers will dump more mercury lighting in Africa as fluorescent lamps are phased-out of the OECD



# Annex A: Mercury limits for Linear Fluorescent Lamps (LFL)

Mercury Added Products	Year
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 10 mg per lamp	2020

- Minamata Annex A defines LFL by type of phosphor and wattage:
  - Triband – modern, three colour rare earth phosphor
  - Halophosphate – older, poorer quality phosphor
- Wattage limits encompass the high-volume LFLs
- Contain generally between 5.0 – 10.0 mg/lamp
- Over one billion bulbs sold each year – roughly 8 tonnes Hg / year
- Requires a “ballast” to operate; there are two types: magnetic (“choke”) and electronic (“high frequency”)
  - Magnetic ballast is most common – more tolerant of humidity and high temperature
- LFL has relatively short service life compared to LED retrofits (2-3x longer life)

T5  
5/8" diameter



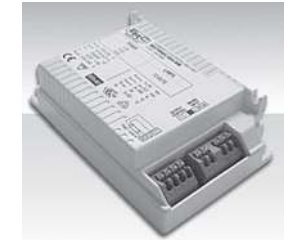
T8  
1" diameter



T12  
1.5" diameter



Magnetic  
Ballast



Electronic  
Ballast

# Are there mercury-free alternatives to LFLs?

- **Yes**, there are literally **tens of thousands of mercury-free alternatives** to LFL
- LED replacements come in different diameters, lengths, colour temperatures, colour rendering, levels of light output and are compatible with all magnetic ballasts and virtually all electronic ballasts
- LED retrofit tubes were **designed as a retrofit product for fluorescent fixtures** - products sold today do not need to rewire the old fluorescent fixture:
  - **Philips/Signify**: “No need to change drivers or rewire”, and a “plug and play solution that works straight out of the box”
  - **OSRAM/LEDvance** state “SubstiTUBE” is a “Quick, simple and safe lamp replacement without rewiring”
  - **Tungsrām** says in addition to “the 2.5-3x longer life (compared to T8 fluorescent) .... LED T8 tubes provide lower system loss while existing fixtures remain intact.”



# Are LED mercury-free alternatives to LFLs cost-effective?

- **Yes**, LED lamps are highly cost-effective replacements for LFL
- Cost-effectiveness has driven the market transition to LED
- In Europe, the payback period on T8 is 5-11 months; you spend an extra €3 or €9 Euro today and save between €100 and €120 Euro in future cost of light
- Least life-cycle cost, LED is 47 to 61% less expensive than LFL
- T5 payback periods are longer, our latest analysis shows 1.2 to 1.5 years



Item	T8 LFL	T8 LED 1	T8 LED 2
Life	20,000 hrs	30,000 hrs	50,000 hrs
Price*	€3.68	€6.77	€12.74
Power	36 W	18 W	12.5 W
Use (10 hr/day)*	131 kWh/yr	66 kWh/yr	46 kWh/yr
Elec cost.*	€15.10/yr	€7.55/yr	€5.24/yr
<b>13-year cost</b>	<b>€205.46</b>	<b>€109.85</b>	<b>€80.89</b>
Payback period		4.9 months	11 months

\* Electricity price of €0.1149/kWh from Eurostat for non-domestic sector . Electricity price escalation rate of 4% is applied (following the MEErP methodology).

# Are there environmental benefits from switching to LED?



- **Yes**, by removing LFLs from the market, risk of mercury exposure and releases to the environment is eliminated
- No more breakage risk in homes, schools, all buildings
- In Europe, most LFLs are not disposed of properly, resulting in mercury released to the environment
- Importing a toxic substance that then becomes hazardous waste and liability for governments

- If LFL is phased out in 2025, there are significant benefits – **187.2 tonnes of Hg** (cumulative, 2025-2050)
  - **108.4 tonnes of Hg** avoided in the bulbs
  - **78.8 tonnes Hg** emissions avoided from coal-fired power stations
- Total energy savings from efficiency gains:
  - **9,231 TWh** of electricity savings (2025-2050)
  - **3,150 million tonnes CO2**





# Principal reasons to choose LED over LFL

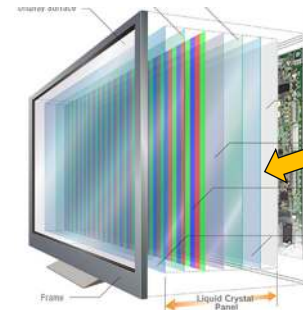
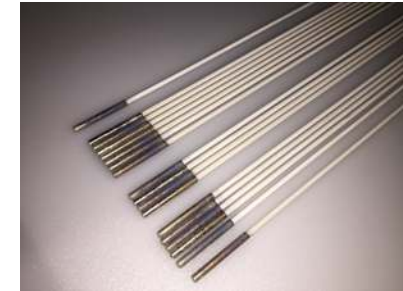
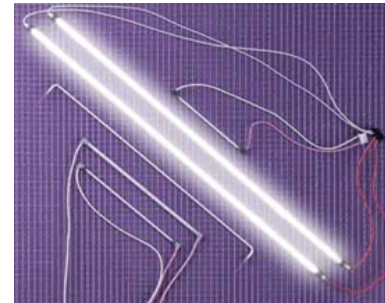
## Summary of Key Points for phasing out LFL:

- **Overview:** LFL is an inefficient, expensive technology which contains mercury
- **Choice:** Mercury-free retrofits are available for virtually all LFLs; with tens of thousands of models available there is a wide selection of light output levels and white light colours
- **Economic:** LED retrofits are highly cost-effective, payback in less than one year for T8 LFL; LEDs cost 50% less than LFLs to buy and use; LED is the least life-cycle cost option
- **Technology:** LED continues to improve, getting cheaper and more efficient each year
- **Waste:** most fluorescent bulbs are not disposed of safely at end of life, even in Europe
- **Business:** Africa has many new local manufacturing companies producing LED lamps, but there is no manufacturing of fluorescent on the continent
- **Policy:** Some African countries are phasing out LFL based on energy savings and cost
- **Equity:** Risk that suppliers will dump more mercury lighting in Africa as fluorescent lamps are phased-out of the OECD

# Annex A: Mercury limits for CCFL and EEFL

Mercury Added Products	Year
Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays: short length ( $\leq 500$ mm) with mercury content exceeding 3.5 mg per lamp medium length ( $> 500$ mm and $\leq 1500$ mm) with mercury content exceeding 5 mg per lamp long length ( $> 1500$ mm) with mercury content exceeding 13 mg per lamp	2020

- **CCFL** – a very narrow tube, T2 (one-quarter of an inch diameter)
- “Cold” because the cathode is 200°F as opposed to a standard fluorescent lamp where the cathode is 900°F.
- **EEFL** - same construction as the CCFL, except the electrode is located on the outside of the lamp at each end
- Contain mercury, like all fluorescent lamps
- Used in electronic displays as back-lighting units
- Have since been replaced by LED back-lighting units



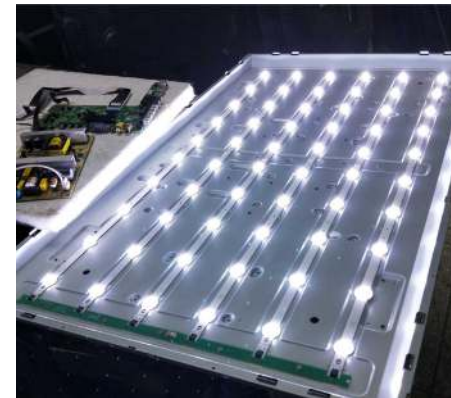
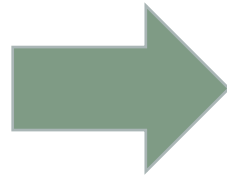
Back Light Unit – used to be CCFL/EEFL, but now all new TV’s and monitors are LED back-lit.

# Are there mercury-free alternatives to CCFL / EEFL Displays?

- Electronic displays (flat screen TVs) require a back light to shine through the LCD and filters to create images on the screen
- CCFL was common as a back light in flat-screen TVs ~10 years ago
- Now this technology has been replaced by LED backlight units and CCFL technology is no longer used
- **CCFL/EEFL bulbs with mercury limits are no longer needed and can be phased out**



CCFL backlight unit  
for a TV  
(Old technology)



LED backlight unit  
for a TV  
(Modern technology)

# Principal reasons to phase-out CCFL and EEFL

## Summary of Key Points for phasing out CCFL / EEFL:

- **Overview:** CCFL and EEFL are an old, outdated technology that was used for back-lighting LCD electronic displays about 20 years ago; these lamps have been replaced by LED backlights in new displays starting in 2008
- **Technology:** today, LED backlight units have completely replaced CCFL/EEFL; no new displays are being made with this old technology anymore
- **Waste:** the clause allowing for spare parts could be retained in Minamata to enable end-users to continue using old monitors, but this is considered to be a very small (non-existent?) market