

A young girl with dark skin and curly hair, wearing a white school uniform, is sitting at a desk in a classroom. She is smiling and has her right hand raised high in the air. In the background, other students are also raising their hands, and there are whiteboards and desks visible. The overall atmosphere is bright and positive.

**Clean  
Lighting  
Coalition**

**Technical & Economic Assessment  
of Mercury-Free Lighting: African  
Region**

# African Region

In 2021 the Clean Lighting Coalition engaged partner organisations in **35 countries across Africa, Latin America and Asia** and gathered over 1200 models of both mercury-containing fluorescent and LED retrofits from those markets.

In April 2021, the African region proposed an amendment to Annex A of the Minamata Convention on Mercury to remove exemptions for mercury-containing fluorescent lamps, phasing out virtually all fluorescents by 2025. While these fluorescent exemptions may have been necessary in 2013 when the Convention was drafted, lighting technology has moved on rapidly – and today, the accessibility and affordability of mercury-free LED retrofit lamps makes the fluorescent lamp exemption unnecessary.

Adopting the proposed amendment at the fourth Conference of Parties (COP4) would lead to an accelerated global transition to LED lighting, which is non-toxic and climate friendly. Specifically, it would:

- avoid **232 metric tons** of mercury pollution from leaking into the environment between 2025-2050, both from the lamps themselves and from avoided burning of coal in power plants.
- avoid **3.5 gigatons** of CO2 emissions which is equivalent to getting ALL passenger cars (globally) off the road for a whole year.

If adopted, the African Region would avoid



**4,900 kilograms**

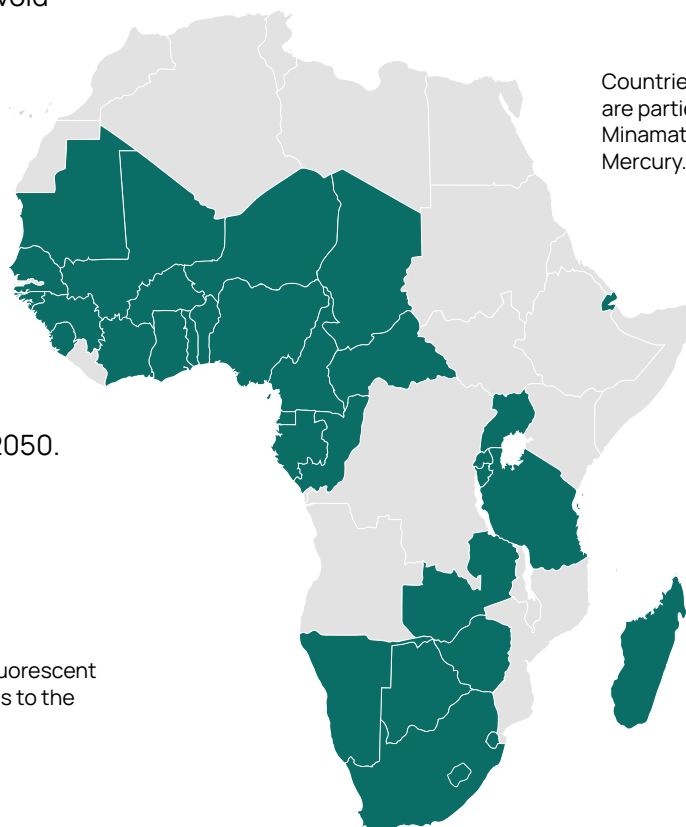
of mercury pollution and



**220 mega tons**

of CO2 emissions cumulatively 2025-2050.

The data above reflects the benefits of a global fluorescent phase-out to all countries in Africa, not just parties to the Minamata Convention on Mercury.



Based on projections from [CLASP's MEPSY model](#), the table below provides country-level projections of avoided CO2 emissions and mercury releases cumulatively 2025-2050.

COUNTRY	CO2 (MT)	MERCURY (KG)
ALGERIA	21.0	500.3
ANGOLA	3.3	86.1
BENIN	0.3	4.5
BOTSWANA	3.2	28.8
BURKINA FASO	0.8	13.9
BURUNDI	0.1	4.0
CAPE VERDE	0.2	3.9
CAMEROON	1.7	56.7
CENTRAL AFRICAN REPUBLIC	0.0	0.9
CHAD	0.1	1.9
COMOROS	0.0	0.7
DEMOCRATIC REPUBLIC OF THE CONGO	0.2	39.2
REPUBLIC OF THE CONGO	0.8	17.7
CÔTE D'IVOIRE	3.3	73.7
DJIBOUTI	0.0	0.4
EGYPT	66.8	1,796.6
EQUATORIAL GUINEA	0.6	13.3
ERITREA	0.1	2.0
ESWATINI	0.1	14.9
ETHIOPIA	0.3	57.5
GABON	1.2	27.5
GAMBIA	0.1	1.5
GHANA	3.4	87.4
GUINEA	0.4	9.2
GUINEA-BISSAU	0.0	0.6
KENYA	2.3	70.3
LESOTHO	0.0	3.4
MADAGASCAR	0.3	9.4
MALAWI	0.0	9.6
MALI	0.5	10.5
MAURITANIA	0.4	9.1
MAURITIUS	0.9	19.4
MOROCCO	13.0	234.1
MOZAMBIQUE	0.7	53.5
NAMIBIA	0.5	43.8
NIGER	0.7	9.1
NIGERIA	10.7	284.8
RWANDA	0.2	4.9
SENEGAL	1.3	23.4
SIERRA LEONE	0.0	0.3
SOUTH AFRICA	66.1	868.7
SUDAN	1.8	44.1
TANZANIA	1.5	31.6
TOGO	0.1	4.6
TUNISIA	5.2	128.3
UGANDA	0.2	20.2
ZAMBIA	0.6	68.0
ZIMBABWE	6.0	68.5

\*Note: Table sums will not match above totals due to rounding. Additionally, for countries without values, there were not sufficient data to accurately project mercury and CO2 figures.

## Lighting Market Overview

The African region is a net importer of lighting products. There is no local manufacture of fluorescent lighting on the continent. However, there are several LED **assembly** companies, providing local jobs and stimulating national economies. The companies include:

- **Botswana** - The Bulb World focuses entirely on LED production.
- **Ghana** – Solid Home Appliance Ltd
- **Kenya** – LEDMatix Ltd.
- **Mozambique** - Tempest LED Lighting and Tecnoelectrica
- **Nigeria** – Oretronics technology
- **Rwanda** - Sahasra
- **South Africa** - LEDwise Lighting and Radiant Group (Pty)
- **Uganda** - Lumens Manufacturing Industries (U) Ltd.
- **Zambia** – Savenda Electricals

As an import-based market, phasing-out fluorescents would encourage local manufacturing of LEDs, aligning with regional efforts to stimulate economic growth, generate employment opportunities, and reduce reliance on lighting product importation.

## Comparing Costs: LEDs vs CFL/LFL

Based on projections from [CLASP's MEPSY model](#), transitioning to efficient LED lighting would avoid the sale of 183.7 million compact fluorescent lamps and 525.9 million linear fluorescent lamps. Taken together, this will avoid 4,900 kilogrammes of mercury in the lamps and save approximately 425 TWh of the African Region's total electricity consumption between 2025 and 2050. Over the 25 year analysis period, Africa would save \$31.4 billion USD and 221 million metric tonnes of CO<sub>2</sub>.





The following tables provide comparative information about the cost of light across countries. The tables show the prices that were recorded in retail stores and on-line shops in each country, and then three columns illustrate the benefits associated with switching to mercury-free LED technology. The Payback Period column tells the amount of time needed for the energy savings from the LED lamp to pay for its higher cost. If the LED lamp is less expensive than the fluorescent lamp, then the payback is "instantaneous". Next, the column labelled "energy savings with LED" shows what the savings will be on the energy bills over the lifetime of the LED lamp.

The following tables detail comparative cost across countries. Please note that the value in brackets is the equivalent cost in USD.








**TABLE 1**

**THE TRUE COST OF LIGHT - GENERAL SERVICE LAMPS**

 <b>COUNTRY</b>	 <b>CFL PRICE</b>	 <b>LED PRICE</b>	 <b>PAYBACK PERIOD</b>	 <b>ENERGY SAVINGS WITH LED</b>
<b>Burkina Faso</b>	XOF 2,500 (US\$ 4.50)	XOF 2,200 (US\$ 3.96)	Instantaneous	XOF 26,986 (US\$ 46.06)
<b>Cameroon</b>	XAF 1,650 (US\$ 2.92)	XAF 1,200 (US\$ 2.12)	Instantaneous	XAF 8,315 (US\$ 14.19)
<b>Ethiopia</b>	EBT 75 (US\$ 1.58)	EBT 75 (US\$ 1.58)	Instantaneous	EBT 571 (US\$ 11.25)
<b>Gabon</b>	XAF 1,000 (US\$ 1.80)	XAF 1,500 (US\$ 2.70)	5 months	XAF 23,215 (US\$ 39.61)
<b>Ghana</b>	GHS 17 (US\$ 2.72)	GHS 22 (US\$ 3.52)	6 months	GHS 136 (US\$ 20.39)
<b>Kenya</b>	KES 140 (US\$ 1.26)	KES 100 (US\$ 0.90)	Instantaneous	KES 1,808 (US\$ 15.89)
<b>Nigeria</b>	NGN 400 (US\$ 0.96)	NGN 340 (US\$ 0.82)	Instantaneous	NGN 6,863 (US\$ 16.49)
<b>South Africa</b>	ZAR 49.99 (US\$ 3.25)	ZAR 27.50 (US\$ 1.79)	Instantaneous	ZAR 208 (US\$ 13.52)
<b>Togo</b>	XOF 800 (US\$ 1.44)	XOF 500 (US\$ 0.90)	Instantaneous	XOF 22,489 (US\$ 38.39)
<b>Uganda</b>	UGX 14,000 (US\$ 3.92)	UGX 8,000 (US\$ 2.24)	Instantaneous	UGX 157,146 (US\$ 44.50)
<b>Zambia</b>	ZMW 35 (US\$ 2.03)	ZMW 30 (US\$ 2.84)	Instantaneous	ZMW 93 (US\$ 5.27)

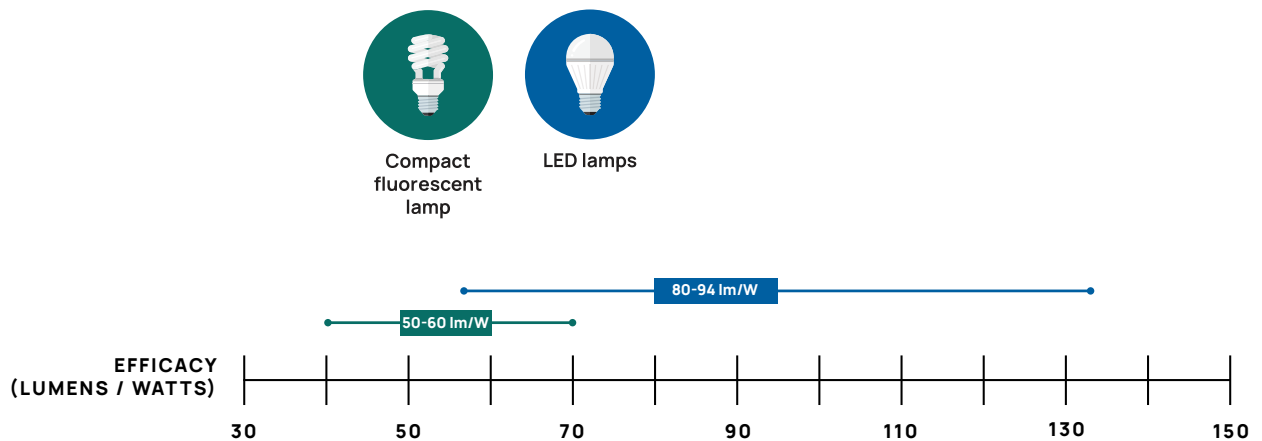
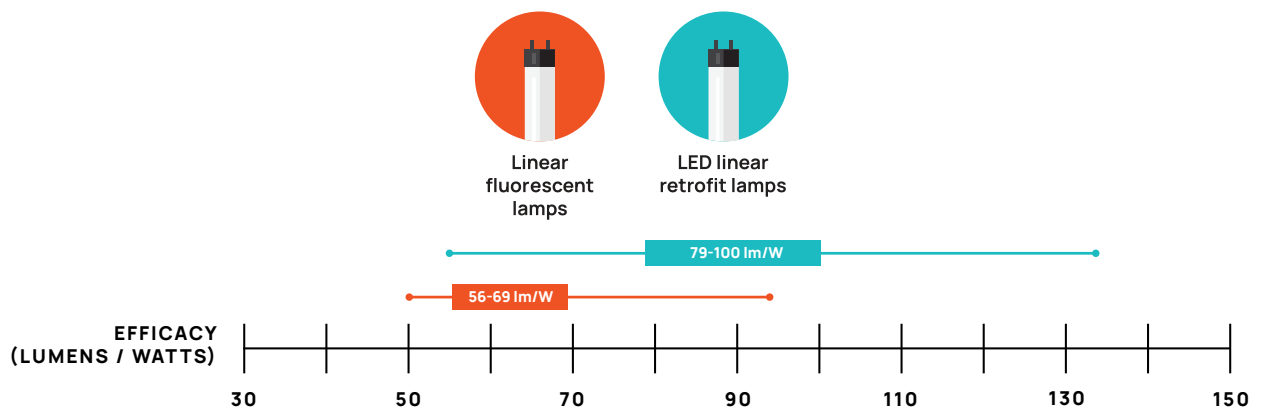
**TABLE 2**

**THE TRUE COST OF LIGHT - LINEAR LAMPS**

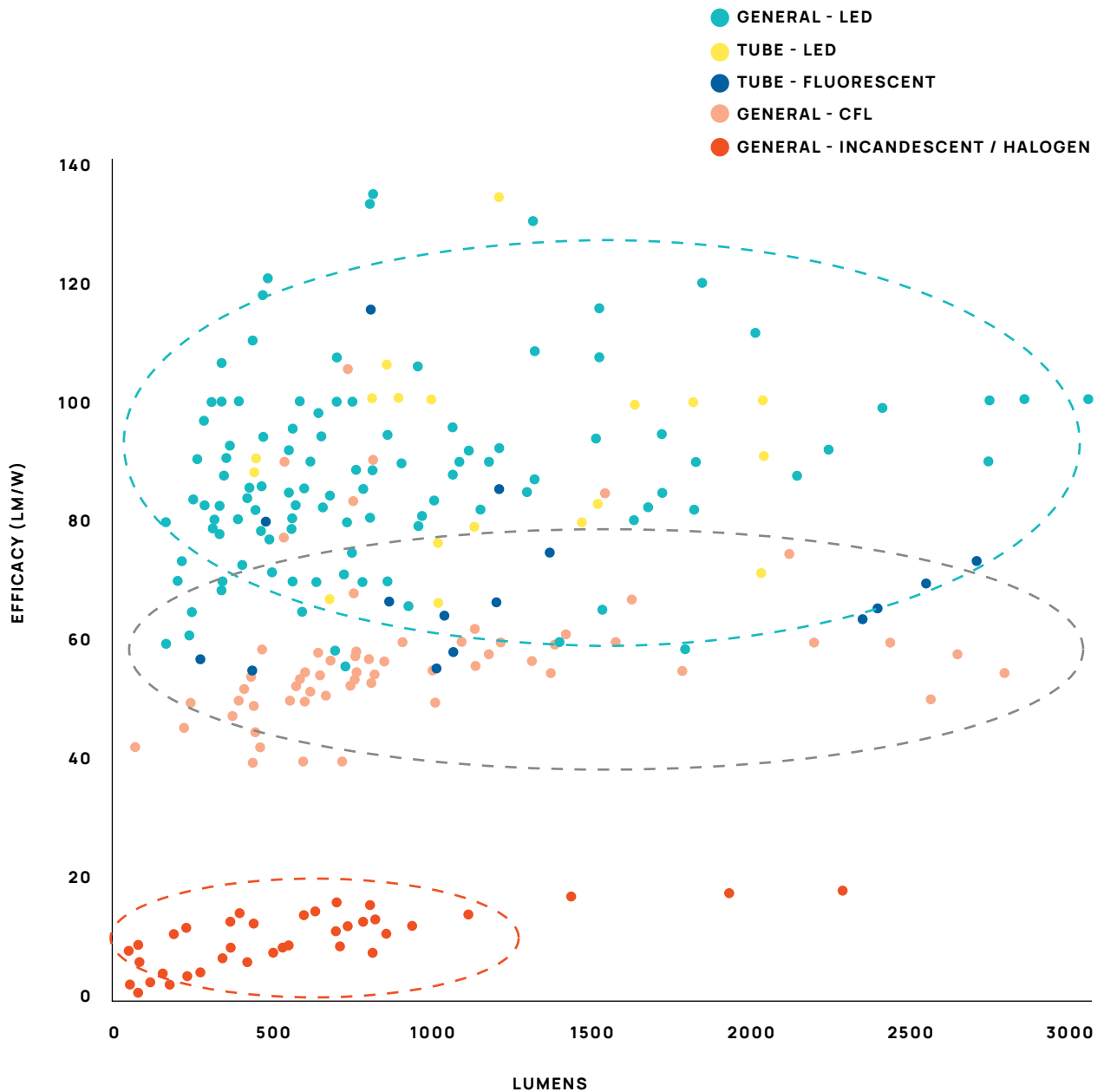
 <b>COUNTRY</b>	 <b>LFL PRICE</b>	 <b>TLED PRICE</b>	 <b>PAYBACK PERIOD</b>	 <b>ENERGY SAVINGS WITH LED</b>
<b>Burkina Faso</b>	XOF 2,200 (US\$ 3.96)	XOF 4,000 (US\$ 7.20)	7 months	XOF 67,489 (US\$ 115.19)
<b>Cameroon</b>	XAF 2,500 (US\$ 4.42)	XAF 3,500 (US\$ 6.19)	5 months	XAF 53,447 (US\$ 91.19)
<b>Ethiopia</b>	EBT 95 (US\$ 2.00)	EBT 170 (US\$ 3.57)	11 months	EBT 2,314 (US\$ 45.56)
<b>Gabon</b>	XAF 650 (US\$ 1.17)	XAF 2,500 (US\$ 4.50)	7 months	XAF 42,753 (US\$ 72.95)
<b>Ghana</b>	GHS 7 (US\$ 1.12)	GHS 10 (US\$ 1.60)	1 month	GHS 1,468 (US\$ 220.28)
<b>Kenya</b>	KES 125 (US\$ 1.13)	KES 400 (US\$ 3.60)	8 months	KES 10,800 (US\$ 94.89)
<b>Nigeria</b>	NGN 500 (US\$ 1.20)	NGN 1,500 (US\$ 3.60)	10 months	NGN 56,301 (US\$ 135.29)
<b>South Africa</b>	ZAR 39.99 (US\$ 2.60)	ZAR 39 (US\$ 2.54)	Instantaneous	ZAR 1,246 (US\$ 81.12)
<b>Uganda</b>	UGX 14,500 (US\$ 4.06)	UGX 8,600 (US\$ 2.41)	Instantaneous	UGX 205,726 (US\$ 58.26)

## Energy Efficiency Comparison

The energy efficiency of a light bulb is measured in lumens/watt. Based on data collected in Q4 2021, the graphic below depicts the ranges of energy efficiency of different types of bulbs available across African markets. It represents efficiency quartiles (0%,25%,50%,75%,100%) of the data we collected when sorted from lowest to highest efficiency. The box with numbers represents the 25th-75th quartile while the thin lines with the dots represent the lowest and highest efficiency per technology on either end.



The graph below shows the energy efficiency of individual samples collected across the region. LEDs are up to 2-3 times more efficient than the other lighting technologies, therefore use less overall electricity to provide the same or better lighting service.





## Lighting Policy & Legislative Landscape

Many countries in the region are shifting towards LED only markets through energy efficiency policy and/or mercury regulation. Some of the notable regulations include:

- Southern Africa Development Community – 16 countries adopted a **harmonised** standard SADC HT 109:2021 in Q2 2021, **shifts markets to LED**.
- East African Community – 6 countries, draft harmonised standard DEAS 1064; finalization is expected in Q1 2022 which will **shift markets to LED**.
- Ivory Coast – After signing the Minamata Convention and developing the Decree of E-waste Management (adopted in 2017), the government has been supplying LEDs lamps for public lighting in all the major cities of the country since 2019. The government is further promoting LEDs lamps by reducing taxes on these lamps.
- Nigeria: In its highlighted strategies to achieve energy efficiency, the Nigeria Energy Policy of 2013 specifically mentions replacing all incandescent light bulbs in every home, industry and institutions with LEDs and other energy saving lamps by the year 2025.
- Burkina Faso's National Energy Act has an entire chapter dedicated to Energy Efficiency. In support of this objective, one of the notable government interventions includes the installation of 3,000LED streetlamps.

## Compatibility/Retrofits for LED tubes

In all the studied African markets, LED retrofits were easily available for both general service lamps and tube lamps. Additionally, the economic co-operation between regions such as EAC and SADC is an indicator that can be used to extrapolate the availability of retrofits in the other African countries, given regions typically have harmonized standards for lighting products and source through the same import channels.

## End of Life Management for Lighting

Collecting fluorescent lamps at the end of life is a global problem that has existed since the introduction of fluorescents. Mercury released during the lifecycle of fluorescent Lamps contaminate the atmosphere, land and water. This contamination may occur from lamp breakage when old lamps are comingled with general household waste, and during installation, collection or transport of discarded lamps, processing or recycling of spent lamps, or when lamps are landfilled, incinerated or otherwise disposed of.

In Africa, collected and properly recycled e-waste (not just lighting products) was at 4% in Southern Africa, 1.3% in Eastern Africa and close to 0% in other regions. The small size and weight of bulbs makes them easy for consumers to mistakenly dispose of in general waste, and consumers may not be aware that they require special disposal. Collection and safe recycling/disposal of fluorescent lamps is difficult – especially in regions with low levels of general e-waste collection and processing. Currently, sub-Saharan Africa has no mercury treatment or disposal facility.

However, major e-waste recyclers across the continent are already safely disposing LED lighting products, including Enviroserve in Rwanda, WEEE Centre in Kenya, Hinckley Recycling in Nigeria and more. While LED lamps are also considered e-waste, they are not toxic or considered hazardous waste. The proposed African Lighting Amendment would remove toxic e-waste from the market more quickly.



# **Annex of Country Level Data**

# Burkina Faso



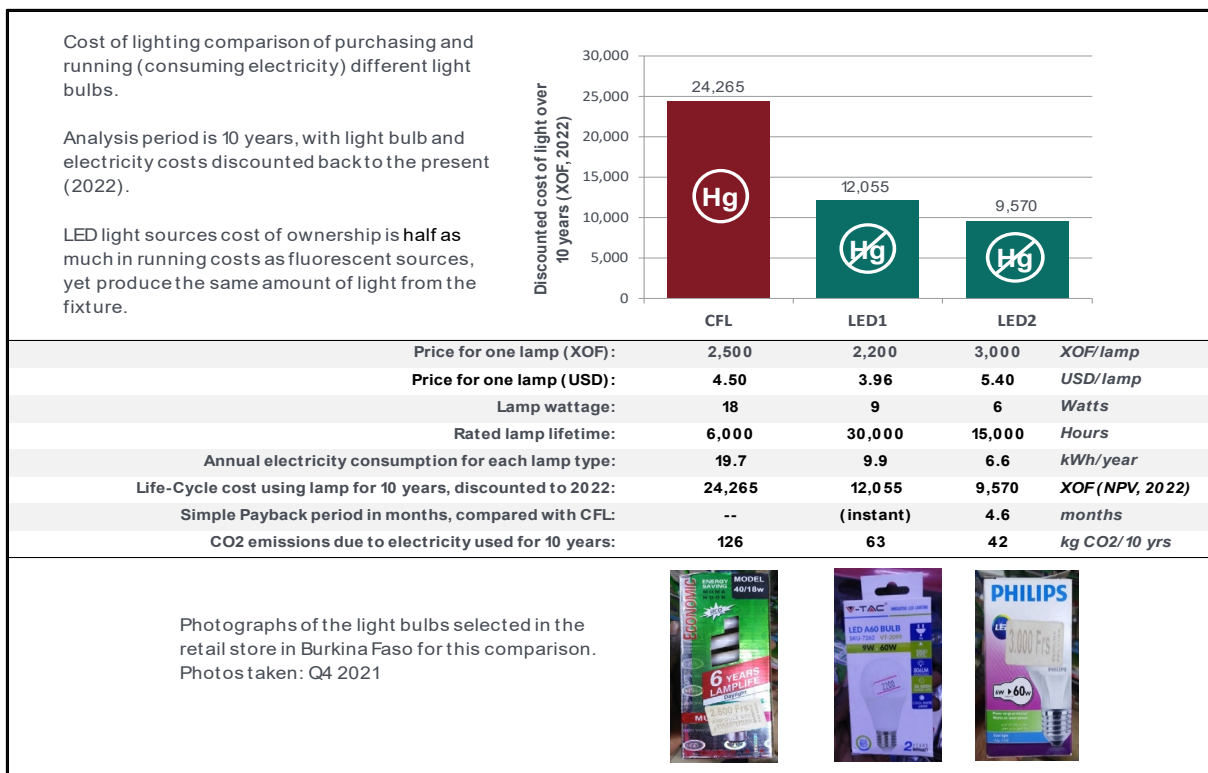
**Table 1. Quantifying the Benefits of the African Lighting Amendment in Burkina Faso**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	522,929 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	1,503,849 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	14 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	1.22 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 220 million

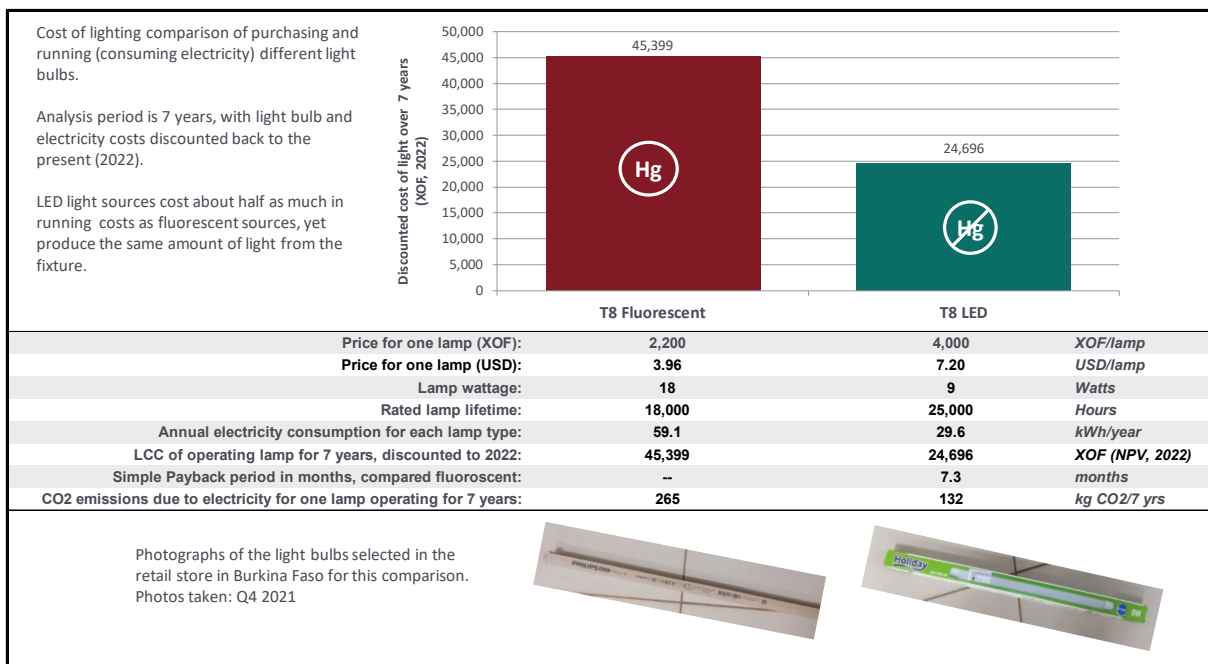
Important information about mercury and lighting in Burkina Faso:

- According to their MIA, mercury light sources contribute 26 Kg Hg/Year resulting in air and soil pollution. It is estimated that about 573,000 (very rough estimate) lamps are imported into the country annually. Their low cost, improved efficiency and porous borders mean that a lot more mercury containing lights make their way into Burkina's market.
- The Burkinabe government has rolled out several initiatives in recent years including the replacement of 1,926 inefficient streetlamps in Burkina Faso's major cities and has installed 3,000 LED streetlamps.
- As members of ECOWAS, Burkina Faso subscribe to the ECOWAS' energy efficiency plan to phase out incandescent lamps and replace them with high efficiency alternatives

The box below offers an economic analysis of a compact fluorescent lamp (CFL) and two light emitting diode (LED) retrofit bulbs. All of these lamps were selected and photographed in a retail store in Burkina Faso. Switching to LED in Burkina Faso offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately XOF 12,000 to 14,500 over the lifetime of the LED retrofit lamp.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Burkina Faso. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately XOF 20,000 over the lifetime of the LED lamp, yet the LED only costs XOF 1800 more at the time of purchase.



# Cameroon



**Table 2. Quantifying the Benefits of the African Lighting Amendment in Cameroon**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	2,211,769 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	6,082,023 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	100 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	5.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 710 million

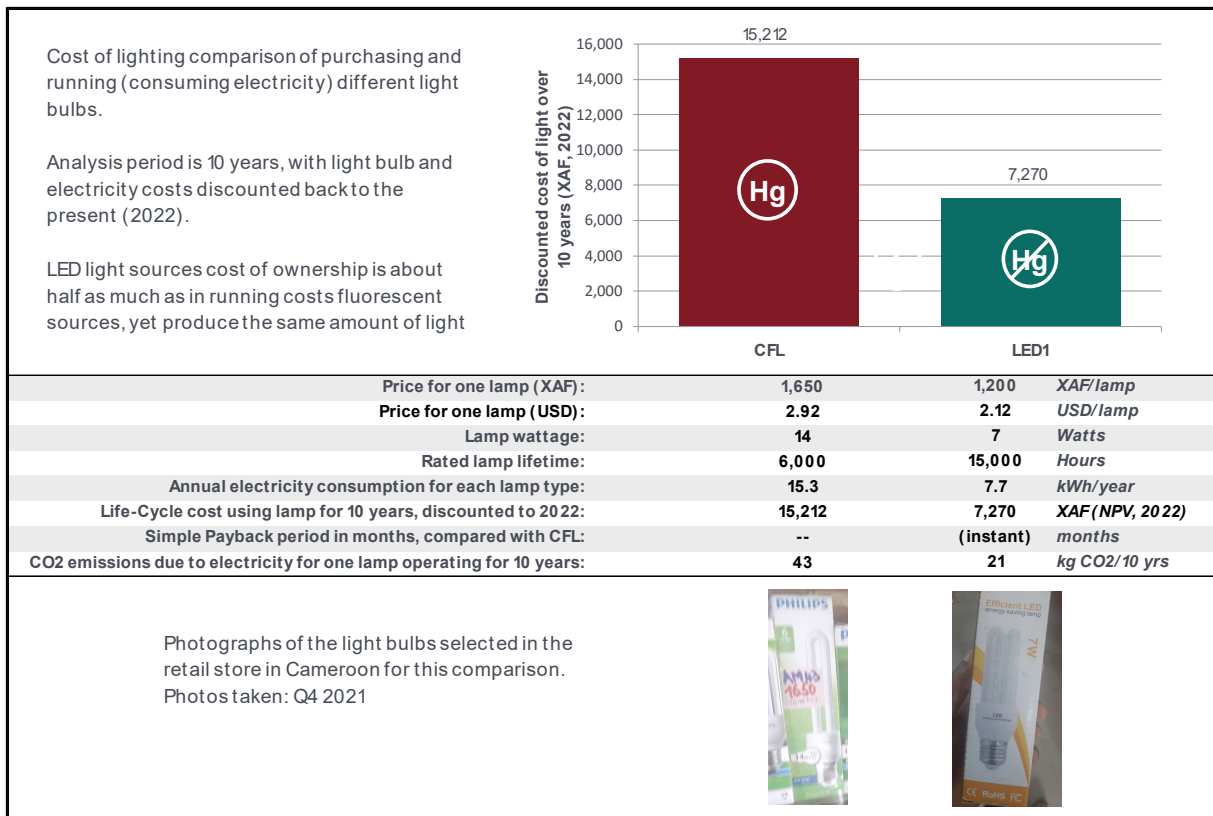
Cameroon has a 10 year (2015 –2025) National Policy, Strategy and Action Plan to promote Energy Efficiency in the Electricity Sector of Cameroon, with specific strategy and action plan that includes:

- Facilitating the Emergence of Bankable Energy Efficiency Projects,
- Development of a regulatory and normative framework promoting energy efficiency,
- Development of a program to optimize lighting efficiency
- Development of an energy efficiency code for the construction of new buildings and national regulations for the energy performance of existing buildings,
- Promotion of Compact Fluorescent Lamps (CFLs) or LEDs,
- Campaigns to raise awareness of energy efficiency among the general public Awareness campaigns for professionals on energy efficiency

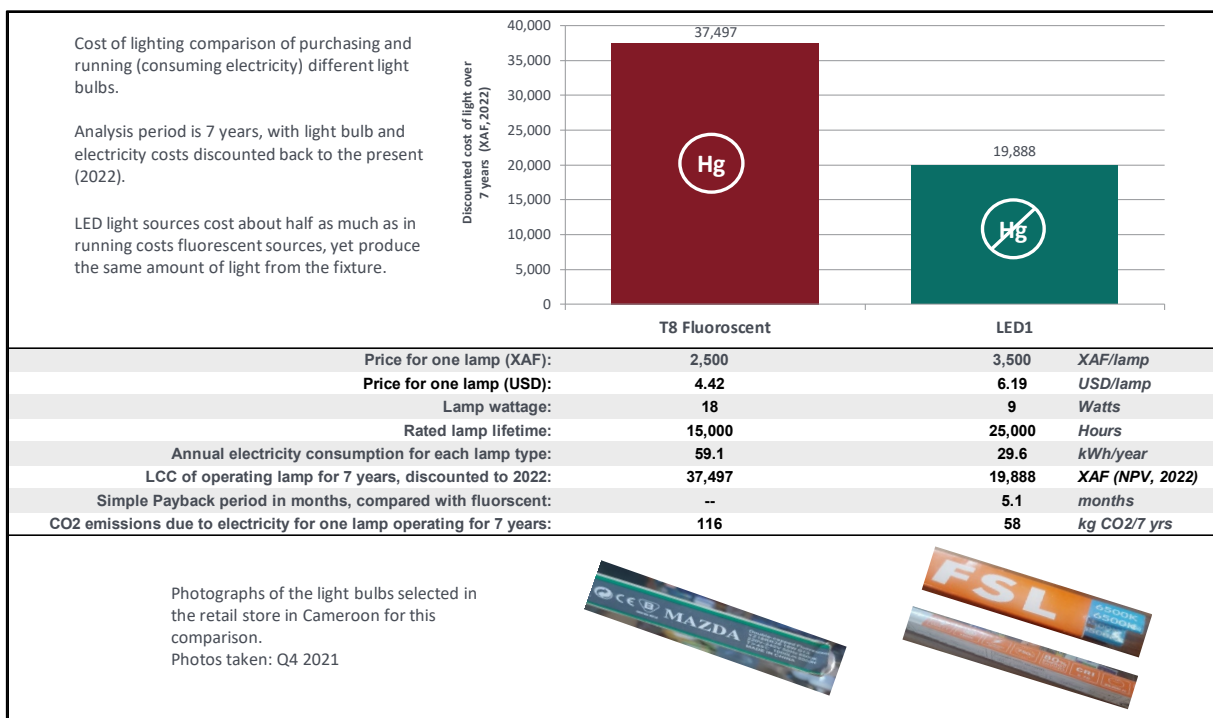
In addition to this, Cameroon has an emerging green technology business Cameroon Energies which is looking to produce LED technologies. Mercury-free LED retrofit bulbs are highly cost-effective in Cameroon.

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Cameroon. Switching to LED in Cameroon offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately XAF 8,000 over the lifetime of the LED retrofit lamp.





The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Cameroon. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately XAF 18,000 over the lifetime of the LED lamp, yet the LED only costs XAF 1000 more at the time of purchase.



# Ethiopia



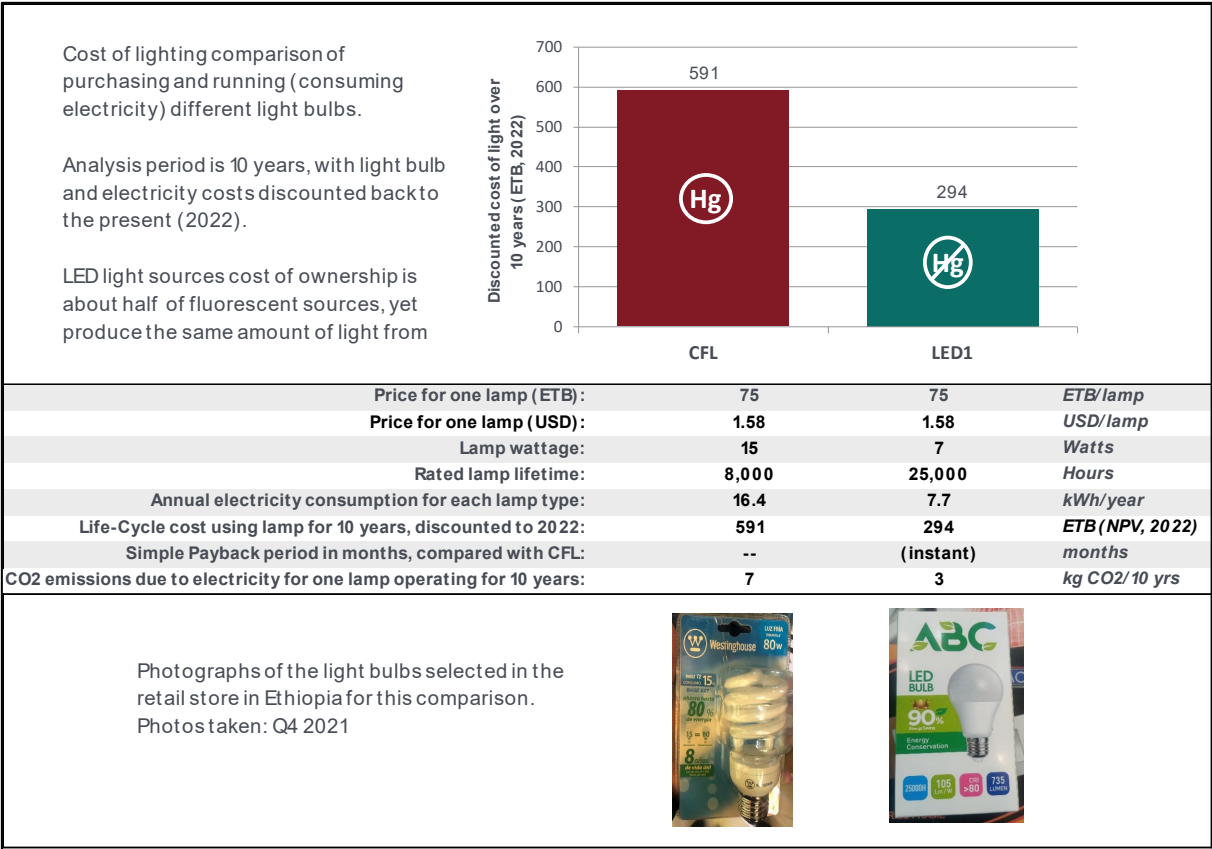
**Table 3. Quantifying the Benefits of the African Lighting Amendment in Ethiopia**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	2,196,952 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	6,199,896 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	100 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	5.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 300 million

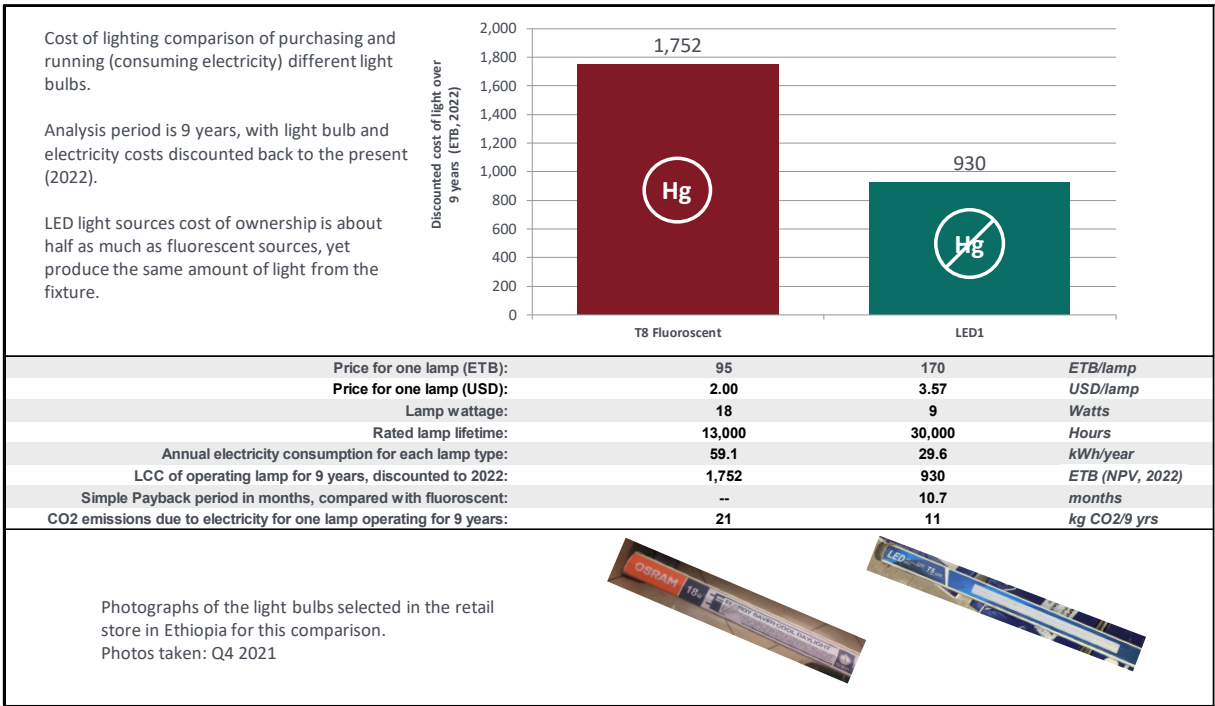
Important information about mercury and lighting in Ethiopia:

- There are several local manufacturers who either manufacture, import or assemble different lighting technologies and accessories including LED. They include ABC Electrical Manufacturing, Maensu, Fosera, Edison and others.
- Five or six years ago, the government purchased 10 million CFLs and distributed them to the people as part of an energy-efficient lighting initiative, the lamps contained 5 mg of mercury each.
- The use of mercury in consumer products, including lighting products, is approximately 14 percent of the total mercury released to the environment in Ethiopia.
- Ethiopia is revising its National Energy Policy and Strategy at the moment, and the plan is expected to ensure least life-cycle cost options are implement.

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Ethiopia. Switching to LED in Ethiopia offers an instantaneous payback, because the LED lamp is the same price as the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately ETB 300 over the lifetime of the LED retrofit lamp.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Ethiopia. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately ETB 800 over the lifetime of the LED lamp, yet the LED only costs ETB 75 more at the time of purchase.



# Gabon



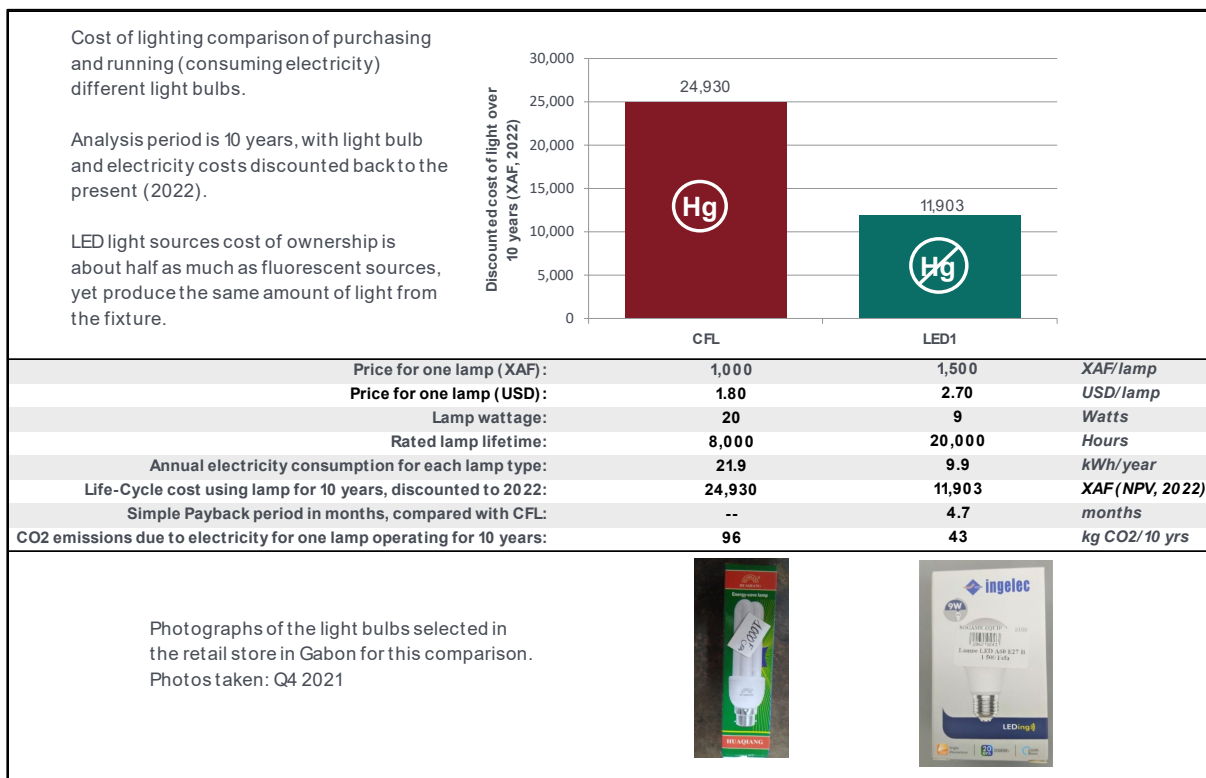
**Table 4. Quantifying the Benefits of the African Lighting Amendment in Gabon**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	1,090,411 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	2,935,461 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	27 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	2.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 450 million

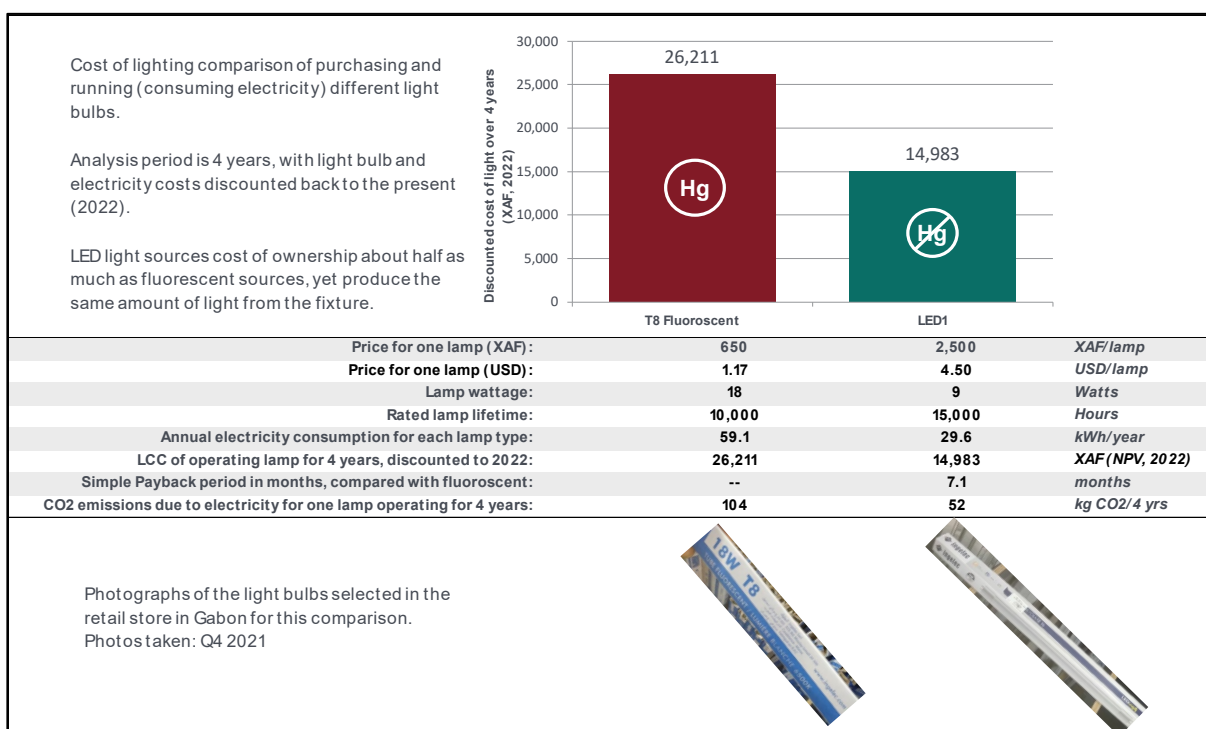
Important information about mercury and lighting in Gabon:

- Importers and traders include Foberd Gabon and Gabon Meca who import majorly LED lighting products, both lamps and luminaires.
- Gabon's oil product is in decline, thus the government is investing in the wider economy to diversify and develop new technologies and businesses.
- Gabon's strategy encourages private investment, both domestic and foreign, through the creation of Special Economic Zones (SEZ).
- Lighting regulations can be traced back 2011 by Decree n°0658/PR/MERH of the National Council for Water and Electricity (CNEE). This Decree gives this body the power to implement a national public lighting policy. Certainly, efforts are being made to popularize public lighting with LED lamps to the detriment of halogens.
- Mercury-free LED retrofit bulbs are highly cost-effective in Gabon.

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Gabon. Switching to LED in Gabon offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately XAF 13,000 over the lifetime of the LED retrofit lamp – yet the LED only costs XAF 500 more.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Gabon. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately XAF 12,000 over the lifetime of the LED lamp, yet the LED only costs XAF 1800 more at the time of purchase.



# Ghana



**Table 5. Quantifying the Benefits of the African Lighting Amendment in Ghana**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	3,668,340 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	9,205,838 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	100 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	8.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 2.24 billion

Important information about mercury and lighting in Ghana:

- Ghana is operating a Mandatory Appliance Standards and Labelling regime. Lighting technologies, sold in the country must meet minimum efficiency and performance standards approved by the Ghana Standards Authority (GSA). Appliance manufacturers who export to Ghana and retailers who sell in Ghana are obliged to display a label which indicates the energy efficiency rating of the product. It is therefore an offence under LI 1815 and LI 2353 to import, display for sale or sell lighting technologies in Ghana unless they meet the minimum performance standards and are properly labelled. The market is going through a transition with increased adoption of LED lighting technologies
- In 2007 the country implemented a programme to replace 6 million incandescent lamps with CFLs. Import duty and VAT were waived on the importation of CFLs in 2002 and on light emitting diode (LED) lamps in 2010
- Ghana is ahead of the curve with a local assembler of LED lighting technologies: Solid Home Appliances

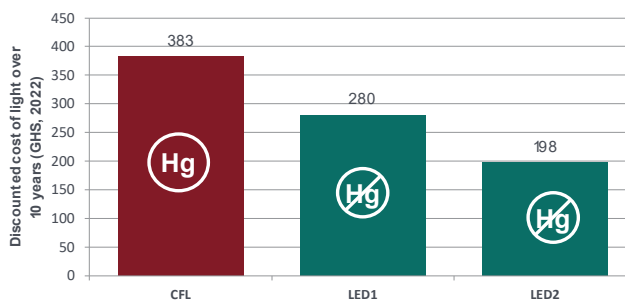
The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Ghana. Switching to LED in Ghana offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately GHS 100 to 200 over the lifetime of the LED retrofit lamp.



Cost of lighting comparison of purchasing and running (consuming electricity) different light bulbs.

Analysis period is 10 years, with light bulb and electricity costs discounted back to the present (2022).

LED light sources cost of ownership is about half as much as fluorescent sources, yet produce the same amount of light from the fixture.



Price for one lamp (GHS):	17	22	15	GHS/lamp
Price for one lamp (USD):	2.72	3.52	2.40	USD/lamp
Lamp wattage:	18	13	9	Watts
Rated lamp lifetime:	6,000	15,000	10,000	Hours
Annual electricity consumption for each lamp type:	19.7	14.2	9.9	kWh/year
LCC of operating lamp for 10 years, discounted to 2022:	383	280	198	GHS (NPV, 2022)
Simple Payback period in months, compared with CFL:	--	6.0	(instant)	months
CO2 emissions due to electricity for one lamp operating for 10 years:	71	51	35	kg CO2/10 yrs

Photographs of the light bulbs selected in the retail store in Ghana for this comparison.  
Photos taken: Q4 2021

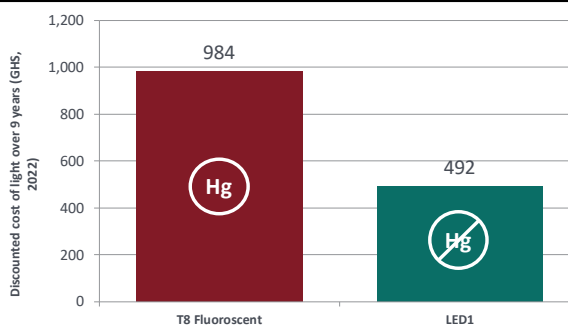


The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Ghana. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately GHS 500 over the lifetime of the LED lamp, yet the LED only costs GHS 3 more at the time of purchase.

Cost of lighting comparison of purchasing and running (consuming electricity) different light bulbs.

Analysis period is 9 years, with light bulb and electricity costs discounted back to the present (2022).

LED light sources cost of ownership is about half as much as fluorescent sources, yet produce the same amount of light from the fixture.



Price for one lamp (GHS):	7	10	GHS/lamp
Price for one lamp (USD):	1.12	1.60	USD/lamp
Lamp wattage:	18	9	Watts
Rated lamp lifetime:	8,000	30,000	Hours
Annual electricity consumption for each lamp type:	59.1	29.6	kWh/year
LCC of operating lamp for 9 years, discounted to 2022:	984	492	GHS (NPV, 2022)
Simple Payback period in months, compared with fluorescent:	--	0.7	months
CO2 emissions due to electricity for one lamp operating for 9 years:	192	96	kg CO2/9 yrs

Photographs of the light bulbs selected in the retail store in Ghana for this comparison.  
Photos taken: Q4 2021



# Kenya



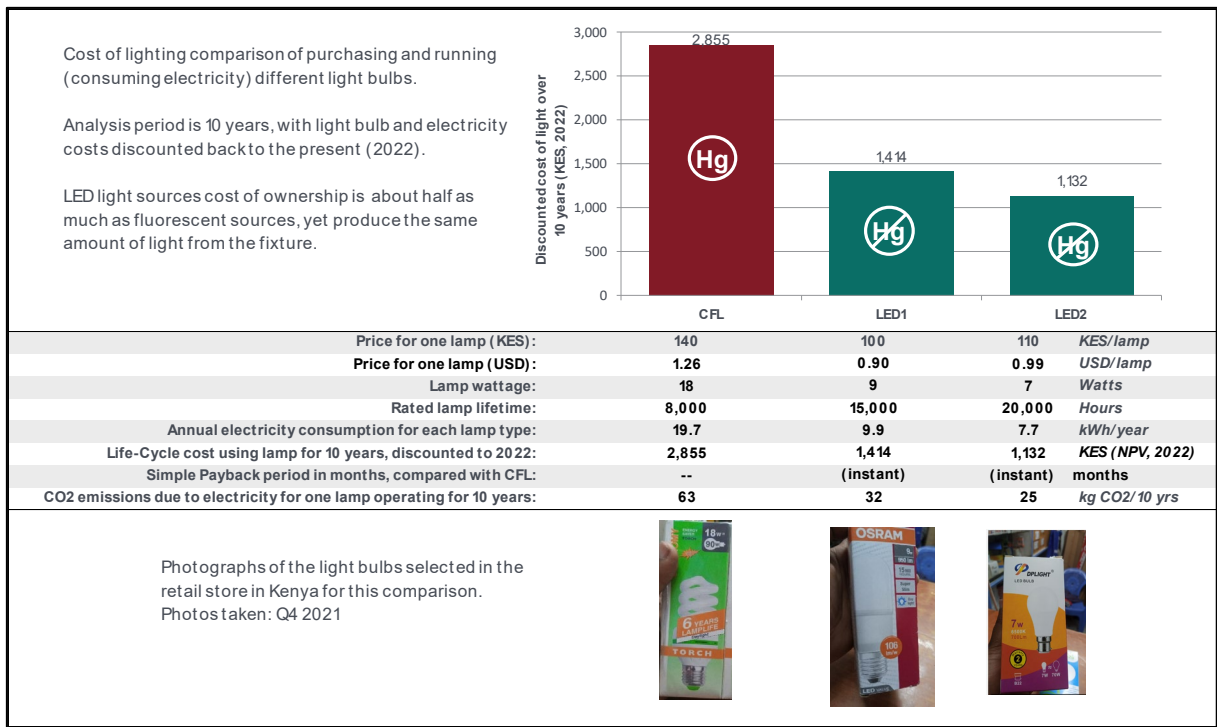
**Table 7. Quantifying the Benefits of the African Lighting Amendment in Kenya**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	2,713,707 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	7,558,884 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	100 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	6.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 740 million

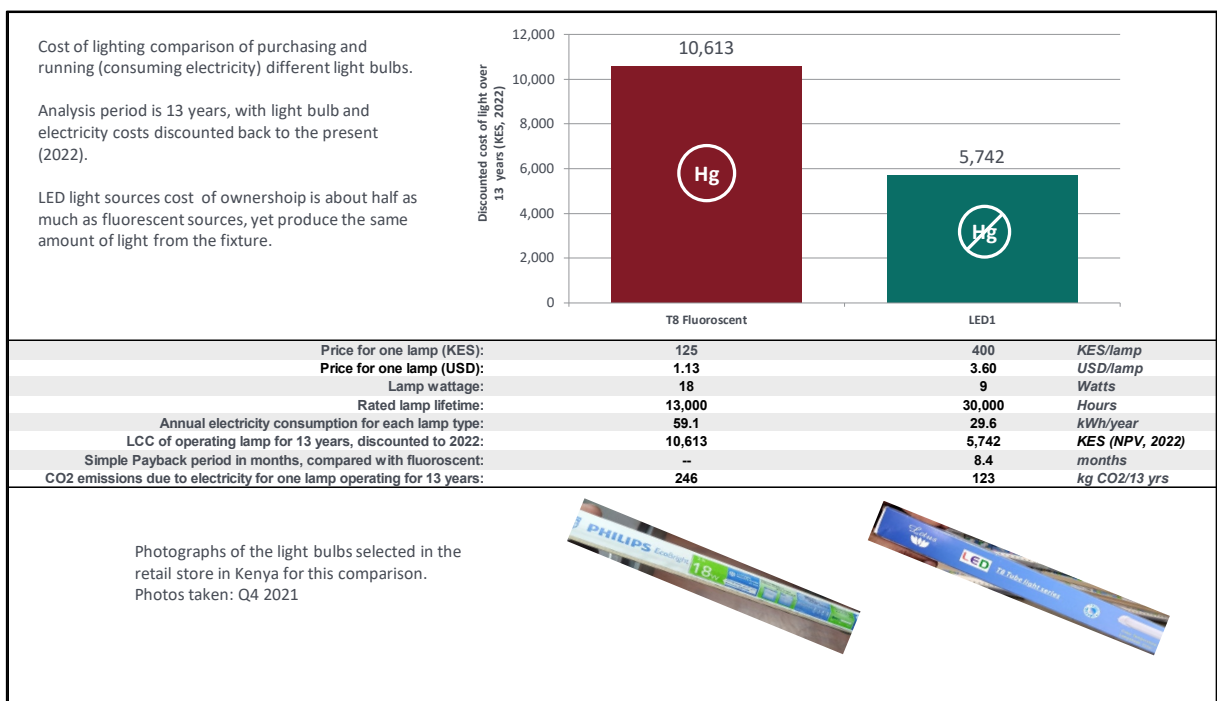
Important information about mercury and lighting in Kenya:

- Standards have already set limits for the mercury content in lighting products (the maximum allowable mercury of 2mg for single capped fluorescent lamps <50W while for lights >50-150W its set at 4.5mg). These regulations also identify the disposal requirements.
- Kenya has MEPS for general service lighting (GSL), directional & non directional lamps and LED that phases out fluorescent lighting (KS 2914:2002) and is in the process of being made mandatory.
- The lighting products (both DC and AC) led to increased uptake of Light Emitting Diode technology, which has quickly been adopted outside the solar segment, leading to increased awareness on efficiency of LED luminary products. The LED product also come in different shapes, and designs, that has further appealed to the consumers as they offer greater flexibility for internal and external lighting fixtures compared to CFLs. The narrowing price differentials between CFLs and LEDs, have translated to many households adopting LED bulbs as opposed to traditional halogens or incandescent bulbs, and currently slowly replacing CFLs
- Kenya is currently the largest market for LED products in the East Africa region; of the different applications; commercial, industrial, residential and other application sectors, the commercial sector accounts for the largest share.
- Kenya is ahead of the curve with a local assembler of LED lighting technologies: LEDMatix

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Kenya. Switching to LED in Kenya offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately KES 1,400 to 1,700 over the lifetime of the LED retrofit lamp.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Kenya. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately KES 5000 over the lifetime of the LED lamp, yet the LED only costs KES 275 more at the time of purchase.



# Nigeria



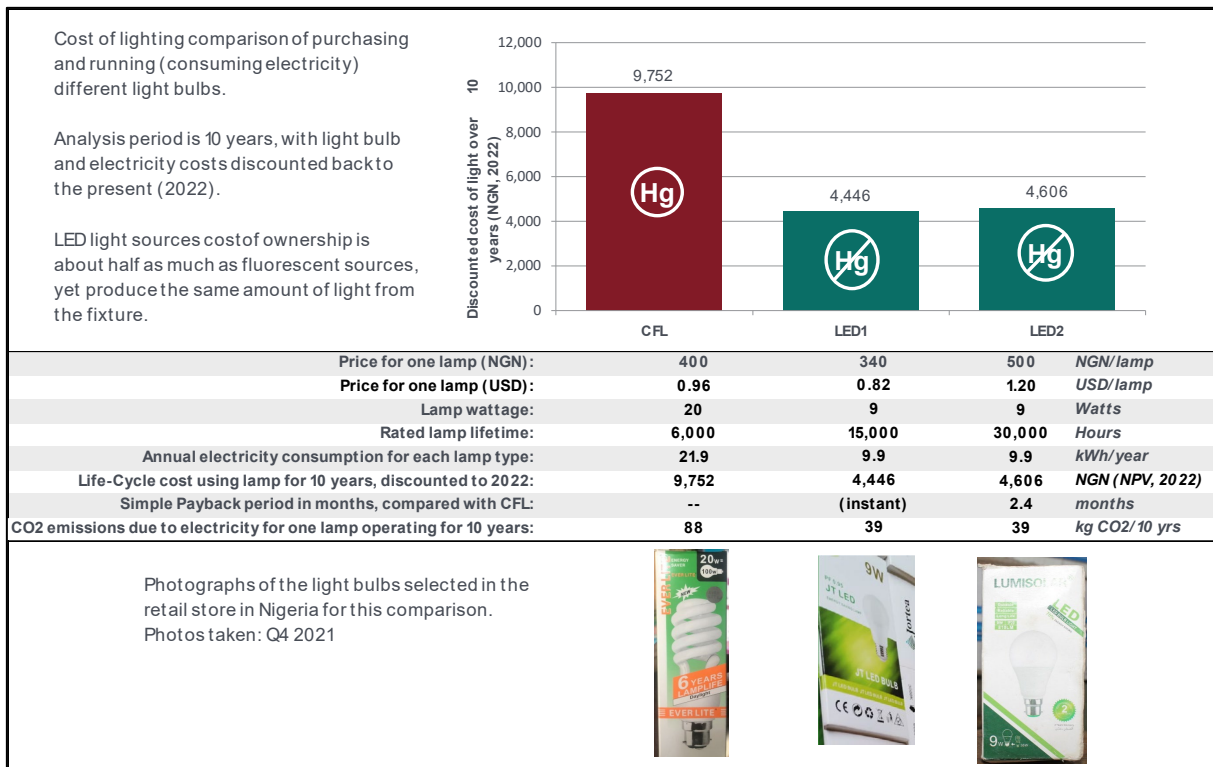
**Table 8. Quantifying the Benefits of the African Lighting Amendment in Nigeria**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	10,306,161 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	31,106,907 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	300 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	25.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 2.47 billion

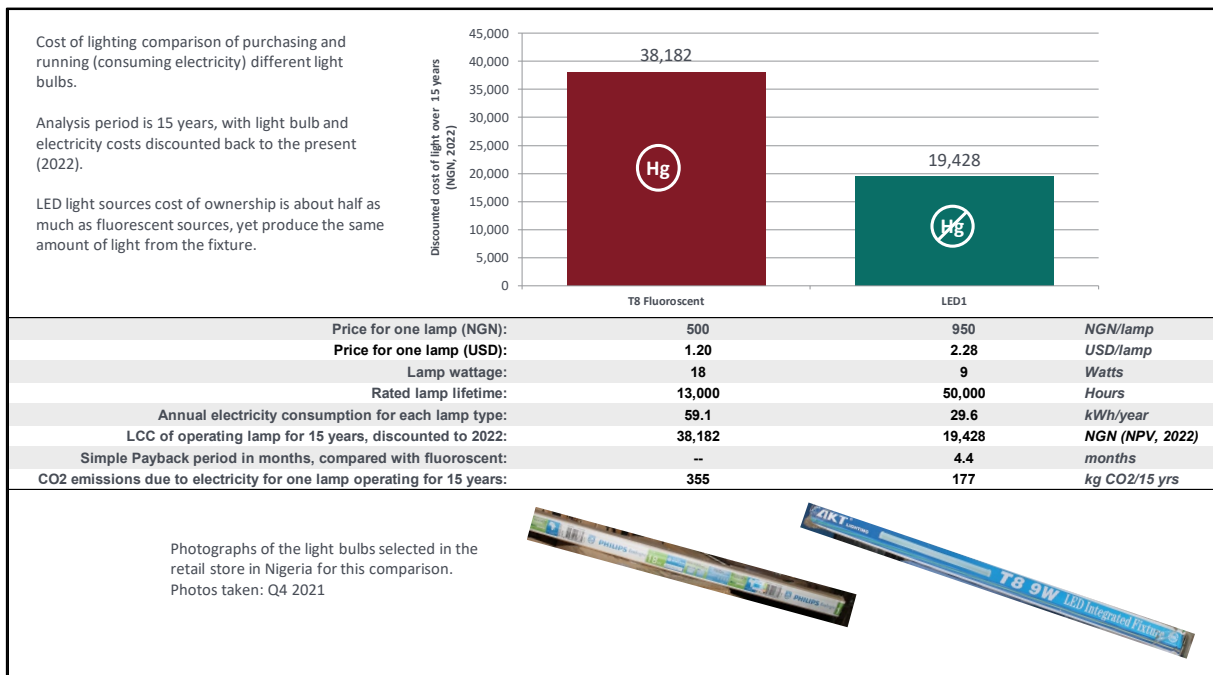
Important information about mercury and lighting in Nigeria:

- Nigeria adopted MEPs for lighting products including self-ballasted and tungsten filament GSL and is carrying out awareness raising on the phase out CFL through their energy efficiency policies.
- The Nigeria Energy Policy prioritized the replacement of all incandescent light bulbs in every home, industry, institution and establishments in Nigeria with LEDs and other energy saving lamps by the year 2025. Nigerian National Energy Efficiency Action Plan (NEEAP) also prioritize the use of EE lighting and target that 40% of households will use EE lighting by 2020 and 100% by 2030.
- The Nigerian Clean Energy Access Program (NCEAP) plans to distribute 150 million efficient bulbs over the next five years under the Clean Development Mechanism (CDM).
- Nigeria has an LED assembly company: Oretronics Technology and key association include Power9ja and Consumer Protection Council who carried out an awareness on LEDS for importers and dealers

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Nigeria. Switching to LED in Nigeria offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately NGN 5,300 over the lifetime of the LED retrofit lamp.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Nigeria. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately NGN 19,000 over the lifetime of the LED lamp, yet the LED only costs NGN 450 more at the time of purchase.



# South Africa



**Table 9. Quantifying the Benefits of the African Lighting Amendment in South Africa**

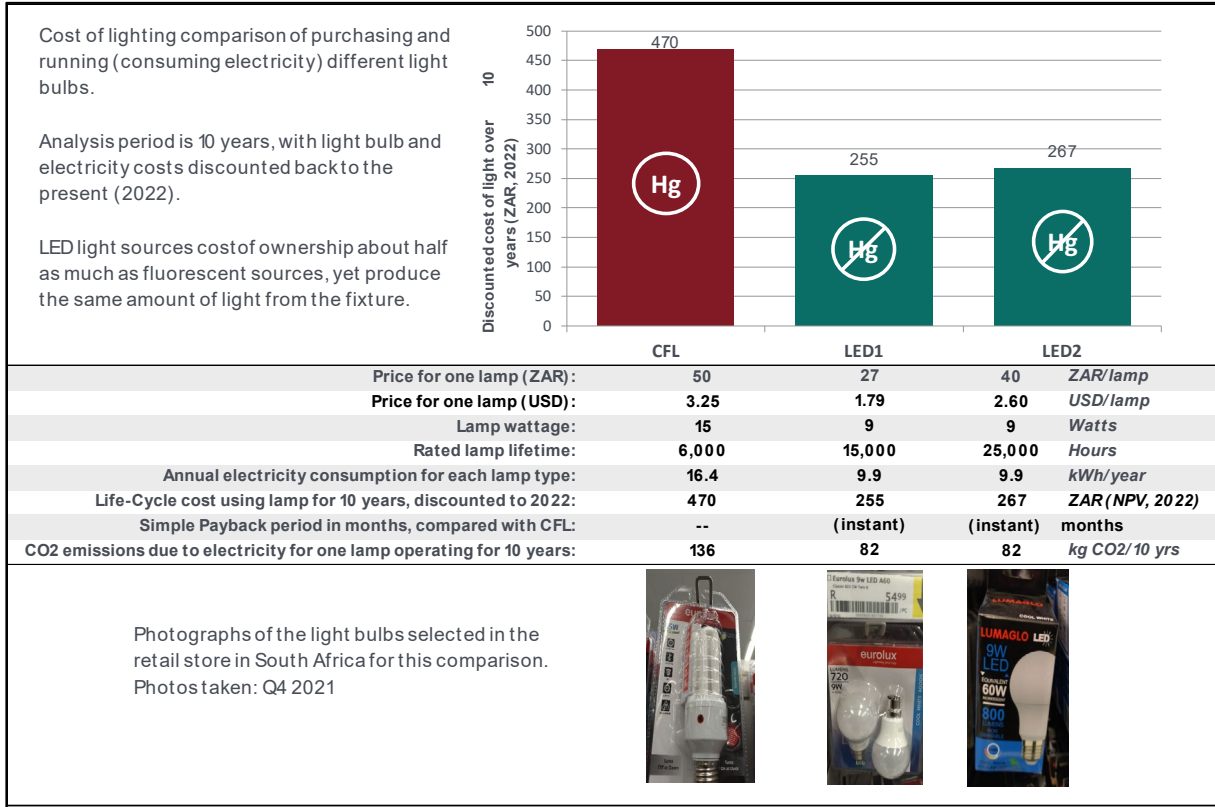
Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	38,288,466 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	90,306,453 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	900 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	76.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 11.39 billion

Important information about mercury and lighting in South Africa:

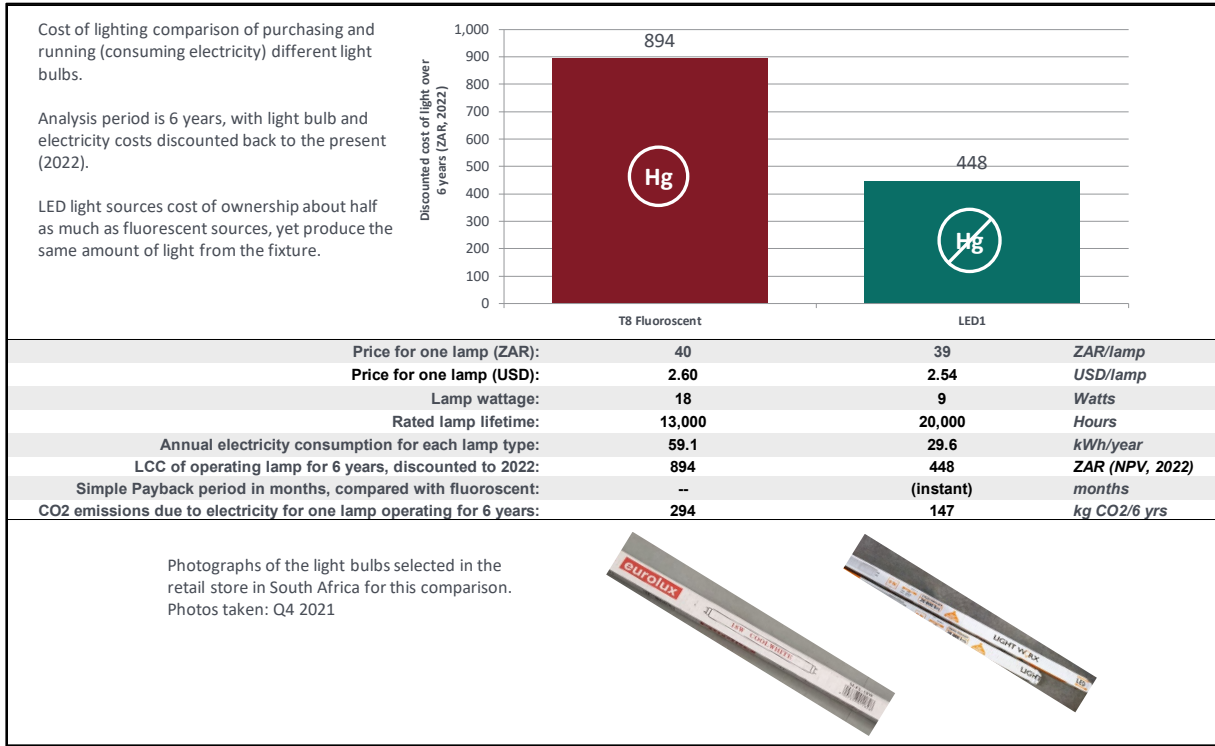
- South Africa has already a compulsory specification policy for General Service Lamps (GSLs) at an advanced stage. South Africa’s National Regulator for Compulsory Specification (NRCS) set out compulsory specifications for safety performance and energy efficiency and functional performance requirements of General Services Lamps: VC 9110 and VC9109 respectively. The proposed VCs will phase out lighting products which do not meet the specifications would be removed from the market in two phases, the first taking effect twelve (12) months from publication in the Gazette and the second phase taking effect in 2024. These new regulations for general-purpose light bulbs in South Africa will make it unlawful to continue selling the compact fluorescent lamps that are currently on the market.
- These specifications are in line with UNIDO program that is actively working to try and shift the general service lamp market to LED (phasing out all CFLs and halogens) by 2023: The UNIDO program which is focusing on adoption of regional MEPS for lighting has been adopted by SADCSTAN (SADC HT 109:2021). However, South Africa has not “domesticated” the SADCSTAN regionally harmonized standard.
- South Africa led the region in phasing out the use of incandescent lighting and is on track to abolish CFL lights

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in South Africa. Switching to LED in South Africa offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately ZAR 200 over the lifetime of the LED retrofit lamp.





The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in South Africa. The LED tube is less expensive than the fluorescent lamp on a first-cost basis, so the payback period is instantaneous. Furthermore, the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately ZAR 450 over the lifetime of the LED lamp.



# Togo



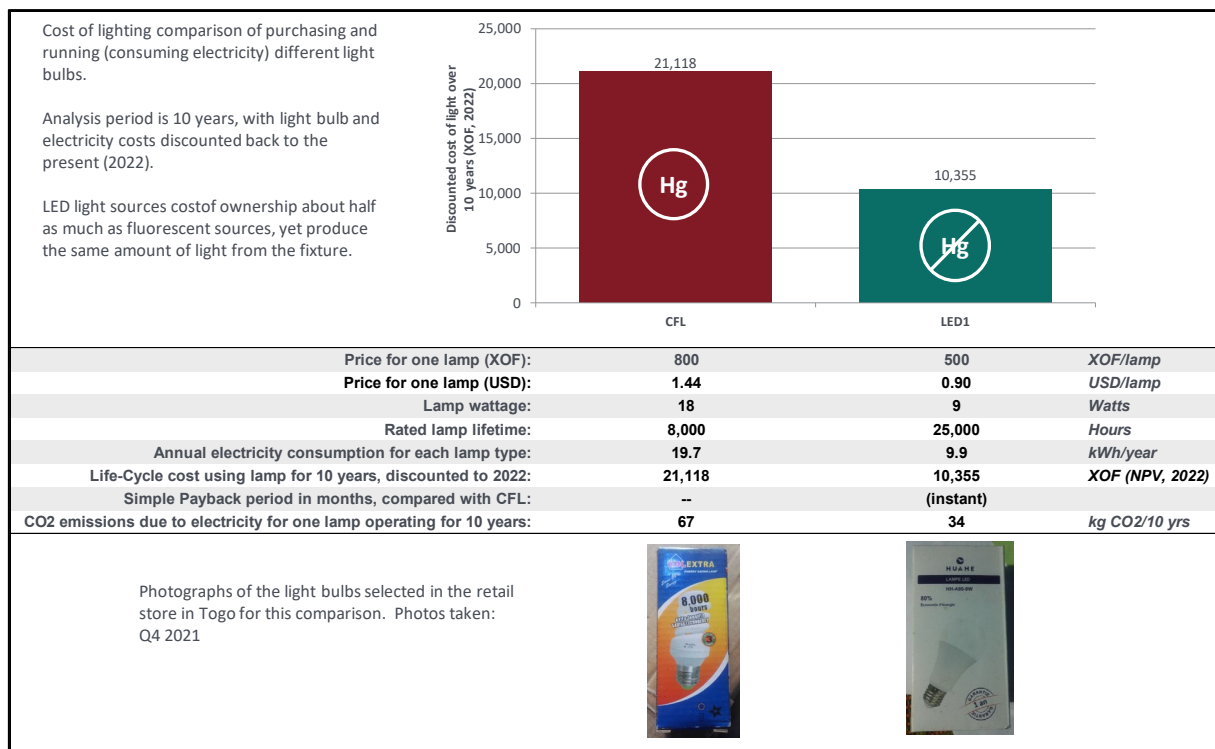
**Table 10. Quantifying the Benefits of the African Lighting Amendment in Togo**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	174,237 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	495,033 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	5 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	0.40 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 70 million

Important information about mercury and lighting in Togo:

- Togo’s lighting market is transitioning to LED, driven by the strong economic benefits of switching away from mercury-containing fluorescent lamps.

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Togo. Switching to LED in Togo offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately XOF 11,000 over the lifetime of the LED retrofit lamp.



# Uganda



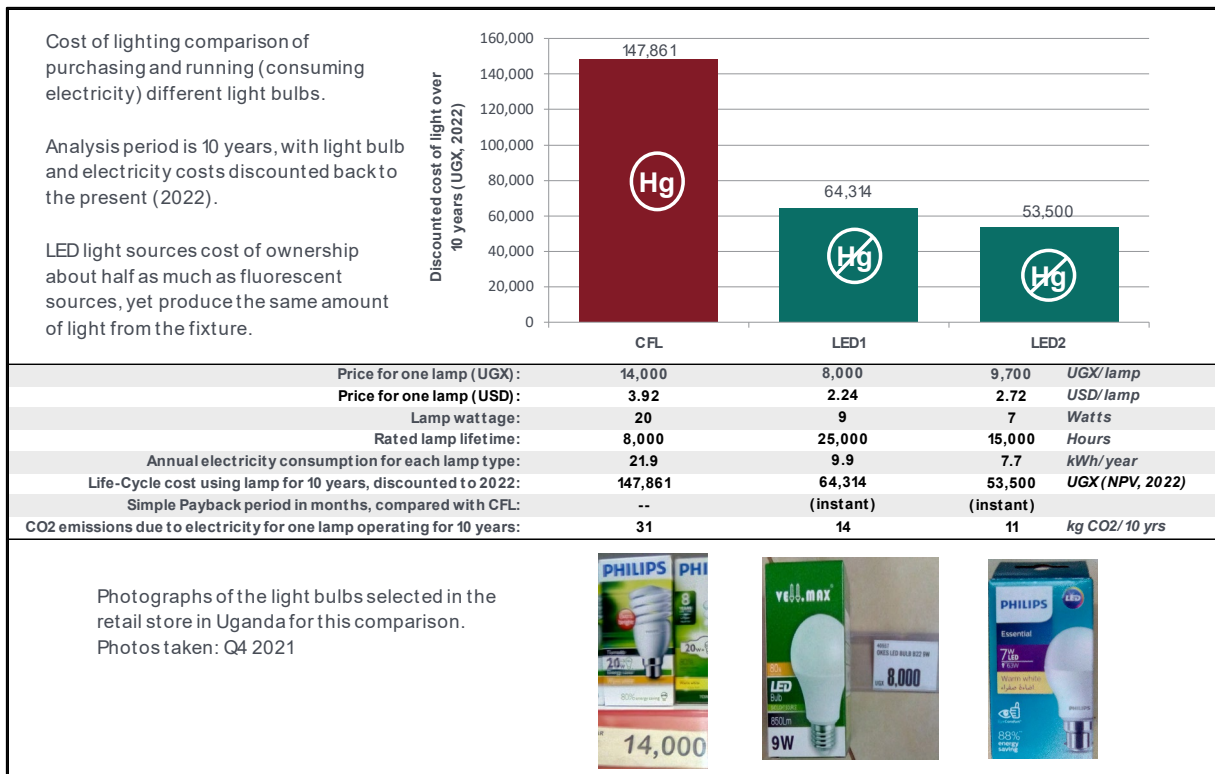
**Table 11. Quantifying the Benefits of the African Lighting Amendment in Uganda**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	765,806 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	2,176,310 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	20 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	2.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 250 million

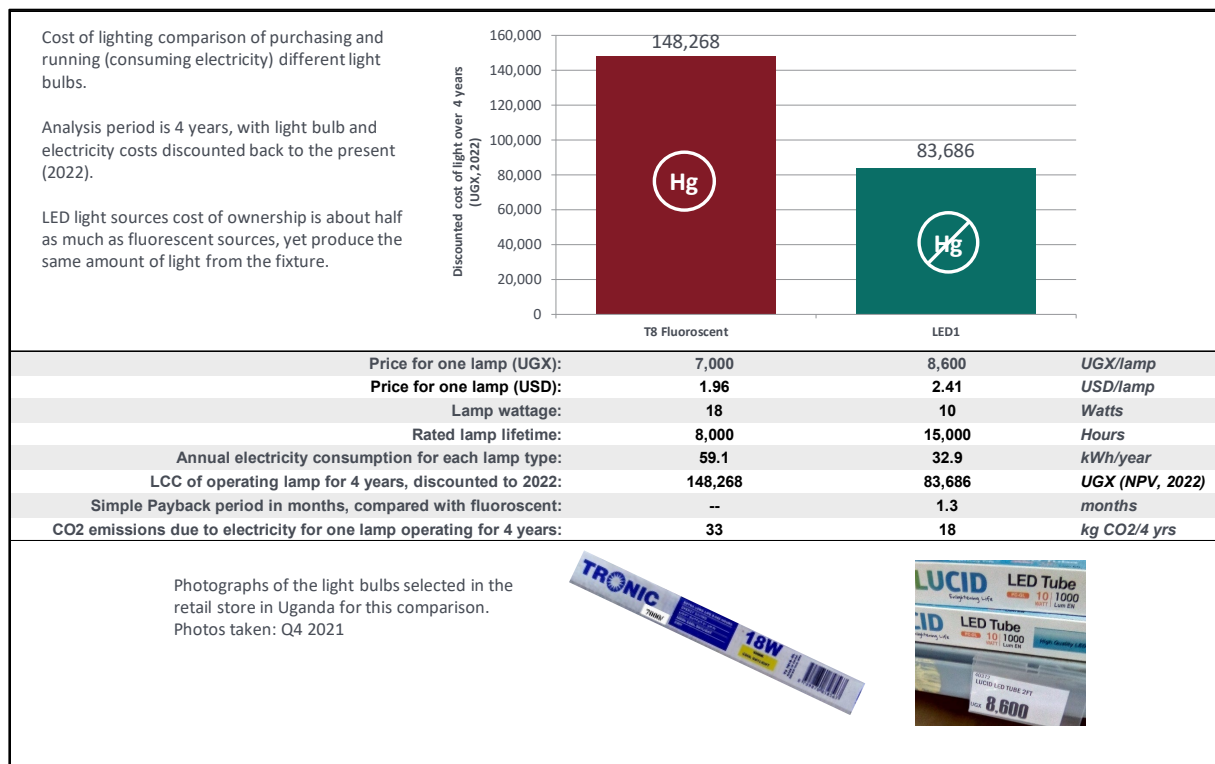
In Uganda, according to draft regulation 43 (of 17th June, 2021) of The National Environment (Management of Hazardous Chemicals and Products Containing Hazardous Chemicals), a person shall not import, manufacture, use or recycle any of the following:

- Compact fluorescent lamps for general lighting purposes that are less or equal to 30 watts with a mercury content exceeding 5 mg per lamp burner
- Triband phosphor linear fluorescent lamps for general lighting purposes of less than 60 watts with a mercury content exceeding 5 mg per lamp
- Halophosphate phosphor linear fluorescent lamps for general lighting purposes of less than 40 watts with a mercury content exceeding 10 mg per lamp
- High pressure mercury vapour lamps for general lighting purposes
- Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps for electronic displays of short length ( $\leq 500$  mm) with mercury content exceeding 3.5 mg per lamp
- Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps for electronic displays of medium length ( $> 500$  mm and  $\leq 1\,500$  mm) with mercury content exceeding 5 mg per lamp
- Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps for electronic displays of long length ( $> 1\,500$  mm) with mercury content exceeding 13 mg per lamp

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Uganda. Switching to LED in Uganda offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately UGX 80,000 to 90,000 over the lifetime of the LED retrofit lamp.



The box below offers an economic analysis of a linear fluorescent lamp and an LED retrofit tube, both of which were selected and photographed in a retail store in Uganda. The LED tube is more expensive than the fluorescent lamp on a first-cost basis, but the LED lamp consumes half as much power as the fluorescent tube – so electricity bills are halved over the lamp lifetime. Switching from fluorescent to an LED retrofit tube will save approximately UGX 65,000 over the lifetime of the LED lamp, yet the LED only costs UGX 1,600 more at the time of purchase.



# Zambia



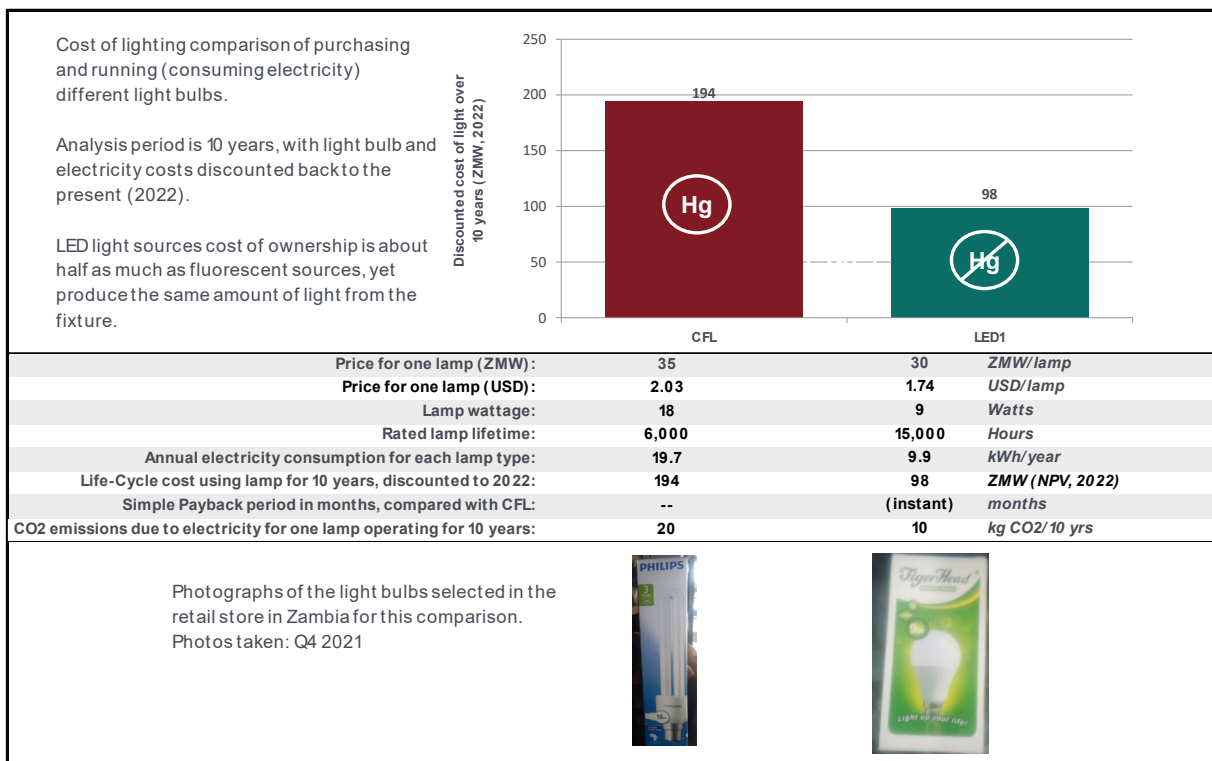
**Table 12. Quantifying the Benefits of the African Lighting Amendment in Zambia**

Benefits of the African Lighting Amendment	Value
Avoided compact fluorescent lamp sales, CFL phase-out in 2024 (cumulative, 2024-2050)	2,388,867 lamps
Avoided linear fluorescent lamp sales, LFL phase-out in 2025 (cumulative, 2025-2050)	7,473,796 lamps
Total mercury in fluorescent lamps avoided (CFL in 2024, LFL in 2025, cumulative to 2050)	68 kilograms
National energy savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	6.0 TWh
National financial savings, fluorescent phase-out (CFL in 2024, LFL in 2025, cumulative to 2050)	US\$ 230 million

Important information about mercury and lighting in Zambia:

- The Zambia Electricity Supply Company (Zesco) has a programme to phase out energy consuming bulbs and replacing them with energy saving bulbs.
- Zesco is giving out Energy saving bulbs to communities so as to introduce the energy saving bulbs to the communities and the communities must compare and differentiate the energy saving bulbs from the energy consuming bulbs.
- In achieving the goal of transitioning households to LEDs, the Zambia Electricity Supply Company (Zesco) has made one brand of lighting bulbs called Woo Jong lighting, Model led A65 13 watts going at a price of k50. And it's a Mercury free product.

The box below offers an economic analysis of a CFL and LED retrofit bulbs. All of these lamps were selected and photographed in a retail store in Zambia. Switching to LED in Zambia offers an instantaneous payback, because the LED lamp is less expensive than the CFL. Additionally, the LED lamp consumes half as much power as the CFL – so electricity bills are halved over the lamp lifetime – yet the LED lamp produces the same amount of light. Switching from CFL to LED will save approximately ZMW 100 over the lifetime of the LED retrofit lamp.



# C Li C

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