Energy Efficiency for Lighting Systems

24th November 2020

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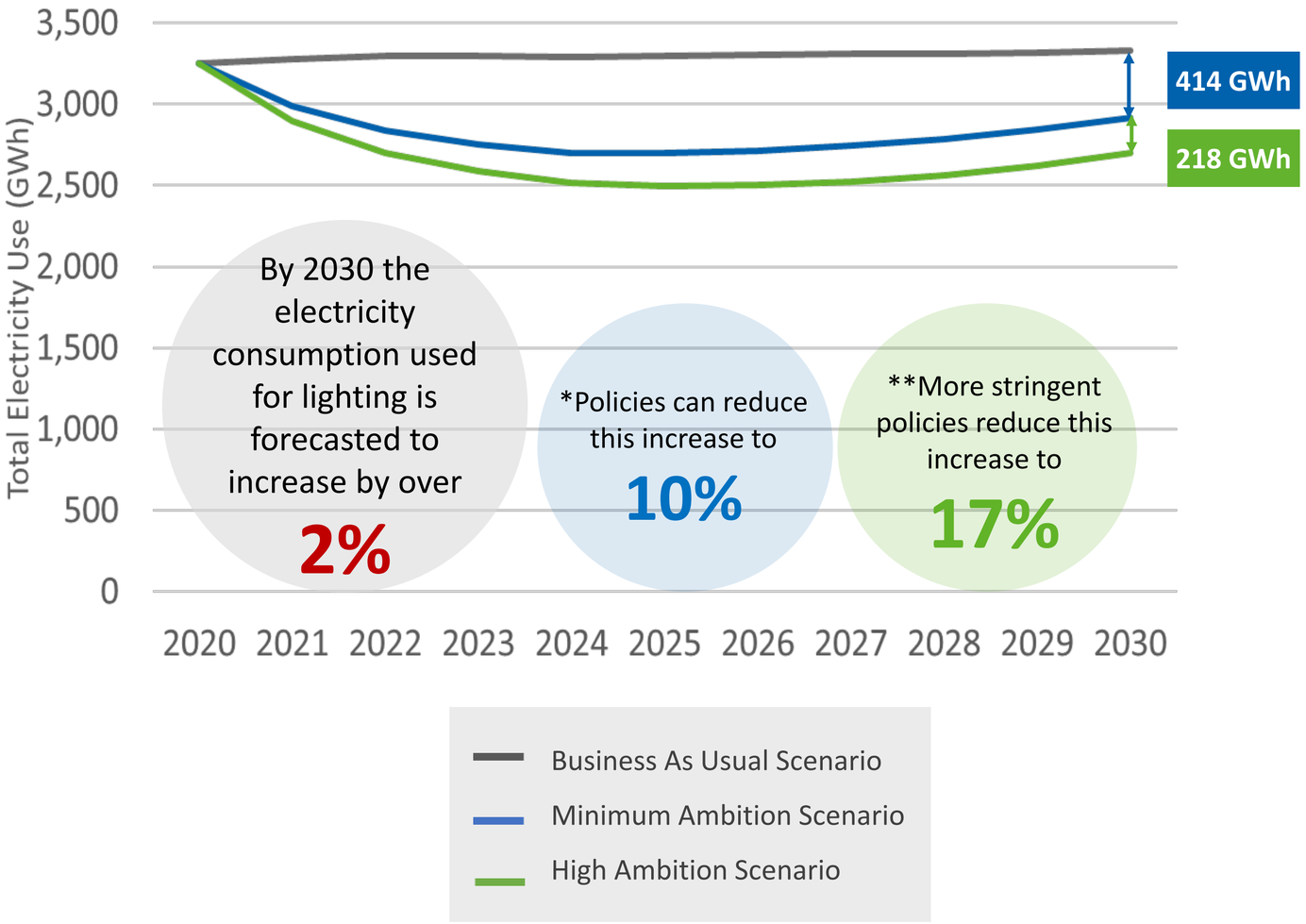
Saving Opportunities in Mozambique from Energy-Efficient Lighting



Annual Savings in 2030* from Energy Efficient Lighting:

414 GWh of electricity consumption, which is equivalent to:

- **4 Power stations** [20 MW each]
- **580** Thousand tonnes of **CO_2**
- **50** Million **USD on electricity bills**

*Minimum Ambition Scenario

U4E United for Efficiency

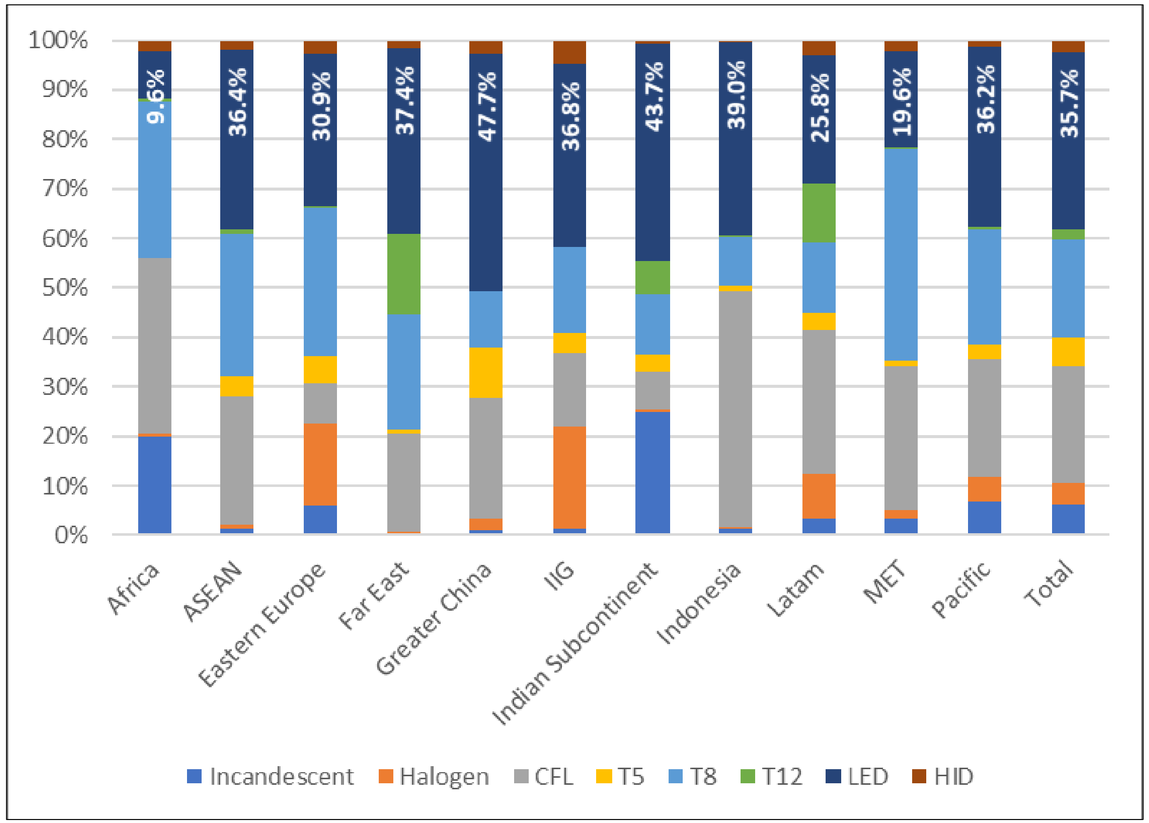
1. Minimum Energy Performance Standards (MEPS) for Lighting

Lighting is an easy win for savings in energy and carbon

Key Takeaways from U4E assessments:

- Fluorescent light sources (GSL & Linear) account for 50% of the installed base and the saving with LED is 50%
- Incandescent and halogen account for 10% and the saving there is 80%.
- In Africa it is 70% Fluorescent & 20% incandescent & halogen, so a combined saving of closer to 60%.
- Emerging markets are building new infrastructure so a move directly to efficient LED is an opportunity, but it needs to be driven by MEPs.

Technology split, 2019 installed base, emerging markets

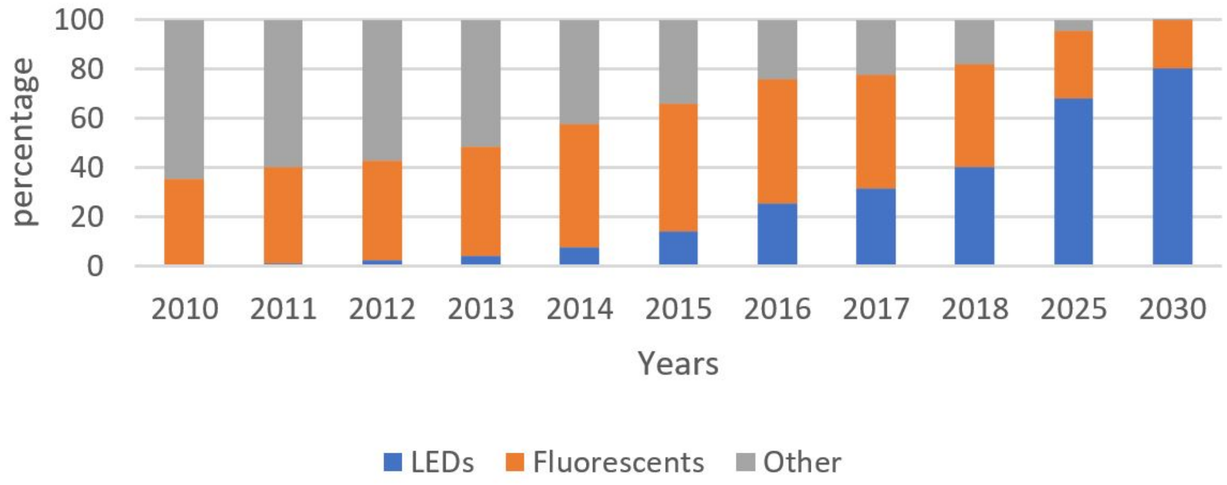


Lighting share by technology over time.

IEA say in their report that *MEPs are required to meet the share of LED shown in 2025*

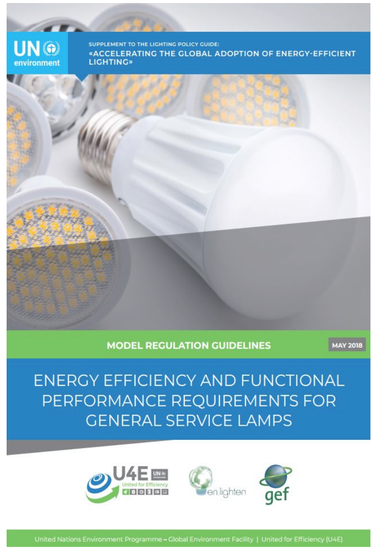
"to raise the share of LED sales to more than 65% of the residential market by 2025, countries need to take advantage of recent sales trends and update their regulatory policies to keep pace with expected LED performance, which is drastically higher than five years ago."

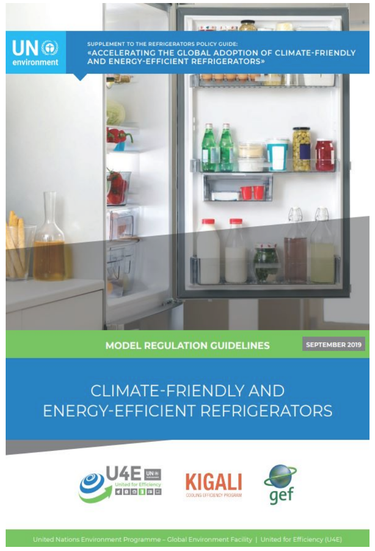
Lighting Sales by Type – IEA (2019)

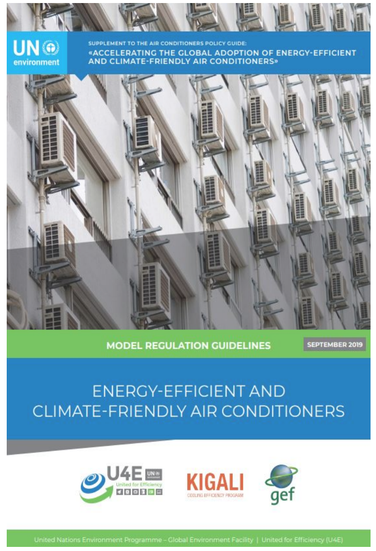


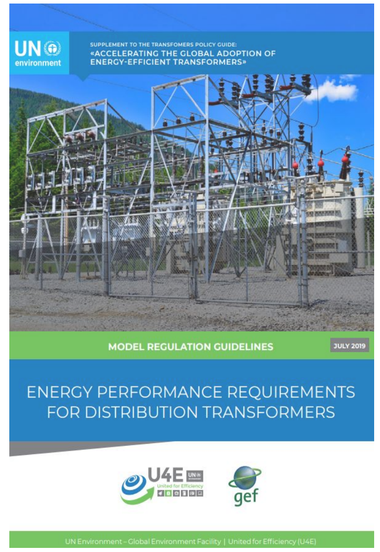
U4E Model Regulation Guidelines

- Intended as guidance to help **inform regulatory authorities and policy makers**
- Sets a **minimum efficiency floor** to prohibit future sales of inefficient products
- References global technology and policy trends
- Deployed in various countries and multiple regions

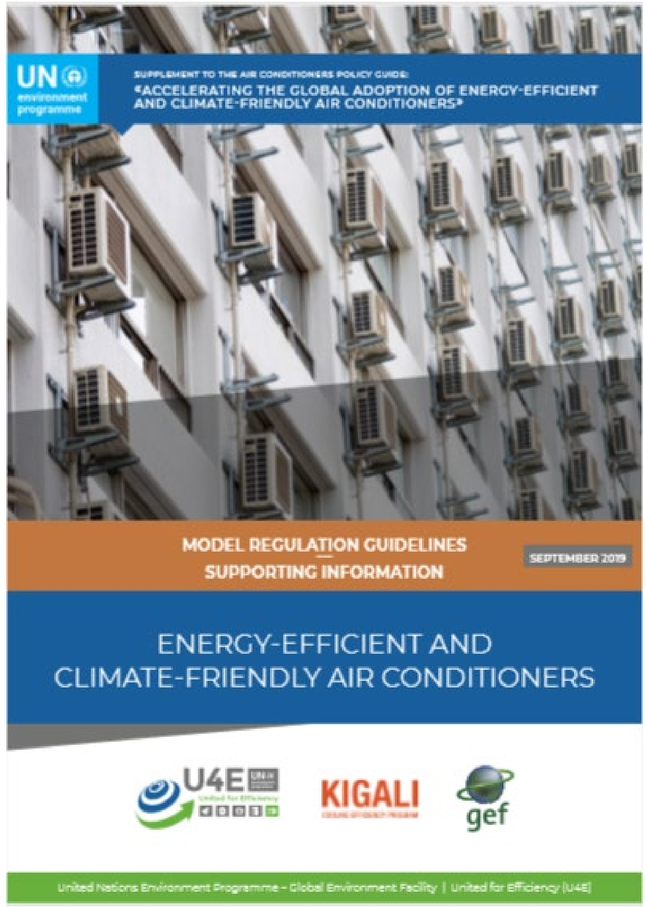








Accompanying Supporting Information Document



- Provides background and justification for what is included and not included in the Model Regulation Guideline.
- Published alongside Model Regulation Guideline.
- Example shown is for Air Conditioners

U4E Model Regulations On Lighting Products

U4E's 2018 Model Regulation Guidelines for GSL are being revised now, why?

- Efficacy & affordability of LED has improved further
- Higher efficiency LED sources can now completely replace CFL (25% of installed base).
- So, CFL is no longer required as an option
- There is an opportunity to simplify the whole regulation.

U4E drafted Linear guidelines in 2019 & a simplified version is being finalised now

- Significant additional savings can be realized if they are introduced without delay
- Linear fluorescent represents 25% to 30% of the installed base of light sources today.
- 50% energy savings can be achieved with LED linear compared to Linear fluorescent.
- LED linear is more energy efficient with a directional light output which reduces losses.

Linear luminaires are included, why?

- LED integrated luminaires replacing linear fluorescent fittings are the most efficient solution
- New build in emerging markets can easily move to LED luminaires as *leapfrog* technology.

U4E Model Regulations On Lighting Products

For both GSL revision & new linear model regulations – a simplified approach.

- Threshold MEPs set just above conventional inefficient technology for maximum affordability.
- Maximum availability at threshold MEPs levels established through analysis of currently tested product from several hundred manufacturers.
- No correction factors, the threshold is a true baseline for simplified monitoring verification and enforcement. (MVE)
- Energy rating system above that for greater ambition & a longer term regulation.
- Minimum lumen maintenance as part of an early failure test to make sure lamp life is not too short to ensure acceptable quality.
- Basic requirements for low flicker to protect the health of the end user.
- Possible alignment to ongoing efforts under the Minamata Convention on Mercury.

Conclusions

- Conventional lighting is still the largest portion of lighting load on the electrical supply.
- Alternative more efficient lighting technology is already widely available/affordable.
- MEPS can help accelerate global market transformation, however as of today many countries do not have MEPS in place or they are poorly enforced / low levels.
- Basic quality must be ensured with simple requirements in the regulations.
- U4Es new simplified approach lowers the barrier to mass adoption.
- The model regulation guidelines can also form the basis of a procurement specification.

Energy saving with lighting is simple,
…just change one light bulb at a time.

2. Case Studies on Policies for Energy-Efficient and Quality Lighting

Pakistan case study: Implementation of MEPS

LED only in the market

Flux	Lamps	downlights	LED tubes	outdoor lighting
60 ≤ Φ < 600 lm	≥ 80 lm/W	≥70 lm/W	2 feet : 106 lm/W 4 feet : 114 lm/W 5 feet : 116 lm/W	100 lm/W for up to 90W, 120 lm/W for more than 90 W
600 ≤ Φ < 1200 lm	≥ 90 lm/W	≥75 lm/W		
1200 ≤ Φ < 3300 lm	≥100 lm/W	≥ 80 lm/W		

Pakistan case study: Labelling

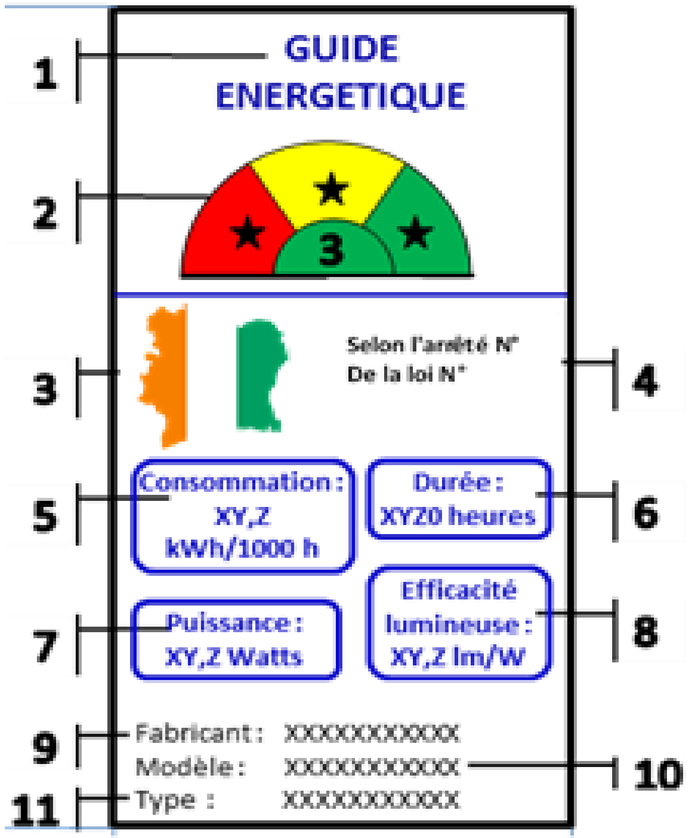
flux (lm)	60 ≤ Φ < 600	600 ≤ Φ < 1200	1200 ≤ Φ
1 star*	≥ 80 lm/W	≥ 90 lm/W	≥ 100 lm/W
2 stars**	≥ 90 lm/W	≥ 100 lm/W	≥ 110 lm/W
3 stars***	≥ 100 lm/W	≥ 110 lm/W	≥ 120 lm/W
4 stars****	≥ 110 lm/W	≥ 120 lm/W	≥ 130 lm/W
5 stars*****	≥ 120 lm/W	≥ 130 lm/W	≥ 140 lm/W

Ivory Coast case study: MEPS & Labelling

CFL and LED in the market, incandescent banned

Easily understandable (survey)

In line with MEPs



Luminous flux Φ in lm	Class 1 (1 star)	Class 2 (2 stars)	Class 3 (3 stars)
	Efficacy in lm/W		
60 ≤ Φ < 600	≥ 50	≥ 60	≥ 80
600 ≤ Φ < 1 200	≥ 55	≥ 75	≥ 95
1 200 ≤ Φ ≤ 3 300	≥ 60	≥ 80	≥ 100

Model Regulation Guideline (2018)

Morocco case study: MEPS

Incandescent, CFL and LED in the market

Model Regulation Guideline 2018

Luminous flux (lm)	Year 1	Year 2	Year 3	Year 4	Year 5
60 ≤ Φ < 600	10	10	50	60	85
600 ≤ Φ < 1200	15	55	55	75	110
1200 ≤ Φ ≤ 3300	60	60	60	80	160

LED

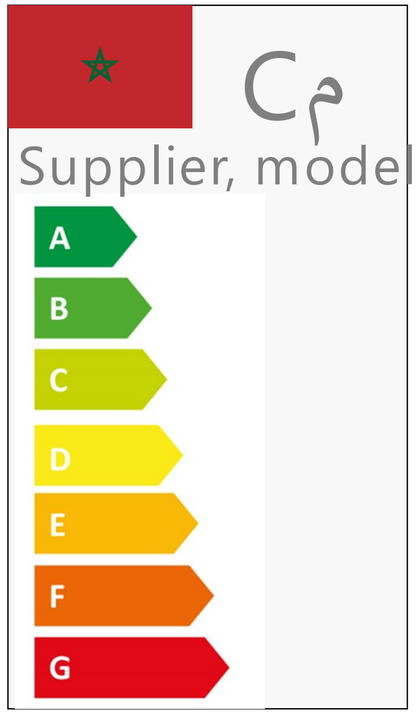
CFL

Incandescent

Morocco case study: Labelling proposal

Understandable and realistic

Classe	Maroc	UE
A	$130 \leq \eta_{TM}$	$210 \leq \eta_{TM}$
B	$85 \leq \eta_{TM} < 130$	$185 \leq \eta_{TM} < 210$
C	$60 \leq \eta_{TM} < 85$	$160 \leq \eta_{TM} < 185$
D	$50 \leq \eta_{TM} < 60$	$135 \leq \eta_{TM} < 160$
E	$30 \leq \eta_{TM} < 50$	$110 \leq \eta_{TM} < 135$
F	$15 \leq \eta_{TM} < 30$	$85 \leq \eta_{TM} < 110$
G	$10 < \eta_{TM}$	$85 \leq \eta_{TM}$



Flux lumineux en lumen (lm)	Année 1	Année 2	Année 3	Année 4	Année 5
$60 \leq \Phi < 600$	G	G	D	C	B
$600 \leq \Phi < 1200$	F	D	D	C	B
$1200 \leq \Phi \leq 3300$	C	C	C	C	A

In line with MEPS for better adoption and market surveillance

United for Efficiency

Sustainable Public Procurement

Street lighting & Office building lighting

Efficacy of the luminaire

Lifetime

Quality of light : CCT, CRI, tolerances

Electrical parameters : Fundamental power factor, standby power

Health : flicker, stroboscopic effect

Ingress and surge protection, impact resistance, humidity and corrosion

Dimming, performance criteria (installation)

Contact

TRANSFORMING MARKETS TO ENERGY-EFFICIENT PRODUCTS

Thank you

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