**Introducing technology-neutral Minimum Energy Performance Standards to promote the uptake of energy-efficient lighting in South Africa.**

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## **Overview**

South African households purchase roughly 22 million electric lamps per year and the total installed stock in homes is approximately 170 million. While a single electric lamp does not consume a large quantity of electricity, the average household has about 15 lamps. We estimate that they collectively consume ~2 900 GWh of electricity per year which is ~1.5% of total national electricity sales.

Regulation in South Africa has not kept pace with the global technological advancements. Light Emitting Diode (LED) lamps have emerged as the most energy and cost-efficient form of household lighting – outperforming both compact fluorescent lamps (CFLs) and halogen lamps. While older lighting technologies (CFLs, halogens and incandescent lamps) are regulated for safety, there are no safety or performance standards for LEDs.

The need for regulation of lighting (from a safety and performance perspective) is justified on the basis that there is a market failure caused by ‘imperfect information’, which results in consumers making poor choices. The proliferation of lighting brands and technologies mean that consumers cannot easily compare the quality, life-cycle costs, and performance of different lamps. A lamp is a relatively low value purchase and consumers are unlikely to invest time and effort to comparing options and make an informed choice.

Our analysis of three years of historical data from major retailers suggests that South African households are indeed making poor choices when purchasing lighting.[[1]](#footnote-2) The best-selling lamps are those that appear to be inexpensive based on their upfront purchase price. Consumers do not appear to factor the full life-cycle costs of using the lamp into their purchase decisions (partly because there is little readily available information to facilitate a comparison). The sales data analysis reveals that many of the best-selling lamps in South Africa are among the least energy-efficient and consequently the most costly to use on a full life-cycle basis.

For example, the best-selling lamp in the 800 to 1 300 lumens (lm) brightness category is a halogen lamp which accounted for 52% of sales during the first half of 2018. This lamp costs R20 (USD1.40) per unit to purchase but is among the most expensive to operate costing a consumer, ~R1 500 (USD 104.40) in electricity and replacement costs over a 5-year (assuming 7 000-hour lifecycle). An equivalent brightness LED lamp costs R35 (USD2.45) upfront but only R178 (USD12.39) to use over the same period. The life-cycle cost of the LED lamp is only 11% of the equivalent halogen lamp.

While sales of LED lamps increased during the first half of 2018, CFLs remain very popular in the household segment in South Africa. CFLs accounted for more than half (52%) of total retail sales over this period, while halogen lamps accounted for a further 26% of sales. The relatively slow uptake of LED technology can be partly attributed to the strong perception of CFLs as energy-efficient lamps. This perception can, in turn, be linked to national utility’s (Eskom) mass roll-out CFLs as part of a nationwide demand-side management campaign in 2010.

The Department of Energy (DoE) is proposing to introduce new regulation to set technology neutral minimum energy performance standards (MEPS) for household lighting products. The main objective of introducing MEPS is to accelerate the adoption of energy-efficient lighting by households and to remove inferior and unsafe lamps from the market.

The main energy performance requirement of the draft technology-neutral MEPS is a minimum efficacy of 90 lm/W under the first tier of the regulation and 105 lm/W under the second tier. While incandescent lamps (ICLs) are already banned in South Africa (with a few exceptions), these requirements remove halogen and CFL lamps from the market as well.

The DoE and NRCS commissioned an economic cost benefit analysis (CBA) of the proposed regulation to set MEPS for household electric lamps. While the proposed regulation is expected to result in range of benefits, including energy savings and environmental benefits, there will also be associated costs related to administration and enforcement. This paper presents some of the key findings of the study.

## **Methods**

The potential economic impacts of MEPS for lighting were assessed within CBA framework which aims to quantify the net benefit of the proposed regulation in monetary terms. We also drew specifically on the guidelines provided by the United Nations Environment Programme (UNEP) in a guidance note on MEPS for lighting for policymakers[[2]](#footnote-3) and on a recent study by Australian and New Zealand Governments – “Decision: Regulation Impact Statement: Lighting”.[[3]](#footnote-4) The cost-benefit analysis relied on four main inputs – market analysis, stakeholder consultation, economic modelling, and lamp testing.

We analysed the market for electric lamps in South Africa based on retail trade data sourced from AC Nielsen and augmented with technical lamp specifications and import statistics from the South African Revenue Service. We followed an extensive stakeholder consultation process with various groups[[4]](#footnote-5) to gauge the sentiment towards regulation, validate key assumptions and inputs to the model and to obtain qualitative insights on the likely economic impact of MEPS.

The economic cost-benefit model was then developed using data and input assumptions obtained during the market analysis and stakeholder consultation processes. CBA is a comparative approach; the impacts of the proposed regulation that will establish MEPS for lighting was defined in terms of a single ‘policy option’ scenario which was then modelled relative to a baseline or ‘business-as-usual’ (BAU) scenario. The BAU scenario represents the energy performance of a typical lamp model in the market and likely usage and uptake without the proposed regulation

We also tested a sample of ten LED lamps from nine different suppliers was purchased from retail outlets and tested at Eskom’s laboratory to obtain an indication of (i) the quality of lamps currently in the market, and (ii) the consistency of products with the information provided on the packaging.

## **Results and conclusions**

The results of the CBA suggest that introducing MEPS for general lighting will yield significant, positive net economic benefits for the South African economy. Under the central assumptions, the net economic benefit of the project is expected to amount to R11.7 billion (USD811 million) over the 15-year period and the benefit-cost ratio is 27.4 to 1; i.e. the present value of the project benefits will exceed the present value of the costs more than 27-fold.

Once MEPS is introduced households will only be able to purchase energy-efficient forms of lighting and as a result are estimated to save between 300GWh and 700GWh of electricity they would otherwise have consumed annually. With the introduction of MEPS, South African households are expected to realise total electricity cost and lamp replacement cost savings of R12.1 billion (USD839 million) over the next 15 years (in present value terms).

Based on stakeholder consultation we identified that the key risks to the economic case for the introduction of MEPS are a potential delay in the implementation of the regulation and poor enforcement of the compulsory specifications. If the implementation of MEPS is delayed by three years, the total net benefit associated with MEPS is reduced to R1.9 billion (USD132 million) from R11.6 billion (USD804 million), under the central assumptions and the benefit-cost ratio decreases from 27.4 to 5.3. There is a strong case for implementing MEPS as soon as possible to maximise the potential economic benefit associated with more rapid switching to energy-efficient lighting. A very low enforcement scenario (33%) would also reduce the expected net economic benefit by more than two-thirds relative to the central scenario but various measures to improve monitoring verification and enforcement activities were recommended by stakeholders.

1. Data used for the sales analysis was sourced from AC Nielsen. [↑](#footnote-ref-2)
2. Scholand, M. 2015. Developing minimum energy performance standards for lighting products. *Guidance Note for Policymakers*. UNEP DTIE and UNEP-GEF en. lighten initiative. [↑](#footnote-ref-3)
3. Australian Department of the Environment and Energy. 2018. *Decision Regulation Impact Statement: Lighting*. [↑](#footnote-ref-4)
4. Over 35 stakeholders, representing five main stakeholder groups (public sector, core technical group, large suppliers, local manufacturers, and other). [↑](#footnote-ref-5)