A review of the residential efficient lighting programme rollout in South Africa

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Abstract

Efficient lighting for the residential sector in South Africa stemmed out of an electricity supply crisis. The Compact Fluorescent Lamps (CFL) rollout programme was carried out in the absence of a supporting policy. The implementation resulted in both desirable and undesirable outcomes. Of even greater concern is that a section of the market may be regressing to inefficient lighting. An analysis of lighting technologies available in the market shows that a shift to more energy efficient lighting technologies, such as light-emitting diodes (LED), will result in significant energy savings.

Introduction

In the late 1990's Eskom[1], the national vertically integrated utility, informed the Department of Minerals and Energy that demand would exceed supply by 2007 and in order to avoid any supply shortages the construction of new power plants would need to commence before 2000. Indeed, this is recorded on page 41 of the *White Paper on the Energy Policy of the Republic of South Africa (1998)*, the country's official energy policy blueprint. Delays in the developing of a suitable framework for the introduction of independent power producers (IPP) (*inter alia* labour union objections, the Enron debacle in the USA raising doubts about the wisdom of private sector ownership of key national assets were exploited by opponents of privatisation, and a policy framework which when presented to the private sector failed to arouse interest) meant that by 2005 government had to accept that not only were investments not forthcoming but that the entire electricity system was on the verge of collapse. Eskom was instructed to start building two mega-coal plants of 4.8 GW each as well as the re-commissioning of mothballed coal stations and pumped storage. A slow start in the build-up programme was further exacerbated by Eskom's loss of institutional capacity and as forecast by Eskom in the Energy White Paper, demand exceeded supply. The crisis was made worse because of the following: As much as 25 % of power stations were not functioning [1], low stocks of coal, low quality coal and supply chain issues.

Consequently, load shedding was implemented nine times in November and December 2007. In 2008, national rolling blackouts commenced in January 2008 and it took Eskom a fortnight to stabilise the grid. A national emergency was declared. Energy intensive industries – mining and associated activities, the backbone of the South African economy, were forced to shut down or drastically reduce output, mining production suffered, falling by 22 %. The country's biggest gold producer expected power shortages to cut production by 400,000 ounces ($363m) and the second largest miner forecast that running on 90 % power would reduce production by 15–20 % annually. It is estimated that during this period load shedding cost the economy R2 billion ($200 million) per day [2; 3; 4; 5].

There was respite from blackouts for the period 2015 to 2018 due to a combination of: Additional (new) power from the much

1. Eskom was established in 1923 and is a classic example of a vertically integrated utility – it monopolises almost all generation, controls transmission and shares distribution with local authorities who may not distribute outside their area of jurisdiction.

delayed renewable IPP programme's plants coming on stream; the commissioning of some of the units from two above mentioned new power plants; and decreased economic activity. However, the situation was always tenuous and from June 2018 Eskom once again raised the threat of a fresh round of blackouts due to delays in the completion of the remaining units of its new power plants.

Historically, energy efficiency has unsurprisingly enjoyed little support or uptake in South-Africa, a country renowned for its plentiful and cheap power. It was only in times of shortages that any attention was paid to the efficient use of electricity. The solution to supply shortages was always to generate more power. Energy efficiency was considered a "stop gap" measure until Eskom built the next power station[2].

Somewhat reluctantly, but knowing the scale of the crisis, in 2005 Eskom injected renewed focus on its basic Demand Side Management (DSM) programme. National government and the private sector quickly recognised the emergency and acted immediately through: New policies and regulations, incentive programmes, the new power stations build-up and the 2005 energy efficiency accord from which a commitment by the private sector to save 12 % of national energy by 2015 [6] resulted.

Eskom has implemented programs to reduce electricity demand primarily driven by efforts to avoid load shedding due to capacity restraints. Its Demand Side Management programme[3] (referred to as Integrated Demand Management (IDM) from 2010) employed a combination of the following in its efforts to reduce demand.:

- Energy efficiency
- Demand-management measures that shift electricity usage from a constrained or peak consumption period to a time when electricity is more readily available
- Demand response measures that call on consumers to reduce consumption rapidly during critical periods.

As part of the energy efficiency program implementation, Eskom made use of extensive mass rollouts for specific technologies, such as Compact Fluorescent Lamps (CFLs), Light Emitting Diodes (LED) down lighters, geyser blankets, shower heads and timers. These rollouts were mainly geared towards the residential electricity consumers and in total 70 million CFL's were rolled out to residential consumers [7].

The CFL rollout has had an undesired effect on consumers where CFL's are in 2018 still largely considered as the *de facto* energy saving lighting technology to the detriment of other newer technologies, such as LED lighting. In turn, consumer appetite or interest towards LED's is significantly low and the market may be regressing. Recent research [17] undertaken by the authors has found that low income consumers are reverting to purchasing illegally imported but significantly cheaper incandescent lightbulbs now that the utility CFL rollout programme has ended. This finding is supported by the large increase of illegal incandescent lightbulbs which have been confiscated by the Regulator in 2018. Policy makers are grappling with how best to adopt policies that will accelerate the transition to more energy efficient lighting technologies for the benefit of consumers, industry and the society as a whole.

In 2017, there were a total of 16.2 million households in South Africa. Since 1998, South Africa has made tremendous progress in its electrification program and in 2017, 84.4 % of households were connected to the electricity supply from mains electricity [8]. Lighting forms a wide usage in electrified households as indicated by the fact that 97 % of the electrified households use electricity for lighting[4] [8]. The provision of free basic electricity (FBE) to the indigent community, which allocates an allowance of 50 kWh of free electricity each month to poor households, contributes to the high percentage of households which use electricity for lighting – 2.35 and 2.45 million households in 2015 and 2016 respectively [22]. It is therefore expected that lighting forms a large contribution to the residential evening demand peak in South Africa.

These developing scenarios in energy efficient lighting and statistics call for a deeper assessment of the program in South Africa. In this paper, the rollout of the efficient lighting programme in the context of national energy efficiency policy and the electricity crisis is presented. The outcomes of the rollout programme are considered and the status of residential lighting in 2018 is discussed. This provides the foundation to undertake an assessment of the potential energy benefits of moving to more efficient technologies**.** The paper concludes having demonstrated that the CFL rollout, without denigrating its significant achievements during the electricity crisis, was done outside of a coherent and overarching policy with the consequence that inevitably it was unsustainable over the long term.

Residential Energy Efficiency (Lighting) Rollout Programme

Eskom, in dealing with the electricity supply crisis and the country's international obligations to combat climate change, had to strike a balance between the two. On the one hand, stabilising the grid called for 'quick' but not necessarily sustainable 'wins'. On the other hand, a measured approach held the potential for permanent electricity savings, however the primary risk being the allegation of Eskom dithering during a national energy crisis. In truth, although Eskom was aware from the late 1990's of the pending crisis little had been done to reduce overall electricity consumption through effective energy efficiency. In general, the utility's response was for the most part reactive.

In developing its demand response strategy, Eskom considered the winter and summer 2012 load profile shown in Figure 1 [9] against the consumption per sector in Figure 2. As is clearly evident in Figure 1 two objectives would need to be addressed to stabilize the grid. The first objective was to reduce demand to match the available supply. The second objective, would be to 'flatten' or remove the peaks from the profile to the greatest extent possible which could be achieved by either shifting loads to periods when supply exceeded demand or consumption through energy efficiency. Figure 2 [9] is then useful to identify which

2. In 1980 Eskom was the fourth biggest utility in the world.

3. Although the IDM programme targeted all sectors (residential, commercial and industrial) it focused on the residential sector due to its profile (see Figure 2) and the immediate savings that could be achieved from efficient lighting.

4. In 2012 lighting accounted for about 18 % of the electricity consumption of a middle income household. This figure is higher for lower income households. (Department of Energy, 2012).

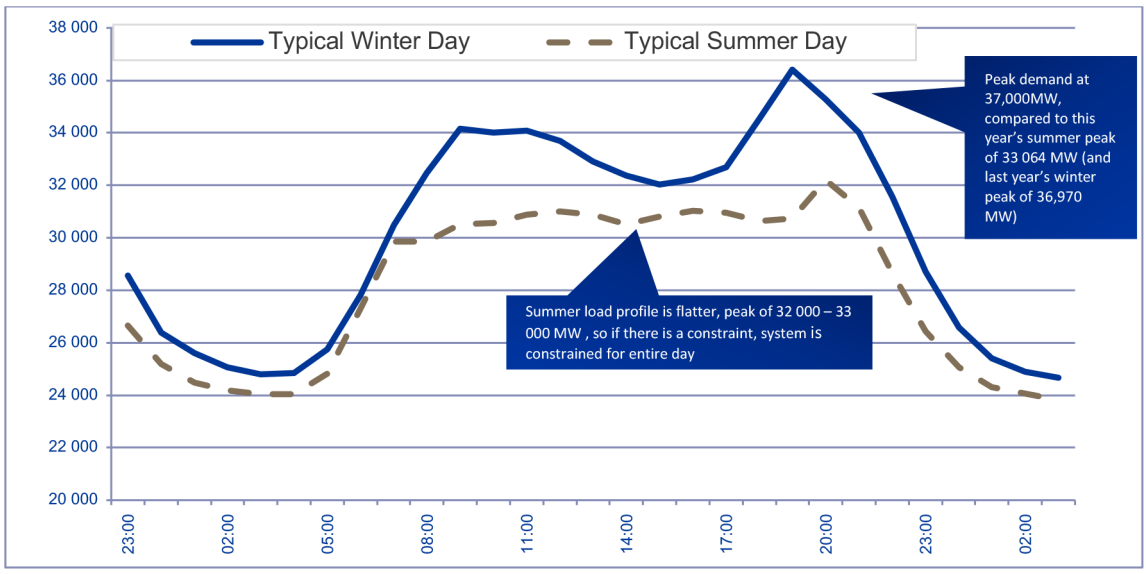

Figure 1. Typical Winter and Summer Load Profiles in South Africa (2012). Source: Eskom (2012).

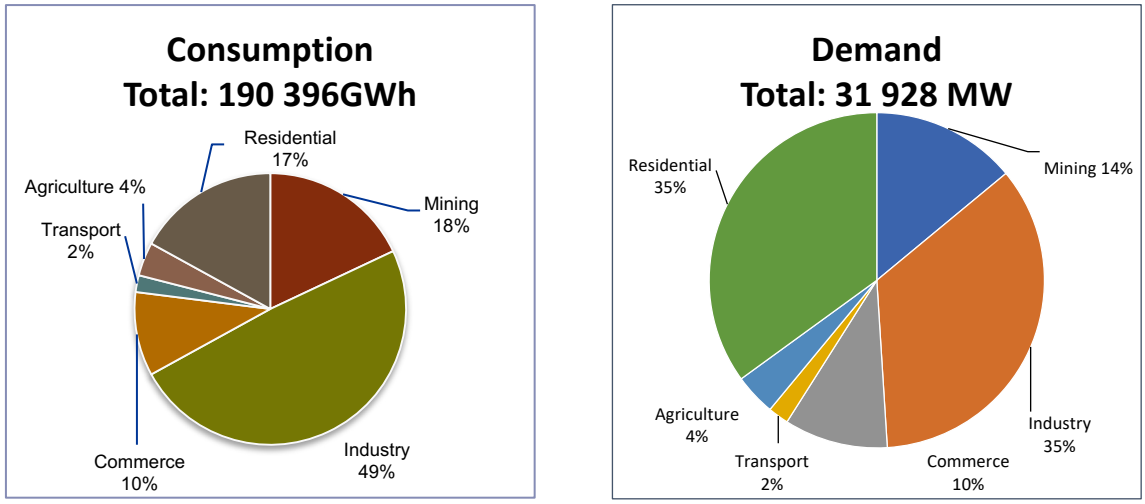

Figure 2. Electricity Consumption per Sector. Source: Eskom (2012).

sectors to target for the greatest impact. It is immediately evident that the residential sector is responsible for the early morning and evening peaks – 17 % of consumption but 35 % of demand.

Inasmuch as Eskom's IDM programme strived for a holistic approach, for the above stated reasons, the morning and evening peaks were prioritised, placing the residential sector at the centre of the programme. Load shifting in the residential sector by its very nature is difficult but made infinitely harder as Time of Use (ToU) tariffs are not applied to the residential sector in South Africa[5]. In general terms, the mechanisms available to policy makers to reduce electricity consumption are: Energy efficiency interventions, tariff hikes (specifically ToU) and appealing to households to voluntarily assist during crisis periods. All three were adopted. Firstly, steep tariff hikes did come into effect as depicted in Figure 3 [10] to cover the cost of Eskom's operational inefficiencies, corrupt activities, and the cost overruns of its new power stations. In 2016 it was estimated that the two new 9.6 GW power stations would exceed US$6.5 billion [11].

Notwithstanding the reasons for the steep tariff increases, the outcome was that residential demand became increasingly elastic (reduced usage) (see [12]) and as a result residential demand dropped. Secondly, Eskom executed a highly effective media campaign called Power Alert[6] which provided households on national television with regular updates about the status of the grid during peak usage hours, requesting the households to turn off appliances with high electricity consumption when the grid was under pressure.

We now turn to energy efficiency, the third intervention[7]. In the two sub-sections to follow, the approach adopted by Eskom to execute its efficient lighting through CFL rollout programme is detailed and the project outcomes are elaborated.

5. The introduction of ToU tariffs for the residential sector have been proposed since the early 1990's but in 2018 they are still to be introduced.

6. http://www.eskom.co.za/sites/idm/Pages/Power-Alert.aspx

7. In addition to the CFL rollout the residential IDM program also included an incentive for solar water heaters.

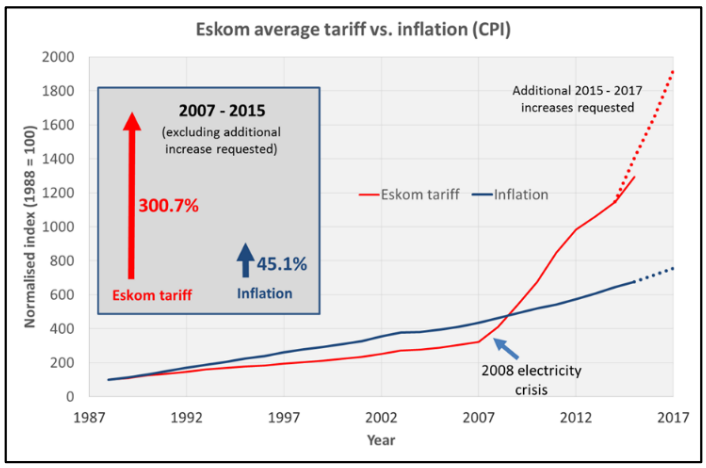

Figure 3. Electricity Tariff Increases (1987 to 2017). Source: Power Optimal.

A REVIEW OF ESKOM'S CFL ROLLOUT APPROACH

The CFL rollout program approach[8], is considered to have had the following features:

Quality: After some initial issues regarding quality, implementation was relatively straightforward:

a. Speed to market: CFL's could be easily procured in large quantities[9]

b. Market acceptance: Free distribution virtually eliminated consumer resistance

c. Equitable experience: All households received the same service

d. Measurement &Verification: To participate households had to surrender their incandescent bulbs which were destroyed thereby ensuring the electricity savings were real

e. Cost effective implementation: By targeting neighbourhoods, large areas could be covered over short periods, with little to no training of staff. The greatest risk was the integrity of the installation team when undertaking home retrofits (theft).

Economies of Scale: Bulk procurement reduced the unit costs significantly. This was seen by Eskom as a means to reduce the retail price and increase the acceptance of CFL's by the general public. At the time CFL's were as much as 10 times more expensive than incandescent lightbulbs;

National Standards: Jointly developed by the South African Bureau of Standards and Eskom. The standards aided Eskom's procurement and improved quality, in so doing consumer confidence increased. Standards and regulations were passed to eliminate inefficient lightings, and incandescent light bulbs exceeding 40 W are now illegal;

Pricing: In 2009 National Treasury introduced a R3 (US$0.20) environmental levy[10] on incandescent lightbulbs to narrow the price differential between efficient and inefficient lighting technologies. This was increased regularly and currently stands at R8 in 2018 [13]; and,

Sustainability: A strategy was needed to maintain the electricity savings achieved, as future replacements would shift from incandescent to CFL. In 2011 Eskom started developing a carbon credit programme of activities (PoA) under the UNFCCC's carbon development mechanism (CDM) project. The project envisaged ~20 CDM project activities (CPA's) whereby free CFL's would be exchanged through a combination of door to door installations and exchange points. The generation of carbon credits would sustain the project by covering the costs associated with purchase, distribution, disposal, communication, as well as the measurement and verification of the project [21]. The PoA formed part of Eskom's climate change strategy – the utility was (and remains) under considerable scrutiny for its high GHG emissions from its almost exclusive use of coal to generate electricity from an ageing fleet, most of which contravene national emission standards.

OUTCOMES OF THE CFL ROLLOUT PROGRAMME

Energy Savings: Switching from incandescent (100, 80 or 60 W) to CFL's (~20, 16 or 11 W respectively) delivered sizable and immediate savings during peak periods. By 2012, the CFL programme was responsible for over 70 % of the total electricity savings of the IDM programme – namely 2,164 MW peak reduction or 4,786 GWh) [12]. The utility also reported that the CFL programme would save more than 7 million tons of GHG emissions over a ten-year period [21];

Costs: …

Cost-benefits: for peak demand/energy consumption a new power plant …

Broader National Policy Objectives: It was estimated that the programme created over 30,000 jobs, and reduced energy costs especially in low income households [21] resulting in social upliftment;

Priority Project: In 2010 when the Department of Energy's residential standards and labelling (S&L) project document was being formulated for submission to the Global Environment Facility for funding, lighting was specifically excluded by the Department of Trade and Industry. At the time it was believed that this would delay the adoption of regulation to introduce minimum energy performance and quality standards;

Consumer Expectations: Households (specifically lower income) expected Eskom to replace their CFL's which had failed, this created logistical and cost implications. Indeed, Eskom reported that members of the general public would visit their offices with failed CFL's demanding that they be replaced. Practically this was not possible and had the effect of damaging Eskom reputation with the public. Eskom became concerned that their consumers were beginning to view them as a technology rather than a service provider;

Market Saturation: In 2012, with the electricity crisis ongoing, the utility recognised that the rollout programme was

8. This paper limits itself to efficient lighting, for a more detailed analysis of the national EE strategy and Eskom IDM programme refer to: Energy Efficiency Country Study (2013) [23].

9. At the height of the electricity crisis, Eskom air freighted CFL's from the international suppliers.

10. The proceeds from the environmental levy went to the general fiscus as it is national policy not to ringfence taxes in South Africa.

reaching saturation point and introduced a broader range of initiatives as additional electricity savings were still required to stave off blackouts. The new programmes included:

a. **Energy Service Company (ESCO) Model:** funding mechanism is best suited to individual projects with unique requirements where the project size exceeds 1 MW;

b. **Standard Offer:** incentive at a standard published rate per technology type per unit of energy (kWh) that is saved during a specific period (16 hours) of a weekday; and

c. **Standard Product:** pre-approved rebates for replacing inefficient technologies with specific, pre-approved technologies.

Energy Efficiency Symbol: The success of the CFL rollout programme was widely publicised as a 'best practise programme' seen by many as a noteworthy case study. An unintended consequence of this accolade is that the CFL has become the *de facto* symbol of energy efficiency in South Africa. Focus groups conducted by the S&L programme in 2018 [17] found that most consumers, across all income groups, remain distrustful of LED's or do not believe that it is a superior product; and,

Market Response: With the lower end of the market saturated, manufacturers and retailers exited this market [14] and turned their attention to middle- and high-income consumers with LED's whose costs and quality started to improve rapidly from 2014. Simultaneously, Eskom's started winding down the programme (see next point) and this created the opportunity for *spaza* shops[11] to start selling much cheaper low quality, and from 2016 illegal, high electricity consuming incandescent lightbulbs. The importation of illegal incandescent lightbulbs is reaching endemic proportions with the regulator reporting that in 2018 it had confiscated over 2 million bulbs and up to 200,000 inferior quality CFL's[12].

Termination: The residential programme continued, albeit it with diminishing returns, and would ultimately install over 70 million CFL's. In 2013 Eskom's financial position declined dramatically and its application for a 16 % tariff increase [16] to fund its revenue shortfall was rejected by the Regulator who only granted an 8 % increase. One of Eskom's responses, citing insufficient funding, was to suspend its IDM programme and with it the CFL programme. It's much publicised PoA programme which was revealed at the UNFCCC COP 17 held in Durban in 2011 (registered by the UNFCCC in 2012) came to little. A combination of high M&V costs and the sharp drop in the international price of carbon credits made the PoA project unfeasible. In November 2018 Eskom announced it had no plans to revive the CFL rollout programme.

Status of Residential Lighting in 2018

In 2016, the Department of Energy started to become increasingly aware of the consequences that the abrupt end of incentives was having on the market and undertook a study to determine the viability of designing a *Market Based Economic Incentives Programme for Energy Efficient Appliances* (residential lighting and water heaters) [14]. Key findings of the study included:

- CFL's were the dominant lamp sold "Eskom rollouts taught the public to buy energy savers – CFL";
- Although Eskom had officially terminated its rollout programme it still had 6 million in stock and as these lamps had been paid for it was likely that they would be distributed over time;
- Eskom CFL's installed in households were still functional and as a result retailers in the middle and especially in the lower income areas had significantly reduced their stockholding of lamps as there was no demand. The study forecasted that this would be the case for some time due to: The life expectancy of the installed CFL's; The remaining stock held by Eskom; and, Perceptions held by the section of the market (because of the Eskom campaign) that CFL's are the most efficient lamps;
- Higher end retailers, recognising that LED technology was likely to dominate the market in the near future wanted to promote LED's but felt that the trade and consumers needed to be educated as they are still "*confused and conservative in their purchase decisions*";
- It was found that in order for LED's to compete on price with CFL's they were of a lower quality (power factor as low 0.3, low efficiency (lumens/watt) and low length of hours to failure);
- During their research in 2016/17 the consultants stated that they found almost no incandescent light bulbs in the township *spaza* or retail supermarkets at the time;
- Halogen bulbs, an alternative to incandescent bulbs were introduced and represented a significant share (22 %) of current light bulb sales. To achieve a transformation to LED's efforts should be focused towards higher income households.

The residential Standards and Labelling (S&L) program, based on the above findings and the recommendations put forward, commenced with the development of a pilot LED incentive programme. Simply put, manufacturers and distributors whose LED's met certain minimum technical specification would qualify for a cash incentive for each lamp sold. A well-attended briefing session ultimately resulted in no qualifying bids. The industry association informed the Department of Trade and Industry (DTI) that this was because the standards were too onerous. For example, all its members insisted on a power factor of 0.5, as they could (would) not meet 0.7. Of greater concern, was that the qualitative research undertaken by the S&L project, which saw researchers conduct focus groups in low income areas, found *spaza* shops selling incandescent light bulbs (60, 80 and 100 W) for as little as R5, R3, much less than the R8 levy imposed by Treasury. The sightings were not isolated incidents as the incandescent lamps were present in all eight areas they visited around the country. This recent proliferation of incandescent lamps was confirmed by the National Regulator which confiscated in excess of 2 million incandescent light bulbs in 2018, consider-

11. A spaza shop is an informal convenience shop business in South Africa, usually run from home. They also serve the purpose of supplementing household incomes of the owners, selling everyday small household items.

12. Meeting held with NRCS December 2018.

Table 1. Main Technology Assumptions.

	Lifespan	*Efficacy*	*Wattage*	*2015 Stock*
	Hours	Lumens per Watt	Watt	
CFL	25,000	60	13	67 %
Fluorescents	15,000	60	13	6 %
Halogens	3,000	24	33	22 %
LED	30,000	80	10	5 %
Incandescent	1,500	14	57	0 %

Source: Author calculations sourced from [14].

ably higher than confiscations from previous years and raising concerns about its ability to effectively enforce compliance due to sheer volumes of illegally imported lamps.

The preliminary, but nonetheless informed, conclusions based on the evidence produced from the research to date is that the residential lighting market, from a perspective of energy efficiency, is at best stagnant and more than likely regressing. At the higher end of the market consumers are shifting towards LED's but as there are no mandatory technical specifications regulating the quality and performance of these products their performance is significantly below international norms. A power factor of 0.5 is universal, and although this has no impact on the household it is a major concern for Eskom. At a time when Eskom's ability to meet national demand is under pressure a growing differential between real and apparent power is not helpful.

Low quality bulbs do however matter to the consumer, and poor performance and longevity which was stated as a concern during the qualitative research [17] by the users, is likely to see consumers reverting back to CFL's (from LED's). This is because CFL's had a proven track record with consumers due to mandatory technical specifications but are less efficient than LED's and their mercury content has environmental consequences. At the lower end of the market, the country's economically marginalised population many of whom live from day to day and who may not have a grasp of life cycle costing, faced with replacing a failed CFL (R20+) with an illegally imported incandescent (R5), the choice is straightforward with dire consequences to the consumer and the utility provider Eskom.

Lighting Energy Consumption

As stated before, lighting is a major source of household energy consumption, especially for low income households for which lighting often represents the largest portion of their electricity bills [19]. In recent years, many governments have banned the production or importation of incandescent bulbs due to their very low efficiency and very short life span. However, trends in different countries, and in South Africa, has shown an increase in the penetration of halogen bulbs which have significantly lower efficiency levels than LEDs and CFLs. Table 1 summarizes the main technology features of these different light bulb technology options. More surprisingly in South Africa is the penetration of incandescent bulbs which is coming back on the market. This has large implications on the overall energy consumption as it is a very inefficient and costly way to provide lighting energy services.

In order to estimate the impact of the current trends recently observed and to assess the impact of introducing a Minimum Energy Efficiency Standard (MEPS) for lighting, two scenarios were assessed: 1) Baseline Scenario: accounts for the current trends of reverting to incandescent light bulbs for low income households and 2) Efficiency Scenario: accounts for introduction of a technology neutral standard that eliminates incandescent and halogen bulbs.

BASELINE SCENARIO: REVERTING TO INCANDESCENT LIGHT BULBS FOR LOW INCOME HOUSEHOLDS

As of March 2015[13], the total number of customers eligible for FBE was 1 177 250, which represents about 8 % of total households in South Africa [19]. We therefore assumed that in the baseline scenario an increasing share of households were reverting to incandescent bulbs, up to an 8 % share of sales by 2020.

The following graphs in Figure 4 show the resulting penetration of different light bulb technologies according to today's sale data [14] embedded in a stock turnover model [20]. In the baseline scenario, we assumed that the shares of technology stay constant but for the share of incandescent bulbs which increases due to low income consumers buying these types of bulb instead of CFLs. This results from dumping of these lamp bulb technologies on the South Africa market. Trends already observed today.

As it can be seen on the graphs in Figure 4, even though the penetration of incandescent bulbs remains low (8 %) in 2025, its impact on total energy consumption is significant with a total share of 23 % of total lighting electricity consumption. In this scenario, electricity consumption increases by 37 % in 10 years.

EFFICIENCY SCENARIO: INTRODUCTION OF A TECHNOLOGY NEUTRAL STANDARD THAT ELIMINATES INCANDESCENT AND HALOGEN BULBS

In this scenario, an energy efficiency standard of 45 lumens per Watt is introduced in 2019 which disqualifies the sales of incandescent and halogen bulbs. Due to the very short life span of these two technologies, the stock of light bulbs in use in the country turnovers rapidly to be replaced by much more effi-

13. Eskom website, http://www.eskom.co.za/news/Pages/Apr18.aspx.

cient CFLs and LEDs. The stock as well as the resulting energy consumption for this scenario is shown in Figure 5.

The resulting savings of the efficiency scenario are striking. More than 40 % of total lighting electricity consumption is saved, representing about 5 % of total residential electricity consumption. Benefits for the consumers are large as the upfront investment pays back in less than a year. However, low income households are very sensitive to upfront costs and may not see the less immediate financial benefits instead of buying cheap incandescent bulbs today. This is even more important as efficient lighting technologies, like LEDs, have a life span of more than 20 years when used ~5 hours a day. Therefore, the savings over the lifetime of these LED bulbs is large due to the avoided costs of buying new incandescent or halogen bulbs every year, or couple of years, as is the case with incandescent bulbs.

On top of being more economical, an energy efficiency standard program would result in reducing CO_2 emissions from coal electricity production and in peak capacity savings. Additional energy savings could be achieved by moving the MEPS level to only allow sales of LEDs. This would have the additional benefits to reduce the level of mercury emissions released by CFLs.

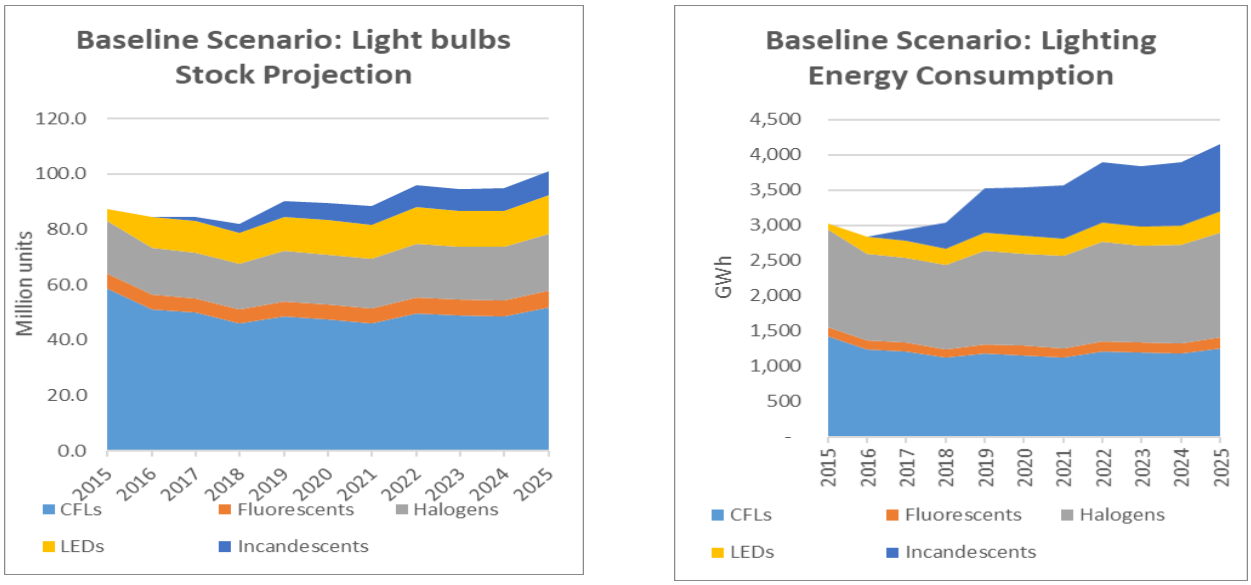

Figure 4. Baseline Scenario: Stock of light Bulbs and Energy Consumption. Source: Author assumptions.

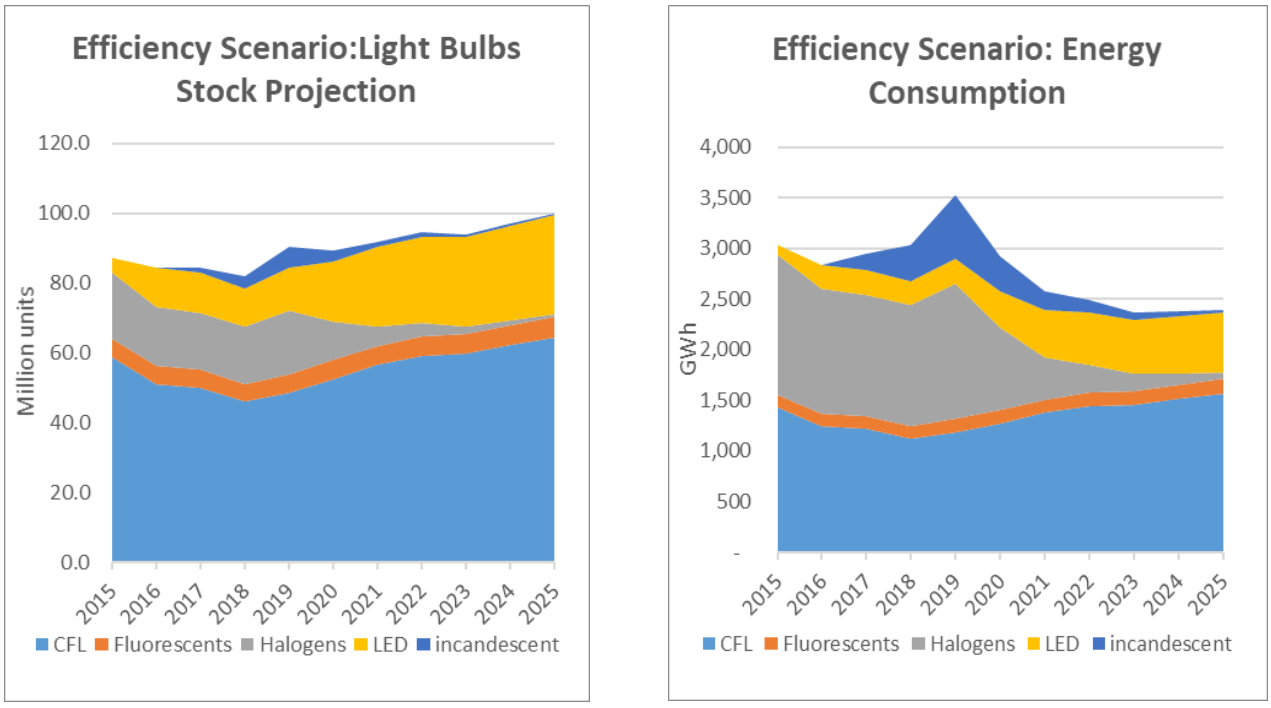

Figure 5. Efficiency Scenario: Stock of light Bulbs and Energy Consumption.

However, it is important to note that MEPS' benefits can only be achieved if a robust monitoring, verification and enforcement plan is also in force to make sure sales align with regulation.

Finding and Where to next for Residential Energy Efficient Lighting?

The modelling has shown that electricity consumption for residential lighting increases by 40 % under the baseline scenario. Such an outcome would have significant implications. Firstly, for low income households and especially those reliant on FBE, electricity usage (and therefore costs) would increase with no additional benefit to the user. This would place households under further financial stress and in so doing compromise government's efforts to uplift these communities. The likely effect being fuel switching which increases health and safety risks – again a regression of national policy. Secondly, Eskom once again struggling with supply shortages is likely to see peak demand rise which in all likelihood will precipitate a return to crisis management rather than long term planning. It was during the 2010 supply crisis that lighting was allocated 'priority' status and extracted from the Department of Energy's residential appliance S&L programme being developed. But in 2018 the appliances included in the S&L programme are being managed by the Department of Energy and regulated under a defined framework. Whereas lighting, now 'homeless' since Eskom's withdrawal, is in disarray. National standards and regulations exist for CFL's but not LED's and introducing such for the latter, in the absence of clear policy and no ministry driving the process, is facing staunch resistance from industry.

The CFL rollout was simply a tool to effect electricity savings, but as it was not executed as part of an overarching national lighting policy its implementation was ultimately haphazard as it focused on immediate savings or 'quick wins'. Without policy guidelines important factors are absent, such as: Long term targets and objectives; Technologies outside of CFL's have not been considered to the extent required; Technology developments (LED's) are lacking; Testing laboratories to manage performance and quality have not been catered for; National standards are incomplete, meaning regulations cannot be promulgated. Most importantly a feasible sustainability plan for the CFL rollout was not developed, with the net outcome that hard fought wins may be lost, exacerbated by the ongoing electricity supply shortages and tariff increases. The South African context is that supressed demand is a daily reality for most households, and it is only once this is dealt with that the country can start to consider a viable approach to address sufficiency.

Our recommendation is therefore rather straightforward. The benefits of efficient residential lighting (premised on the principle of the now universally recognised savings achieved from a switch from incandescent/halogen to LED or CFL) have been demonstrated in this paper. Achieving this objective is both necessary and worthwhile but doing so requires a solid foundation on which to build a holistic programme – the next step being a detailed cost benefit analysis. Thus, the first order of business should be the development of a national lighting policy by a ministry, in our view the Department of Energy. This would create policy certainty and allocate ownership. Industry would be presented with their government counterpart with whom they can engage and cooperate directly, thereby reducing the inevitable inconsistencies of dealing with multiple agencies with differing priorities, which generally leads to misalignment and sub-optimal outcomes. Furthermore, officially absorbing residential lighting into the S&L appliance programme allows it to benefit from the existing structures.

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