EXECUTIVE SUMMARY

It is generally accepted that to achieve long term sustainability for the electricity industry, there is ultimately no other option but for electricity tariffs to be fully cost-reflective. Economic fundamentals also confirm that from a macro-economic and allocative efficiency perspective, cost-reflective tariffs are the most economically efficient and provide the optimum price signals. To reach that level, present prices would still have to increase significantly. This would have some impact on the entire economy, including on households. Eskom commissioned this research in order to better understand the potential impacts on households and the affordability of electricity for households under different scenarios of electricity tariff increases. The research was done in a comparative way i.e. by determining and comparing the impact on households of different methods of raising the revenue to cover the cost of producing electricity.

The share of electricity expenditure to total household expenditure is used to measure the affordability of electricity tariff increases. This average household expenditure on electricity is compared between ten income groups (deciles) in South Africa as well as to a selected list of developing, emerging and developed countries.

In the developed economies, where the majority of the population has access to electricity, the distribution of the deciles or quintiles of all the economies seems to reflect a situation where the expenditure on electricity as a share of total expenditure in the lower income groups are higher compared to the richer income groups. This distribution, where poorer households spend a larger portion of their expenditure on electricity were also the case in some of some more developed emerging countries as well as in South Africa. This is to be expected and commensurate with the theory of the Engle curve.
Using the most recent data from the 2008/09 Living Conditions Survey from Stats SA, the SA average share of electricity expenditure of 3.2% (or 2.26% weighted according to spending) seems relatively high compared to the 2.9% of Australia (in 2009/10) as well as to the proportions in Bangladesh, Cambodia, Kenya, and Uganda. However, the comparison needs to be evaluated keeping in mind that the percentage of households that use electricity (thus, spend on electricity) are very low in countries like Kenya and Uganda.

The average SA expenditure share on electricity seems low when compared to the 3.5% in India (2004/05) (a country with very similar percentage electricity consumption patterns), 4.4% in the US (2010), 4% in Pakistan, 5.6% Vietnam and the 4.3% in New Zealand. However, to make a direct comparison between SA and the developed countries it needs to be kept in mind that the SA expenditure share will increase in line with the increase in the number of households that are connected to electricity, as is the case in most developing and emerging countries. In addition, the SA survey was done in 2008/09 before the recent electricity tariff increases.

Another observation is that internationally the share of electricity expenditure to total expenditure is increasing – this is clearly visible in developed countries with more regular surveys like the US (and where basically all households are connected to the grid).

The price elasticity of demand is an important variable to understand how households will react to tariff increases. Research conducted in Australia shows that the price elasticity of demand in richer households in Australia is basically inelastic (-0.2%), while poorer households have a price elasticity of between -0.4% and -0.5%.

Data from Stats SA shows that more than 50% of the poorest households used electricity for lightning during 2008/09 and 100% of the richest households used electricity for lightning. Data from the non-financial census survey from Stats SA shows that there were 8.77 million
households (units) in 2010 (up from 8 million in 2008) that received electricity from municipalities and that 34.6% received a form of free basic electricity.

An analysis was performed using a basic economic impact model for 2009 based on a Social Accounting Matrix (SAM) and a Leontief inverse matrix. The economic impact of five scenarios was estimated with the focus on households. These include:

1) Tariff increases:
   a. 2x25% over 2013 and 2014 and CPI inflation increases in 2015 and 2016 (nominal increases). The tax which Eskom would pay is recycled through government spending,
   b. an alternative of 3x18% over 2013 to 2015 and a CPI inflation increase in 2016. The tax which Eskom would pay is recycled through government spending. Any shortfall relative to scenario 1a is assumed to be funded by an increase in income tax rates.

2) Tariff increase in line with CPI between 2013 and 2016, and where the net shortfall (relative to scenario 1a) is financed in the following ways:
   a. through a combination of tax increases,
   b. through an increase in the personal and corporate income tax rates, and
   c. through an increase in the household VAT rate.

The research results (given model limitations and assumptions such as constant returns to scale) show a negative impact on the economy for all scenarios\(^1\). However, from a household perspective tariff increases should be preferred above income tax increases and especially above VAT increases. The reason for this finding is that it is estimated that households pay 56% of total national income tax whereas households pay 26.4% of the national electricity bill. Therefore, if income taxes are used as the mechanism then 56% of the required revenue would be directly contributed by households whereas if electricity tariffs are used as the mechanism to cover the cost of producing electricity then 26.4% of the required revenue would be directly contributed by households. Increases in income tax will also have a relative larger negative impact on the economy given the multiplier impact. VAT increases will have a large negative impact on household consumption and, being a regressive tax system, a relative redistributive impact on poorer households (they will have to pay a larger relative share given their lower levels of income).

Tariff increases will also have a direct impact on the demand of electricity consumed (compared to income tax and VAT increases) that will most likely, depending on the elasticity of demand, result in relatively lower household electricity demand. This will imply that there will be a monetary incentive to save electricity under the tariff scenario and thus relatively lower levels of additional electricity generation capacity needed – something that could not be included in the model. This will further imply that the net impact on households might be lower under the tariff scenarios than what is shown in this report, due to the ability to control consumption and thus avoid some of the expenditure.

\(^1\) It must be noted that these results only shows the impact of the tariff increases (or tax increases) to fund the Eskom expansion and does not include the impact of new investments and increased operational expenditure on the economy. All impacts are modelled in real terms.
Table 1 shows the impact on household deciles for each of the scenarios in a ‘heat map’ format, with red more negative and green less negative.

Table 1 Household decile impact for each of the scenarios

<table>
<thead>
<tr>
<th>Decile</th>
<th>2x25% impact</th>
<th>3x18% impact shortfall funded by income tax</th>
<th>Tariff adjusted by CPI</th>
<th>Shortfall funded by income tax and VAT</th>
<th>Shortfall funded by income tax</th>
<th>Shortfall funded by VAT (on consumers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decile 1</td>
<td>-5.9%</td>
<td>-5.8%</td>
<td>-5.90%</td>
<td>-5.3%</td>
<td>-11.4%</td>
<td></td>
</tr>
<tr>
<td>Decile 2</td>
<td>-6.7%</td>
<td>-6.5%</td>
<td>-6.20%</td>
<td>-5.8%</td>
<td>-11.4%</td>
<td></td>
</tr>
<tr>
<td>Decile 3</td>
<td>-7.3%</td>
<td>-7.1%</td>
<td>-6.80%</td>
<td>-6.5%</td>
<td>-11.5%</td>
<td></td>
</tr>
<tr>
<td>Decile 4</td>
<td>-7.6%</td>
<td>-7.5%</td>
<td>-7.40%</td>
<td>-7.4%</td>
<td>-11.6%</td>
<td></td>
</tr>
<tr>
<td>Decile 5</td>
<td>-8.1%</td>
<td>-8.1%</td>
<td>-7.90%</td>
<td>-7.9%</td>
<td>-11.6%</td>
<td></td>
</tr>
<tr>
<td>Decile 6</td>
<td>-8.0%</td>
<td>-8.1%</td>
<td>-8.20%</td>
<td>-8.3%</td>
<td>-11.6%</td>
<td></td>
</tr>
<tr>
<td>Decile 7</td>
<td>-8.3%</td>
<td>-8.3%</td>
<td>-8.30%</td>
<td>-8.6%</td>
<td>-11.1%</td>
<td></td>
</tr>
<tr>
<td>Decile 8</td>
<td>-8.2%</td>
<td>-8.3%</td>
<td>-8.50%</td>
<td>-8.9%</td>
<td>-10.7%</td>
<td></td>
</tr>
<tr>
<td>Decile 9</td>
<td>-7.4%</td>
<td>-7.8%</td>
<td>-8.70%</td>
<td>-9.4%</td>
<td>-10.3%</td>
<td></td>
</tr>
<tr>
<td>Decile 10</td>
<td>-6.9%</td>
<td>-7.3%</td>
<td>-8.80%</td>
<td>-9.6%</td>
<td>-10.1%</td>
<td></td>
</tr>
</tbody>
</table>

Note: The impact in the table is aggregated over a number of years. It is better to interpret the results relative to each other than looking at the absolute numbers, given that the model does not adjust the results for the impact of elasticities. Also no adjustments have been made for example for subsidy mechanisms such as ‘inclining block tariffs’ which would imply lower increases for poorer households.

The lowest deciles indicate the impact on the poorest households and the higher deciles show the impact on the richer households. There are about 1.246 million households per decile. The VAT scenario shows the largest impact on households, especially the poor households. The income tax scenario shows a large impact on the richest households. The highest impact of the tariff increases is on the deciles 5 to 8.

Overall the results indicate that households would be more negatively affected were the costs to produce electricity to be paid for by increasing personal and company tax rates or by increasing VAT rates, relative to if electricity tariffs were increased to cost-reflective levels. Further, that deciles 5 to 8 are relatively more negatively impacted than either deciles 9 and 10, or deciles 1 to 4 (even when excluding the effect of subsidy mechanisms on the lower deciles).

Future research could include the household price elasticity of demand in South Africa; impacts of the proposed electricity tariff increases on the share of household expenditure per decile; potential impacts on grants and equitable share funding that government would need to pay to finance free basic electricity for poor households; the impact of municipal electricity increases where municipalities serve as redistributors of electricity; the current general vulnerability of households in SA using indicators such as the Bureau of Market Research’s (BMR) vulnerability index as well as information from the National Credit Regulator (NCR). Research could also be done regarding the impact on inflation as a result of

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2 Using the data from the SAM, the average expenditure of the poorest households (decile 1) is R20 108 per year compared to R57 689 per year for decile 5. Decile 8 for example is R112 677 per year and decile 10 is R496 123.
the tariff increases and the potential negative impact if interest rates are increased as a result of higher inflation, relative to the economic impact of increases in personal and company income tax rates or in VAT rates