South Africa

Energy efficiency benefits from lighting, residential refrigerators, room air conditioners, power and distribution transformers and industrial electric motors with the implementation of globally benchmarked minimum energy performance standards.

ANNUAL SAVINGS IN 2030

Reduce electricity use

→ by over **24 TWh**

→ **7.3%** of future national electricity use

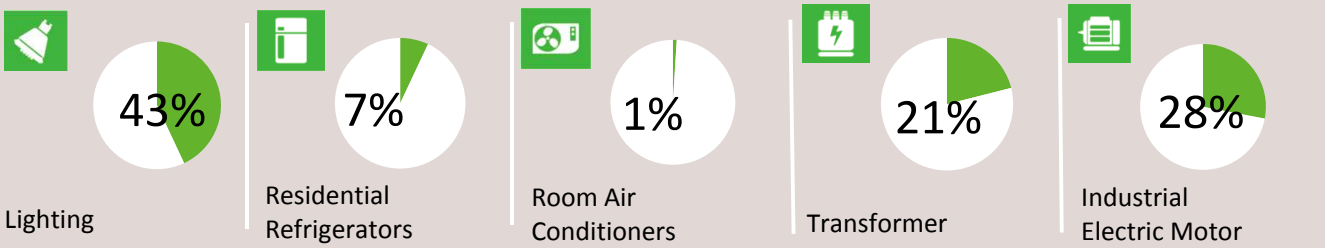
Save electricity worth **1 Billion USD**

equivalent to **11 Power Plants [500MW]**

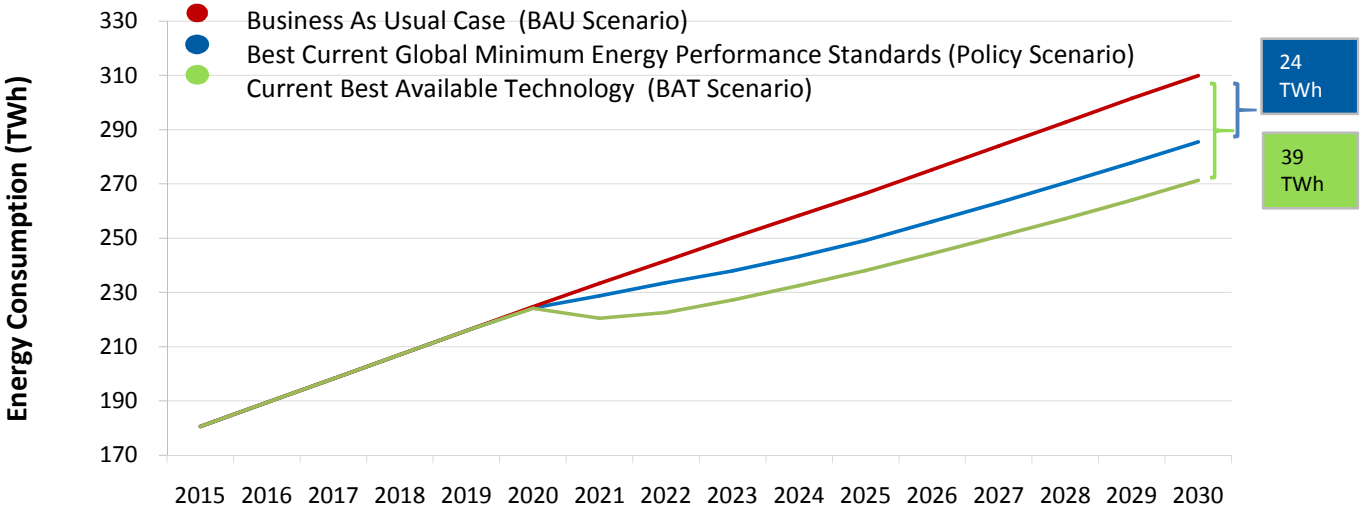
Reduce CO_2 emissions by **20 Million Tonnes**

equivalent to **10 Million Passenger Cars**

SHARE OF EACH TYPE PRODUCT TO THE COUNTRY'S TOTAL SAVINGS IN 2030



EVEN GREATER SAVINGS POSSIBLE WITH BEST AVAILABLE TECHNOLOGY



THE PATHWAY TO ENERGY EFFICIENCY

ANNUAL SAVINGS IN 2025 AND 2030

		Lighting		Residential Refrigerators		Room Air Conditioners		Transformers		Industrial Electric Motors	
		2025	2030	2025	2030	2025	2030	2025	2030	2025	2030
	Electricity (GWh)	10,290.7	10,447.6	822.6	1,596.3	212.7	361.4	2,692.2	5,109.2	3,299.6	6,877.6
	Electricity Bills (million US$)	545.4	553.7	43.6	84.6	11.3	19.2	142.7	270.8	66.0	137.6
	CO2 Emissions (thousand tonnes)	10,209.2	10,364.9	816.1	1,583.7	211.1	358.6	2,425.7	4,603.4	3,273.5	6,823.2

CUMULATIVE SAVINGS (2020 - 2030)

		Lighting	Residential Refrigerators	Room Air Conditioners	Transformers	Industrial Electric Motors
	Electricity (TWh)	90.3	9.0	2.2	30.0	36.9
	Electricity Bills (billion US$)	4.8	0.5	0.1	1.6	0.7
	CO2 Emissions (million tonnes)	89.6	8.9	2.2	27.0	36.6

OTHER BENEFITS IN 2030

	Direct GHG emissions reduced by	→	3 Million Tonnes		
	Increased grid connection to	→	12 Million Households		
	Reduced emissions by	→ SO2	152 Thousand Tonnes	NOx	82 Thousand Tonnes

ENERGY EFFICIENCY STRATEGY AND NATIONALLY DETERMINED CONTRIBUTION

The 1998 White Paper on energy policy highlighted the benefits of a standards and labelling (S&L)programme in contributing to energy efficiency in the country. This was operationalised in the National Energy Efficiency Strategy of 2005, in which an S&L programme for household appliances was envisaged to contribute to the target of reducing residential electricity demand by 10% by 2015.In South Africa's Second National Communication to the UNFCCC, energy efficiency was noted as a key area of action for climate change mitigation.
Country Nationally Determined Contribution (NDC): Takes a peak, plateau and decline (PPD) approach to emissions. Aims to peak between 2020 and 2025, plateau for roughly a decade and then start to fall.

Country Specific Data and Input Assumptions

For South Africa

GENERAL INFORMATION	
Population	54 million
GDP per capita	6,478 US$
Electrification level	85%
CO2 Emission Factor	0.901 kg / kWh

ELECTRICITY MARKET	
Residential Electricity tariff	0.053 US$ / kWh
Industrial Electricity tariff	0.020 US$ / kWh
Transmission and distribution loss factor	9.18%

ASSUMPTIONS

Product	Unit Energy Consumption (kWh/year) or Efficiency Level			Type of Product
	BAU	Policy Scenario	BAT	
Lighting	65.7	15.3	8.8	Low incandescent Lamp,3h/day; 14W CFL; 8W LED
Residential Refrigerators	325	191	134	2-door top-mount Average size 225 liters
Room Air Conditioners	542	442	290	Split unit with 3.5 kW cooling capacity
Transformers	N/A	SEAD Tier3	SEAD Tier5	three-phase and single-phase liquid-filled and three-phase dry-type power and distribution transformers
Industrial Electric Motors	IE1/IE0	IE3	IE4	3-phase induction motors Ranging from: 0.75 - 7.5 kW; 7.5 - 75 kW;75 - 375 kW

METHODOLOGY

The analysis uses CLASP's and Lawrence Berkeley National Laboratory's Policy Analysis Modeling System (PAMS) to forecast the impacts from implementing policies that improve the energy efficiency of new household air conditioners and refrigerators. For lighting, electric motors, and power and distribution transformers individual - models were developed, taking into account country level data, expected GDP growth, and industrialization levels. The savings potential assumes minimum energy performance standards (MEPS) are implemented in 2020 at level equivalent to the present day (2015) best global MEPS that are currently implemented. The graph on page two also shows the savings potential that is possible with the implementation of MEPS in 2020 at level equivalent to the present day best available technology (BAT).

ASSUMPTIONS AND DATA SOURCES

- Population and GDP per capita data (2014) comes from the World Bank.
- Electrification levels come from the International Energy Agency (IEA).
- Market size was determined by data provided by industry partners; UN Comtrade database; household penetration forecasts generated by PAMS from population, climate, and macroeconomic indicators.
- Future electricity consumption was calculated using current consumption figures provided by the IEA and the U.S. Energy Information Administration (EIA).
- Baseline price, unit energy consumption (UEC), appliance lifetime were provided by country representatives (when available); industry partners; and Lawrence Berkeley National Laboratory. The business-as-usual scenario assumes a 1 per cent annual improvement in UEC.
- Electricity tariffs were provided by the IEA; and Internet research.
- Transmission and distribution loss factor is a regional average calculated from electricity production and consumption data published by the IEA.
- CO2 emission factor came from the IEA and extrapolations were made for countries lacking data.
- Consumer discount rate was derived from the Human Development Index, United Nations Development Programme (2012).
- The approach of calculating the potential direct emission saving of refrigerators and air conditioners: the typical current mix of refrigerants fillings, leakage rates and end of life emissions in the BAU compared to the best alternative with natural refrigerants (mostly R290 for splits and R600a for domestic refrigerators).
- Additional to the above sources, a questionnaire was used to gather data from country officials.