Libya

Product scope	Lighting	Cooling		Equipment	
	All Lighting	Residential Refrigerators	Room Air Conditioners	Industrial Electric Motors	Distribution Transformers

A summary of the benefits attained from improved energy efficiency through the implementation of Minimum Energy Performance Standards at two levels of ambition (minimum and high). More detailed reports for lighting, cooling and equipment can be downloaded from the United Nations Environment Programme (UNEP) United For Efficiency (U4E) website.

ANNUAL SAVINGS IN 2030*

Reduce electricity use by over **1.1 TWh** which is **4.1%** of current national electricity use

Save electricity worth **33 Million US$** equivalent to over **2 Power Plants [100MW each]**

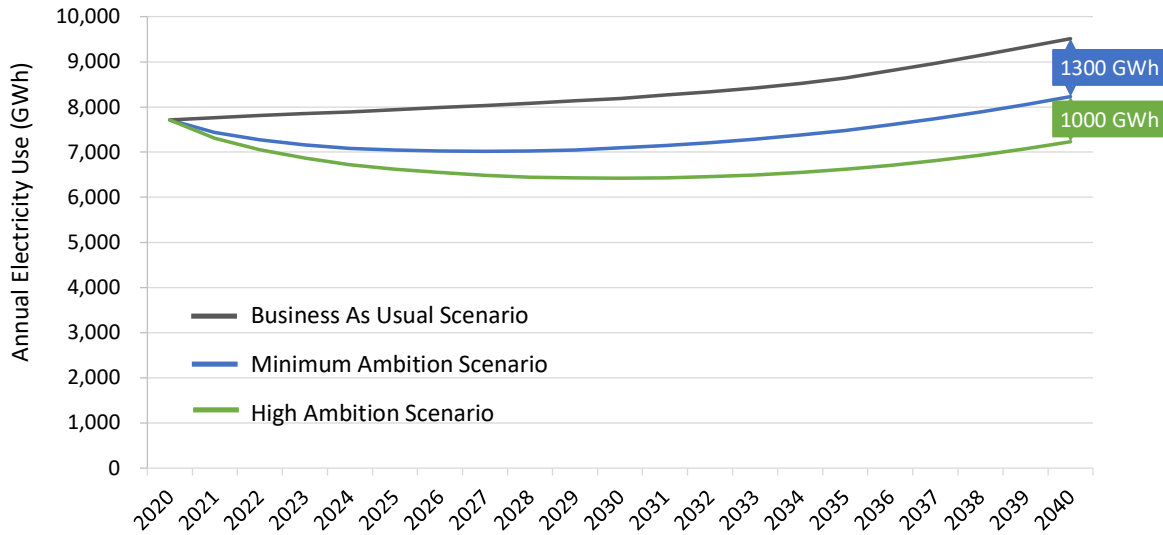Reduce electricity CO_2 emissions by over **2.9 Million tonnes** equivalent to **1.6 Million Passenger Cars**
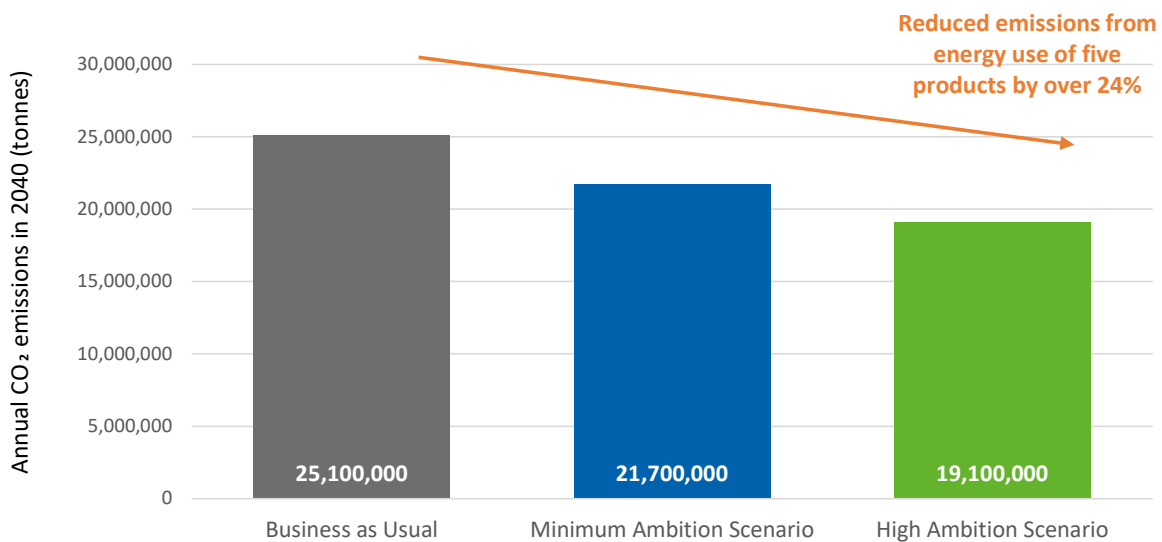
ELECTRICITY SAVINGS OVER TIME*
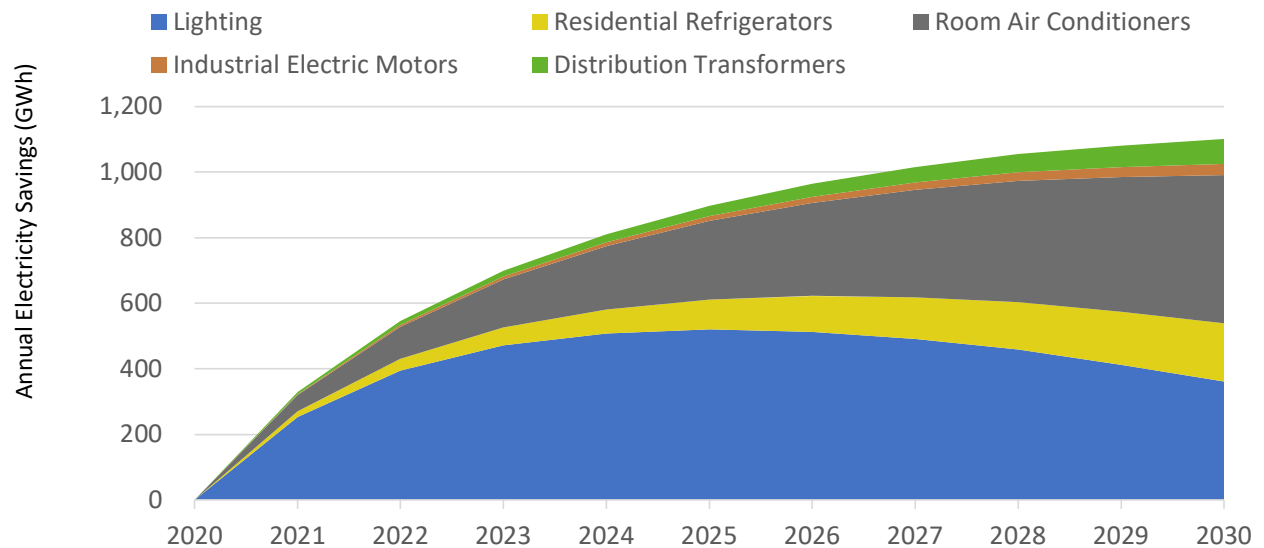
Legend: Lighting, Residential Refrigerators, Room Air Conditioners, Industrial Electric Motors, Distribution Transformers. Y-axis: Annual Electricity Savings (GWh), 0 to 1,200. X-axis: 2020 to 2030.

AND EVEN MORE BENEFITS

THE MORE AMBITIOUS THE REGULATION, THE MORE SAVINGS ARE POSSIBLE

Annual Electricity Use (GWh)

- Business As Usual Scenario
- Minimum Ambition Scenario
- High Ambition Scenario

1300 GWh
1000 GWh

MEET GLOBAL CLIMATE GOALS BY SIGNIFICANTLY DECREASED EMISSIONS

Reduced emissions from energy use of five products by over 24%

Annual CO_2 emissions in 2040 (tonnes)

Business as Usual	Minimum Ambition Scenario	High Ambition Scenario
25,100,000	21,700,000	19,100,000

OTHER BENEFITS ACHIEVED IN 2030*

⚡	Reduced annual electricity subsidies by	**25 Million US$**
❄	Reduced cumulative direct GHG emissions by	**47 Thousand tonnes**

DETAILED BENEFITS

ANNUAL SAVINGS IN 2030 AND 2040*

	Lighting		Cooling				Equipment			
			Residential Refrigerators		Room Air Conditioners		Industrial Electric Motors		Distribution Transformers	
	2030	2040	2030	2040	2030	2040	2030	2040	2030	2040
Electricity (GWh)	360	30	180	270	450	690	34	80	76	210
Electricity Bills (Thousand US$)	11,000	910	5,400	8,100	14,000	21,000	1,000	2,400	2,300	6,400
CO_2 Emissions (Thousand tonnes)	970	82	480	730	1,200	1,900	92	220	200	570

CUMULATIVE SAVINGS BY 2030 AND 2040*

	Lighting		Cooling				Equipment			
			Residential Refrigerators		Room Air Conditioners		Industrial Electric Motors		Distribution Transformers	
	2030	2040	2030	2040	2030	2040	2030	2040	2030	2040
Electricity (GWh)	4,400	5,600	1,000	3,400	2,600	8,700	180	770	370	1,800
Electricity Bills (Million US$)	130	170	30	100	77	260	5.3	23	11	55
CO_2 Emissions (Million tonnes)	12	15	2.7	9.3	6.9	24	0.5	2.1	1.0	4.9

CONTRIBUTION TO CUMULATIVE ELECTRICITY USE BY 2040
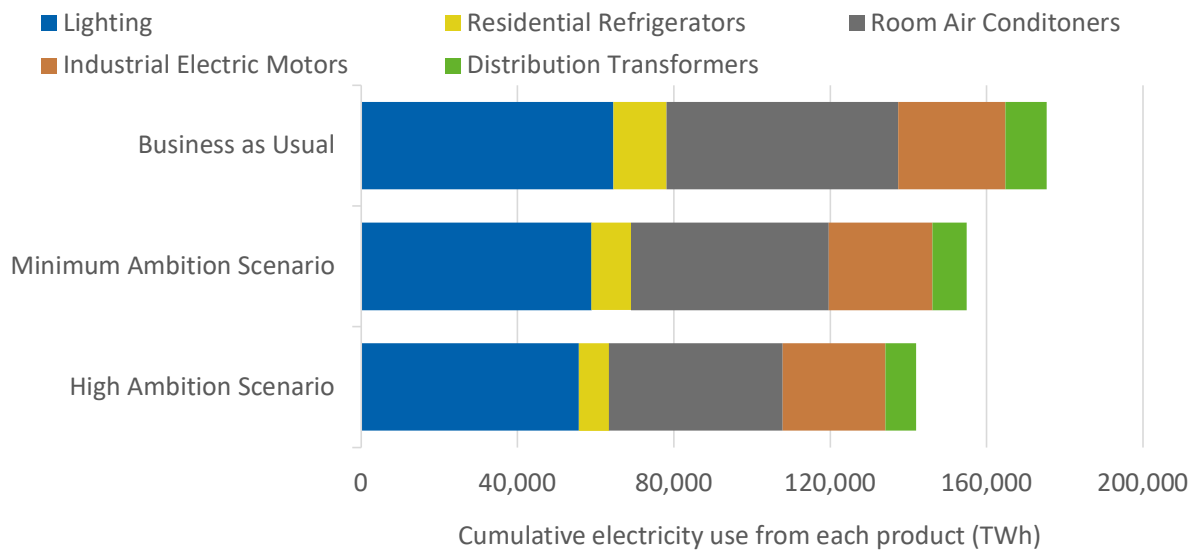
Legend:
- Lighting
- Residential Refrigerators
- Room Air Conditoners
- Industrial Electric Motors
- Distribution Transformers

Cumulative electricity use from each product (TWh)

(Bar chart categories: Business as Usual, Minimum Ambition Scenario, High Ambition Scenario; x-axis 0 to 200,000)

Country Data and Input Assumptions

GENERAL INFORMATION

Population	6.47 Million
GDP per capita	7,235 US$
Electrification level	100.0%
CO2 Emission Factor	0.82 kg / kWh

ELECTRICITY MARKET

Residential Electricity tariff	0.03 US$ / kWh
Transmission and distribution loss factor	69.7%

ASSUMPTIONS

	Product	Unit Energy Consumption (kWh/year) or Efficiency Level			Type of Product
		Business As Usual	Minimum Ambition Scenario	High Ambition Scenario	
Lighting	GSL	15W CFL 15	10W LED 10	7W LED 7	800 lumen light bulb: 1,000 hrs/year
	Linear	36W T8 108	20W LED 60	16W LED 48	4 foot tube: 3,000 hrs/year
	HID	70W HPS 307	50W LED 219	40W LED 175	Poletop street light: 4,380hrs/year
Cooling	Residential Refrigerators	485	278	139	2-door refrigerator freezer of average size 330 liters
	Room Air Conditioners	2,673	1,829	1,375	A mix of 3.5 kW and 7 kW split units with a weighted-average cooling capacity of 5 kW
Equipment	Industrial Electric Motors (IEC level)	IE0	IE2	IE3	3-phase induction motors used in the industrial sector
	Distribution Transformers (Model regulation level)	See note	Level 1	Level 2	Three-phase and single-phase liquid-filled and three-phase dry-type power distribution transformers

Distribution transformers Note: it is assumed that distribution transformers have losses in line with those assumed in the CENELEC harmonization research for the development of the EU standards.

METHODOLOGY

The analysis uses the UNEP-U4E's Country Savings Assessment Models to estimate the impacts of implementing policies that improve the energy efficiency of each product analysed. The savings potential in each scenario assumes Minimum Energy Performance Standards (MEPS) are introduced in 2020 at two different levels of ambition (minimum and high) as shown above.

ASSUMPTIONS AND DATA SOURCES

■ Market size is based on data from industry partners, the UN COMTRADE database and market penetration forecasts generated by U4E Country Savings Assessment Models using data on population, climate, income and other macroeconomic indicators as detailed below.

■ Population (2019 and future forecasts) comes from the UN Population Division.

■ GDP per capita data (2018) comes from the World Bank with future growth forecasts derived from the IPCC's SSP3 scenario.

■ Cooling Degree Days are based on average monthly temperatures from weatherbase.com, degreedays.net or given by wunderground.com.

■ Current total electricity consumption comes from the World Bank and the US Energy Information Administration (EIA) with future forecasts derived from the International Energy Agency's (IEA) World Energy Outlook 2018.

■ Residential electricity tariffs are based on IEA data.

■ Transmission and distribution loss factor is a regional average calculated from electricity production and consumption data published by the IEA.

■ Electrification levels come from the IEA's Word Energy Outlook 2018 and the World Bank.

■ CO2 emission factors come from the IEA and the Institute of Global Environmental Strategies (IGES) and are assumed constant in future years.

■ Product typical characteristics are based on analysis from the UNEP-U4E Model Regulation Guidelines and other data from UNEP-U4E industry partners and technical experts including the US Lawrence Berkeley National Laboratory (LBNL), the International Copper Association (ICA) and GIZ.

■ The approach of calculating the potential direct emissions saving of refrigerators and air conditioners is based on expert input from GIZ and LBNL.

■ Additional to the above sources, a questionnaire was used to gather data from country officials.

■ In a small number of instances, additional data was obtained from internet research or by using proxy data from similar markets.

Further details of the modelling approach and assumptions are available on the U4E website. For more information contact: U4E@un.org