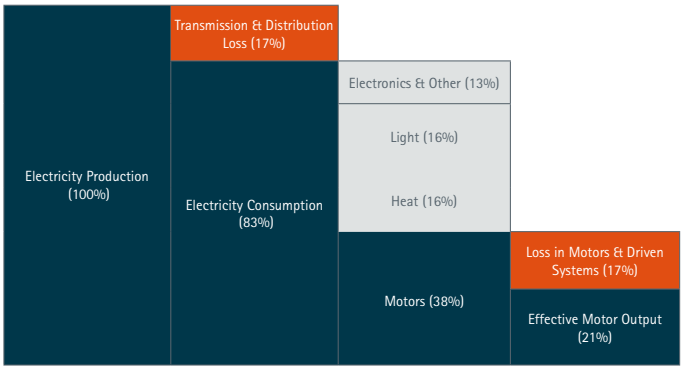
International Copper Association
Copper Alliance

Copper to Benefit from Global Drive for Motor Efficiency

Study Name: Copper in Electric Motors and Generators
Study Author: MetalsPlus
First Presented: October 2018

Motors are by far the largest consumer of electricity, using 38% of total global production. Improving motor efficiency will therefore prove crucial in the transition to a low carbon economy. Effective at minimizing the loss of energy between input and useful application in motors, copper will likely be a key driver of such improvements in the coming years

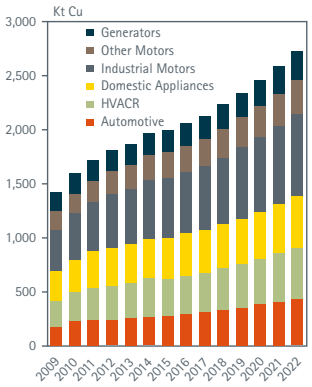
Motor Electricity Use and Loss in the Electricity Market Context



Overview

According to new research commissioned by the International Copper Association (ICA), copper demand will be a major beneficiary of the drive for greater motor efficiency. The research, undertaken by MetalsPlus, found copper demand for motors could grow to 2.73 million tonnes per year by 2022.

This latest research highlights the vital role of copper in the energy transition. From heavy industry and utility motors to smaller applications such as the automotive sector and domestic appliances, the increase in efficiency facilitated by copper will be a building block of the transition to a low carbon economy.



MARKET SUMMARY

	2011	2017	2022	% CAGR 11–17	% CAGR 17–22
ALL COPPER USE (kt)	1,722	2,134	2,728	3.6%	5%
BY END MARKET					
Automotive	237	318	434	5.0%	6.4%
HVACR	302	369	484	3.4%	5.6%
Domestic Appliances	329	393	469	3.0%	3.6%
Industrial Motors	471	598	771	4.1%	5.2%
Other Motors	193	242	302	3.9%	4.5%
Generators	190	213	267	2.0%	4.6%

Key Findings

- Copper makes up 65% of electrical materials—excluding steel used in motors and generators—most of which is in the form of copper winding wire.
- Motor driven systems currently have a 45% technical rate of loss of electricity between input and useful application, a significant portion of which is in motors themselves.
- Copper demand for motors could rise from 2.13 tonnes per year in 2017 to 2.73 million tonnes per year in 2022.
- With 28% of the copper market share, the largest proportion of material is found in industrial motors, followed by domestic appliances (19%) and HVACR (17%) respectively.

Minimum Energy Performance Standards

Increasingly ambitious carbon emission reduction targets are escalating the pace of adoption. As more efficient motors become mandatory, the demand for copper will rise.

Mandatory Minimum Energy Performance standards apply to a growing portion of motor sales, with a minimum IE3 standard now firmly on the agenda and a higher IE4 standard clearly defined. China—accounting for around one half of global motor supply—formed plans to bring in IE3 as the minimum standard in 2012 and is now at the implementation stage. In 2017, India set its first mandatory ruling: a minimum of IE2 for industrial motors.

Options for Improving Efficiency

1. Optimize existing designs.
2. Variable frequency drives.
3. Rare earth permanent magnet (REPM) solutions.
4. Non-permanent magnet solutions (synchronous reluctance motors, switched reluctance motors and copper rotor motors).