Copper's Role in the $140 Billion HVAC(R) Market

Study: Heating, Ventilation, Air Conditioning and Refrigeration

Research Conducted by: MetalsPlus Research & Consulting

Presented: October 2017

International Copper Association
Copper Alliance

The Heating, Ventilation, Air Conditioning and Refrigeration (HVAC(R)) market is growing rapidly, due to factors like design change, increased product efficiency and emerging markets. Copper's natural engineering properties—including high conductivity, durability and workability—give it a dominant role in this $140 billion industry. A new study commissioned by the International Copper Association (ICA) outlines key market drivers and sector developments, and highlights copper's role in driving the HVAC(R) industry.

The Market for HVAC(R)

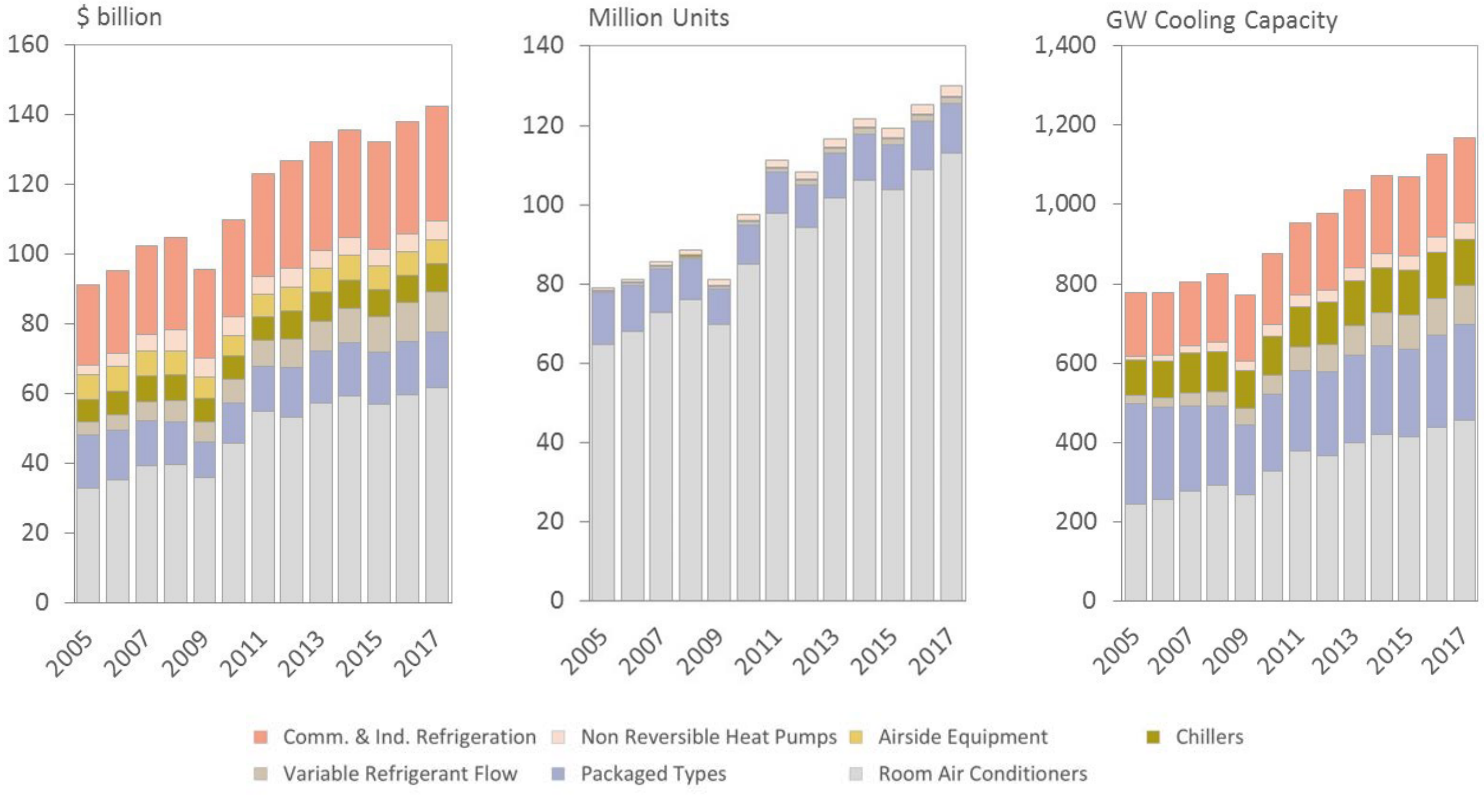
This industry is comprised of both residential and commercial products, including:

- Room air conditioners.
- Multi-room air conditioners, including chillers.
- Commercial and industrial refrigeration, and heat pumps.

HVAC(R) unit demand has increased by 56% over the last 12 years, led by room air conditioners that make up the majority of the units sold.

- In terms of copper content, room air conditioners make up 43% of the 2.4 million tonne market, as of 2017.
- An estimated 110 million room air conditioning units will be sold in 2017.
- Refrigeration is also a valuable part of the market, contributing an estimated $32 million value to the HVAC(R) industry in 2017.

HVAC(R) Market Size and Trends

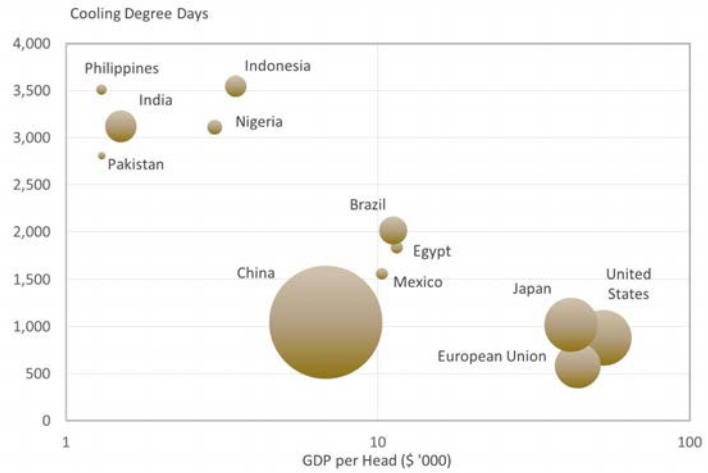


Copper's Role in Product Efficiency & Design Improvements

- Copper is essential to HVAC(R) products. Room air conditioners form the largest sector for copper, requiring over 1 million tonnes of copper annually.
- Commercial and industrial refrigeration products require 430,000 tonnes of copper. Chillers and variable refrigerant flow (VRF) combined—both in the large air conditioning system sector—use a further 470,000 tonnes.
- Climate change concerns and minimum efficiency performance standards (MEPS) worldwide have created a strong demand for more efficient and environmentally friendly products.
- Copper use is helping to expand the overall market demand by enabling design improvements that meet this demand without significantly increasing costs.
  - o Smaller diameter, thinner copper tubes have allowed MicroGroove™ heat exchangers to drop from 9.52 millimeters to 5 mm over the past 20 years.
  - o Smaller tubes and the inner grooving of copper tubes have been used to optimize product designs and increase efficiency in heat exchangers.
- Copper tube is well suited for use with more eco-friendly refrigerants.
- Motor-driven systems use high-efficiency copper motors to deliver better and more efficient designs.

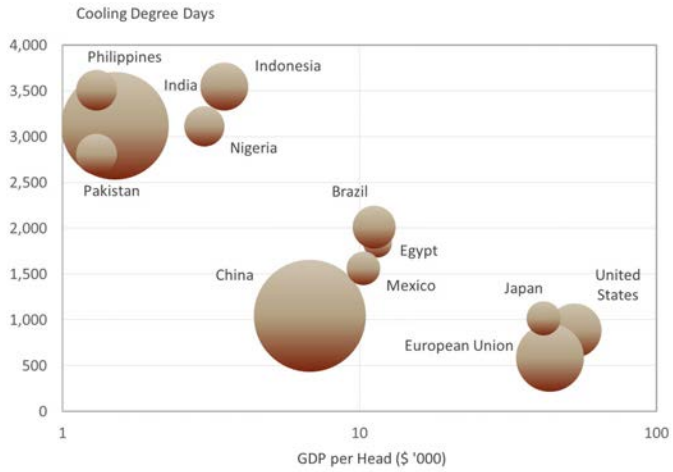
Wealth & Cooling Degree Days*

(Bubble Sizes Show Room Air Conditioners in Place)



Market Potential

(Bubble Sizes Show Population)



Opportunities for Market Growth

- India, Indonesia, the Philippines and other emerging markets have high populations as well as a high number of cooling degree days, which measure potential demand for air conditioning.
- These countries also have the lowest density of room air conditioners in place.
- These markets present a significant demand opportunity for additional air conditioning units.
- The market demand for copper is forecast to reach three million tonnes by 2022.

As the HVAC(R) market continues to adapt to climate change mitigation and efficiency demand, growing populations in emerging markets are forecast to increase demand for air conditioning units. Copper will remain a prominent factor in expanding this industry and delivering better, more eco-friendly products.

* Cooling Degree Day (CDD) is a measure of potential demand for cooling, normalised to 18°C (65°F). Source: Climate Analysis Indicators Tool (CAIT): World Resources Institute.

Cu

International Copper Association

Copper Alliance

For additional information about copper or the International Copper Association please visit www.copperalliance.org.

For enquiries, email colin.bennett@copperalliance.org.uk or bryony.samuel@copperalliance.org.uk.