

Copper intensity in the electrification of transport and the integration of energy storage

Research Conducted by: IDTechEx

Presented: April 2017

The International Copper Association—the leading authority on copper end-use—issued research findings that detail the increasing role copper plays in the development of electrified transportation and the integration of energy storage. The research was conducted by IDTechEx, who examined the relationship between copper and the essential elements needed to advance the electro mobility industry.

Key Findings

- Copper will have a critical impact in three key areas as electrified transportation grows: energy storage, charging infrastructure, and the production of electric vehicles.
- Energy storage is the most copper-intensive component of electro mobility.
- As the use of electric vehicles increases, a charging infrastructure utilizing significant amounts of copper material will be required.

Copper and Energy Storage

The greatest concentration of copper in electric vehicles is contained within the battery.

- Estimates show that for every kilowatt-hour of a lithium ion battery, 1.1 to 1.2 kilograms (kg) of copper is used.
 - As a result, projections show the potential for up to 600 kilotonnes of additional copper use by 2027.
- Charging stations contain 0.7 kg of copper (for a 3.3 kW charger) or 8 kg (for a 200 kW charger).
- Fully-electric buses contain 129–292 kg of copper in their batteries, depending on the battery's size.
 - This represents 85% of the vehicle's total copper content.
- Pure electric vehicles (no internal combustion engine) have a battery pack containing 40 kg of copper.
 - This accounts for 48% of their total copper content.

Copper Content by Electric Vehicle Type

The total copper content among the spectrum of electric vehicles includes the following:

- Electric bus – 224–369 kg of copper per vehicle.
- Electric vehicle – 83 kg of copper per vehicle.
- Plug-in hybrid electric vehicle – 60 kg of copper per vehicle.
- Hybrid electric vehicle – 39 kg of copper per vehicle.

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

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



International Copper Association
Copper Alliance