### GEOLOGICAL PERSPECTIVE

Typically, the future availability of minerals is based on the concept of reserves and resources. Reserves are deposits that have been discovered, evaluated and assessed to be economically profitable. Resources are far bigger and include reserves, discovered deposits which are potentially profitable, and undiscovered deposits that are predicted based on preliminary geological surveys.

According to the latest science of the United States Geological Survey (USGS), copper reserves amount to 720 million tonnes and copper resources are currently estimated over 5,000 million tonnes (USGS, 2014 & 2017). The latter does not take into account the vast amounts of copper deposits found in deep sea nodules and submarine massive sulphides. Current and future exploration opportunities will lead to increases in both reserves and known resources; of the around 1,000 copper projects targeted for future exploration, nearly 100 are already under construction (Intierra, 2011).

It is also important to note that copper is naturally present in the Earth's crust at a concentration of about 68 parts per million (ppm). Thus the total resource base of copper is estimated at 300,000 million tonnes (Kesler, 2008). This includes only deposits above 3.3 km, a likely limit of future mining.

### RESERVES IN CONTRAST TO PRODUCTION

Since 2000, 270 million tonnes of copper have been mined. In that same period however, known reserves have grown by 380 million tonnes. As a result, the reserves/mine production ratio has increased by 45% from 26 to 37.

Since 1950 according to USGS data, there has always been, on average, nearly 40 years of copper reserves. This reflects the timeframes, technological advances and evolving economics of mining.

### COPPER IN USE

Based on the global copper stocks and flows model, recently developed by the Fraunhofer Institute, it is estimated that two-thirds out of the 550 million tonnes of copper produced since 1900 are still in productive use (Glöser, 2013).

Nearly 70 percent of worldwide copper produced is used for electrical/conductivity applications and communications, as shown in Figure 3.

- Copper has the highest electrical conductivity of any metal, apart from silver. This property makes copper the material of choice in power generation and transmission (45 percent of use)—delivering electricity safely and efficiently to homes and businesses.
• Electrical equipment—providing circuitry, wiring and contacts for appliances and consumer electronics accounts for 12.5 percent of copper usage.
• The remaining 12.5 percent is used for by the transport sector. The high purity copper wire harness system in a train, car or truck carries the current from the battery throughout the vehicle to equipment such as lights, central locking, on-board computers and satellite navigation systems.

Another 20 percent of all the copper produced is used in buildings—for plumbing, roofing and cladding. Copper provides light, durable maintenance-free structures that are naturally good looking, long lasting and fully recyclable.

The remaining 10 percent is used for coins, sculptures, jewelry, musical instruments, cookware and other consumer goods.

CONCLUSION
Copper is civilization’s oldest metal, dating back more than 10,000 years. It still plays a vital role in addressing issues critical to society. As well as making contributions to our diet and human health, Copper is also central to providing energy access in developing countries, allowing important improvements in energy efficiency and the growth in renewable energy sources, and from this, important reductions in CO₂ emissions.

Based on the latest knowledge on geological availability and continuous industry innovation there are good reasons to believe that copper will continue to be a vital and positive contributor to society well into the future.

ANNEX: REFERENCES


ICAIWCC Global 2017 Semis End Use Data Set copperalliance.org/trends-and-innovations/data-set/