Copper is....

Easy to Alloy
Aesthetic
Antimicrobial
Antifouling
Easily Shaped
Colourful
Conductive Durable
Easy to Join
Essential Malleable
Ductile Safe
Recyclable Available
Sustainable Tough

# Copper is....

## Copper is the metal of civilisation

Copper is essential for modern living. It delivers electricity and clean water into our homes and cities and makes an important contribution to sustainable development. More than that, it is essential for life itself.
For centuries, copper has been interwoven with the story of humanity's progress. Its crucial role in society can be seen in our homes, in transportation, as well as in infrastructure and industries. So, what are the special features of this metal that make it indispensible in the modern world?

This publication from the European Copper Institute looks at the properties and applications of one of our planet's most versatile resources, copper, along with its value to our society, today and tomorrow.

Copper is....

# Aesthetic

Copper has always fascinated people with its beauty and elegance. It respects tradition, but at the same time enables new and appealing architectural and design solutions. The pleasing appearance of copper and its alloys adds a feeling of quality, even prestige, to public spaces, furniture, design objects and decorative items for the home.

Copper is....

# Easy to alloy

For many industrial applications, copper's performance needs to be expanded. This is achieved by alloying: making a solid material out of two or more different metals. The most well-known copper alloys are brass (copper-zinc), bronze (copper-tin) and copper-nickel.
By combining copper with other metals, alloys can be made to fit almost any application.

Copper is....

# Antimicrobial


Humans have exploited the inherent antimicrobial properties of copper since the dawn of civilisation. Scientific research has demonstrated copper's antimicrobial effect on a range of disease-causing bacteria, viruses and fungi. This supports its use in applications where control of these germs will benefit society, such as healthcare, food processing, heating & air-conditioning and public transport. Pathogens don't survive on copper surfaces, reducing the risk of them being transferred via touch. This positions copper as an additional weapon in the fight against hospital acquired infections.

Copper is....

# Antifouling

Biofouling is the gathering of undesirable materials, such as algae and barnacles, on wet surfaces, like the undersides of boats. It can lead to pipes getting blocked and ship hulls being completely coated. In the 18th Century, copper cladding was used on wooden ships to combat biofouling and attack by the notorious Toredo Worm. Today, copper nickel alloys are used to protect offshore platforms, boat hulls, seawater pipework and desalination units. Modern fish farms are starting to use copper alloy cages. These require minimal maintenance and provide a safe and healthy environment for fish to grow.

Copper is....

# Easily shaped

Copper is very easy to work, and can be shaped into nearly any form, offering cost-effective products for industrial and consumer applications alike. Along with its alloys, such as brass and bronze, it has been used for many centuries to produce tube, sheets for roofing and cladding of buildings, and wire for electrical applications and jewellery. It can be made into complex shapes, as demonstrated by the intricate curves of brass instruments such as trumpets. It is also cast to make taps and valves, bells and statues that last for hundreds of years.

Copper is....

# Colourful

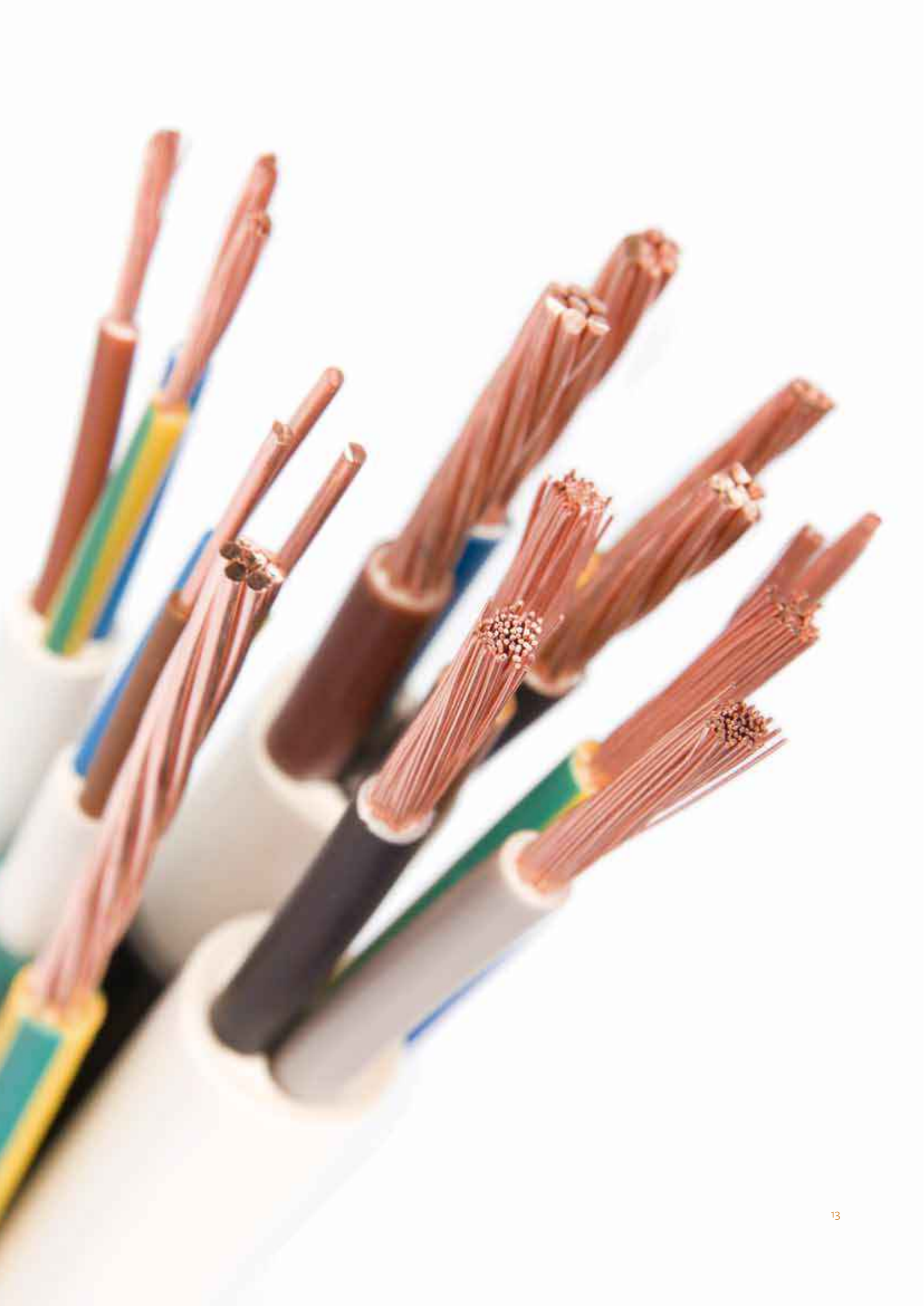
No other metal has a range of attractive colours comparable to copper and its alloys. The red of copper, the gold of the brasses and aluminium bronzes, the chocolate-brown of manganese bronzes the green patina and the shiny white nickel-silvers enable designers to exploit their artistic talents.
Surface treatments can provide even more colours if desired.

Copper is....

# Conductive

**Conductive of heat:**
Copper has the highest thermal conductivity of any metal, except silver. When good heat transfer is essential, as in vehicle radiators, heat sinks, and refrigeration units, copper and brass are excellent choices. Good-quality saucepans are copper-bottomed to provide uniform heating and are, still today, the choice of professional chefs.

**Conductive of electricity:**
Copper has the highest electrical conductivity of any metal, except silver, with this property accounting for over 50% of its use. It reduces electrical energy losses, improves energy efficiency, and optimum use can reduce the lifetime costs of its applications. From high voltage transmission to micro-electronics, and from gigawatt generators to personal computers, in every aspect of electricity generation, transmission and use, copper is the vital, energy-efficient metal.



Copper is....

# Durable

Indoors, copper and its alloys will very slowly darken in colour, but they will not rust. This darkening does not damage their function, which is very important for items such as water and gas pipes, taps and electrical wires. Decorative items such as jewellery, light fittings and door furniture are easily polished to restore a bright surface.

Outdoors, copper and its alloys will gradually form an attractive, stable green patina that enhances the appearance of statues, roofs and other decorative and architectural items. It is no wonder that architects and designers choose copper time and again.

Copper pipes were used by the Ancient Egyptians to carry water. Today, copper tube is used in many European homes to carry hot and cold water for plumbing and heating and to safely convey natural gas to homes and businesses.

Copper is....

# Easy to join

Copper and copper alloys can be easily joined, by bolting and riveting, by soldering, brazing and welding and by adhesive bonding.
In industry, this is very useful for plumbing pipework and joining busbars, vital elements of power distribution systems. Elsewhere, it is also an important feature for artists crafting sculptures and statues, and to jewellery makers and other artisans working with this beautiful material.

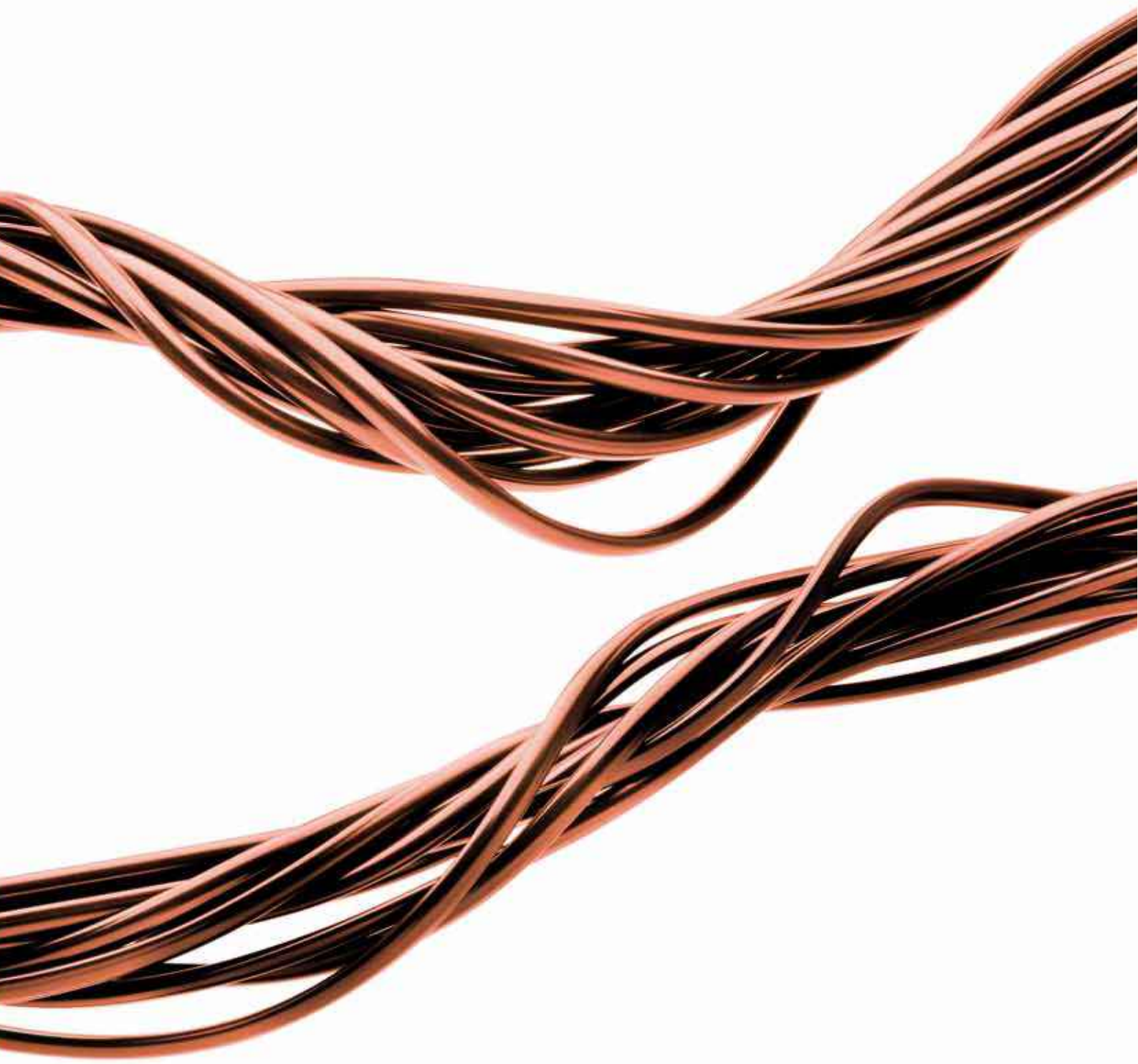
Copper is....

# Essential

Copper is an essential trace element vital to the health of all living organisms. Without it, our blood would not be able to carry oxygen. Copper nutrition is important for pregnant women, the developing foetus and new-born babies. In our bodies, copper enhances bone strength, red and white blood cell maturation, iron transport, cholesterol and glucose metabolism, heart muscle contraction and brain development. Avoiding copper deficiency requires a recommended daily intake of about 1mg. Good dietary sources of copper include dark chocolate, nuts, seafood, legumes, liver and green leafy vegetables.

Copper is....

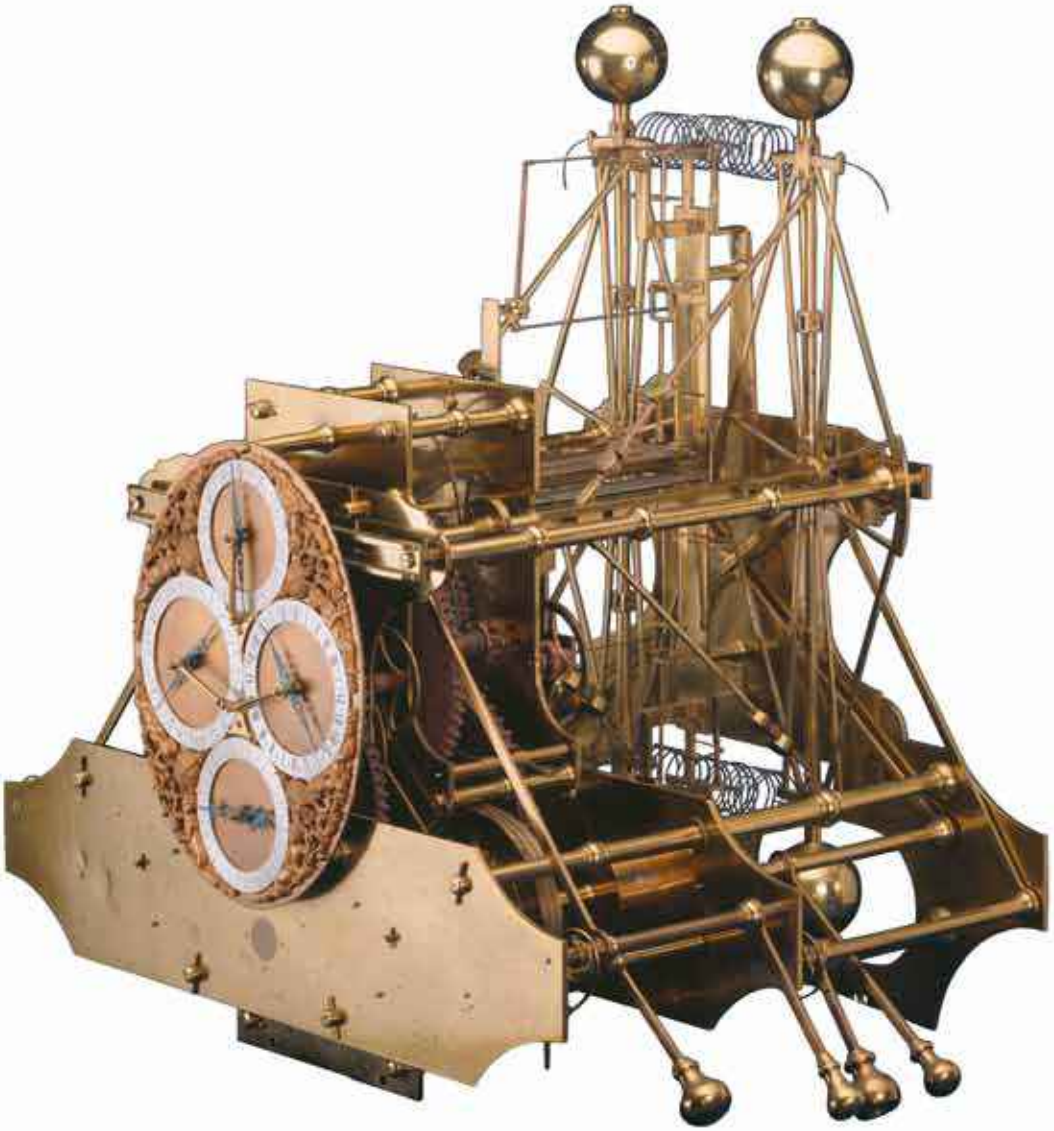
# Malleable & Ductile



The generation and transmission of electricity has transformed the world. Copper has made this possible. The very small diameter wires, which transmit power in cars, computers, televisions, lighting and mobile phones, only exist because of the high ductility and malleability of copper.

Copper is....

# Safe

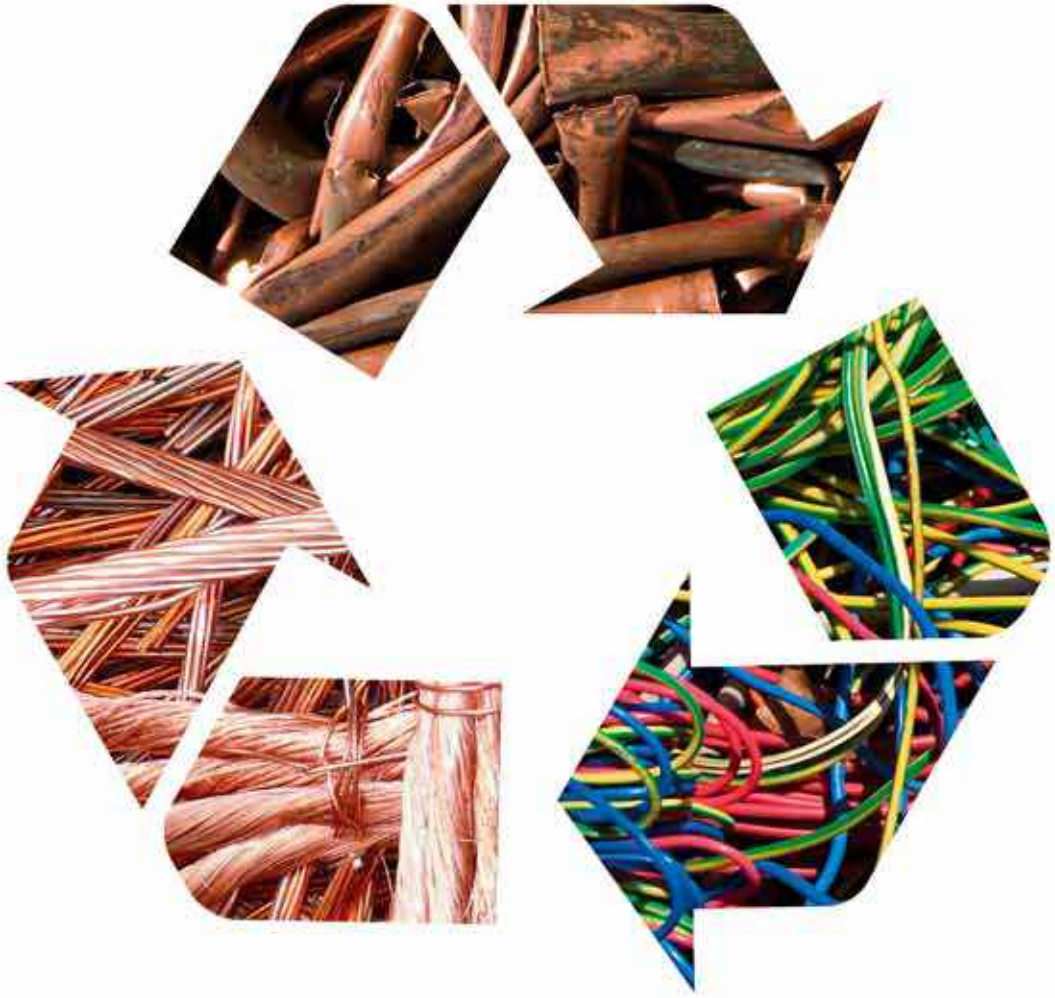


In hazardous environments, copper is non-magnetic and non-sparking. Because of this, alloys such as copper beryllium are used for special tools where a spark would be dangerous, such as in a mine where it could ignite gas. They are also important in military applications, such as minesweepers, which must have a low magnetic permeability.

The famous sea clocks and watches made by John Harrison in the 18th Century, which helped solve the problem of longitude, could not have been made without extensive use of brass and tin bronze.

Copper is....

# Recyclable



Copper exists in naturally-occurring ores and, in Europe, is mined mainly in Poland, Portugal, Spain, Russia and Sweden. As copper can be recycled, again and again, without any loss of performance, it is rarely lost from the world's resources. Today, around 40% of Europe's demand for copper is met by recycled material.
Recycling products at the end of their lives contributes to sustainable development. Recycling also uses only 20% of the energy required to mine copper.

Copper is....

# Available & Sustainable

Known reserves of copper today are around 550 million tonnes, according to the United States Geological Survey. However, total copper resources are much higher and short term supply limitations, which often result in upward price trends, act as a spur to the exploration of new deposits. In Europe, recycling is a significant source of supply, currently meeting around 40% of demand. Copper's ability to be recycled, again and again, without any loss in performance, is an important sustainable benefit.

Copper's technical and social values, outlined in this brochure, combined with its infinite recyclability, make copper one of the important materials for building a sustainable world.

Copper is....

# Tough

Copper and copper alloys are tough. They resist cracking and are resistant to wear and tear. This means they have always been well-suited for use in tools and weapons. Imagine the joy of an ancient hunter when he discovered that his carefully formed bronze arrowheads no longer shattered on impact. This property is still vital today for all components made from copper and copper alloys.

The European Copper Institute (ECI) is a joint venture between the world's leading mining companies, custom smelters and semi fabricators (represented by the International Copper Association, Ltd) and the European copper industry. Its mission is to promote copper's benefits to modern society across Europe through its headquarters in Brussels and its network of eleven national Copper Development Associations.

be Curious

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