COPPER

CRITICAL TODAY, TOMORROW AND FOREVER

THE MATERIAL FOR A

MODERN ECONOMY

Copper is present in most of the materials we come across in our daily lives.

From **electrical appliances to jewelry, healthcare, and transport**—the applications of copper today are widespread and likely to grow in the future.

WHY COPPER TODAY?

COPPER BUILDS

CONSTRUCTION & INFRASTRUCTURE

More than 40% of all copper is used in construction and infrastructure.

Source: International Copper Study Group, data is from 2018

Copper is used in:

- Roofing material for buildings for its **wind resistance** and **aesthetic appeal.**
- Tubing material in residential heating systems for its **thermal conductivity.**
- Wiring material for electric grid infrastructure—**in the generation, transmission, distribution, and consumption of power.**

Source: Copper Development Association

COPPER'S AFFORDABILITY AND UNIQUE PROPERTIES MAKE IT CRITICAL IN BUILDING AND POWERING OUR HOMES.

COPPER MOVES

TRANSPORTATION

THE TRANSPORT INDUSTRY MAKES USE OF COPPER'S HIGH CONDUCTIVITY, PRESSURE-RESISTANCE, AND DUCTILITY.

- A single Boeing-**747-200 jet contains 632,000 feet of copper wire.**
- The average luxury car contains approximately **1.6 km** of copper wire.
- Copper alloys are used in **landing gear parts** and **bearings** for their ability to withstand **high pressure.**
- Used in motors for its **efficiency,** resulting in higher power generation and longer driving distances.
- Electric vehicles, including buses and trains, rely on copper for its **conductivity.**
- Used to make radiators that are **lighter, smaller,** and more **affordable.**
- Used in brake-tubing for its **anti-corrosive** and **pressure-resistant characteristics.**

Source: Copper Development Association, Beryllium.com

COPPER CARES

HEALTHCARE AND HOSPITALS

COPPER IS ESSENTIAL TO HEALTH, AND ITS APPLICATIONS IN HEALTHCARE CONTINUE TO GROW.

- More than **500 antimicrobial copper** alloys are registered with the **U.S. Environmental Protection Agency.**
- Antimicrobial copper touch surfaces eliminate 99.9% of certain bacteria within **two hours** of exposure.
- Copper is used to make high-touch surfaces, such as doorknobs and bed handles, **safer** in hospitals.

Controlled dietary ingestion of copper also presents several health benefits:

- Copper is crucial to the normal development of the brain and nervous systems.
- Adults require **1-2 mg of copper in their daily diet.**

Source: Copper Development Association, European Copper Institute

COPPER STRENGTHENS

JEWELRY

COPPER'S DURABILITY AND AESTHETIC APPEAL MAKE IT IDEAL FOR USE IN JEWELRY AND COINAGE.

- Copper is used to **strengthen** gold and silver jewelry.
- **18k gold jewelry** typically contains 75% gold, 15% silver and **10% copper.**
- Many of the coins we use are made from copper and its alloys.
  - **Corrosion resistance:** Copper-nickel alloy coins do not tarnish.
  - **Electrical conductivity:** Copper-nickel coins have specific electronic signatures that help prevent fraud in vending and coin-handling machines.

Source: World Gold Council

COPPER COMFORTS

HOMES AND HOUSEHOLDS

An average single-family home contains approximately **200 kg** of copper.

Used in building wire, plumbing tubes and fittings, built-in appliances, and other hardware. **88.5 kg** **68.5 kg** **21 kg**

Numerous general appliances rely on large amount of copper for wiring, including:

- Air conditioners **23.5 kg**
- Dishwashers **2.2 kg**
- Heat pumps **21.7 kg**
- Refrigerators **2.1 kg**

Apart from appliances, copper plays a crucial role in objects that we use on a daily-basis:

On average, a typical iPhone contains **15 grams of copper.**

Source: BBC

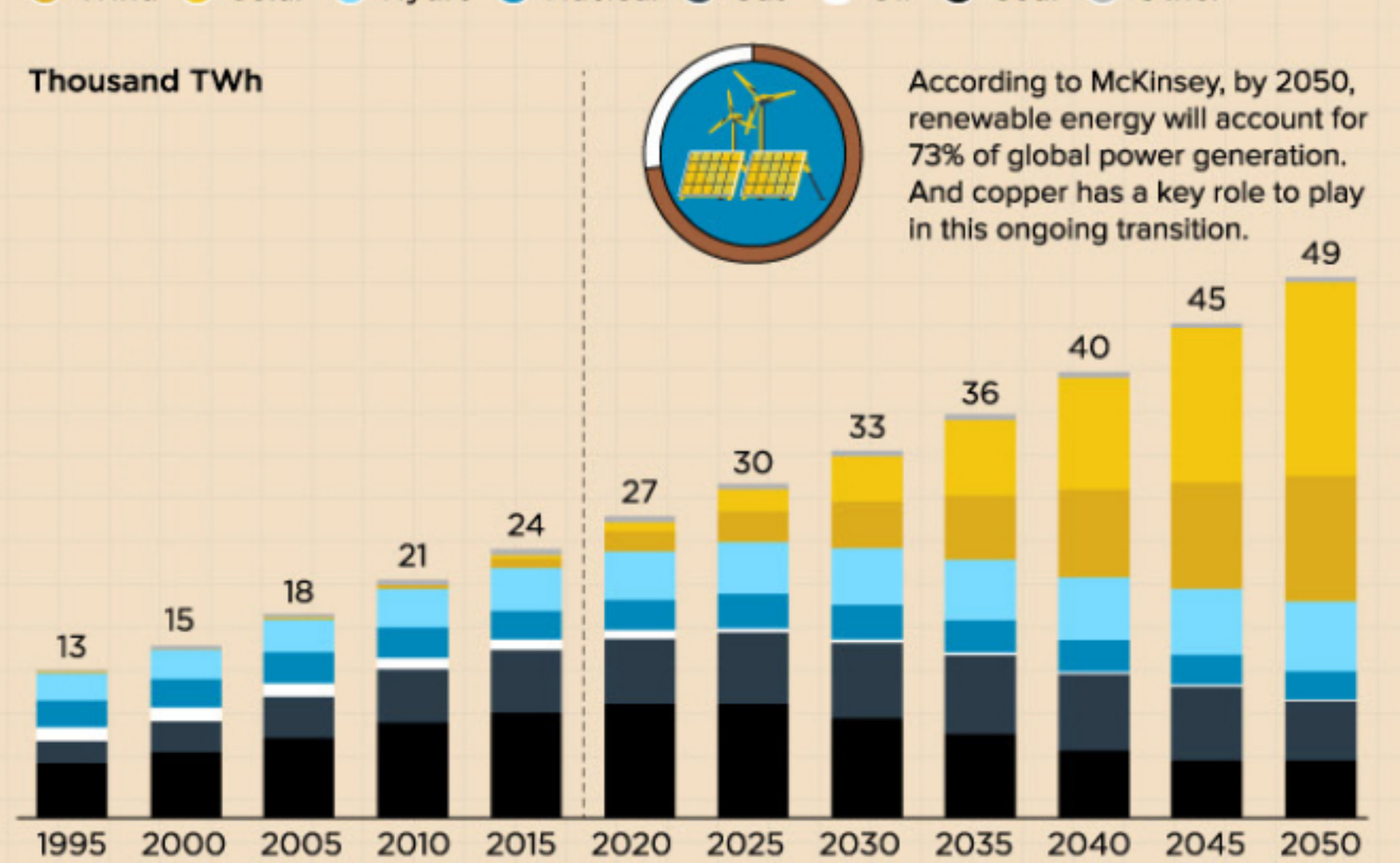
COPPER IS CRITICAL TO THE MODERN ECONOMY TODAY. ITS UNIQUE PROPERTIES ALLOW FOR URBANIZATION AT LOWER COSTS.

But as the world transitions towards clean energy, will it continue to play an important role?

WHY COPPER TOMORROW?

POWERING AND WIRING THE FUTURE

GLOBAL POWER GENERATION



According to McKinsey, by 2050, renewable energy will account for 73% of global power generation. And copper has a key role to play in this ongoing transition.

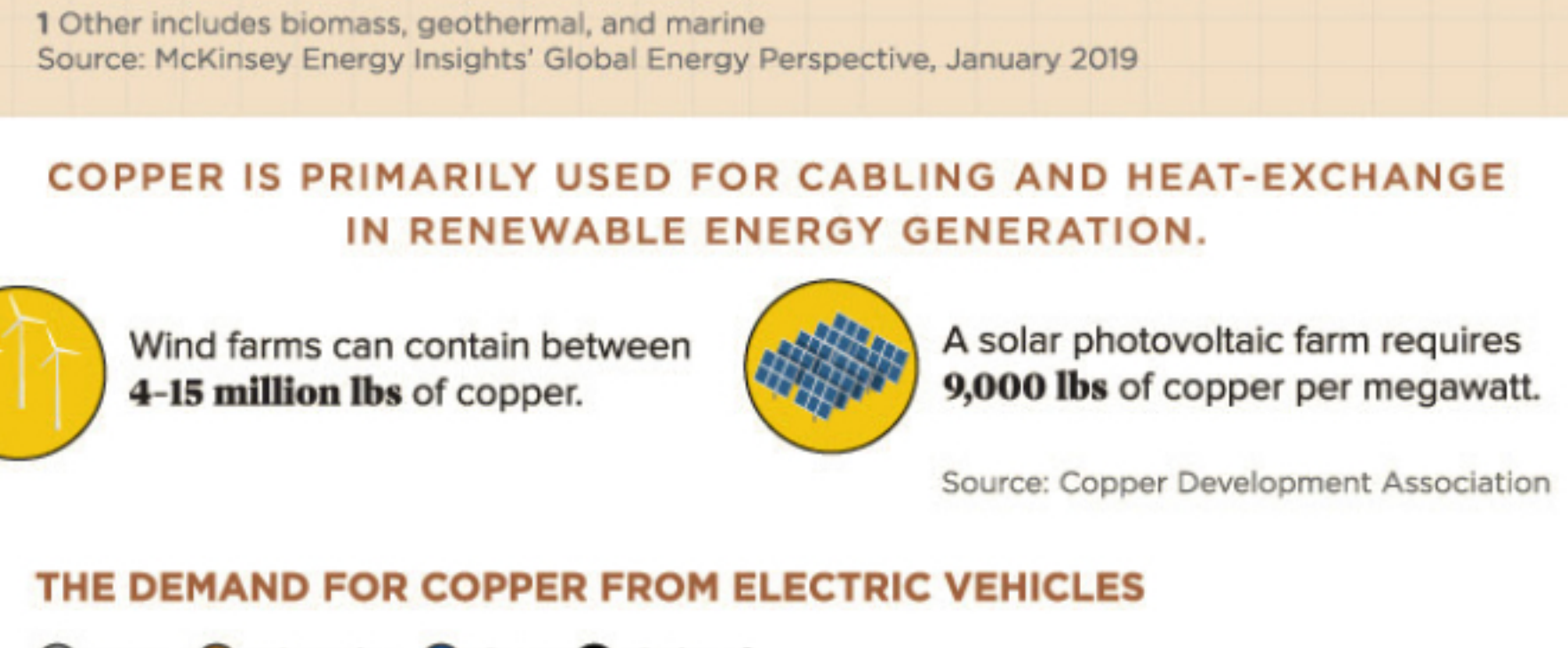
1 Other includes biomass, geothermal, and marine
Source: McKinsey Energy Insights' Global Energy Perspective, January 2019

COPPER IS PRIMARILY USED FOR CABLING AND HEAT-EXCHANGE IN RENEWABLE ENERGY GENERATION.

- Wind farms can contain between **4-15 million lbs** of copper.
- A solar photovoltaic farm requires **9,000 lbs** of copper per megawatt.

Source: Copper Development Association

THE DEMAND FOR COPPER FROM ELECTRIC VEHICLES



By 2030, more than **250,000 tonnes** of copper will be needed per year as part of the windings in electric traction motors in on-road electric vehicles.

2 Other includes scooter, bus, motorcycle, trucks, and three-wheelers
Source: Copper Alliance

- The growing market for **electric vehicles** is set to bolster the demand for copper in the near future.
- Copper is used in batteries, coils, wiring, and charging stations for EVs.
- EVs can contain **85-813 lbs** of copper, depending on their size and type.

Source: Copper Development Association

THE TRANSITION TO CLEAN ENERGY, COUPLED WITH URBANIZATION AND ECONOMIC DEVELOPMENT, IMPLIES THAT COPPER IS CRITICAL FOR THE FUTURE.

However, this raises concerns about the sustainability of copper supply—will there be enough?

COPPER FOREVER

SUSTAINABLE MATERIAL

- Copper recycling uses 80-90% less energy than mining. This saves 40 million tonnes of CO_2 annually, which is equivalent to 16 million passenger cars off the road.
- Recycled copper offers the **same quality** and **benefits** as newly mined copper.
- A total of **8.5 million tonnes** of copper is produced from recycled scrap **each year.**

Source: International Copper Association

COPPER'S RECYCLABILITY MAKES IT REUSABLE FOR YEARS TO COME, COMPLEMENTING THE PATH TO SUSTAINABLE DEVELOPMENT.

COPPER

CRITICAL TODAY, TOMORROW, AND FOREVER

The exceptional properties and affordability of copper allow for widespread applications, which continue to grow as the world shifts towards clean energy.

Copper is needed for almost all the materials we use in our daily-lives, and its demand will always persist.

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