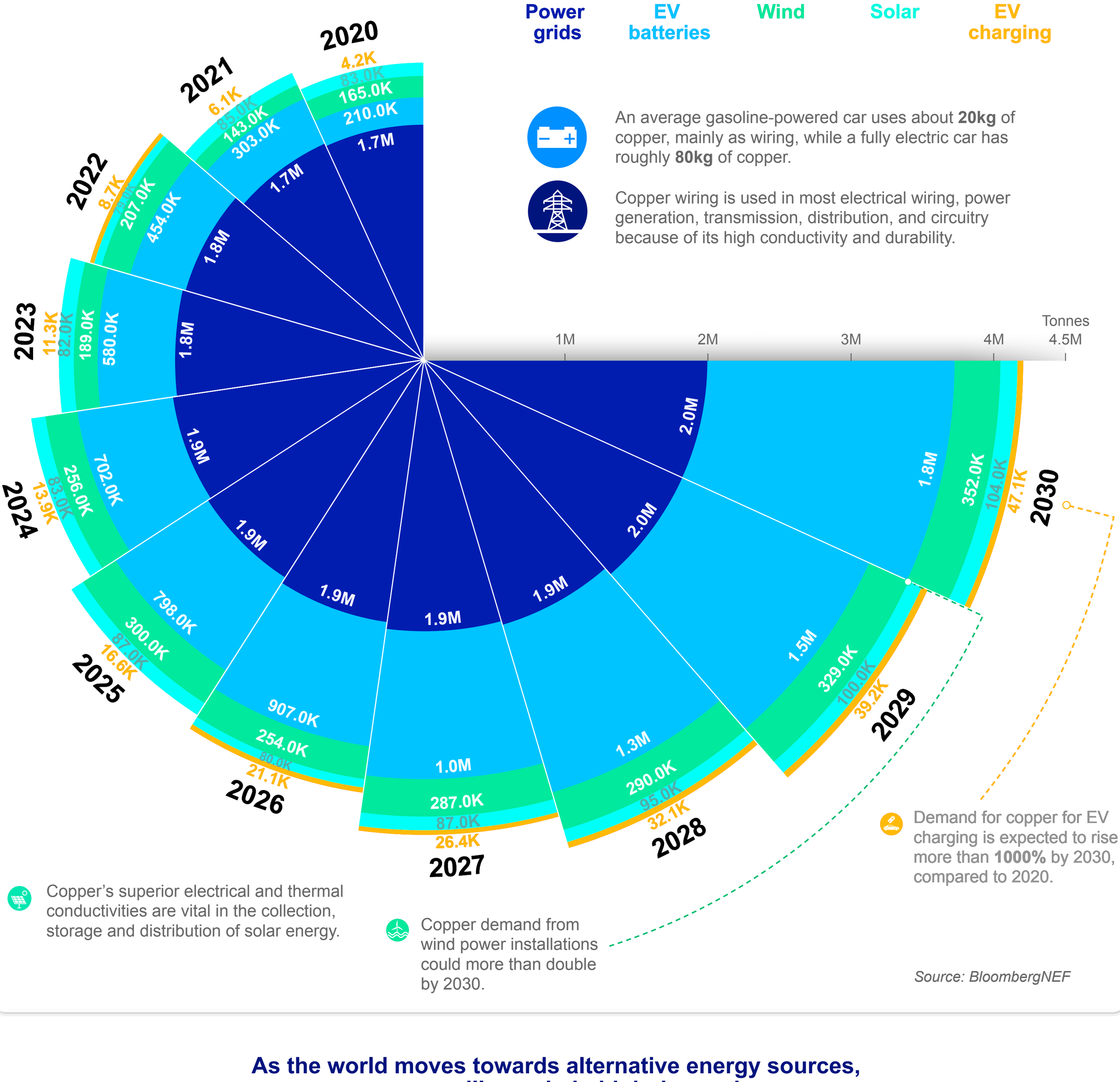
Riding the Electric Wave
Copper in a Renewables Powered Future

Global copper demand for alternative energy sources is expected to jump from **2.1M** tonnes in 2020 to **4.3M** tonnes in 2030.

The Essential Metal for the Energy Transition

Power grids | EV batteries | Wind | Solar | EV charging



An average gasoline-powered car uses about **20kg** of copper, mainly as wiring, while a fully electric car has roughly **80kg** of copper.

Copper wiring is used in most electrical wiring, power generation, transmission, distribution, and circuitry because of its high conductivity and durability.

Demand for copper for EV charging is expected to rise more than **1000%** by 2030, compared to 2020.

Copper's superior electrical and thermal conductivities are vital in the collection, storage and distribution of solar energy.

Copper demand from wind power installations could more than double by 2030.

Source: BloombergNEF

As the world moves towards alternative energy sources, copper will remain in high demand.

Presented by

Understanding Zinc's Role in a Low-Carbon Economy

Most people know zinc is used for vitamins, sunscreen, or metal coating, but few are aware of its essential applications in transportation, infrastructure, electronics, and renewable energy.

Zinc's Role in Renewable Energy Production

Due to its superior ability to protect metals against corrosion and its growing role in energy storage and production, zinc remains an essential material for the future.

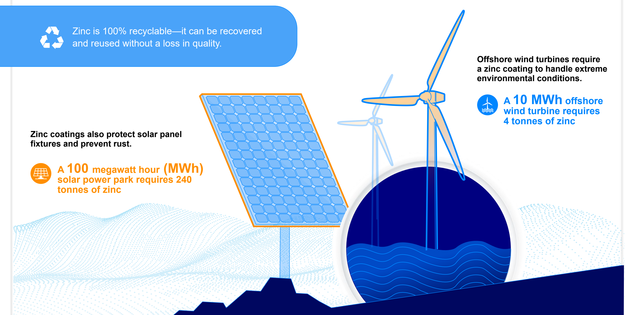
Zinc is 100% recyclable—it can be recovered and reused without a loss in quality.

Offshore wind turbines require a zinc coating to handle extreme environmental conditions.

A **10 MWh** offshore wind turbine requires 4 tonnes of zinc

Zinc coatings also protect solar panel fixtures and prevent rust.

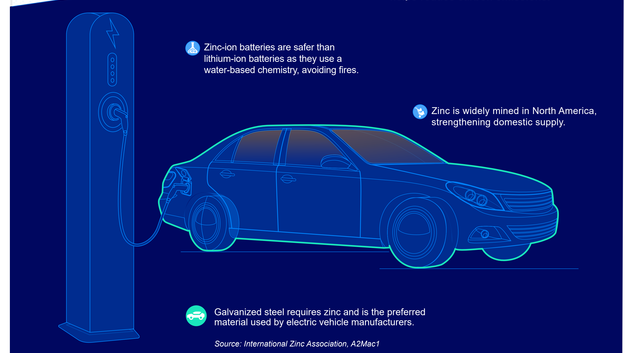
A **100** megawatt hour **(MWh)** solar power park requires 240 tonnes of zinc



Zinc is a key ingredient in battery technology that helps reduce carbon emissions.

Zinc-ion batteries are safer than lithium-ion batteries as they use a water-based chemistry, avoiding fires.

Zinc is widely mined in North America, strengthening domestic supply.

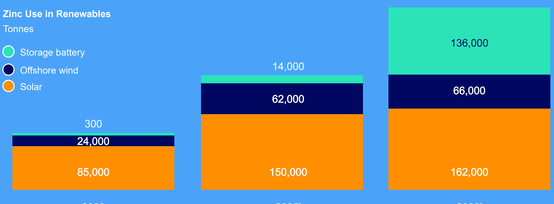


Galvanized steel requires zinc and is the preferred material used by electric vehicle manufacturers.

Source: International Zinc Association, A2Mac1

Growing Demand for Zinc

Accelerated investment and adoption of renewable energy is leading to growing zinc demand.



** Projected* | *Source: CRU, IRENA*

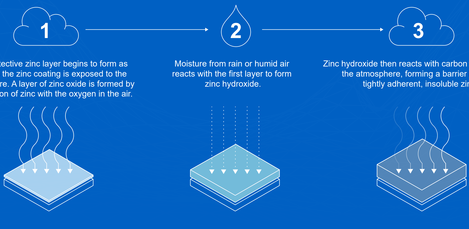
Galvanizing the Economy

Zinc plays an important role extending the life of products made of steel. Doing so means that infrastructure such as bridges and power transmission systems do not need to be rebuilt as frequently, thus reducing emissions.

Protecting steel against corrosion is the most important market for zinc, representing 60% of the metal's use worldwide. This includes the steel in infrastructure and vehicles.

Zinc coatings extend steel's life on average by 9x vs. bare steel.

How Zinc Protects Steel



Source: International Zinc Association

The Versatile Metal

From transistors to lasers, satellites to circuit boards, photocopiers to fuel cells, zinc is one of the most versatile and essential materials.

Zinc's Applications

- Renewable energy
- Batteries
- Die-casting
- Electronics
- Space travel
- Ceramics
- Disease prevention
- Paints
- Brass and bronze production
- Glass
- Pharmaceuticals
- Galvanizing steel or iron
- Rubber
- Sunscreen
- Fertilizer

To stop corrosion, the original lead-based paint of San Francisco's iconic Golden Gate Bridge was replaced with a zinc silicate primer in 1995.

Zinc coatings ushered in the rust protection warranties seen in vehicles from the 1980s and onwards.

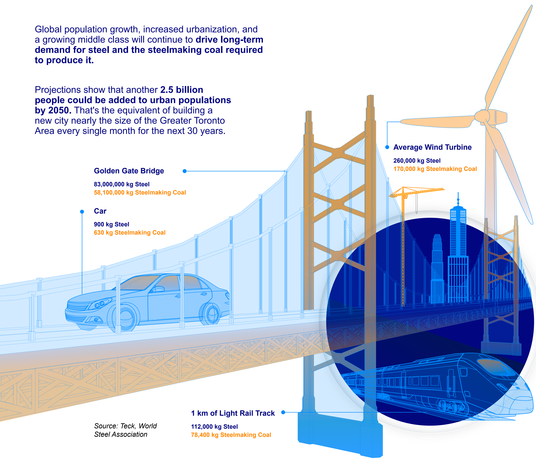
Source: International Zinc Association

As one of the world's largest producers of mined zinc, Teck is committed to responsible mining and delivering the metals necessary for a low-carbon future.

Understanding Global Demand for Steelmaking Coal

Global population growth, increased urbanization, and a growing middle class will continue to **drive long-term demand for steel and the steelmaking coal required to produce it.**

Projections show that another **2.5 billion people could be added to urban populations by 2050.** That's the equivalent of building a new city nearly the size of the Greater Toronto Area every single month for the next 30 years.



Source: Teck, World Steel Association

Fundamentally different from thermal coal, which is used for power, **steelmaking coal is needed to make the steel used in everything from:**

Everyday Items

Microwave
13 kg Steel
9 kg Steelmaking Coal

Gas Stove
68 kg Steel
48 kg Steelmaking Coal

Refrigerator
69 kg Steel
48 kg Steelmaking Coal

Transportation & Infrastructure

40-Foot Shipping Container
4,000 kg Steel
2,850 kg Steelmaking Coal

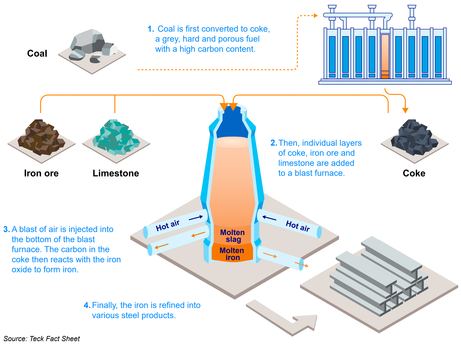
Boeing 787-10 Aircraft
13,500 kg Steel
9,450 kg Steelmaking Coal

High-Voltage Transmission Tower
27,000 kg Steel
18,900 kg Steelmaking Coal

Sources: The American Iron and Steel Institute, World Steel Association, Boeing

The Steelmaking Process

About 72% of global production of steel relies on steelmaking coal.



Source: Teck Fact Sheet

Steelmaking Coal in the Low-Carbon Future

Clean and renewable technologies needed to mitigate climate change also demand steelmaking coal.

Each megawatt of solar power requires up to 45,000 kg of steel, which requires 31,500 kg of steelmaking coal.

The average wind turbine requires up to 260,000 kg of steel, which requires 170,000 kg of steelmaking coal.

As the steel sector works to decarbonize, several primary pathways will contribute to reducing GHG emissions from steelmaking.

Carbon Capture, Utilization and Storage (CCUS) is the only commercially ready technology capable of decarbonizing the steelmaking industry at the rate and scale required **by 2050 to limit global temperature increases to 1.5°C**.

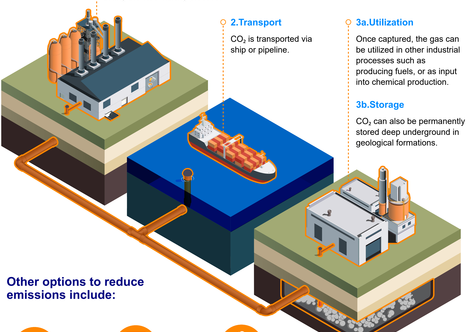
The CCUS Process

1.Capture
Carbon dioxide (CO_2) is captured during the steelmaking process.

2.Transport
CO_2 is transported via ship or pipeline.

3a.Utilization
Once captured, the gas can be utilized in other industrial processes such as producing fuels, or as input into chemical production.

3b.Storage
CO_2 can also be permanently stored deep underground in geological formations.



Other options to reduce emissions include:

Scrap Steel Recycling

Electric Arc Furnace Production

Hydrogen-Based Production

Sources: IOGP, IEA, World Steel Association, ArcelorMittal

As demand for steel grows in the low-carbon economy, so will the role of sustainable production.

Teck is the world's second-largest seaborne exporter of steelmaking coal and is among the lowest carbon-intensity producers.

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Learn more about steelmaking coal and its critical role in infrastructure and building a low-carbon future.

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