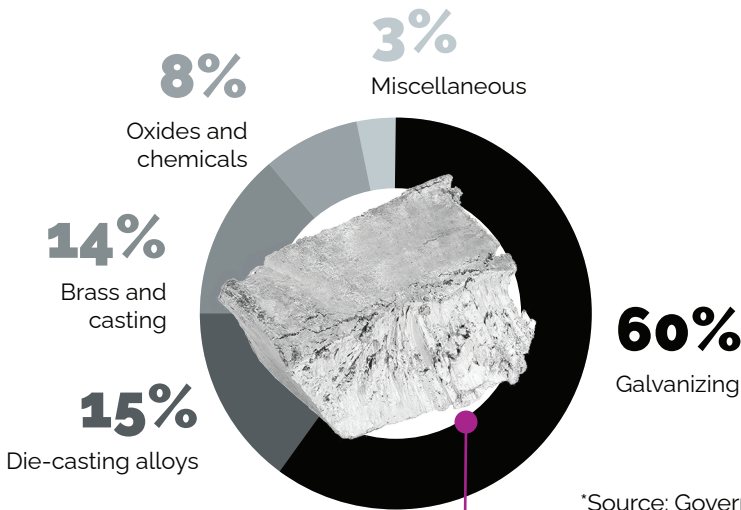


## Uses & Applications\*

Zinc's unique properties make it an extremely versatile metal, essential for everyday life. Zinc plays a crucial role in:



- Legend**
- Galvanizing
  - Die-casting alloys
  - Brass and casting
  - Oxides and chemicals

- Renewable Energy** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Transportation** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Food Security** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Energy Storage** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Healthcare** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Infrastructure** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Industrial Applications** (Galvanizing, Die-casting alloys, Oxides and chemicals)
- Electronics** (Galvanizing, Die-casting alloys, Oxides and chemicals)

\*Source: Government of Canada, "Zinc facts", 2021

# Zinc - Why is it critical?

## Unique Characteristics

Zinc possesses several unique characteristics that make it an indispensable element in diverse applications:

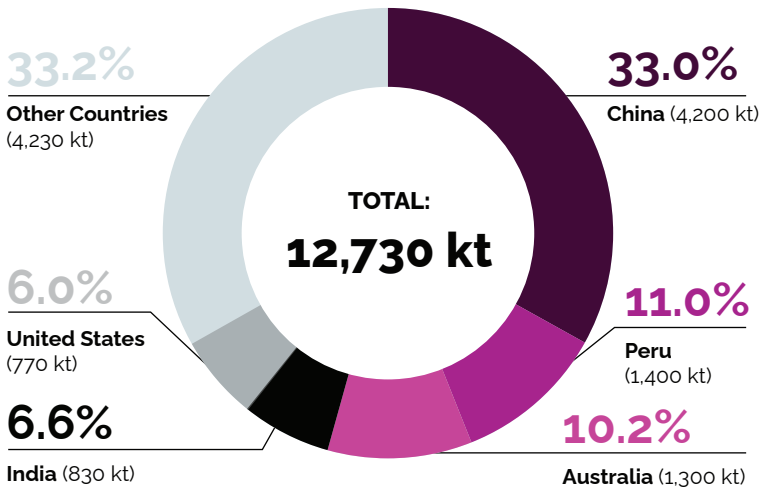
**Corrosion Resistance:** Zinc is suitable for various protective coatings, as it acts as a sacrificial anode, meaning it corrodes preferentially to protect the underlying metal. This property is widely used in galvanizing steel structures, such as bridges, buildings, and automotive parts. Zinc coating is the reason we rarely see rusty cars today.

**Low Melting Point:** Relatively low melting point of 419.5°C (787°F) makes Zinc suitable for soldering and various other industrial applications.

**Essential Micronutrient:** Plays a vital role in various human biological processes; including growth, development, immune function, and enzymatic reactions.

## Zinc Supply

### Worldwide Zinc Mine Production in 2022 (kt)\*

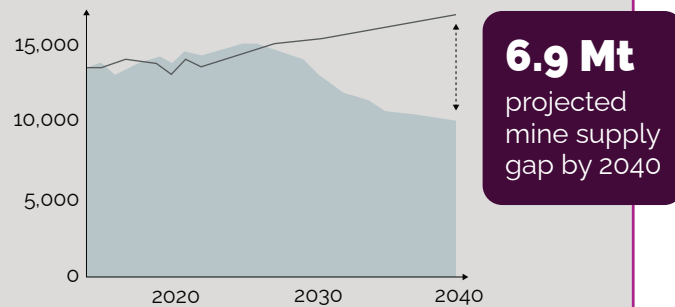


China is the largest zinc producer, with **33%** of the world's zinc production in 2022.

\*Source: U.S. Geological Survey, "Mineral Commodity Summaries", 2023

## Zinc Demand Outlook

### Zinc Mine Production and Demand (kt)



Zinc demand is expected to steadily increase, underpinned by energy transition uses, while supply is expected to fall systematically starting 2025, primarily driven by declining production rates at existing mines and fewer new projects coming on-line.

Sources: Wood Mackenzie, CRU, IZA, BGRIMM, SMM, Teck.

## Market Factors

### Emerging Uses of Zinc



**Agriculture:** The gaining prominence of zinc-based fertilizers to address soil deficiencies can significantly impact global food production, addressing nutritional deficiencies and improving crop yields.



**Batteries:** Aqueous zinc-ion batteries and zinc-air batteries are emerging as potential alternatives to traditional lithium-ion batteries, offering advantages such as cost-effectiveness, higher energy densities, longer life cycles, enhanced safety, and sustainability.



**3D Printing:** Zinc alloys are finding applications in 3D printing, particularly in industries like aerospace and automotive, where their lightweight and corrosion-resistant properties are valuable.



**Photovoltaics:** Zinc-based materials are being researched for use in thin-film solar cells and other photovoltaic technologies to improve solar panel efficiency and reduce production costs.



**Water Treatment:** Zinc oxide nanoparticles are being explored for their antimicrobial properties in water treatment applications, helping to combat waterborne pathogens and improve water quality.