

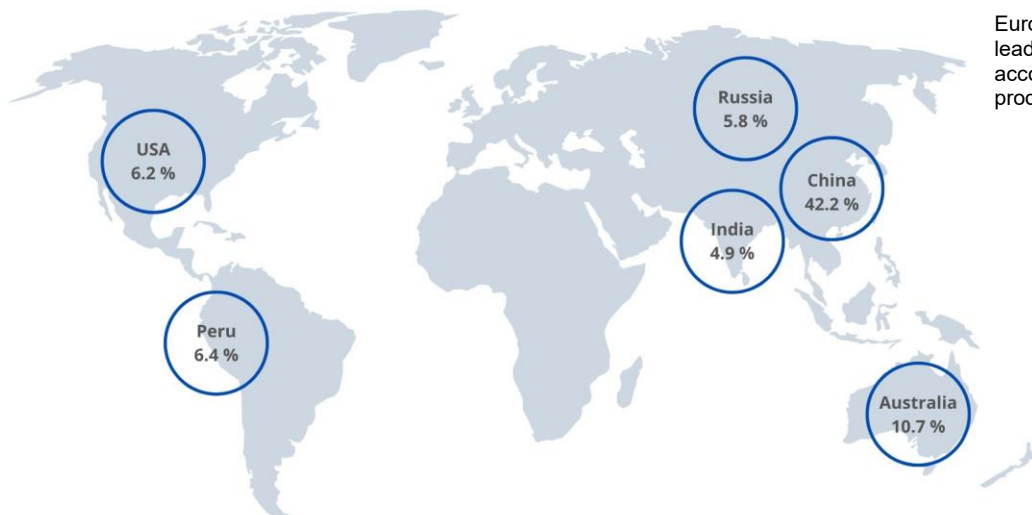
LEAD

A recyclable material with unique properties

Used by humans for more than 2,000 years, **lead is a naturally occurring metal** found in ores. Silver-grey in color with bluish reflections, it has physical properties that have made it an essential material in many industrial and technical applications.

Global production and consumption

Global mine production in 2025 amounted to approximately **4.5 million tons** (USGS), mainly distributed among the following regions:



Europe accounts for approximately 4% of global lead production. Sweden is the leading producer, accounting for nearly 38% of European production.

Global consumption of refined lead in 2025 is estimated at **13.25 million tons** (ILZSG - USGS).

Main consuming countries:

1. **China** (more than 40% of global demand)
2. **United States**
3. **India**
4. **South Korea**
5. **Japan**

French consumption is estimated at approximately **100,000 tons of lead per year, representing nearly 0.8%** of global consumption (13.25 Mt in 2025).

Main end-use sectors

End-use sector	Estimated share
Lead-acid batteries: automotive, energy storage, industry	≈ 85-90%
Chemicals, excluding batteries	≈ 2-4%
Alloys and cable sheathing	≈ 2-4%
Finished products: construction, nuclear, leisure, etc.	≈ 2-4%
Ammunition	≈ 2-3%

Over the centuries, lead has been used to manufacture water pipes, decorative objects, utensils and cosmetics, as well as paints in which its oxides were used as pigments and anti-corrosion agents.

Today, lead is used in the form of:

- **Shot and pellets for hunting, fishing or adjustable ballast;**
- **Sheets for roofing, radiation protection and sound insulation.**

As a finished product, lead can be cast, stamped and cut for industrial and technical applications (for example, **sealing lead and boat keels**). When alloyed with other elements, such as antimony, tin or calcium, lead is also used in **telecommunications, cables, connections and the chemical industry** (for example, in the manufacture of anodes).

It should be noted that global mine production (approximately 4.5 million tons) is significantly lower than refined lead consumption (13.25 million tons), because **a large proportion of the supply comes from recycling (66%!).** Worldwide, lead is one of the most extensively recycled metals.

A recyclable resource

Lead is a non-renewable mineral resource. However, it has a major environmental advantage:

it can be recycled virtually 100% and indefinitely!

Over several decades, a particularly efficient collection and recycling industry has developed, especially around lead-acid batteries, which are the main source of recycled lead.

Producing recycled lead requires approximately twice less energy than producing primary lead extracted from mines. Its low melting point (327°C) also helps reduce energy consumption during melting and processing operations compared with most other metals.

Recycling therefore makes it possible to:

- **Preserve mineral resources;**
- **Significantly reduce energy consumption;**
- **Reduce the carbon footprint.**

LEMER Foundry sources almost exclusively recycled lead from specialized refiners. This approach enables the company to reduce its carbon footprint by a factor of five compared with sourcing exclusively from mined lead production.



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Technical properties

Lead is a very dense metal that is particularly malleable and ductile. In its pure state, it has low mechanical strength but an excellent ability to deform.

Characteristics	Lead	Pb + 4%Sb	Steel	Aluminium
Density	11.35	11.05	7.50	2.70
Yield strength / tensile strength (MPa)	6 to 14	20 to 30	200 to 250	20 to 80
Melting point (°C)	327	302	1,534	660
Young's modulus (MPa) (stiffness)	14,000	16,000	210,000	69,000

Reminder: 1 MPa = 1 N/mm² ≈ 0.1 kg/mm².

Health and safety

In metallic form, lead is stable and only slightly soluble. The main risks arise from:

- Dust generated during mechanical operations;
- Fumes produced during melting;
- Lead oxides.

If **ingested** or **inhaled**, lead can cause **lead poisoning (saturnism)**, a condition associated with the **progressive accumulation** of lead in the body. The risk increases with the level and duration of exposure. Children are particularly sensitive because their nervous systems are still developing.

In industry, prevention relies on:

- **Medical monitoring** of employees;
- Regular **blood lead level testing** (twice a year);
- **Dust and fume extraction systems**;
- The use of **personal protective equipment**;
- **Strict hygiene measures** (showers, dedicated work clothing, industrial laundering of workwear, wastewater treatment, etc.).

The 2026 European Directive revises the blood lead level limits applicable to exposed workers.

Until 31 December 2028:
300 µg/L of blood for women et 400 µg/L of blood for men.

From 1 January 2029:
A single threshold of 150 µg/L of blood.

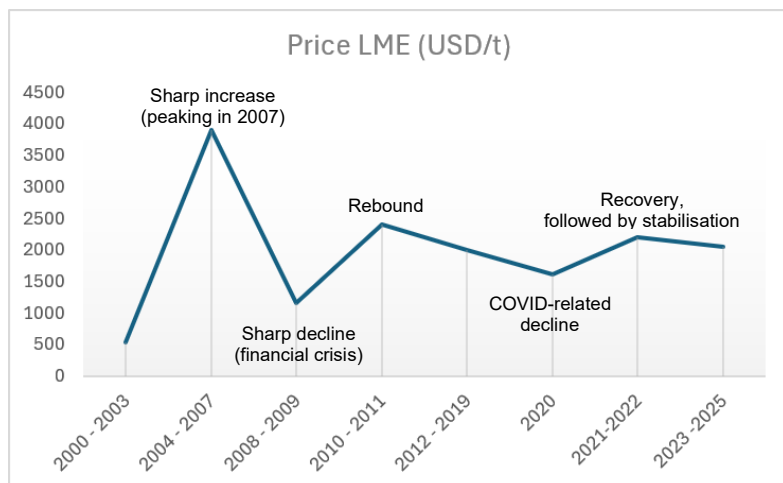
A few common misconceptions

“Lead-based” paints: The toxicity of old lead-based paints is mainly due to **lead oxides** (such as red lead, or minium), which were used as pigments. The danger arises when these paints deteriorate or are sanded, releasing dust that can be inhaled.

Old lead pipes: The gradual replacement of lead pipes follows the precautionary principle, with the aim of reducing potential sources of exposure. The risk was mainly associated with water that had remained stagnant in the pipes for several hours. In homes that were only occasionally occupied, simply running the water for a few minutes before drinking was generally sufficient to reduce this exposure. Plumbers were also a particularly exposed population during installation and repair work, which led to the gradual prohibition of new lead installations.

Lead shot: Lead poisoning: a case of mistaken identity! Lead used by hunters would not pose quite the same problem if our friend Saturnin did not mistake the pellets for small stones and ingest them while feeding. By its very nature, hunting lead becomes dispersed in the environment, particularly over wetlands, which are popular habitats for game.

Prix du plomb



In Europe, the benchmark price is the lead price quoted on the **London Metal Exchange (LME)**. A physical premium is then added to this price to cover processing, logistics and supply costs. Its amount depends on:

- The composition of the alloy (antimony, tin, copper, calcium, etc.);
- The availability of recycled materials;
- The required metallurgical quality.

Depending on the type of product and market conditions, this premium generally ranges from a few hundred euros to more than €1,000 per ton.

Since 2012, lead has been one of the least volatile base metals. Following the exceptional peak in 2007, its price fluctuated around **USD 2,000/t** for approximately the past fifteen years, with variations mainly driven by:

- Global demand, particularly from China;
- Economic cycles;
- Inventory levels and mine production;
- Environmental regulations.

For comparison, **London Metal Exchange (LME)** prices evolved as follows between 2012 and 2025:

Metal	Price range (USD/t)	Change
Lead	1,600-2,600	x1.6
Aluminium	1,450-4,100	x2.8
Zinc	1,450-4,600	x3.2
Tin	13,000-50,000	x3.9

This stability is mainly due to demand being largely driven by **lead-acid batteries** (accounting for approximately 85–90% of global consumption) and a **high recycling rate**, which helps limit imbalances between supply and demand.