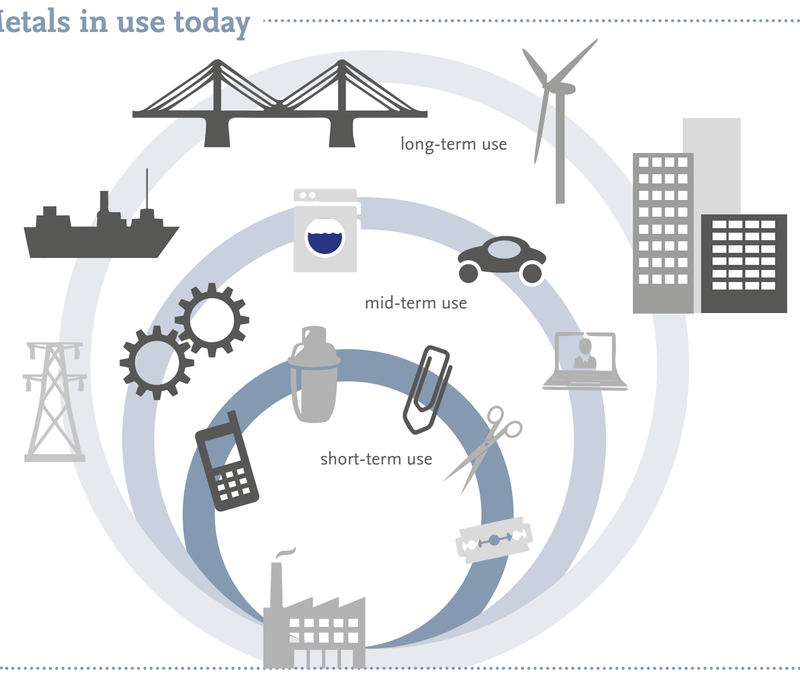
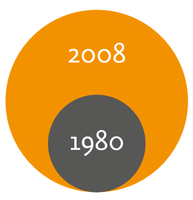
How metals determine our lives

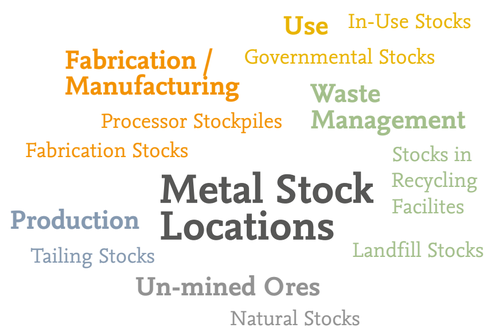
METALS DEMAND

Metals in use today



From **1980** until **2008** global metal demand increased by 87% **up to more than six billion** tonnes.





Trends suggest that if the populations in fast growing emerging economies are going to use a similar suite of technologies and lifestyles, global in-use metal stocks required would be 3-9 times those existing at present.

Drivers of the demand for metals

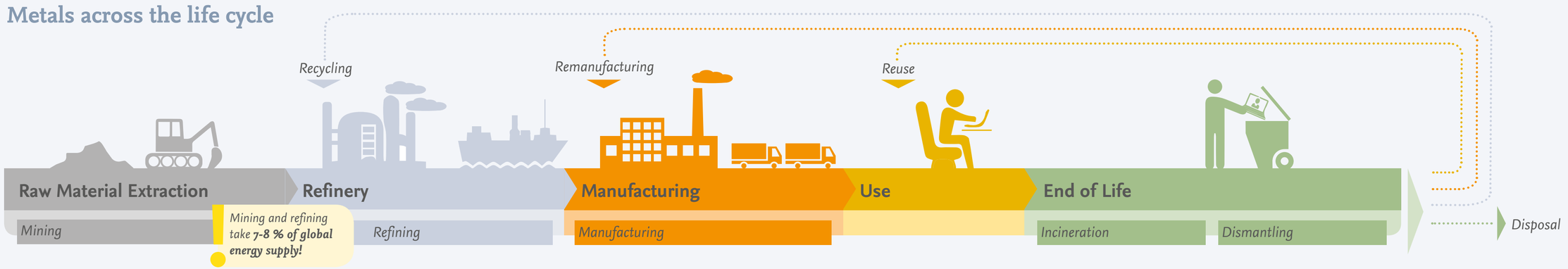
- Building-up of infrastructure
- Electronic revolution
- Shift towards renewable energy technologies

Results of the demand for metals

- Declining ore grades
- Resource scarcity and price hikes
- Environmental impact

LIFE CYCLE OF METALS

Metals across the life cycle



Environmental impacts related to metal flows

Air pollution

e.g. Greenhouse gas emissions are generated during production of various metals including copper, aluminium, nickel and zinc.

Land degradation

e.g. Land clearing, and erosion lead to degradation; Potential to contaminate soils; Impacts on land scenario due to open pits and mine waste.

Biodiversity loss

e.g. Loss of species; Degradation of landscape and ecosystems.

Water pollution

e.g. Large consumption in mining and production can impact groundwater and surface water resources; Direct discharge of contaminated water; Seepage from ponds, tailings dams, or mine wastes.

Impact on human health

e.g. Metals enter the food web via plant uptake; Bio-accumulation may lead to a high intake in animals and humans at the top of the food chain.

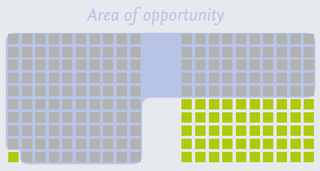
RECYCLING

Recycling Chain

All steps in the recycling chain **are relevant** for the overall recovery efficiency.

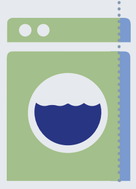
Recycling is an Opportunity

Energy savings for secondary compared to primary production are reported to range from **60-75% for steel** and **over 90% for aluminium**.



95% of a washing machine is made of **bulk materials** such as steel, stainless steel, plastics, glass and copper.

Electronic components (special and precious metals) amount to **less than 5%**.



Mass-based recycling targets often **neglect electronic components.** However, they contain specialty and precious metals. Their **recovery should be increased**. Recycling targets should be refined using a **Product-Centric approach**.

Product-Centric Approach

How can we use a product as a resource?

The Product-Centric approach takes the multi-material composition of modern products into account.

The Product-Centric approach answers the question of how to best recycle a product in order to achieve maximum resource efficiency.

Less waste!

More recovery!

Limits of Recycling

- Lack of basic recycling infrastructure and technology in many developing countries.
- New and complex applications of metals at mass production scales.
- Too much valuable metal today is lost because of imperfect collection of end-of-life products.

WAY FORWARD

Policy options for sustainable metal management

Reduce impact of mining by greening the global primary metal sector:

- Enforce environmental impact assessment and environmental monitoring in all phases.
- Strengthen advanced mining concepts and the use of best available technology (BAT) through multilateral agreements.

Support sustainable production:

- Conduct Life-Cycle Assessment (LCA) as an essential strategy of sustainable metals management.
- Support recycling friendly product design.
- Enhance technology transfer, accelerated by international recycling conferences, technological implementation programmes in emerging economies and developing countries.

Support enabling framework:

- Enhance government support for data acquisition and analysis, recycling technologies research and other research, and development efforts is thus a priority.
- Introduce appropriate legislative framework; and continuous improvement of legislative systems.
- Increase consumer awareness.
- Promote multidisciplinary systemic education approaches, research and development.

Improve recycling as key to sustainable metals management:

- Promote recycling based on best available technology (BAT).
- Build technological capacity and infrastructure on metallurgy to improve recycling rates.
- Promote higher end-of-life recycling rates of metals by supporting the development of necessary infrastructure, especially optimized collection schemes.

SOURCES & CONTACT

This document highlights findings from the reports on metals and should be read in conjunction with the full reports. References to research on which this infographic is based are listed in the full reports:

- UNEP (2013): Metal Recycling: Opportunities, Limits, Infrastructure.
- UNEP (2013): Environmental Risks and Challenges of Anthropogenic Metals Flows and Cycles.
- UNEP (2011): Recycling Rates of Metals: A Status Report.
- UNEP (2010): Metal Stocks in Society: A Scientific Synthesis.

The International Resource Panel was established in 2007 to provide independent, scientific assessment on the sustainable use of natural resources and the impacts of resource use over the full life cycle.

www.unep.org/resourcepanel

UNEP

International Resource Panel