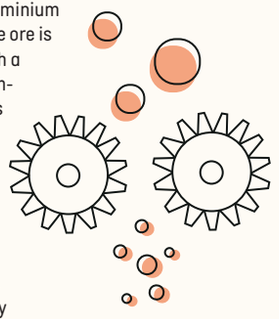
MATERIAL FLOW
- Aluminium

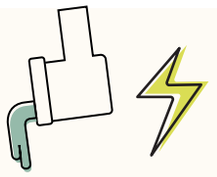
1 BAUXITE MINING

Bauxite ore, the primary raw material for aluminium production, is typically mined in tropical and subtropical regions like Australia and Brazil. Bauxite mining involves removing topsoil and using heavy machinery, can lead to deforestation and habitat loss.

2 ALUMINA PRODUCTION

To extract alumina (aluminium oxide) from bauxite, the ore is crushed and mixed with a strong base at high temperatures. This process produces alumina and a byproduct called red mud. As of today, red mud recycling is rather uncommon, leading to the need of large storage capacity. Due to its high alkalinity and heavy metal content it poses environmental risks when spilled into natural ecosystem.





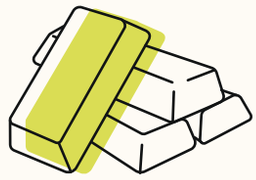
SMELTING 3

Alumina is converted into aluminium through an energy-intensive smelting process, where it is melted and subjected to an electric current. This step relies heavily on electricity, often from fossil fuels, greatly contributing to aluminium's high carbon footprint.

Melting: Gives a liquid out of a solid substance. Occures at the melting point of a substance.
Smelting: Done at temperatures beyond the melting point of ore. Gives a pure element or simple compound from an impure ore.

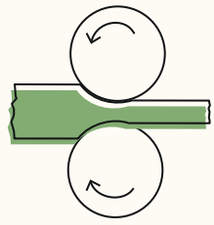
4 CASTING

The liquid aluminium is poured (or cast) into forms often called ingots. The ingots cool, solidify and can be sent for further manufacturing.



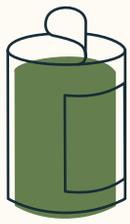
5 ROLLING & FORMING

In rolling, ingots are passed through rollers to create thin sheets. In extrusion, aluminium is formed into complex shapes for specific uses.



6 MANUFACTURING

Aluminium products are shaped into final forms such as car parts, window frames, electronics, furniture and packaging.

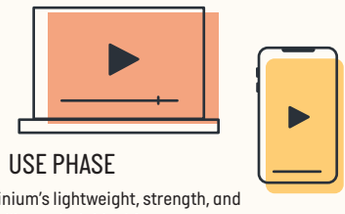


7 FINISHING

Surface treatments like coating improve the durability and appearance of aluminium products.

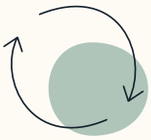
8 USE PHASE

Aluminium's lightweight, strength, and durability make it ideal for construction, transportation, packaging, and electronics.



9 RECYCLING & END-OF-LIFE

Aluminium can be recycled endlessly without quality loss. Recycling reduces the need for primary aluminium and lowers both costs and environmental impact.



MÅLBAR

MATERIAL FLOW - Ceramics

1 CLAY MINING

Clay contains clay minerals which are fine-grained components of soil and can be found and mined almost all over the world. Clay mining involves removing topsoil, using heavy machinery, and can lead to deforestation and habitat loss.

2 MIXING

Clay is mixed with water and sometimes additives to achieve the desired plasticity and consistency.

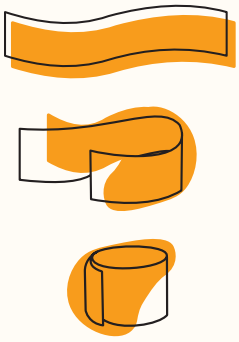
3 FORMING

Ceramics can be brought into shape in different ways depending on the degree of manual labour and desired product. The two most traditional ones are hand-building, and throwing.

In *hand-building* the clay is shaped solemnly by using hands and fingers. Techniques include coiling, slab construction and pinching.

Coiling: forming 'worms', adding them up and forming a vase or similar:

Slab construction: forming 'sheets' that are brought together:



In *throwing*, the clay is placed on a rotating potter's wheel and shaped into bowls or vases using hands, fingers, or tools. More advanced techniques are for instances moulding, where the clay is pressed into moulds for uniform designs, or slip casting, where the liquid clay (also called slip) is poured into plaster moulds.

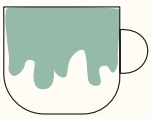
4 DRYING

The shaped clay is left to air-dry slowly to remove moisture. This prevents cracks during firing. When it reaches the "bone-dry" stage, it's fragile and ready for firing.

5 BISQUE FIRING

The first firing in a kiln takes place at temperatures around 900–1000°C. It removes remaining moisture and further hardens the item.

6 GLAZING



A glaze (a mix of silica, fluxes, and colourants) is applied to the bisque-fired piece using brushing, dipping, or spraying. The glaze provides a smooth, often glossy finish and makes the ceramic waterproof. Some glazes contain heavy metals (e.g. lead, chromium), which can leach into the environment if not properly managed.

7 GLAZE FIRING

After the glazing, the pieces get fired a second time. This time at higher temperatures (typically 1200–1400°C). The glaze fuses to the surface and vitrifies the clay.

8 FINISHING

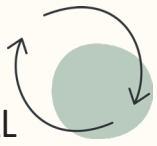
The cooled ceramic may undergo polishing, sanding, or decorative enhancements (e.g., painting or decals).

9 TRANSPORT

The finished ceramic gets packaged and shipped to stores and final costumers.

10 USE PHASE

Ceramics are typically used as plates, mugs, bowls, or vases. The impact from the use phase of such products lie in the cleaning of them.



11 DISPOSAL

Ceramics are non-biodegradable and non-combustible. If they end up in a waste incineration plant, the combustion of the glaze can result in the release of toxic substances causing air pollution. One way to recycle ceramics is to crush it and use it as aggregate in construction materials (e.g. in concrete or road base). Otherwise, ceramics typically end up in landfills.

MÅLBAR

MATERIAL FLOW
- Electronics

1 EXTRACTING RAW MATERIAL

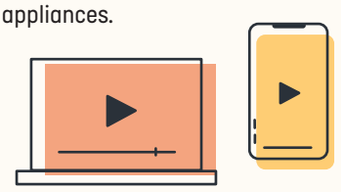
Electrical products are made from various materials, primarily metals (e.g., copper for wiring, gold for circuit boards), plastics (for insulation), and glass (for displays). Metals are mined and refined, plastics come from petroleum or recycling, glass from silica, and silicon from quartz for semiconductors. Chemical treatments enhance properties.
Most electrical devises contain at least one printed circuit board (PCB), which connects and supports components. PCBs vary in complexity (single, double, or multi-layer) but generally consist of a non conductive layers with conductive copper circuits. These materials and processes form the foundation of modern electronics.

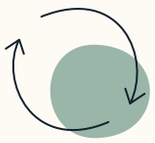
2 PRODUCTION PHASE

In production, both PCB assembly and final product assembly take place. Key PCB assembly steps include applying solder paste, placing components, reflow soldering, and final inspection, testing, and cleaning – placing components, soldering, cleaning, testing and final inspection. Once all components are ready, they are assembled into the final product (e.g., a phone).

3 USE PHASE

The biggest impact of electronics can come from the use phase, if the product consumes an amount of electricity during its life which is larger than its amount of materials and production. This is often the case for white goods and other electrical appliances.





4 RECYCLING AND RECOVERY

In the EU, the WEEE (Waste from Electrical and Electronic Equipment) directive requires producers to pay the electrical product recycling. However, despite intensive research for many years, non-metal recovery is low or does not take place and metals are only partially recovered, highlighting the challenge of achieving high-quality recycling.

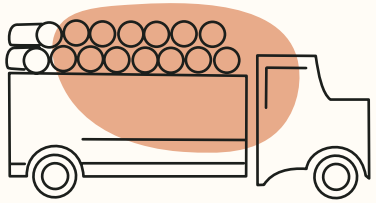
MATERIAL FLOW - Solid wood

1 FORESTRY MANAGEMENT

Thinning and logging describe activities which promote growth of selected trees and log individual ones.

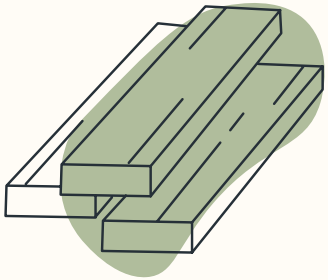
2 TRANSPORT

Harvested logs are cut up in smaller trunk lengths and left to dry naturally at the roadside for some time before being transported to sawmills and dryed further.



3 SAW MILLING AND DRYING

Logs are debarked and cut into rough sawn lumber using large saws or band saws. Lumber is dried to the desired moisture content.

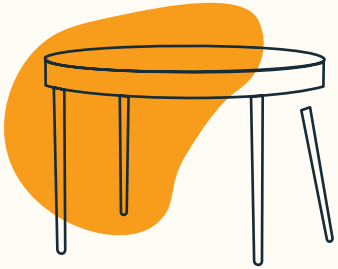


4 TRANSPORT TO MANUFACTURERS

Lumber is transported to various manufacturing facilities where it will be transformed into finished products.

5 MANUFACTURING OF FINISHED PRODUCTS

Basic intermediate materials like beams, planks and solid wood boards are planed. Finished goods such as furniture components are manufactured.



6 DISTRIBUTION & RETAIL

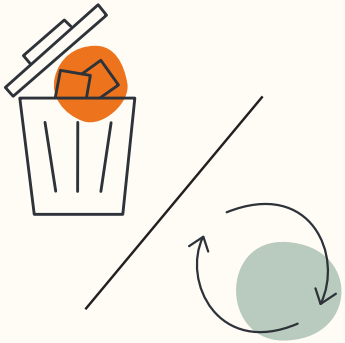
Intermediate wood materials and finished solid wood products are distributed to wholesalers, retailers, and other intermediaries. Products are sold to end consumers through retail.

7 END CONSUMER

The finished wood products are used for various purposes, including home construction, renovation, furniture, and other applications.

8 END-OF-LIFE & RECYCLING

Solid wood products will usually be reused, recycled, used for energy recovery or landfilled.

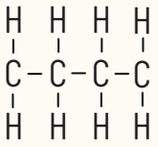


MÅLBAR

MATERIAL FLOW
- Plastic

1 EXTRACTING RAW MATERIAL

Plastics are primarily derived from petrochemicals, which are obtained through the extraction of crude oil or natural gas.
These raw materials are processed to produce monomers, such as ethylene and propylene.



2 POLYMERISATION*

Monomers undergo chemical reactions to form polymers, creating different types of plastic materials (e.g., polyethylene, polypropylene).
Additives may be mixed in to enhance properties such as strength, flexibility, or colour.

3 MANUFACTURING

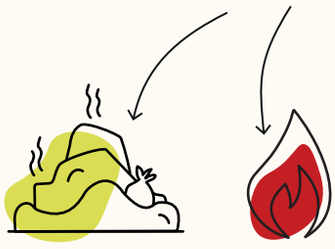
The plastic polymers are melted and shaped into various products through processes like injection moulding, extrusion, blow moulding, or thermoforming.
These products can range from packaging materials and household items to automotive parts and electronics.

4 DISTRIBUTION AND USE

Finished plastic products are distributed to consumers and industries.
These products are used for various durations depending on their purpose (e.g., single-use packaging vs. durable goods).

5 WASTE GENERATION

After use, plastic products enter the waste stream. Ideally, they are collected for recycling. However, depending on local waste management systems and due to contamination or mixed materials, they may also be disposed of in landfills or incinerated.



6 RECYCLING AND RECOVERY

Collected plastics are sorted, cleaned, and processed into new materials or products.
Mechanical recycling involves melting and remoulding plastics, while chemical recycling breaks them down into monomers for re-polymerisation.

Plastics are more easily recyclable when they are not mixed with other materials

*Polymerisation basically means to glue single molecules together so that they form chains

MÅLBAR