



**PRECIOUS METAL RECOVERY**  
**FROM e-WASTE & i-WASTE**



ITALIMPIANTI ORAFI



## WHAT IS e-WASTE?

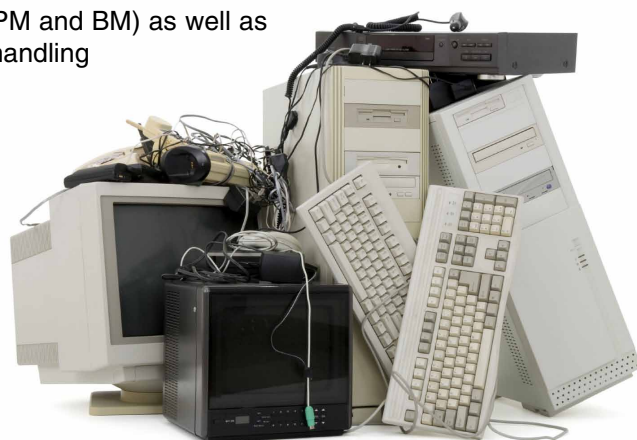
E-waste for short - or Waste Electrical and Electronic Equipment (WEEE) - is the term used to describe old, end-of-life or discarded electrical appliances.

In this catalogue, "e-waste" is used as a generic term embracing all types of waste that consists of electrically powered components containing Precious Metals (PM) or Base Metals (BM).

E-Waste contains both valuable materials (PM and BM) as well as hazardous materials which require special handling and recycling methods.

Some examples :

- Information and communication equipment
- Entertainment and consumer electronics
- Medical Instruments and equipment



## AND i-WASTE?

i-Waste – or Industrial Waste – is a term used to describe those materials produced with various industrial manufacturing process that , as with e-Waste, contain Precious Metals (PM) or Base Metals (BM) .

Some examples are :

- Luxury & artistic goods
- Automotive industry (i.e. catalysts)
- Oil and petroleum industry (HCR and CCR)

## WHY RECYCLE e-WASTE & i-WASTE?

Electronic appliances and industrial products are composed of hundreds of different materials that can be both toxic but also of **high economic value**. While bulk materials such as iron, aluminium, plastics and glass account for over 80 weight %, valuable materials are found in smaller quantities but are still of high importance.

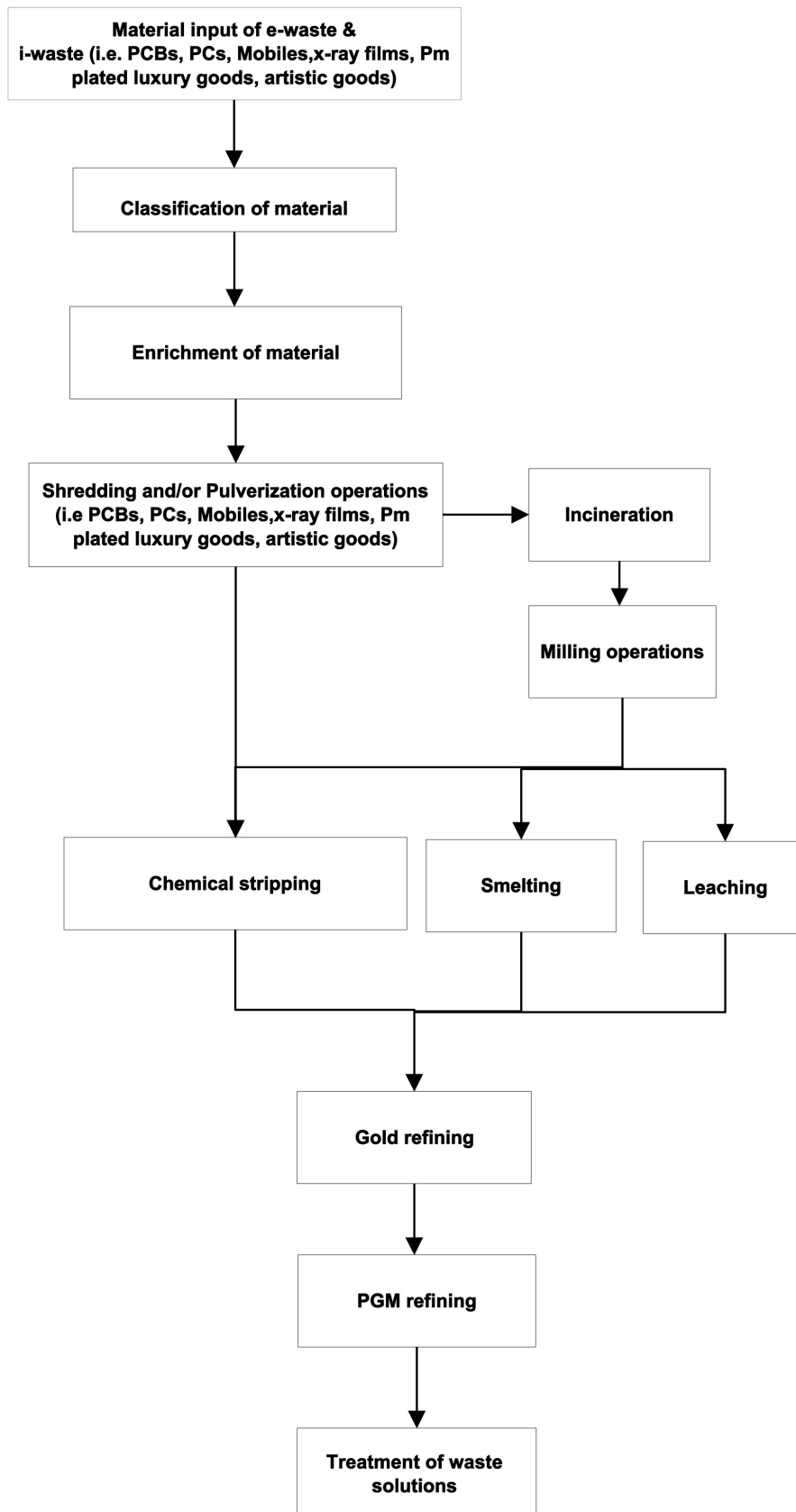
Gold, silver, copper, platinum etc. are just some of the valuable substances which turn recycling of e-waste and i-waste into a **lucrative business opportunity**.

## e-WASTE &i-WASTE RECYCLING PROCESSES

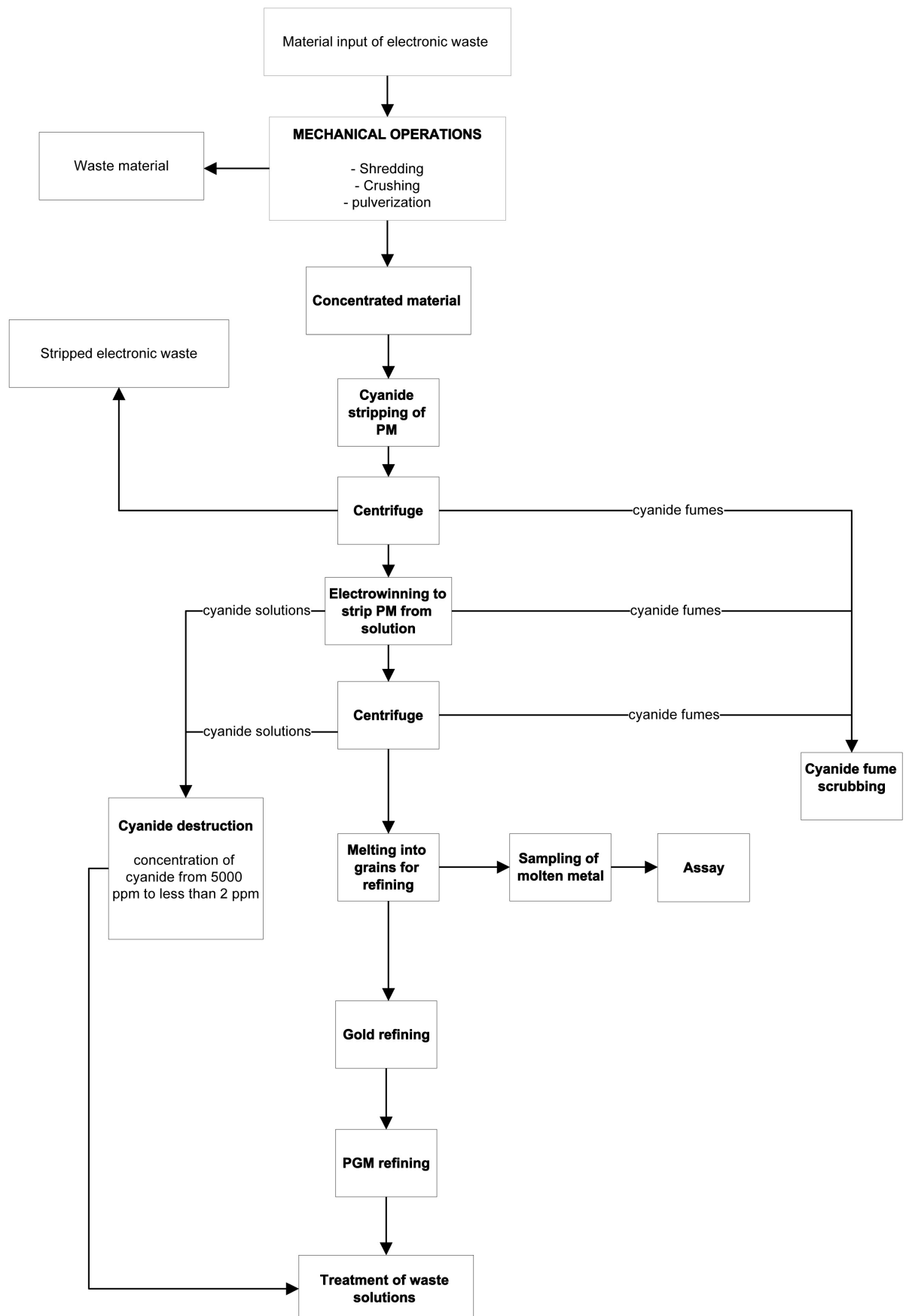
The selection of the recycling process depends on three main factors :

- Type of material and its complexity
- Metal Content
- Volume

# PROCESS FLOW CHART FOR RECYCLING OF e-WASTE & SAMPLE i-WASTE MATERIALS

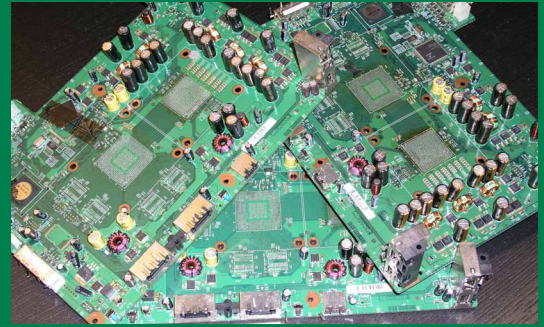


## EXAMPLE OF POSSIBLE PROCESS FLOW CHART FOR RECYCLING OF e- WASTE



## CLASSIFICATION

The initial step in the recycling and recovery process is to classify, evaluate and separate the type of material according to metal content and recoverability.



## ENRICHMENT

The next step in the recycling process is the removal of critical components from the e-waste in order to avoid dilution of and / or contamination with toxic substances during the downstream processes.

## MECHANICAL PROCESSING

Mechanical processing is the next step in e-waste treatment, normally an industrial large scale operation to obtain concentrates of recyclable materials in a dedicated fraction and also to further separate hazardous materials. Typical components of a mechanical processing plant are crushing units, shredders, magnetic- and eddy-current- and air-separators. The gas emissions are filtered and effluents are treated to minimize environmental impact.



## CHEMICAL STRIPPING

The chemical stripping of precious metals from e-waste or i-waste material normally requires acids, usually cyanide. The secure handling of these substances is extremely critical – Italmimpianti Orafi has therefore designed units to reduce all environmental and safety hazards to a minimum, including cyanide neutralisation and treatment installations. Chemical stripping agents work on the surface of the material being treated and basically strip the metal surface content into solution. Embedded metals e.g. in components or inter-board layers are not reached unless the material is finely milled.



## REFINING

The subsequent step of e-waste recycling is refining. Refining of resources in e-waste is possible and technical solutions exist to get back raw with minimal environmental impact.

Most of the fractions need to be refined or conditioned in order to be sold as secondary raw materials.

## INCINERATION

Incineration is the process of destroying waste through burning. Because of the variety of substances found in e-waste, incineration can be associated with a major risk of generating and dispersing contaminants and toxic substances. The gases released during the burning and the residue ash are often toxic.

In view of this, Italmimpianti Orafi designs incineration plants to specifically avoid risks to the environment by incorporating state-of-the-art technologies for real-time process analysis and automatic fume treatment, thus meeting EP requirements as stated by the majority of EPA regulators worldwide.



## MILLING OPERATION

The milling operations are a step in the recycle process, subsequent to the incineration process, in which the resulting materials are crushed to a fine powder.

## SMEETING



The smelting process is used to separate precious metals (PM) and base metals (BM) from inert material residues from the incineration process.

High temperature melting furnaces are used in conjunction with special melting fondents.

## LEACHING

Leaching operations are very similar to chemical stripping, as previously mentioned. Leaching agents work on the surface of the material being treated and basically strip the metal surface content into solution. Embedded metals e.g. in components or inter-board layers are not reached unless the material is finely milled.

## COST ANALYSIS

There are several key factors used to analysis the cost effectiveness of recycling e-waste and i-waste materials :

- Initial contents of precious metals
- Local manpower costs
- Electricity costs
- Chemicals
- PM recovery rate and efficiency
- Equipment investment costs
- Other costs like transportation, warehousing, Marketing, Sampling etc



## BENEFIT OF ITALIMPIANTI ORAFI TECHNOLOGY

1. Italimpianti Orafi is able to provide a turn-key close loop process which includes recovery and refining of all precious metals like gold, silver, platinum and palladium (including rhodium & ruthenium)

2. Italimpianti studies the products' metallurgy and can customize the recovery process to suit to clients' needs

3. Italimpianti Orafi is able to committ to the close loop environmental process which can comply with WEEE, EPA or any other international regulations

- Best Available Chemical Technquies
- Close Loop Process
- Comply with all environmental regulations
- High performance and better returns
- Transparent and 100% accountable
- Enviornmental friendly etc.



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