

Title of Technology to be offered	A process for the recovery of metal values from waste printed circuit boards
Type of Technology	A process flow sheet for physical separation of metals from plastic in the pulverised electronic waste
Area of Technology	Waste recycling
Details of Collaborating Agency	Department of Information Technology
Uses	Electronic waste processing, recycling and reuse
Salient Features	<ul style="list-style-type: none"> • The components in e-waste containing metals are shredded and pulverized. The metals are separated from the plastics in the particulate mass using a series of physical processes. • The process does not require specialized and sophisticated equipment for processing of waste printed circuit boards. All equipment and machinery required are standard and readily available worldwide. • The natural hydrophobicity of non-metallic constituents is effectively exploited by wet flotation process • A continuous operation at plant level will be able to minimize the loss of ultrafine metal values to a negligible level. • The operation is simple and the overall processing cost is low as only inexpensive, physical separation processes are used. • The techniques used are purely physical in nature and thus generate no additional harmful effluents. • Enables the recovery of both the metallic and non-metallic constituents separately. • Very little or no chemicals are used and therefore the cost effectiveness of the process is improved.
Scale of Development	About 1.0 ton scale.
Major Raw Materials	Scrap computers, end-of-life TV sets and mobile phone handsets
Major Plant Equipment/Machinery	Shear/Shredding machine, Ball mill, Classifier, Gravity concentrator, Flotation cell, High tension separator
Details of specification application	The raw materials need to be ground to -1.0 mm in size. The pulverized particle mass is then treated using a series of physical separation methods to exploit the differences in the physical properties of the metals and the plastics. These are wet processes in the initial part of the flow sheet while the later processes are dry processes with a drying step in between. The application is essentially in the recycling of electronic waste.

Status of Development	Completed
Ecological/Environmental Impact (if any, specify briefly)	A combination of wet and dry processes is used. Initial wet processes eliminate the dust problem. After removal of a large amount of plastics in the fine form dry processes are employed. The water is recycled after dewatering stage. The unit operations are physical processes and no chemicals are used. No adverse effect on environment.
Patenting details	Patent filed in 2008
Commercialisation Status	Not commercialised
Key words	Electronic waste, Waste recycling, Physical separation, Metal recovery