

The Complete Technology Book on E-Waste Recycling (Printed Circuit Board, LCD, Cell Phone, Battery, Computers) 3rd Revised Edition

Author: NPCS Board of Consultants & Engineers

Format: paperback

Code: NI288

Pages: 360

Price: Rs 1975 | US\$ 150

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Shipping: 5 days

About the Book

Electronic waste or e-waste describes discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling or disposal are also considered as e-waste. With advancements in the electronic world almost occurring on a day-to-day basis and increased availability of products to the public, it is not surprising to see a staggering increase in the generation of electronic wastes over the past decade. The e-waste now represents the biggest and fastest growing manufacturing of wastes with as high as about 40 million tons a year at the global level. All these things lead to an increase in E-waste generation in the country.

Electrical and electronic equipment contain different hazardous materials which are harmful to human health and the environment, if not disposed of carefully. Due to the lack of awareness for e-waste recycling in emerging economies, innovation hubs and centres of excellence have not yet been established. This has led to the requirement of a proper disposal and recycling system so that environmental pollution and health hazard is reduced. We have tried to give information in this book which will help in minimizing this ever growing problem.

Today the electronic waste recycling business is in all areas of the developed world a large and rapidly consolidating business. This recycling is done by sorting, dismantling, and recovery of valuable materials. This diversion is achieved through reuse and refurbishing.

This book aims at providing a thorough understanding and analysis of the E-Waste in the wake of evolving market dynamics. The book describes E-waste rules by Ministry of Environment and Forests. The book discusses the overview of the E-Waste Recycling along with their Classification, Composition, Recycling Process of different products and effects of E-waste on environment and human health. Also it contains suppliers contact details of plant & machinery with their photographs.

The book covers E-waste Recycling- An Introduction, Overview of WEEE/E-Waste Management, Hazardous Materials in E-Waste, E-Waste Management System Specifications, Recycling of E-Waste, Recycling of Printed Circuit Board, Recycling of Liquid Crystal Display, Cell Phones Recycling, Battery Recycling, Computer Recycling, Restriction of Hazardous Substances Directive and Environmental Aspects.

It will be a standard reference book for Professionals, Decision-makers, Engineers, those Studying and Researching in this important area and others interested in the field of E-Waste Recycling. Professionals in academia and industry will appreciate this comprehensive and practical reference book, due to its multidisciplinary nature.

Contents

1. E-WASTE RECYCLING--AN INTRODUCTION

Composition of E-Waste

Components of E-Waste

Status of E-Waste in India

SWOT Analysis

SWOT Analysis of E-Waste Management

E-Waste Legislation in India

The Hazardous Waste (Management and Handling) Rules, 2003

The Hazardous Waste (Management, Handling and Trails boundary Movement) Rules, 2008

Guideline for Environmentally Sound Management of E-Waste, 2008

The E-Waste (Management and Handling) Rules, 2011

Loopholes in Legislations

Integrated Product Policy

Sustainable Development

2. OVERVIEW OF WEEE/E-WASTE MANAGEMENT

Introduction

Mechanism of WEEE/E-waste Trade

WEEE/E-waste Life Cycle

WEEE/E-Waste Material Flow Model

Phase I

Phase II

Phase III

Phase IV

Components of WEEE/E-waste Management

Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union

Obligations of the Producer under the WEEE

Barriers to Recycling of WEEE

WEEE Health and Safety Implications

3. HAZARDOUS MATERIALS IN E-WASTE

Valuable Materials in E-Waste

Possible Hazardous Substances Present in E-Easte

Component Possible Hazardous Content

Glycol, Other Unknown Substances

Plastics Containing Brominated Flame Retardants (BFRs)

Insulation

Asbestos

Refractory Ceramic Fibers (RCFs)

Liquid Crystal Display (LCDs)

Components Containing Plasticisers/Stabilizers

Circuit Boards

Flame Retardants

Lead

Mercury

Beryllium

Capacitors

Electrolyte Capacitors

Capacitors Containing Poly Chlorinated Biphenyls (PCBs)

4. E-WASTE MANAGEMENT SYSTEM SPECIFICATIONS

Tentative Specifications for E-Waste Collection System

Tentative Specifications for E-waste Treatment System
Manual E-Waste Dismantling/Treatment Plant
Semi-Automatic E-Waste Dismantling/Treatment Plant
Automatic E-Waste Dismantling/Treatment Plant
Common Specifications for Utilities at Collection Centers and Processing Facilities

5. RECYCLING OF E-WASTE

Individual Processes
Crushing/Diminution
Size Classification
Magnetic Separation
Density Separation
Eddy Current Separation
Electrostatic Separation
Outputs and Markets
Metals
Glass
Plastics
Emerging Recycling and Recovery Technologies
Automated Disassembly
Comminution
Separation
Thermal Treatments
Hydrometallurgical Extraction
Dry Capture Technologies
Biotechnological Capture
Sensing Technologies
Design for Recycling and Inverse Manufacturing
E-Waste Segregation and Disposal Method
Structure and Main Steps in the Recycling Chain
Structuring of the Recycling Chain

6. RECYCLING OF PRINTED CIRCUIT BOARD

Composition of Printed Circuit Board
Characteristics of PCB Scrap
Density Differences
Magnetic and Electrical Conductivity Differences
Polyformity
Liberation Size
Chemical Reactivity
Electropositivity
Materials
Fabrication Process for Printed Circuit Process (PCB)
Mechanical Recycling Process of Printed Circuit Boards (PCBs)
PCB Recycling of the Metal Fraction
Pyrometallurgy
Hydrometallurgy
Biometallurgy
Challenges and Future Trends
Dismantling
Recovery of Copper and Precious Metals
Recycling and Recovery of the Non-Metallic Materials

7. RECYCLING OF LIQUID CRYSTAL DISPLAY



Composition and Characterisation of LCDs
 Barriers to Recycling of LCDs
 Recycling Processes for Liquid Crystal Displays (LCDs)
 Manual Disassembly
 Manual Disassembly Processing for LCDs
 Automated Processes for LCD Recycling
 Automated Disassembly Processes for LCDs
 Hazardous Materials in Liquid Crystal Displays (LCDs)
 Environmental Concerns of LCD
 Loss of Light Energy
 Hazardous Chemical
 Hazardous Gases
 Mercury Accumulation in End-of-Life Products
8. CELL PHONES RECYCLING
 A Cell Phone Contains Just a Few Individual Parts
 Harmful Substances in Mobile Phones
 Cadmium
 Lead
 Lithium
 Mercury
 Process Overview
 Collection and Transportation
 Pre-Processing
 Reuse of Phones
 Reuse of Components
 Recycling of Materials
 I. Pre-treatment
 II. Copper Recovery
 III. Precious Metals Recovery
 IV. Recovery Rate
9. BATTERY RECYCLING
 Main Processing Routes
 Pyrometallurgical Route
 Hydrometallurgical Route
 Metallurgical Aspects of Lead Recycling from Battery Scrap
 Technical Steps in Battery Recycling
 Dismantling of Battery Cases and Feed Preparation
 Melting and Reduction Operation of Paste and Battery Fines
 Melting of Grids, Terminals and Bridges
 Refining of Crude Lead
 Gas Cleaning System
10. COMPUTER RECYCLING
 Composition of Computer
 Recycling Process of Computers
 Collection
 Sorting, Processing and Reuse in Production
 Removing the Large Objects
 Test for Potential Reuse
 Manual Disassembly
 Separation into Material Composition
 Disposal of Non-Recyclable Parts

Purchase of Products Made of Recycled Materials

11. RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

RoHS Compliance

The RoHS Directive and Proscribed Materials

RoHS Proscribed Materials

Lead

Brominated Flame Retardants

Cadmium, Mercury and Hexavalent Chromium

Benefits ROHS

Health Benefits

Reliability Concerns Unfounded

Flow Properties and Assembly

Some Exempt Products Achieve Compliances

12. E-WASTE RULES BY MINISTRY OF ENVIRONMENT AND FORESTS

Modified Draft Notification

General

Responsibilities

Procedure for Seeking Authorization and Registration for Handling E-wastes

Procedure for Registration with State Pollution Control Board

Reduction in the Use of Hazardous Substances (ROHS) in the Manufacture of Electrical and Electronic Equipment

Miscellaneous

Schedule-I

Schedule-II

Schedule-III

13. ENVIRONMENTAL ASPECTS

Effects on Environment and Human Health

Pollutants in E-Waste

Impact of Hazardous Substances on Health and Environment

Dealing with E-Waste

Management Options to Severity of the Problem

Responsibilities of the Government

Responsibility and Role of Industries

Responsibilities of the Citizen

Need for Stringent Health Safeguards and Environmental Protection Laws in India

14. ADDRESSES OF PLANT AND MACHINERY SUPPLIERS

15. PLANT AND MACHINERY PHOTOGRAPHS

16. PLANT LAYOUT AND PROCESS FLOW SHEET DIAGRAM

NIIR PROJECT CONSULTANCY SERVICES (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General

Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes varies process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

NIIR PROJECT CONSULTANCY SERVICES, 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** npcs.india@gmail.com **Website:** NIIR.org