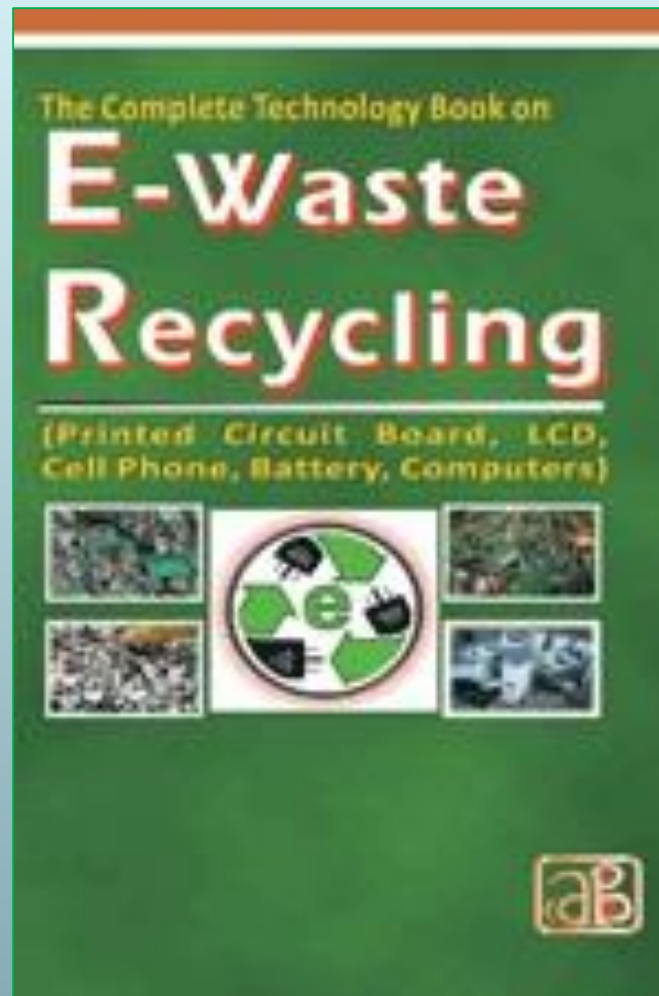


E-Waste Recycling

*(Printed Circuit Board, LCD,
Cell Phone, Battery, Computers)*



www.entrepreneurindia.co



Information about the Book

- Title:** The Complete Book on E-Waste Recycling
(Printed Circuit Board, LCD, Cell Phone, Battery, Computers)
- Author:** NPCS Board of Consultants & Engineers
- Format:** Hard Cover
- ISBN:** 978-81-7833-157-7
- Code:** ENI288
- Pages:** 355
- Published:** 2015
- Publisher:** Asia Pacific Business Press Inc.

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 leads 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.

Table of 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

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-Waste

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

The background is a light blue gradient with several white butterfly silhouettes of various sizes scattered across it. The text is centered in the upper half of the image.

Visit us at

www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #Street View

<https://goo.gl/VstWkd>

NIIR PROJECT CONSULTANCY SERVICES

An ISO 9001:2008 Company

Who are we?

- One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services
- We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad

What do we offer?

- Project Identification
- Detailed Project Reports/Pre-feasibility Reports
- Market Research Reports
- Technology Books and Directory
- Databases on CD-ROM
- Laboratory Testing Services
- Turnkey Project Consultancy/Solutions
- Entrepreneur India (An Industrial Monthly Journal)

How are we different ?

- We have two decades long experience in project consultancy and market research field
- We empower our customers with the prerequisite know-how to take sound business decisions
- We help catalyze business growth by providing distinctive and profound market analysis
- We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors
- We use authentic & reliable sources to ensure business precision

Our Approach

Requirement collection



Thorough analysis of the project



Economic feasibility study of the Project



Market potential survey/research



Report Compilation

Who do we serve?

- Public-sector Companies
- Corporates
- Government Undertakings
- Individual Entrepreneurs
- NRI's
- Foreign Investors
- Non-profit Organizations, NBFC's
- Educational Institutions
- Embassies & Consulates
- Consultancies
- Industry / trade associations

Sectors We Cover

- Ayurvedic And Herbal Medicines, Herbal Cosmetics
- Alcoholic And Non Alcoholic Beverages, Drinks
- Adhesives, Industrial Adhesive, Sealants, Glues, Gum & Resin
- Activated Carbon & Activated Charcoal
- Aluminium And Aluminium Extrusion Profiles & Sections,
- Bio-fertilizers And Biotechnology
- Breakfast Snacks And Cereal Food
- Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling

Sectors We Cover *Cont...*

- Bamboo And Cane Based Projects
- Building Materials And Construction Projects
- Biodegradable & Bioplastic Based Projects
- Chemicals (Organic And Inorganic)
- Confectionery, Bakery/Baking And Other Food
- Cereal Processing
- Coconut And Coconut Based Products
- Cold Storage For Fruits & Vegetables
- Coal & Coal Byproduct

Sectors We Cover *Cont...*

- Copper & Copper Based Projects
- Dairy/Milk Processing
- Disinfectants, Pesticides, Insecticides, Mosquito Repellents,
- Electrical, Electronic And Computer based Projects
- Essential Oils, Oils & Fats And Allied
- Engineering Goods
- Fibre Glass & Float Glass
- Fast Moving Consumer Goods
- Food, Bakery, Agro Processing

Sectors We Cover *Cont...*

- Fruits & Vegetables Processing
- Ferro Alloys Based Projects
- Fertilizers & Biofertilizers
- Ginger & Ginger Based Projects
- Herbs And Medicinal Cultivation And Jatropha (Biofuel)
- Hotel & Hospitality Projects
- Hospital Based Projects
- Herbal Based Projects
- Inks, Stationery And Export Industries

Sectors We Cover *Cont...*

- Infrastructure Projects
- Jute & Jute Based Products
- Leather And Leather Based Projects
- Leisure & Entertainment Based Projects
- Livestock Farming Of Birds & Animals
- Minerals And Minerals
- Maize Processing(Wet Milling) & Maize Based Projects
- Medical Plastics, Disposables Plastic Syringe, Blood Bags
- Organic Farming, Neem Products Etc.

Sectors We Cover *Cont...*

- Paints, Pigments, Varnish & Lacquer
- Paper And Paper Board, Paper Recycling Projects
- Printing Inks
- Packaging Based Projects
- Perfumes, Cosmetics And Flavours
- Power Generation Based Projects & Renewable Energy Based Projects
- Pharmaceuticals And Drugs
- Plantations, Farming And Cultivations
- Plastic Film, Plastic Waste And Plastic Compounds
- Plastic, PVC, PET, HDPE, LDPE Etc.

Sectors We Cover *Cont...*

- Potato And Potato Based Projects
- Printing And Packaging
- Real Estate, Leisure And Hospitality
- Rubber And Rubber Products
- Soaps And Detergents
- Stationary Products
- Spices And Snacks Food
- Steel & Steel Products
- Textile Auxiliary And Chemicals

Sectors We Cover *Cont...*

- Township & Residential Complex
- Textiles And Readymade Garments
- Waste Management & Recycling
- Wood & Wood Products
- Water Industry(Packaged Drinking Water & Mineral Water)
- Wire & Cable

Niir Project Consultancy Services

106-E, Kamla Nagar, New Delhi-110007, India.

Email: npcs.india@gmail.com , info@niir.org

Tel: +91-11-23843955, 23845654, 23845886

Mobile: +91-9811043595

Fax: +91-11-23841561

Website :

www.niir.org

www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

<https://goo.gl/VstWkd>

Follow Us



➤ <https://www.linkedin.com/company/niir-project-consultancy-services>



➤ <https://www.facebook.com/NIIR.ORG>



➤ <https://www.youtube.com/user/NIIRproject>



➤ <https://plus.google.com/+NIIRPROJECTCONSULTANCYSERVICESNewDelhi/posts>



➤ https://twitter.com/npcs_in



➤ <https://www.pinterest.com/npcsindia/>



THANK YOU!!!

For more information, visit us at:

www.niir.org

www.entrepreneurindia.co

www.niir.org

www.entrepreneurindia.co