



Emerging Environmental and
Social Imperatives -

*Challenges & Opportunities for
Indian Electronics Industry*



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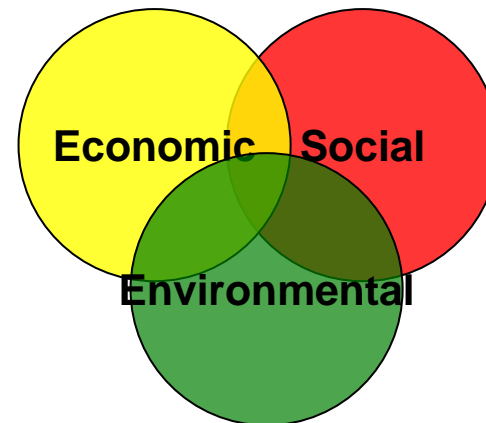
What is Sustainable Development?

Like 'democracy' and 'freedom', 'Sustainable Development' means different things to different people.

The most widely accepted definition is:
"Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs"

- *Our Common Future, The World Commission on Environment and Development, 1997*

"It is a balance of Economic, Social and Environmental considerations in all forms of development"





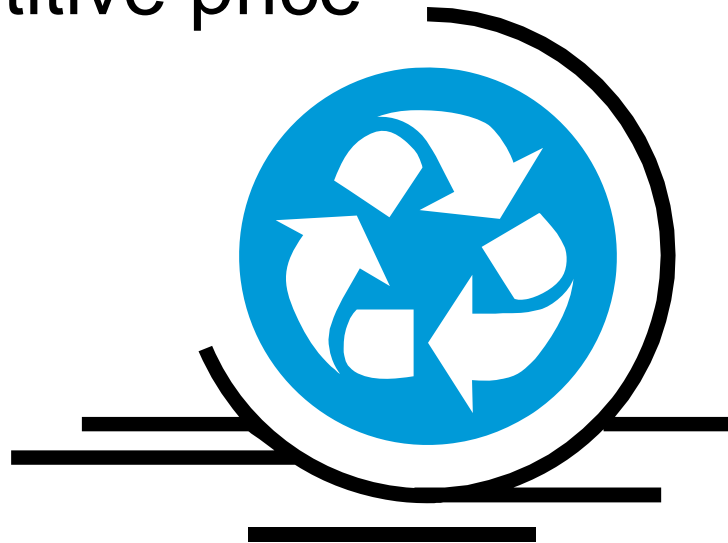
Introduction

- Environment and Social considerations have influenced business environment of the Global Electronics Sector
- India is key participant in global supply chain
- India is today a hot destination for manufacturing of electronic products



The Challenge

Indian electronics needs to be prepared to meet the new environmental and social impositions and yet offer quality and a competitive price





Challenges to Indian Industries

Indian Scenario

A comparative statement on penetration levels of various electronics products in India and China

	India	China
TV Penetration	95/1000	400/1000
PC Penetration	9/1000	34/1000
Internet Subscribers	3.8 million	34 million
Cellular Subscribers	11.6 million	> 100 million
Telephone Mainlines	40/1000	120/1000

Ref: Paper on National electronics/IT hardware manufacturing policy. www.mit.gov.in/hwpolicy



The Opportunity - Entry of International Companies in India

- Celestica acquired Displaytronix to handle repair of flat panel displays and will start its plant in Andhra Pradesh
- Flextronics plans to develop an industrial park near Chennai for PCB assembly, repair services and display
- Motorola will make its C-115 handsets in India through EMS partnerships
- Sanmina-SCI closed its EMS centre in France, and would be establishing its plant in India in 2006



New Environmental and Social requirements

Key Drivers

- a. **Precautionary thinking**: Use of low hazard or hazard free substances in manufacturing
- b. **Preventive action**: Safe reuse and recycle techniques so as to reduce waste for land filling
- c. **Responsible employer**: Ensure transparency to employees and customers on environment, health and safety related information



Effect of Global Issues on Electronic Industry



- Restriction on Hazardous Substances (“The RoHS Regulations”)
- Waste Electrical & Electronic Equipment (“The WEEE Regulations”)
- Additionalities like
- Ozone Depleting Substances (Regulation & Control) Rule (ODS rule), 2000 – *Montreal Protocol*



WEEE & RoHS

The European Union (EU) endorsed two directives,

1. Limiting use of certain substances – RoHS
2. Used Product Recycling – WEEE

By August 2006 these directives will be implemented in the national laws of each EU Member State.





RoHS Regulations

Purpose:

To **restrict** the use of hazardous substances in electrical and electronic equipment and to contribute to the protection of human health and environmentally sound recovery and disposal of waste electrical and electronic equipment.



The role of RoHS is to reduce harmful substances at source, ensuring that these substances are not leached into the environment by equipments, which inevitably aren't recycled.

RoHS Regulations

The substances identified as hazardous substances

- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr ⁶⁺)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)
- Lead (Pb)





RoHS Regulations

Requirements:

The restrictions do not call for the total elimination of these substances but set an upper limit based upon weight

- The limit for all materials except cadmium is 0.1% by weight or 1000 ppm
- For “Homogenous” materials, Cadmium is limited to 0.01% by weight or 100 ppm.





WEEE regulations

Purpose

To prevent waste electrical and electronic equipment generation, encourage reuse, recycling, recovery of WEEE and improve the environmental performance of all operators in the life cycle of electrical and electronics equipment

The role of WEEE is primarily with reducing the amount of electrical and electronic equipment from entering into landfill at the end of its useful life

However EU commission recognizes that WEEE directive cannot eradicate all EEE from entering into land fill





WEEE regulations

Waste Electrical & Electronic Equipment (“The WEEE Regulations”)



Requirements

It defines criteria related to collection, treatment, recycling and recovery of WEEE.

Producers are responsible for financing most of these activities, retailers/distributors also have responsibilities in terms of take-back of WEEE and certain information dissemination.

Private householders are to be able to return complete WEEE without charge.



WEEE Regulations

The regulations have two categories

Private households & Professional households



Private households: These users should have possibility of returning WEEE free of charge and producers should finance the treatment, recovery and disposal of WEEE

Professional households: The necessary measures to comply with WEEE directives (cost of collection, treatment, reuse, recovery and environmentally sound disposal) is covered by agreements between the producer and the user of the respective equipment at the time of purchase.



WEEE & RoHS Regulations

RoHS is very explicit about which substances should be restricted and the precise levels that may be tolerated.



WEEE directives set minimum levels for recycling that must be met but may be exceeded.

According to OECD, any appliance using electric power supply that has reached its end-of-life, would come under WEEE



RoHS Regulations

Technological Factor



Compliance to RoHS requires reduction and/or substitution of hazardous substances. This requires a technological change and careful consideration on the product quality or specifications.

Example : Lead free soldering

● ● ● | RoHS – Technological factor

Example: Lead (Pb) free finishes and soldering*

It will require the use of higher reflow temperatures to achieve reliable soldering joints.

The leading Pb-free solder used in board assembly processes has melting temperature of approx 34⁰C higher than traditional Pb-based solders.

Common components related to higher temperature include

- Interfacial delamination
- Popcorn-induced cracking
- Warping



* Ref: <http://smt.peenet.com>



RoHS – Technological factor

Changes in mould compounds and other aspects of plastic packaging for integrated circuits with large die will often be needed.



Many passive devices, such as aluminium electrolytic capacitors, will require characterization and other changes to ensure their ability to withstand the higher soldering temperatures without yield, reliability, or parametric degradation

The effect of the higher reflow temperature on the reliability of the entire assembly will have to be assessed.

● ● ● | WEEE Regulations

Product Design, Market and Consumer Factor

The design of product must adhere to the WEEE directives (reuse, recycling, recovery)

Responsibility of producers:

Complying to labelling requirement,
information to end-users & treatment facilities,
providing infrastructure for collection,
submission of sales and recovery data and
financing of WEEE cost.





WEEE Regulations

Legal action against industries

Boots Retail (Ireland) has become the first company in Ireland and the EU to be prosecuted for offences under the WEEE Regulations.



The Court imposed a fine of €1,200 on the company, while costs of €6,865 were awarded to the EPA.

The company admitted failing to keep a specified notice in their shops alerting customers to the fact that prices include a contribution to a producer recycling fund to ensure that old electrical and electronic equipment is collected and recycled in a responsible manner

Electronic Waste (e-waste)



E-waste regulations

- What is E-waste

It comprises of electronic goods which are not fit for their original intended use.

These range from house hold appliances such as refrigerator, air conditioner, cellular phone, personal stereos and consumer electronics to computer.



The classification of e-waste as hazardous or non-hazardous depends upon the extent of presence of hazardous constituents in it.

● ● ● | Electronic Waste (e-waste)

Policy and Institution factors



- Public perception to e-waste is often restricted to a narrower sense, comprising mainly of end-of-life information on telecommunication equipment and consumer electronics.
- Technically E-waste is only subset of WEEE



WEEE categories

- Large household appliances
- Small household appliances
- IT and telecommunications equipment
- Consumer equipment
- Lighting equipment






WEEE categories

- Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
- Toys, leisure and sports equipment
- Medical devices (with the exception of all implanted and infected products)
- Monitoring and control instruments
- Automatic dispensers





e-waste: Developments in India

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- The first comprehensive study to estimate the annual generation of e-waste in India and answer the questions above is being undertaken up by the **National WEEE Taskforce.**
 - Preliminary estimates suggest that total WEEE generation in India is approx. **1,46,000 Tonnes/year**
 - Almost 59% of PC's sold in India are products from secondary market and are re-assembled on old components. The remaining market share is covered by multinational manufacturers (20%) and Indian brands (20%)

(Source: Annual Report, MAIT)



e-waste: Developments in India

National WEEE Taskforce set up in July 2004

- Mandate: To identify, plan and implement all issues related to E-waste in India.
- Thrust areas of National task force
 - Policy and Legislation
 - Baseline study
 - Restructuring & Recycling
 - Extended Producer Responsibility (EPR)
 - Awareness building





e-waste: Developments in India

- Three categories of WEEE account for almost 90% of the generation



- Large Household appliances : 42.1%
- Information and Communications Technology equipment : 33.9%
- Consumer Electronics : 13.7%

e-waste: Developments in India



The top states in order of highest contribution to WEEE include

- Maharashtra
- Andhra Pradesh
- Tamil Nadu
- Uttar Pradesh
- West Bengal
- Delhi
- Karnataka
- Gujarat
- Madhya Pradesh
- Punjab



e-waste: Developments in India



The city wise ranking of largest WEEE generators is

- Mumbai
- Delhi
- Bangalore
- Chennai
- Kolkata
- Ahmedabad
- Hyderabad
- Pune
- Surat
- Nagpur





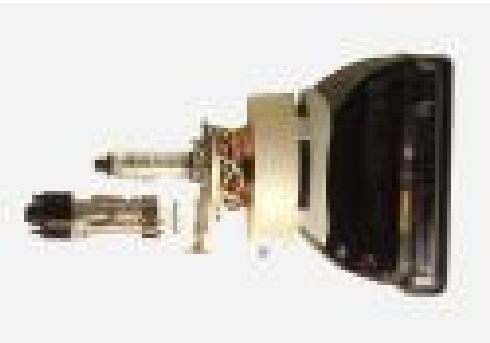
WEEE Hazards

- Electrical and electronic equipment are made up of a multitude of components
- Some contain toxic substances which can have an adverse impact on human health and the environment, if not handled properly
- These hazards arise due to the improper recycling and disposal processes used



WEEE Hazards

Cathode Ray Tubes (CRT's)



- Have high content of carcinogens such as lead, barium, phosphorus and other heavy metals.
- Breaking, recycling or disposing CRTs in an uncontrolled environment without the necessary safety precautions can result in harmful side effects for the workers and can also release toxins into the soil, air and groundwater

WEEE Hazards

Hazardous compounds in PCB's and cables



- Halogenated chlorides and bromides are used as flame-retardants in plastics, which form persistent dioxins and furans on combustion at low temperatures (600-800°C)
- Copper in printed circuit boards and cables acts as catalyst for dioxin formation when flame-retardants are incinerated
- PVC sheathing of wires is highly corrosive when burnt and also induces the formation of dioxins

WEEE Hazards

Hazardous compounds in PCB's and cables



- A study on burning printed wiring boards in India showed alarming concentrations of dioxins in the surroundings of open burning places reaching 30 times the Swiss guidance level.



WEEE Hazards

Land filling



- E-waste land filling is prone to hazard due to leachate which often contains heavy water
- Old uncontrolled dumps pose a much greater danger of releasing hazardous emissions such as
 - **Mercury** leaching from circuit breakers
 - **Cadmium** leaching from brominated flame retarded plastics
 - **Lead** leaching from cone glasses of cathode ray tubes of TV's and monitors
- Landfills are also prone to uncontrolled fires resulting into release of toxic fumes





Electronic Industry Code of Conduct (EICC) – Social Factor

- Developed in Oct 2004 by companies engaged in manufacturing of electronic products
- Participating industries included

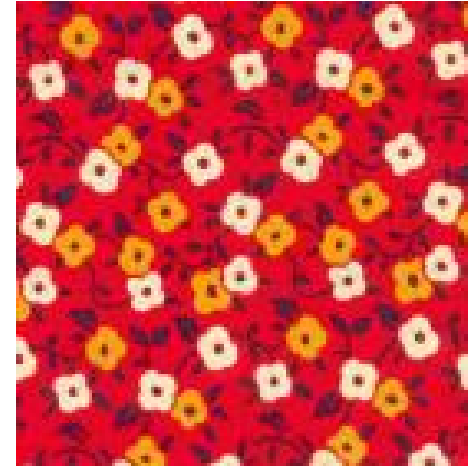
- Celestica
- Dell
- Flextronics
- HP
- IBM
- Jabil
- Sanmina SCI
- Solectron






Electronic Industry Code of Conduct (EICC) – Social Factor

- The EICC code consists of five sections
 - Section A: Labour
 - Section B: Health and Safety
 - Section C: Environment
 - Section D: Elements of an acceptable system for conformity to code
 - Section E: Standards for Business ethics





Electronic Industry Code of Conduct (EICC) – Social Factor

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- The EICC outlines standards to ensure that working conditions in the electronic industry supply chain are safe, that workers are treated with respect and dignity, and that manufacturing processes are environmentally responsible
 - It includes
 - Original Equipment Manufacturers (OEM's)
 - Electronic Manufacturing Services (EMS)
 - Original Design Manufacturers (ODM) including contract Labour



Electronic Industry Code of Conduct (EICC) – Social Factor

- It can be voluntarily adopted by any business in electronic sector and subsequently applied by that business to its supply chain and sub contractors.
- To adopt the code, the business needs to declare its support to code and comply as per the management system of code and standards.
- Code should be regarded as total supply chain initiative - as a minimum, immediate next tier of suppliers should be encouraged to implement the code.



Electronic Industry Code of Conduct (EICC) – Social Factor

- As a fundamental principle to this code, the business and all of its activities must operate in full compliance with the laws, rules and regulations of respective countries.
- The code encourages its participants “To Go Beyond Compliance”



Electronic Industry Code of Conduct (EICC) – Social Factor




Companies adopting / endorsing the code or joining the Implementation Group include :

- Celestica, Cisco, Dell, Flextronics, Foxconn, HP, IBM, Intel, Jabil, Lucent, Microsoft, Sanmina SCI, Seagate, Solectron, and Sony

These companies are sure to influence supply-chains in India by insisting on the compliance to the Code.



Key International Legislations

- 
- The Basel Convention: On Control for the Transboundary movement of Hazardous Waste and their Disposal (since 1992)
 - The Swiss Ordinance on the Return, the taking back and the Disposal of Electrical and Electronic Equipment (ORDEE): First legal regulation on WEEE (Since 1st July 1998)
 - German Electrical and Electronic Equipment Act – ElektroG Act: Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment and implements
 - EU directives on WEEE and RoHS (Since March 2005)



Key International Legislations

- China's RoHS Regulation: It is more demanding than EU RoHS Directives - Proposed to be in force from 1st January 2007

Important

Contrary to EU RoHS approach of self-certification, China RoHS law will require a product to be tested before it is allowed entry into China, and only testing by Chinese certified labs will be accepted by the authorities





Level of Preparedness - Asia

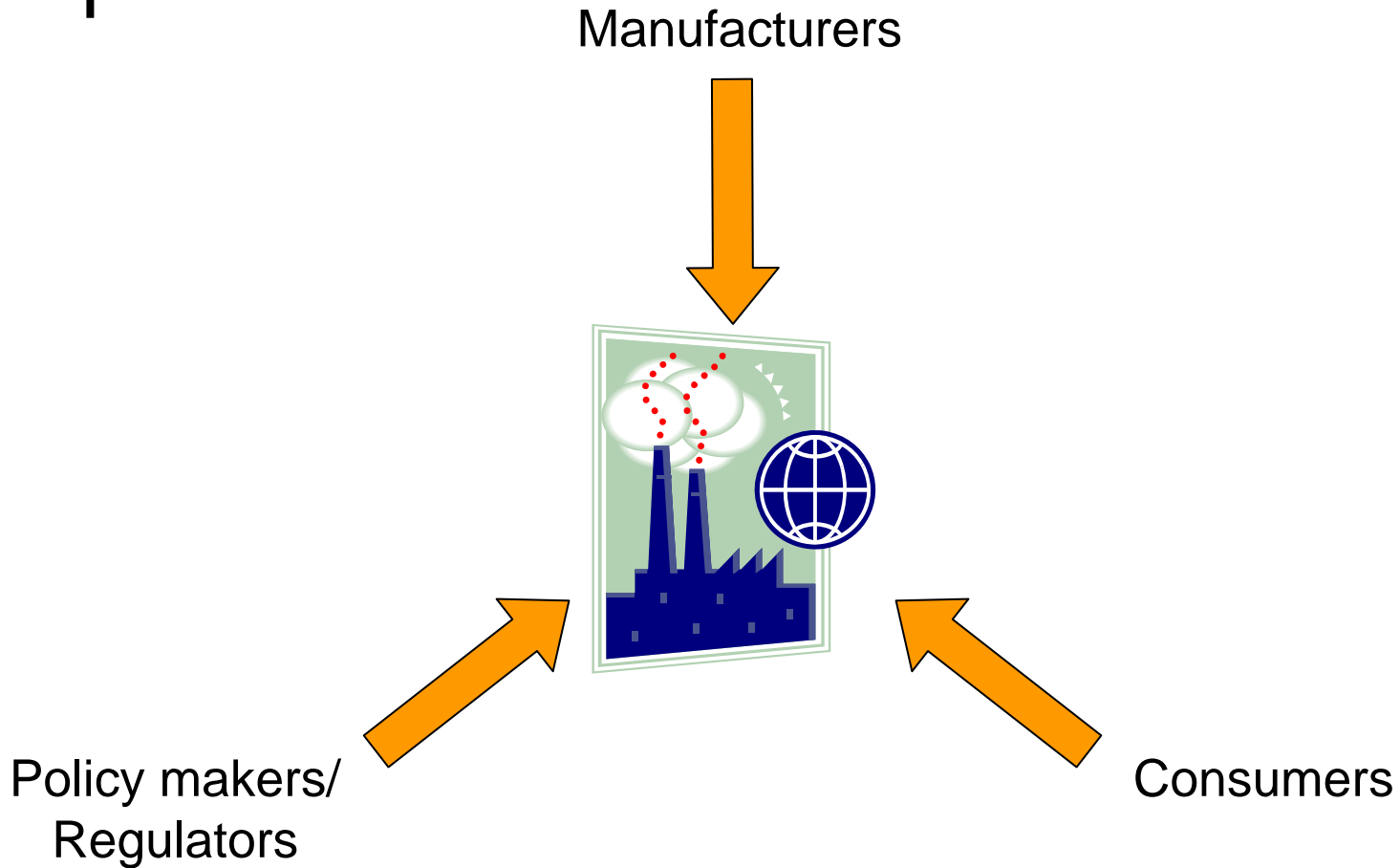
- 93% of electronic manufacturers in Asia expected to comply with RoHS directive by 1st July, 2006*
- As per a survey covering 359 manufacturers from Hong Kong, Taiwan, Mainland China and South Korea :
 - Hong Kong: 84% compliant
 - Taiwan: 63% compliant
 - Mainland China: 50% compliant
 - South Korea: 9% compliant



Level of Preparedness – India

- ELCINA in India commenced the work on the new project offered by CfSD-UK and sponsored by EU
- NetPem at Nagpur is sponsored by Confederation of Swedish Industries (*implementation yet to start*)
- These projects relate to Eco-friendly design of electronic components & products and also gearing up industries for impact of worldwide environmental legislations
- These programs include capacity building workshops on Eco-design, RoHS and WEEE

Multi-Stakeholder Approach in Preparedness



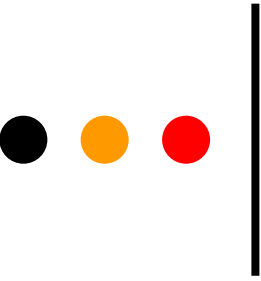


Level of Preparedness – India

- There are several companies in India that are already RoHS compliant.
- Initiatives on E-Waste management and WEEE have begun in Karnataka and Maharashtra with international assistance

**Workshop on Green Manufacturing and Management is
an Excellent step towards Preparedness**





Thank You

