



Environmentally Conscious Electronics (ECE)

IMPLEMENTATION NEEDS

DRIVERS

- Legislative/regulatory
- Market Competitiveness
- Sustainable Development
- Customer Requirements

ATTRIBUTES

Energy Efficiency
 Elimination of Materials of Concern
 End-of-Life Recycling
 Information Management
 Legislative knowledge

DEPLOYED TECHNOLOGY

Design for Environment Approach (DfE)
 Lead-free (early adopters)
 Environmental Management System (EMS)
 Product Life-cycle Management (PLM)

RESEARCH & DEVELOPMENT

Non-halogenated flame retardants
 Reporting Tools
 Alternative Finishes

ATTRIBUTES

Energy Efficiency
 Elimination of Materials of Concern
 End-of-Life Recycling
 Information Management
 Legislative knowledge

Product Marking
 Substance Bans

DEPLOYED TECHNOLOGY

DfE
 Lead-free
 Non-halogenated flame retardants (early adopters)
 Reporting Tools
 Alternative Finishes

RESEARCH & DEVELOPMENT

Life Cycle Analysis (LCA)

ATTRIBUTES

Energy Efficiency
 Elimination of Materials of Concern
 End-of-Life Recycling
 Information Management
 Legislative knowledge

Product Marking
 Substance Bans
 Recycling Targets
 Waste Minimization
 Recycled Content

DEPLOYED TECHNOLOGY

LCA (early adopters)

RESEARCH & DEVELOPMENT

Life Cycle Cost Models

ATTRIBUTES

Energy Efficiency
 Elimination of Materials of Concern
 End-of-Life Recycling
 Recycled Content
 Information Management
 Legislative knowledge

Product Marking
 Substance Bans
 Recycling Targets
 Waste Minimization
 Recycled Content
 Life Cycle Analysis

DEPLOYED TECHNOLOGY

LCA
 Life Cycle Cost Models

RESEARCH & DEVELOPMENT

Dematerialization
 New Separation Technologies

ELV **2003**

WEEE/RoHS **2005**

2007

Draft EuE

2009

RAC 7/28/03

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Environmentally Conscious Electronics (ECE)

BUSINESS & TECHNOLOGY GAPS

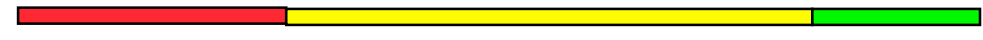
Parts, Materials & Processes

- Lead-free Soldering Technology
- Lead-free Compatible Components
- Tin Whisker Accelerated Test Method
- Substitution of Hazardous Materials in Cables
- Mercury
- Cadmium
- Hexavalent Chromium
- Halogenated Flame Retardants (PBB, PBDE)s



Engineering/Design

- DfE Integrated into Product Development



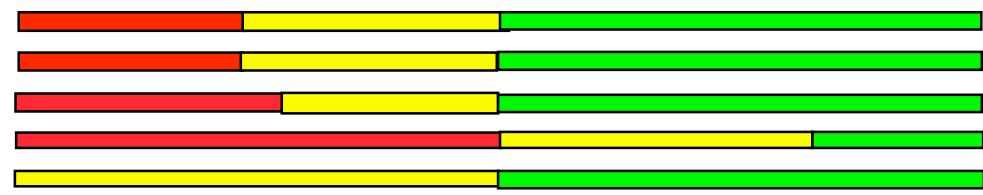
Tools

- Materials Declaration
- Design for Environment (DfE)
- Life Cycle Assessment (LCA)



Business

- Recycling Infrastructure in EU
- Supply Chain Readiness
- Materials Declaration Standards
- North American OEM Readiness
- Keeping track of e-waste legislation



Legend: ■ Sufficiently Ready ■ Emerging Technology (or readiness issues) ■ Development Required

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