



**iNEMI**

International Electronics Manufacturing Initiative

# Reuse, Recycling, End of Life

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Advancing manufacturing technology

# Reuse, Recycling and End of Life

- **Some ideas to get you thinking...**
  - Design for recycling
  - What gets reused /recycled now?
  - What's the decision tree?
  - What are the barriers to collection?
  - Who pays?



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# It starts at the Start of Life!

## Design for Reuse / Recycling / End of Life

- **Reuse**

- **Easy upgrade (software / memory / battery)**
  - iPod, BlackBerry...
- **Cross-compatibility**
- **Need special cables**
- **Personal data protection**

- **Recycling and End of Life**

- **Easy removal of valuable parts**
- **Labeling of plastic parts**
- **Use recyclable or biodegradable plastics**
- **Careful use of functional or decorative coatings (make recycling difficult)**
- **“De-materialization”**

# What gets reused?



- **Post-consumer**
  - Ink jet cartridges
  - Computers
  - Cell phones 3% Nokia, Motorola
  - TV's (but what about Feb 17 2009 when TV's become "obsolete"?)
  - % are not high.....and tough to raise
- **Higher %**
  - Professional
    - High value professional electronics ~90% Alcatel-Lucent
  - Pre-consumer & Exchanges
    - Repaired and refurbished by manufacturer e.g. Dell

# The Reuse / Recycle Decision Tree

- **Does it work and will someone want it?**
  - Yes
    - Resell
    - Donate (income tax benefit in the USA)
- **If it doesn't work, does the value justify testing with consumables (battery, ink)**
  - Yes
    - Resell
    - Donate
  - No
    - Scrap

*~ 72 HP ink cartridge types  
~ 48 Lexmark  
~ 90 Canon*

*I recently bought a Canon printer for  
\$10 less than the cost of the cartridges!*

# Collection

- **Charities**
  - Goodwill, Salvation Army etc.
- **Businesses**
  - Best Buy etc.
- **Local Authorities**
  - “Electronics days”

*Fine – but you need to be motivated to take it there!*

# Disincentives to Collection

- **Electronic products are not easily traceable like automobiles**
- **Security of personal data on computers – is it erased?**
- **Small devices are easy to throw away - iPod**
- **Return fees may encourage dumping**
  - TVs in MA
  - Refrigerators in US
- **Difficulty of returning may encourage dumping**
  - “We accept during normal working hours”
- **Rely on**
  - Conscience
  - Ease of disposal
- **Attics and basements in the US are full of obsolete “stuff” that still works**
  - Alan’s “stash” with 1 laptop, 1 printer, DVD drive, TV adaptor, VCR, portable TV.....



# Other Challenges

- **Devices where electronics form a minor component by weight or people may not think of them as electronics**
  - Toys
  - Projection TV
  - Electric toothbrush
  - Power tools



# The disassembly decision tree

- **Do components have value?**
  - **Yes**
    - **Are components economic to disassemble**
      - **Yes**
        - » **Disassemble**
        - » **Sell**
      - **No**
        - » **Shred & Separate**
    - **No**
      - **Shred & Separate**

*Challenge –  
Counterfeit new parts*

# Shredded Material

- **Metals**
  - Have value and can be separated
- **Thermoplastics**
  - Can be separated / recycled
- **Thermosets**
  - Primarily epoxies - have calorific value
  - ~30% pyrolysis residue ~ 33MJ/kg (fuel oil 40)
- **Fillers, glass fiber mat**
  - Slag – filler material

# Challenges we will hear about

- **Individual state regulations differ**
  - EU has WEEE but implementation differs in each country
  - US has patchy state regulations
- **Pay for disposal upfront in the price... or on disposal?**
  - Voluntary
    - Soda cans (upfront but easy recycling to get your money back)
  - “Captive”
    - Tires (\$20 disposal fee when you fit new tires)
    - Refrigerators (\$30 disposal fee when they take the old one away)

# Who Pays?

- **We do!**
- **As consumers directly**
  - Recycling fees
- **Indirectly**
  - **Manufacturers take-back costs absorbed in the price**
  - **As taxpayers**
    - Recycling costs not covered by fees
    - To set up municipal recycling centers
    - Incentives to set up a commercial recycling infrastructure
      - In Europe WEEE interpreted differently in every country
      - Similarly in the USA



# Today's speakers & panelists

- **The objective is to prime the panel session by giving**
  - A situation overview on electronics reuse and recycling
  - Examples of real-life end of life - reuse and recycling in the cell phone business
- **Wayne Rifer, Green Electronics Council**
- **Amanda Hale, SIMS**
- **Chris Newman, EPA**
- **Panel session – what we can learn from the cellular phone experience and how we can apply it more broadly?**
- **How can iNEMI members work better with NGOs and regulators?**

