



STRUCTURING MARKET COMPETITION TO BUILD A CIRCULAR ECONOMY

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The Circular Economy
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Introduction

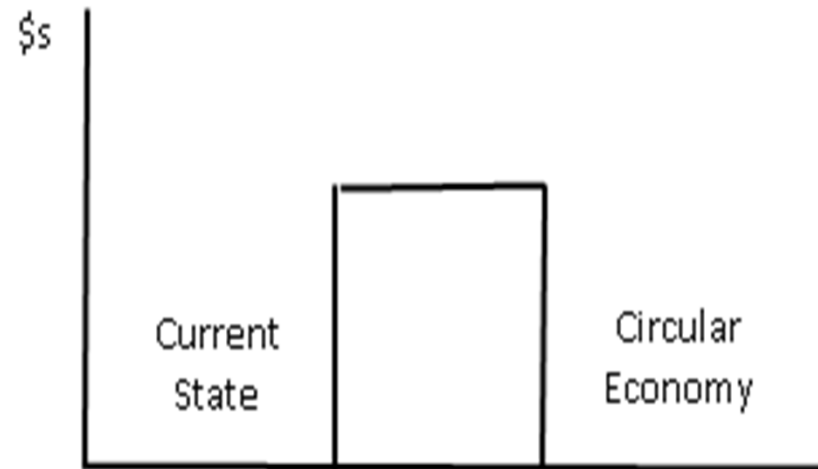
- EPEAT – A tool to catalyze environmental leadership throughout the lifecycle of electronic technologies and through market mechanisms
- For a decade EPEAT has served as a defining force in the electronics marketplace, providing a prerequisite structure for measuring and communicating environmental design and performance
- Accordingly, today my message is how a structured market can be used to advance toward a Circular Economy
 - First EPEAT
 - Second the Circular Economy challenge to the electronics industry



Premise:

To Achieve a Circular Economy Requires an Investment

- A Circular Economy will require new technologies, markets and business models
- Lowest cost is an unreliable driver of transformational change
- The challenge is to penetrate the potential barrier between here and there
- Entrepreneurism for a Circular Economy will be birthed by vision, risk taking and investment
- But first a baseline to reduce risk, and then a clear statement of demand to exceed the baseline



Driving Investment

- Two tools to define transformational demand
 - Laws and regulations establish the baseline
 - Eliminate bad actors
 - Market opportunities incentivize exceeding the baseline
 - Faster and further
- Creating Tim Ellis' Race to the Top
 - A race needs: a raceway, goals and rewards
 - Raceway: A definition of superior environmental performance
 - Goals: Measures of successfully superior performance
 - Reward: A new dimension of the demand equation = Price + features + style + environment
 - A race to the top through marketplace opportunity
 - Created by entrepreneurship, fostered by policy



Stating Environmental Demand

- EPEAT leverages the institutional purchaser – government, education, healthcare, enterprise
- Consumer versus institutional purchasing
 - Consumers shop the offerings
 - Institutions set specifications
- B2B market sets the baseline and explores the range of possibles
- High-value institutional requirements can then ‘trickle down’ to consumers



Government, Higher Education, Healthcare, Hospitality

- Federal, State and Local Governments Require EPEAT
 - Federal Acquisition Regulations: 95% of purchases must be EPEAT
 - More than 40 States require EPEAT



- More than 300 U.S. Universities Require EPEAT
 - Spent \$403 Million in 2013 on EPEAT-registered PCs and Displays

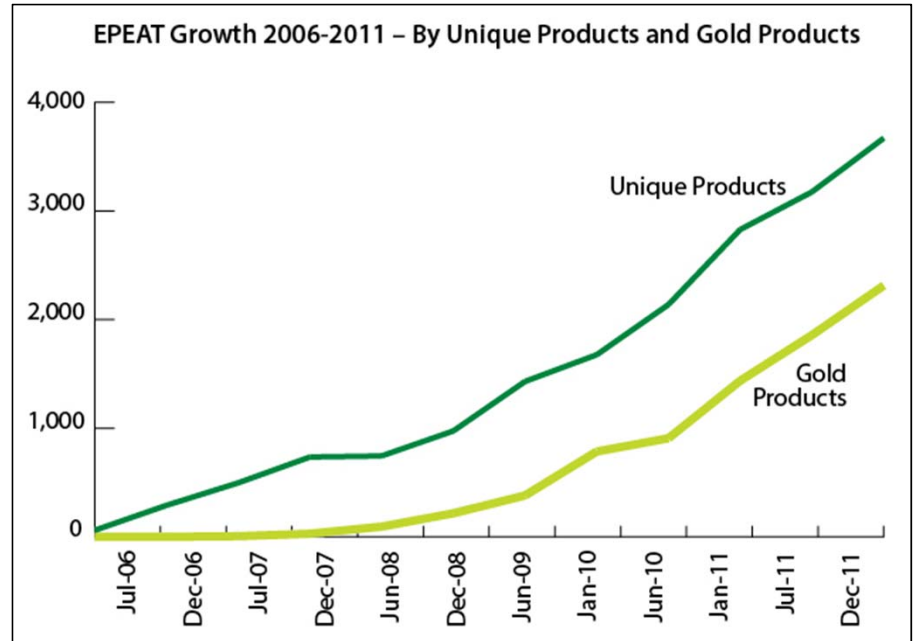
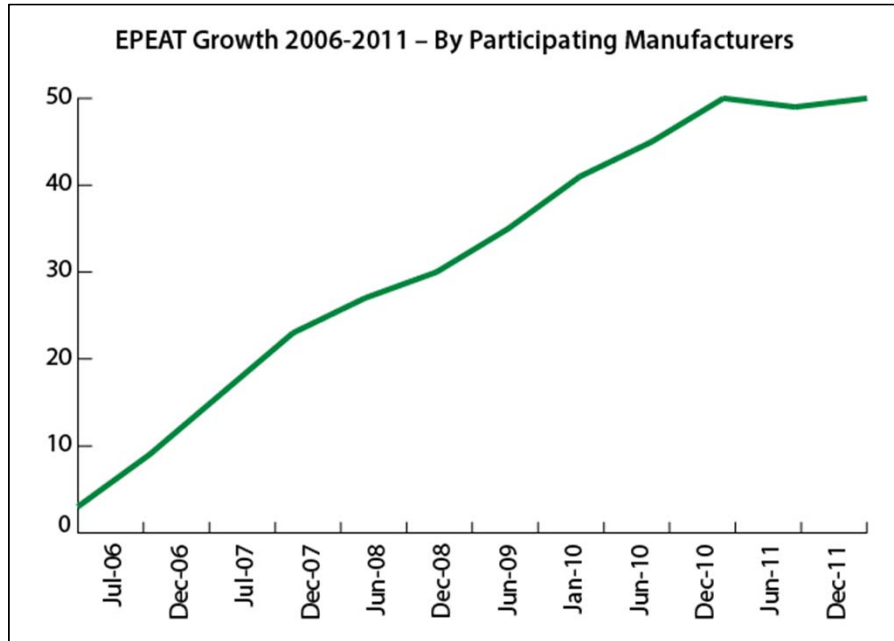


- U.S. Healthcare & Hospitality TV Market Estimated at \$3.5 Billion



Driving Environmental Progress for Computers

- EPEAT Has Changed How PCs and Displays are Made
 - Pioneering purchasers change the marketplace by insisting on greener electronics



The Three Dimensions of the EPEAT System

- 1. Standards define superior environmental performance**
- 2. Registration and verification measure superior performance**
- 3. The Registry offers the products**



EPEAT Standards – Measures of Environmental Performance

- Standards developed in public, open, balanced, consensus processes
 - American National Standards developed by ANSI-accredited Standards Development Organizations.
- They cover environmental impacts across a product's entire life-cycle
 - Extraction, manufacturing, use, reuse, and recycling
 - And the interrelationships between those life-cycle stages



EPEAT Standards

Currently Implemented

- IEEE 1680.1 for PCs & Displays
- IEEE 1680.2 for Imaging Equipment
- IEEE 1680.3 for TVs

Under Development

- NSF 426 & IEEE 1680.4 for Servers
- UL 110 for Mobile Phones



Environmental Baseline Plus Performance Tiers

Environmental criteria come in two forms:

Required and Optional
Baseline and Competitive

	PC&D	IE	TV
Required	23	33	24
Optional	~28	~26	29



EPEAT Bronze – Meets all required criteria



EPEAT Silver – Meets all required criteria and at least 50% of the optional criteria



EPEAT Gold – Meets all required criteria and at least 75% of the optional criteria



Defining Superior Environmental Performance

Environmental Criteria	1680.1 PC&D	1680.2 IE	1680.3 TV
Reduction of Environmentally Sensitive Materials	●	●	●
* Materials Selection	●	●	●
* Design for End-of-Life	●	●	●
* Product Longevity/Lifecycle Extension	●	●	●
Energy Conservation	●	●	●
* End-of-Life Management	●	●	●
Corporate Performance	●	●	●
Packaging	●	●	●
Consumables		●	
Indoor Air Quality		●	

* Criteria categories most directly contributing to a Circular Economy



Ingredients of a Circular Economy in EPEAT Standards

Product Longevity

- Modular design
- Upgradable
- Durable
- Service software

Materials Selection

- PCR content
- Renewable & biobased

Design for EoL

- Ease of reusability
- Ease of material liberation
- Recyclable materials
- Information for EoL

EoL management

- Take back
- Processing standards



EPEAT Registry – Offering Superior Environmental Products

Registry contains **~4500** products

from **~55** manufacturers

Sold in **43** countries



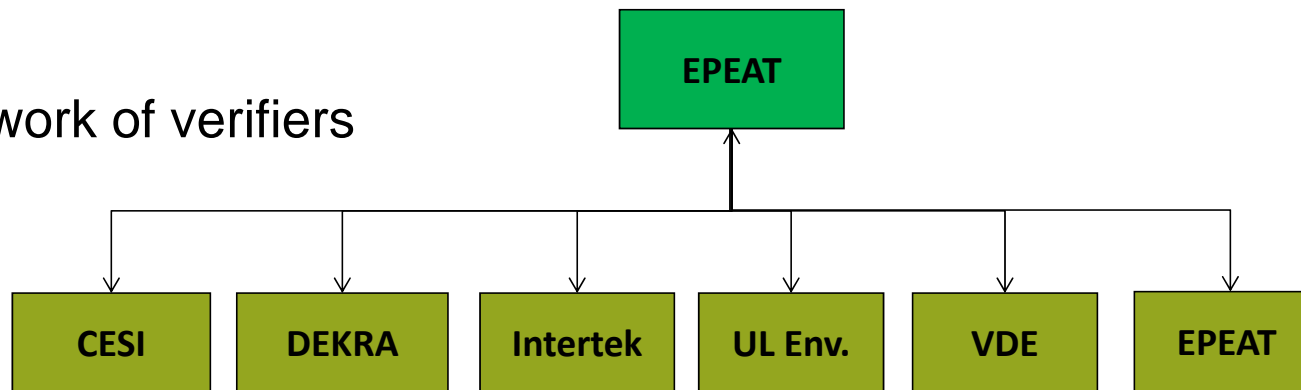
EPEAT Registration is Available in Major Markets

United States	Canada	Japan	Portugal
Australia	Estonia	Latvia	Romania
Austria	France	Lithuania	Singapore
Belgium	Finland	Liechtenstein	Slovakia
Brazil	Germany	Luxembourg	Slovenia
Bulgaria	Greece	Malta	Spain
China	Hungary	Mexico	Sweden
Costa Rica	Iceland	Netherlands	Switzerland
Cypruss	India	New Zealand	Taiwan Region of PRC
Czech Republic	Ireland	Norway	United Kingdom
Denmark	Italy	Poland	



EPEAT Conformity Assurance

- A network of verifiers



- Ongoing verification investigations
- Exposure of non-conformances

A Circular Economy for Electronics

- There are high, and justified, expectations for leadership from the electronics industry
- But the industry's challenges are great

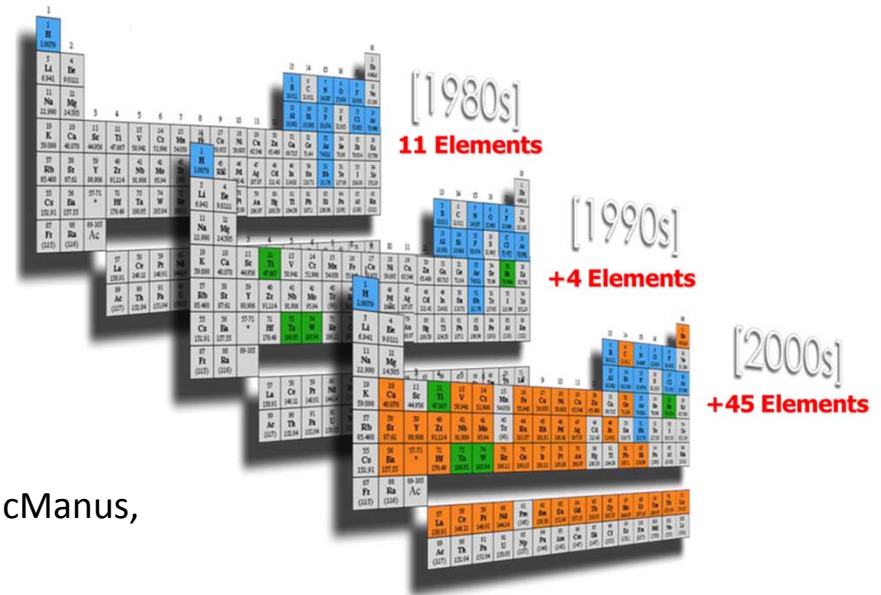


Technology Trends

- Ultra miniaturization



- Material composition



Adapted from a figure courtesy of T. McManus, Intel Corporation (2006).

System Challenges to a Circular ICT

- Low EoL collection rates
- Export and informal sector recycling
- High cost to liberate small quantities of valued materials
- Sinking economics of recycling
 - Increasing costs
 - Declining value of recovered commodities
- Low recovery rates for key metals
 - Ag & Au: 10 – 15%; Pd: 5 – 10%; Pt: 0 – 5%



Envisioning a System for a Circular Economy of Electronics

- The challenge: to economically recover critical materials (e.g. REEs)
 - Minute quantities per product, huge number of products, spread around the world
 - Building efficiency through shared rules, aggregation, and new technologies
- Coordinated actions by many actors
 - Manufacturers design products, using shared rules, that facilitate REE recovery
 - Via product standards
 - Users (discarders) make EoL products available to a formal channel
 - Via WEEE-type system
 - First processor sorts, separates components, accumulates, and delivers components for final processing
 - Via recycler standards
 - Final processor implements new recovery technologies for REEs
 - Via investment in technology development/implementation



THANK YOU