CURRENT UNDERSTANDING OF THE CRT LANDSCAPE BY THE ELECTRONICS RECYCLING COMMUNITY

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SOURCES

Import • Households • Businesses • Governments • State Programs

FACTORS

- No legal requirement in many states to recycle electronics
- Inconsistent state laws
- Products with no OEM in existence
- CRTs are big and heavy and inconvenient to recycle
- CRT rule doesn't apply to households
- Consumers may be unwilling to pay to recycle if disposal is cheaper
- Technology change (CRTs replaced by flat panel)
- With EPR laws, responsibility for disposition of CRTs has shifted from consumers to manufacturers (Note: this has different perspectives.)
- Regional variation in collection systems
- "Cherry picking" high-value parts lowers value down the chain
- Economic incentive needed to recycle
- Broken CRTs harder to recycle
- Enforcement needed against illegal disposal by generators

CRT Problem Statement

CRTs and CRT glass were once easily recycled into new CRTs; however, the demand for new CRTs has collapsed in favor of new flat panel technologies.

Because of rising costs, negative economic incentives, and shifts in CRT glass markets, some CRT processors and recyclers are choosing to store the glass indefinitely rather than send it for recycling (or disposal), which increases the risk of mismanagement and/or abandonment of the CRTs.

COLLECTION POINT

OEMs • Municipal Collectors • Recyclers • Retailers

- Thousands of collectors are highly fragmented and hard to organize
- No standard or requirements for a "collector"
- Subsidies and manufacturer payments going to collectors rather than recyclers
- Collectors have no solution for CRT glass
- Breakdown in contracting/auditing for ensuring proper CRT glass disposition
- Recyclers collecting without contracts with manufacturers
- "Cherry picking" high-value parts lowers value down the chain
- Lack of/varying levels of education about CRT regulation in different states
- CRTs are heavy and pose a challenge to ship long-distance
- Inconsistency in state programs
- Lack of up-to-date information for consumers on which collectors will take CRTs
- Hiring of recyclers sometimes leads to funding being split by two recyclers
- Lack of rural route density increases cost per unit
- Bad actors in the industry misrepresenting "air pounds"
- Broken CRTs are harder to recycle
- Shipments out of state can't be regulated by original jurisdiction
- Use of pounds as basis for performance encourages CRTs to be collected
- Ergonomic challenges of managing CRTs—physical wear and tear on people

ELECTRONICS RECYCLER

- Financial incentive for entities to get paid to receive CRTs and then not pay to recycle (or dispose)
- Lack of enforcement of CRT rule by states and EPA
- Lack of tracking of CRTs to final disposition
- Barriers to entry are low
- Lack of awareness about phosphor, silica and lead hazards in the workplace
- Certification is not assurance of compliance or responsible recycling
- Stewardship organizations represent a monopsony and consolidate the control of contracts by selecting vendors. This creates lack of competition, which in certain states raises costs. (Note: this has different perspectives.)
- Recyclers aren't charging enough to cover costs for recycling
- Too many recyclers are exporting CRTs improperly
- Whenever the state manages CRT recycling, it seems issues of mismanagement increase
- Lack of knowledge about outlets for recycling CRTs
- Lack of engagement of glass manufacturers who made the glass
- Lack of adequate closure plans
- Ergonomic challenges of managing materials—physical wear and tear on people
- Costs are high to switch to new technologies
- Lack of clear specs for recycling grade material
- Need to ship trailer loads of CRTs/glass in order to be accepted
- Thin operating margins, insufficient funds held

TREATMENT AND DISPOSAL IN LANDFILL

(HAZARDOUS OR NON-HAZARDOUS)

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- Large capacity likely

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- State bans on landfilling CRTs
- Doesn't count toward state recycling obligations
- Cost
- Not environmentally-friendly
- Potential stigma issues

TREATMENT AND USE AS ALTERNATIVE DAILY COVER

AT MUNICIPAL SOLID WASTE LANDFILL

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- Large capacity likely

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- Doesn't count toward state recycling obligations
- ADC may be considered a form of recycling by some, which discourages other recycling options for CRT glass
  - (Note: Different perspectives on this point)
- Whether ADC would be considered legitimate recycling by EPA
- Potential stigma issues

ADVANTAGES + / CHALLENGES −

CERAMICS

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- Substitute for raw material
- Doesn't require energy to separate lead from glass because
- Large global capacity potentially available

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- Would likely require export
- May not be able to export to non-OECD countries
- Shifts the lead to ceramics, which may create legacy issue
- No MSDS required on tiles
- Proper firing required in order to minimize exposure
- Needs regulatory certainty/acceptance
- Real capacity unknown

GLASS FURNACES

Uses electricity/plasma to separate lead from glass

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- Smaller and regional in scale; could be co-located with large piles of glass
- Multiple furnaces would lower freight costs
- Lead recovered from CRT glass

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- Very few in operation
- High energy consumption; lifecycle assessment may be helpful
- Needs longer timeframes to store glass
- Small capacity
- Permitting/regulatory issues
- Disposition of slag

GLASS TO GLASS/CRT MANUFACTURING

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- There is niche market for CRTs
- CRTs are inexpensive and are more robust equipment for variable power situations

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- New CRTs will eventually need recycling
- Lack of engagement with the glass manufacturers in recycling options for CRTs
- Declining market

CONCRETE

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- Huge capacity
- Regional markets

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- Shifts the lead to concrete products, which may create legacy issue
- Whether treatment process adequately prevents leaching
- Permitting issues
- Potential stigma issues – (e.g., "Not in My Back Yard" [NIMBY])

LEAD/COPPER SMELTER

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- Existing process in operation
- Regulated
- Large capacity
  - (Note: Different perspectives on this point)

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- Limited capacity and no growth potential
  - (Note: Different perspectives on this point)
- Lead recovery may not be very efficient
- Disposition of slag
- Air emissions
- Variable commodity prices
- Permitting of new smelters is difficult
- Few smelters in North America accept CRT glass
- Perception of taking in hazardous waste
- Needs longer term storage of glass

CRT REUSE

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- There is niche market for CRTs
- CRTs are more robust equipment for variable power situations
- Inexpensive compared to LCDs

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- Low demand in US
- Hard to export; exports can be abused as "sham reuse"
- Wiring diagrams are needed to refurbish
- Reused CRTs will eventually need recycling
- Inadequate enforcement of CRT rule

RETRIEVABLE STORAGE

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- Avoids irresponsible speculative accumulation
- Allows material to be held until solutions appear
- Quantify the amount of available feed stock or supply

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- Funding needed/Need to devise a financial structure to account for recovery
- May create a legacy issue
- Competes with viable recovery technologies
- Hazardous waste permit and regulations may apply
- Seen as a "kick the can down the road" approach

CHEMICAL EXTRACTION

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- Potentially environmentally friendly process
- Complete recovery of lead

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- Not operational commercially
- Could be expensive
- Potentially slow and time intensive
- Limited capacity