

Massachusetts Electronics Recycling Program

Five Years Later:
The uncensored story
Of a CRT Waste Ban
1998-2003

- Massachusetts Recycling Infrastructure 1990-1999
- Massachusetts plan for electronics
- The cost of doing nothing

Summary

- **Background** – MA state role in bottle bill and curbside recycling infrastructure development
- How MA DEP instituted a **6-point plan** to create a CRT Infrastructure in advance of HDTV transition
- Successful implementation of the first **Waste Ban**
- **Problems/Lessons learned** – public financed domestic programs vs. free market exports

Background: MA DEP and Recycling Infrastructure Development 1990-1998

- **Access** to residential recycling increased from 10% to 90%
- **Participation** in the bottle bill captures 85% of the 1.6 billion beer and soft drink containers sold in Massachusetts
- **State Procurement** of recycled products increased over 500%
- **Costs** of operating the state's 225TPD MRF fell from \$1.6M per year to \$0, through long-term contracts
- **Assignment:** *create convenient access, high participation, state demand, and low cost infrastructure for electronics*

Previous Largest Access investment: To ensure an infrastructure for curbside recycling, DEP built and contracted operation of the Springfield MRF in 1990.

Construction: \$6M

Capacity: 50,000 TPY

1990-95 operating cost: \$1.6M/Year

1995-2005 operating cost: \$0/Year



If the state guarantees a market, municipalities can handle collection costs

Why Massachusetts tackled E-Waste

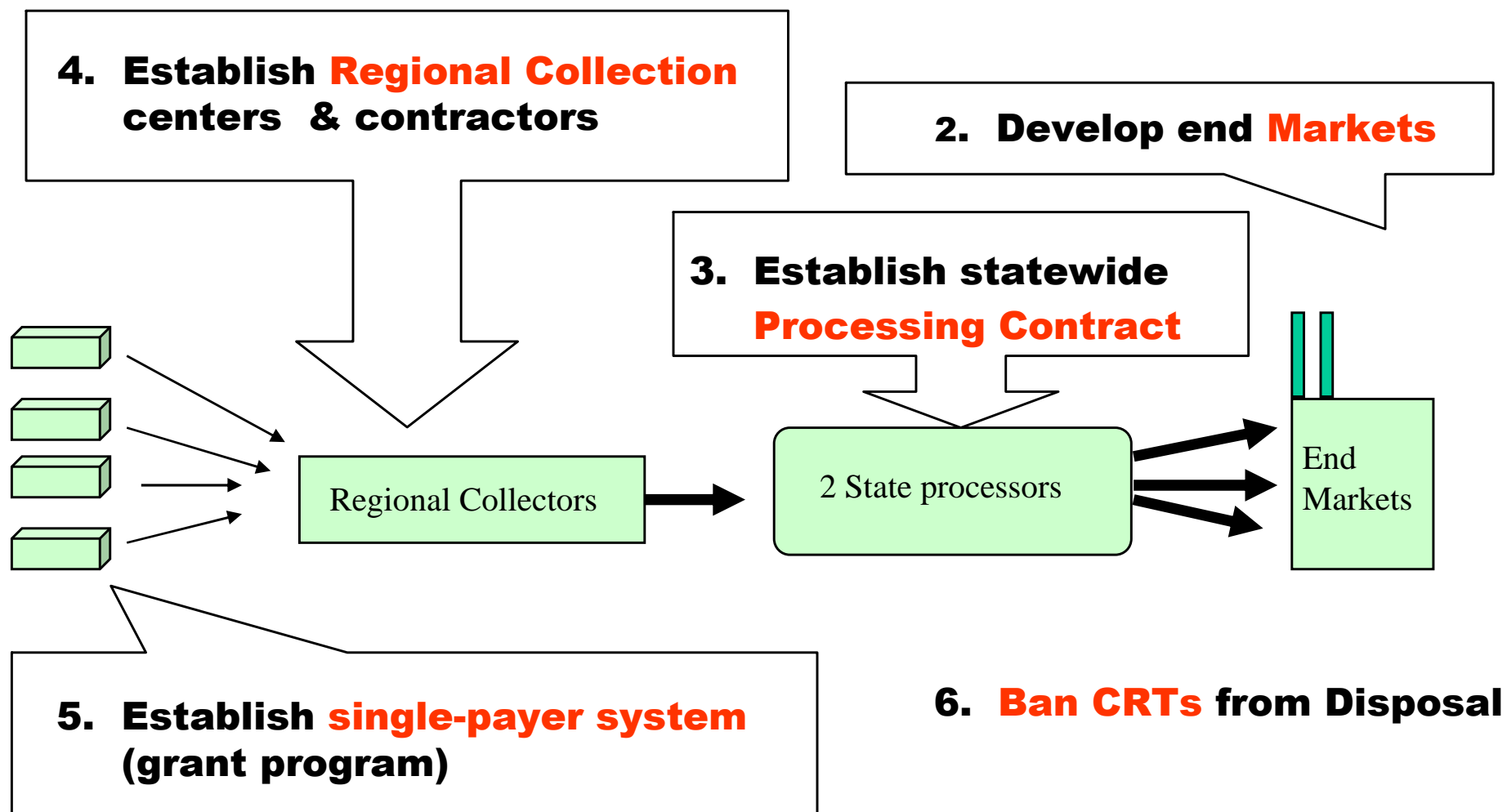
- **Massachusetts. 6M Residents, 2.2M households, heavy commercial and institutional stream.** About 25,000 tons of electronics are returned for warranty, resold, repaired, stored, or landfilled. (Because they are durable products, the entire product chain could be impacted by legislation).
- **Digital and HDTV may create a landslide in the year 2005. TV Repair is already in a freefall, dropping 80% since 1980s.** As digital systems replace TVs, VCRs, and other analogue machines, *DEP projected that basements will begin to empty.* 300,000 tons may be discarded in one year.
- **A Cathode Ray Tube (CRT) may contain 4-8 lbs. of lead.** While intact, CRTs are safe to handle. However, once incinerated, the lead from CRTs concentrates in the ash, making disposal more toxic and more expensive.
- **Markets for leaded glass will be around for 5-10 more years** – states which wait will lose access to TV tube manufacturing markets.

The Massachusetts Electronics Strategy

1. **Exempt** intact CRTs as hazardous waste
2. Develop CRT recycling **markets**
3. Establish 2 statewide **Processing Contracts** for municipalities.
4. Establish **regional** centers and 3rd party collection systems.
5. Est. **single-payer system** for municipalities on state contract.
6. **Ban** CRTs from solid waste disposal facilities: June 1999

6-Point Plan

1. **Exempt** intact CRTs from hazardous waste requirements



1. Exempt intact CRTs from hazardous waste requirements

Massachusetts DEP demonstrated to EPA that the **effect** of a waste ban (covering both residential and commercial material) surpassed the effects of RCRA.HW enforcement..

HW Regulations regulate collection, reuse and repair, tying up regulators and truck drivers with paperwork; meanwhile, residences (**where the TVs are**) would be exempt. **Waste Bans** regulate more effectively, and capture residential material – including TVs, the focus of Massachusetts efforts.

40,000 commercial CRT generators
(businesses, factories, sports bars,
ATMs, schools, etc.)

2,200,000 residences

1,500 TV and computer repairers, charities,
parts and material scrap recyclers

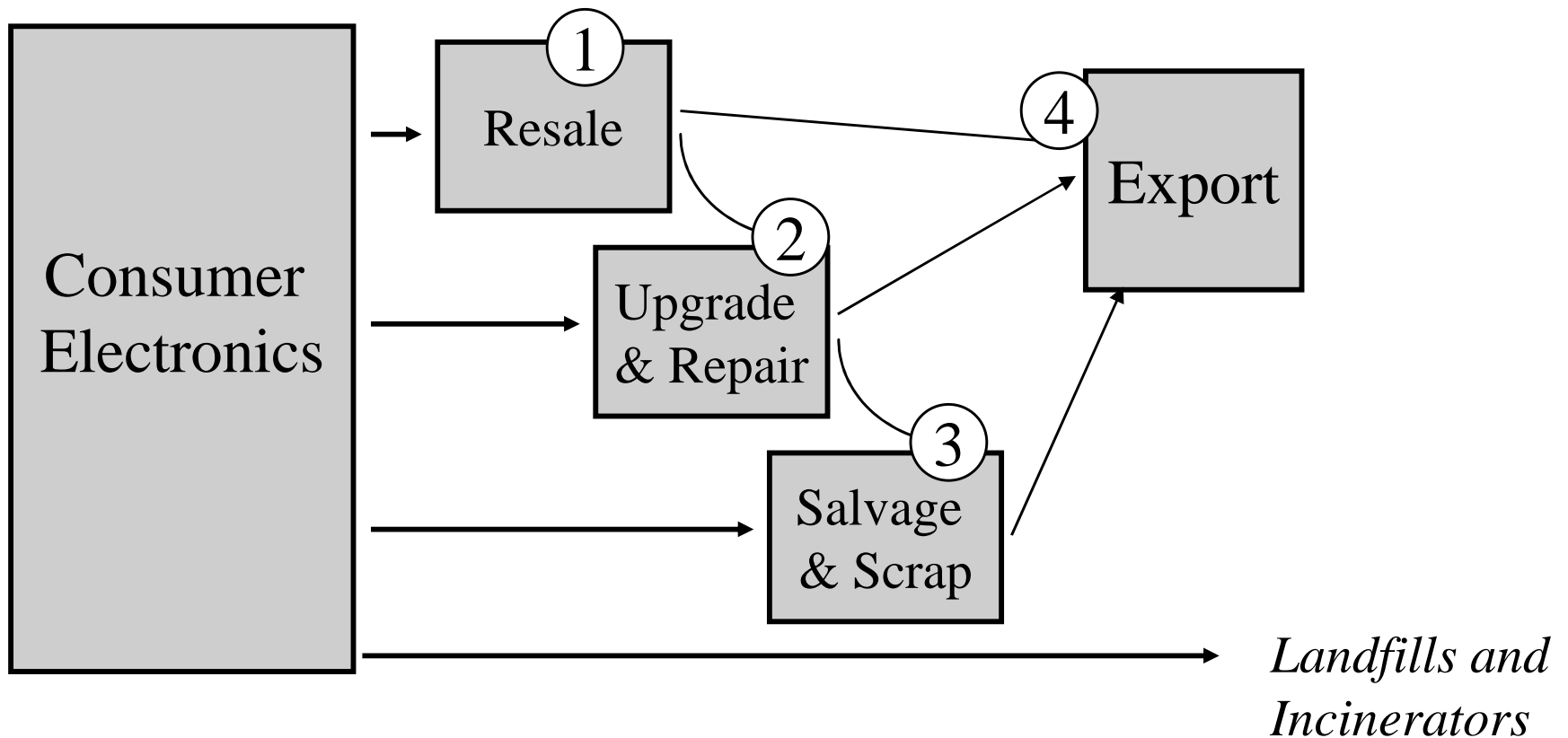
SW Enforcement

HW Enforcement

85 Solid Waste transfer and disposal facilities

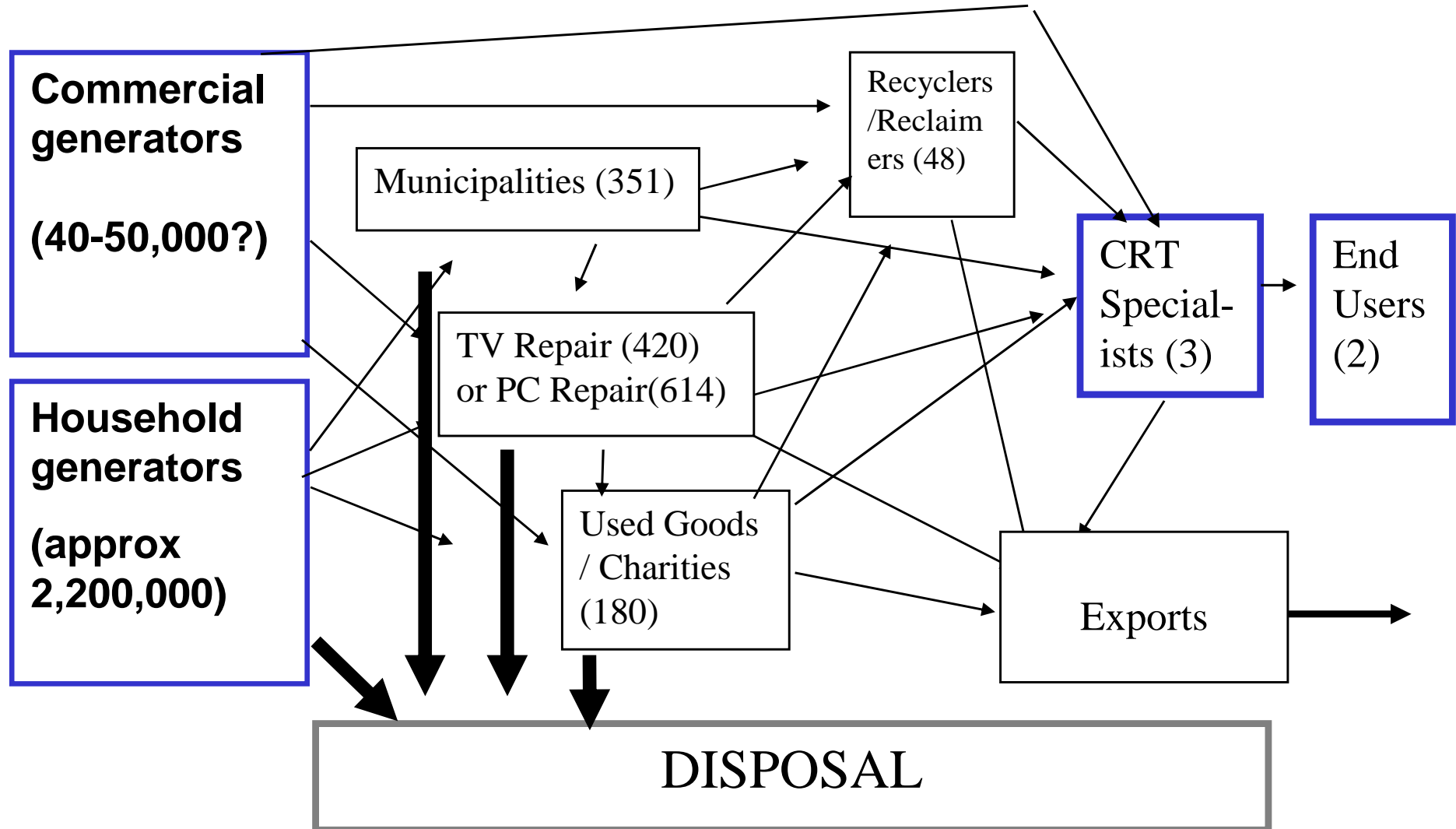
2. Develop end Markets

DEP issued a contract, jointly funded by EPA, to survey 400 TV repair shops, 600 computer repair shops, 50 electronics “recyclers”, dozens of exporters, and 400 second-hand thrift stores.



2. Develop end Markets

Market Research: Secondary Commodities infrastructure is complex. Loopholes, potential contractors, markets, and other “stakeholders” became apparent as influential players in the total system.



2. Develop end Markets

Under an state & EPA Grants, UMass performed inventories, market analysis, and recycling time studies on TVs and PCs collected from 115,000 residents. UMass became the first “permanent regional facility”, as well as a market and operations research center.



2. Develop end Markets

Other market development activities:

- grants for plastic recycling
- grants for CRT glass processing
- \$4M Recycling Loan Fund
- New “EPP” procurement language for \$50M /year state computer procurement contract

3. Establish Statewide Processing Contract

DEP selected 2 vendors to provide processing services to cities and towns for CRT and other electronics collections for the first six months.

FY1998: *PCs from state and municipal office buildings only*

FY1999: *Add 8 permanent regional facilities, 1,335,000 residents*
\$100,000, single-payer contract

FY2001: *Rebid contract for 10-12 facilities, serving 6,000,000 residents*
\$400,000 single-payer contract

3. Establish Statewide Processing Contract

- Reduced emphasis of **truck fleet** via regional centers, reduced HW transport paperwork
- Emphasized points for **reuse**
- Emphasized accountability for **lead glass**
- Standard **insurance, closure plans, record-keeping, reporting**
- **Single-payer accounting** very attractive to bidders

- 2 Statewide Processors bid 40% previous state contract cost (Onyx, ElectroniCycle)

4. Establish Regional Collection centers & contractors

DEP provided free recycling to regional centers which agreed to consolidate from large populations. University of Massachusetts at Amherst, three Salvation Army centers and three Goodwill charitable donation centers signed up.

Part of the purpose of these regional collection programs was to demonstrate a manageable logistical flow to potential state contractors. More contractors could bid on trailerloads from central locations than could put out a truck fleet for 351 municipalities.

Existing small contractors, such as white goods collectors, were also set up as “3rd Party” collectors eligible to deliver on municipalities behalf to the state contractors. Two of these collectors later went on to invest in processing capacity, and bid on state contracts.

1999	Pop.Served*	Since	Tons/Date				
UMASS AMHERST	115,329	October	14.58	GLOBAL RECYCLING		54.15	
GOODWILL BOSTON	825,599	March	0				
GOODWILL SPRINGFIELD	190,835	January	13.04	108,300	LBS TO DATE	61%	
GOODWILL PITTSFIELD	62,234	April	0	70,000	EST. OTHER GLOBAL AC	39%	
SALVATION ARMY SAUGUS	756,372	November	11.64				
SALVATION ARMY SPRINGFIELD	150,000	January	1.76				
CHICOPEE LANDFILL	150,000	November	10.75				
GLOBAL RECYCLING TECH	90,284	October	2.38				
TOTAL TO DATE	1,325,901		54.15				

4. Establish **Regional Collection centers** & **contractors**

Salvation Army and **Goodwill Industries** screen donations to see if the equipment works, but does not do complex repairs.



Equipment which does not work, or does not sell in 45 days, is placed in 8-10 pallets for collection by the state contractor



Until 2002, Salvation Army and Goodwill Industries provided free collection and screening in return for free recycling



Collect in a way which preserves repair and reuse value

Units	ReUse	% Reuse	ReUse \$	Cost
50	0	0%	0	300
49	1	2%	50	244
48	2	4%	40	208
47	3	6%	30	192
46	4	9%	20	196

Significant, but Diminishing Returns on Reuse:
The higher the ReUse %, the lower the NET value
(Resale or Technician Cost).

5. Establish single-payer system (grant program)

Transport	1	2	3	4
CRTs	Residents	Municipality	PERMANENT REGIONAL FACILITY	PROCESSOR (STATE CONTRACT)
			Pop.Served* Since	Tons/Date
487	36,504	AMHERST	UMASS AMHERST 115,329	October 14.58
581	43,587	ARLINGTON	GOODWILL BOSTON 825,599	March 0
7,657	574,283	BOSTON	GOODWILL SPRINGFIELD 190,835	January 13.04
1,331	99,858	CAMBRIDGE	GOODWILL PITTSFIELD 62,234	April 0
251	18,825	GREENFIELD	SALVATION ARMY SAUGUS 756,372	November 11.64
618	46,324	HOLYOKE	SALVATION ARMY SPRINGFIELD 150,000	January 1.76
83	6,247	LEE	CHICOPEE LANDFILL 150,000	November 10.75
76	5,663	LENOX	GLOBAL RECYCLING TECH 90,284	October 2.38
200	15,032	LONGMEADOW	TOTAL TO DATE 1,325,901	54.15
144	10,772	MAYNARD		
163	12,228	MILLBURY		
344	25,803	MILTON		
89	6,700	NEWBURY		
1,093	81,968	NEWTON		
385	28,879	NORTHAMPTON		
639	47,927	PITTSFIELD		
341	25,553	SAUGUS		
2,000	150,000	SPRINGFIELD		
32	2,397	STOCKBRIDGE	17,679	1,325,901 1999 Grantees
800	60,000	UMASS/FRK Co	82,667	6,200,000 Entire state
175	13,091	WAYLAND		
190	14,260	WESTBORO		
-		GLOUCESTER		
-		LEVERETT		

GLOBAL RECYCLING 54.15
 108,300 LBS TO DATE 61%
 70,000 EST. OTHER GL 39%
 62.87 UNION CO. NJ

6. Ban CRTs from Disposal

FY2001: Types of Collection Programs

- 7 charities
- 25 one-day events
- 4 city curbside contracts
- 100 town drop offs
- 10 back end (dump and pick) collections
- 6 intermediary electronics recyclers
- 2 retailer take-back programs
- hundreds of commercial clients, schools

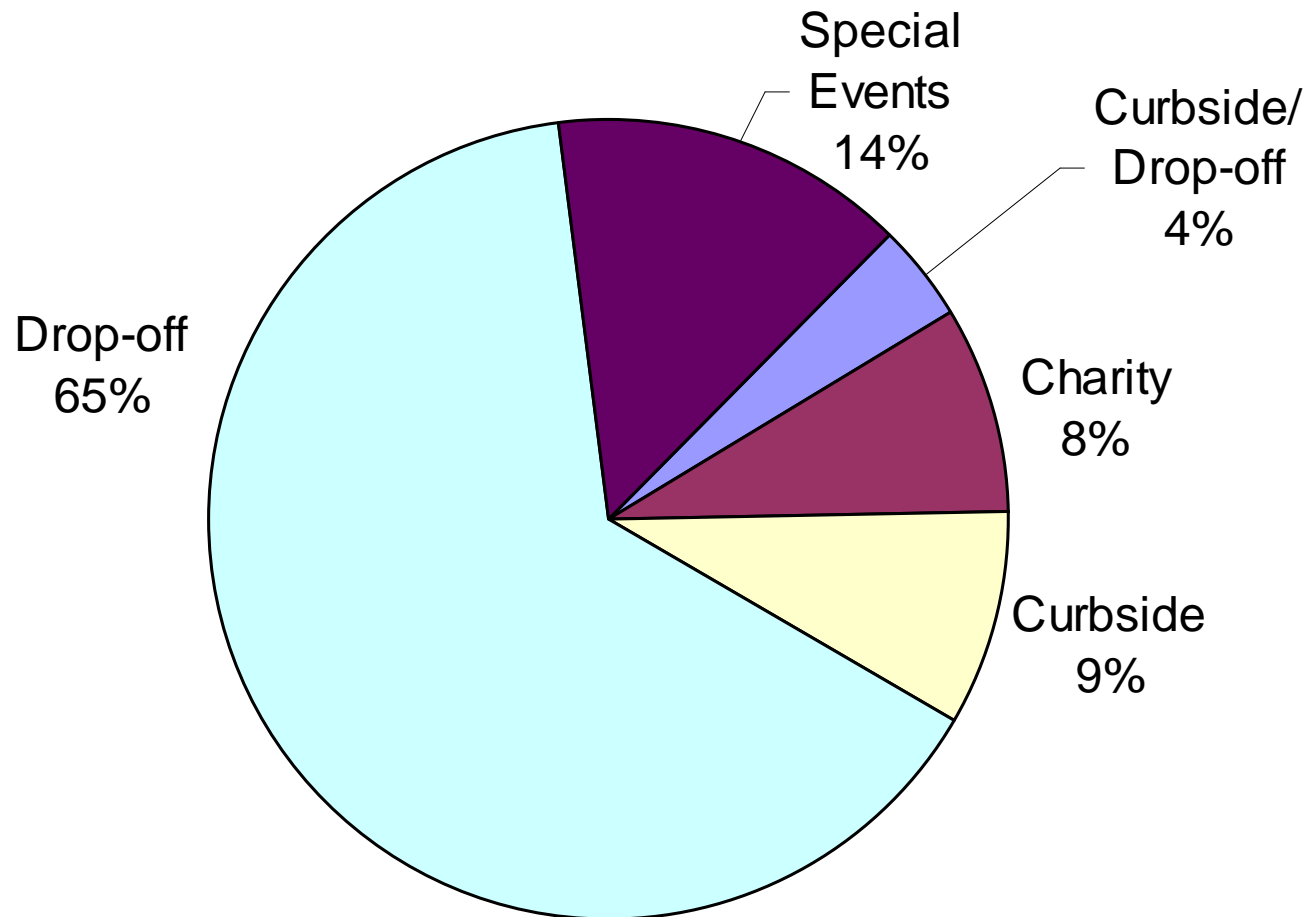


#1 Source of Material: 3rd Party Private collectors

Waste Ban in effect 12 Months. No Train Wreck.

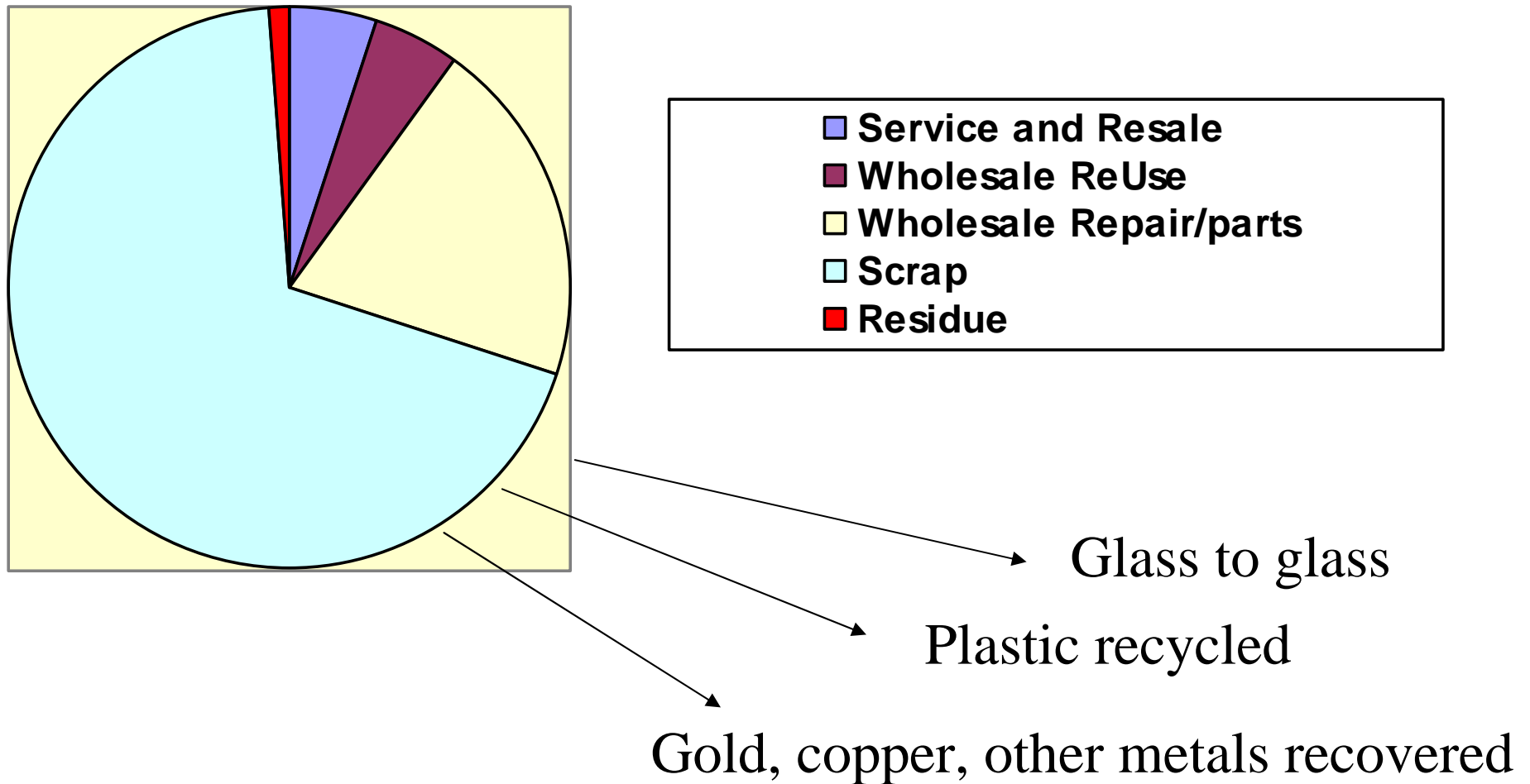
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Types of Massachusetts collection programs (not by tonnage)



6. Ban CRTs from Disposal

What happened to it



6. Ban CRTs from Disposal

Illegal dumping of CRTs no worse than tires, white goods, and auto batteries.



Illegal dumping occurs at public housing dumpsters



Small, private haulers were slower to enforce the bans, but overall haulers like removing the CRTs from the packer waste

Other States Build on MA Infrastructure

- **Vermont:** Permanent collections in all but one district; TVs included in half of programs. 2lbs per resident, close to MA. Local collector uses MA state processing contract for unrepairable items.
- **New Hampshire:** Permanent collections in the last year in ½ of state. Local collector uses MA state processing contract for unrepairable items.
- **Maine:** Contracted both MA state processors
- **Rhode Island:** Contracted MA regional collector, which now has processing facility
- **CT:** Bankruptcy of CRRA halts collections... *foreshadowing of MA?*

Problems/Lessons learned

In 1999, DEP had over \$10M budget, single-payer CRT grants cost about \$400K per year.

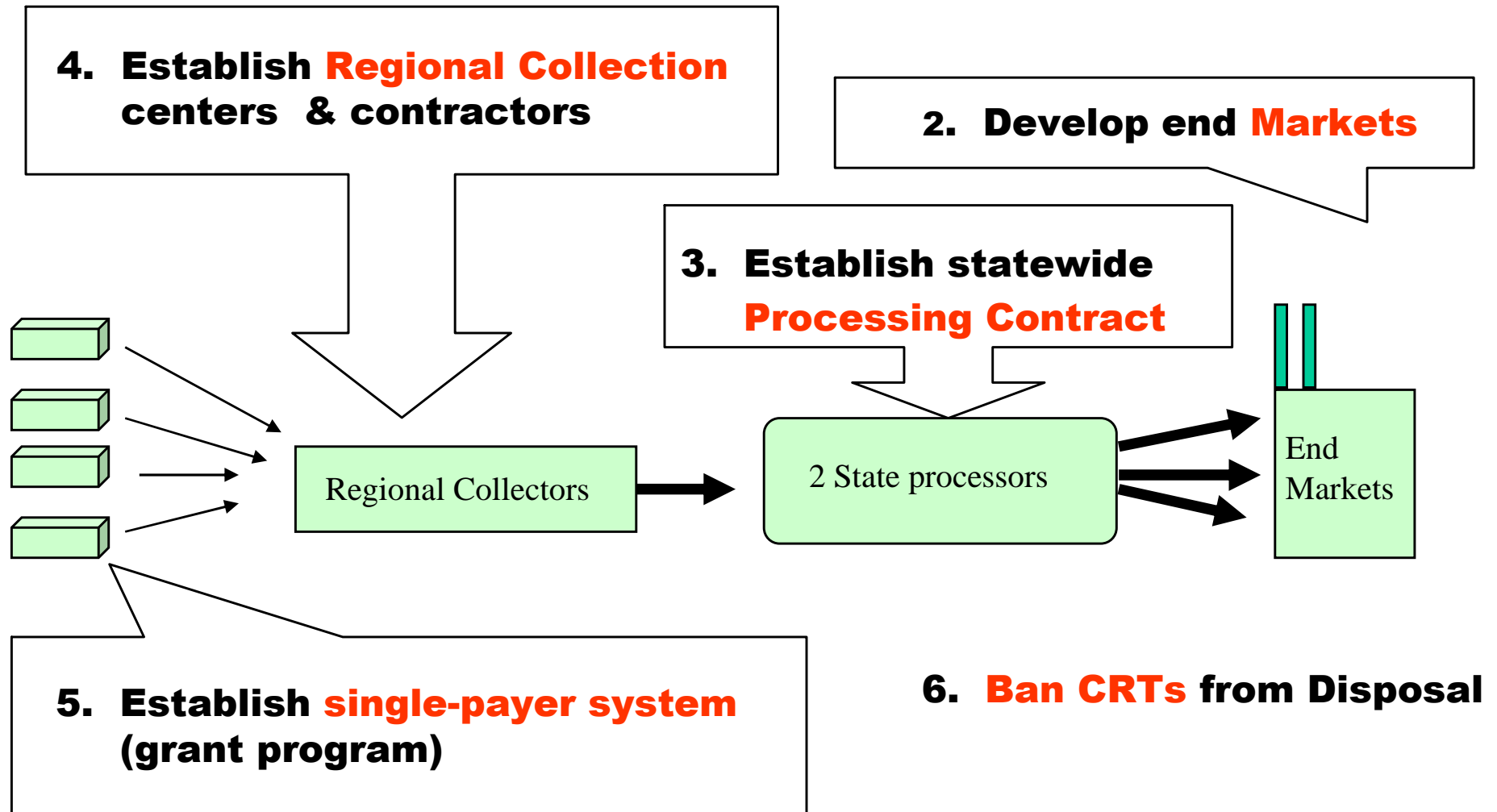
In 2002, DEP cut CRT budget

In 2003, DEP's budget was cut

Without a single payer, is being state contractor a blessing or a curse?

FY2003: State cuts program 80%. FY2004: \$0

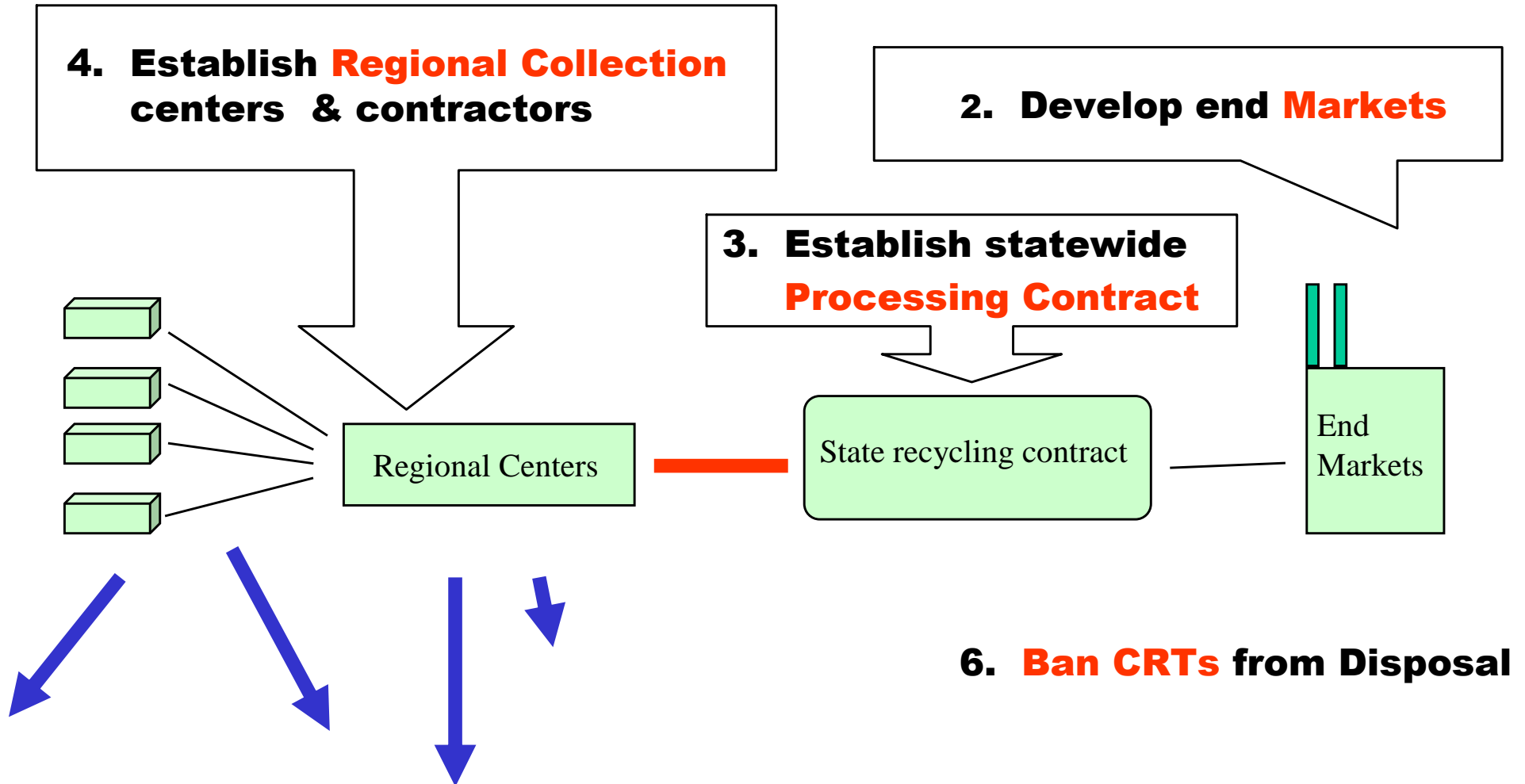
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MUNICIPALITIES and 3RD Party Haulers are on their own.

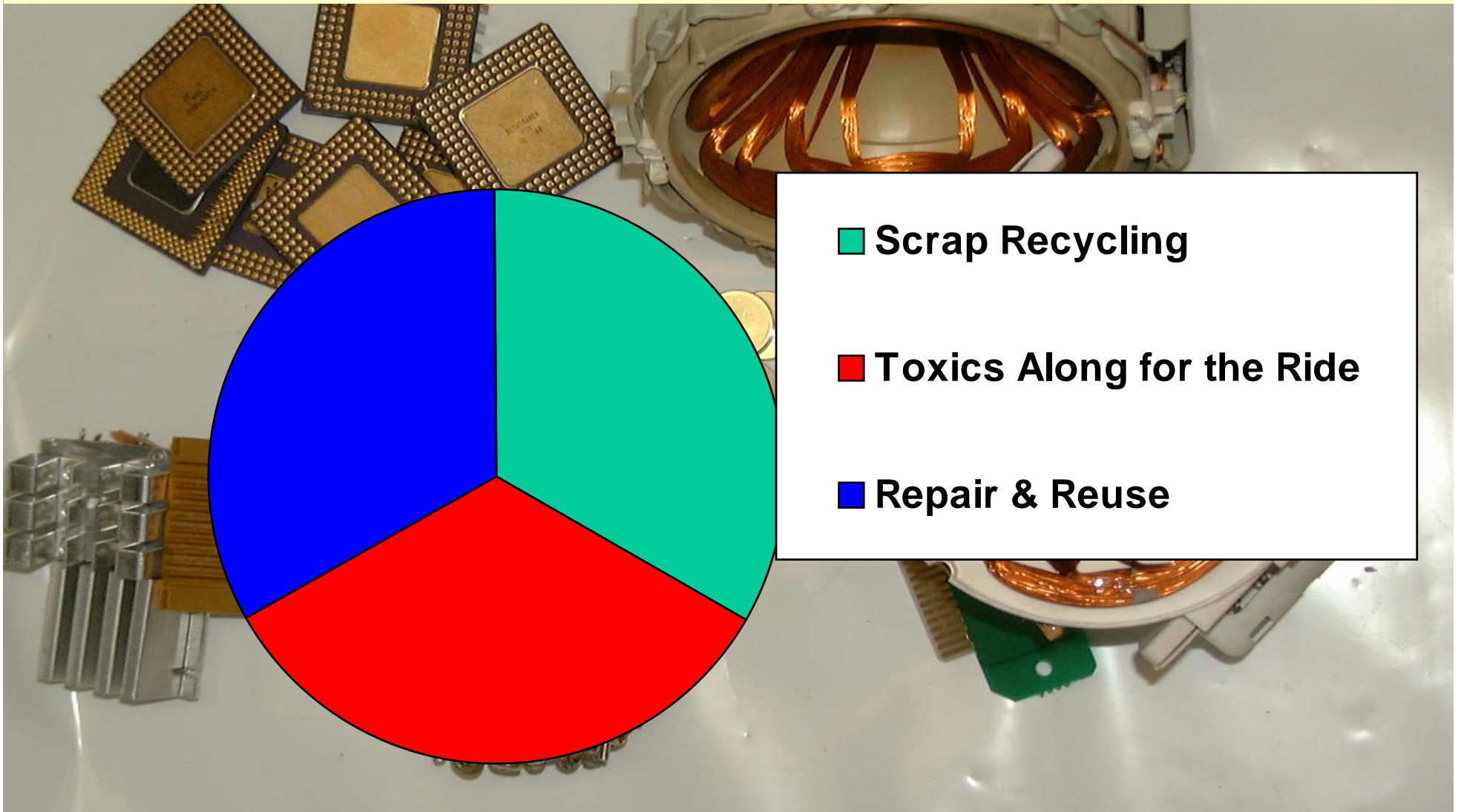
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1. Exempt intact CRTs from hazardous waste requirements



Out of state, out of country export markets win low bids.

Overseas legitimate demand for reuse and copper become an excuse for CRT dumping?



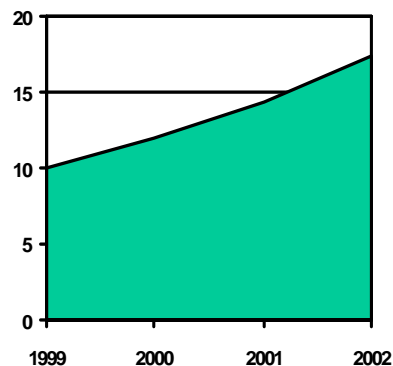
Understanding Export Forces to Asia

Reuse Forces

1. High tolerance/demand for used
2. “Free” software
3. Cheap parts
4. Good, cheap tech. labor

Recycling Forces

1. Metal demand
2. Balance of Trade
3. Cheap labor
4. Cheap env. Laws



Giant Sucking Sound

Growth in Chinese demand for copper (ore and scrap): 20% per year 1999-2002

Understanding USA demand

Anti-Reuse Forces

1. Technical Labor cost
2. Affluence
3. Software rules
4. Parts, manuals costs

Anti-Recycling Forces

1. Mining preferences
2. Labor cost
3. Population-based env. standards
4. Loss of manufacturing demand

TAR under control. We are the best at throwing things away.

How the market forces affect your Recycling Costs

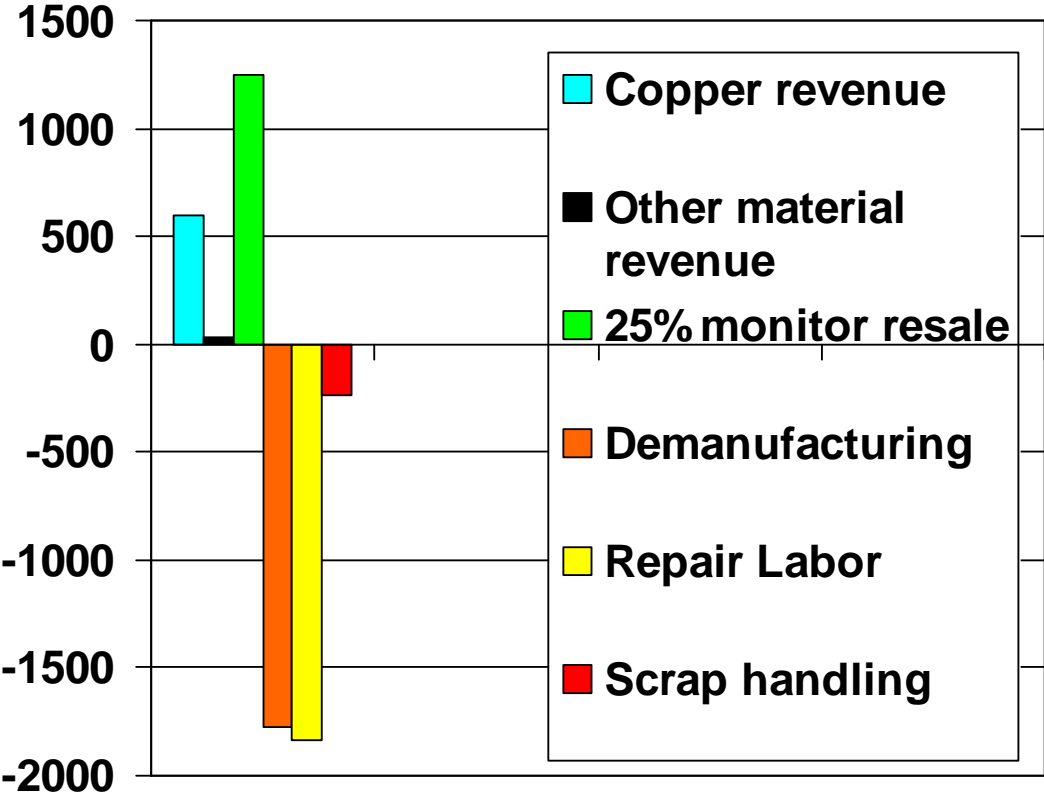
Next 3 Slides:

- USA costs currently (1000 monitors)
- USA costs with 1900 copper prices
- USA costs with Chinese labor rates



Overall USA Monitor Management

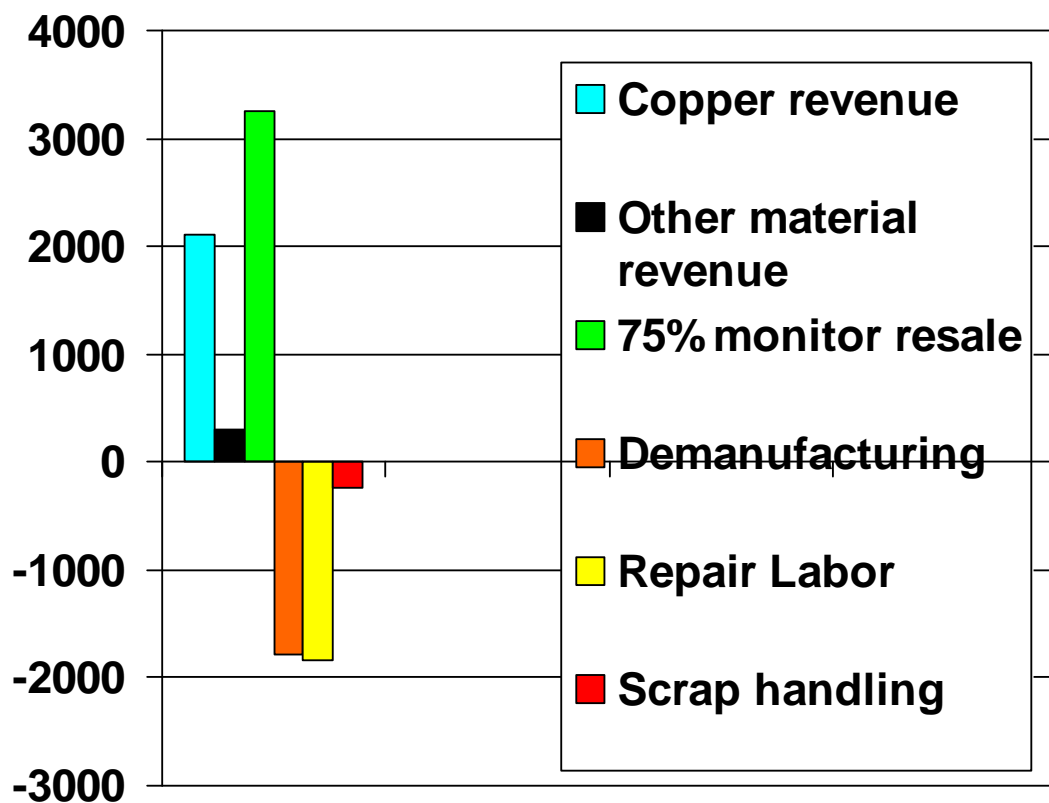
\$ spent and earned per 1000 monitors



Most demand for used is overseas

Possible USA Monitor Management

\$ spent and earned per 1000 monitors

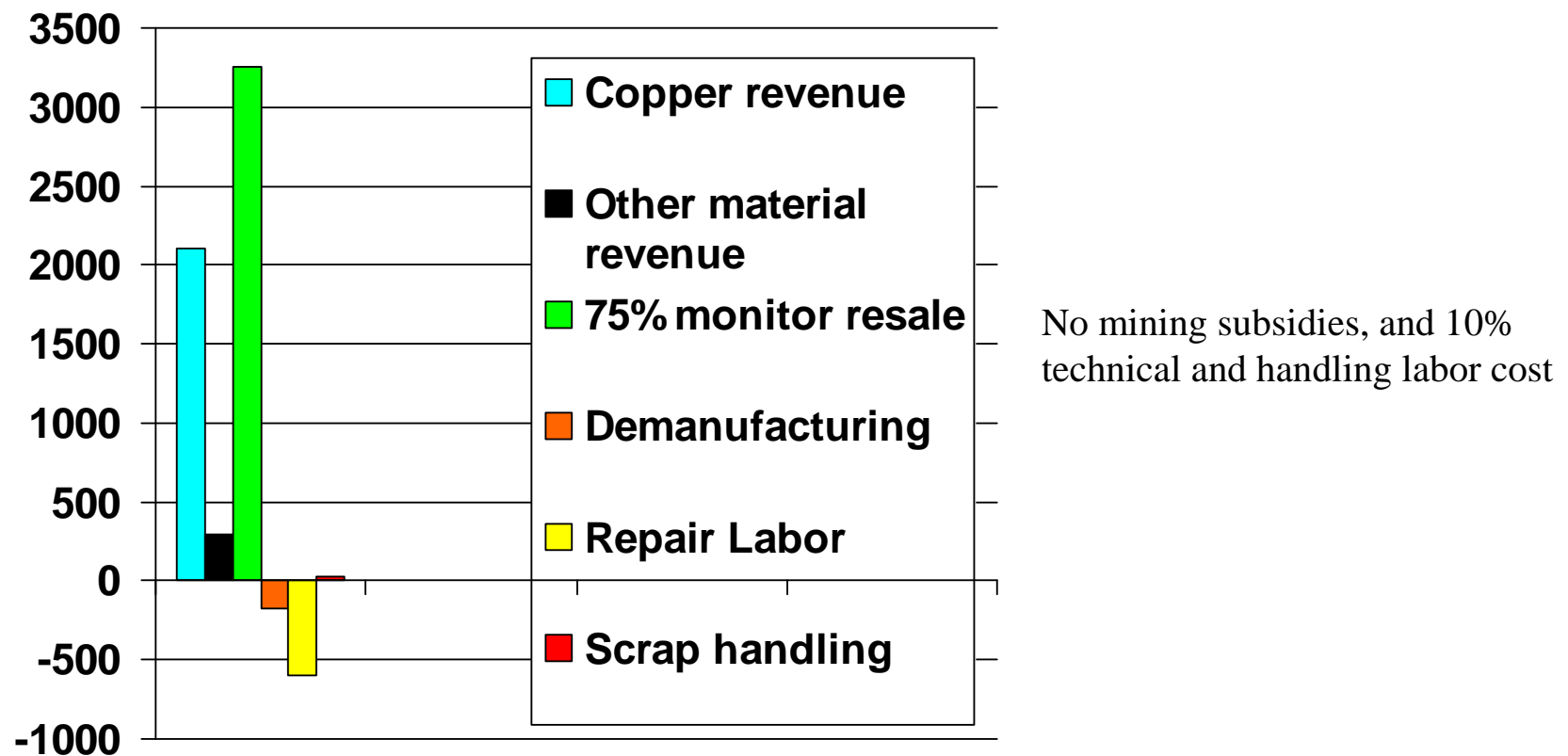


If copper and lead returned to 1900 prices, and monitors were repaired at 75% rate

Countries with high reuse and no mining subsidies have the advantage

Overseas Monitor Management

\$ spent and earned per 1000 monitors



Countries with high reuse, no mining subsidies, and low wages are the winners

CRT Glass Test - no known market in Asia for screen burned, scratched or busted tubes. Legitimate USA recyclers must be able to show where the non-repairable glass goes.

Guidance document at retroworks.com, several other sites



Better to meet demand than not to?

E-Scrap is 300% richer in copper and other metals than mined ore

Recycling produces a fraction of the pollution from mining.

Gorilla and orangutan extinction is arguably driven by electric metal mining.

One Copper mine in Papua New Guinea (feeding China) dumped 80,000 Tons Per Day of Cyanide tailings into the OK Tedi River from 1990-2000

USGS – At 1990 rate of consumption, all known copper reserves will be exhausted this century: Ocean mining will be the primary source of copper in our lifetimes.

USA Model? 95% from federal lands, \$5/acre, 14/15 largest Superfund sites

Hard rock mining produces 45% of all toxics produced by all USA industries.

Gold mining releases more mercury into the environment than mercury production and disposal combined!!!

Basic Export Lessons

REALITY: If USA exports everything, we send 1/3 reusables, 1/3 recyclables, and 1/3 Toxics Along for the Ride.

REALITY: if USA exports nothing, we destroy reuseables (and they cannot afford new); they mine to replace the recycled metals, and mining produces even more toxic harm than recycling.

SOLUTION: **Setting a Higher Standard**. USA processing, limited exports (tested equipment, copper scrap), simple tests (like CRT Glass Test); market development to promote best practices; (funded) state processing contracts with restrictions and incentives; etc.

Conclusions

6 Point Plan was effective strategy (Exports are just as high or even higher in states which have HW or UWR)

Single payer systems are great unless the single payer goes broke.

Statewide processing contracts provide a necessary backstop, and set Good rules for exports and environmental stewardship. But if no one can afford them, “the perfect can become the enemy of the good”

Bans jump start decision makers to provide access, but participation rates are high in states without bans, once access is established.

For copies and links to other resources, visit

www.retroworks.com

