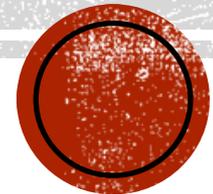




CRTS: CURRENT MARKETS AND FUTURE OUTLOOK

National Center for Electronics Recycling

Jason Linnell, Executive Director



NATIONAL CENTER FOR ELECTRONICS RECYCLING

- **Non-profit 501c3**
- **Located in Vienna, WV**
- **Involved in Federal, State & Association Projects**
- **Conduct Research, Administer Programs**
- **MIT-NCER report on US exports, upcoming Closed Loop Foundation report**
- **Partner with NERC on Electronics Recycling Coordination Clearinghouse (ERCC)**
- **Manage Oregon State Contractor Program (since 2009) and Vermont State Standard Plan (since 2014)**

- **Our Mission: Dedicated to the development and enhancement of a national infrastructure for the recycling of used electronics in the U.S.**



WHAT IS THE ERCC?

- **Electronics Recycling Coordination Clearinghouse – joint with Northeast Recycling Council**
- **Forum for coordination and info exchange, joint decision-making**
- **Voting and Affiliate Members**
 - 18 States, 26 Affiliates
- **Reduce administrative overlap**
- **Offer covered stakeholders a one-stop shop for information on state laws**
- **Coordinate data gathering and information sharing**
- **Formalize joint, but non-binding, responses on key implementation issues**
- **Main projects: eCycleRegistration, market share data reports, consumer awareness surveys**



CRTS: WHAT'S THE ISSUE?

- Old “tube-style” TVs and monitors
- Dominant weight under state programs - CRT (70-80%)
 - Most states focus on consumer collection rather than business
- Difficult to collect, transport, due to weight (largest over 200 lbs)
- Contain lead in back (funnel) glass, lead in “frit” solder sealing front and back glass
- Some low grade circuit boards, copper, steel band, plastic, BUT does not offset cost of transporting, managing glass
- Households still able to dispose in landfills in over half of states



HOW MANY ARE LEFT? RECYCLING CAPACITY?

2014 and 2015 CTA Survey and NCER Analysis:

- 46% of US households w/1 or more CRTs
- Estimated 6 billion lbs TVs, 1 billion lbs monitors
 - Down to 6 billion overall based on 2015 survey
 - Most of the decrease in TVs
- 3-4 billion collected for recycling over last 5 years
 - Around 2 billion lbs disposed in landfill over last 5 years
- How much capacity is there?
 - CTA survey by Greeneye: currently available processing capacity worldwide to take US CRT glass is approximately 503,450 to 520,050 tons per year.

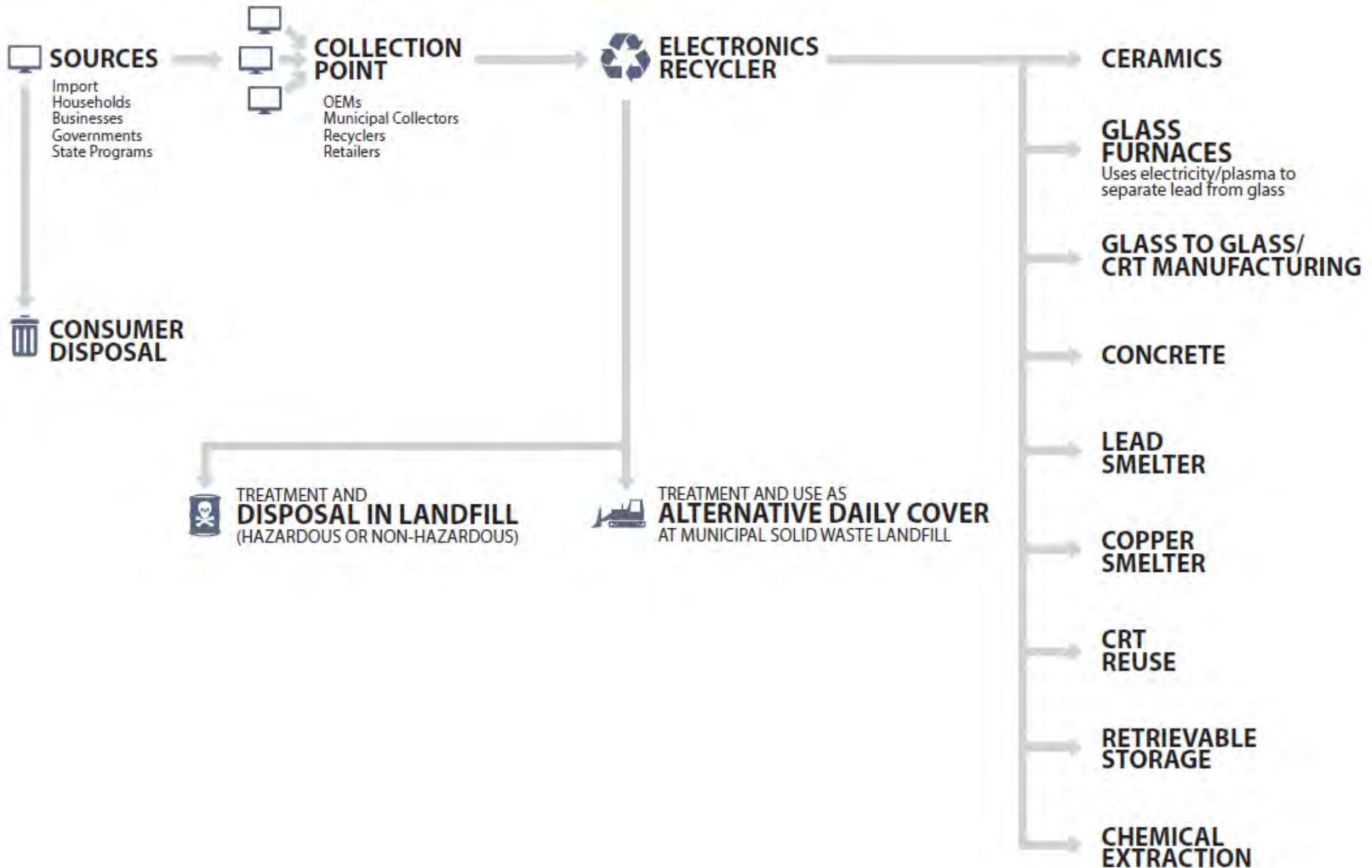


BASICS ON CRT “RECYCLERS”

- CRTs collected by numerous types of entities as “collectors”
- Then to a “recycler” after collector BUT...
- Some “recyclers” merely sort, wrap for further transport
 - May only dismantle other devices, not CRTs
- Others remove the tube, sell materials other than glass, send whole tubes further downstream
- Limited number process, separate and clean CRT glass
 - Panel and funnel separation, “washing”/cleaning
 - End with “processed glass”, “furnace-ready cullet”
- Ultimate end destination after that can be :
 - Glass for new CRTs
 - Smelters
 - Lead separation furnace
 - Ceramics
 - “retrievable storage”
 - landfill



WHERE CAN CRTS GO?



MARKETS

- Two webinars held by US EPA Region 3 and ERCC March and May 2016 on downstream markets
 - All presentations available online
- Heard from:
 - Camacho Recycling: Spain, ceramics
 - COM2, IL: Process glass into ceramic frit for tile manufacturers in Brazil
 - DP Electronics, WI: preparing facility for ceramic tile
 - Kuusakoski, IL: alternative daily cover until July 15, now dedicated storage cell for treated glass at Peoria landfill
 - Novotec, OH: glass processing and shipping to smelter in Canada
 - Nulife Glass, NY: electric furnace separates lead from glass, now running
 - TDM (Cali Resources, Videocon): glass processing, send to last CRT glass manufacturing furnace in India
- Invited but couldn't attend:
 - Regency Technologies, OH: process glass for Dlubak (other glass applications)
 - Closed Loop, AZ/OH: planning glass furnace, out of business



OTHER CONSIDERATIONS

- Hazardous waste disposal: allowed after cleaning in CA, can be paid from state fund at recycling rate
 - Other states implicitly allow as well
- Panel glass: Ask what recyclers do with it? Some old CRTs contain leaded panel, need ability to detect/separate
- State restrictions on panel glass
 - CA: still considered hazardous, special conditions
 - ME: Issues permits for beneficial use of panel in paving products
 - MN: Guidance, restricts panel used in sandblast, cement, bedding, piping; not recycling; approved uses on web
 - WI: Guidance, need permit/exemption if used in road bed aggregate/pipe bedding/drainage media
 - If permitted, could count towards goals
- Certifications: R2 and e-Stewards also limit what options recyclers may have (i.e. landfill, retrievable storage)

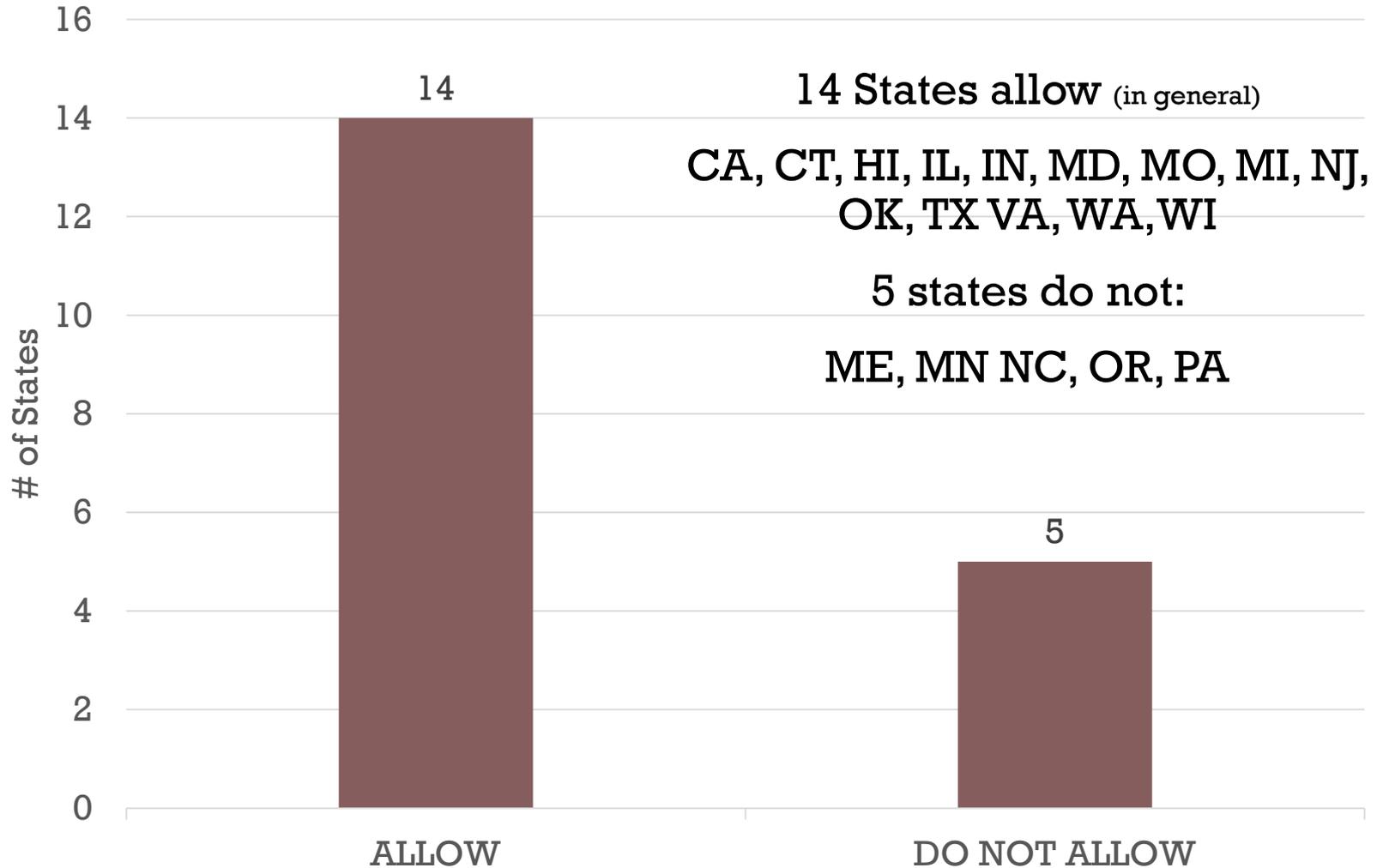


CRTS AND STATE LAW PROGRAMS

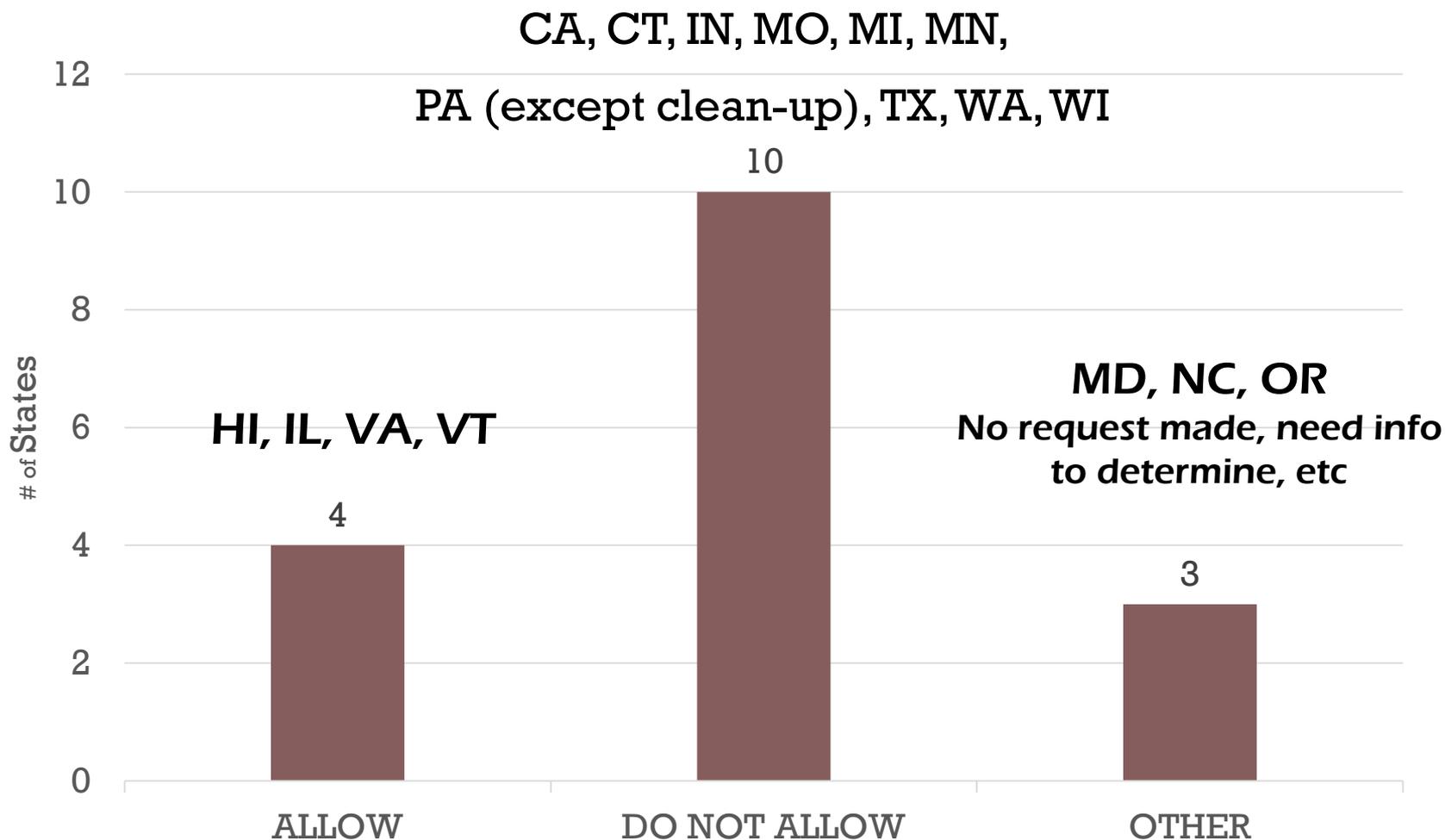
- CRTs issues not limited to state law programs, but on front lines
- Since CRTs are most costly, most often devices to be excluded from programs when cutting back
- State managers can't control flows, but do decide what "counts" for programs
 - I.e. can it go to landfill, smelting
- Manufacturers must meet goals in at least 13 states
 - If states don't count management option, OEMs won't allow recyclers to use



LANDFILLING CRT GLASS

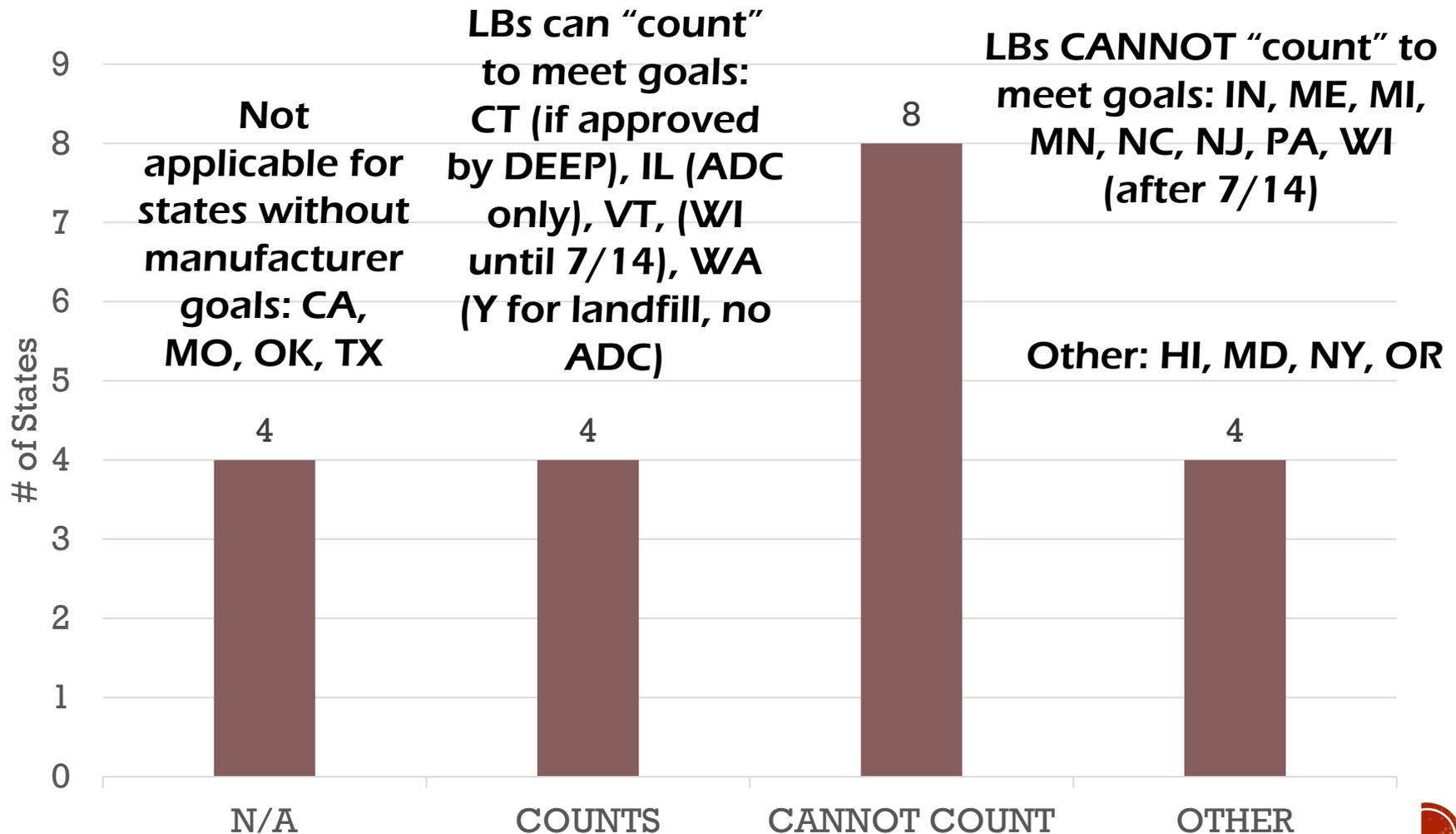


ALLOW CRT GLASS AS ALTERNATIVE DAILY COVER



Does Landfill or ADC “Count”

Just as important: certification and manufacturer/client requirements!



CRT COSTS AND IMPACT ON PROGRAMS

- CRTs add costs but contribute to recycling goals
- More cases of local programs ending collection or adding fees
 - But, fees prohibited under some state laws
- Challenges for recyclers working under manufacturers/groups
 - Targets create limits
 - Not all recyclers have manuf contracts, still collect under state law program
 - Collectors need info on whether their recycler has contracts
- Outside state laws, collectors must pay or charge fees to cover increasing costs



STOCKPILING AND ABANDONMENT

- Why? #1 Cost: Recycler bring in CRTs, not enough to pay for proper downstream
 - Mismatch between collector's recycler and manufacturer's recycler
- Changing markets
- Restrictions from certification programs, state laws, customer contracts limit options
- Time limits on accumulation
- Can lead to abandonment or dumping – at least 10-15 instances



OBSERVATIONS

- Industry claims capacity not the issue, what is?
- Need CRTs to go where the capacity is
- Under state laws, collectors need to know which recyclers have solid contracts with manufacturers/groups
- Are quick fixes really the answer?
 - #1 – just keep increasing the targets until everything is covered (but some mature programs already coming down, no collectors left out)
 - #2 – manufacturers just need to pay more (some recyclers doing fine, manufacturers don't contract with all)
- Need to keep in mind – CRT returns will slow to a trickle in the future – when? 10 years, 15 years?
- Take lessons here that may apply to mercury-backlit LCDs ramping up now



OUTLOOK

- Some ongoing discussions, analyzing new markets
- % CRTs not tapering, but some mature states overall lbs leveling off
- Markets and costs for CRTs challenging for recyclers, but also states to regulate for approval
- Need to prepare for and prevent potential further abandonment cases



Thank You!



www.electronicrecycling.org

www.ecycleclearinghouse.org

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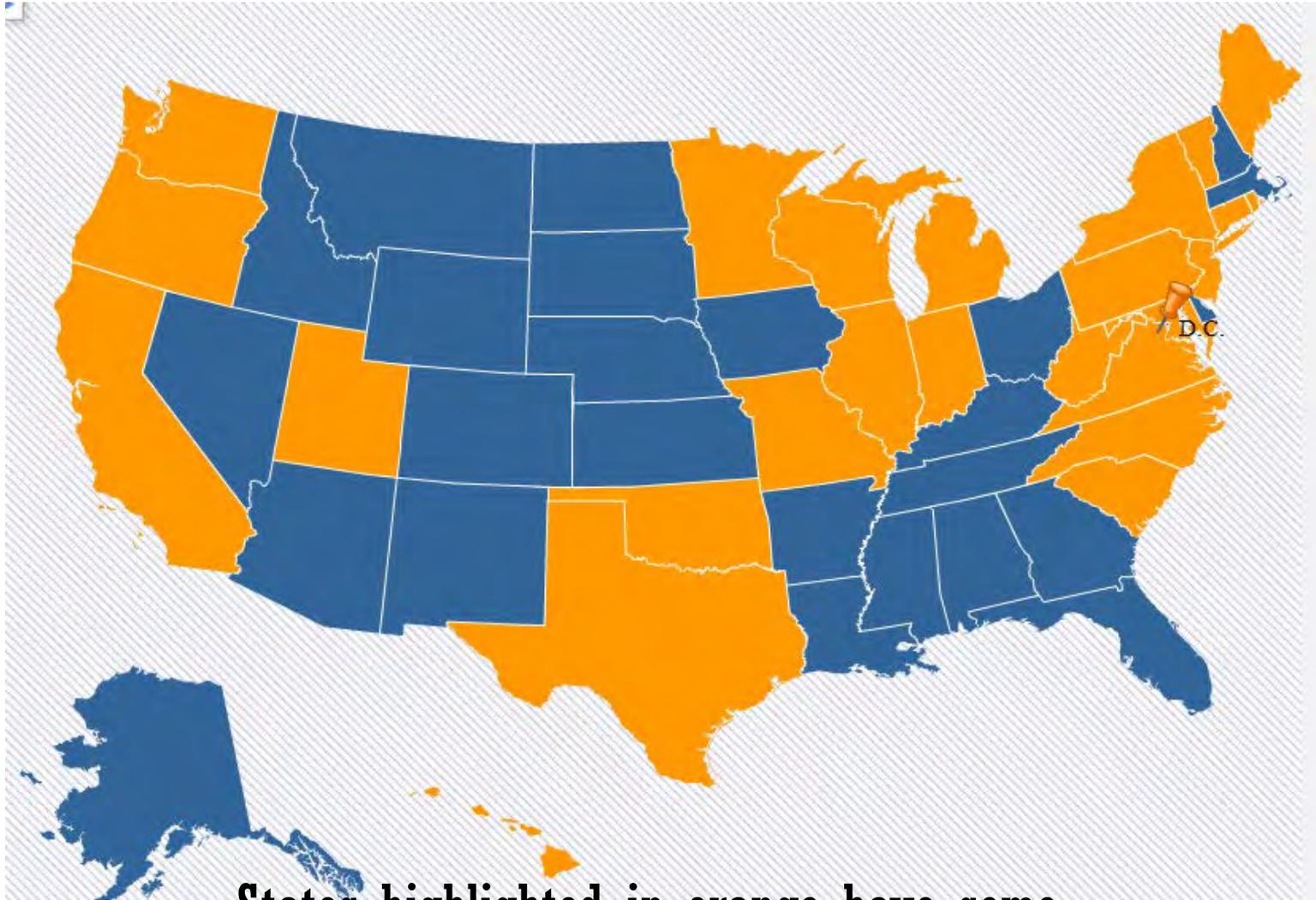
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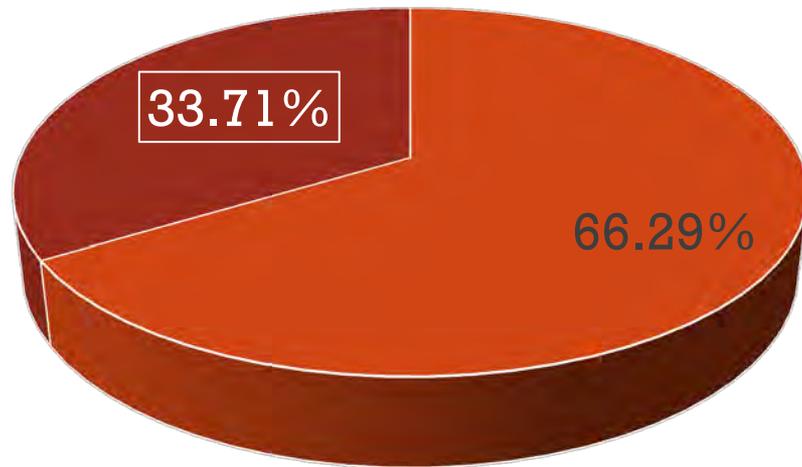
STATES WITH E-SCRAP LAWS



States highlighted in orange have some type of electronics recycling program law

25 STATE PROGRAM LAWS . . .

AND NOW DC



■ % covered ■ % not covered

- 2003: California
- 2004: Maine
- 2005: Maryland
- 2006: Washington
- 2007: Connecticut, Minnesota, Oregon, Texas, North Carolina
- 2008: New Jersey, Oklahoma, Virginia, West Virginia, Missouri, Hawaii, Rhode Island, Illinois, Michigan
- 2009: Indiana, Wisconsin
- 2010: Vermont, South Carolina, New York, Pennsylvania
- 2011: Utah
- 2014: DC

