WHAT'S BLOCKING CRT RECYCLING?

Cathode-ray tubes, found primarily in old televisions and computer monitors stashed in people's homes, are complicated to recycle — and there are fewer and fewer places doing it. Why? Each CRT contains several pounds leaded glass, which requires special handling procedures for safety and to comply with U.S. Environmental Protection Agency regulations. Even when the glass is processed properly, its low value and other market limitations make it difficult to recycle into new products.

Considering the many CRT recycling problems, which have made news since the mid-2000s, it is surprise that some recyclers have stopped accepting the problematic material. Yet others, especia those who have contracts with original equipment manufacturers under extended producer responsibility laws, still continue to handle CRTs despite the challenges. The market difficulties ar not going away, even as fewer and fewer CRTs enter the recycling stream.

The Situation So Far

If CRT market dynamics have changed at all in the past few years, they've gotten worse. CRTs ar difficult to recycle because of the leaded glass they contain, and CRT glass has essentially no commodity value. A typical CRT has between 4 and 8 pounds of lead, almost all of which is in the funnel. The leaded glass needs to be processed, stored and transported without causing environmental contamination. Recyclers typically must pay a consumer to take the panel and funr glass. At the same time, the value of the remaining commodities, such as copper wiring, plastic ar other metals, has gone down in the past few years. That makes it much harder for recyclers to absorb the costs associated with CRT recycling.

Business competition also is making CRT processing a losing proposition. Kelley Keogh, co-founc and managing partner for recycling auditor Greeneye Partners in Santa Rosa, Calif., says many recyclers accept CRTs to win competitive bids to receive high volumes of other used electronics. " order to even be considered [for these contracts], they have to be willing to accept everything und the e-scrap umbrella," she says. "When a recycler says, 'I don't handle CRTs,' the customer may

Another negative market factor is the lack of demand for leaded CRT glass. For years, CRT glass was just recycled back into new CRTs. As consumers have moved to flat-screen LED and plasma screen electronics, this market has all but disappeared. Mumbai's Videocon, the last company in t world that recycles CRT glass from North America into new CRTs, shut down its furnaces and stopped processing CRTs for five months last year. In March, Videocon announced it would start accepting CRT glass from U.S.-based suppliers again, but Walter Alcorn, vice president of environmental affairs and industry sustainability for the Consumer Technology Association (CTA), thinks that opportunity will be short-lived. "2016 may be the last year for glass-to-glass recycling fo any CRTs collected for recycling in the United States," he says.

Experts say there are other markets for the material, such as lead smelters, tile manufacturers an glass companies, but not all of these solutions will work for each recycler. Keogh says some state certification standards or contracts require recyclers to send CRT glass only to certain outlets, wh limits where a recycler can send the material. And, since recyclers typically pay consumers to take the leaded glass off their hands, some markets can be cost-prohibitive. "There is market capacity, the key is finding markets they can afford," Keogh says.

How Many CRTs Are Left?

CRT TVS WERE THE MOST COMMON TYPE OF TV SOLD UNTIL 2004. PHOTO CREDIT:SHUTTERSTOCK.COM

While electronics such as smartphones, tablets and laptops seem to have shorter and shorter live "consumers tend to hold on to TVs for more than a decade before they hit the recycling stream," Alcorn says. CRT TVs, which were the most common type of TV sold until about 2004, are still slo finding their way into recyclers' hands, and recyclers and OEMs hope to keep chipping away at th supply until it's gone, he says.

In 2015, CTA, which was then called the Consumer Electronics Association, did a survey to determine how many CRT devices might still be in use or in storage somewhere in U.S. household The study found about 34 percent of households in the United States still have at least one, down from 41 percent in 2014. The supply seems to be shrinking, but it is still substantial. The study estimates about 3 million tons of household CRT devices are still out there — 2.5 million tons of T and 500,000 tons of monitors. That's down from 3.5 million tons estimated in 2014.

According to CTA, state-mandated EPR programs are responsible for collecting about 70 to 75 percent of CRTs that get recycled. The study estimates that volume at about 350,000 to 400,000 t collected each year, though CTA's goal is to raise that collection rate to 500,000 tons annually.

Resa Dimino, senior adviser for policy and programs at the Product Stewardship Institute, says it's not clear when the supply of CRTs for recycling will come to an end, in part because different parts the country are experiencing more of a slowdown than others. Washington, which was one of the states to implement an EPR program 10 years ago, is starting to see bigger declines in volume, w states that have more recently adopted EPR programs still seem to have higher volumes, she say "We thought [CRT collection] would be a two- to three-year cycle. It now looks like it is more of a 1 year cycle," she says.

One recycler still in the CRT collection business is Regency Technologies in Twinsburg, Ohio. It collects end-of-life CRTs and other electronics from its suppliers, then processes and prepares the material for recycling. Used electronics that require further downstream processing go to "qualified and approved companies that specialize in handling specific types of material such as CRT glass, says Jim Levine, Regency's president.

Though glass-to-glass recycling is at its end, experts say several other industries can take the material. One is the tile manufacturing industry, which uses the lead as flux in tile furnaces. It can also go into construction projects such as paving and cement, or get sent to lead smelters to be turned into lead for new products.

Although recyclers such as Bill Long, chair of ISRI's Electronics Division and executive vice presid of All-Green Recycling in Tustin, Calif., feel optimistic that at least some CRT glass will find its way these emerging markets, he is cautious about predicting how big an impact these businesses will have on the overall CRT recycling sector. "The opportunities are there, but time will tell," he says.

Dramatic Downfalls

STILL HAVE A CRT TELEVISION FROM THE 1960S HANGING AROUND? THE NUMBER OF PLACES THAT RECYCLE THESE IS DWINDLING. PHOTO CREDIT: SHUTTERSTOCK.COM

As Keogh notes, with today's low scrap commodity prices, finding sufficient consumers of CRT gla at a reasonable price can make or break an electronics recycler. Failed CRT recycling operations have made headlines in recent years, either because the companies could not sustain financial backing or they could not find markets for the material. Some companies, weighed down with CRT they could not recycle or move downstream, ended up stockpiling or dumping them.

One of the most recent examples is Closed Loop Refining and Recovery in Phoenix. When it open in 2010, it promised to build furnaces in Ohio and Arizona to recycle CRT glass into separate strea of glass and lead, as much as 72,000 tons a year, and it received upfront financial backing to get t project going, *Resource Recycling* reported. Yet Closed Loop faced building delays and unexpecte costs to deploy its technology. It found itself unable to meet processing demands and ended up w huge stockpiles of CRTs — much higher numbers than the EPA allows without a permit — that caused the company to cease operating. Both locations fell behind in rent payments, leading the property owners to sue them and close the facilities at the same time the firm was being investiga for EPA violations. The Arizona Department of Environmental Quality estimates the company had stockpiled up to 25,000 tons of leaded CRT glass and 2,250 tons of whole CRTs at its Phoenix site

Other CRT recyclers have made headlines for even more dramatic problems. In 2015, a fire broke out at CRT Recycling in Brockton, Mass., and destroyed a warehouse that held thousands of CRT TVs and computer monitors. Officials say the fire was arson, local newspaper *The Enterprise* reported. Other high-profile, suspicious CRT fires happened a year earlier at three different Stone Castle Recycling locations in Utah. Stone Castle also was cited for storing broken CRT glass outdoors in open Gaylord boxes, which, when rained on, potentially allowed the lead to leach into the ground. The EPA is now leading the cleanup of one of the facilities.

A Distorted Market

The extended producer responsibility laws that promote electronics recycling also have complicat the process when it comes to CRTs. In the United States, 25 states have laws concerning used electronics collection and recycling. All but one require OEMs to pay for some or all of the recyclir electronics, including CRT monitors and TVs. Many of those states also ban the landfilling of CRT from both residential and commercial sources, Dimino says. “Some state [EPR] laws are structure such a way that they inadvertently created pressure among recyclers to keep costs down, driving people into bad behaviors,” she says. OEMs try to partner with recyclers who can get the job done the lowest possible cost, Alcorn explains. That puts a burden on recyclers who win the contracts, must figure out how to get the CRTs to their final recovery facility safely but within budget. Low commodity prices mean collectors are getting less profit for their other materials, he says, leaving less available for CRT costs.

Another problem, Long says, has to do with the way EPR laws charge OEMs for recycling prograr Companies that manufacture or sell electronics today must pay to cover the cost of recycling end-life electronics based on the weight of electronics they sell in that state. Older companies such as RCA and Zenith, which made CRT devices for decades, make fewer electronics today. And they a newer companies such as Dell, HP and Lenovo are manufacturing smaller, lighter electronics, meaning EPR laws provide funding to recycle smaller and smaller proportions of the heavy CRTs. “There’s nobody now to pay for this equipment, which has been in service for 20 years. That complicates things,” he says. If more CRTs are collected after the OEM reaches the quota, “recyc get stuck between a rock and a hard place and are asked to make up the difference,” Dimino says The entire effectiveness of the program, Long adds, “relies on you not running out of money halfw through.”

One approach to closing the funding gap is to make the CRT owner bear some of the recycling co but doing so has had a dramatic impact on collection volumes. Several electronics retailers had takeback programs that accepted CRTs for free, in part because the companies only would get cr under EPR laws for electronics it collects for free. But once they introduced a recycling fee for CR volumes decreased, Levine says. Though he believes customers should take at least some responsibility for recycling costs, he realizes it creates a barrier. “If you make [CRT collection] free and convenient, the material will flow. If you charge, it will flow at a much slower pace,” he says. “ material is out there, but most people don’t want to pay.”

Tighter Regulations

MORE CATHODE RAY TUBES WOULD LIKELY BE RECYCLED IF ORIGINAL EQUIPMENT MANUFACTURERS WERE REQUIRED TO PAY THE FULL COST OF RECYCLING THEM. PHOTO CREDIT:SHUTTERSTOCK.COM

Though CRT glass recycling is subject to EPA regulations and is subject to OEM takeback laws in half of the country, enforcement of such laws can vary, Dimino says. “A lot of state programs, onc

Experts have different ideas of how to pursue that goal, but Keogh says she has her own “perfect world” list: Glass processors would be required to have a closure plan, a permit to process glass, provide mass balance numbers regularly to a regulatory agency. They also would be subject to periodic, unannounced inspections, and recyclers would be on the hook to make sure their downstreams are “legitimate.” She says several other countries in Latin America, Asia and the European Union have implemented these regulations and have well-run facilities as a result.

Another possible solution is improving existing legislation to make it fit better with the realities — a costs — of recycling CRTs, Harris says. OEM takeback programs must address the real cost of recycling, and most often, OEMs must be the ones to pay those costs so recyclers can do the job safely, he says.

Recently, Minnesota passed a law that raised the state’s recycling performance goal and requires OEMs to cover the full cost of recycling, not just a percentage. Connecticut also has come up with EPR law that begins to address cost balancing, though it has given some OEMs heartburn, Harris says. The state sets the price OEMs have to pay recyclers, “so it’s less reflective of the market, ar recyclers are getting paid what they need to get paid to get the job done.” Meanwhile, California h addressed costs in a different way. Consumers pay a fee upfront when they buy a new electronic device, and that fee helps fund the recycling effort.

Some combination of regulatory enforcement, better funding mechanisms and creative problem-solving could be the key to moving CRT recycling forward in a healthy way, Keogh says. She and others say it could take years because legislative and cultural buy-in take time. Doing nothing is n an option, she says. “Some people say, ‘Just let it play out on its own.’ It won’t.”

Finding good solutions for CRT glass recycling will help set a precedent for the next end-of-life electronics that have their own challenges, such as used electronics that contain mercury or other hazardous substances. “There’s always a temptation to say, ‘Just landfill it all and cleanse the ma of CRTs,’” Harris says. “But what about the next generation of material, the LEDs, the LCDs?” The industry must continue to work on creating and following responsible recycling policies, he says. “ because it’s hard doesn’t mean it won’t be good in the long run.”

This article is excerpted from Scrap*, a magazine from the Institute of Scrap Recycling Industries (ISRI). Read the full article here.*

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