A new life for old CRTs

It's taken over a decade to solve the problem of separating the lead from glass in old cathode ray tubes (CRTs). **Andrea Height** meets the man who cracked it

The molten glass produced by the process can be re-used immediately without further treatment

BAD NEWS STORIES ARE BECOMING SOMEWHAT SYNONYMOUS WITH WASTE electrical and electronic equipment, be it WEEE found dumped in developing countries or industry frustration at how the WEEE regulations are working here in the UK. So it's refreshing to come across a positive WEEE story that demonstrates both innovation and dedication.

Simon Greer has spent the past 13 years developing a process that has carved him a niche in the market. The puzzle that had kept him occupied all this time was how to remove the lead from cathode ray tube (CRT) glass found in old television screens and monitors.

He's now solved the puzzle and developed a piece of kit that can take in CRTs and separate them into glass and lead so that they can be used again as raw materials.

"I've been working on the process for 13 years, so it's not been quick and it's not been easy," says Mr Greer. He was told repeatedly that such a feat couldn't be done. But his perseverance and hard work has resulted in a piece of equipment that he is immensely proud of and that he says is a world first.

"What this process allows you to do is create usable products, here in the UK, so there is no need to ship this material abroad," says Mr Greer.

Most UK CRT recyclers currently crush CRTs and ship the material to countries where CRTs are still manufactured. It is then used as a raw material in CRT manufacture. While this is 'closed-loop recycling', Mr Greer argues that the decline in the CRT market makes this a less and less sustainable solution.

"The CRT market is on its knees," he explains. "Manufacturers such as Sony and Panasonic no longer manufacture CRTs and quite simply, the market for CRTs is disappearing."

Disappearing demand

Evidence of this decline can be seen by walking into any electrical retail store, where you will see a range of flat-screen televisions and monitors which use liquid crystal displays (LCDs) – now considered the norm. Sony stopped selling CRTs in 2008 and Hitachi and Panasonic had stopped production before this. As the UK public and businesses phase out their old television screens and monitors and replace them with LCDs instead, the demand for crushed CRT glass as a raw material for new CRTs is certain to disappear, says Mr Greer.

Nulife Glass has positioned itself nicely to

WHY ARE CRTs DIFFICULT TO RECYCLE?

CRTs are made from two different types of glass, which have different chemical compositions and characteristics, which makes recycling them a difficult task.

The front part of the CRT (the panel) is made from a silica/barium glass and the rear part (the funnel) is made from silica/lead glass, which contains up to 20 per cent lead in the form of lead oxide. This is essential to cut down the amount of radiation emitted by the TV or monitor, but means that scrap CRTs are classified as hazardous waste.

intervene, offering a solution that treats this CRT waste stream by converting it from a hazardous waste to two raw materials that can be sold for remanufacturing into new products.

The business had been running two tonnes of material a day through its development plant in Stourbridge in the West Midlands, where the material and process have been tested. Leach tests on the products made from de-leaded glass show lead leaching below 40 parts per billion, and emissions tests have shown no lead or particulate emissions above background levels.

The plant also re-uses the water within its cooling system, so there are no solid or liquid waste discharges – only the molten glass and lead outputs. The lead purity is "typically better than 99.7 per cent pure" as long as optimum operating conditions are maintained. This can therefore go back into applications such as church roofs or car batteries.

"The glass can be used for flooring, worksurfaces, tiles, even cufflinks. The market for it is enormous," Mr Greer explains. It has already been used successfully as aggregate replacement in construction projects such as floor screeds. Mr Greer has also used it to create kitchen worksurfaces in his own home, as well as cufflinks for the guests at his wedding last year.

Other potential applications include road surfacing, grit blasting and higher-value decorative glass products and Mr Greer had several expressions of interest in the material as a building material at the sustainable building exhibition Ecobuild, held earlier this year.

Up and running

The next step for Nulife Glass will be the completion of a larger plant that can process 10 tonnes of leaded glass a day, which equates to around 5,000 average-sized monitors a day. This should be up and running before the summer.

Mr Greer has calculated that his plants will have a lifespan of around eight years in the UK – treating the country's old CRTs as they pass into the waste stream and equipment is upgraded. He then predicts demand in other parts of the world, including developing countries, as they follow this pattern. He calculates that one 10-tonne plant would be able to service about 6 per cent of the UK's CRT waste stream.

Plans for the business are for Nulife Glass to either sell the recycling system directly to businesses to own and operate, or for the company to set up a plant itself, if it can secure contracts that guarantee supplies of CRTs to feed the plant. But Mr Greer says he is flexible about the options and open to discussion.

He has already received interest from around 50 companies in the UK, Europe, the US and elsewhere in the world – a positive WEEE outlook indeed.

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STEP BY STEP: HOW IT WORKS

- The rear of the tube containing the leaded funnel and neck glass is separated from the lead-free panel glass (pictured above), ensuring no cross-contamination of the two different glass types.
- The panel has its phosphor coating removed and is separately treated, leaving a clean glass ready for re-use.
- The leaded glass is crushed and processed in an electrolytic converter.
- The process results in two distinct re-usable streams of clean, molten glass and lead (pictured below).
- Both can be immediately re-used as valuable raw materials with no further processing.