PGM Refiners has invested in an innovative automated process to recycle next generation e-waste. This state-of-the-art, enclosed system can recycle e-waste with mercury without any dust or vapour being emitted.

The rise of LCDs

PGM Refiners is a true end-of-life recycler of e-waste based in Dandenong, Victoria. Their primary plant is a mechanical separation system for recycling cathode-ray tube (CRT) televisions and monitors – the most common form of electronic waste (e-waste) today.

Since 2007 sales of liquid-crystal displays (LCDs) have surpassed CRT sales. The e-waste industry predicts a rapid decline in disposal of CRTs and an increase in disposal of LCD devices, otherwise known as ‘next generation’ e-waste. LCDs can be found in most electronic devices with a digital display, such as flat panel display monitors, laptops, tablets and smart phones.

The challenge of ‘next generation’ e-waste recycling

A key component of LCDs is the backlighting tube that creates the display image. This tube contains mercury compound dust and mercury vapour, which are highly toxic.

LCDs are currently dismantled manually for recycling in Australia, a labour-intensive exercise. The backlighting tubes are fragile and easily broken during the dismantling process, causing mercury vapour and dust to be released into the surrounding environment.

In 2013, Australia and 127 other countries signed the Minamata Convention on mercury – an international treaty designed to protect human health and the environment from the adverse effects of mercury.

SNAPSHOT

ORGANISATION
PGM Refiners

PROJECT
Investing in a state-of-the-art, automated process to recycle next generation e-waste while capturing mercury emissions.

OBJECTIVES
Increase the efficiency of e-waste recycling and comply with Minamata Convention by reducing mercury pollution from e-waste recycling as well as the Australian Standard AS5377 (collection, storage, transport and treatment of used electrical and electronic equipment).

STATUS
The new system will be commissioned in late 2015.

OUTCOMES
Forecast outcomes include internal business improvements, compliance with the Minamata Convention, new employment opportunities, and a best practice solution for other recyclers to responsibly handle flat panel displays that complies with EPA air quality workplace limits, the Minamata Convention and AS5377.

CHALLENGES
Finding the right technology, particularly an air sorting system to separate materials into individual recyclable streams with high productivity and efficiency.

NEXT STEPS
Get the system up and running and increase collection of feedstock to 2,500 tonnes per annum.
An opportunity to invest in innovative e-waste systems

The Minamata Convention provided the impetus for PGM to invest in a new turn-key recycling plant for the mechanical separation of flat panel televisions, monitors and general electronic material. The plant had to comply with numerous environmental acts and regulations, as well as the Australian Standard AS5377 (collection, storage, transport and treatment of used electrical and electronic equipment).

“We had the idea to invest in new best practice technologies to handle next generation e-waste, in particular flat panel LCD displays with mercury components,” says Karvan Jayaweera, Chief Technology Officer. “In this way we could provide an Australian solution that complies with the Minamata Convention and relevant Australian standards.”

Building the business case

The business case is based on a predicted increase in demand for recycling of LCDs due to the Minamata Convention. Karvan explains: “We had some concerns about obtaining sufficient stockfeed but looking ahead we think it’s likely that the Australian federal and state governments will create pressure to comply with the Minamata Convention. It is also possible that they may ban disposal of LCDs to landfill since mercury is emitted during this process.”

PGM predicts a three-year return on investment. The main outputs are printed circuit boards, plastics, ferrous and non-ferrous metals, and mercury, all of which have established end markets.

Recovery targets are likely to remain the same (>90%), however PGM’s capacity to handle LCD e-waste and general domestic household e-waste will increase. It takes 125 man hours to manually dismantle one tonne of LCD televisions (average 8kgs/unit). With the new system it only takes one hour to recycle the same amount. In addition, it reduces all of the environmental, health and safety hazards by removing the mercury vapour and dust from the e-waste.

Research and development is key

The company researched different technologies from around the world to determine what is considered as best practice. PGM also conducted in-depth trials with test materials.

“After researching and visiting several facilities and seeing the BluBox system in action in the US and Switzerland, we were comfortable that the technology was the best available in the market,” says Karvan. “I recommend looking at multiple systems before making any investment decisions.”

Returns on our investment in innovation

The BluBox system will be commissioned in late 2015. The main, forecast benefits are:

› internal business improvements
› compliance with the Minamata Convention
› a solution for other recyclers to responsibly handle flat panel displays that complies with EPA air quality workplace limits, the Minamata Convention and AS5377
› new employment opportunities.

The BluBox system is the only one of its kind in Australia and one of five operating across the world (one in Switzerland and three in the United States). PGM has exclusive rights to BluBox technology in Australia, placing the company at the forefront of next generation e-waste recycling.

An environment conducive to growth

PGM appreciates the investment support they received from the Victorian Government, particularly from Sustainability Victoria, who helped PGM to build the business case.

“The grant certainly made the decision easier,” says Karvan.

PGM Refiners worked with Sustainability Victoria to host a meeting for councils and transfer stations within the metro region to discuss their investment plans and the potential for e-waste collection and supply.

“Being in Victoria gave us industry experience in e-waste recycling and was a pathway to this new automated process.”

Karvan Jayaweera, Chief Technology Officer, PGM Refiners