Extended Producer Responsibility and Product Design

By Lynne Pledger

Product redesign

One of the desired outcomes of Extended Producer Responsibility (EPR) legislation is a reduction in the amount and toxicity of product waste. Requiring producers to pay for the management of their products when discarded gives them a financial incentive to design products that are less toxic, more durable, and easier and less expensive to dismantle, repair, remanufacture or recycle.

Can producers design waste away? There are many examples of products designed to be less wasteful. For example, in Germany—a country that pioneered EPR laws for packaging—toothpaste tubes are found on store shelves with no cardboard packaging. In some cases, the tubes have been designed with broad flat caps so they can be displayed standing on end; other brands are displayed in large open boxes with a dozen or more tubes per box.

What about reducing toxicity? Again, there are many examples of producers finding safer alternatives when faced with pressure to do so. For example, for years, mercury, a potent neurotoxin, was used in the convenience lights in car trunks and hoods. This caused a terrible problem for the steel industry when metal from demolished cars was melted to make new steel. Furnaces used in steel making are the fourth leading source of mercury air emissions in the United States. Once the problem was identified, a simple ball bearing fulfilled the function of the mercury in the switches. But there are still millions of cars on the road that contain mercury switches. Some states have passed EPR laws requiring car manufacturers to pay for the collection and safe disposition of the mercury in cars they produced.

Design change overseas

The examples of product design changes listed below resulted from EPR legislation in Japan and Europe. Voluntary changes in product design to make products easier to reuse or recycle are not included here unless there is evidence that they came about in response to the EPR movement.

The legislation relevant to the examples listed in this report are these four:

Home Appliance Recycling Law (Japan)
Waste Electrical and Electronic Equipment (WEEE) Directive (Europe)
Restriction of Hazardous Substances (RoHS) Directive (Europe)
End of Life Vehicles (ELV) Directive (Europe)

EPR in Japan

In Japan the Home Appliance Recycling Law requiring manufacturers to collect and recycle their own appliances went into effect in April 2001. Some appliance manufacturers, including Panasonic, Sharp,
and Sony, lobby against EPR in the U.S., but their respective corporate reports speak in glowing terms of the beneficial design changes that have resulted from EPR-mandated recycling of their products in their own country:¹

Panasonic built the Matsushita Eco Technology Center (METEC) in western Japan and reports, “METEC is providing feedback to product designers. Developing products that will be easier to dismantle and sort when they are recycled is an important way that Matsushita can help build a recycling society.”

http://panasonic.co.jp/eco/en/rpt2005/env03_01.html#C01

Sharp and Mitsubishi launched the Kansai Recycle Systems facility in Osaka to recycle household appliances. From a corporate report: “Kansai...holds recycling design seminars aimed at providing product design engineers with feedback from the recycling plant on how to design easy-to-recycle products.”


Mitsubishi operates the Kigashama Recycling Center in Ichikawa City and reports, “We feed information gained there back to our product design division, plus share it with other companies in the industry to raise the level and quality of environmental response.”

http://global.mitsubishielectric.com/company/environ/index.html

Sony recycles its televisions at 15 recycling plants across Japan. Sony is the principal shareholder in one of the plants: Green Cycle Corp. According to their corporate report, “Feedback from such research helps television designers and engineers create new products that are easier to recycle.”

http://www.sony.net/SonyInfo/Environment/recycling/recycle/japan/index.html

The following specific product changes are only a few examples of product changes made by these and other electronics manufacturers in Japan.²

- NEC, Hitachi, Fujitsu, Matsushita and Sony replaced plastic housings with magnesium alloy for TV cabinets and personal computers, owing to the low plastic recycling results.
- The recyclability of products through material unification and standardization of types and grades of plastics used in products has been improved. (Matsushita, Sharp, Mitsubishi, Ricoh, and Hitachi).
- Hitachi and Mitsubishi provided ease of repair and maintenance.
- Several manufacturers adopted modular designs to facilitate component re-use (NEC, Ricoh, and Fujitsu).
- Sony Ericsson eliminated the use of beryllium, anticipating future recycling advantages.

¹ http://www.computertakeback.com/corporate_accountability/doublestandard.cfm

• With Sony’s new TV, “BRAVIA” KDL-32J1 series, Sony increased its use of flame-retardant plastics that are recycled in-house.
• Sony recycles waste material from plastic optical film for use in the BRAVIA LCD TVs, with a reported 40% reduction in CO2 emissions.³

EPR in Europe

Milliken Carpets
While Milliken has a long history of interest in resource conservation, “observation of other industries being subject to increasing legislative constraint on their activities led Milliken to consciously adapt its manufacturing technology and range to enable its own products to be recycled.”⁴

• Its remanufactured carpet has been designed so that unwanted carpet tiles can be recovered, cleaned, retextured, and restyled for reuse either with the same company or at another location, leaving the rest of the carpet intact, thus reducing carpet waste.
• A glue-free carpet installation system is available on all modular carpet products; the absence of adhesive makes reprocessing easier.⁵

Vehicle Manufacturers
• Volvo, SAAB, and Volvo Trucks established lists of substances targeted for phase-out.
• The same companies worked on improving vehicle design for quicker disassembly and better recycling.
• Toyota developed thermoplastics called TSOP (Toyota Super Olefin Polymer) that can be recycled for the same purpose (instead of being downcycled) while having other properties such as durability and moldability.
• Toyota also began using polyurethane and fibers recovered from auto-shredder dust as noise buffers in new cars.
• Fuji Heavy Industry established a system of collecting glass from end-of-life vehicles and recycling it for glass wool.⁶

Caterpillar Inc.
In 1998 Caterpillar purchased the Perkins Engines Company Ltd in the UK, enabling the parent company to enter the European market.
• In 2004 the Caterpillar Perkins plant switched from manufacturing new diesel engines to remanufacturing—that is, processing a used product or components to like-new condition.⁷

---
³ http://www.sony.net/SonyInfo/News/Press/200806/08-0617E/index.html
⁴ Remanufacturing and Product Design, Designing for the 7th Generation by Casper Gray and Martin Charter, The Centre for Sustainable Design, University College for the Creative Arts, Farnham, UK
⁵ Ibid.
⁷ Remanufacturing and Product Design, Designing for the 7th Generation by Casper Gray and Martin Charter, The Centre for Sustainable Design, University College for the Creative Arts, Farnham, UK


**EPR and product design in the US**

As of this writing, 33 states in the US have 72 EPR laws covering everything from mercury products to carpeting. According to Product Policy Institute, 80% of these have been enacted since 2004. This is in contrast to Europe, where the EPR movement began much earlier in Germany with the Packaging Ordinance of 1991.

Twenty-four states have EPR laws for computers and TVs and there are some indications that manufacturers are beginning to consider “end-of-life” management issues. Dell has this statement on their web site:

> The electronics industry, as well as other industry sectors, is facing an increasing number of demands focused on reducing the environmental impacts of how products are designed, manufactured, used, and managed at end-of-life.... In order to meet these challenges, Dell established the Design for the Environment (DfE) Program to integrate environmental attributes into each aspect of the product life cycle, from supplier management during component manufacturing to end-of-life solutions.\(^8\)

In the US we may not see product changes as a result of our EPR laws until more states adopt them or the laws demand higher collection rates from manufacturers. When the volume goes up, so will the costs, and that may motivate design changes that will bring those costs down.

**Fostering Design for the Environment**

While the goal of EPR is to incentivize design for the environment, the best way to achieve that outcome is a topic of debate. As noted, **high volume of collection** is one factor because it increases costs and may prompt redesign to cut those costs. Progress in product redesign will also depend on **differentiating recycling from incineration or conversion of waste for energy recovery**.

Another factor is **fair competition for improved design for discard management**. Typically producers within a covered product category work together to fulfill the obligations of collection and reuse or recycling. One approach, called Individual Producer Responsibility (IPR) is to have producers paying end of life guarantees according to the real environmental cost of their own products at end of life.

To encourage design for the environment, the e-waste law from Washington requires the producer’s plan to include a statement about what is being done to achieve this outcome. The plan must include,

> (j) A description of how manufacturers participating in the plan will communicate and work with processors utilized by that plan to promote and encourage design of electronic products and their components for recycling.\(^9\)

---


Barbara Kyle, Director of the Electronics Take Back Coalition, acknowledging that the potential for design changes has not been reached, describes EPR as “a long-term vision towards sustainability.”

The examples of product design changes in this paper are only a sample to indicate that design change resulting from EPR is already happening. More examples exist and more will be forthcoming. It is important to catalogue them and learn from the regulations that brought them about in order to fulfill the potential of EPR to reduce the volume and toxicity of waste and the concomitant impacts on global health and the environment.

--July 2011

Lynne Pledger is the Massachusetts Solid Waste Director for Clean Water Action, and the Coordinator of the Massachusetts Product Stewardship Council.