



Extended Producer Responsibility and Product Design

By Lynne Pledger

Product redesign

Extended Producer Responsibility requires producers to plan for, and pay for, the management of their products when discarded. This responsibility for the costs of collecting and processing their products gives brand owners a financial incentive to redesign them so that they are less expensive to manage: less toxic, and easier to dismantle, repair, remanufacture or recycle. The goal is a reduction in the volume and toxicity of waste.

Can product design reduce waste? Yes, there are many examples of products redesigned 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 a reason to do so. For example, for years mercury was used in auto switches to activate convenience lights in car trunks and hoods. The hazard of using this potent neurotoxin in cars became clear when metal from demolished cars was melted to make new steel. Furnaces used for steel making became the fourth leading source of mercury air emissions in the United States. Faced with pressure to stop using mercury for this purpose, the auto industry found that the mercury's function in the switches could be fulfilled by a simple ball bearing.

Design change overseas

The examples of product design changes listed below resulted from EPR legislation in Japan and Europe, where some sweeping EPR laws have been implemented for more than a decade. 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 of product redesign offered in this paper are these four:

Home Appliance Recycling Law (Japan) 2001

Waste Electrical and Electronic Equipment (WEEE) Directive (Europe) 2003

Restriction of Hazardous Substances (RoHS) Directive (Europe) 2006

End of Life Vehicles (ELV) Directive (Europe) 2000

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.”
<http://sharp-world.com/corporate/eco/report/2005pdf/sharp24e.pdf>
- ⇒ 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.

- 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,

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

Ricoh, and Fujitsu).

- Sony Ericsson eliminated the use of beryllium, anticipating future recycling advantages.²
- 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

Europe

In Germany the Green Dot system for packaging has resulted in a number of design changes including light-weighting, elimination of non-essential packaging such as blister packs, and an increase in concentrates and refills. Other examples from Europe include the following changes in carpeting and vehicles:

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 down-cycled) while having other properties such as durability and mould-ability.
- Toyota also began using polyurethane and fibers recovered from auto-shredder dust as

² *How Producer Responsibility for Product Take-Back Can Promote Eco-Design*. www.cleanproductionaction.org

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.

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

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.

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 that 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**.

⁶ EPR: An Examination of its Impact on Innovation and Greening Products by C. Van Rossem, N. Tojo, and T. Lindhqvist. <http://www.greenpeace.org/raw/content/international/press/reports/epr.pdf>

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

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 or 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 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 to extend the lives of the products or to facilitate recycling."

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.

May 2011

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