Aiming for Sustainable Product Development

Electrical & Electronic Products

Contents:

This brochure aims to provide summary information and guidelines that can assist the electrical and electronics industry in transition to higher levels of environmental performance and Sustainable Product Development (SPD).

Each year, Australians purchase millions of electrical and electronic products (EEPs) such as refrigerators, televisions, photocopiers and computers, accounting for more than 17 million units in 1995 alone. The convenience of and benefits gained from EEPs often come at a cost to the environment: vast amounts of energy, water and detergents are consumed, as well as millions of tonnes of non-renewable resources. In addition, a potential revenue stream may be missed by not recovering and recycling materials. A substantial amount of those materials end up in landfill at the end of the product's life. As components may contain hazardous materials, they require expensive waste disposal. In some cases, these hazardous materials are inappropriately disposed of. The aim of this brochure is to provide manufacturers and designers of EEPs with a glimpse of what EcoDesign might mean for their industry and give some guidelines to its implementation.

Drivers for change

- *Exports into markets where extended producer responsibility (EPR) policies are in force*
  Australian products intended for such markets will have to meet stricter regulatory requirements, forcing Australian manufacturers to consider a range of options and strategies similar to their European counterparts.

- *Competing against green imports*
  Consumer products imported into Australia from countries with strong environmental regulations will be marketed on their environmental features to appeal to 'green consumers'. Competition from imports that are more energy-efficient, CFC-free, contain recycled materials, have low emissions, and so on, has spurred Australian product development in similar directions.

- *Multinational company policies*
  Companies within Australia that are either part of, or closely associated with a parent company abroad or a multinational company will need to recognise corporate environmental policies and platforms.

- *Pro-active decision making*
  Australian manufacturers should see overseas trends towards EPR and growing energy and water standards as indicating a likely evolutionary direction for local regulations in the near future.

- *Regulating appliance take back*
  A German law, to come into effect in 1997, requires information technology, office and telecommunications equipment manufacturers to take back new appliances at the end of the products' useful life. Sweden has a proposal to require distributors and retailers to take back all EEPs (Warmer Bulletin, March 1997). The Netherlands is drafting legislation that is expected to require manufacturers of all EEPs to take back new and existing appliances. In Australia, the Commonwealth Government together with the Australian Electrical and Electronics Manufacturers' Association are working on the development on a National Product Stewardship Agreement.

- *Overseas Energy Efficiency Standards*
  The European Union has approved a Draft Directive on Refrigeration Energy Efficiency that calls for a 15 per cent improvement within three years. (Appliance, May 1996). In the USA, the Association of Home Appliance Manufacturers (AHAM) has committed their industry to a 30 per cent improvement in efficiency by 2003. (Appliance, May 1996)

In Australia, there is growing awareness about discarded EEPs and their contribution to solid and hazardous waste. The NSW Government has already flagged the possibility of whitegoods being subject to industry waste reduction plans including product take-back schemes. EcoRecycle Victoria has specified EEPs as a priority sector for waste avoidance and resource recovery.

Life cycle environmental impacts

The environmental impacts of EEPs are not isolated to any single stage of the product life cycle. Nonetheless, with very few exceptions, the major environmental impacts associated with EEPs occur during their use and operation. For example:

- energy use – significant contributions to greenhouse gases and climate change
- water consumption – depletion of resources, contamination and disposal issues
- detergent use – water and water-systems pollution
- emissions to air – associated with ozone depletion
- waste management – disposal of resources can lead to lost economic opportunities (non-recovery of precious, scarce or non-renewable materials at the end-of-life stage. Toner cartridges and hazardous and toxic wastes (e.g. mercury, cadmium, lead) can contribute to a range of environmental and human health problems.

The life-cycle impacts of EEPs also vary according to the specific product. Research by governments and industry in Europe, North America and Japan has clearly established that EEPs lead to a range of environmental impacts across their life cycle (although some are difficult to quantify). We need to be cautious in generalising about the nature of environmental impacts but, broadly speaking, full life-cycle environmental assessments show energy consumption is the main environmental impact.

Adopting a life-cycle approach toward identifying, assessing and comparing the relative environmental impacts of particular EEPs is of paramount importance.

Design strategies

Design for minimal energy consumption

- minimise standby power consumption
- minimise warm-up time
- power down as far as possible, as fast as possible, after use
- minimise operational power requirements
- use efficient power supplies
- for equipment that uses paper, provide double-sided copying and printing
- ensure controls for energy-saving features are easy to use
- evaluate usage patterns to identify the potential to store useful heat; carry over energy for next task
- minimise heat losses and gains
- incorporate lightweight moving components
- optimise system efficiency under the likely range of usage, including standby energy, part-load operations
- where water is heated, minimise volume and heat losses and recover waste heat
- where heat must be transferred, optimise the process
- where ducts or pipes are part of the system, optimise insulation and size
- ensure where relevant products comply with the energy efficiency star rating scheme and that 'point of sale' labels are clearly displayed and promoted.

Design for water efficiency
Many of the principles listed above also apply to water efficiency. The aim at all times should be to minimise water usage – in production, use and re-use. Water should be recovered and re-used. Consumer use of a product is also critical. The 'AAA' Water Conservation Rating Scheme and associated labels can encourage consumers to buy the most efficient product but consumer education is also required to ensure that the product is used in the most efficient way. Both energy and water labels are in place

Design for durability
The designer should specify durable materials. Products should also be designed to allow for future upgrades, particularly of electronic products, such as computers, audio-visual equipment, washing machines and other household appliances.

Design for disassembly and recycling
Complex products will need to be disassembled so that different materials can be separated for recycling. Design for disassembly can also make a product easier to repair or remanufacture. Design for recycling means that the materials used to manufacture a product could have a secondary use, either for the same product or for a different product. Design for disassembly, reducing the diversity of materials, and labelling polymers are important in improving the potential for recycling EEPs.

Design for remanufacture
Remanufacturing is an important strategy in avoiding waste. Re-manufacturing involves collection of used products, disassembly, replacement of damaged components, assembly and resale. Products that are remanufactured include photocopiers and toner cartridges. Consider setting up strategic alliances with other organisations to facilitate collection, remanufacture and/or recycling.

Increasingly there is considerable discussion about product-service strategies and how the total volume of manufactured products might be reduced through dematerialisation and maximising materials efficiency. It's therefore important to carefully understand the functional aspects of conventional products and explore the potential for designing new, sustainable services as opposed to simply redesigning existing products.

Relevant publications

- Gertsakis, J., Lewis, H. & Ryan, C., *A Guide to EcoReDesign™ Improving the environmental performance of manufactured products*, Centre for Design at RMIT with Environment Australia, Melbourne, 1997 (manual and video).
- Gertsakis, J., Lewis, H. & Ryan, C., *An Introduction to EcoReDesign:™ Improving the environmental performance of manufactured products*, Centre for Design at RMIT with Environment Australia, Melbourne, Reprinted 1998
- Gertsakis, J. and Ryan, C., *Short Circuiting Waste from Electrical and Electronic Products*, Centre for Design at RMIT, 1996.
- Gertsakis, J., Reardon, S. and Sweatman, A., *Appliance Reuse & Recycling: A Product Stewardship Guide,* Centre for Design at RMIT, 1999
- Banfield, M., *Appliance Recycling Project: Pilot Disassembly Plant for Whitegoods,* Email Major Appliances, Bayswater, March 2000
- *Waste Generation and Recycling Survey in the Electrical Equipment and Appliance Manufacturing Sector,* Meinhardt, Melbourne 1999.
- *Designing for the Environment: A Design Guide for Information and Technology Equipment,* American Plastics Council, Washington DC, 1995.
- Cooper, T., *Beyond Recycling: The Longer Life Option*, New Economics Foundation, London, 1994.

Web sites

Centre for Design at RMIT University
http://www.cfd.rmit.edu.au

EcoRecycle Victoria
http://www.ecorecycle.vic.gov.au

Australian Electrical & Electronics Manufacturers' Association
http://wwwaeema.asn.au

Mobile Phone Recycling Program
http://www.amta.org.au

Industry Council for Electronic Equipment Recycling
http://www.icer.org.uk

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- Sustainable Product Development for Furniture & Building Products
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