
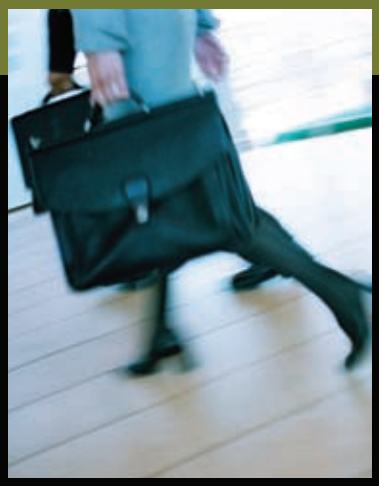

Healthy Business Strategies for Transforming the Toxic Chemical Economy

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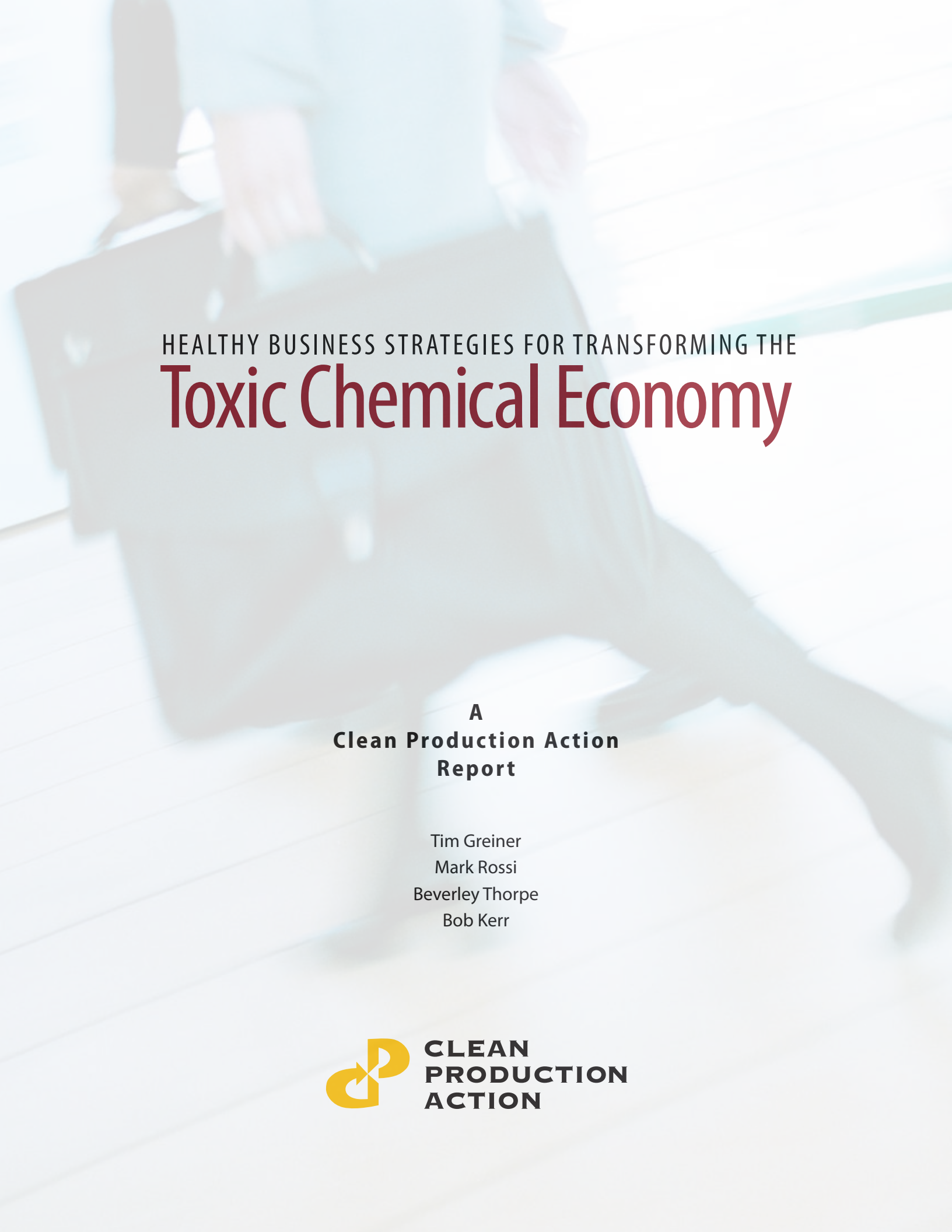

HEALTHY BUSINESS STRATEGIES FOR TRANSFORMING THE

Toxic Chemical Economy

A
Clean Production Action
Report

Tim Greiner
Mark Rossi
Beverley Thorpe
Bob Kerr

CLEAN
PRODUCTION
ACTION

Clean Production Action
Mark Rossi, Beverley Thorpe
Clean Production Action promotes the use of products that are safer and cleaner across their life cycle for consumers, workers and communities. Our mission is to advance Clean Production which we define as the design of products and manufacturing processes in harmony with natural ecological cycles, the elimination of toxic waste and inputs and the use of renewable energy and materials.

Pure Strategies, Inc.
Tim Greiner, Bob Kerr
Pure Strategies helps companies improve their environmental and social performance using clean production tools, sustainable materials, strong community relationships and transparent measures of progress.

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A project of
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Herman Miller: Healthy Chairs

Environmental Design Roots

Long before green design became popular, a culture that would nourish it had formed at Herman Miller. Product design at Herman Miller has long been seen in the light of constraints, problem solving, and long-term value. The designer Charles Eames, renowned for his "Eames Chairs", saw constraints as a constructive force in design:

> **Design depends largely on constraints… the sum of all constraints. Here is one of the few effective keys to the design problem — the ability of the designer to recognize as many of the constraints as possible — his willingness and enthusiasm for working within these constraints — the constraints of price, of size, of strength, balance, of surface, of time, etc.: each problem has its own peculiar list (Neuhart et al. 1989).**

Where constraints overlap is the space, Eames wrote, where "the designer can work with conviction and enthusiasm" (see illustration). Within Eames' framework the natural environment becomes another constraint to guide designers to products that fulfill broader societal needs.

Good design also creates value for Herman Miller. The company's founder, D.J. De Pree, defined the benefits of good design in these terms: "We came to believe that faddish styles and early obsolescence are forms of design immorality, and that good design improves quality and reduces cost because it achieves long life which makes for repeatable manufacturing" (Knoll 1975).

HermanMiller

HERMAN MILLER, INC.

Herman Miller researches, designs, manufactures and sells furnishings for offices, healthcare and education environments, and the home.

- **Founded in 1909 by D.J. De Pree**
- **Headquartered in Zeeland, Michigan**
- **6,035 employees**
- **$1.7 B annual revenue**
- **Global company with sales offices, dealers and licensees in more than 40 countries**

In 1953, De Pree extended his vision of the company beyond products to encompass the environment, stating that Herman Miller would "be a good corporate neighbor by being a good steward of the environment." That environmental awareness led the corporation to establish a comprehensive corporate-wide environmental program in the 1980s, to help found the U.S. Green Building Council in 1994, and to create its Design for Environment (DfE) program in the 1990s.

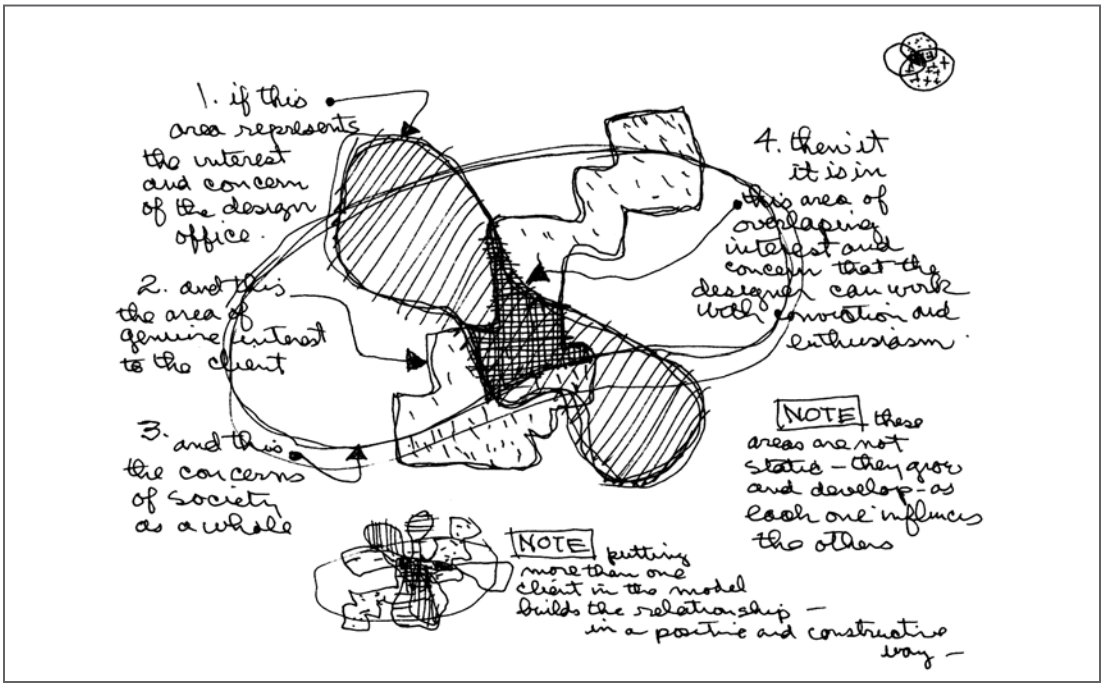
Designed for the Environment— The Mirra Chair

To integrate environmental goals into products Herman Miller established its DfE program in 1999. "Only by incorporating environment into design," explains Gary Miller, chief development officer at Herman Miller, "can we create value rather than cost." Herman Miller worked with McDonough Braungart Design Chemistry (MBDC) to create its "DfE product assessment tool," which evaluates the environmental performance of its products.

The DfE product assessment tool evaluates new product designs in three key areas: material chemistry, disassembly and recyclability. "Material chemistry" involves three core steps: 1) identifying all the chemicals in a material used to manufacture a product — such as the steel shaft in a chair — down to 100 parts per million, 2) evaluating the hazards posed by the chemicals in the material and 3) assigning the material a score of green, yellow, orange or red. "Green" is little to no hazard. "Yellow" is low to moderate hazard. "Orange" is incomplete data. And "red" is high hazard.

"Disassembly" evaluates the ease of breaking a final product — e.g., office chair — down into its constituent parts for recycling or reuse. "Recyclability" evaluates whether a part contains recycled material and, more important, whether that part can be recycled at the end of the product's useful life.

The first product Herman Miller ran through the entire DfE process was the Mirra™ chair.



Charles Eames Design Diagram (made for the 1969 Exhibition, What is Design?— at the Musée des arts Décoratifs, Paris)

HermanMiller

Over the course of the chair's development the DfE process generated a number of design changes, including: eliminating all PVC plastic, increasing recycled content in a number of components and designing the chair for rapid disassembly using common tools.

Gaining data on the chemical content of all materials used in the Mirra chair proved to be a major challenge. Suppliers, especially of plastic parts, coating finishes and colorants, were reluctant to supply the data. Only after face-to-face meetings explaining the program and signing non-disclosure agreements were most suppliers willing to provide chemical content data. In the course of designing the Mirra, one supplier did refuse to disclose the additives used to manufacture its polypropylene plastic. Herman Miller dropped the uncooperative supplier after it found an alternative supplier willing to provide the data.

Eliminating all PVC plastic from the Mirra proved to be a significant challenge. The most difficult PVC part to eliminate was the plastic "skin" used to cover the armrests. While armrests may seem like trivial components, the actual performance requirements are substantial. They include: abrasion resistance, tear resistance, UV stability and most important, comfort. The PVC-free alternatives initially evaluated included plastics made from styrene and polypropylene. But none of these plastics provided the abrasion resistance required.

As the Mirra moved closer to launch date, no alternative material had been found to PVC armrest skins. The pressure was on the Design for Environment team to find a suitable alternative. The purchasing team wanted to stay with PVC because it was a known entity on performance and cost. The product team wanted to launch the Mirra with PVC armrest skins and then develop an alternative. Yet the DfE team knew that changing design after product launch would be difficult: engineering resources for evaluating alternatives would be reallocated to new projects and the cost baseline would be established using PVC.

At the last moment, the DfE team found a thermoplastic urethane (TPU) plastic that met all the performance measures, although at a slightly higher cost than PVC. Senior management decided that the somewhat higher costs of the TPU armrests were justified to have a completely PVC-free chair and were offset by other material choices that had lowered costs.

Based on the DfE product assessment tool, which creates a scale of 0-100 percent, with 100 percent being a truly cradle-to-cradle product, the Mirra chair achieved a score of 71 percent. The areas of greatest success were in the use of recyclable parts (96 percent of the parts by weight are recyclable) and ease of disassembly (93 percent of the product by weight can be readily disassembled).

The areas of greatest challenge were in the use of recycled content (42 percent pre- and post-consumer recycled content by weight) and the use of materials with a green chemistry composition (the chair has 69 percent green chemistry composition).

The recyclability score reflects the availability of materials, especially metals (which account for a greater percent by weight of a chair than plastics), that have an established recycling infrastructure. The disassembly score reflects the high degree of control that Herman Miller has over how the product is assembled. The design team increased its disassembly score from 40 percent to 93 percent over the course of product development by making assembly adjustments such as moving from adhered and stapled covers to slip on/off covers.

Increasing recycled content proved to be a challenge because of the plastics used in chairs. Unlike metals, which often contain some recycled content, very few plastics are made from recycled material. Additionally most post-consumer recycled plastics do not meet the performance specifications of virgin plastics. The materials chemistry score reflects the limited range of green chemicals and materials on the market. Very few chemicals have been designed to meet the second of 12 Principles of Green Chemistry: "to be fully effective, yet have little or no toxicity" (see Anastas & Warner 1998).

Redefining the Terrain of Competition

The Mirra chair met with widespread acclaim upon its release in 2003: receiving a Gold Award in the Best of NeoCon 2003 (the premier conference for the interior furnishings sector), a GOOD DESIGN™ Award from the Chicago Athenaeum Museum of Architecture and Design in 2003, a "Top 10 Green Building Product" in 2003 from the *BuildingGreen* magazine, named one of the best new products of 2003 by *Fortune* magazine and a Silver-

Mirra Parts. Left: recyclable parts, 96% by weight. Above: non-recyclable parts (4% by weight)—mixed plastic armpads (white parts), seat pan, and leaf springs (black parts)

HermanMiller

Award from the 2004 Industrial Design Excellence Awards (IDEA).

The model of product design developed for the Mirra is being extended to other products. Most notable is "Kira," a proprietary office panel fabric made from 100 percent renewable, bio-based fiber derived from the plant sugars of corn (see Interface case study). The 2004 launch of Kira netted Herman Miller another Gold Award at NeoCon.

Since DePree set Herman Miller on the path to environmental stewardship in the 1950s, senior management support for the environment remains high. On the DfE side, Herman Miller has committed to using the DfE product assessment tool for evaluating all future products and for re-examining existing product lines. A challenge goal set by President and CEO Brian Walker is that 50 percent of all sales in 2010 must be from products that meet the DfE protocol, including:

- Contain no "red" materials — i.e., contain no highly hazardous chemicals.
- Are easily disassembled.
- Maximize recycled content and recyclability of materials.
- Contain no PVC.

Sixty years after the first Eames chair, Herman Miller is still redefining the terrain of competition, this time with quality design that meets demanding environmental specifications.

Healthy Business Strategies
for Transforming the Toxic Chemical Economy

Business leaders are creating value by embedding concerns for human health and the environment into their products. Healthy business strategies differentiate a company's brand from its competitors — lowering costs, enhancing consumer and employee loyalty and increasing market share by creating healthier products for people and nature. For these leading companies, using environmentally preferred chemicals and materials is a core value, not a secondary assignment relegated to the periphery of the company.

This report profiles six companies that are crafting healthy strategies for using chemicals and materials in their products. While their individual actions to address toxic chemicals vary, their best practices, when gathered together define the terrain of healthy chemical strategies:

- Identify all chemicals in products.
- Eliminate high hazardous chemicals.
- Strive to use only green chemicals.
- Commit to product re-design.
- Take responsibility for products from cradle-to-cradle.
- Adopt internal chemical policies, including the precautionary principle.
- Work collaboratively with environmental advocates.
- Publicly support government reform of chemical policies.

These strategies exemplify the approaches companies must take if they are serious about creating a healthy chemical economy.

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P.O. Box 153, Spring Brook, NY 14140
www.cleanproduction.org