



Sustainable Products for a Sustainable Planet



In the 1980s the Environmental Protection Agency urged everyone to reduce, reuse, recycle, in that order. Since then, individuals and corporations alike have responded by becoming more “eco-efficient,” minimizing their impact on the environment by reducing the amount of waste and pollution they generate. Many companies have increased their use of recycled materials and “lightweighted” their products; aluminum cans, for example, weigh 40 percent less than they did 10 years ago.¹ Source reduction—using and throwing away less—nearly doubled between 1996 and 2000, thereby avoiding a 25 percent increase in waste generation.² Only 10 percent of garbage was recycled in 1980; that rate had increased to 30 percent by 2000.³ And toxic chemical releases into the environment decreased 54 percent between 1988 and 2001.⁴ That’s pretty good progress.

But if the goal is sustainability—which, in its purest sense, means meeting the needs of the present without compromising the ability of future generations to meet their own needs⁵—then what can be achieved through eco-efficiency alone is not enough. How can it be when each American generates 4.5 pounds of trash a day?⁶ Or when over 30 tons of waste are produced for every 1 ton of product that reaches the consumer and then 98 percent of those products are thrown away within 6 months?⁷ Or when 6.16 *billion* pounds of chemicals are still being released into the environment?⁸ It can never be enough, according to Bill McDonough and Michael Braungart, authors of *Cradle to Cradle: Remaking the Way We Make Things* and principals of MBDC (McDonough Braungart Design Chemistry). That’s because “it works within the same system that caused it in the first place...It presents little more than an illusion of change. Relying on eco-efficiency to save the environment will in fact achieve the opposite—it will let industry finish off everything quietly, persistently, and completely.”⁹ Eco-efficiency is still a depletive approach. It’s baby steps, when the world needs a giant leap.

Eco-effectiveness is that leap. It’s a “cradle to cradle” paradigm in which “human industry...is regenerative rather than depletive,” say McDonough, an environmental designer, and Braungart, an environmental chemist. Aspiring to be 100 percent good rather than “less bad,” eco-effectiveness is modeled on nature, where nothing goes to waste. One organism’s waste is another’s food. Because the “take-use-dispose” (or “cradle to grave”) approach to products has been predominant, most products and the processes used to create them have not been designed with end-of-life considerations in mind.



The prevailing assumption is that old products go to landfills. Unfortunately, while nature is supremely effective within its own biological system, it was not designed to break down things outside of its system, e.g., many consumer products.

A company can become sustainable by putting in place two loops—biological and technical. The parts of the product itself, or byproducts of the development process, that can be used as food in the biological system are returned to nature. Everything else becomes part of the technical loop and “feeds” another product. “The materials go back to soils safely, or they go back to industry. That’s it. That’s the new paradigm,” says McDonough.¹⁰

It’s never easy to move to a new paradigm, and it’s rarely cheap. To the latter, McDonough says, “If it’s not profitable, don’t do it. Companies are businesses, not tax exempt organizations. *But*—don’t stop until you figure it out.” Regarding the former, the McDonough-Braungart team has identified four progressive steps companies go through as they work toward a model of sustainability.¹¹

1. They stop using substances known to be harmful, such as PVC, cadmium, lead, and mercury.
2. When faced with a decision between two substances that may be harmful to the environment in one way or another (either the product itself or the process used to make the product), they choose the one they determine is less harmful, based on what they *do* know. There’s a good chance that the results will be better than if the issue hadn’t been considered at all.
3. They create a “passive positive” list by doing a detailed inventory of all the materials used in a product and the substances it may give off during its manufacture and use. The substances are then rated according to how environmentally problematic they are. In this step, companies discover which substances need to be phased out or replaced first, and they are able to improve products incrementally.
4. They use the passive positive list to design new products, knowing from the beginning which parts of the products will end up as part of the biological loop and which will become part of the technical loop. This is where “we stop trying to be less bad and start figuring out how to be good.”¹²

McDonough and Braungart add a fifth step: reinvention. In a sustainable world, a car company would design a car with emissions that are actually nutritious for the environment, or even design a new transportation infrastructure.

Even organizations that understand and support the concept of sustainable product design might be overwhelmed by the prospect of implementing it. Indeed, implementation can include analyzing every part of every product for its environmental impact, conducting material flow analyses to determine where all resources come from and ultimately end up, and convincing suppliers to give up proprietary information on what goes into *their* products.

In theory, companies can undertake sustainable design as they have undertaken other big philosophical changes, such as lean thinking. Says McDonough, “It’s another set of criteria and conditions that you operate under. You simply look at design through the sustainability lens.”¹³

What follows are examples of companies who are trying to do just that. They all share a concern for the environment, but each company has its own compelling business reasons, as well. None purports to be near sustainability, but all are further along the continuum than they were several years ago. None believes that there’s an instruction book that guarantees success. As Gabe Wing, a chemical engineer on the Design for Environment team at Herman Miller, says, “We know where our ‘true north’—sustainability—is, but we’re in uncharted territory, and everyone will take a slightly different path to get there.”¹⁴ As these companies can attest, the path is rarely direct or smooth.

Nike—Living up to its brand

Based in Beaverton, Oregon, Nike is a young company with largely youthful employees (the average age is about 35), and caring for the environment is a value that’s widely shared, according to Bill Malloch, general manager, Footwear Sustainability, at Nike. That, and the fact that Nike’s corporate culture is a healthy mix of bottom-up and top-down, has meant that environmental efforts, including its successful Reuse-A-Shoe program¹⁵, have been embraced over the years. The company has placed a significant commitment on corporate



responsibility programs, recognizing that their customers had high expectations of Nike because of its “leading, youthful, pop culture” brand. “The consumer was saying that we have responsibilities beyond what we can see,” says Malloch.¹⁶

Nike realized that those responsibilities extended to the environment and that it could leverage that effort to further strengthen the brand. In 1999 an organized network of leaders from throughout the company was formed to think about how to tie environmental sustainability more directly to how Nike operates and creates product.

The subsequent cross-functional meetings were informative and inspiring but not very effective. The well-intentioned effort stalled as management pushed back. “They asked, ‘Where’s the business value to doing this? It makes us feel good to talk about, but where’s the value?’” says Malloch.

The result was that in 2000, teams responsible for sustainable product development were incorporated into each product area (footwear, apparel, and equipment). The teams set ambitious, long-term goals—zero waste, zero toxic substances, and 100 percent recoverable product¹⁷—and started working toward them.

But if there’s ever a case of the devil being in the details, sustainable product design is it, starting with the question, “What is toxic?” To illustrate the point, Malloch says, “You can die if you eat too much salt.” And depending on how a company defines toxic, things may not be what they seem. For example, while chromium is considered the major culprit in tanning leather, energy use, water discharge, and disposal all need to be taken into consideration. “It’s more complex than just one easy answer. You have to look at all the impacts in the manufacture of a material,” says Malloch. “It’s not just in product, it’s in process. And then the question is how far back in the supply chain do you go? How far reaching is your spread of ‘zero toxic’ and what is zero?”

And even, what is waste? A few years ago, Nike decided that waste included product, process, and facility waste, which meant that even fluorescent-light waste from the factories was included in their waste numbers. Eventually, they narrowed their definition of waste to include only product-related waste so that the whole effort would be more manageable.

Scoping the effort is important, says Malloch, and so is deciding how to measure success. Just as not all areas of the company have the same financial metrics, they don’t all have the same sustainability metrics. For Footwear Design and Development teams, Nike created a very simple metric system where select models receive a score that’s based on its use of environmentally preferred materials, the efficiency of its manufacture, and end-of-life considerations. “There’s a lot of detail behind those three things,” says Malloch. “What designers need to know is that the next shoe they design should have a better score than the previous one.”

To help designers do that, Nike has put together a quick reference guide on preferred materials and processes. “Designers have been asking us to get out of Conceptual Land,” says Malloch. “The guide cuts to the chase and focuses the conversation for designers and developers.”

Malloch believes that a good way to make progress toward sustainability is to jump in and start trying things. “Make mistakes, learn from them, and as you do, you’ll begin to understand how this fits into the company and what the company has to do in order to make it fit.” His other advice? Establish goals and clarity of direction. Keep expectations reasonable, because the road to sustainability is a long one and not everything will get accomplished in the near term. Finally, create specific steps that will translate the vision into action.

At Nike, sustainable product design is as much a business imperative as an ethical consideration. Increasingly environmentally savvy customers expect Nike to lead in this area. “Business needs to see a return,” says Malloch. “We are a visible, iconic brand, and [sustainability] builds that brand. We believe that translates into consumer loyalty.”

Visteon—Leapfrogging future legislation

In a global economy, legislation enacted in other countries is the equivalent of a shot heard round the world. Under the newly enacted End-of-Life Vehicle legislation in Europe, car companies must remove hazardous materials (such as lead, mercury, and cadmium) from products and components and ensure that 85 percent of the vehicle by weight is recyclable.¹⁸ In addition, at the end of the vehicle’s useful life, the manufacturer must take it back from the customer, free of charge.¹⁹

Visteon, a Dearborn, Michigan-based automotive supplier that was spun off from Ford Motor Company in 2000, is using this legislation as an opportunity to get ahead of the curve. “We want to be proactive,” says Matt Roman, environmental affairs manager at Visteon.²⁰ “If you choose only those materials that are known to be safe both during use and at the end of use during disposition, then you don’t have to worry about laws like this.”

That strategy will make Visteon more competitive in the long run: When the next piece of environmental legislation is rolled out, Visteon won’t have to revisit the issue of material toxicity. “Product development costs should go down,” says Roman. “If we can work with our suppliers to find alternatives to these substances, it will pay off. The requirements of ELV legislation have given us a window of opportunity.”

To make it through that window, Visteon must make sustainable products at the same price point as the competition’s nonsustainable products. While original equipment manufacturers (OEMs) may want to buy environmental products, they are notoriously bottom-line driven. “We have the vision,” says Roman, “but we have to show that it can be profitable for us and our customers to do this.”

They plan to do that through a pilot program in which they’ll take a new product through the product-development cycle using a cradle-to-cradle protocol. While there are efforts under way at Visteon to examine what can be done about process waste, the company thinks that developing products that are more environmentally sensitive can be its biggest contribution to the environment. For example, Visteon now makes an air filter that lasts for 150,000 miles—five times longer than traditional filters—so fewer filters end up in landfills.

One of the legacies Ford Motor Company gave to Visteon was an environmental sensitivity: “Henry Ford’s original car factory had an entire section devoted to reclaiming wooden crates and pallets, many of which were made into auto bodies.”²¹ The effort has the support of Visteon’s Chairman and CEO Peter Pestillo, who told *Green@Work* magazine, “In my view, if you don’t disassociate [the environment] from what you do, you tend to do better. We ought not have business initiatives and environmental initiatives. We ought to have solid business initiatives that embrace environmental considerations.”²²

Without upper management support, a run at sustainable product design will surely fail, but having it doesn’t guarantee success. “It gets you in the door,” notes Roman, “but you still need to demonstrate that it makes sense for the business.” Educating people about more environmentally friendly options and getting them to use a new criteria in the product-development process is hard work. Still, Roman is heartened by what he’s seen. “There are a surprisingly large number of people who are interested in moving [the sustainable product design effort] forward, even though it’s not part of their job responsibilities. People intuitively know that it’s right.”

Visteon thinks that, whether driven by legislation or something else, their customers will seek out sustainable products eventually. The company, which sees sustainable products as a way to differentiate itself when opportunities for differentiation are dramatically decreasing, plans to be ready.

Shaw Carpets—Taking up the Gauntlet

A confluence of events set Dalton, Georgia-based Shaw Carpets on the sustainable product design path: government regulations that encouraged “greening;” the establishment of LEED (Leadership in Energy and Environmental Design), a voluntary national standard for developing high-performance, sustainable buildings; and the emergence of business-savvy environmentalists who asked, ‘How can I help you make money and still be environmentally excellent?’ And then there was Ray Anderson, CEO of Interface (a Shaw competitor), who, through his book *Mid-Course Correction: Toward a Sustainable Enterprise*, “galvanized the industry and made sustainable design a competitive issue,” says Steve Bradfield, vice president of Environmental Development at Shaw Commercial Division.²³

Shaw already knew how to make nylon fibers into “food” for new carpet, but Bradfield wanted the backing to be food, as well. He wanted to make a carpet tile system that was designed for disassembly. When Mr. Bradfield read an article in *Scientific American* about an emerging way to make polyolefins (a group of environmentally preferable plastics) more flexible, he wondered if he’d found a way.

Knowing there were no guarantees that the venture would pay off, Bradfield's boss gave him \$600,000, which Bradfield used to fund a small pilot production line and a real production line. "This allowed us to test compounds on the pilot line, then move to full production if the compound showed promise," thereby saving considerable time in development, Bradfield writes.²⁴ Another \$400,000 later, they were still doing only test installations and "pursuing a polymer backing system that could possibly change a plant where nothing was broken...To the credit of Shaw management throughout the organization, we were tolerated, often encouraged, and left to our own devices to prove that we could produce a return on one million dollars of capital."

The risk paid off when the group succeeded in developing a new polyolefin carpet tile backing that doesn't use PVC, costs the same as PVC tile backing, performs better, and "shines" environmentally, says Bradfield.²⁵ The resulting product, EcoWorx, is 40 percent lighter in total product weight. Transportation costs—the literal ones to the company and the figurative ones to the environment—are lower, and there's simply less carpet-tile mass to deal with at the end of the product's life. Also, during the process used to break down the carpet tile for reuse, the polyolefin backing separates from the nylon threads more cleanly, so that both the backing and the nylon can be reused more easily. EcoWorx won the 1999 Best of NeoCon Gold Award for innovative technology and, in less than two years, surpassed Shaw's goal of making up 50 percent of its total tile backing business within five years.²⁶

Now Shaw is attempting to expand its use of the polyolefin backing. "Will we be successful? I don't know," says Bradfield. "But I'm a lot more optimistic about it than I was the first time through. That was our first trip to California in a covered wagon. When you go the next time, you know where to cross the river."²⁷

For those "crossing the river" for the first time, Bradfield has a few suggestions.²⁸ First, the effort needs a champion who has credibility with senior managers and can tolerate risk, and who "has energy and passion to stay on this, because there will be so many times that you just want to quit." Second, if the goal is to use a "green" product to

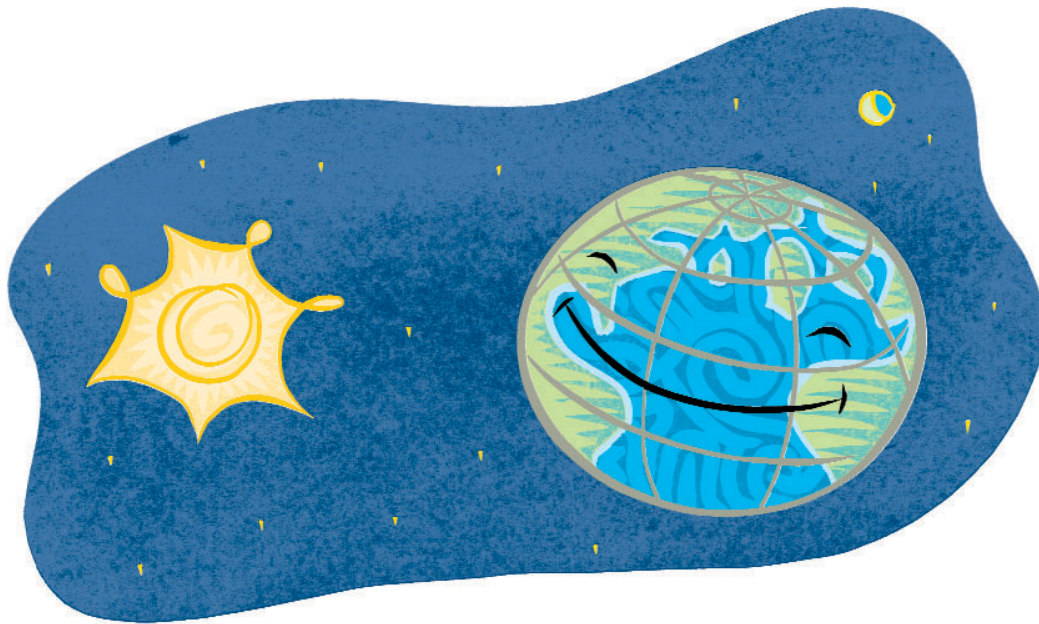
replace one that's not green at the same price point, start with a higher priced product because it allows more room for increases in product costs, some of which might be short term. Third, before launching a sustainable product design effort, look at the company's financial situation. "Being 'less bad' is an easier way to get started, in good times or in bad, because it saves money. But cradle-to-cradle requires commitment and financial stability," says Bradfield. "If we were trying to push the development of EcoWorx in a bad economy, I'm not sure we'd be where we are today." Finally, a company needs to get it right before going public with its intentions to follow a cradle-to-cradle protocol. "People are watching you—people like Bill McDonough, and if you don't get it right, he'll be the first one to say that you didn't and he can't support it."

Herman Miller—Signaling its intentions

From Herman Miller's inception, its leaders have acknowledged that the company has a responsibility to the environment. Herman Miller "will be a good corporate neighbor by being a good steward of the environment," wrote founder D.J. DePree in the early 1950s. "Living with integrity and respecting the environment" continues to be one of the company's five core values that guide its business decisions.²⁹

From "reducing, reusing, and recycling" to building award-winning "green" facilities, Herman Miller has defined what it means for a company to be environmentally responsible. Its approach to the environment has become increasingly comprehensive as its understanding of environmental issues has broadened. "Because it's a design-based company, Herman Miller understands that their designs signal their intentions," says McDonough.³⁰

In 2000, the company publicly stated its intention to become a sustainable business. The company has "a good start," writes Mike Volkema, Herman Miller's CEO and chairman of the board. "It is only a good start...With each passing day, we gain greater insight into how our business practices affect the environment, as well as what we can and must do to reduce our impact on the planet. It is a never-ending process."³¹



Herman Miller has applied significant resources to ensure that the good start results in constant progress toward the goal, most notably in the area of sustainable product design. In 2001, a more comprehensive Design for the Environment (DfE) team was established to develop environmentally sensitive design standards for new and existing products. Team members apply a variation of the MBDC Cradle to Cradle Design Protocol to evaluate new product designs in three areas:

- **Material chemistry and safety of inputs**—What chemicals are in the materials specified, and are they the safest available?
- **Disassembly**—Can products be taken apart at the end of their useful life to recycle their materials?
- **Recyclability**—Do the materials contain recycled content and, more importantly, can the materials be recycled at the end of the product's useful life?

The MBDC protocol involves a painstaking process of inventorying and *evaluating* every material that goes into a product, and then assigning it a color status (in descending order of acceptance: green, yellow, orange, or red) based on human health and environmental relevance criteria.³² As part of the new product design process, the DfE team substitutes green or yellow materials for orange and red ones. The DfE team actually uses a “Miller-ized” version of the MBDC protocol that’s just as rigorous as the original but better meets the company’s business needs, according to Wing; the team has analyzed 500 chemicals and 850 materials used to make product.

Herman Miller’s “stake in the ground” product—the first to follow the protocol—was the Mirra™ chair. Among the DfE team’s direct influences on the chair were a redesign of its tilt structure to remove plastic components, the replacement of PVC with thermoplastic elastomer (a rubber-like material that can be recycled more easily than PVC), and a rethinking of the chair’s structural “Y” spine to meet DfE’s disassembly criteria. The latter resulted in a less costly and more elegant design solution that has since been patented.³³

The Mirra chair was just the beginning. All future Herman Miller products will be subject to the cradle-to-cradle protocol from the beginning of the product-development process. The DfE team will apply what it has learned to existing products, as it is able.

At Herman Miller, the DfE process extends to suppliers, some of which are understandably reluctant to enter into that process. The DfE team learned quickly that personal relationships with suppliers are the key to moving forward. “The protocol is going to make a difference in how we do business with suppliers,” says Scott Charon, advanced materials and concepts commodity manager. “I’m a salesperson, negotiator, coach, and educator, bringing suppliers up to speed. We can’t make the changes without their help.”³⁴ Once suppliers understand what is required of them, they can decline to participate. In those cases, Herman Miller finds another supplier.

Companies need not be deterred from pursuing sustainability because of the assumption that it will cost them more money. “Sometimes it will cost more and sometimes it won’t,” says Wing, the chemical engineer at Herman Miller. Sending less—or nothing—to landfills saves on landfill costs, and companies who don’t pollute won’t have to apply for permits.

The DfE team will be the first to say that the journey metaphor that Nike, Visteon, and Shaw all use to describe sustainability applies to Herman Miller, too. “There’s no finish line,” says Charon. “At least not in my lifetime.”

In the earth’s lifetime, however, there needs to be one. Industry needs to get to a place where, as environmentalist Paul Hawken says, “doing good is like falling off a log, where the natural, everyday acts of work and life accumulate into a better world as a matter of course, not as a matter of conscious altruism.”³⁵

Companies who want to embark on the sustainability journey can learn from the collective experience of Nike, Visteon, Shaw Carpets, and Herman Miller. While all are different, ingredients of their success

are consistent: a corporate culture that values the environment—or at least is receptive to new ideas—leaders who are visionary and willing to take risks, a respected and influential advocate, corporate financial stability, and an understanding of customer expectations.

Good starting points for additional exploration on this subject include the sustainability section of the Environmental Protection Agency's web site,³⁶ Business for Social Responsibility,³⁷ the MBDC, and GreenBlue, a nonprofit organization begun by MBDC.

The best starting points of all are also the simplest. Read. Seek out like-minded companies. Ask questions. Think. Just begin.

Notes

- 1 Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (Boston: Little, Brown and Company, 1999), p. 76, citing J.P. Womack, D.T. Jones, and D. Roos, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* (New York: Simon and Schuster, 1996).
- 2 Environmental Protection Agency, "Municipal Solid Waste in the United States: 2000 Facts and Figures," p.137 and p. 14.
- 3 Environmental Protection Agency, "Municipal Solid Waste in the United States: 2000 Facts and Figures," p.5.
- 4 Environmental Protection Agency, "Latest Toxic Release Inventory Shows Continued Decline of Chemicals Released into Environment," press release, 30 June 2003.
- 5 This is the definition of sustainability used in the Brundtland Report, which was produced by The World Commission on Development and Environment in 1987, according to the Alliance for Global Sustainability: <http://globalsustainability.org/Education/Definitions/>
- 6 Environmental Protection Agency, "Municipal Solid Waste in the United States: 2000 Facts and Figures," p. 1.
- 7 Edwin Datschefski, "Sustainable Products: Using Nature's Cyclic/Solar/Safe Protocol for Design, Manufacturing, and Procurement" (BioThinking International, June 1999), p. 6.
- 8 Environmental Protection Agency, "2001 Toxics Release Inventory," p. 2 of executive summary.
- 9 William McDonough and Michael Braungart, "The NEXT Industrial Revolution," *The Atlantic Monthly*, October 1998.
- 10 Florence Williams, "Prophet of Bloom," *Wired* magazine, February 2002.
- 11 William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the Way We Make Things* (New York: North Point Press, a division of Farrar, Straus and Giroux, 2002), pp. 173 - 181.
- 12 William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the Way We Make Things*, p. 177.
- 13 Herman Miller, personal phone interview with William McDonough, conducted on 9 September 2003.
- 14 Herman Miller, personal phone interview with Gabe Wing, conducted on 12 September 2003.
- 15 For more information on Nike's Reuse-A-Shoe program, see www.nikebiz.com.
- 16 Herman Miller, personal phone interview with Bill Malloch, conducted on 15 September 2003.
- 17 Nike's definitions of these terms are as follows. Zero waste: Eliminate the concept of waste in product and processes by maximizing the utilization of materials in products and the reuse of manufacturing byproducts, increasing Nike's use of renewable or reutilized substances and maximizing the use of renewable energies. Zero toxic substances: Eliminate from product and processes all substances known or suspected to be harmful to the health of biological or ecological systems; maximize the proportion of substances the company uses that are beneficial to human and ecological systems. 100% recoverable product: Return post-consumer product safely to biological or industrial systems; ultimately, products that are no longer useful become the ingredients for new products or are safely reincorporated into biological systems.
- 18 In 2015, 96 percent of the vehicle by weight needs to be recyclable.
- 19 The "take back" part of the End-of-Life vehicle legislation took effect in July 2003 for any vehicle produced today. In 2007, it goes into effect for any car the company has ever made.
- 20 Herman Miller, personal phone interview with Matt Roman, conducted on 17 September 2003.
- 21 Hawkin, Lovins, and Lovins, *Natural Capitalism: Creating the Next Industrial Revolution*, p. 80, citing *Automotive Industries* (1995).
- 22 Katie Sosnowchik, "In the Driver's Seat," *Green@Work*, November/December 2001, pp. 14 and 16.
- 23 Herman Miller, personal phone interview with Steve Bradfield conducted on September 19, 2003.
- 24 Steve Bradfield, "A Walk in the Garden," June 2003, on the MBDC website: http://www.mbdc.com/features/feature_june2003.htm. Accessed 15 September 2003.
- 25 Bradfield phone interview.

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- 26 Bradfield, "A Walk in the Garden."
- 27 Bradfield phone interview.
- 28 Bradfield phone interview. All recommendations in this section are taken from that interview.
- 29 Herman Miller, "Blueprint for Corporate Community."
- 30 William McDonough phone interview.
- 31 Michael Volkema, "Our Planet, Our Journey," <http://www.hermanmiller.com/CDA/SSA/Category/0,1564,a10-c382,00.html>. Accessed on 30 September 2003.
- 32 "The Cradle to Cradle Design Protocol," McDonough Braungart Design Chemistry (MBDC). See http://www.mbdc.com/c2c_mbdp.htm for the human health criteria and environmental relevance criteria that the protocol entails.
- 33 "With the design of the Mirra chair, 'We are helping to define a sustainability standard for corporate America,'" *Salesmarts* (Herman Miller's publication for the sales force) 25 April 2003.
- 34 Interview at Herman Miller's Design Yard in Holland, Michigan, 7 August 2003.
- 35 Paul Hawken, *The Ecology of Commerce: A Declaration of Sustainability* (New York: HarperCollins, 1993), p. xiv.
- 36 <http://www.epa.gov/ebtpages/pollsustainabledevelopment.html>, "The Sustainability Continuum" (March 2000 Waste Wise Update) has a "Resources for Sustainability" section that's particularly useful. See it at <http://www.epa.gov/wastewise/pubs.htm#wwwupd>.
- 37 There is a large environmental section at <http://www.bsr.org/BSRResources/IssueBriefsList.cfm?area=all>