Cradle to Cradle Study Guide

Cradle to Cradle by William A. McDonough

BOOKRAGS

Contents

Cradle to Cradle Study Guide....1

Contents....2

Plot Summary....3

Introduction, This Book is Not a Tree....5

A Question of Design....7

Why Being Less Bad is No Good....9

Eco-Effectiveness....11

Waste Equals Food....13

Respect Diversity....16

Putting Eco-Effectiveness into Practice....19

Characters....21

Objects/Places....24

Themes....26

Style....28

Quotes....30

Topics for Discussion....31

Plot Summary

This is a book by two researchers who set out to find ways to build and manufacture things friendly to the environment. Their approach varies radically from the usual ecological approach, which, as the authors say, is to "be less bad." The typical approach tries to reduce the amount of toxins in a product, or attempts to collect and recycle goods, or to add expensive and bulky fixes to existing systems. Instead, the authors suggest that designers and manufacturers rethink and redesign materials with their end uses in mind. Using materials that are nontoxic and also that easily break down into quality materials results in byproducts that can be easily reused to manufacture items of first quality. The authors also recommend planning buildings and industrial complexes that utilize the surrounding environment for heating, cooling, and beautiful design. The strength of this book is that the suggestions here are not merely hypothetical. The book itself is made of a polymer plastic printed with nontoxic inks that easily wash off, thus making the material pristine and available to manufacture another beautiful book. The authors have worked on big projects, such as the redesign of the Ford facility in Michigan, based on these principles. The book is positive and specific on how to design and manufacture things for the greater good.

This book is different than virtually any other ecology books because it does not lay blame on any person or institution. At one point, the authors describe an ecological difficulty, and ask if it is important who is to blame. They answer, yes, and no. Perhaps those who are to blame need to acknowledge their actions, but the more important question is to ask what to do next. The authors acknowledge that even conceiving the changes necessary may be difficult, but again, what makes this book different than other ecological points of view is that the authors actually have conceived and implemented major projects with new, effective materials and practices. For example, they redesign the Ford Rouge automotive plant not only to make it safe now, but for generations. They cleanse the soil and add organisms to clean it deeply. They design water retention and cleansing practices that utilize nature. In another example, a factory in Germany is designed to have cross ventilation from open windows, to have all-day natural light from skylights, and to have pleasant, open workspaces. Some workers actually refuse higher pay in less friendly environments because they feel so good in the positive environment. One delightful difference in the points of view of these authors and many other ecologists is that this book insists on joy, fun, enjoyment, and positive thinking. Rather than making people feel guilty for buying and using things, the book encourages abundant, healthy design with easy recycling. As an example, the authors suggest installing a durable underlayment of carpet backing with snaps, so that healthy carpet can be snapped into place, enjoyed for a time, and then easily removed for replacement with another color or texture, all of healthy, affordable materials. The authors are not just hypothetical writers, though. They have actually designed and produced examples of many of their ideas, and at the same time, they invite other designers to take the challenge of thinking way outside the box.

The most important overlying principles through the book are using local environments to dictate design; using clean, friendly materials that can be easily reused to make

quality items; not being "less bad" but being innovative in designing healthy things; and enjoying an abundant point of view the whole time.

Introduction, This Book is Not a Tree

Introduction, This Book is Not a Tree Summary and Analysis

The introduction opens with a picture of what seems to be friendly home environment. However, the chair is made of materials that are toxic in themselves and together. The computer used by a child contains "more than a thousand different kinds of materials," many of which are toxic and dangerous. The dust from the printer toner itself is extremely toxic. When the computer becomes outdated, it will be thrown away and contribute its toxins to the environment.

One can try to overcome these bad effects by recycling, but the authors point out that recycling usually means "downcycling," or in other words, using materials in a way that they were not intended for. To do this, many chemicals and much energy must be used to process the discarded soda bottles, for example, to make a new carpet. It creates more waste and toxicity than a newly manufactured carpet. Sport shoes give off toxic particles and fumes, but they are manufactured in countries without regulation and imported without question.

In particular, books are problematic because their covers are made from different materials than their insides, making the whole harder to recycle. The inks used in printing books, even soy-based inks, are hard to remove. This particular book is made of an easily-recycled polymer and printed with nontoxic inks that easily wash off with nontoxic chemicals. Further, the book is pleasant and even waterproof.

The authors introduce themselves here, prefacing their remarks with the idea that being a consumer in itself is not a bad thing. There is no guilt in using beautiful and useful things, although designers and manufacturers bear the burden of designing and making these things so they are supportive to our Earth. Bill identifies himself as an architect who grows up in Japan, with beautiful, well-designed items all around. He goes to Jordan as a student, helping a professor develop housing for Bedouins who cannot any longer cross international borders in their wanderings. Formerly these Bedouins use goat-hair tents, with an ever-renewable source of material from their goat herds. Later Bill apprentices with an architectural firm trying to be "green" but having a hard time getting information on materials in buildings and materials. They work hard to be "less bad," but do not substantially change things.

Bill realizes that design is more than trying to overcome bad things. Design in itself signals the intention of the designer, as Bill observes in a visit to Auschwitz and Birkenau. He wants not to be "less bad" but rather to be completely positive.

Michael grows up in a family of literature and philosophy scholars, but he departs from this scholarly line of work to become a chemist. He is one of the inventors of "ecological chemistry" and becomes a founder of the German Green Action Future Party, which

later becomes the Green Party, with the goal of taking care of the environment. He is asked to work for Greenpeace in their chemistry department. After a chemical spill by the big companies Sandoz and Ciba-Geigy, which causes a "massive loss of life" of wildlife for a hundred miles, Michael and colleagues chain themselves to the smokestacks of the company Ciba-Geigy. The owner comes down with soup and flowers to listen to their complaints. He encourages Michael to pursue a position in the Environmental Protection Encouragement Agency in Germany. Michael does so. He studies cultures where positive practices are the norm, but has a hard time finding chemists to work with, people who have a vision of beautiful, positive design and production.

Bill and Michael meet in 1992 at an Earth Summit meeting. They realize they need to move past criticizing industry but instead to make something positive within industry. They talk about a biodegradable soda bottle with a seed implanted in it, so the seed will grow when the bottle is tossed on the ground.They discuss problems with shoes, both with toxic substances and those made with leather which creates great toxins in its production. They suggest shoes with a biodegradable sole and safe uppers. Observing the waste in New York, they visualize a world without waste, so everything can be easily and safely reused.

They form a new company, McDonough Braungart Design Chemistry, in addition to their other jobs, a company dedicated to the idea of abundance, not limits. Using models from nature, they set to the task of healthy, happy design.

A Question of Design

A Question of Design Summary and Analysis

This chapter begins with a reference to the Titanic, which appeared to be indestructible but met a famous fate. The Titanic is a good metaphor for the Industrial Age, which appears to offer such promise but is also doomed to fail.

Although the Industrial Revolution offers such promise, it operates on several untenable premises, including rampant and toxic waste, with irretrievable disposal methods, destruction of natural resources, the goal of employing ever fewer people, and reducing diversity of species. At the time, the minds behind the Industrial Revolution do not consider these factors and they generally mean no harm. However, beginning with textile production in England, which does indeed produce more fabric but causes harm to people and the environment, the Industrial Revolusion reveals its downside. People move to the cities for increase in pay and thus deplete farming in the countryside. Although some groups resist these changes, the lure of fast production and higher pay lures people in.

Everything in the Industrial Revolution intends to earn more and more money. As an example, automobiles are originally built by hand. Henry Ford designs an automated system that produces cars in a factory setting, using the then-new assembly line. Prices go down and sales rocket up, and salaries improve as well.

These things might be seen as good. However, early factories assume an endless supply of natural resources, and early industrialists do not consider effects on the environment, large or subtle. In fact, people in this early era consider nature a "dangerous, brutish force" to be tamed. The focus is quick, cheap production.

The attitude of the Industrial Revolution is "cradle to grave." Waste is jumbled together into landfills so that useful materials and biodegradable materials mix with materials that cannot easily be reused. It is all wasted. Virtually all manufacturing presupposes cradle-to-grave uses for their products. In fact, many products are programmed to wear out within a certain amount of time so customers will buy new ones.

The general outlook of the Industrial Revolution is almost universally accepted, so much so that even people who look for alternatives still operate within its structure, as, for example, the International Style of architecture which seeks clean, affordable housing for all but ends up sterile and expensive to use. Why not design homes and indeed many products for local use? They can use the natural resources of an area to enhance heating and cooling. Soap manufacturers can design soap for use in particular areas, with hard water or soft, and so on. In fact, soap can be designed to break down into materials so nontoxic that the water can be reused for fish ponds and other gentle uses. Instead, manufacturers design their product for "worst-case" scenarios, so it will work in the most difficult of circumstances, no matter what or where.

The Industrial Revolution presumes "brute force." You can make products to serve just about anyone, anywhere, if you just add more fuel, despite the consequences. Relying on petrochemicals and coal are good examples of this approach, even though these resources are expendable and irreplaceable.

A negative result of this approach is what the authors call "monoculture." Homes and lawns and gardens are very much the same throughout the country, even though conditions vary wildly. Crops are grown with the same approach, using pesticides and herbicides to eliminate potential pests. Fewer types of crops are grown to make it easier to store and ship the crops. Toxins fill the environment from the chemicals used for farming. Even certain disasters, such as the 1991 Exxon Valdez oil spill result in economic advantage for those who participate in its cleanup, thus emphasizing this narrow point of view.

Products designed with this point of view are "crude products," as the authors say. They work okay but they are "unintelligent and inelegant." Many products carry toxic chemicals with them as part of their manufacture. For example, polyester fabric and plastic water bottles have a toxic chemical, antimony, included in them. Many manufactured products "off-gas" toxic chemicals that are carcinogenic. Part of the problem for this is that components or even the whole product may be produced somewhere else in the world and imported for final assembly or packaging in America. As an example, benzene is forbidden in America for rubber products but is common elsewhere, so you may be getting benzene "fumes" from your treadmill even though you assume it is safe.

The result is that most households reveal high levels of toxic contaminants when tested, causing allergies, asthma, and what is called generically "sick building syndrome." Even children's products reveal this toxicity. For example, PVC off-gasses harmful substances, especially when heated, such as in children's playground equipment. Perhaps these contaminants in themselves are not such a problem, but in the aggregate, they potentially reduce immunity, by increasing body stress and immunologic responses.

The authors ask why we should have these toxins if we do not plan them, if we do not need them? Beyond cancer, there may be many subtle or long-term problems not yet defined. There are 80,000 chemicals and compounds used by industries today, but only 3,000 have been studied for their effects.

There is no way to know how these things will affect us. Some materials have the potential for changing our genetic structure. To be sure, using up natural resources depletes our children's inheritance, but adding toxins as we are doing also endangers their very survival.

Why Being Less Bad is No Good

Why Being Less Bad is No Good Summary and Analysis

As soon as early factories begin to evince dangers, people have been trying to undo them. Thomas Malthus, an 1800's writer, points out that the end result of the Industrial Revolution will be destruction. Malthus is not popular during his day. During the next century, the Romantic writers are inspired by nature and point out that industrialism destroys it. During the early 1900's, writers with the point of view of the Sierra Club begin to understand the relationship between consumerism and the destruction of nature. In 1962, Rachel Carson writes Silent Spring, which at particular points out the dangers of DDT, which is eventually banned in the U.S. and in Germany in the 1970's. At the same time, Paul Erlich is writing about the negative consequences of overpopulation and rampant production. Other writers point out that people must cut down on consumption to prevent problems. These writers point out the need for "eco-efficiency," or getting more from less. Many companies have tried to heed these warnings and improve their production for less toxicity and better use of materials.

Even though these companies are trying to do these things, the efforts may be enough. For example, garbage is often incinerated, which releases hormonally damaging materials into the air. Many other wastes are not truly biodegradable in the soil and water.

Recycling is problematic because manufactured materials are such an amalgam of materials that they must be "downcycled" instead of recycled. In other words, materials are mixed with other materials to produce a product of lesser quality. For example, there is currently no technology to separate paint from car body parts; thus, the steel cannot be recovered. Aluminum cans have the same problem. It is impossible to safely and easily remove the printing, so the recycled product is weaker than the original aluminum. It is currently impossible to safely remove the ink from paper, so it must be strongly bleached, resulting in a weaker product. Since the inks are usually toxic, the recycled paper contains a higher level of these toxins, causing allergies in some people.

Regulators may try to make the process work, but it is hard to ignore the demands of commerce. In actuality, eco-efficiency is not possible, in the Industrial model, which aims for fewer toxic chemicals in manufacture and less consumption of valuable resources, all the while trying to increase profit and reduce production costs.

Too much so-called efficiency can result in danger, such as the inexpensive housing in Turkey several decades ago. This housing collapsed in recent earthquakes. More and more efficient agriculture can destroy native habitats. More and more efficient factories contaminate local areas.

All of these approaches try to "be less bad." Why not instead design a model that is 100% good?

Eco-Effectiveness

Eco-Effectiveness Summary and Analysis

This chapter opens with a comparison of three books. The first is a typical bookstore book, which is printed on beautiful quality paper with nice bright ink, including a beautifully colored jacket and sturdy cardboard cover. One might think it is a biodegradable product, but it is not. Instead, the paper contains chlorine in every aspect of production, so it adds toxic chlorine to the environment when recycled. In addition, printing inks, even soy inks, are toxic when they break down. An electronic book is an option which is now being discovered. However, there is another option. As with this book Cradle to Cradle, the book may be manufactured from an easily recycled polymer, not even paper at all. The inks can be nontoxic and easily washed off with appropriate chemicals when ready. A third book would perfect the process in the book Cradle to Cradle, but the authors say the process is not yet perfect.

The authors present a cherry tree as a good model for cradle-to-cradle manufacture. It may seem that cherry trees are wasteful. They produce masses of blossoms without depleting the environment, and then fling these blossoms to decompose when their purpose is done. What would a building be like if it were built on the model of the cherry tree? It would not look like an eco-efficient building which is sealed off from the environment. A cherry tree type of building would let in abundant light in the daytime. It would offer beautiful views, delicious and abundant food, cool evenings, and fresh air. The windows are open. Native grasses cover the roof, insulating the building and absorbing water. Such a building is energy efficient but it also brings pleasure to the inhabitants with fresh air and beautiful views.

The authors design such a building for Herman Miller, an office furniture manufacturer. The factory gives the workers the feeling they are outside. They have lots of daylight, including skylights, throughout the facility. Water is cleaned throughout wetland environments, and people love to work there, preferring it to another factory nearby with higher wages.

The cherry-tree model is more delightful to humans than the Industrial Revolution model. It can be affordable and cost-efficient as well. It is a model of growth more akin to a child's growth than industrial growth. However, it is possible to merge both, so that you can grow the economy as well as protecting the environment and nurturing people. The cherry tree enhances its environment by biodegrading its leaves and flowers, providing fruit, and cleaning air and water, stabilizing soil. It supports the life of other plants and animals. Ants are similar. They are incredibly productive but they build the environments around them. Ants are the most prolific and widespread of all creatures but they do not deplete the world. They enrich it.

Most manufacturing concerns do not enrich the world. They create a trail of consumption and waste that is not easily assimilated into the environment. The authors are interested in design that enriches the world like the ants and like cherry trees.

As an example, the authors point to a simple thing, a roof on a regular house. Most of these offgas bad chemicals but do not particularly insulate the house from the weather. A well-designed roof would shelter the house, conserve water, and even produce energy. Many traditional homes accomplish this with sod roofs and "living" roofs of grass. Solar collectors on the roof would make the energy positive rather than negative consumption. Such a roof would work with nature. Instead of utilizing brute force, it works gently with the needs of people to the benefit of the environment as well.

The authors do not think we should abandon Earth. It is our natural home. We should instead find wholesome ways of living on and with the earth. For example, the Menominee tribe utilize their abundant forests, while keeping them thriving by using only weaker trees. The Yakima Indians cooperate with the state of Washington by assuring the government that they will keep their own children safe from toxins in a dump site.

The goal is not to minimize production till there is nothing left. The goal is to design and manufacture goods and dwellings and businesses that produce healthy goods and healthy byproducts. The environments are safe to people and to the planet, and more than that, they are joyful spaces. It is a world of abundance, not limits.

Waste Equals Food

Waste Equals Food Summary and Analysis

In the natural world, systems replenish each other, as with the cherry tree. It is a cradle-to-cradle model, because even when things die, they provide a clean, natural environment for new life. Early nomads and early agriculture follow a similar model. Certain cultures, such as Rome, turn away from this model and deplete the landscape with tree-felling and nonsustaining agriculture. The same things happen when great cities arise in America, when the surrounding farmlands are depleted. Soon "nutrients," such as food and other raw materials, become transferred from localities instead of remaining local. Agriculture becomes industrialized, but this threatens the soil as well as adding toxins to the local environments.

Not all civilizations ignore nutrient flows. The Nile River cultures waited the overflow every year to revitalize the soil with nutrients. They also stored food surpluses for drought periods. Gradually, western methods replace the traditional ones. The Aswan Dam makes it impossible for the nutrients to flood farms. Egypt now produces less than 50% of its food crops.

Previously, the Chinese used household waste and other biological wastes to enrich their rice paddies and other fields. They have turned from these practices to western ways, to their detriment, since they must rely more and more on imported foods.

Anytime people live with waste, they must conserve materials, as people did during the Great Depression in America. Nowadays, people do not conserve but simply throw things away and buy new. One cannot reuse everything. For example, it is impossible to reuse a car unless you are a junk artist. However, in countries like Africa, people creatively reuse materials for other uses such as using discarded tires to make sandals.

In a throwaway society, many materials cannot be recycled because they are "hybrids," or mixtures of materials that cannot be recycled together. A good example is today's leather shoe. On the face of it, leather seems like a healthy shoe. In former times, it is. The leather is vegetable-tanned, so no harmful wastes return to the soil. However, vegetable tanning is replaced by chromium tanning within the last forty years. Chromium is rare and can be toxic. Leather for shoes is often produced overseas where there is no regulation on toxicity. Conventional rubber shoe soles contain lead and plastics, which are emitted every time you walk or run, and then later when the shoes go into the landfill.

When you think of waste, you almost always think of sewage, a disagreeable topic. There is not a good way to handle sewage in the earlier years of our world. People often throw it right into the street. Finally people find ways to compost it in septic tanks right on their properties. When populations increase, the septic tank idea expands into sewage plants, but then people start to use materials that cannot decompose safely,

such as paints, paint thinner, bleaches, nail polish removers, estrogens from birth control pills, antibiotics, soaps, and other such things. The sewage plants cannot remove all these things. Such things as medications pass through to the drinking water. Why not find a way to safely process these things and use the resulting sludge, which contains nutrients for agriculture, to enrich the soil? Why not design products, as well, for their next life?

Nothing ever leaves this planet except energy. When we contaminate, the results stay with us permanently. Thus it becomes important to design our products for reuse, including packaging. If we do so, things cannot contain mutagens, carcinogens, persistent toxins, or other substances. There is no need for packages to last centuries longer than their contents. The authors try to design an upholstery fabric for DesignTex with these principles in mind. They consider cotton combined with recycled soda bottles, but these may offgas toxic chemicals. They finally decide on a combination of wool and ramie and then must address finishes. Many chemical companies decline the project because they do not want their products exposed to scrutiny. They find a European company that will produce a safe and beautiful product and use it for their fabric. The product is very beautiful, and it is safe.

Manufacturers can design upcycling into their process. As an example, a computer case can continue its life as a computer case. Henry Ford did a similar thing by incorporating its shipping boxes into the floorboards of the Model A trucks. Korean rice husks are used for packing stereo components and recycled into making bricks. Some products can be used for a period of time, such as televisions, refrigerators, or computers, and consumers pay for the service rather than the item itself. Companies are encouraged to reuse solvents instead of discarding them. Materials become an asset, become nutrients, rather than waste to be destroyed. The concept of renting a service rather than purchasing a product can transform the way people buy things.

Carpets lend themselves to this idea. Carpeting is almost impossible to recycle because it is so large and because the components do not break down into easily separated parts. One idea would be to provide a durable bottom layer with a detachable top that snaps off, is recycled, and is replaced with a new color.

This kind of approach allows people to enjoy new products as often as they like, especially since their consumption will help the environment and the economy, not hurting anything. The discarded items are upcycled into new, beautiful things. Without such a system, certain products, which the authors call "monstrous hybrids," will pollute the environment during use and afterward. Running shoes are a particular example. It would be possible to design shoes that have biological nutrients in their soles so that running will dislodge particles that nurture the soil.

Materials that cannot safely be recycled or decomposed can be stored till technology develops a way to do so. PVC is a good example, and so is PET, a component of plastic soda bottles and other plastic bottles. Companies can do a "waste phaseout" to remove toxic waste from waterways. Certain polyesters can be phased out of production. Hybrids can be carefully separated out by composting and sifting.

At this point, it does not matter who causes the problems. It is time to start fixing the problems and not pointing the finger of blame.

Respect Diversity

Respect Diversity Summary and Analysis

The chapter begins with an imagining of the beginnings of life on earth. The result is an abundant diversity. Modern design, architecture and landscape flatten this concept into "one size fits all," using the same structures and plants throughout the country. The authors call this devolution. They wish to encourage diversity. They suggest that things that are most fit for their situation will survive. Thinking about ants, there are thousands of different species, each suited to its environment. The relationships between organisms keep them thriving because living things are interdependent. The oxygen cycle is one good example and the water cycle is another. Ants make the soil fit for growing things. Trees cool and replenish the planet. Industry can model itself on nature in this way, working with the conditions of place and respecting diversity in materials and applications.

Manufacture needs to be grounded in local water flow and energy sources. We need to consider how waste affects locality. Bill, one of the authors, travels to Jordan to work on housing for Bedouins who are no longer permitted to cross borders. The Soviets suggest prefabricated housing blocks, "anywhere buildings." Bill and his colleagues suggested adobe structures using native materials that people can build themselves, including the young people.

Building with local materials makes sure that non-native species do not harmfully invade areas. It makes sure that sewage remains a local problem. The authors suggest sewage treatments that build the environment and replenish clean water. At Silva Jardin in Rio de Janeiro, such a sewage plant exists. A community in Indiana has another solution, storing winter sewage till it can be processed in the summer sun in a specially constructed wetland. Residents in such systems are careful not to put strong chemicals in their wastewater, to prevent harming the sewage system.

Similar principles apply to power. Sailing turns from wind to fuel power, to steamships. Homes turn to fossil fuels so they seem like steamships in their power consumption. This is very different from earlier homes constructed to utilize the natural setting of the home for cooling breezes and heat collection from the sun and fireplace. Even low-tech solutions, such as sitting under woven bark, as Australian aboriginals do, can provide relief from the weather. Various cultures have found simple, local solutions to heating and cooling. Pakistani houses use "wind scoops" to bring cool air down a chimney. Iranian wind towers drip water onto vents that bring in the cooled air. In India, some homes have porous sandstone screens that are saturated with water. Some Chinese homes are dug into the ground.

However, modern structures are made of wood and glass, heated and cooled with fossil fuels. Architects do not seem to understand using nature for these purposes. Well-designed homes can use wind, sun, and water for heating and cooling, but always with

the idea of being integrated into the larger environment, not being "off the grid," but utilizing local sources in every sense of the word.

Often smaller-scale power distribution turns out to be more cost effective. One utility in Indiana found it was more effective to have one small plant for every three city blocks than to have a larger centralized power plant. Using smaller-scale power production, the by-products, such as hot water, can be used by businesses or homes. Solar collectors can be kept small and local. Power prices can fluctuate depending on peak time usage. Sometimes small changes can turn into big benefits. For example, in an auto manufacturing facility, the authors suggest a change from thermostats near the roof to putting them lower and piping in air at the level of the employees. By placing intake and output in strategic places, people are much more comfortable and costs are greatly reduced. Combining this kind of strategy with a grass roof will reduce costs further.

Wind power can be locally used as well. Hybrid systems are particularly good, keeping production and consumption close to each other.

Some old buildings remain great because they use these types of principles, such as the SoHo neighborhood in New York. Packaging can be planned to be used with the product, such as when Henry Ford planned the shipping crate to be used as the floorboards in the Model A Ford. Shipping crates can be made of waterproof insulation for use in third world construction. Some societies need trash that is safe to burn, when dump space is limited, while other may need ways to easily reuse materials for new products. In China, travelers throw styrofoam off the trains so much that the problem is called "white pollution." How about a food container that decomposes easily and maybe even contains a seed so it can restore the land?

Manufacturers can provide opportunity for local peoples to customize their generic products. For example, car manufacturers could provide opportunities for Filipino customers to custom-paint their own cars with creative designs, per their customs. Soaps can be custom designed for the water and conditions they'll be sold in. In fact, soap need never contain water, which is expensive to ship, but just have pellets or powders to be sold in grocery stores. Washing machines can be leased loaded with two thousand loads' worth of internally recycling detergent, because it works fine several times and will save that much soap pollution in the environment.

Charles de Gaulle said it is difficult to manage a country that produces four hundred types of cheese. Still, so many types of cheese are much preferable to orange cheese product, one size fits all. People prefer diversity, preferring their own locale to generic scenery. Thinking in these ways, manufacturers will consider how their products affect various localities. Working with a soap manufacturer in Germany, for example, the authors help ask the question, "What would the river [Rhine] want?" This question relates to what people want and need, too.

The chapter then analyzes "isms," such as capitalism, communism, socialism, and so on. All intend to help people, but none is quite enough. Working with all "isms" is the only way to make great design, including everyone. In the same way, it is important to

balance ecology, equity (meaning fair wages and good treatment of workers), and economy, or profit motive. Balancing all of these makes it possible to make design good for the earth and good for people in many ways.

The authors recommend an "industrial re-evolution." Our products and processes are best when they most resemble the natural world. Natural systems take things from the environment, but also give things back. Factories can help people, nourish the environment, and produce good materials.

Putting Eco-Effectiveness into Practice

Putting Eco-Effectiveness into Practice Summary and Analysis

In 1999, William Clay Ford, great-grandson of Henry Ford, decides to renovate their huge River Rouge factory in Dearborn, Michigan. It is innovative but highly consumptive of materials when it is first built in the 1920's. Bill, one of the authors of this book, is asked to help redesign the factory. Many employees contribute ideas. Research reveals any toxicity problems to be fixed. The whole plant is redesigned with the principles of this book. Water is to be cleaned so well that it can be used for drinking. Toxicity is to be removed from all layers of soil, using natural and surprising methods, such as mushrooms and fungi. The goal is to create healthy soil, where even employees' children can safely play. Additionally the company seeks ways to enhance the environment without causing financial problems. Managing storm water appears to be a problem until designers come up with a green roof that seeps into a marsh and then through ditches of native plants, eventually ending up with perfectly clean water in a natural way. This approach creates beauty, does the job beautifully, and saves the company a good deal of money. The interior of the plant is redesigned as well to become friendly and healthy for workers. Someday a plant for disassembling discarded autos to reuse for new materials will be part of this design.

Remaking an entire gigantic company is a courageous move, especially since it means rethinking everything dear to "common knowledge," such as the cradle-to-grave mentality. Eco-effectiveness usually starts with one problem, not by solving many at once. The authors now suggest a list of things to begin moving toward eco-effectiveness.

Step 1. Get "free of" known culprits. In other words, people should be aware of recognized problems and toxins, and begin to turn away from them. This is already somewhat in place, because many products are labeled "fragrance free" and other labels, showing that people are aware of negative chemicals. Getting free of individual toxins, however, makes it possible to include many other chemicals with potential toxicity. The authors have been asked to make a chlorine-free package, but point out that many other equally damaging chemicals may still be included in the process. The coating of the package is polyurethane, and the inks are toxic. Still, it is an important first step to recognize that there are bad chemicals that are bio-accumulative, such as PVC, cadmium, lead and mercury. Thermometers present significant mercury, but even more prevalent are mercury switches, common in cars, for example.

Step 2. Follow informed personal preferences. In other words, the problems may be so complex that it is impossible to know what to address first. A person must choose what seems best based on personal preference, trying to find out as much as possible about materials and methods. Try to choose things that will minimize the risk of people getting

sick. Choose things that maintain as much equity as possible for people involved. Choose items that encourage delight, celebration and fun.

Step 3. Create a "passive positive" list. This means making a list of things that are known at the very least to be harmless. Certain things are verboten, such as asbestos, benzene, vinyl chloride, and more. Other things may not be so dangerous and thus are not so urgently needed to be omitted, such as cadmium used in solar collectors. And finally, certain things are positive, after passing tests for safety for people and the environment. Small changes, such as changing to a safer upholstery for a car that still contains elements that are either toxic or that cannot be easily recycled, are an example. Even these changes can be difficult to implement, helping manufacturers and consumers make changes.

Step 4. Activate the positive list. This means redesigning many things from the beginning, including materials that can be used safely and reused easily and safely. The authors point out that no matter how well we do this step, it still retains the basic concepts of things. If you use healthy upholstery and paint in a car, it is still a car and contributes to pollution, traffic jams, and "a world covered in asphalt." These things will not change with the car's design, so the authors suggest the next step.

Step 5. Reinvent. A complete redesign might produce a car that produces healthful additions to the environment. Perhaps another method of transportation, not using cars, will be invented. Of course, the outcomes may be drastically different than what we first envision, but that is the nature of reinvention.

Any of these steps take time and effort, and all of them result in a long-term exploration. There are five guiding principles along the way. First, signal your intention. This means to let people know what you are hoping to accomplish. Second, restore. In other words, try to remedy ills in localities, so that water, air, buildings, marketplaces, and so on, can be made beautiful and useful once more. Third, be ready to innovate further. Remember that you may happen on a good solution, and yet there still may be another, better one in the future. Fourth, understand and be ready for the learning curve. It is not possible to know everything ahead of time, but it takes time and effort to truly understand the ramifications of any changes. Fifth, exert intergenerational responsibility. This means to remember that what we do now will affect generations to come.

Characters

William McDonough

McDonough is the American architect who is one of the co-authors of the book. He grows up in Japan, where there is much beauty as well as intelligent design and utilization of scarce resources. Attending college, he assists a professor in designing homes for the Bedouin in the Jordan River valley. This is Bill's first strong sense of how good design can be simple, elegant, and well-suited to locale. Bill goes to graduate school to become an architect, and he notices that energy efficiency, embodied by insulation and other typical practices, are the only environmental issues addressed in designing buildings. He learns that many of the passive approaches suggested by colleagues and professors are already in use in appropriate environments, such as rock masses in building Irish houses. He apprentices with a New York firm devoted to socially responsible housing. At this time, Bill investigates indoor air quality, looking at many components of homes. Bill tries to get the firm to use water-based paints and nontoxic carpet installation, and other environmentally sensitive approaches. He says that the approach is to be less bad. However, he wishes for more, especially after visiting historic Nazi Germany sites and realizing that design can be used for very bad purposes as well as good. He wants to create design that is totally good. Bill brings the architect's point of view to the discussions in this book, which are very interesting when it comes to roofing, materials, recycling and so on.

Michael Braungart

This is the German chemist who is one of the co-authors of the book. Michael grows up in a house of professors and philosophers, and he notes that his parents are somewhat puzzled when he wants to study chemistry. Michael reveals his compassionate nature from the beginning when he chooses to study chemistry out of sympathy for a high school chemistry teacher. Studying at college, he emphasizes environmental chemistry and because of what he learns, he joins the German Green Action Future Party which eventually becomes Germany's Green Party. He becomes well known as an environmentalist, eventually invited to work with Greenpeace. He directs Greenpeace's chemistry department and works with Greenpeace's protests. When there is a huge chemical disaster in Germany, when big companies Sandoz and Ciba-Geigy dump firefighting chemicals into the water which eventually kills wildlife for hundreds of miles along the Rhine River, he chains himself to a smokestack along with other protesters. The director of the company brings them flowers and hot soup, and wants to know what he can learn from the protesters. Michael confers with this director and makes plans for the Environmental Protection Encouragement Agency. Michael becomes director of this agency. He studies many cultures and how they wisely recycle materials. He notes that most chemists do not address whole systems nor do they propose real solutions, because chemists are paid to deal with problems. However, Michael maintains his hope

for better design and eventually meets Bill. Together they conceive the approaches in this book.

The Director of Ciba-Geigy

This gentleman directs a company responsible for one of Germany's worst ecological disasters, yet he listens compassionately to Michael's ideas and suggests improvements.

Thomas Malthus

This is an 18th century writer who predicts population overgrowth and industrial disasters very early on.

Rachel Carson

This is the author of the groundbreaking book, Silent Spring. Silent Spring first alerts people to the terrible dangers of DDT and other chemicals.

Anne and Paul Erlich

This couple writes in the 1980's, explaining the dangers of overpopulation and negative consequences of industrial growth and depleting the earth.

Fritz Schumacher

This author writes Small is Beautiful: Economics as if People Mattered, in 1973. He suggests that people consider the downside of bigger and bigger growth without regard to people's welfare.

Maurice Strong

Maurice Strong organizes the 1992 Rio Earth Summit, intended to discuss issues of overpopulation, unrestrained development, bad manufacture, environmental issues, and other things.

The Menominee

This Indian tribe in Wisconsin provides a good model of utilizing wood from the forests, using logging techniques that build the environment. They only cut down trees that are weaker, thus strengthening the mother trees and building the forest.

Kai Lee

This is a professor of environmental science at Williams College. He points out that native peoples encourage communication between all generations so they can know how to take care of the environment.

Henry Ford

This famous designer of cars invents the first assembly line. He designs shipping crates to be broken down and used as floorboards for the Model A Car

William Clay Ford Jr

This descendant of Henry Ford undertakes to redesign and improve all aspects of the Ford Rouge plant, so it can be a good place to work and good for the environment.

Objects/Places

The book that is not a tree

This is the actual book in hand. It is made from a nontoxic polymer. It feels smooth and heavy, and it is beautiful. It can be reused again to make similar products.

Computers

These are end products with components that cannot easily be extracted from each other to be reused.

Carpet

This composite product can be toxic with its offgassing, but it also is impossible, in its present form, to reuse. The authors suggest another way, having a sturdy subcarpet which can have a top carpet made of friendly materials snapped onto it.

Early English Textile Factories

These are a good example of how the Industrial Revolution goes wrong. They abuse workers, have terrible indoor conditions, and pollute the enviornment. They produce textiles that are mono-cultural in use, and take away from local industry.

Prince William Sound

This body of water is the site of the Exxon oil spill disaster. The area actually benefits economically from the cleanup

The Ford River Rouge Plant

This is an excellent example of a responsible company that changes design and process so everything coming out of the plant is good for people and the environment.

The Rhine

This river in Germany experiences a terrible disaster after firefighting chemicals are dumped into it. Later it is held up as an example of how soap affects waterways.

Chicago

This city hopes to become the greenest city in the United States through good design.

Buffalo Ridge

This is a very windy place in Minnesota with great potential for wind energy.

Pakistan

Here specially constructed wind scoops bring cool air into homes.

Fatepur Sikri, India

Here special sandstone screens are wet down to bring cool air into homes.

Iran

Here wind towers drip water through air vented into homes so people can be cool.

New England

Here salt-box homes bring in winter warmth with southern exposures having few windows.

Jordan

In this country, Bill and his colleagues design adobe homes that local people can build together, that are cheap, and that are clean and nontoxic to the environment.

Themes

Cradle to Cradle Means Good Design.

Most of our goods and architecture are designed to be thrown away or destroyed after use. Unfortunately, many of our goods are made of bad combinations of materials that cannot be easily separated, broken down, and reused for quality, aesthetic goods. These badly designed goods are hybrids that may combine components manufactured in various parts of the world, so that there is no quality control on what goes into the components. The authors refer frequently to athletic shoes, which are often manufactured overseas, and even if they are made in the U.S. or other countries that have regulations about ingredients and toxicity, many of the components are imported which are not made according to rigorous standards. In the case of athletic shoes, every time a person takes a step, toxic particles can be thrown into the air and onto the ground. These particles may not biodegrade easily nor may they be easily separated from the environment. This approach, using materials that are potentially dangerous, or combining materials that cannot be easily reused, is called "cradle to grave" design. The end product cannot be transformed into something as good as or even better than the original item. Cradle to cradle means that good design allows a product to be produced safely, used with enjoyment, and when it is no longer wanted, easily broken down into its components, to make another great product. Cradle to cradle means that manufacture, consumption, and building do not need to damage the environment. All our practices can enhance the environment and provide excellent, beautiful materials for an abundant life.

There is a Difference between Recycling, Downcycling, and Up

There is a big movement today to recycle materials. People collect bottles, cans, books and other materials for their materials to be reused into other materials. There is a general feeling of negativity about consuming products because every use can somehow reduce the prosperity of the earth and possibly endanger the earth with more and more garbage and toxins. However, when products are recycled today, according to general common practice, they are actually downcycled. This means that they are turned into products of lesser value, because most products are an amalgam of various materials that cannot easily be separated out from the original. Because of this, the new products are of lesser value, of lesser quality, than the originals. An example is the typical book. Usually the covers are made of paper bonded with plastic. The book's pages are printed with toxic inks, and all wood-based paper is bleached with chlorine products, as part of the usual papermaking process. It is impossible to separate cover, ink and book, and so the materials are broken down, mashed up, and washed as best as possible. The resulting paper to be recycled is still full of chlorine, which breaks down into toxic chemicals in the atmosphere, as well as the toxic ink, with more toxic ink added on top. The paper that comes from this process is of lesser quality, less beautiful,

than the original. However, with forethought and intelligent planning, materials can be upcycled. In other words, items can be built with superior materials that have their end in mind, so that the materials are easily separated and ready to be reused. An ideal book could be made of a nontoxic polymer, as the Cradle to Cradle book already is, and printed with a nontoxic ink easily washed off the pages with the right, safe chemicals. Then the polymer is ready to be reused and made into another beautiful book or similar item. Upcycling is preferable because it saves money but also provides people with beautiful, quality materials that can be used with pleasure and without guilt, because all the materials will be usable in another form.

Abundance is Possible.

Common wisdom today says that we are depleting and polluting the earth when we use things. There is a general feeling of guilt associated with this, because we are polluting the waterways, eating up all the fish, poisoning the earth with our agriculture, using up all the fossil fuels, and burdening the land with our immense waste. In some ways, this is true, because we utilize design and manufacturing principles that are negative. However, this book suggests that we can enjoy abundance in our lives and at the same time, build and replenish the earth. We do this by choosing materials and methods that we know to be safe and healthful, not just to people but also to the earth itself. This kind of design is deceptively simple, partly because most of us have bought into the idea that there is a limited amount of resources on the earth, and once resources are gone, we will do without. This embodies the cradle-to-grave philosophy that says that products of any kinds have a single life and then must be discarded. The cradle-to-cradle philosophy, however, supposes that good design gives people delightful abundance and then replenishes the earth and its systems, so more and more abundance can be enjoyed. The metaphor of the cherry tree shows that a system can produce lots of products, such as cherries, while helping the enviornment, with mulch from the fallen blossoms, purification of air and water, providing shelter for wildlife, and much more. To create this kind of design and manufacture means thinking and trying things outside of the normal methods of design and manufacture. The idea of abundance makes it possible to make and enjoy many different items guilt-free, because after we enjoy things, we can easily remake other things using the same materials, improving the environment as we go along the way. It is a cheerful, hopeful point of view rather than the usual gloom and doom of environmentalists.

Style

Perspective

The book is written by two authors, one American, William McDonough, and another German, Michael Braungart. These two may seem very different at first, because Bill is an architect and Michael is a chemist. However, as the two grow up and faced various challenges, they both realize that current design and manufacture processes are an end-game problem, but also they realize that the usual environmental approach of "being less bad" cannot really effect permanent change because it does not actually change things very much. These two have put together an approach that can be very technical, because it requires looking with exactness at the composition of materials and how they interact, as well as how they affect people and how they affect the environment. At the same time, the approach is playful and positive, because it considers alternatives that may be far beyond the usual. The authors ground their experiments in a set of good guidelines, outlined in the last chapter, but interestingly including the ideas of enjoyment, fun and delight. This positive, happy perspective is so different than the usual environmentalists' approach, which makes people feel guilty and unhappy for their consumerism and their lack of effort in making things right. Instead, Bill and Michael suggest that making, using and reusing products can be a positive, joyful experience for everyone involved. The two have actually worked on projects that have turned out well, including very big ones such as the redesign of a Ford plant.

Tone

This is a fairly serious book, although the authors take care to emphasize enjoyment. It is necessary to have a decent reading vocabulary to be able to understand this book. The authors do not talk down to the reader, but at the same time, they use sophisticated vocabulary. This serious, responsible tone makes the authors credible, and makes their suggestions credible as well. It is not a tone that encourages popular enthusiasm so much as a serious investigation into important ideas, which can change the direction of the modern world. The authors take care to include many specific examples of what toxins are and what they can do. They also detail projects that actually work toward a cradle-to-cradle approach. The most important thing about the tone in this book is that the authors do not descend into negativity or criticalness, even though there is plenty of room to do so because there are so many bad design and manufacturing principles in play now. Instead, they insist in a positive, hopeful, pleasant approach to the problems. They do not minimize the difficulties in redesigning the way things are made, but they keep positive so it seems very possible to make the good changes.

Structure

The book itself is its own introduction, because it is heavy, smooth, and very different from other books, which are made of paper. This one is made of a plastic that can someday be reused easily and safely. The introduction of the book, "This Book is not a Tree," explains the idea behind this book. The authors know this book is not the ideal final product, but it is a good example of how changes might begin. The authors take a good deal of time to explain that good products will result from thinking clearly about how a thing is made, what it is to be used for, how it will differ from other things in existence, how it will interact with the culture and climate of the prospective consumer, and so on. These are all questions of design. Good design is not only safe but goes further to be beneficial for users and for the environment as well. The whole idea of innovative, basic redesign is central to the structure and meaning of this book. It permeates the entire argument of the book. The next chapter addresses typical environmentalism, which tries to ameliorate the bad parts of what already exists. However, this is a catch-up process that can never really catch up because the only way to get a good, positive product is to move away from what already exists into something new and wonderful. The information is pleasant and positive, but firmly rejects the gloom and doom of typical environmentalists. The authors suggest in the next chapter various ways to implement good design. They give many examples, large and small, of how buildings, factories, products and systems have been designed to provide excellent products and environments, but also to produce good effects on the earth. This chapter is very important because it takes the argument beyond the hypothetical into the real world of actual products and buildings. The important concept of planning a product's next use is the subject of the next chapter, "Waste Equals Food." Most people in the modern world just throw things away and buy new things, but this chapter shows how products can be originally designed with an end use that will be positive and practical as well. The packaging itself can be used for something good, such as using nontoxic packing material to be utilized as insulation in a third-world recipient. The next chapter points out an important component in the authors argument, that everything is actually local. Designers and manufacturers need to factor in the local elements for a thing to be used, and also to plan for all the interesting and important factors in an environment. Modern manufacture and agriculture tend to make things monocultural, but this book's approach respects and encourages much diversity. The final chapter gives a simple outline of how to take steps toward cradle-to-cradle design. There are interesting and adequate references to research in the notes.

Quotes

"It was portable and easily repaired: the fabric factory—the goats—followed the Bedouin around," p. 8.

"I wanted to be involved in making buildings, even products, with completely positive intentions," p. 10.

"I come from a family of literature and philosophy scholars, and turned to chemistry only out of sympathy for my high school chemistry teacher," p. 10.

"Michael explained his idea of creating a biodegradable soda bottle with a seed implanted in it, which could be thrown on the ground after use to safely decompose and allow the seed to take root in the soil," p. 13.

"Nature doesn't have a design problem. People do," p. 16.

"To be sure, the Industrial Revolution brought a number of positive social changes," p. 26.

". . .brute force energy doesn't make good sense as a dominant strategy over the long term," p. 32.

"But in the race for economic progress, social activity, ecological impact, cultural activity, and long-term effects cannot be overlooked," p. 37.

"But as we shall see, good design can require no regulation at all," p. 61.

"The marvelous thing about effective systems is that one wants more of them, not less," p. 77.

"We are not leaving this land, either, and we will become native to it when we recognize this fact," p. 89.

"How can we gain profit and pleasure from a diversity of natural energy flows? How can we engage with an abundance of diverse materials, options, and responses, of creative and elegant solutions?" p. 120.

"Instead of promoting a one-size-fits-all aesthetic, industries can design in the potential for "mass" customization, allowing packing and products to be adapted to local tastes and traditions without compromising the integrity of the product," p. 141.

"We can celebrate the fecundity in the world, instead of perpetuating a way of thinking and making that eliminates it," p. 156.

"How can we support and perpetuate the rights of all living things to share in a world of abundance?" p. 186.

Topics for Discussion

The authors suggest new and startling ways to use materials. A good example is the book itself, which is made of polymers and not wood products. Would this approach be acceptable to people generally? Why or why not?

The Industrial Revolution worked on the assumption that materials are ever-renewable. How has this point of view changed in the last century-and-a-half?

Discuss the extended metaphor of the cherry tree as a model for design and production.

What is your response to the various suggestions for eco-friendly architecture? Include topics such as skylights, windows that open, design that incorporates local climate, grass roofs, solar collectors on roofs, and so on.

Compare and contrast the typical recycling point of view with the radical new ideas in this book about design and reuse of friendly materials.

Discuss the relative costs of "cradle to cradle" design and manufacture as opposed to "cradle to grave" manufacture.

Give examples of how individuals and companies, who have been using the designs of the authors, have responded to the work.