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Stirring It Up

*For Meg, whose partnership and love
make the impossible possible, and for
Alex, Ethan, and Danielle,
who give me hope and purpose.*

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he says, but the company can't lose sight of its bottom line. If costs force it to raise its price so much that it can't compete and grow, then how can it do anything good for its consumers, its supplier communities, and the planet? "We have to be market savvy and business savvy in the way we approach our responsibilities," he points out. What else would you expect from a man whose watchwords are honesty and authenticity?

The experiences of the people showcased in this chapter tell me that organic is, quite simply, the best way to do business. Not just for Seth and Barry at Honest Tea or for me. It's true for anyone who wants to run a truly cost-efficient business—the only kind that can survive long-term—and still leave behind a habitable planet for our children. And as the next chapter makes unmistakably clear, the planet won't be habitable unless we all find ways to clean up the messes that conventional business leaves in its wake, never even counting the cost.

No Such Place as Away

My grandfather was the hardworking son of Eastern European immigrants, the sort of entrepreneur who built America's industrial base in the middle of the last century. He and my father owned and ran a shoe factory in Pittsfield, New Hampshire, called the Pittsfield Shoe Corporation, and it was located on the banks of the Suncook River. The factory employed a lot of people, it produced a good product line—and it was a polluter.

But I knew nothing of that. When I was young, I loved to watch the colored water—one minute red, another yellow, still another green—gushing out of the factory into the river. To me, the wastewater was beautiful. Only later did I learn that the Merrimack, into which our little river emptied and whose banks were crowded with shoe factories, was the tenth most polluted river in the United States. I had to face the fact that our family business, of which we were so proud, was a part of the problem.

The shoe business was slow to seek a solution. Part of the reason was cut-rate foreign competition—how could an embattled

industry stay afloat if it was being forced to spend hundreds of thousands or even millions of dollars to reduce its impact on the environment? But that attitude, understandable if short-sighted, explained only a portion of the industry's inertia. The rest traced to the sheer disbelief of the shoe business's leaders. How could a little wastewater, they wondered, be worth such a fuss?

In those days, you understand, America felt so huge, and its distances seemed so expansive, that people believed their garbage somehow melted into the landscape and disappeared—that it simply went “away.” You could throw it “away,” flush it “away,” and if you had a tailpipe or a smokestack, even blow it “away.”

It sounds odd from today's perspective. It's as if “away” were some mythical, Oz-like place where all waste, trash, and associated ugliness could be disposed of without consequence. And we threw stuff away until it was piled higher than the fence around it, or killed the fish, or put a haze on the horizon.

It has taken us a shamefully long while, but at last we have learned that there is no such place as “away.” The fact is, the planet Earth is a closed system. Whenever and wherever a light switch is thrown, a puff of smoke or some type of pollution is created where the power is generated. We may not see it, but it's there. My trash washes up on someone else's shore—or fouls their groundwater—just as surely as distant air pollution follows prevailing winds to my valley.

Think how far we've come, yet how far we have to go: Today, we find it laughable that anyone ever believed the world was flat. We marvel that it took Christopher Columbus's voyage of discovery in 1492 to disprove it once and for all. What's

it going to take for the last stubborn few to accept that the idea of “away” is a myth worthy only of flat-earthers? We've already seen medical waste washing up on beaches, even after it's been taken miles out to sea. We've long seen birds struggle to free themselves from plastic six-pack rings stuck around their necks. It's simply delusional to think there is—or ever was—such a place as “away.”

Every day, in everything we do, we are having an impact on the planet. If it's true for individuals, and it is, then it is certainly true for businesses. Any business owner or leader who doesn't see this is willfully blind, but that's not all. He or she is turning down the largest and most lucrative opportunity of this young century, which is to reduce or eliminate industrial waste. The companies that figure out how to do business with little or no waste are going to reduce their costs, boost their profits, and win tremendous public support as they do it. I fully intend for Stonyfield Farm to continue leading in this pursuit, and I want your company to be my competition.

There are people out there who excel in designing waste out of (and, I might add, profits into) a system—more and more of them every day. But if you're looking for real creativity and efficiency, you don't necessarily have to retain a consultant. You can learn a lot simply by paying attention to how nature handles waste. In nature, there is no waste—period. Every by-product of every process fuels or catalyzes some other process. Decomposed leaves feed mushrooms and fertilize wildflowers. Tiny insects feed on fungi that would otherwise overwhelm a tree. Old beaver dams provide spawning zones for fish. It's just amazing how efficient nature is, once you start paying attention to it.

As businesspeople, we need to strive to be just as efficient in handling waste as nature is. Ideally, each company and each process should be able to boast that everything that doesn't go out to the consumer goes back to the Earth. Any system that delivers less than total efficiency should be regarded as broken.

That last sentence sets up a high hurdle. But it also represents a very hopeful goal. What it says to us is, waste is inevitable—but dealing with it need not be an insurmountable obstacle to processes or products. If nature handles it, somehow we can, too.

Let me stop here for a moment and assure you that my strategies for reducing or eliminating waste did not spring fully formed from my subconscious. It's been a long evolution for me, as I'm sure it is for many. My goal is to shorten your evolutionary time line a bit, by sharing what I've learned.

In our early years at Stonyfield, we sometimes, and always reluctantly, dealt with waste by dumping it, much as my father and grandfather did, in the nearest version of "away." But it really bothered me. Having waste to dispose of always seemed, well, a waste.

If I needed an epiphany to make me truly serious about the problem, it came one snowy night when the dumpster outside the Yogurt Works caught fire. We were still on the farm, with Samuel's house and mine both connected to the barn, where all our cups and lids were stored, as well as the Yogurt Works and the office. We had supported our local recycling center back then, but it didn't take plastic, so we had a dumpster outside the barn. It turned out later that an employee had thrown a cigarette butt in there.

We were having dinner when I noticed that it was light

outside—this in February, long after dark. We ran outside and there was the dumpster, about ten feet from the barn, with twenty-foot flames belching up, dancing back and forth in the hilltop wind. The dumpster itself was literally orange, glowing with heat. The paint on the barn was already blistering and cracking, and I was afraid the whole place would go up in flames.

There was a volunteer fire department, but we were at the very end of the end of town and it was going to take them forever to arrive. I had no choice. I grabbed a chain, jumped onto the tractor, and backed up to the dumpster. My hair and skin were getting singed as I crawled through the snow to hook up the dumpster and drag it away from the barn to burn itself out in the driveway.

The next morning, the contents of the dumpster had cooled into one giant meteorite of plastic. We made two firm decisions that day. One was that nobody would ever smoke again anywhere on our hill. And the other was that, somehow, all our film and plastic would be recycled from that point on. We had to find a place to do it.

There was another, less dramatic turning point for Stonyfield's waste processing, and it came about twenty years ago when circumstances forced us to discard 3,600 plastic cups of unsellable runny yogurt. Incubator problems had kept the batch from reaching the right consistency, and we hadn't noticed the problem until it was neatly packaged and ready for shipping. I knew that I couldn't just put the load in a landfill, so we piled it on ten pallets, trucked it to a nearby pig farm, and began laboriously opening each cup. We intended to pour the contents into the pigs' trough and then rinse the cups for recycling.

I'll never forget the look on the farmer's face when he figured out what we were going to do. "Forget it," he said. "Just push those pallets off the truck, and watch what happens." As the cups rolled all over the ground, the farmer opened a gate and the pigs stampeded through. In a matter of seconds, they tore the cups apart and slurped up every ounce of yogurt, drooling, oinking, and stinking with a ferocity that left only a pile of plastic shreds licked absolutely clean. All we had to do was scoop up the debris with snow shovels and drive it to the local recycling center.

Thus did a herd of hungry pigs show me the way, back in 1986. I am forever grateful. Besides saving us the cost and trouble of washing out 3,600 yogurt cups, those pigs showed us—vividly—how little we knew about managing our waste in more efficient ways. Watching those pigs eat was a master seminar in how to slash costs and drive profits—without the consulting fee, the boxed lunch, or the stuffy conference room.

Since those porkers schooled me, however, I've learned that not everything works as perfectly as feeding cups of yogurt to pigs. It's largely unrealistic to think that we can avoid generating at least *some* waste. People are not going to lie down beneath a cow, mouths open wide, to get their dairy. We have to package it, and reducing the environmental impact of packaging is the Holy Grail of waste management—the goal everyone in industry is straining to meet.

It would be nice if there were a national strategy in place to guide companies seeking to do the right thing. Unfortunately, in the area of packaging waste, all we have is a crazy quilt of state initiatives begun under the 1976 Solid Waste Disposal Act. Huge landfills here, incinerators there. Curbside recycling

programs in some communities, virtuous individuals left to scout out recyclers on their own in others. Worse yet, very little attention is given to the notion of stopping waste, say, by finding another use for an item or repairing something that's broken.

No wonder many businesspeople feel isolated and uncertain as to how to proceed. Lacking a coherent waste-management policy in this country, each company struggles to find a path for itself—or, too often, gives up entirely.

The Stonyfield Way with Waste

How have we wrestled with environmental stewardship at Stonyfield? With determination, I would say, tempered with a commitment to incremental improvement. I knew from the beginning that this wouldn't be an overnight proposition. I assumed we would learn a little bit more each year, and that technology and environmental knowledge would grow with us.

I also assumed that packaging should cease to be merely the province of marketers, and that waste management should be a company-wide concern. To that end, we have established a multidisciplinary team that has several key goals. The first and most important—the one that supersedes all others—is to ensure that Stonyfield Farm's packaging is 100 percent sustainable by the year 2015. That's a huge feat to accomplish, but it's an endeavor that our employees have wholeheartedly embraced. They have dug into the research, challenging all assumptions (especially mine), and they have stepped up whenever extra effort was required.

One of the first and most important data points we collected, the one that spurred us on our way back in the early 1990s, was found in a study conducted by Boston's Tellus Institute. The researchers weighed a range of packaging options, from plastics and the poly-coated paper used in milk cartons to glass and metals. The surprising upshot was that package *production*, not disposal, was the leading environmental villain.

Over more than twenty years, that fact has not changed. Would you believe that less than 5 percent of the environmental impact of packaging is to be found in the final disposal stage? More than 95 percent of the ecological damage comes from the energy used and the toxins created in the package-manufacturing and delivery process. The conclusion is as true today as it was when the study was first done: Except for highly toxic materials like PVC, the lightest package is the best package for the environment.

We decided to start making our yogurt cups out of polypropylene, the lightest-weight but still durable plastic for preformed cups. The drawback was that injection-molded polypropylene plastic was and is still not recyclable in most communities. Even so, we use so much less plastic to make our yogurt cups—17 percent less, in fact—that, compared to alternative materials, the polypropylene ended up being the better environmental choice. For instance, we now prevent the manufacture and disposal of nearly 200 tons less plastic than we would if we used the more widely recyclable HDPE (#2) plastic. In addition, our decision preserved nonrenewable resources (it takes oil to make plastic) and kept tons of atmospheric emissions from the manufacture and distribution of the packaging out of the air. This was all good, and we were proud of

ourselves. But not for a moment did we believe that polypropylene was the end-state solution for us. We only knew that it would have to do until something better came along.

Part of the answer came along soon, in the form of the lid. In 2002, guided by a University of Michigan Center for Sustainable Systems study of our packaging, we eliminated plastic lids and inner seals in favor of foil and, in so doing, saved more than \$1 million per year. The switch reduced solid waste by 6 percent annually and cut back on the amount of energy (16 percent) and water (13 percent) needed to turn out a cup of yogurt.

Still, aluminum foil feels like just another step along our road to sustainable manufacturing. We aren't resting on our laurels. We're continuing to move forward, and setting annual goals for incremental improvement.

Between 2007 and 2015, when we expect to reach our 100 percent sustainability goal, we have made a commitment to achieve at least 10 percent annual improvement in sustainable packaging.

So, like a fisherman seeking to improve the chances of hauling in his limit, we throw the nets far and wide in search of elusive prey—the fully sustainable packaging method that will wring another few percentage points out of our goal. Recently, for example, Stonyfield has considered developing yogurt containers made from crops such as beets, corn, and potatoes.

A plasticlike material from vegetables? It sounds strange, I know, but chances are you've already eaten a takeout meal using a fork made from corn, especially if the restaurants you frequent have environmental sustainability as a goal. Why not use the same recipe, or something similar, to make yogurt

containers? Biopolymers—plastics made from agricultural products like corn—are becoming more commonly available. And they pose enormous potential for the future. However, using corn as an example, it is not the panacea it may appear. That's because the growing of corn sucks up inputs (water, fuel, pesticides, and energy-intensive fertilizer). The true potential of biopolymers will come when we can make them from the waste from farming and processing of food—not from virgin crops.

If our investigations into innovative container materials bear fruit, your cup of Stonyfield yogurt might someday look and feel the same as today's plastic version, but the container itself will add nutrition to the yogurt it holds. Furthermore, it won't require disposal. No more stuffing your empty cup into an already choked trash or recycling bin; you might instead choose to eat it as a second course, or toss it onto your compost pile, returning it to its carbon roots.

Warming to the challenge of using as little plastic and cardboard as possible, we've swapped injection-molded, preformed cups for ones that are actually made by the machine that also fills them with yogurt. In what's known as a "form, fill, and seal" packaging process, the cups are stamped from gigantic rolls of plastic film, leaving hardly any scrap behind. The finished package weighs 37 percent less than injection-molded cups.

Some of the packaging changes we've made originated from a 1999 assessment by the University of Michigan's Center for Sustainable Systems, which looked at Stonyfield Farm's entire product-delivery system (PDS)—from the manufacturing of the materials used in our packaging through to the

consumer. Everything was on the table—from our yogurt cup's inner seal and its multipack outer wrap, to the corrugated boxes and pallets used in shipping and the various transportation links that bring the materials to us and take the yogurt to our customers.

Interestingly, the study showed that the size of our containers had a much bigger impact on the environment than did either the materials themselves or the process used to make them. It takes 27 percent less energy per pound of yogurt to produce and distribute our yogurt in thirty-two-ounce containers than it does to turn out six-ounce cups. If we sold only the quart-size containers, we could save about 25,000 barrels of oil a year, adding nearly \$1 million to our bottom line. But our consumers would have to be on board with the one-size-fits-all idea, and even I have to admit that thirty-two ounces of our yogurt is way too much for a brown-bag lunch. What works best for the customer has to be our guide—always.

That was an unfortunate but inescapable lesson: Not every environmentally good idea is a sound business idea as well. But that doesn't stop us from forging ahead with innovative concepts. Sometimes we overreach our grasp or run into roadblocks, but one thing is certain: It's an education every step of the way.

Consider Stonyfield Farm's liquid and solid waste issues, because we have those to contend with, too.

When I talk about liquid waste, I'm talking about the water we use to rinse the equipment when we change from one product line or flavor to another. This rinse water contains milk, yogurt, fruit, and flavorings—nothing bad, but nothing that belongs in water, either.

Our solid waste consists mainly of cupped yogurt from a variety of sources, including samples from our quality control process. While we try to minimize the waste we generate, we are still far from zero waste.

Where the yogurt waste was concerned, our first thought was of the pigs that had done such a snortin' good job for us decades ago. We paid to install a feed tank at a New Hampshire pig farm, and the farmer even branded his pork to local restaurants for a while as "Stonyfield Farm yogurt-fed." But our production soon grew beyond the pigs' abilities to pig out. Since so many farms have disappeared in New Hampshire, there are simply not enough pig farmers to take our yogurt. Just getting the solid waste off our site took fifty-two tractor-trailers hauling 2.5 million pounds of trash per year.

Meanwhile, doors were closing on the liquid-waste side, too. There came a point when the town of Londonderry told us they couldn't continue to accept our rinse water. Londonderry leases its wastewater capacity from nearby Manchester, where the regional sewage treatment plant is located. Thanks to residential and commercial growth in and around Londonderry, the city maxed out its treatment allocation and sent us packing. It was strictly a matter of capacity. We'd gotten too big for the system.

Our answer to both the liquid- and the solid-waste problems was to build our own ecological pretreatment plant. Since the spring of 2006, we've been turning waste yogurt into methane gas and using it as part of the energy we consume. Believe me when I tell you that building a pretreatment plant hadn't been high on our list of priorities. The project required huge

amounts of capital, money we could have used to make more yogurt and expand into new markets. But when the town was forced to limit our liquid-waste discharges, we saw an opportunity for a great leap forward that would make Stonyfield more environmentally sound.

That's not to say we didn't look hard before we leaped. Indeed, we had two very big problems to solve first. The first was technical, the second more corporate in nature—but related to the technical issue, too.

Aerobic biological systems are the standard in the dairy industry. These systems use bacteria and oxygen to "eat" waste material, leaving the water clean enough to put back into a river. But that model requires a great deal of energy and would leave us with large amounts of sludge that would have to be hauled to that mythical place called "away." We didn't want to become a net hauler of a different type of waste, even if it was mostly organic. So we opted to use bacteria but in an oxygen-free, or anaerobic, system known as a digester. The methane by-product could be used as fuel to heat the system, and the amount of sludge left behind would be greatly reduced.

Our second problem concerned our partner, Groupe Danone. Our agreement with them required me to get approval for any capital spending of more than \$1 million. Initially, the people at Danone said no to the pretreatment facility, having had a bad experience with an anaerobic system that failed. But after I showed them the innovative designs of our supplier, ADI Systems in New Brunswick, Canada, and convinced them that the technology was much improved, the Danone people went along with our plan.

The payoff has been enormous. The new system cost 15 percent more to build than an aerobic plant, but it uses 40 percent less energy and generates 90 percent less waste. Instead of the treatment system resulting in one to two trucks of sludge per week, as had been projected for the standard aerobic approach, we now have been operating for more than a year without hauling any sludge at all and expect to produce just a few truckloads every three years. With a 50 percent reduction in operating costs, and projected savings of \$3.6 million over the system's first ten years, the extra capital investment will pay for itself very quickly.

We are now in the process of designing a separating operation that removes yogurt generated or rejected by our quality control process from its cup and separates the aluminum-foil lid from its seal, eliminating the need to truck the material a good distance away just to get the job done. Better yet, the waste yogurt can be mixed with rinse water and pumped as slurry for the short distance to our digester, saving still more trucking.

Our sustainable packaging team is looking at more than material. Each year we try to understand a bit more about our packaging, in the belief that the more we know, the more we can improve. This year the team, under our vice president of purchasing, Rolf Carlson, is focusing on creating a sustainability scorecard for the materials themselves, but also for the manufacturing process. By devoting resources to these initiatives, we hope to pave the way for continuing improvements and reductions.

And if anyone can find a way to reduce waste, it will be Nancy and her team. I know no one more passionate on the subject. She tells a story about a recent trip to Ecuador, to visit our organic banana supplier there, and driving past fields of conventional

bananas and sugarcane stretching for miles. At one point she saw some children happily splashing in a water hole, and she stopped, intending to take a photo of the charming scene. Then she realized—an “Oh, my God” moment, she said—that the water was runoff from the fields, loaded with who knows what pesticides and herbicides. She said it sent shivers down her spine to think what the stuff was doing to those kids and made her grateful that Stonyfield only buys organic bananas that will not put poisons into the local environment.

Reduce or Redesign, Reuse, Recycle—In That Order

I'm convinced that smart, hardworking people can profit from practicing what many people call the R's of effective waste management. The R's aren't new, but the order of priority is much more important than people realize. Specifically:

- ◆ *Reduce or redesign* (or both) by using less material and resources and producing less waste. This is where you get the biggest net environmental impact—and net profit.
- ◆ *Reuse* by putting used materials and products back into service. This is the second biggest waste-saving and money-saving opportunity, much larger than through recycling.
- ◆ *Recycle* by transforming used materials and products into new ones. Recycling is the buzzword that gets people's attention, but it really is the lowest-priority choice and the slowest payback option.

At Stonyfield, we've learned that reducing waste means consuming less and discarding less. And since source reduction, particularly when it comes to packaging, stops waste before it starts, it's the most economical and ecological choice.

Incorporating reusable materials and equipment into a production operation like ours is difficult but not impossible. For example, the fruit that goes into Stonyfield yogurt used to come to us in throwaway plastic bags inside cardboard boxes. We plugged that leak by replacing the bags with five-gallon plastic buckets, which were reused by manufacturers of wallboard paste. However, too many were still winding up in landfills, so we plugged that leak, too. Now most of our fruit preparations arrive in big, stainless-steel totes that resemble oversize beer kegs. The totes can be washed and used over and over again. It's less expensive and easier for us not to have to handle mountains of empty fruit bags or buckets, and it's easier on the environment. Another example of reuse is with the cardboard boxes that our plastic cups are shipped in. Over a decade ago we found a company that buys them from us—and resells them to clothing and auto parts manufacturers to ship their products. Hopefully the boxes will be used many times before they are recycled.

Recycling is almost universally regarded as a virtue. I beg to differ. The act of recycling actually means that we have failed to reduce or reuse. The EPA's own numbers delineate that failure: Each of us now produces 4.4 pounds of waste each day, nearly twice as much as thirty-five years ago. Consequently, we have to spend enormous amounts of energy and money carting away all of this waste to someplace else, where it will be made

into something different—a process that releases still more CO₂ into the atmosphere.

What is more, recycling affects only a fraction of solid waste. At best, 5 percent of plastic gets recycled. We do better with aluminum cans, but the recycle rate is still only 30 to 35 percent.

Even when commonly used and supposedly recyclable waste materials are taken to a recycling center, the energy contained in them isn't necessarily recaptured. Take certain yogurt cups and soft-drink bottles made of polyethylene. Look on their bottoms and you're likely to see the number 2, meaning they are made of the same base resin. Yet your municipal recycling plant likely accepts only the bottles. This is because all number 2 plastics are not the same. The number 2 used to make bottles has a different melting point than that used to make wide-mouth containers like yogurt cups. Since they are different, they cannot generally be recycled together. Little surprise, then, that so many supposedly recyclable plastic containers end up in landfills.

At Stonyfield, we still recycle, but only as a last resort after we've tried to design waste out of the product or process. We've been working for many years with a Waltham, Massachusetts-based company, Recycline, that makes toothbrush and razor handles from our used cups.

As part of its quest to become a green giant, Wal-Mart has pledged to eliminate a quarter of the solid waste currently produced by its U.S. facilities. When the company took an environmental impact team up on its suggestion that Wal-Mart bundle for resale the plastic that it used to send to landfills or incinerators, the company saved \$28 million a year. Another

\$2.4 million of cost savings was lopped off by asking the supplier of its private-label Kid Connection line of toys to eliminate unneeded packaging. Wal-Mart now ships nearly five hundred fewer containers each year, reducing shipping costs and saving 3,800 trees and a million barrels of oil in the bargain.

Indeed, here's how CEO Lee Scott wants his employees to think about waste: "If we throw it away, we had to buy it first. So we pay twice—once to get it, once to have it taken away. What if we reverse that? What if our suppliers send us less, and everything they send us has value as a recycled product? No waste, and we get paid instead." Smart talk.

And speaking of smart talk, when it comes to seizing waste-based opportunities that boost a company's bottom line, the grand master is my friend Ray Anderson, founder and chairman of Atlanta-based Interface. In his quest to erase Interface's environmental footprint while boosting its profits, nothing escapes Ray's attention.

Interface Sweeps Waste Out from Under Its Rug

The carpet industry casts a huge shadow in Georgia. More than forty-five thousand people work in the state's carpet mills, earning wages of some \$4 billion a year in a business that accounts for \$10 billion of the state's overall economic activity. But thanks to forward-looking industry leaders like Ray, whom I've known for more than ten years, the carpet industry is leaving an environmental footprint far less visible and dam-

aging than one might ever imagine. "Reduce or redesign; reuse; recycle" is not just the Interface gospel; it's the message Ray is fervently spreading throughout the carpet and flooring industry—indeed, throughout business as a whole.

He has been enormously successful as the head of a \$1 billion company that leads the world in the design and production of so-called carpet tiles, the modular squares that can be laid down and taken up easily, just the thing for a wired world in which access to under-floor connections is such a cost-effective feature of office space. Interface, which also makes broadloom carpet and (until its recent divestiture) commercial fabrics, does business in more than one hundred countries and has manufacturing plants on four continents.

Despite his tailored suits, Ray isn't your typical captain of industry. He makes clear in his Georgia drawl that he'd rather be known as, say, "a radical industrialist," than as a conventional carpet mogul. Commercial carpet making, after all, has long been a highly toxic business. It has depended on petroleum products for its synthetic fibers and on problematic glass fiber and polyvinyl chloride for its carpet backings, spewing out greenhouse gases and toxin-laden water as manufacturing waste by-products. Moreover, worn-out carpets end up as virtually indestructible components of garbage mountains and underground waste pits.

With that legacy behind him, it's no wonder that when Ray makes his case for planetary sustainability as unparalleled profit opportunity, he sounds like a repentant sinner, compelled to atone and eager to share the good news of salvation. He names his own sins as plundering the Earth, polluting the environment, and stealing resources that belonged not to him

but to future generations. He's determined to make up for past transgressions by completely erasing his business's environmental footprint and by bringing others into the sustainability fold. Reducing waste and reshaping what remains into reusable raw material is a big part of Ray's vision.

Ray underwent his eco-conversion in 1994, when he realized the extent of industry's destructiveness and vowed to become a new kind of businessman, one who puts back into the environment everything he takes out. For the previous twenty years, this smart and ambitious Georgia Tech-educated engineer had been immersed in making a success of Interface, which he founded in 1973. But in 1994, he was asked by ecology-minded interior designers what Interface was doing to help the Earth. He looked blankly. "Nothing" about covered it, and the question stayed with him.

Seeking to educate himself, Ray found a book that changed his life—Paul Hawken's *The Ecology of Commerce*. Reading Hawken's account of species extinction, of the fouling of air and water, and of "the death of birth," a phrase that particularly stunned Ray, was like taking "a spear to the chest," he recalls. He responded by vowing to make his company totally sustainable by 2020, meaning that it will produce no toxic waste or dangerous emissions and will use no oil whatsoever. Ray says Interface is over 40 percent of the way to that goal.

What Ray preaches to anyone who will listen is not fire and brimstone, but the chance for acolytes to earn redemption and greater profits all at the same time—hardly a penance for any company thinking of following his lead. He points to the \$336 million of savings Interface has enjoyed in little more than a decade just from its waste-reduction efforts alone. He regales

listeners with tales of hard times weathered and new business won, thanks to technological advances and design innovations inspired by the company's environmental initiatives. Who can argue with an ecological message built on lower costs, better products and processes, motivated employees, and an admirable image? And Ray has the numbers to back up his claims: Over the three years ending January 1, 2007, Interface's annual gross profit rose more than 52 percent to \$339.6 million. Operating income surged 130 percent to \$72 million while its share price has gone from \$6 to \$20.

Ray and I agree that efficient waste reduction is a two-part process: First, reduce the input of raw materials, particularly the nonrenewable kind. Second, reduce the output of by-products that nature cannot absorb nor industry reuse and that end up harming the environment. Accordingly, Interface defines waste as "any cost that does not provide value" to its customers—in effect, it is the product of inefficiency, of not doing something "right the first time." So, besides its effort to eliminate flawed goods and scraps that end up clogging landfills, the company works hard to use as little as possible of any material and to stem losses caused by shipping errors and mistakes on invoices. That means that both products and processes are being redesigned with an eye to generating only the kind of waste that can be turned into a resource—or a "technical nutrient," as Interface styles it—for another product.

The gist of Interface's waste policy can be summarized with one word: Simplify. The corporate acronym for it is anything but simple: QUEST (Quality Utilizing Employee Suggestions and Teamwork). Fortunately, the policy itself is crystal clear—using fewer resources is always better than recycling or reclaiming.

At Interface's plant in Guilford, Maine, for example, managers cut water usage by 65 percent, saving more than 2 million gallons a year. How did the Guilford crew do it? With a few minor adjustments to a heat- and water-recovery system and the installation of a brass nozzle that changed the water flow pattern. The nozzle cost Interface \$8.50; the savings add up to \$10,000 a year. Not a bad return on investment, and proof of the fact that getting rid of waste need not be a long and costly business.

Another manager at the Guilford plant decided that too much antistatic agent was being used in the dyeing operation, which led him to check out an alternative product. The result was a money-saving, environmentally friendly reduction of 83 percent in antistatic chemical use. That achievement sparked further dyeing-process evaluations that did away with acetic acid altogether in favor of a more benign alternative.

Interface's catalog of waste-reduction gains also shows lighter but more durable carpet tile products, with as much as a pound less material per square yard, and a modular-carpet-making process that uses an astonishing 81 percent less water than it did in 1996. In addition, the company's energy use at its carpet manufacturing facilities has declined by 45 percent, and the manufacturing waste Interface carts off to landfills has shrunk by 70 percent, from more than 20 million pounds in 1996 to around 7.5 million in 2006.

But there's more to Interface's solid-waste-reduction program than simply cutting back on trash. It strives to turn manufacturing leftovers and previously used materials into valuable raw material for another product cycle, which reduces material purchases and costs, eases the strain on the Earth's natural re-

sources, and lessens the amount of waste that goes into landfills. This manufacturing trifecta, in turn, frees up capital that can be invested in sustainable technologies and saves consumers money by providing them with less-expensive products.

Among the company's innovations are nylon yarn made from reclaimed carpet face pile (part of its ReEntry carpet-reclamation program), backing material made from waste goods and previously used carpet backing, and new textiles woven from fibers reclaimed from polyester fabric. Innovations making their way through the pipeline also include raw materials made from plants such as hemp, sugarcane, and corn.

Ray Anderson believes—and I agree—that we are in the early days of a new industrial revolution, one driven by gentler techniques and technologies that mimic nature's ways. And as a former debaser of the environment, he is grateful for the chance to help renew and sustain the Earth, while reorienting his company and the world at large toward "a new and better way to bigger profits and to greater, more genuine shareholder value." A combination of conviction and success makes Ray Anderson a very persuasive voice for the notion that a business can manufacture without waste and grow without damaging the environment.

Terracycle, Inc.—Worming Its Way to Success

Mother Nature's got nothing on Tom Szaky—well, not much, anyway. There is no waste in her world, and there's precious little in Tom's, either. Tom understands that what most of us consider to be waste is nothing more than raw material for production.

Tom Szaky is the cofounder of TerraCycle, a Trenton, New Jersey, start-up whose flagship product is liquid plant fertilizer. But it's not *what* he does that warrants the comparison with natural systems; it's *how* he does it. Tom's fast-growing company uses waste to make waste. He then packages it in bottles made from waste and sells the product to a growing legion of satisfied customers who like it enough to, well, not waste it.

Let's break it down some more. What Tom and TerraCycle do is take organic waste—composted vegetables, for example—and feed it to a quarter million worms that eat their body weight in landfill-bound trash every day. Then TerraCycle collects the worm poop—that's the indelicate word the company prefers—and sells it in a liquefied form quaintly known as "tea." Even the packaging is derived from waste material—namely used twenty-ounce soda bottles they collect from schoolchildren, among other donors. (They pay a nickel a bottle as a fund-raising contribution.) All Szaky and company do is wash those bottles and remove the labels. Then they put on a label of their own, screw on a spray top they've gotten as surplus from another manufacturer, and load the finished product into someone else's misprinted shipping boxes. Before sending them out into the gardening world, TerraCycle takes care to ensure that every box of bottles has a variety of colors and shapes, just to reinforce the recycled nature of the packaging.

TerraCycle began its young life as an entry in a university business-plan competition in 2001. Szaky and a fellow freshman Princeton University student named Jon Beyer wanted to prove that a business could be run with a nearly negative cost structure, and to them, selling worm poop sounded like the way to put the theory to the test. They had a friend who grew

plants of a particular species in his basement, and they had seen what repeated applications of worm poop could do for that guy's production, so they thought why not try to commercialize the idea? When it came time to write the plan, it certainly didn't hurt that Beyer's father was an ecotoxicologist who knew plenty about worms. Szaky and Beyer came in fourth, which was great, but that wasn't good enough to win a cash prize.

They won the next contest they entered, however, and received a check for \$200. Then they entered another low-stakes contest and won that, too. And then another, and another. All told, they entered seven business-plan competitions, capped by Carrot Capital's very prestigious contest, which offered a \$1 million purse. Much to their shock, they won that one, too. But they turned down the payday—and walked away knowing they had only \$500 in the bank to come home to. Turns out Carrot Capital, a New York-based venture capital group, wanted to let everyone go except Tom, making him something akin to a spokesman for what would become their fertilizer. Tom wasn't interested. He rather liked the idea of running his own company, surrounded by people who shared a passion for literally pulling profit from trash cans.

So Tom went his own way, leaving school to devote his full energy to TerraCycle. Beyer stayed in school and eventually graduated, but remained involved in the technological end of the company. Szaky's first significant move was to borrow money from everyone he knew and max out his credit cards to buy the "worm gin" that would be central to the TerraCycle process. It was essentially a series of conveyer belts stacked atop one another to bring garbage to the worms, and it was available

from its Florida developer in prototype form at a price of \$20,000. The money was raised, but just barely.

Then Szaky, with Beyer's help, amassed the necessary production vats and tanks for mixing the worm-poop potions. Each was recycled from some other purpose and found in a landfill—some were horse tanks, others were thousand-gallon storage tanks that had their tops cut off. Eventually a headquarters building was purchased in a tough neighborhood of Trenton and painted with graffiti by can-wielding locals who were invited to use the walls to showcase their work. Tom furnished the HQ with cast-off desks and computers, and put lots of college interns in front of them.

One of the competitive aces TerraCycle has always held is its ability to offer retailers higher-than-average margins, because TerraCycle's own margins are so high. The worms work for free, after all. Still, no one is quite sure how Szaky managed to talk the likes of Wal-Mart and Home Depot into carrying his products. Then as now, Szaky greets the world in rumpled jeans and a T-shirt. But I can bet how he carried the day during those crucial presentations. When Tom Szaky opens his mouth, he doesn't miss a cue or a beat. He may have started his company as a nineteen-year-old college dropout, but he has matured into the role of a most persuasive twenty-four-year-old eco-entrepreneur.

From today's perspective, TerraCycle seems to have done everything right thus far. It was Szaky who realized that all soda bottles take the same size cap, meaning that these recyclable bottles were the ideal and most available source of cost-free packaging. He was also smart to seek and obtain organic certification for his plant food, because it lent the company instant

credibility with gardeners. Certainly it didn't hurt in those early days when *The New York Times* called TerraCycle's plant food "the most eco-friendly product ever made." With that endorsement, plus literally dozens of high-visibility free-media opportunities each year, the transformation to hot-company status has long been complete. TerraCycle crossed the \$5 million revenue threshold in 2007. The new waste-based TerraCycle products that are coming on line—including planting soil, seed-starter trays, and a deer repellent—are expected to generate a new spurt of growth to move the company toward \$10 million in years to come—or to spur its public offering, whichever comes first.

None of this should suggest there haven't been glitches along the way: Szaky and Beyer found their first source of organic waste in the Princeton University dining halls, abundantly so, but they couldn't always get it to the worms before it became putrid. The two were forced to sort the reeking bags by the scoopful themselves because employees balked (or worse, became ill). Talk about hands-on. They almost quit the business before it got started.

Szaky also nearly got into trouble some years ago when he decided that the best way to find lots of soda bottles for packaging would be to gather them from curbside recycling bins throughout Trenton. Lo and behold, the practice turns out to be illegal. That's why schoolchildren are pocketing TerraCycle nickels today.

TerraCycle's latest hurdle is a lawsuit filed by Scott's, the lawn-and-garden behemoth that markets MiracleGro plant food. Scott's alleges that TerraCycle's packaging looks too much like theirs, both products having a circle on the label and

some yellow (although TerraCycle's looks more goldenrod-toned, and no fewer than 120 other products on the market feature green-and-yellow labels).

Scott's and TerraCycle are also arguing about their respective research claims, but at last word, neither was allowing the other a look at the data. Szaky earned the ire of Scott's by publicizing a study conducted at the Rutgers University Eco-Complex that concluded that TerraCycle's liquid plant food performed as well or better than Miracle-Gro on most compared indices, and that unlike Miracle-Gro, TerraCycle can't be overapplied and cause plant burn. So far, Szaky and company are not cowering from the fight. They're emphasizing the David-and-Goliath nature of the dispute on their Web site and taking the issue public, encouraging customers to write to Scott's and tell them to back off. The message from TerraCycle to its customers is that Scott's is trying to prevent waste-based plant foods from succeeding in the marketplace, and must be stopped.

Beyond these inevitable consequences of doing well in business, Szaky faces only two significant challenges to fulfilling the business-from-garbage scheme he envisioned five years ago. The first is, will he ever actually achieve the negative cost stream he still thinks is possible? On the TerraCycle Web site, Szaky and company offer a long economic treatise on the theoretical feasibility of running a waste-based business with a negative cost structure. Still, Szaky has not yet found an economical way to get people to pay him to haul away the waste he feeds the worms, so that's kept him on the plus-side of the cost ledger. But he hasn't given up trying to drive the company toward the minus side.

Szaky's second problem looks smaller, but it may prove to be almost as tricky to solve as the first. It's the bottle caps—what to do with all those bottle caps that come into the factory with the soda bottles. Szaky and all his bright, creative employees are stumped. They've thrown it open to all comers now, through a contest on terracycle.net. Figure out what to do with all those bottle caps, and you win a lifetime free supply of—what else?—liquefied worm poop.

If you've come with me this far, you probably agree that the Earth needs more Ray Andersons and Tom Szakys—desperately and right away. It's fine and fitting to lament the oncoming decades of global warming and Katrina-like disasters, the disregard for nature that increasingly endangers all living creatures. But hand-wringing gets us nowhere; alarmists are only slightly more useful than polluters. The times cry out for pragmatists more than idealists; for hardheaded, profit-hungry entrepreneurs who see the looming crisis as an opportunity to be seized and leveraged like any other.

And any entrepreneur aiming to chase that goal could do a lot worse than model him- or herself and business on the family farmers who supply the bulk of our country's burgeoning organic crops. The next chapter looks at their methods and practices—and at their rewards, not least of which is their lifestyle.