part I

ENDINGS, NEW BEGINNINGS
A Future Awaiting Our Choices

Anyone visiting Australia today cannot help but notice massive billboards in all the major cities encouraging people to conserve water. A natural response would be to think these are the result of recent drought conditions, and indeed they are—in a way. But though the signs are new, the drought they were erected in response to has gone on for years and shows no sign of improvement. Across the nation, water reservoirs are at roughly one-quarter of capacity and have been declining for a decade—thanks to a combination of subnormal rainfall and rising temperatures widely attributed by leading scientific panels to climate change.1 Starting in 2007, water became the focus of national debates; one popular suggestion even called for the complete elimination of the nation’s large citrus crop. This sounds drastic, but when there is simply not enough water to go around, hard choices need to be made, even if that means sacrificing an important crop in an industry that accounts for roughly 3 percent of GDP. The country’s national election in fall 2007 was the first in the world in which climate change was the number one issue (and the candidate deemed most dedicated to addressing it won), a possible harbinger for other countries in the coming years, including the United States.
But in addition to conserving resources such as water, innovative Australians everywhere are also seizing the opportunity to rethink and re-create their lives and the infrastructures that govern them. They are working together in communities across the country to come up with renewable energy solutions, and beginning to consider sweeping changes in energy and water industries. Business, long dominated by mining and minerals industries, has become a vocal advocate for investment in innovative alternative energy technologies, such as wind and solar.

Half a world away, Sweden has parted ways with other industrial economies to completely sever their dependence on imported oil—and the vulnerability that goes along with it. Under former prime minister Göran Persson, a commission was established in 2006 that laid out a fifteen-year plan to cut fossil fuel use to zero by 2020. This momentous shift was, in fact, the outcome of decades of work by remarkable networks of public and private sector leaders committed to making northern Sweden the world’s first “bioregion,” in which all energy needs are met from sustainably produced biofuels.

Similar changes are occurring in businesses the world over. In response to the turmoil of world oil markets and oil-producing regions, DuPont, one of the largest and oldest companies in America, has set itself on a course to shift its product line from petroleum-based to bio-based feedstocks. Like many companies around the world, DuPont has worked for years to reduce waste, including carbon dioxide (CO₂) emissions. But it now sees that the real innovation opportunities lie in the creation of new products that break the company’s dependency on conventional oil and gas entirely. Similarly, Nike has reduced its “carbon footprint” by more than 75 percent. But, again, by looking for the truly innovative opportunities for the future, the company has declared its intent to achieve zero waste, zero toxicity, and 100 percent recyclability across its entire product line by 2020. “Our company and our customers care about health; our products and ways of producing them should embody this,” says Darcy Winslow, former head of the women’s footwear division. “But to do this we are having to completely rethink how we design, produce, and distribute those products and how we recover them at the end of their lifetime.”
There are many types of revolutions. History talks mostly of political revolutions, dramatic events that all too often represent little real change over the long term: The cast of players in power shifts and new political philosophies come into vogue, but when it comes to the daily realities of most people, little changes. But occasionally something different happens, a collective awakening to new possibilities that changes everything over time—how people see the world, what they value, how society defines progress and organizes itself, and how institutions operate. The Renaissance was such a shift, as was the Industrial Revolution. So, too, is what is starting to happen around the world today.

Perhaps surprisingly, the most visible signs of this new revolution are a mounting series of environmental and social crises.

While Australia’s water situation may seem extreme, it is hardly unique. Both the southeast and southwest regions of the United States are facing a similar need for rationing and possible permanent cutbacks. In developed countries around the world, previously taken-for-granted aspects of daily life—food, water, energy, predictable weather—seem less and less reliable.

Each of the last several summers has brought record heat waves to much of Europe, as well as other strange occurrences such as extreme flooding, crops that come to season a month early, and the appearance of mosquito-borne diseases previously known only to the Southern Hemisphere—events that scientists have linked to global warming and increased atmospheric CO₂.²

In the United States, there have been repeated scares about contaminated food imported from Asia and E. coli outbreaks from crops grown in our own backyard, recent warnings to parents about the rapid spread of poison ivy caused by higher CO₂ levels in the atmosphere (which both speed the plant’s growth and increase its toxicity), and a historic shift in the politics of energy. Even former protectors of the oil-fueled economic status quo now recognize that America’s energy consumption (we consume 25 percent of the world’s fossil fuels with only 5 percent of the population) cannot continue.³ Our rampant consumption and protect-the-source foreign policies no longer offer a reliable path for the future. As President Bush admitted, “America is addicted to oil.”
While environmental crises get most of the headlines today, the simple fact that the wealth of the 200 richest people in the world exceeds the combined annual income of the world’s 2.5 billion poorest people should give anyone pause, as should the knowledge that almost half of the world’s population lives on less than $2 per day while the average American earns $130 per day. The belief that economic growth alone will solve the problems of poverty is simply not borne out by the facts. And the drive to satisfy legitimate ambitions for material progress is forcing developing countries such as China and India toward unprecedented rates of fossil fuel consumption—a poignant reminder that our social and environmental crises are joined at the hip.

But the real problem is not these crises per se but the likelihood that our responses will be completely inadequate.

If we see each problem—be it water shortages, climate change, or poverty—as separate, and approach each separately, the solutions we come up with will be short-term, often opportunistic, “quick fixes” that do nothing to address deeper imbalances. Take the recent frenzy in the U.S. over ramping up production of corn-based ethanol as an alternative to imported oil. The number of ethanol plants is expanding rapidly (there will be almost 200 by the end of 2008) and vast amounts of corn are being grown to supply them. Not only is this driving up food prices around the world, but ethanol from corn arguably takes us in the wrong direction in terms of reducing greenhouse gases. Greenhouse gas emissions from using corn ethanol in cars do not differ substantially from emissions from using gasoline in cars. The net effect of using corn-based ethanol may even increase greenhouse gases due to land-use changes, as farmers worldwide clear forests and grasslands to grow corn in response to higher prices and demand. More sustainable alternatives such as cellulose-based biofuels from forestry and crop wastes are being developed, but the search for a quick fix, as opposed to creating a truly environmentally sound energy system, has put the attention on corn ethanol.

Fortunately, more and more people are beginning to sense that the mounting sustainability crises are interconnected—symptoms of a larger global system that is out of balance. As soon as people understand this, their view of the problems shifts. They start to see the extraordinary op-
portunities for innovation that can occur when we abandon fearful, reactive mentalities. They start to realize the deep problems we face today are not a result of bad luck or a greedy few. They are the result of a way of thinking whose time has passed.

All ages end—from the Iron Age to the Bronze Age, from the age of the Renaissance to the Reformation, from the rise and reign of empires such as Rome's to more modern empires such as Britain's. No era—no matter how influential or how far-reaching—lasts forever. The Industrial Age, which has shaped our lifestyles and our worldview for generations, is no different.

To many, the term *industrial* itself seems rather quaint, since most of us in the developed nations appear to live in a world dominated by bits and bytes, not smokestacks and coal mines. Seventy percent of the American economy, for example, is driven by the spending of consumers, people who for the most part work in service or white-collar industries. Relatively few Americans work in factories today, fewer still in mines or on farms.

But immediate circumstances can be misleading. In fact, the last quarter century has seen the most dramatic increase in industrial activity the world has ever known. The number of automobiles in use in the world has grown from about 50 million in 1950 to about 800 million in 2008. The annual growth rate in the global production of automobiles (over 6 percent) is now at least four times the growth of human population in percentage terms. Since 1980, annual steel production worldwide has almost doubled. While U.S. industrial production grew by only half a percent in 2007, China posted a 13 percent increase in industrial production in 2007, Vietnam 17 percent, and India 10 percent. More coal is mined than ever before. As customers and consumers, we are tied to industrial production for our computers and PDAs, cars and trucks, and flat-panel televisions. And we are dependent on the energy required to make them work, over 70 percent of which comes from burning fossil fuels, as it has for the past 150 years.

Yes, products and industrial processes are far more information-intensive than ever before, but such shifts in the mix of dominant technologies, such as the move from gaslights to electrification or from mainframe computers to the Internet and personal computing, have been a recurring feature of the Industrial Age, not a signal of its demise.
But something important has happened in this last stage of the industrial era that sets it apart from the past: Globalization has brought a level of interdependence between nations and regions that has never existed before, along with truly global problems that also have no precedent. This includes environmental crises such as increasing levels of waste and toxicity (which often spill over from one country to another) and growing stresses on a host of finite natural resources, but also the widening gaps between the wealthy and the poor and alarming political reactions to these imbalances in the form of global terrorism. Just as the Iron Age didn’t end because we ran out of iron, the Industrial Age isn’t ending because of the decline in opportunities for further industrial expansion. It is ending because individuals, companies, and governments are coming to the realization that its side effects are unsustainable.

Ages do not end abruptly. Everyone does not just wake up one day and say, “This isn’t working. We must change.” Quite the contrary. When faced with challenges of this magnitude, the vast majority of people and institutions try harder to maintain the status quo. As neuroscientists say, the brain “downshifts” under stress—in other words, we revert to our most habitual (and more primitive) modes of behavior. Societies are no different. Fortunately, societies are not monolithic. At the same time that many companies resist change to outdated methods and technologies, governments refuse to implement needed regulations, and individuals resist change to their established lifestyles, others wonder instead about what could be. What would an economy look like that operated entirely on “our energy income rather than our energy capital,” as the pioneer systems thinker and inventor Buckminster Fuller used to say? Or that embraced the natural systems principle, as articulated by William McDonough and Michael Braungart, that “all waste equals food for another system”? Or one in which Marshall McLuhan’s image of the “global village” was not merely a clever metaphor—but a principle for a world of interdependence, where the unilateral pursuit of “national security” is like chasing a shadow; none of us is secure if all of us are not secure?

Endings are also beginnings. The Industrial Age has brought extraordinary improvements in public education, human rights, and material well-being, but it has also destroyed ecosystems, swallowed up traditional
cultures that had thrived for centuries, and created a way of life that cannot continue for much longer. With regard to each of these interconnected problems, the same fundamental choice exists: Do we protect the ways of the past or join in creating a different future?

People and organizations around the world are already planting the seeds for new ways of living and working together. Yes, they are a minority. No, they are not part of the mainstream, either within their industries or usually within their own organizations. But, unlike previous periods of profound change, it is unlikely these seeds will take centuries to mature and spread, because in today’s interconnected world, the problems are global, and the changes will be as well. Pressures for change are building rapidly, and solutions and opportunities—and news of what works and how to build on it—are spreading equally rapidly.

CREATING THE FUTURE

Amid all the uncertainties, three guiding ideas stand out as essential for creating a more sustainable future:

1. **There is no viable path forward that does not take into account the needs of future generations.** The term *sustainability* is widely used to express the need to live in the present in ways that do not jeopardize the future. When a process is sustainable, it can be carried out over and over again without negative environmental effects or impossibly high costs to anyone involved. The belief that we can attend only to our own needs and goals is tantamount to discounting the value of the children, families, communities, and businesses who will inhabit that future. Businesses can no longer expect to compete in the future without taking into account the larger problems that stand between now and then.

2. **Institutions matter.** Today’s world is shaped not by individuals alone, but by the networks of businesses and governmental and non-governmental institutions that influence the products we make, the food we eat, the energy we use, and our responses to problems that arise from these systems. No one person could destroy a species or warm the planet
no matter how hard he or she tried. But that is exactly what we are doing collectively, as our individual actions are mediated through the web of institutions that interconnect the world. It is folly to think that the changes needed in the coming years will not involve fundamental shifts in the way institutions function, individually and collectively. Ironically, despite increasing interdependence, most institutions are more consumed than ever by short-term thinking, frenzy, and opportunism. The gap between the need to think and act interdependently and our abilities to do so sits at the heart of all the most difficult problems we face today. Still, as you will see from the stories below, the leadership needed to close that gap is now emerging from business and non-business organizations alike, and often in partnership.

3. All real change is grounded in new ways of thinking and perceiving. As Einstein said: “We can’t solve problems by using the same kind of thinking we used when we created them.” While institutions matter, how they operate arises from how we operate, how people think and interact.

In short, to shape a sustainable future, we all need to work together differently than we have in the past. And that is what we will be describing in the pages ahead.

In *The Necessary Revolution*, we will talk about the challenges we face in three interconnected areas—energy and transportation, food and water, material waste and toxicity (what we make and discard)—and the consequent imbalances that result when too many resources are concentrated in too few hands.

We will look at how these problems have arisen, and how they are all symptoms of a way of living that we have come to take for granted, which has produced great progress but also growing side effects. Seeing the deeper pattern that connects many different problems is crucial if we are to move beyond piecemeal reactions and create lasting change.

But we are most interested in exploring the extraordinary opportunities these problems represent and how business and social entrepreneurs are stepping forward to create flourishing new businesses, networks, and organizations of all kinds based on these opportunities.
No one has the answer to the question of how 6 (soon to be 8 or 9) billion people can live together sustainably. But an ultimate solution is exactly what is not needed. No one had a plan for the Industrial Revolution. No ministry was put in charge. No single business led the way. Instead, countless acts of initiative and daring created a critical mass of unstoppable changes. The Industrial Age was not planned but innovated. The next age will be no different.

The difference between many random initiatives that add up to little and a revolution that can transform society itself boils down to a shift in thinking. The Industrial Age has often been called the “machine age” because the rise of machines and the way they operated transformed the way people thought and worked. It wasn’t long before people were expected to work like machines and the assembly line became the icon of efficiency and standardization for all organizations. Gradually, machine thinking shaped much more than manufacturing: Economic progress became synonymous with increases in efficiency and productivity; cultural advance became equated with dazzling new technologies; and nature, including the other creatures with whom we share the earth, was reduced to “natural resources,” inputs to the economic machine.

A sustainable world, too, will only be possible by thinking differently. With nature and not machines as their inspiration, today’s innovators are showing how to create a different future by learning how to see the larger systems of which they are a part and to foster collaboration across every imaginable boundary. These core capabilities—seeing systems, collaborating across boundaries, and creating versus problem solving—form the underpinnings, and ultimately the tools and methods, for this shift in thinking.

For over a quarter of a century our work, first at the Massachusetts Institute of Technology and then through the Society for Organizational Learning (SoL) global network, has involved helping organizations of all sorts to “learn how to learn”—which naturally leads to the question, “Learning for what?” For many years, precedent provided the answer: learning so that companies could be more innovative and profitable, so that schools could help students learn, so that governmental organizations could better serve their constituencies. For the past decade, however, we have begun
to also see a larger answer: shaping a sustainable, flourishing world for life beyond the Industrial Age. This represents perhaps the greatest learning challenge humans have ever faced, and it will require extraordinary leadership from institutions of all sorts.

This is not pie-in-the-sky rhetoric or intellectual idealism, but in fact is reflected in ways organizations and individuals are already working together. The organizations and people you will meet in the pages that follow are starting to enact new ways of managing, leading, and ultimately creating value, not just for today’s real needs but for tomorrow’s, and their practices are spreading to hundreds of businesses and non-business organizations of all sizes around the world. There is no silver-bullet formula for putting these ideas into practice widely, but there are principles, practices, and ways of getting started.

A FINAL WORD

One thing we have learned from working on organizational and systemic change is that the leaders are hard to identify in advance. Sometimes they are CEOs or presidents, but often they do not occupy positions of obvious power in a corporate hierarchy. They are not the flag wavers, campaigning vocally for change, but rather passionate individuals working to transform their organizations from the bottom up. They are most often open-minded pragmatists, people who care deeply about the future but who are suspicious of quick fixes, emotional nostrums, and superficial answers to complex problems. They have a hard-earned sense of how their organizations work, tempered by humility concerning what any one person can do alone. They often do not think of themselves as leaders, but time proves them wrong.

This is the sort of person for whom we have written this book. You may find it hard to get a handle on the immensity of the challenges we face today. But you likely understand those aspects that are more immediate—air quality or waste where you work, local water shortages or contamination problems where you live, the anxiety people in your community feel about the future. You see the larger imbalances and sense that major changes are needed. You may have found it hard to see how all the prob-
lems fit together and to know exactly what you—and the organization you work in—can do to help. But you know these problems are important to you, and you genuinely want to contribute to addressing them.

If that is true for you, welcome. You are the person for whom we have written *The Necessary Revolution*, and our highest hope is that it will help you in your work.