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A Brighter Shade of Green

Rebooting Environmentalism for the 21st century

by Ross Robertson

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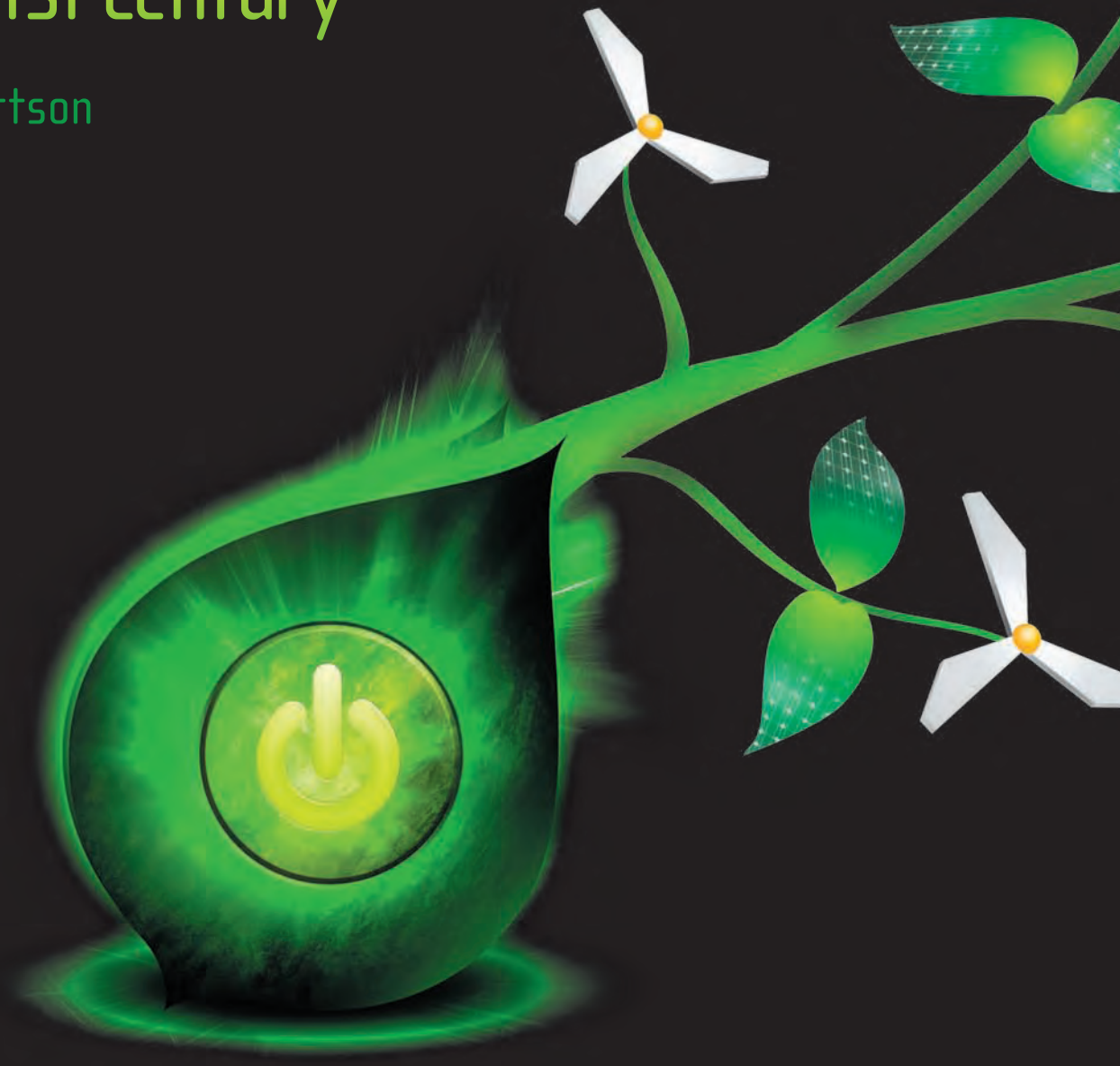
A BRIGHTER SHADE OF GREEN

Rebooting Environmentalism for the 21st century

by Ross Robertson



"Nature" is over. The twentieth century did it in. There's not a liter of seawater anywhere without its share of PCB and DDT. An altered climate will reshuffle the ecological deck for every creature that breathes. You can't escape industrialism and hide from the sky. It's over. From now on, "Nature" is under surveillance and on life-support. A 21st century avant-garde has to deal with those consequences and thrive in that world.

Bruce Sterling, Founder of the Viridian Design Movement

I've always been a somewhat reluctant environmentalist. I was practically weaned on John Muir's Yosemite, and as a kid growing up in the suburbs of California in the last decades of the twentieth century, I fell fast in love with the depth and space and beauty of the mountains. They were everything my world of clay lots and cement and computer technology was not—cool, silent, elemental, rich with unquestionable mystery. They were every bit as spiritual as church, minus the dogmatism and the bake sales. The forest wilderness of the Sierra high country made a green romantic out of me, and when I got to college in Atlanta, I became concerned enough about the fate of nature to do something about it. I organized river cleanups and letter-writing campaigns, studied the classics of American nature writing, and sat on the environmental committee of the university senate. I lobbied on Capitol Hill in Washington and protested chip

BUCKMINSTER FULLER (1895-1983) was a visionary American thinker and designer. Inventor of the geodesic dome and author of nearly twenty books, including *Operating Manual for Spaceship Earth* and *Critical Path,* his quest to revolutionize the way we view technology, architecture, and the environment was an early forerunner of the movement known today as "bright green."

mills and nuclear reactors in Tennessee. I even intercepted a Brazilian merchant ship on its way into Savannah harbor and blocked it from unloading its illegal cargo of Amazon mahogany, which was still wet with the blood of indigenous tribes.

I'll always remember the incredible sense of purpose I felt that day as our small skiff shot over the waves at sunrise, the righteous, lawbreaking freedom of putting my future on the line for what I believed in. Even more than that, however, I'll never forget the confusion and the strange unease that came over me when the action was done and we headed for home through the twilit forests of coastal Georgia. It had been the ultimate statement of "us versus them," but somehow it left me feeling at odds with myself. Less than a week from my twenty-first birthday, I was frightened to realize how far I'd already come from love and idealism and the will to change things to anger, frustration, and a cynicism that increasingly bordered on desperation. I saw this in my friends, also. It cut us off from one another, and when the urgency of our common mission brought us together, it set us in opposition to the rest of the world.

I knew my days as an eco-extremist were done. What I didn't know then was that I was coming up against a shadow so basic to the character of modern environmentalism, it would take me more than a decade to find my way out from under it. That everywhere my path would take me as a young activist in the coming years—from a lonely biodynamic cooperative in the farmlands of rural Missouri to the networked high-rises of the San Francisco nonprofit world—I was walking down a well-worn track toward a dead end. It was only one day last spring, in fact, that I finally figured out what was wrong and what to do about it. That was the day a book called *Worldchanging* came across my desk and made me proud to call myself an environmentalist again.

If you bleed green like I do, you may also be under the wings of a shadow so close to you, it's difficult to see. This blind spot has less to do with the environment and more to do with how we perceive it—and how we perceive ourselves. To me, the most pivotal environmental issue we're faced with is not climate change or hunger or biodiversity or deforestation or genetic engineering or any of those things. It is an issue that is going to determine what we *do* about it all: our deeply felt ambivalence toward the human race and our presence here on planet Earth.

"Within environmentalists and environmentalism reside

The most pivotal environmental issue we're faced with is not climate change or biodiversity or deforestation or any of those things. It is our deeply felt ambivalence toward the human race and our presence here on planet Earth.

both a love for and a hatred of humanity," one of my generation's more controversial environmental heroes said in a now-famous speech at San Francisco's Commonwealth Club in 2004. His name is Adam Werbach, and he was describing what my own experience tells me is the most difficult underside of the green mind—the "misanthropic nostalgia" for a time before modern society crashed nature's party and ruined everything. "Because misanthropy at a political level is suicidal," he went on, "it merits remaining private. But over the years, ordinary Americans have sensed it, the media have magnified it, and during the springtime of the environmental movement, the keenest conservatives saw an opportunity to exploit it. Ayn Rand, for one, saw environmentalists' 'ultimate motive [as a] hatred for achievement, for reason, for man, for life.'" I met Werbach once in Washington, DC, in 1995, not long before he was elected the youngest-ever president of the Sierra Club at age twenty-three. And I can't help but wonder if his assessment of the current state of things would make the Sierra Club's founding father, the great Scottish naturalist John Muir, turn over in his grave.

Around a hundred years before I did, Muir fell in love with the glades and glaciers of Yosemite and began to articulate the wilderness ethic that helped shape the birth of the American conservation movement. "In God's wildness lies the hope of the world," he wrote, "the great fresh unblighted, unredeemed wilderness. The galling harness of civilization drops off, and wounds heal ere we are aware." As environmental historian Andrew Kirk explains it, Muir and other early conservationists constructed rigid dichotomies between nature and human civilization, between the utopian purity of the wilderness and the polluted blight of industrial society. From their perspective, the essential flaw of modern humanity was to set ourselves above and outside the natural world, harnessing its energies to our own ends through the machinery of technological enterprise. In so doing, we stepped outside the delicate ecologies of nature, risking the health and survival of species and ecosystems, including our own. What brought us down that road was the hubris of seeing ourselves as separate from nature, and the only way back was to become part of it again. Yet the irony of their position was that it defined nature in terms that made such a reunion impossible: The natural was all that was untouched by the human; the human, in turn, was nature's erratic antithesis.

That sharp dichotomy between human nature and nature itself set the tone for American environmentalism's thorny confrontation with modernity. Suspicious of industry, wary of progress, and often hostile toward innovation and enterprise, the environmentalists of the twentieth

The Air Car

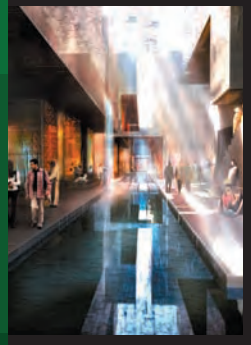
French engineer Guy Negre's switch from designing state-of-the-art Formula 1 engines to developing a lightweight motor that runs on compressed air might seem like a bit of a comedown. But when you consider that true zero-emissions technologies for motor vehicles have been something of an environmental holy grail in recent decades, it starts to look more like a bold career move. Air has been used before to power things like mine locomotives and naval torpedoes, but Negre is the first to bring a viable compressed-air car to market. After fifteen years of research and development, six thousand of his vehicles are expected to hit the streets of India by the end of 2008, with three thousand a year rolling off the production lines each year after that. The basic mechanics of the air car are simple: a more or less conventional piston engine is powered by short blasts of air, with no batteries, no combustion, and no polluting exhaust. With a lightweight tubular chassis and a body constructed of fiberglass, the air car can drive 125 miles on a single tank, which only takes two or three minutes and an air hose to refill. Negre has designed two models of the air car, one primarily for urban use and a second hybrid model for country driving. Incorporating a gasoline engine for powering an on-board air compressor, the hybrid version can go from Los Angeles to New York City on a single tank of gas.

Future Cities

Dongtan

In a country like China that is scrambling to build housing for four hundred million people by 2017, the commitment to construct a city for total environmental efficiency is an achievement in itself, signaling a welcome shift from short-term expediency to long-term sustainability. The city of Dongtan, which is currently competing with Masdar (see below) for bragging rights to the moniker "World's Greenest City," is planned for a small island off the coast of Shanghai. Designed by the British firm Arup, Dongtan's dense neighborhoods of super-efficient buildings will be home to five hundred thousand residents, with the remaining sixty-five percent of the site reserved for organic farms and wildlife habitat. Dongtan will receive power from local wind farms and photovoltaics, employ advanced cogeneration plants (whereby excess heat from burning rice husks generates electricity used to heat buildings throughout the city), ban cars that emit carbon dioxide, and aims to reuse ninety percent of its waste.

Masdar



Blessed with the world's third largest oil reserves, the United Arab Emirates is exploding like a gold rush boom town, but some builders are keeping sustainability in mind amid the growing frenzy. Billed as "the first zero-carbon, zero-waste city in the world," Foster & Partners' Masdar project in the Abu Dhabi desert will be a high-density square walled city (pictured above) centered around a gargantuan photovoltaic power plant. Car free, linked by a web of shaded pedestrian walkways to beat the 130-degree summer heat, and surrounded by wind and solar energy farms, Masdar is the recent winner of the 2007 World Clean Energy Award. "A new era is now upon us, challenging us to venture beyond the achievements of the past and to lay the groundwork for the next 50 years of progress," says Ahmed Ali Al Sayegh, Chairman of the Abu Dhabi government's Masdar Initiative. The six-square-kilometer development will also house an advanced energy, science, and technology community that will include a research institute in cooperation with the Massachusetts Institute of Technology.

century found themselves caught in a peculiar double bind. On one hand was the desire to reach for a brighter future for the world and its children; on the other, the fear that the very tools and technologies that might get us there were themselves our future's greatest enemy. Competing currents of thought pitted faith in the progressive solutions of science against the urge to conserve the purity of nature while we still had the chance. Yet as the century progressed from Hiroshima and Nagasaki to Rachel Carson's terrifying *Silent Spring,* it became more and more difficult to ignore our power to destroy the world. "Within the conservation movement," Kirk writes, "a growing ambivalence toward technology turned into full-fledged technophobia." With fears of ecological meltdown and postindustrial apocalypse growing more plausible by the decade, the majority came to see the brightest future of all as a swift return to the way things were in the past.

This, more or less, is where things stand in much of the environmental world today. On the radical fringes, militant extremists still beat the drums of rebellion against the ravages of commerce and industry. Derrick Jensen's double volume *Endgame,* for example, recently called for the voluntary destruction of civilization in order to save the world. Even mainstream thinkers who disagree strongly with extremist tactics are largely in agreement with their message. Take the popular nature writer Bill McKibben, whose 2003 bestseller *Enough* laments: "Meaning has been in decline for a very long time, almost since the start of civilization." His latest book, *Deep Economy,* argues passionately against the very idea of progress, claiming that the only "durable future" for our imperiled planet is one based on the revitalization of small-scale local cultures and economies. No matter where you find yourself on the green spectrum, it seems, people are trying one way or another to step on the brakes, if not reverse the tides of history.

McKibben's dream of a future marked by simple things—shopping at the farmer's market, bird watching, baking your neighbor a pie—is shared by many, and I can certainly sympathize. In a world of strip malls and postmodern alienation and neighborhoods choked with carcinogens and asthma, the romantic tug of some idyllic agrarian yesterday can be a strong one. Yet every time I indulge in these reveries of years gone by, I end up feeling like I did that day in Savannah—stuck, hamstrung, oddly out of step with my own times. Is it not modernity itself we have to thank for the fact that most of us haven't died of starvation or disease, or that liberty and equality are basic rights we enjoy, or even that we know enough about how the world works to *think* about things like global ecosystems? Besides, I wonder whether going backward is even an option anymore. Half the people on the planet are under the age of thirty, and a third are under fifteen. (That's 2.2 billion kids, if you're counting.) We're adding just shy of a thousand coal plants to this warming globe over the next ten years, and a city the size of Seattle every four to seven days. In upcoming decades, billions of people will migrate to the squatter cities of the developing world in order to bring themselves up out of poverty. Ready or not, we're all on a trajectory that is lifting us rapidly beyond a world that makes any sense whatsoever by even twentieth-century standards. And the future isn't waiting for anybody.

ALEX STEFFEN is a pioneering thinker on global sustainability and the cofounder of Worldchanging, an international weblog that has garnered significant accolades over the past few years as a clearing house for cutting-edge environmental thought. He is credited with coining the term "bright green," which is now beginning to enter popular usage.

BRUCE STERLING A science fiction author and futurist best known for his influence on the cyberpunk genre and his popular writing for *Wired* magazine, Sterling is also the founder of an innovative green design movement called "Viridian Design." Sterling's radical approach to environmentalism, including his embrace of consumerism and high-tech solutions, helped inspire the founding of Worldchanging.

This brings me to *Worldchanging,* the book that arrived last spring bearing news of an environmental paradigm so shamelessly up to the minute, it almost blew out all my green circuits before I could even get it out of its stylish slipcover. *Worldchanging: A User's Guide for the 21st Century.* It's also the name of the group blog, found at Worldchanging.com, where the material in the book originally came from. Run by a future-savvy environmental journalist named Alex Steffen, Worldchanging is one of the central hubs in a fast-growing network of thinkers defining an ultramodern green agenda that closes the gap between nature and society—big time. After a good solid century of well-meaning efforts to restrain, reduce, and otherwise mitigate our presence here on planet Earth, they're saying it's time for environmentalism to do a one-eighty. They're ditching the long-held tenets of classical greenitude and harnessing the engines of capitalism, high technology, and human ingenuity to jump-start the manufacture of a dramatically sustainable future. They call themselves "bright green," and if you're at all steeped in the old-school "dark green" worldview (their term), they're guaranteed to make you squirm. The good news is, they just might free you to think completely differently as well.

Worldchanging takes its inspiration from a series of speeches given by sci-fi author, futurist, and cyberguru Bruce Sterling in the years leading up to the turn of the millennium—and from the so-called Viridian design movement he gave birth to. Known more in those days as one of the fathers of cyberpunk than as the prophet of a new twenty-first-century environmentalism, Sterling nevertheless began issuing a self-styled "prophecy" to the design world announcing the launch of a cutting-edge green design program that would embrace consumerism rather than reject it. Its mission: to take on climate change as the planet's most burning *aesthetic* challenge. "Why is this an aesthetic issue?" he asked his first audience in 1998 at San Francisco's Yerba Buena Center for the Arts near my old office at the Natural Resources Defense Council. "Well, because it's a severe breach of taste to bake and sweat half to death in your own trash, that's why. To boil and roast the entire physical world, just so you can pursue your cheap addiction to carbon dioxide."

Explaining the logic of the bright green platform, Sterling writes:

> It's a question of tactics. Civil society does not respond at all well to moralistic scolding. There are small minority groups here and there who are perfectly aware that it is immoral to harm the lives of coming generations by massive consumption now: deep Greens, Amish, people practicing voluntary simplicity, Gandhian ashrams and so forth. These public-spirited volunta-rists are not the problem. But they're not the solution either, because most human beings won't volunteer to live like they do. . . . However, contemporary civil society can be led anywhere that looks attractive, glamorous and seductive. The task at hand is therefore basically an act of social engineering. Society must become Green, and it must be a variety of Green that society will eagerly consume. What is required is not a natural Green, or a spiritual Green, or a primitivist

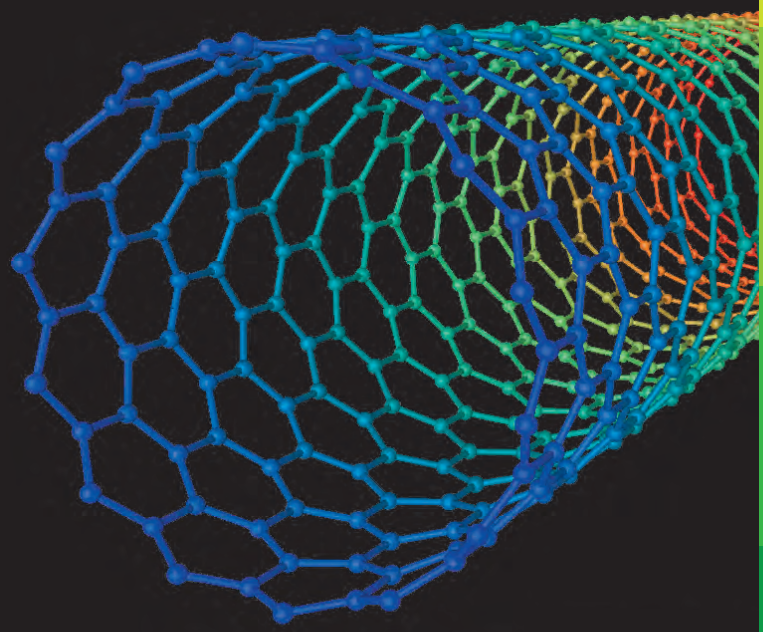
"We need, in the next twenty-five years or so, to do something never before done. We need to consciously redesign the entire material basis of our civilization."
—Alex Steffen

Green, or a blood-and-soil romantic Green. These flavors of Green have been tried and have proven to have insufficient appeal. . . . The world needs a new, unnatural, seductive, mediated, glamorous Green. A Viridian Green, if you will.

Sterling elaborates in a speech given to the Industrial Designers Society of America in Chicago in 1999:

> This can't be one of these diffuse, anything-goes, eclectic, postmodern things. Forget about that, that's over, that's yesterday. It's got to be a narrow, doctrinaire, high-velocity movement. Inventive, not eclectic. New, not cut-and-pasted from the debris of past trends. Forward-looking and high-tech, not William Morris medieval arts-and-craftsy. About abundance of clean power and clean goods and clean products, not conservative of dirty power and dirty goods and dirty products. Explosive, not thrifty. Expansive, not niggling. Mainstream, not underground. Creative of a new order, not subversive of an old order. Making a new cultural narrative, not calling the old narrative into question. . . .
>
> Twentieth-century design is over now. Anything can look like anything now. You can put a pixel of any color anywhere you like on a screen, you can put a precise dot of ink anywhere on any paper, you can stuff any amount of functionality into chips. The limits aren't to be found in the technology anymore. The limits are behind your own eyes, people. They are limits of habit, things you've accepted, things you've been told, realities you're ignoring. Stop being afraid. Wake up. It's yours if you want it. It's yours if you're bold enough.

It was a philosophy that completely reversed the fulcrum of environmental thinking, shifting its focus from the flaws inherent in the human soul to the failures inherent in the world we've designed—*designed,* Sterling emphasized. Things are the way they are today, he seemed to be saying, for no greater or lesser reason than that we made them that way—and there's no good reason for them to stay the same. His suggestion that it's time to hang up our hats as caretakers of the earth and embrace our role as its masters is profoundly unnerving to the dark green environmentalist in me. But at this point



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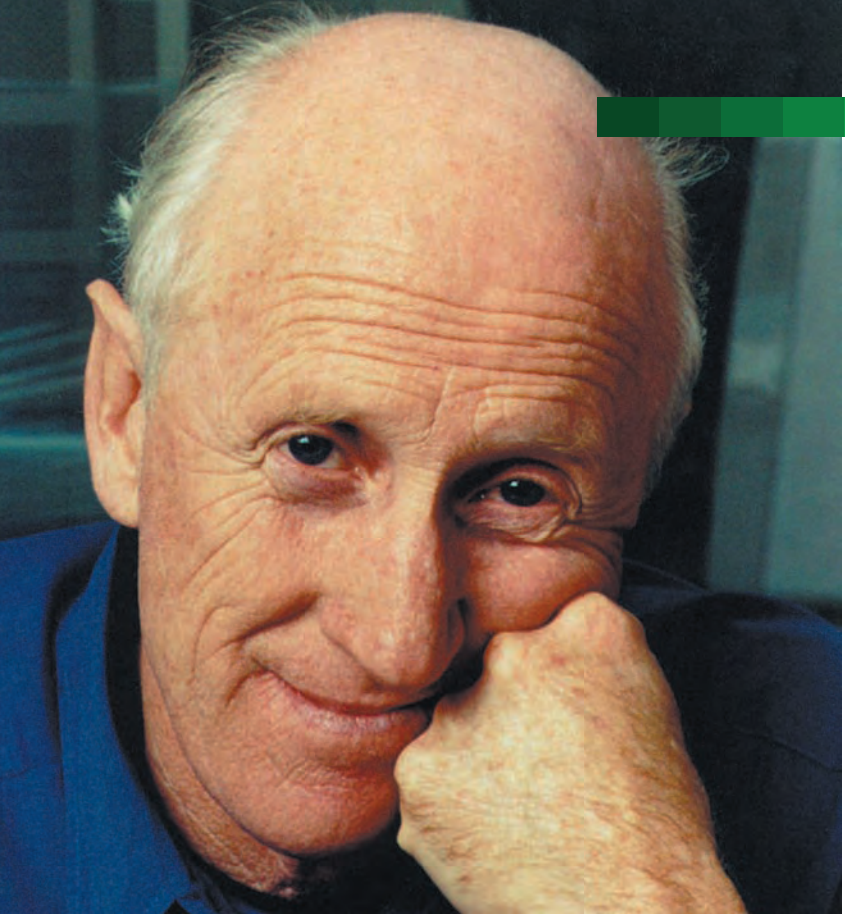
Fresh for Less

From elevators linking Earth with outer space to longer-lasting tennis balls, nanotechnology is radically transforming the way we think about manufacturing and design. Learning how to build at the ultramicroscopic, or nano, scale has potentially enormous consequences for eliminating waste, saving energy, eradicating resource scarcity, and generally making things that once seemed impossible more possible than ever. One instance in which nanotechnology is having an immediate, practical, and potentially lifesaving impact is in the field of water purification. The scarcity of potable water is a growing problem in many developing countries, and current desalinization technologies are prohibitively expensive and energy-consuming. By making water filters with carbon nanotubes—very smooth, very tiny cylinders constructed of carbon molecules—salt can be removed from seawater without applying the extreme high pressure needed to force water through conventional semipermeable filters. The resulting savings in energy costs is seventy-five percent.



"Urbanization is the most massive and sudden shift of humanity in its history. Environmentalists will be rewarded if they welcome it and get out in front of it."

—Stewart Brand

STEWART BRAND Founder of the influential *Whole Earth Catalog* and early contributor to the budding development of the internet, Brand has been predicting trends and pushing forward new environmental and social thinking since the 1960s. His continually evolving ideas have inspired and informed an entire generation of environmentalists, including many of the bright green movement's leading lights.

in history, is it any more than a question of semantics? With PCBs in the flesh of Antarctic penguins, there isn't a square inch of the planet's surface that is "unmanaged" anymore; there is no more untouched "natural" state. We hold the strings of global destiny in our fingertips, and the easy luxury of cynicism regarding our creative potential to resolve things is starting to look catastrophically expensive. Our less-than-admirable track record gives us every reason to be cautious and every excuse to be pessimists. But is the risk of being optimistic anyway a risk that, in good conscience, we can really afford *not* to take?

Sterling's belief in the fundamental promise of human creativity is reminiscent of earlier design visionaries such as Buckminster Fuller. "I am convinced that creativity is *a priori* to the integrity of the universe and that life is regenerative and conformity meaningless," Fuller wrote in *I Seem to Be a Verb* in 1970, the same year we had our first Earth Day. "I seek," he declared simply, "to reform the environment instead of trying to reform man." Fuller's ideas influenced many of the twentieth century's brightest environmental lights, including Stewart Brand, founder of the *Whole Earth Catalog* and the online community The WELL, an early precursor of the internet. Brand took Fuller's approach and ran with it in the sixties and seventies, helping to spearhead a tech-friendly green counterculture that worked to pull environmentalism out of the wilderness and into the realms of sustainable technology and social justice. "We are as gods, and might as well get good at it," he wrote in the original 1968 edition of the *Whole Earth Catalog,* and he's managed to keep himself on the evolving edge of progressive thought ever since. Brand went on to found the Point Foundation, *CoEvolution Quarterly* (which became *Whole Earth Review*), the Hackers Conference, the Global Business Network, and the Long Now Foundation. As he gets older, he recently told the *New York Times,* he continues to become "more rational and less romantic. . . . I keep seeing the harm done by religious romanticism, the terrible conservatism of romanticism, the ingrained pessimism of romanticism. It builds in a certain immunity to the scientific frame of mind."

Many remember the *Whole Earth Catalog* with a fondness reserved for only the closest of personal guiding lights. "It was sort of like Google in paperback form, thirty-five years before Google came along," recalls Apple cofounder Steve Jobs. "It was idealistic, and overflowing with neat tools and great notions." For Alex Steffen, it's the place "where a whole generation of young commune-kid geeks like myself learned to dream weird." And at Worldchanging, those unorthodox green dreams have grown into a high-speed *Whole Earth Catalog* for the internet generation, every bit as inventive, idealistic, and brazenly ambitious as its predecessor: "We need, in the next twenty-five years or so, to do something never before done," Steffen writes in his introduction to *Worldchanging.* "We need to consciously redesign the entire material basis of our civilization. The model we replace it with must be dramatically more ecologically sustainable, offer large increases in prosperity for everyone

on the planet, and not only function in areas of chaos and corruption, but also help transform them. That alone is a task of heroic magnitude, but there's an additional complication: we only get one shot. Change takes time, and time is what we don't have. . . . Fail to act boldly enough and we may fail completely."

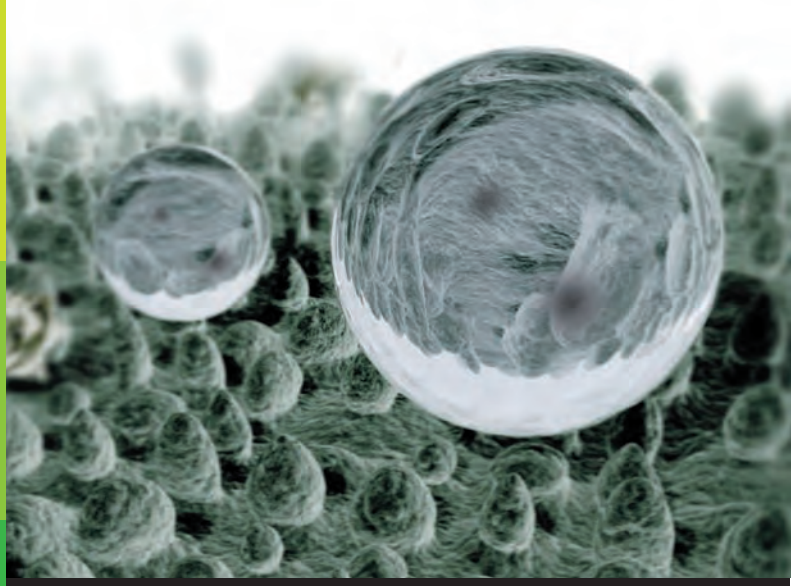
"Another world is possible," goes the popular slogan of the World Social Forum, a yearly gathering of antiglobalization activists from around the world. No, counters Worldchanging in a conscious riff on that motto: "Another world is *here*." Indeed, bright green environmentalism is less about the problems and limitations we need to overcome than the "tools, models, and ideas" that already exist for overcoming them. It forgoes the bleakness of protest and dissent for the energizing confidence of constructive solutions. As Sterling said in his first Viridian design speech, paying homage to William Gibson: "The future is already here, it's just not well distributed yet."

Of course, nobody knows exactly what a bright green future will look like; it's only going to become visible in the process of building it. *Worldchanging: A User's Guide* is six hundred pages long, and no single recipe in the whole cornucopia takes up more than a few of them. It's an inspired wealth of information I can't even begin to do justice to here, but it also presents a surprisingly integrated platform for immediate creative action, a sort of bright green rule set based on the best of today's knowledge and innovation—and perpetually open to improvement.

To start with, Worldchanging's core principles are based on the concept of the ecological footprint. "Ecological footprints give us a metaphor for understanding our impact on the planet and the meaning of sustainability," Steffen writes. "They boil that impact down to a single number and measure it in terms of land area." Your ecological footprint represents the amount of land required to provide you with absolutely everything you consume, both directly and indirectly—from your water, shelter, and electricity to the food you eat, the truck that took it to the grocery store, the gasoline the truck burned, and even the roads it drove on to get there. Divide the planet into six and a half billion or so equal pieces and you get what's called a "one-planet footprint," which is each

Termite Air Conditioning

When architect Mick Pearce was designing Zimbabwe's largest multi-use office and shopping complex, he sought an alternative to installing a costly conventional air conditioning system that would require an exorbitant amount of energy to beat the Harare heat. He found his inspiration in the termite mounds that populate the country's savannah. Because termites must maintain the temperature of their food supply within the narrow range of a degree or two, they ingeniously construct their mounds with a system of ventilation tunnels and earth banks that they adjust throughout the day as the outside air temperature fluctuates. Applying a similar system to the design of his Eastgate building, Pearce was able to reduce its energy consumption by ninety percent.



Inspired by Nature

In hindsight, it's not hard to see that industrial society has been relatively clumsy and wasteful in making the things we need to survive here on Earth. Using sheer brute force, we "heat, beat, and treat" all manner of materials to manufacture most everything we use. But there's a new design paradigm on the scene called "biomimicry" that looks to nature as a mentor for how to do things differently. Indeed, with 3.8 billion years of research and development under their belts, the organisms that have made it this far down evolution's unforgiving path have developed adaptive strategies we humans are only just beginning to be able to understand—and copy. According to science writer Janine Benyus, author of *Biomimicry,* as today's biology becomes more and more sophisticated, designers and manufacturers are learning to blur the distinctions between the "made" and the "born" like never before, modeling nature's ingenuity in fields as diverse as engineering, medicine, architecture, and computing. The Lotusan brand of paint, for example, was inspired by the lotus flower, long considered a symbol of purity because it always remains clean even though it grows in pools of muddy water. Inspecting the lotus leaf under a microscope, scientists found a unique surface configuration of tiny crags and peaks that causes water molecules to ball up and roll off, carrying dirt away with them. The paint they designed to mimic this microscopic surface structure not only cleans itself every time it rains but offers greater mold resistance and lasts up to twice as long as conventional paint.

Janine Benyus is the author of *Biomimicry: Innovation Inspired by Nature.*

person's fair and sustainable share of a finite resource base. Here in the West, our footprints are more like five or ten times that size, and the bright green bottom line says we've got about thirty years to get that number down to one.

Lest you think you can achieve this roughly eighty or ninety percent reduction of your demand on the planet's carrying capacity by swapping out your light bulbs and spending extra on organic groceries, forget it. Buy yourself a Prius, put up some solar panels, clothe yourself in vegan leather—no matter what, you can't shop your way to a bright green future. At Worldchanging, they call this the "myth of individual lifestyle responsibility." Small steps are good, Steffen says, but they won't get our ecological footprints anywhere near the one-planet standard because they won't transform the severely unsustainable systems and infrastructures our lives are utterly entrenched in:

> We don't need more recycling, we need a completely different system of closed-loop manufacturing, and no matter how many cans I crush, my personal actions *at the consumer level* are of very little importance in getting us there. Even millions more eco-consumers will not get us what we need. What we need instead, it seems to me, is a global movement of smart people who understand the systems in which we're embedded, are actively pursuing better models which could replace them, and are clever as heck about communicating visions for doing so to their fellow citizens.

Canadian ecologist William Rees, who coined the term "ecological footprint" in 1992, agrees. "We're all on the same ship," he told the *Vancouver Sun* recently, "and what we do in our individual cabins is of almost no consequence in terms of the direction the ship is going." (In the meantime, we still have to buy stuff anyway, and the bright green ethos suggests spending less time sweating the little things and more time strategizing your bigger purchases to support emerging innovation and help leverage markets toward sustainability.)

When it comes to changing the structures and systems that are the real lynchpins of one-planet living, Worldchanging takes its lead from two of the most celebrated exponents of bright green environmentalism to date: Virginia architect William McDonough and German chemist Michael Braungart, authors of *Cradle to Cradle: Remaking the Way We Make Things.* For over twenty years, these prescient pioneers of ecologically intelligent design have been doing their best to make twentieth-century industry and architecture obsolete by eliminating the concept of waste from buildings, manufacturing processes,

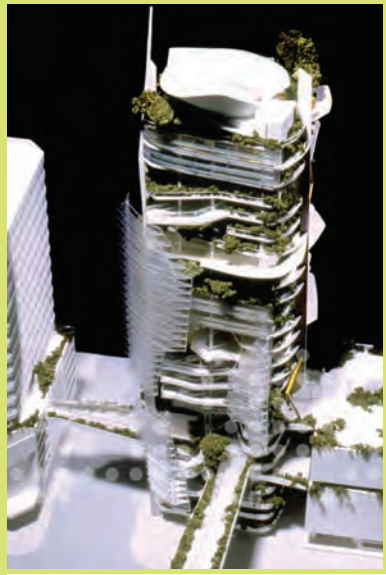
WORLDCHANGING
A USER'S GUIDE TO THE 21ST CENTURY

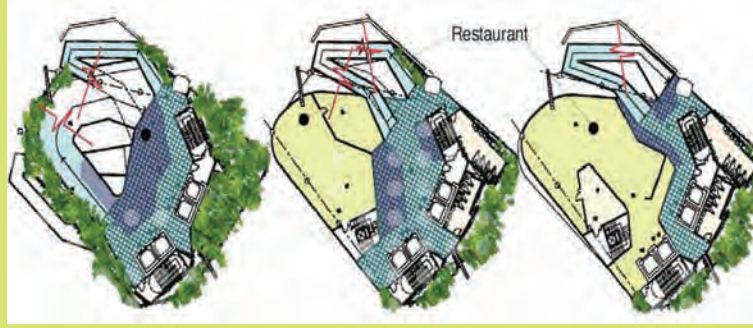
This compendium of ingenious green "tools, models, and ideas" from all over the world will completely reframe the way you think about sustainability. Says Earth Day founder Denis Hayes, "*Worldchanging* might well be the most complete, compelling articulation of the possible look and feel and actual operation of a sustainable society ever written."

an excerpt from *WorldChanging*

The Editt Tower, Singapore

by Sarah Rich





Imagine walking through a verdant urban park and finding yourself in the atrium of a skyscraper. This will be the experience at Singapore's Editt Tower. Still in the planning stages, under the direction of Dr. Ken Yeang, Editt Tower approaches the fusion of indoors and outdoors by bringing greenery to the whole building—inside and out, top to bottom. Though relatively tall, the twenty-six-story building is designed to minimize the disconnect between upper-floor offices and street-level pedestrian traffic. Visitors will stroll along landscaped ramps and greenways lined with shops that climb to the sixth floor. The indigenous plants that line the walks will be irrigated by means of rainwater harvesting and sewage recycling. When someone in a twentieth-floor office flushes the toilet, that water will run through an on-site cleaning system and into the irrigation lines, forming a closed system for the building's resources. Other green features, such as solar energy and natural ventilation, will keep costs down and spaces comfortable. The Editt Tower design has undergone an evaluation of its strategies for eventual retrofits and the long-term disuse of building components, ensuring that its environmental accountability doesn't apply only to its initial construction, but to its entire life cycle.

Dr. Yeang, whose tower design won the Ecological Design in the Tropics 1998 award, made human experience a priority in the development of Editt Tower. In contrast to the cold, disconnected, and hollow feeling of many skyscrapers, this place will be alive with people, commerce, and greenery. Integration of inside with outside and top floors with ground floors will bring the otherwise diffuse energy of a large building into a cohesive whole. Even in its conceptual stages, Editt Tower serves as an inspiring model for what's possible in the revitalization of skyscraper landscapes. Hopefully, by the time it's done, similar concepts will be in the works everywhere.

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MICHAEL BRAUNGART & WILLIAM McDONOUGH, authors of *Cradle to Cradle: Remaking the Way We Make Things,* are leading proponents of a philosophy of sustainability that takes fullness and abundance rather than scarcity and limitation as the starting point for industrial and architectural design. Their work has laid crucial ground for the bright green reinvention of modern industry and commerce.

and material flows. "Achieving a sustainable system of consumption and production is not a matter of reducing the footprint of our activities on this planet," Braungart insists, "but transforming this footprint into a source of replenishment for those systems that depend on it." He and McDonough have a simple revolutionary dictum—*waste equals food*. Every structure, process, and product they design is anchored in closed-loop cycles that use materials of only two kinds: "Biological nutrients" are biodegradable materials that can be safely discarded when their life cycle is complete; "technical nutrients" are nonbiodegradable materials like metals and polymers that can be reused indefinitely in industrial chains. Everything else gets phased out as fast as possible, and a world where that standard was being met would be a world where landfills and pollution were relics of history. To get there, we need the freedom to analyze every stage in the life cycle of every product and service we utilize, and that means new levels of transparency and accountability up and down the marketplace.

As revolutionary as the shift to a cradle-to-cradle design paradigm will be, it's just one part of a bright green future. That future will also be significantly more urban. "Manhattanites use fewer resources and less energy than anyone else in America," writes Steffen—even people living in super-efficient green homes in the country. In fact, urban density is not only one of the best drivers of sustainable consumption but one of the best strategies for preserving wild nature as well. Rejecting the lavish inefficiency of the suburbs and learning how to integrate densely orchestrated urban

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communities with agricultural greenspace and healthy natural habitats will be essential to building a one-planet society. "The environmentalist aesthetic is to love villages and despise cities," wrote Stewart Brand in MIT's *Technology Review:*

> My mind got changed on the subject a few years ago by an Indian acquaintance who told me that in Indian villages the women obeyed their husbands and family elders, pounded grain, and sang. But, the acquaintance explained, when Indian women immigrated to cities, they got jobs, started businesses, and demanded their children be educated. They became more independent, as they became less fundamentalist in their religious beliefs. Urbanization is

the most massive and sudden shift of humanity in its history. Environmentalists will be rewarded if they welcome it and get out in front of it.

Everywhere that we see the rural-to-urban demographic swing around the world, Brand explains—about two hundred thousand people a day leave the countryside for life in the city, and the planet just passed the fifty percent urban point this year—birthrates plummet and population growth stabilizes. That's good news for developing nations being crushed under economic, environmental, and social pressures never before seen on Earth, because hand in hand with the challenges of urbanization comes an unprecedented explosion of opportunity. According to Steffen, the bright green vision of sustainable development is one that treats "entrenched social and sustainability difficulties as problems capable of solution through the conscious and context-sensitive application of innovation." But those solutions won't come from the developed world, he cautions. They will be created "on the streets of developing-world cities, by a younger generation just now coming into its own. They don't need our answers; they need the tools for finding and sharing their own answers." To that end, Worldchanging advocates open-source models of design, copyright, and licensing that encourage collaboration, maximize the appropriateness of solutions in local contexts, and allow for uninhibited retooling of technologies to keep pace with evolving realities on the ground. They also call for "leapfrogging" expensive first-world infrastructures and going straight to cutting-edge technologies in developing nations, skipping land lines for cell phones and power poles for solar cells. The more we knit the whole world together in open and accessible webs of information technology, they believe, the more the precarious tension "between urban possibility and urban collapse" will swing in the direction of a bright green future.

Worldchanging's radical tool kit for the world of tomorrow is marked by much, much more—some of it more familiar from the mainstream environmental agenda (clean renewable energies, carbon neutrality, sustainable transportation and agriculture, environmental justice), and some of it less so. Of that latter category, one aspect in particular stands out. According to Sterling at least, the bright green paradigm will be one that is completely free of spiritual or mystical overtones. "[These are] simply absolute anathema for us," he declared the day he inaugurated the Viridian design movement. "If it doesn't pass muster over at the *Skeptical Inquirer* magazine, we don't want to know about it. It's not that we're going to pick big public fights with spiritually motivated Greens and other illuminated hippie types. This is useless and a waste of time, like beating up Quakers and the Amish. We're simply going to serenely ignore them, the way everyone else does."

How a Seashell Made Brand Obsolete

As we follow the course that economist Jeremy Rifkin predicted some years ago and move further away from the age of physics and chemistry and into the age of biology, scientists continue to find innovative solutions to formerly intractable problems by taking cues from how nature has solved similar ones. Take the unwanted buildup of mineral deposits inside pipes, a plumber's nightmare that has hampered everyone from wastewater treatment engineers to most homeowners at one time or another. When industrial designers learned from biologists that seashells grow by precipitating minerals out of ocean water to form their shells, they recognized a process analogous to the formation of clogs in pipes, and they became curious to find out how marine mollusks regulate their size by turning this process *off*. It turned out that a protein released by the mollusks is all it takes to stop the accumulation of calcium carbonate, and there are synthetic alternatives that mimic this same stop-action mechanism. The designers soon developed a nontoxic product that can be released into the plumbing, sticking to the inner surface of pipes and keeping them free-flowing. Now, thanks to a seashell protein, we stand to prevent millions of gallons of noxious chemicals from being flushed into the environment.

Because I was an "illuminated hippie type" myself, I can understand what Sterling is rejecting here. These days, the quaintly Old World mysticism of dark green—the kind of spirituality that reveres the earth, celebrates full moons and solstices and harvest time, and idealizes the pastoral simple life—often makes forward-thinking folks of all stripes run in the other direction. But we have to make sure we don't lose the baby with the bathwater. Environmentalism itself was born out of the eighteenth- and nineteenth-century "discovery" of nature—a spiritual awakening if ever there was one—in which Europe's Romantics and later America's Transcendentalists began to contemplate the aesthetic beauty of the world and saw reflected in its mirror new and unseen depths within themselves. Not coincidentally, the emergence of environmentalism as a movement in the late 1960s happened in conjunction with that same romantic awakening in the popular counterculture. It was in 1968 that NASA released the first photos of the entire Earth from space taken by the *Apollo 8* moon mission, and that familiar shot of a tiny blue-green marble floating alone in the black distances of eternity graced the cover of Brand's first *Whole Earth Catalog.* People made it into buttons for Earth Day 1970. The astronauts who came back spoke of seeing a planet without nations or borders, a home more like *home* than the places they grew up in. James Lovelock, whose "Gaia hypothesis" proposed a vision of the Earth as a single living superorganism, called it the most extraordinary image he had ever seen.

"When people look at Earth from the outside," NASA scientist John Oró predicted, "something strange [and] revolutionary will happen: people will alter their thinking." And he was right. In those days, it was as if some cosmic aperture began to open in the human mind that helped shift us out of ethnic and national identities and into a deeper resonance with the rest of creation. This awakening to a heartfelt unity and affinity with all of nature and life—the same thing I discovered myself as a young man walking the prehistoric Sequoia groves and lupine-dotted valleys of Yosemite—is the foundation stone of environmental consciousness, the very platform of relatedness and responsibility that makes dark, bright, or any other shade of green possible. It changed the entire historical trajectory of the industrialized world, for starters. If you want to give yourself nightmares, just imagine what our planet might look like today if it weren't for this flowering of spiritual and moral sensibility that emerged within postmodern culture in the sixties and seventies in response to the reckless exploitation of nature and the runaway materialism of modern society. Those were the decades of every major American environmental law, from the Wilderness Act to the Clean Air Act, Clean Water Act, National Environmental Policy Act, and Endangered Species Act, and in no uncertain terms, we have the evolution of consciousness to thank for them.

In his glittering exuberance for high-tech solutions and glamorous green consumerism, Sterling seems to have forgotten all that. "The cybergreens are winning," he writes in a recent op-ed for the *Washington Post,* because unlike the rest of the environmental world, "they're not about spiritual potential, human decency, small is beautiful, peace, justice or anything else unattainable. The cybergreens are about stuff people *want,* such as health, sex, glamour, hot products, awesome bandwidth, tech innovation and tons of money." While he's clearly delighting somewhat in the role

Fueling up on Algae

Hydrogen is the most abundant chemical element in the universe and has long been considered the ideal pollution-free replacement for fossil fuels. Yet here on Earth, it doesn't exist naturally in its pure gaseous form. Extracting it from larger molecules, such as water, is too energy intensive to be feasible. But scientists are now working to employ a common species of green algae to do the same task with far less fuss. Withhold sulfur and oxygen from the algae's growing environment, and voilà, they happily excrete hydrogen gas. Though the process is still confined to the laboratory, once production rates are sufficiently improved, you might find yourself bypassing your favorite gas station en route to your local scum-covered pond when you want to fill up your tank. According to researcher Tasios Melis, of the University of California, Berkeley, "A single small commercial pond could produce enough hydrogen gas to meet the weekly fuel needs of a dozen or so automobiles."

of the provocateur, his anti-spiritual triumphalism is not only shortsighted but confused. Imploring us all to become environmentalists in one breath, he turns around and mocks the very impulse that encourages us to do so in the next. This sort of hyperbole is obviously self-defeating, but it also points to a deeper irony within the bright green movement as a whole. Indeed, the greatest danger for bright green today seems to be that the very thing that makes it so progressive—its attempt to integrate postmodern ecological consciousness into the modernist project of economic and social progress—is the same thing that threatens to drag it backward into an overly materialistic orientation toward sustainability and global development.

Luckily for bright green, its center of gravity is not entirely settled yet. The movement has many voices, and Sterling's is only one of them. Many tend toward unbridled materialism in the same way that Sterling does, if not so vociferously; others seem to recognize that being ruthlessly pragmatic about moving forward doesn't have to mean flattening everything down to the lowest common denominators of "sex, glamour . . . and tons of money." At times, progressive environmentalists have certainly been able to embrace technological optimism and capitalist ingenuity without rejecting spiritual idealism, and there's no reason they can't do so again. Bucky Fuller, for example, was a man for whom a certain reverential depth seemed to be synonymous with the attitude of progress. "I live on Earth at present," he wrote, "and I don't know what I am. I know that I am not a category. I am not a thing—a noun. I seem to be a verb, an evolutionary process—an integral function of the universe." Brand has always held a richer, more integrated view as well. One of his current projects is called "The Clock of the Long Now," a mechanical clock that will be built to last 10,000 years out in the Nevada desert, ticking once a year, bonging once per hundred, and letting out its cuckoo each time a millennium rolls around. The idea is to create a public icon of "mythic depth" that will do for the concept of "deep time" what the photos of Earth from space did for our awareness of the environment.

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> —Buckminster Fuller

In continuing to define and consolidate the next stage of green for the twenty-first century, perhaps the insights of the nascent field of integral ecology can help orient us. Environmental philosopher Michael Zimmerman is coauthor with Sean Esbjorn-Hargens of the forthcoming *Integral Ecology,* due out in 2008. "There's such a revulsion against modernity among modern environmentalists," he told *WIE,* "that their interpretation of modern history is always colored by the worst possible way of looking at it. But there's no going back to a naïve time when humans are just like the other animals running around. It's too late for that now." At the same time, integral ecology would argue that as we take up the mantle and the moral burden of absolute creative stewardship over the biosphere, we have to make sure we don't lose touch with the reason

Weeding Out Land Mines

There are an estimated 45 million land mines still buried throughout the world. Not only are they brutally dangerous, but they keep much-needed arable land from cultivation. In search of a reliable yet uncomplicated means for their detection, a Danish biotechnology firm found that the lowly thale cress, a flowering weed, could effectively do the job with a bit of genetic modification. Their customized variety of the plant changes color when its roots encounter nitrogen dioxide, a byproduct released by buried explosives after they've been in the ground for a while. Grown on fields infiltrated with land mines, the thale cress indicates the location of the treacherous devices when its leaves turn from green to red.

Melissa Hoffman, founder of the LivingFuture foundation and owner of Teal Farm.

A Model of Perpetual Life

Vermont has no shortage of eco-minded residents, but when Melissa Hoffman of the nonprofit foundation LivingFuture purchased the historic Teal Farm—1,300 acres of pastureland and forests in the center of the Green Mountain range—she had plans far more ambitious than an organic garden in the backyard. Her goal? To create a perpetually self-sustaining, life-enhancing farm ecology "capable of meeting regional food and energy needs within the tumultuous conditions of global warming, fluctuating energy supplies, and an oil-dependent global economy." The key word in her vision is *perpetual*. Inspired by William McDonough and Michael Braungart's "cradle to cradle" design principles, the idea is that Teal Farm will function as a living, evolving organism—one that eliminates waste by continuously deriving all its nutrients locally and producing or capturing all the resources it needs for powering machinery and heating and cooling the buildings on the property. Intended to serve as a prototype of highly integrated, state-of-the-art energy, food, building, and ecosystem technologies, Teal Farm will incorporate wind, photovoltaics, solar hot water, wood gasification, and small-scale hydroelectric generation into a single unified system.

people such as John Muir railed against modernity in the first place. "Most people are *on* the world, not in it," Muir wrote in *John of the Mountains* in 1938. "[They] have no conscious sympathy or relationship to anything about them—undiffused, separate, and rigidly alone like marbles of polished stone, touching but separate." This is not only the perspective that gave birth to environmental awareness, Zimmerman explains, but the only perspective sensitive and sophisticated enough to sustain it:

> Environmentalism has to align itself with a developmental, even progressive interpretation of human history. The developments of modernity are extraordinary, including the human emancipation from terrible political systems, the elimination of slavery, the elimination of poverty in many ways, the development of science, the separation of church and state, the development of rights for women . . . I mean, these are not trivial achievements. Yet there is also a dark side to modernity, which includes this continuing practice of domination over other species, and a kind of willful ignorance, at times, in regard to our dependence on the natural world. But the solution to modernity's dark side is not to abandon modernity and regress to premodern social formations, which would just be a disaster. The only solution is to encourage and facilitate the further development of human consciousness, and the institutions and practices that are necessary to sustain it. We have to be able to go forward constructively, to open up and envision further developmental possibilities while respecting everything that's gone before in a way that's not naïve.

The crisis that confronts us is "unthinkable," Alex Steffen likes to say. The solutions we must implement, he continues, are as yet "unimaginable." And between these two seemingly paralyzing poles lies the liberating perspective of the bright greens. To stretch way beyond our comfort zones into the unknown, they propose, may be the only real shot at survival that is left to us. To let go that much, with both feet on the (hybrid) gas pedal, may be our only chance at moving fast enough.

"The most important thing that professionals in sustainability will have to offer in the future is not ready-made solutions," writes Worldchanging contributor Alan AtKisson, "but

an ability to improvise, adapt, innovate, and dream up still more visionary-yet-feasible ideas about how to transform a global civilization or rescue ecosystems in trouble. This is going to require even more exertion, more creativity, more risk. . . . In the next few years, people who have been working on sustainability, especially where it touches the climate-and-energy nexus, are going to be seriously tested—not by resistance to their ideas, but by the ever-increasing demand for them." Perhaps our greatest asset in this enterprise of possibility and uncertainty will be the willingness to question everything—the courage not to take easy positions but to insist on searching for the right ones. Worldchanging itself is a real example of this in that they're honestly grappling with the whole integrated matrix of sustainability in ways I've never seen before. Everything, it seems, is up for reinvention, and nothing's off the table—including some of environmentalism's heftiest sacred cows.

Two years ago, for example, Brand published a piece titled "Environmental Heresies" in which he called for a serious reconsideration of two of the most sacrosanct issues of the day: biotechnology and nuclear power. Setting off predictable storms of controversy, Brand's arguments were mostly practical ones. On genetic engineering, he feels knee-jerk anticorporatism has won out over science and that genetically modified crops and microorganisms have the potential to dramatically ameliorate hunger and disease in the developing world, produce new and cleaner fuels, and combat invasive species. On the nuclear issue, he believes that our burning need to decarbonize energy production and avert the "universal permanent disaster" of global warming trumps the risks of nuclear generation and nuclear waste, which, great as they are, are nevertheless known quantities. Several prominent environmentalists agree with him, including James Lovelock, and heated debates are taking place on all sides of the fence. Worldchanging comes down more in agreement with Brand on bioengineering and less so on nuclear issues, according to the website's cofounder Jamais Cascio:

> The Bright Green reluctance about nuclear power has far more to do with it being centralized infrastructure and dated technology than with any fear or loathing of atoms. The environmental situation in which we find ourselves demands a fast-learning, fast-iterating, distributed and collaborative technological capacity, not a system that bleeds out investment dollars and leaves us stuck with technologies already on the verge of obsolescence. If we're looking for resilience, flexibility and innovation, the nuclear industry is not a good place to start. With regards to biotechnology, resilience, flexibility and innovation are definitely possible, at least in the years to come.

In the years to come, I can't wait to participate myself in the creative unfolding of a future so bright and green it's currently impossible to imagine. And while the avant-garde eco-philosophers at Worldchanging and elsewhere are doing their best to question everything, reconfigure all our dark green assumptions, and blow the old sacred cows out of the water, I hope they don't make a sacred cow out of spirituality. If the future of environmentalism depends on the evolution not just of our physical circumstances and social formations but also of the deeper interior structures of consciousness and culture, the most important question of all may be whether the bright green vision of sustainability is willing to grow broad enough to encompass these interior dimensions.

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The good news is, I think it can. If Zimmerman is right when he characterizes the dark green call for a romantic return to nature as reflecting a kind of nostalgia for older, safer, more familiar structures of consciousness within ourselves, then why shouldn't the call of the bright green future be the call to completely let go of them, making room for something as yet unknown? With bright green, the pressing moral obligation to take the fate of the world consciously and carefully into our own hands *right now,* or risk losing everything, is really inseparable from the thrilling possibility inherent in the human capacity for progress that we can make life better, richer, and more inclusively prosperous than ever before in history. And to me, that's not just the voice of technological optimism. It's the voice of the spiritual impulse itself. ■