

**NEW DIMENSIONS BROADCASTING NETWORK®
PROGRAM TRANSCRIPT**

Program #2988

Guest: William McDonough and Steve Bradfield

Host: Michael Toms

Title: The Monticello Dialogues, Part VI: Cradle to Cradle; Going Green

MAT: When talking about the future of our environment, choosing between what is bad and less bad isn't good enough. We need to, and can, revolutionize the way we make things so that the manufactured world, the world designed by us, people, is as safe and as effective as the one nature gave us. That's the crucial message an internationally known environmental design team William McDonough and Michael Braungart want to champion as the next industrial revolution in a radical new manifesto, *Cradle to Cradle: Remaking the Way We Make Things*.

Cradle to Cradle begins by showing how our ecological efforts today are doomed by the four Rs: reduce, reuse, recycle and regulate. Braungart and McDonough say if humans are truly going to prosper we will have to imitate nature's highly effective cradle-to-cradle system in which the very concept of waste does not exist. According to them there are two distinct metabolisms: biological and technical. Products can be composed either of materials that biodegrade and become food for biological cycles, or of technical materials that stay in closed-loop technical cycles in which they continually circulate as pure and valuable nutrients for industry. If we set out to design things with the notion that materials circulate within one sphere or the other, with no crossover, we can entirely eliminate the concept of waste. Simple? Yes. Radical? Absolutely. Attainable? For certain.

I know you'll appreciate the importance of William McDonough and Michael Braungart's *Cradle to Cradle* in this special edition, "The Monticello, Part VI: Cradle to Cradle; Going Green," with William McDonough and Steve Bradfield of Shaw Industries. My name is Michael Toms. I'll be your host. Welcome to New Dimensions.

This conversation with William McDonough was recorded in Charlottesville, Virginia, at his home in September 2003. William McDonough is an architect and the founding principal of William McDonough and Partners Architecture and Community Design based in Charlottesville. From 1994 to 1999 he served as dean of the School of Architecture at the University of Virginia. In 1999 *Time* magazine recognized him as a Hero for the Planet, stating that his "utopianism is grounded in a unified philosophy that in demonstrable and practical ways is changing the design of the world." In 1996 he received the Presidential Award for Sustainable Development, the highest environmental honor given by the United States.

Bill, welcome.

MCDONOUGH: Thank you.

MAT: Nice to be here in your home in Charlottesville.

MCDONOUGH: It's nice to have you here.

MAT: So let's start with the primordial, where it all began.

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MCDONOUGH: Well, I think as designers we realize that design is a signal of intention, but it also has to occur within a world, and we have to understand that world in order to imbue our designs with inherent intelligence. So as we look back at the basic state of affairs in which we design, we in a way need to go to the primordial condition to understand the operating system, and the frame conditions of a planet. I think the exciting part of that is the good news that's there, because the news is the news of abundance and not the news of limits. And I think as our culture tortures itself now with tyrannies and concerns over limits, and fear, we can add this other dimension of abundance that is coherent, driven by the sun, and start to imagine what that would be like to share, so that our fundamental notion of displacement becomes one of displacing local things for local benefit that in the aggregate provides global delight, and that I think is a really interesting framework for design today.

MAT: You mention you went back to the planetary beginnings. It's kind of interesting because we often talk about the personal connected to the planetary, but it's also in inverse. I'm thinking it's also important for us as persons, as individuals, to go back and understand our beginnings, too, because we'll find abundance there. There was a mother that nurtured us, otherwise we wouldn't be here now. That kind of abundance is personal as well.

MCDONOUGH: It is. And you know, we go back to Einstein's theory of relativity to see the frame conditions. But it's also important to remember Einstein said that imagination is more important than knowledge. So we see both knowledge and imagination, so the abundance, if we go back and look, is both physical and cultural, in many forms. So the celebration is quite rich. It's not just a technical question. It's also a cultural question, social question. If we look at $E=mc^2$ as knowledge then we can see it as a formula that describes, essentially if $E=mc^2$ that since c is a very large number, if you square it it's an almost infinitely huge number, then there's a very large amount of energy and a very small amount of mass.

MAT: So E is energy, m is...

MCDONOUGH: m is mass.

MAT: Mass.

MCDONOUGH: And c is the speed of light.

MAT: And squared.

MCDONOUGH: Hundred and eight-six thousand miles per second, right? Squared. So it's such a large number that a very large m will still yield a very large E . And that's why Hiroshima and Nagasaki disappeared, and that's why we see the whole notion of atomic energy. I think that on a planetary level we recognize that the earth really does want to be nuclear powered. I think we recognize that, and that that whole interaction is actually fundamental to our survival. But we

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want it to occur exactly where it has over the millennia, which is ninety-three million miles away. That's our nuclear reactor. So we are a nuclear powered planet, I think we'd agree with that, but at the next level let's make sure the reactor's where God put it, and what we evolved for.

So if we look at that, then we realize that the energy that we use, the E is going to be coming from the sun. So E is the sun. In a sense, from a poetic perspective—I'm not a scientist, so I look at this from a designer's perspective—it's my energy source but it's also essentially physics. It's the kinetic energy that is going to be sent to the project, which is planet earth. And then as we look at earth, if we rarify it poetically we just realize it's a blob of mass that's inert. It's mineral, so on. Then when you put the two together, you're basically putting together physics now with the mass of chemistry. These are atomic structures that are mass. You put these two together and we get this thing that is magical. I mean, even Einstein saw it as something essentially delightful and astonishing and almost impossible to come to grips with, which is life itself. And this is biology. So you take chemistry and physics, you put them together, and you end up with biology, and growth is good.

So there's this great fecundity ahead of us as we take solar energy, convert it on the earth's surface into living things. It's a growing of fecundity because we start with something inert and then we see something that's constantly growing. So even though the soils in the Amazon are very thin, they are constantly growing, even at a very small level. But there's this fecundity to it. So it's a really critical part of the design equation that we preserve that fecundity and actually celebrate it. So if all we do is pave over the planet then we are destroying its fundamental operating system, which is the making of oxygen to breathe, and purifying water, and so on. I think from a design perspective we can see that's critical.

That's really the primordial state. It's the sun shining on the earth, and then life happens. So wouldn't it be marvelous if our buildings, our products, our artifice, our relationship to the landscape worked within that operating system.

MAT: You get a sense of that fecundity when you're in a rainforest, and you have these little pockets where lightning had struck a tree or whatever and you have the sunlight coming through, but when you're in the middle of a rainforest it's teeming with life. Life wants to happen everywhere, and it's happening everywhere, and the variety of different insects and flower forms and trees. It's just amazing.

MCDONOUGH: It is amazing. And I think diversity is what it's about. It's about creating niches and filling them. When you look at Darwin, and the way the business community has interpreted Darwin, they say, "survival of the fittest." Well, that's in essence what he was saying, but you also can see that you could interpret it as "survival of the fitting-est." One of the fundamental design precepts is that many niches are being created, and more and more niches are being created and occupied. So if you look at the ant-wrens, you know there are fifteen different species of ant-wren occupying different parts of the rainforest canopy. So the competition—it goes back to its original roots of the word, which were "strive together," "together" and "strive." So what we find is all these species strive together. They all compete, but they compete in a way that's productive.

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MAT: And within the whole system.

MCDONOUGH: Yeah. And the system gets bigger.

MAT: Not trying to tear down parts of the system as they're feeding.

MCDONOUGH: Right.

MAT: But actually they're contributing to the whole.

MCDONOUGH: Right. And they're creating new niches, which then get occupied by either adapted species or new species.

MAT: So where does Crick and Watson's work, and the DNA and double helix come into all this?

MCDONOUGH: Well, if we expand on this then we start to ask ourselves some fundamental questions like, "What does it mean to be alive? What does biology mean?" It has a magical quality to it. Anybody who sees a mandrill for the first time has to ask, "Isn't this an astonishing creature?" You're staring at a face of a primate and it's bright red and blue. It looks like what happens when we paint ourselves up.

MAT: And where do find these critters?

MCDONOUGH: In Africa. But if you look at the discovery of DNA and then reflect on it as Francis Crick did in 1962 in a book called *Molecules and Men*, he recognized that in order to have what he called the nature of vitality, the vitalism, the idea that something is actually alive, what would that be? From a person who saw DNA, from the evidence that they were looking at, it's an astonishing revelation, structural revelation. But to then ponder, "What is life itself?" from a scientific perspective, he pointed out that in order to have life we must have growth. And growth is actually a necessary precondition even of simple replication. While you and I are talking here, our children are growing, to replace us in a sense. In the ancient Irish tradition, you know, the Forever Young look back at the mortals and called us the immortals because we could have children and the Forever Young could not. So our children, as Wordsworth saw, are our immortality.

So we need growth in order to have replication. And that's an astonishing idea because as an environmentalist, people often wonder what I mean when I say growth is good. Well, growth is good if we follow the laws of nature. As an architect I follow the law of gravity. I also need to follow the other laws of nature. Well, what might they be?

So in order for something to be alive we need to have growth. And then in order to have growth we have to have a free form of energy, because you must have something coming from the outside. You and I are using up our resources right now, here, talking to each other, and so

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our children are going to need something else. So we need some form of revenue to support them, and I'm sure most parents understand that, certainly at college time. But the idea of having that revenue, it must come from a free source. So what Crick recognized is it comes from the sun. So the energy comes from outside the system, which is the E in Einstein's equation, in the poetic form for us.

Then after you have an outside form of free energy, you have to have an open system of chemicals that are moving in and out of the metabolism to metabolize and synthesize for the benefit of the organism and its reproduction. So what Michael Braungart, the chemist I work with, and I are postulating is that if we look at that as the rule of life itself, wouldn't it be marvelous if we not only saw biological systems as being fecund and having materials returned to the system so that the soils are restored by human activity instead of destroyed, but it would be marvelous if we could also look at the world of technology and realize that if we all relied simply on nature in its primordial state, that we could probably support between two and five hundred million people on the planet's surface.

But at this point with six billion people and looking at eight to ten billion, and primarily in cities, its impossible to imagine going back to nature at this point, and that essentially the world is a garden and we need to understand it that way, which brings us back to some pretty basic questions about design and gardens. But we have to look at that. And we say, wouldn't it be marvelous if the objects of human technology—this tape recorder, this radio that people are listening to—could go back to the company that made it and become a radio once again, with all of its materials in a closed cycle, similar to a leaf falling, rotting and becoming soil again, all in a safe, fecund system that is accruing in abundance as we use it rather than destroying the planet as we use it. I think that's the fundamental design question for today. Then when we see Einstein with the revelations of physics and chemistry, Crick and Watson with the revelation of biology, then we can bring it today and use those revelations in our design. There's absolutely no reason for us not to take advantage of our most thoughtful insights.

MAT: At the Seventh Annual Environ Design Conference, held in Washington, D.C. in May of 2003, it was announced that Shaw Carpets, the largest carpet manufacturing company in the world, had adopted the Cradle to Cradle concept. Steve Bradfield is Vice President of Environmental Development at Shaw. Shaw has recently been awarded the Presidential Green Chemistry Award from the United States Environmental Protection Agency for their innovation in material design. Here Steve Bradfield talks about the innovation that's happened at Shaw.

Steve, I heard you announce that Shaw Industries had adopted Cradle to Cradle. I wanted to ask you, how did you first encounter the ideas of Bill McDonough and Michael Braungart and the whole Cradle to Cradle concept?

BRADFIELD: Like a lot of things in life, Michael, that's a bit serendipitous. Actually the first thing that happened was we encountered Ray Anderson's challenge in 1994 to the carpet industry to become a sustainable enterprise. He had actually come out publicly and said that it

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was his intention to basically make a sustainable carpet. I think in a highly competitive industry like carpet, that's the kind of gauntlet that gets thrown down, and those that are up to the task certainly pick up the challenge. At that time, of course, Bill was doing some work with Ray. At about the same time I had read an article—this is where the serendipity comes in—in *Scientific American*, which talked about metallocene catalysis in polypropylenes. Now that may sound like a mouthful, but basically, PVC is what's used in the carpet tile industry in making the squares that go on floors in commercial buildings. What happens is, is that's really a very small part of the carpet industry *per se* but it's a very profitable one and also at the top of the hierarchy, so to speak. That's an expensive product, and one where you would naturally expect people to start with trying to become sustainable, to make changes in polymers.

When I got around to getting this information back to one of our very bright chemists and saying, "You know, I think we could make a much better carpet tile backing out of this flexible polypropylene than PVC," we were essentially off to the races. And to bring it back in to Michael and Bill and some of their work, they were certainly advocating the position of Cradle to Cradle, which was essentially in our view the idea that you could take your own product and have it serve its natural purpose on the floor for many years, and then take it back at the end of its useful life and turn it back into exactly the same product that it was before.

MAT: I'm holding in my hand a colorful little booklet that I picked up at the conference that Shaw published. It's a delightful little piece, and it's totally recyclable. And one of the lines in it, it says, "We're proactively phasing out old technologies like PVC for new polymers that use less energy." Also, it talks about how, in adopting Cradle to Cradle, "It's a third-party system created by William McDonough and Michael Braungart. The Cradle to Cradle design protocol assesses each individual material used in the product to determine whether it's safe for us and our ecosystem. Materials deemed unsafe are replaced with those that are." So what we're talking about is technical nutrients, and there's total integrity within the system so that they don't interact with biological systems later.

BRADFIELD: That's exactly right. And it's which came first, the cart or the horse, with us. We actually started along the road before we knew Bill and Michael. And as we began to understand their work more and more, it was one of those very fortunate events where what you're doing just happens to converge with the work of some very respected people. And I had this conversation with Bill, basically, telling him what we were doing, and it turns out that by choosing polypropylene and trying to pursue a totally recyclable carpet tile, we were actually doing Cradle to Cradle without knowing it. So Bill and Michael provided the framework for what we are doing today and made it much easier for us to go forward with a clear vision of where we wanted to go.

MAT: Steve, one of the things you told me in Washington, D.C., when we first met, was that the system wasn't broken. And in implementing what you did in adopting Cradle to Cradle, there were some interesting things you had to deal with, right?

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BRADFIELD: Absolutely. You know, Bill and Michael do a great job of holding an audience in their hand and getting them really into this concept of technical nutrients, and bringing them back and never seeing a landfill, and putting them back into perpetual use. But you could walk away from one of those speeches and you say, “You know, I’m invigorated and I feel all this energy to really get something done,” and then you think for a minute and you say, “Well, how am I going to do that?”

So really, the problem is not in any way with the theory. The problems begin to come in when you start talking about implementation. At the time when we were doing this, Shaw was making the finest quality PVC plastisol backing for carpet tile in the industry. We had a plant that was essentially humming along very nicely, and here comes Steve Bradfield and a group of other people who are saying, “You know, maybe we can do this a better way.” That’s an extremely difficult thing for a plant manager or a manufacturing organization to accept, when somebody walks up and says, “I know that things are running really well here, but we’d like to change everything you’re doing.”

MAT: [laughs] Yeah. Right. I think all of us as human beings have a natural resistance to change.

BRADFIELD: Absolutely.

MAT: And then what happened?

BRADFIELD: Well, that also is very interesting. Again, operating at the back of a plant that was not broken, everything was running very well, we were at first just tolerated, and then interest started to come our way. The folks would start to float back and try to see what we were doing. I think what they began to see was that we were making some real strides. The biggest stride that we really made was, is we were actually taking a lot of weight out of the traditional carpet tile backing. We were able to lower that weight by about forty percent. So we actually fulfilled one of the first tenets of sustainability, which is to reduce, reduce the amount of material that was going into the product.

You know, it really wasn’t until later that we got involved with Michael and Bill, and found that we only had half the story, and the half we didn’t have was the ecological and human health and safety issues. We thought we’d done a pretty good job, but until we started taking a look at those issues, we really didn’t have that in our gun sights. We essentially had that paradigm in our mind of being “less bad.” And as we really began to understand what Bill and Michael were trying to say is, is that has to be really three parts. One is that human and ecological health and safety are important. You’ve got to put chemicals and materials into your product that are safe for the environment and for human beings. Secondly, you’ve got to watch the embodied energy. If it’s costing you two barrels of oil to produce what you could have made from one barrel of oil by using virgin materials, then you’re really not doing the world any big favors. And then third, was really the value recovery infrastructure. If you don’t have a means of getting it back economically from that nationwide distribution of carpet, and actually process it

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and put it back into our products then, again, it was a fruitless effort. But we were able to address all of those issues and find that we in fact could do so.

MAT: The little booklet I mentioned earlier, in the middle of which is a handwritten letter entitled “Shaw Environmental Policy” signed by R. E. Shaw and dated April 30, 2003, and the first point is, “Environmental sustainability is our destination and Cradle to Cradle is our path. Our entire corporation and all stakeholders will value and share this vision.” And then at the last one, there’s a number of them here—one, two, three, four, five, six, seven—the last one, “Honesty, integrity and hard work remain our core values. We will continue to deliver unsurpassed safety, quality, beauty, performance and value to our customers.” What an amazing piece, documentation here from a Fortune 500 company, and one that’s owned by billionaire Warren Buffet. Tell us about this little booklet and this statement.

BRADFIELD: Well, you know, being a corporation and being large, and being owned by Warren Buffet, doesn’t mean we’re not concerned about our employees and our environment. I think at some point in time we all think about whether we’re actually native to the places where we grew up and live and work. And at some point I think we’ve all got to get over this guilt, I guess, that we displaced the Native Americans, and realize that we are the new Americans, and what we do with this land is up to us. You know, when you take something and say that environmental sustainability is our destination, and that all the stakeholders will value and share this vision, we’re simply pointing a direction for not only ourselves, but for the kind of customers that we believe, we want to serve, and for the kind of people that we want to deal with in terms of buying materials and other products. And so it was basically bookends. If you take that statement and the last statement, which is a much older part of our policy, which was the “honesty, integrity and hard work remain our core values,” and of course delivering “unsurpassed safety, quality, beauty, performance and value,” that’s what we’re supposed to do. So those two things are not incompatible, and by getting involved a bit more with Michael and with Bill, we found that the framework that they offered us in Cradle to Cradle was really something that completed our ideas. It allowed us to continue to grow and basically see a future that had no limits.

MAT: So how do you see, realizing that none of us know the future, but if you had all your druthers, what future would you like to see in the business you’re in and with what you’re doing?

BRADFIELD: I’d like for everyone to understand that Cradle to Cradle is a generational point of view. We cannot hope to attain in our own lifetimes all of the things that are going to change industry and make it completely sustainable. I’m not sure that our children or grandchildren can do that. But I think that it’s something, it’s a journey we have to embark upon. There was a time in my own thinking where I considered sustainability to be a journey and not a destination. I’m now firmly convinced that it is in fact a destination, and we are simply on that journey. What good is a journey if you don’t know where you’re going? So if people look at the generational aspect and accept that, while, and again this is part of our policy statement, we simply say that we’ll plan for generations while accepting the urgency of the present, as long as the company is

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truly doing its best to use current technology and to develop new technology to push forward the Cradle to Cradle agenda, I think that that's a very noble and acceptable position for a company to take. But to expect that company to change overnight is not really a rational point of view.

So one of the things I guess I'd say is for people to realize is that we've got a long road ahead of us. But we have to start.

MAT: This is a special production of New Dimensions Radio, "The Monticello Dialogues, Part VI: Cradle to Cradle" with William McDonough and Steve Bradfield.

[musical interlude]

MAT: Bill, so soy based inks on recycled paper and petroleum based inks on regular paper, neither one of them are optimal. What is optimal? What do we do? Where do we go?

MCDONOUGH: If the world could be a place of abundance of biological and technical nutrition, then paper as we presently use it is suboptimal in a large-scale sense because we're cutting down trees, which are exquisitely beautiful, provide amazing habitat, and yet we're using it for something as prosaic as a newspaper we're about to read once and throw away, and then we're not even going to read most of it.

MAT: Five-hundred-year-old cedar trees in Canada being taken down for pencils.

MCDONOUGH: Right. That's just not intelligent at this point in history, and it's a pattern that we need to stop repeating. So when we look at that and ask, "Is that intentional? Do we intend to destroy species? Do we intend to destroy forests and water quality, and so on?" then we get past it. Now we can say, "What do we intend?" Well, if we intend for things to either be biological or technical nutrition, then we could imagine that there are going to be plenty of kinds of paper that are made from various kinds of carbohydrates that are secondaries in the marketplace. There's rice straw, there's lots of cornstalks, there's plenty of cellulosic and lignosic material around, floating out there in the agricultural system looking for something to do other than be burned. If that can be designed into coherent flows where it goes back into natural systems—toilet paper would be a good example. I mean, the idea that we actually find chlorine in our sewage systems in Europe, and it's from the toilet paper, which is insane because we want the sewage system to be a biologically active place, and yet we're chlorinating it like a swimming pool, while we wipe ourselves. And what are we wiping ourselves with? Trees. Well, that was smart. So there's a whole optimization there. But that would be a place where biological nutrition in paper makes sense because we're going to put it into a biological system, which is sewage, which should be an asset not a liability. We should see sewage systems as something we want to go back to the

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soil. Well, why would we want to contaminate it with chlorine if we're trying to get it back to the farmers? So there's that.

On the other side, and I think this principally the revelation of Michael Braungart and the work we're trying to do with Cradle to Cradle, because the idea of technical nutrition and that Cradle to Cradle is printed on a polymer—it's an experiment. Our book is quite heavy. We were surprised at that and we're working on lighter versions of it. But essentially the idea was, there's so much polymer around—every time you get a bottle of water, that's polyethylene terephthalate—these things could become white sheets of infinitely reusable material. So the idea that you would get a newspaper, if you want it in a physical form, should come to you delightfully. From our perspective it could be a polymer with inks that are designed for human health, and are designed to be lifted off the polymer, so when the paper gets recycled this polymer, this plastic, the inks are designed to come off it, you know, two hundred degrees or something, so we just lift the inks and then reuse the inks. So the ink gets reused, and it's all safe for humans and natural systems if it gets flushed into it. And the polymer is infinitely reusable as bright white material that doesn't require bleaching. So you end up with this thing where if you see a newspaper, it's an asset not a liability, and we're not destroying habitat to read the news.

MAT: Sounds like a good idea to me.

MCDONOUGH: Yeah. I think it's the kind of thing that the industries are very excited about. We're working with nature companies to put this into play.

MAT: There's another thing that Michael Braungart mentioned at the Environ Design Seventh Annual Conference in D.C. in May of 2003. He talked about antimonies. I didn't know about antimonies before he brought them up, and how these antimonies are toxic and they appear in lots of things that we use, like our kids' toys are wrapped in antimonies, and they're in the plastic, within the plastic, and they're in water bottles that we drink water from. So there's another example of technology leaking over into biology.

MCDONOUGH: What he's talking about is antimony, which is an element. It's a metal. It's used in catalysts for PET, which is this water bottle, and lots of other plastics, plastic things that you get in ordinary life. The problem is, we've found the antimony is residual in the PET. It's not an essential part of its recipe. We think PET is a marvelous material. It's a really critical one, because for us it's what we call technical nutrition. But if it's going to be technical nutrition, and bottles become paper become bottles become outdoor clothing become bottles become outdoor clothing become paper, you know, *ad infinitum*, then it shouldn't be contaminated with carcinogens. It's just a bad design. So if it is just a bad design then why are we still doing it? So we're looking at new catalysts using titanium dioxide and other things that won't yield this problem, and then the PET is totally valuable.

No one in the industry would get up, I think, and say, "We intend to cause problems with our products." I think as soon as they really come to grips with these issues they're primarily well-meaning, certainly at the senior level, and have the executive authority to go ahead and say, "We want something better." So that's why we're working there.

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It's really critical to understand, and ironic, that Mr. Robinson in *The Graduate* was probably right when he said to Benjamin Braddock, "It's plastics," because if we look at the world today, we're not going back to nature. If everybody wore cotton and Birkenstocks the world would dry out and run out of cork. So we will need synthetic materials that are intelligently deployed for the benefit of eight billion people. So human creativity on these synthetic products are actually really to us, so we can actually celebrate plastics. But they need to be seen as an essential part of the technical metabolism, and that they should be seen in closed cycles. Therefore they have to be designed to be totally safe, and to be ready for reuse and improvement.

So we're looking at a, we coined the term "downcycle" for what is most recycling today. Most recycling we call downcycling because the milk bottle goes back to the, if it does get "recycled" it becomes a park bench or a speed bump or something like that. It's still on its way to a landfill, and it's losing its quality. So we call it downcycling. When something goes back and gets mixed together, a carpet full of PET and nylon gets crushed up into a new backing for carpet—or not PET, excuse me, PVC—you still have PVC and nylon mixed together, and PVC is a very disconcerting material because we have great concerns over the potential carcinogens there. So what we see is the idea of totally safe materials in closed cycles either going back to soil or back to industry forever. And we need to celebrate that. So we're working with some of the largest chemical companies on that transformation.

MAT: So it's not a matter of transforming technology as much as it is appropriately using technology in the right way.

MCDONOUGH: It's celebrating the intelligence that we have today and then putting it into the products. This is just a quality question. For us this is not browbeating about be less bad or more efficient and make lighter products, you know, lighter bad things. Being less bad is not being good. It's being bad, just less so. So the question is, "What is good?" and "Why can't we design good things now, now that we know these things?"

MAT: You talk about the difference between efficiency and effectiveness. A little bit about that.

MCDONOUGH: Well, the environmental movement has taken up the notion of efficiency ever since the Earth Summit where the eco-efficiency movement really got moving, and then there are all a series of things around, things like factor flow reductions and things like that where we talk about major reductions in badness, let's call it—less toxins, less energy being used for a certain thing. That's not necessarily something we shouldn't be doing. Of course we should be doing that. Destroying the planet is not our primary agenda and we should try and do it as little as possible. But on the other hand, simply being less bad is not being good. So efficiency *per se* has no value, because if you're doing the wrong thing efficiently, then you might even be more pernicious. So a Nazi who's efficient is worse than a Nazi who's inefficient. So efficiency on its own terms has no value.

The question would be not, "Am I doing something right?" certainly if it's the wrong thing. But, "Am I doing the right thing?" Then I want to do it efficiently. So effectiveness is the

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question of, “Am I doing the right thing?” See, when we look at a cherry tree in the spring, it’s not efficient. You wouldn’t look at it and say, “How many blossoms does it take?” But it makes cherries and it’s beautiful. So it’s not efficient but it’s highly effective. Ask a cardinal. I think that’s really what we’re looking at is this celebration of abundance, so as we move into energy for example we can celebrate the abundance of solar energy. Then the question would be, “How do we make solar collectors like cherry trees that are all safe and delightful?” If we make our solar collectors out of gallium arsenide or cadmium telluride or copper indium diselenide, are we substituting a mass toxification problem for an energy problem? Why would we do that? So it does get back to this question of connecting energy and mass in intelligent ways, and the way the planet works is that’s a safe system that’s delightful and creates safe abundance. Well, let’s do that do. We can.

MAT: Well, as we understand more about the natural system and how the life cycle works, and then there’s this idea of, well, we have to get out into nature and back to nature, what happens to our cities?

MCDONOUGH: We’re working now with Jaime Lerner from Curitiba, Brazil, one of the most astonishing urban thinkers. In looking at the future of cities and designing cities—we’re actually doing some cities now, which is pretty exciting, and we’ve just written the Chicago Principles for Mayor Daley. He would like Chicago to be the greenest city in the world. So when we beg the question, “What is the greenest city in the world? What would it mean?” Well, from our perspective, if we just see the world as biological and technical nutrition, and use Chicago as an example, since it’s a good one, the history of Chicago, as William Cronon the historian has pointed out, is what he calls “nature’s metropolis.” So if Chicago grew around the abundance of the natural world that surrounded, and the Great Plains and the West, so all the cattle, all the grains, the woods, the minerals were all moved from the countryside to the city for processing and then sent back out—so the slaughterhouses, the stockyards, the lumberyards, the smelters, all the refining. So we see cities as the home of technical nutrition and human artifice writ large, as well as the place where the most sophisticated cultural events occur. Operas are written and performed in cities. So that’s the home of technical nutrition and of a certain level of culture and the arts and science.

We then look at the countryside as the home of biological nutrition and this great wisdom about the land. So we see cities as organisms, and that they represent an object of human artifice as one of the most poetic ever imagined. As Claude Levy-Strauss said, cities are like poems and symphonies. They are creative acts of human artifice of astonishing kind, and that they actually are a part of biological creation because they’re our nest at a certain level of culture. Now if we expect eighty percent of the world’s population to be living in cities, and eighty percent of the world’s cities to be on large bodies of water, which is what we’re seeing, well then we must understand that the cities need to become integrated with the system of the large bodies of water, and integrated with the flows of biological and material nutrition coming from the countryside.

So we see the cities as the home of technical nutrition, countryside as the home of biological. Imagine these two big flows. The city will make windmills and send them to the farmers of the Great Plains, so the farmers will not only farm corn and soil and so on, they will

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also farm energy overhead and they can plow around it. It's a very delightful prospect. And then when the windmills wear out in thirty years they get sent back to the city to be refurbished. If the materials are cradle-to-cradle they can go back to become new windmills, they could become other forms of mobility, they could become anything. So that's the technical flow to the country and back to the city.

And then on the opposite would be the flow of biological material to the city—the food, paper, things like that. As it goes to city we see the sewage systems of the city being a giant asset for the countryside, so that all that biological nutrition is returned to the forests, returned to heal the soils, and so on. So that's the way we see the cities fitting into this program.

MAT: In the course of the conversation, Bill mentions Lewis Mumford. The late Lewis Mumford died in 1990. He was called the last of the great humanists. His contributions to literary criticism, architectural criticism, American studies, the history of cities, civilization and technology, as well as to regional planning, environmentalism and public life in America mark him as one of the most original voices of the twentieth century. Mumford argued passionately for a restoration of organic human purpose in the larger scheme of things, a task requiring a human personality capable of primacy over its biological needs and technological pressures, and able to draw freely on the compost from many previous cultures.

Okay, Bill, you were talking about biological nutrition, cities and the benefit of cities. Where do we go from here?

MCDONOUGH: Well, cities are one of the most profound human creations. This is something Lewis Mumford saw, Jane Jacobs saw, and as we look at the world population dynamics and, "How are we going to love all our children?" most of our children are going to need cities. So if we intend to love all our children, and not be ecologicistic and just say they're a population problem, then we have to learn how to love our cities, because how can we love all our children if we don't love the cities? And how can we love all our children if our cities don't love children? So we need to design cities that love children. That, I think, is a much more interesting design assignment than a lot of the typical ones.

For example, I see Ground Zero as having an opportunity to be a place of healing, literally. And if a city loved children, obviously there were children who grew up to hate the World Trade Center. Think about that. They hated the United States and they hated the World Trade Center and they brought 'em down. These were not children who grew up with love. They grew up with hate. So, you know, the World Trade Center site, for example, could be a place where people come to get eyesight, hearing, things like that, the kind of work that we see going on in India.

MAT: Healing center.

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MCDONOUGH: A healing center. And that could be in addition to all these other stylistic and zoning and commercial real estate moments that are going, cultural moments, which are all part of a delightful prospect as well. So it's not to say instead of, but it's certainly a much richer idea.

So cities are a very fecund concept because they're the human nest that could be tremendously potent from an economic, social and ecological perspective. So we see them as a delightful prospect. I think what Mumford saw was the fact that the cities, as they became giant machines and as the decisions that were being rendered there—you know, highways being cut through the middle of cities rending them apart, energy systems that were just incredibly consumptive and noisy and gritty—I think he realized that the machine aspect had to find itself really secondary to the cultural and natural opportunity. I think when Fuller, when he got to cities, had that very strange photo montage that he did of a dome over midtown, which I think in a way took away a lot of the strength of many of his strategies, because a lot of people looked at it as, "Well, what is he going to do, air condition midtown if the air gets too bad?" It looked like a reactive agenda, not necessarily a delightful one. An artificial sky. Why? Because we need it. Why? Because we've obscured the real one. I think that's a problem.

The idea of applying technological band-aids is not going to work for us. We have to get into the core of the city and understand what the implications of that are, and understand that it breaks down to about a hundred and fifty people as a group that could actually be coherent in community.

MAT: More like a village.

MCDONOUGH: Like a village. Within a city we find many villages. They don't have to be necessarily collocated. When I lived in New York City for seventeen years I probably had a cadre of a hundred and fifty people sprinkled around the city that represented my community of friends and architects.

MAT: San Francisco is like that, too. It has little villages within the city itself.

MCDONOUGH: Yeah. So I think that we have to celebrate that, the connectivity, not the discontinuities of it. That, then, lets us imagine a whole world of cities, like Jaime Lerner is doing, the former mayor of Curitiba, urban planner, great urban planner, and imagine what it would mean to sort of act out at a local level these delightful strategies. One of the great things that Jaime Lerner did in Curitiba was make heroes out of the garbage men. He said, "These are the heroes of the city." He just said it. He dressed up in a garbage man's uniform, the mayor, and went out with a garbage man and got on TV, and all the little kids were running around the garbage man going, "Superman! Superman!" A wonderful thing. So all of a sudden recycling became this sort of exciting social act of engagement, and people involved in it weren't the lowest rung on society. They were the heroes of the favelas. Pretty interesting social question.

So as we see the cities I think we have to really enjoy the prospect that our cities could be magnificent acts of human creation and culture, and add function within the biological system and not be seen as separate from it.

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MAT: And what happens in the country?

MCDONOUGH: Well, as we look the sort of meta scale questions, I work a lot with China now as the co-chair of the China-U.S. Center for Sustainable Development. My co-chair, Madam Deng Nan, who is Deng Xiaoping's daughter, is Vice Minister of Science and Technology, she actually put into the language of the mission statement of the center that China would make products based on nature's design based on Cradle to Cradle life cycles. It's actually an official document at this point, which is very exciting for me because it means, what China has recognized and we will come to recognize because we're bringing U.S. commercial actors into this center on the premise that they will adopt Cradle to Cradle, because that's the Chinese side's protocol, that if we look at China and the United States for example—let's take a look at the current economic and trade dynamics. There's these huge deficits that are starting to occur. When the longshoreman's strike occurred on the west coast it had to be settled quickly because clearly our economy is completely linked to China. I mean, nobody could go to a Wal-Mart without recognizing how many of the products in that building are coming from China, and more and more because the Chinese are now out-competing Mexico as the lowest-cost producers.

But if we go back to the meta scale, go back out as Bucky Fuller would, go to the stratosphere and have a look back at the lithosphere, what we'll see going on in the lithosphere is that China will be the lowest-cost producer of toxic products, essentially, because all of the mass production that we see involves incredibly sub-optimal systems from an ecological toxicology perspective. So they will be the lowest-cost producer. They will ship all that material over to the United States, and we will send them our money. Right? That's what we're seeing. Then they will deliver it to the most efficient distribution system ever invented, by Sam Walton, called Wal-Mart, where most of the products, which are basically unnecessary if we really stop and think about it hard, will end up in a landfill or in an incinerator probably within three months, certainly the packaging.

MAT: Or wind up in people's homes, and it's toxic.

MCDONOUGH: Yeah. And then it'll end up, or it may not be toxic to them but as an overall system it's a non-optimized material. Right? So the Styrofoam boxes and the cardboard and the heavy metal inks and the urethanes and all the rest of it end up in the trash heap immediately, because most of the products is actually packaging in many cases. Then the products themselves break and, you know, the little kid gets tired of his electric truck and then it goes to a landfill or, worse, an incinerator. And if the batteries are still in it and include cadmium, now we've contaminated ourselves even further, and so on. So the whole system toxifies China while they make it, then toxifies us while we use it over the short term. Then we take the very worst of it, like the computer monitors and so on, and send them back to China because we refuse to handle them here because we don't handle hazardous waste very well. So we'll send them back the worst of it where some Chinese woman will smash a cathode ray tube, release four pounds of lead, a neurotoxin, into her children's environment, breathe toxic phosphor dusts in order to capture some copper.

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So what is the meta design of this system? It's China destroys itself. America then sends China our money and destroys ourselves. And we send them back the very worst of it that destroys them some more. So basically the idea is kill each other over time. That's our economic strategy. So we're looking at a whole new strategy.

MAT: Sounds good.

MCDONOUGH: Well, it's exciting because it...

MAT: Sounds necessary.

MCDONOUGH: Well, it's necessary and it's urgent, because just on the mass side—we have mass and energy—on the mass side the implication of technical nutrition and biological nutrition is so delightful, and that's why China taking up Cradle to Cradle is so important, because what essentially is happening then is China would send us, they would make safe products that purify their water, create oxygen, in fact creates wetlands, and have wetlands on the roofs. We grow rice on the roofs of buildings. Why would we want to lose farmland? They're afraid of urbanization because it'll destroy farmland. Well, why can't the farms move up onto the roofs? We've done three of the most important green roofs in America. We did Chicago City Hall, The Gap's corporate campus in California. We just finished the Ford Motor Company Rouge plant, the largest green roof in the world. These are all done because they're delightful and cost-effective, otherwise we wouldn't get to do it. Well, the Chinese can certainly bring the rice patties up onto the roofs. We could grow buckwheat up there like they are in Tokyo and make soba noodles and so on.

So if you look at it, the idea that China, if China could do clean, ecologically intelligent manufacturing, which would be very akin to what they did for four thousand years, because if you look at Chinese soil it's been farmed continuously for four thousand years. It's only in the last hundred years that they've developed systems that aren't perpetual, which is really astonishing. So for them it's something they completely understand. Cradle to Cradle, of course. They were doing it for centuries. So if they make totally safe, healthy things out of technical nutrition and biological nutrition, send them to the United States, then we're receiving assets not liabilities, and we end up with polymers and hydrocarbons and carbohydrates that we have something we can do with. So we get to rebuild American industry. So China can then invest in American industry, which is really fascinating. Most people, if anybody said, "That's crazy. You know, they're building their own economy. Why would they invest in America?" I'd just like everybody to reflect and pretend it's 1947 and I'm saying to you that by 2000 you'll see a factory in Mississippi owned by Nissan making cars in America. The Japanese will make cars in the United States. Everybody would say, "You're crazy." And yet within thirty years that was the name of the game and they're taking over the industry in a certain kind of way.

So that way China could actually invest in American jobs, because we're losing our jobs at such a dramatic rate, we need basic job infrastructure in the United States. If we could keep making cars that were Cradle to Cradle then their technical nutrition, then we celebrate the making of cars. We celebrate the making of everything. And people keep working instead of

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making durable things of the raw materials that end up making sure we don't have any jobs, or making short-term things that are so toxic that they poison us. Totally sub-optimal. So the idea would be to take the two countries and say, "Let's compete. But let's go back to the fundamental idea of what competition is, which is to strive together, so that instead of killing your customer you send them assets and you enhance them and you invest in them, and vice versa." It's a delightful prospect of sharing and abundance.

MAT: May it be so.

Thanks for being with us, Bill.

MCDONOUGH: My pleasure.

MAT: You've been listening to a special production of New Dimensions Radio, "Monticello Dialogues, Part VI: Cradle to Cradle; Going Green" with William McDonough, coauthor with Michael Braungart of *Cradle to Cradle: Remaking the Way We Make Things*; and Steve Bradfield, Vice President of Environmental Development at Shaw Industries. If you'd like more information about the work of Bill McDonough you can contact the website McDonough.com or greenblue.org.

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My name is Michael Toms. On behalf of the New Dimensions Staff, and all those who are *Friends of New Dimensions*, as well as members of our affiliate stations, I'm wishing you well.

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