

These Revolutionary Times
Finding Our Way in a Post-Carbon World¹

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I have less than an hour this evening to persuade you that whatever collective unease you are all feeling about the stock market, the job market, the global economy, and the environmental stresses being put on the planet is a legitimate unease. Less than an hour to persuade you that the unease, as bad as it is, does not adequately capture the challenges we face. To show you the extent of our wholesale dismantling of climatic and eco systems in the search for carbon-rich fossilized energy, and with a destructive power not seen since the Earth's collision with that Manhattan-size meteor 65 million years ago. But this time there are whole social and economic systems being brought down too. Less than an hour to persuade you that our best hope at stopping this dismantling of Earth and our social and cultural systems is to dismantle a way of thinking—our way of thinking about ourselves and Earth. The dismantling of this four hundred year old worldview and its replacement is the revolution of our times. The young people in this audience are coming of age in a moment of historical transition, and have inherited—and have helped create—a crisis that some claim is Homo sapiens' greatest challenge in 12,000 years.

The good news? The world is filled with young people like those of you here this evening who have the creative power and potential to think differently. I hope that by the end of this talk you are at least a little bit more willing to change radically your mind and

¹ The following lecture was delivered on April 5th, 2009 at Carroll University, Waukesha, Wisconsin. For more information contact Vitek@clarkson.edu.

to help usher in a conceptual revolution. And you don't have to be young to do it; but it helps.

What is this change of mind? We humans need a new strategy, a new paradigm, a new set of systems and “isms” for living well in a world that is alive, interconnected, and crowded; and that is limited by ethics, ignorance, and net primary production. Our Earth is a living, sun-powered ecosphere that can only do so much, and that can be harmed. Human beings are not the hotshots we think we are, and if we don't get ourselves under control we will make life miserable for billions of fellow humans, cause the rapid extinction of myriad life forms, and all in all, make a mess of things.

Well, that's not exactly right. Our *current* lifestyles and the assumptions that motivate them, particularly in the industrial nations, specifically in the United States, and certainly right here on this campus, and every university campus in America, are already making life miserable for billions of fellow humans, causing rapid extinctions of species, and making a mess of things.² Sustainability is the new buzz word to describe a decent start to setting things right and it offers a path for living well in a limited world, but I believe that in its current form sustainability doesn't require enough from us. As Wes Jackson likes to say, if you set goals for yourself that can be accomplished in your lifetime then you are not thinking big enough. Sustainability is still too laden with a near fundamentalist belief in technological fixes, still stuck in the old “the-earth-is-a-machine” way of thinking. And it is just a tad presumptuous too. The wise ones (Homo sapiens)—that's us—have devoted 12,000 years to whittling away at the Earth's vital and

² “A new international ranking of environmental performance puts the United States at the bottom of the Group of 8 industrialized nations and 39th among the 149 countries on the list. European nations dominate the top places in the ranking, which evaluates sanitation, greenhouse gas emissions, agricultural policies, air pollution and 20 other measures to formulate an overall score, with 100 the best possible.”
<http://www.iht.com/articles/2008/01/23/america/23enviro.php/>

sustainable forces, all the while mistaking human cleverness for nature's creativity, and now insisting that what the ecosphere has been providing all along—namely, sustainability—is actually our job, and that somehow the great consumers of the Earth can now become its benefactors. If the Earth had eyes they would certainly be rolling.

If we want to get downright edgy in our definitions we could say that what now goes by the name of sustainability is comparable to the good behavior of a self-diagnosed, reformed psychopath. Both the psychopath and the sustainability movement admit that previous behaviors were anti-social, destructive, compulsive, without broader perspective, and dangerous to others and self. Both require a radically new perspective as different from their previous lifestyles as to feel alien and unnatural. And both risk relapses into hold habits, and hence neither can be fully trusted in the long run.

The movement toward human-powered sustainability is an improvement over our previously unsustainable practices, and an acknowledgement of the correctness of the emerging ecospheric paradigm, but sustainability is still too much about preserving comfort and status quo thinking, and not enough about a conceptual revolution. Sustainability still holds out the hope that we can get out from under our global environmental and social problems—even as these problems approach crisis proportions—without disrupting our everyday lives too much. It is a natural and predictable hope, even if it is false. After all, who wants to have to change too radically or to risk too much? Who wanted to fight Hitler's armies in Europe or the British armies in the American colonies? Thomas Paine, in his revolutionary pamphlet *Common Sense*, recognized this reluctance when he said that “until independence is declared, the continent will feel itself like a man who continues putting off some unpleasant business

from day to day, yet knows it must be done, hates to set about it, wishes it over, and is continually haunted with the thoughts of its necessity.” There are plenty of examples in history when radical transformations—revolutions—occurred that forced ordinary people into extraordinary roles. I believe deeply that we are at one of these historical moments now.

These are revolutionary times in which this generation of college-age students will face a leadership challenge that has few analogs in human history.

I wish I could tell you that I was exaggerating this challenge in an effort to motivate you. When I was in the 10th grade my high school chemistry teacher, Mr. Rizzo, would frequently tell my classmates and me that we were the worst class he ever had. He finally admitted that he told every class, every year, that they were the worst class he ever had in order to motivate them; but that unlike those other classes, our class really was the worst.

Like Mr. Rizzo I honestly believe that your generation really will face a leadership challenge of the sort that will be—must be—individually and culturally transformative. You and your generation will need to learn to live in a world that is no longer well aligned with your beliefs about it. Or to put it another way, your central task is to dismantle some of the fundamental beliefs about yourselves and the world before these beliefs dismantle the world. You must, quite literally, begin to change your minds.

When I say that you will need to change your minds I am referring to what might be called the intellectual DNA of the modern mind, a deep seated set of core beliefs that are assumed, rarely questioned, and built into the educational system from kindergarten to the Ph.D. These beliefs are at work in the labs and classrooms of every modern university in the world, and they are also with you when you are at the mall or in your car

or on the plane taking you to a ski resort or Jamaica for spring break. They shape your expectations that high salaries and big houses will bring you happiness; and they cause you excitement about every new technological gadget.

Some of these beliefs have their earliest origins in ancient and well known stories about—of all things—theft: the theft of the knowledge of good and evil in the Garden of Eden by Eve and Adam, and the theft of fire by the Greek god Prometheus for the benefit of humankind. But it is a more recent historical period we call the Enlightenment that gave a modern voice to these beliefs. The Enlightenment claimed that human power and knowledge were no longer crimes against the gods, but rather the right of every human being.

Knowing these Enlightenment names is a hallmark of a good liberal arts education: Galileo, Copernicus, Kepler, Descartes, John Locke, Thomas Hobbes, Francis Bacon, Voltaire, Isaac Newton, and Adam Smith, among others. These and other Enlightenment revolutionary thinkers and leaders freed human beings to embark on pursuits that had been forbidden or considered impossible: the control of nature; the creation of economies and technologies that went far beyond subsistence; individual freedom from oppressive governments, religions and family traditions; and a belief in human progress separate from the rest of life and largely unencumbered by moral and spiritual beliefs. Voltaire's description of the influence of Descartes' work well describes the Enlightenment as a whole: it gave sight to the blind, and the course it opened to us has since become boundless.

Boundless indeed. From 1750 to the present the human population doubled three times, from 790 million to 6.6 billion, and counting. Our history books tell us about all

of the personalities, discoveries and inventions that made possible this population growth and the advances of culture, but we probably know much less about the five energy-rich carbon pools that fueled this population surge, and with it everything we associate with the modern world. I need to talk about these carbon pools this evening because energy is at the very center of all advanced civilizations, including our own. Long before the Enlightenment the soil of the Fertile Crescent was the first carbon pool to be tapped twelve thousand years ago, giving birth to agriculture and the first increases in human population. The second pool—forest carbon—furthered human dominance of the world and made the bronze and iron ages possible. And wood served as the preeminent energy source in the United States during its first one hundred and fifty years.

But it was the third carbon pool—coal—that fired the industrial revolution and that remains a critical source of energy today. In 2004 the world used over 6 billion tons of coal. The United States used a billion of those tons in 2004 and is expected to need 1.5 billion tons in 2025, most of it going to the production of electricity. Oil and natural gas are the most recent carbon pools, discovered first in large quantities in Pennsylvania in 1859 and later worldwide, and that together fuel the global economy today. Oil is currently consumed at the rate of 83 million barrels/day around the world, and the demand is expected to grow to 113 million barrels/day by 2020. The world used 100 trillion cubic feet of natural gas in 2004, and is expected to need 150 trillion cubic feet by 2020. And in what seems like an ironic twist of fate, and perhaps a warning, some of the largest known quantities of oil and natural gas are underneath the now mostly exhausted soils and forests of the Middle East's Fertile Crescent.

Soil, forests, oil, natural gas, and coal are the primary feedstocks of our modern civilization just as the ideas forged in the Enlightenment are the primary feedstocks of our modern mind. Each feeds the other. And for those of us who have been alive these last fifty years in industrialized societies, particularly in America, it has been a wonderful ride, an amazing and blazing run on the carbon bank.

But as the data continue to come in it appears that the processes driving our exponential growth may be at their peaks. And as with most exponential growth in biological systems—and it is a very large biological system—the Earth—that we are talking about here—what goes up exponentially usually comes down exponentially too. Your parents' generation rode this exponential wave to the top and it looks like your generation will be the first to be riding down the other side of the peak, the first to usher in what Wes Jackson calls “The Age of Rapid Depletion.”

- One year ago The Bulletin of the Atomic Scientists moved its doomsday clock two minutes closer to midnight, “reflecting global failures to solve the problems posed by nuclear weapons and the climate crisis.”
- Eight nations possess nuclear weapons, and two more are known to be working to acquire them.
- Current data indicate atmospheric Carbon Dioxide, a greenhouse gas, is at a 650,000 year high.
- The latest report of the Nobel Prize winning Intergovernmental Panel on Climate Change states that “there is a 90% chance humans are responsible for climate change," mostly due to the burning of carbon fuels.

- The world’s leading petroleum geologists estimate that in less than a century the modern world has burned its way through half of the global supply of oil, and that the other half may be gone in as few as thirty years. Fifty four percent of the oil ever consumed—a half trillion barrels—was consumed in the last 22 years alone, essentially during your life spans. The numbers and predictions for natural gas are similar.
- The current rate of species extinction is being compared to the five known mass extinction waves. This sixth wave is caused by humans, not asteroids, and according to the Millennium Ecosystem Assessment Report, agriculture is the largest threat to biodiversity.
- Global meat consumption has quadrupled since 1961, from 71 million tons annually to 284 million tons annually. Livestock agriculture requires 30 percent of the planet’s ice-free land. In the US alone, 10 billion animals are “processed” annually.³
- Speaking of agriculture, it’s not just for food anymore. Large numbers of Mexican farmers and workers recently protested the high cost of tortillas, a food staple, due to the increased exports of Mexican corn to America for the production of ethanol, an alternative to gasoline.
- Soil destruction now claims 24 million acres a year world-wide.
- One billion people lack access to fresh water.

³ NY Times, “Rethinking the Meat-Guzzler,” Mark Bittman, January 28, 2008.

- Two of the world's most populous nations—China and India—are on the path to becoming two of the world's largest economies. Their economic good fortune accelerates the rate of depletion worldwide.
- Human population growth continues to follow an exponential curve.
- It is estimated that there are currently 27 million slaves in the world, more than at any other time in human history. In 1850 a slave cost 40,000 of today's dollars. A slave can be purchased today for a mere \$30. (Bales, 1999).⁴

That was a lot of facts and figures to process, and I would apologize for overwhelming you with them were it not my intention to overwhelm you with them. You, we, all of us, need to feel the enormity of these challenges and to see the connections between them. In a world overcrowded with desperate people, the slave market, tragically, grows. Fresh water is scarce because of the demands of industrial agriculture to supply food to a global population that grows by 85 million people a year. The high demand for ethanol as an alternative to fossil fuels reaches further into the well: it takes three gallons of water to produce one gallon of ethanol. And a world made less stable by the high demand for energy becomes even more dangerous with nuclear weaponry. Meanwhile, hurricanes increase in intensity, and summer temperatures soar around the world.

OK, you say, but the Enlightenment mind and a good university education can solve these problems with better, more sustainable technology and the march of progress. I am not so sure. What we commonly call “progress” has produced some of the very problems we expect progress to eradicate. Advances in agriculture and medicine have led to the

⁴ <http://dawn-drupal.science.oregonstate.edu/facts>

exponential growth of the human population, and that has put increased demands on topsoil and fresh water. Technology has made more of the world's fossil fuels accessible, leading to increased consumption and an increase in atmospheric carbon.

Optimists, especially those in the sustainability movement, talk about efficiency, but paradoxically efficiency leads to higher consumption. It's called Jevons Paradox, named after the man who demonstrated that as 19th century Great Britain became more efficient in its use of coal, it actually consumed more of it. Even if every car in the world was a hybrid, and every light bulb a compact fluorescent or LED, the continuing growth demands for cars and light bulbs worldwide would easily dwarf the savings. New technologies will help replace old technologies, but they will create unforeseen problems of their own. And they will take time to develop. The late Cornell physicist and Nobel Laureate Hans Bethe used to point out that no form of energy – from the draft horse to coal to petroleum to nuclear power – ever became a fuel for commonplace technology in fewer than fifty years. Sorry, there are no quick fixes on the energy front.

If we are to successfully transition from the Age of the Rapid Depletion to the Age of Sustainability you will have to change your minds because nearly everything you believe about yourselves and the Earth is likely to increase human population and consumption, to make life worse for millions—perhaps billions—of people worldwide, to increase species extinction, to extract from the earth more energy rich carbon than the earth can ever replace in a human timeframe, and to release more carbon into an atmosphere already too full of it. Your Enlightenment mind and its technological fundamentalism have become dangerous disabilities in the 21st Century. You need to become the leaders of a new Enlightenment that values and protects human freedom and dignity while

rejecting the beliefs that we can master the earth and treat it merely as our personal supermarket, playground, laboratory and dumpster.

Hard truths, once confronted, can change our lives for the better, especially when ignorance is no longer capable of providing bliss. Overwhelming challenges, when faced with strength, creativity, and leadership can be overcome. Here are some examples of the types of challenges I believe you will face in the Age of Sustainability. You must:

- Reduce the industrialized world's carbon footprint eighty percent by 2050.
- Reduce human population seventy percent from its current level without famine, war, viruses or the loss of human dignity by 2110.
- Eliminate the automobile as a form of personal transportation.
- Create political and social systems that run on a solar economy.
- Revise the scientific method so that it more accurately balances the discovery of new knowledge with moral considerations and precaution.
- Devise viable models of happiness and success that do not require economic growth and increased consumption.
- Make the virtues of humility, cooperation, generosity, gratitude, kindness and thrift cool again, or hip, or bad, or the bomb, or whatever word or phrase you use to describe something really good and worth having.

When you change your mind powerful things begin to happen. The inconceivable becomes possible, and the possible becomes commonplace. This, in a word, is the essence of leadership in any age.

Wes Jackson changed his mind about how we grow food. For the last thirty-five years he and his colleagues at the Land Institute have been working to transform the major food crops from annual monocultures into perennial polycultures; in other words, to turn the average corn field into an abundant, complex and resilient prairie of food. Their efforts are featured in a recent issue of *Scientific American* and are described in this way: “The challenge is monumental, but if these plant scientists succeed, their achievement would rival humanity’s original domestication of food crops over the past 10 millennia, and be just as revolutionary.” Jackson was on my campus last fall to announce that he and his staff have produced a small perennial wheat crop and that the flour produced from this crop has been used by a well-known restaurant chain.

Vandana Shiva changed her mind. Trained as a physicist, Shiva is described as “one of the world's most prominent radical scientists.” She is the founder of a movement for biodiversity conservation and farmers' rights in India, and her studies have validated the ecological value of traditional farming and have been instrumental in fighting destructive development projects in India.

David Orr changed his mind. Not content to simply teach environmental studies, Orr single handedly raised \$13 million dollars and brought together some of the world’s most creative architects. Together they built the Adam Joseph Lewis Center for Environmental Studies at Oberlin College, one of the most sustainable educational buildings in the world. On most days it generates as much or more energy than it consumes.

Engineer and businessman Ray Anderson changed his mind about how to manufacture carpet. As founder and CEO of Interface Carpet, a billion dollar company, Anderson

decided fifteen years ago to change radically how his company would do business and to make it “the first company that, by its deeds, shows the entire industrial world what sustainability is in all its dimensions: people, process, product, place and profits.”⁵

There are countless more examples—thousands actually—of individuals and organizations that have decided to change their minds and directions. And now it’s your chance to join them. I hope each of you will commit to a serious change of mind, to one major, deep change of mind that you will work on in the coming year, a change of thinking about the world and your place in it; a change of attitude; a commitment to action.

Thank you for giving up a Monday evening. There is a positive energy in this room and I can feel confident that among us tonight are some members of Carroll University’s, America’s and the world’s next generation of leaders. With them at the forefront of the conceptual revolution, we just might be able to pull this off. This is your century and, ready or not, you will be going through the greatest and most important transition in human history, or at least since the invention of agriculture. I hope you consider it an exciting time, filled with opportunities to think big thoughts and to imagine wonderful alternatives. Imagine feeling at home on an earth that is very much alive, interconnected, filled with morally valuable species, and limited in terms of how much it can provide; where our own ignorance about this living earth will always exceed our knowledge; and where our curiosity promotes understanding—not subjugation—of the earth’s complexity, beauty and resiliency.

⁵ <http://www.interfaceinc.com/who/founder.html>

In these revolutionary times consider yourselves revolutionaries and imagine your names in future history books. Be part of the most important modern leadership revolution since the Age of Enlightenment, nearly 400 years ago. Like many of America's revolutionary founders who were wealthy and well educated, you have a unique opportunity to utilize your privileged place in the world to promote social justice and ecological resilience.

Sustainability is a first step in this journey, one that will soon seem too obvious to mention. Historians in the next century will wonder what took us so long. But it's an important first step in the process of thinking anew about the Earth and our place in it.

In Mark Haddon's recent novel *The Curious Incident of the Dog in the Night-Time*, the central character, Christopher, a teenager, has Asperger's Syndrome, a form of autism. He has many talents, but none of them are particularly useful to him as he confronts a series of events for which he is very much unprepared. The book describes Christopher's discovery of Wellington, his neighbor's dog, dead with a pitch fork sticking out of him. Christopher is launched on a path of discovery that goes way beyond his social skills and his predictable and well protected life. He discovers many harrowing and terrible truths. He must talk with strangers, leave his home, and ride the London subway. But he triumphs because his curiosity, courage and perseverance in light of his discoveries force him out of his comfort zone, out of his habits, out of his ignorance, and, amazingly, out of his disability. Christopher triumphs in spite of his autistic mind, not because of it. At the conclusion of his harrowing journey of discovery, Christopher says "I know I will get a First Class Honors degree in mathematics because I went to London

on my own, and because I solved the mystery of who killed Wellington, and I found my mother, and I was brave and I wrote a book and that means I can do anything.”

With a good amount of curiosity, diligence, creativity and fearlessness—and by changing your own minds—so can each of you.

Resources and Sources for Bill Vitek’s “These Revolutionary Times Finding Our Way in a Post-Carbon World,” Carroll University, April 6, 2009.

Energy Consumption

<http://www.eia.doe.gov/oiaf/ieo/oil.html>

http://www.eia.doe.gov/oiaf/ieo/nat_gas.html

<http://www.eia.doe.gov/oiaf/ieo/coal.html>

Exponential Growth

<http://www.otherwise.com/population/exponent.html>

<http://raju.varghese.org/articles/powers2.html>

<http://www.youtube.com/watch?v=F-QA2rkpBSY> (Physicist Al Bartlett’s well known lecture on the exponential function)

Nuclear Weapons

<http://www.nrdc.org/nuclear/nudb/datainx.asp?gclid=CNzNxb2Wlo4CFQ2aOAodln6RDg>

<http://www.isis-online.org/mapproject/introduction.html>

Atmospheric Carbon Dioxide

http://www.gfdl.noaa.gov/~tk/climate_dynamics/climate_impact_webpage.html

<http://www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html>

Intergovernmental Report on Climate Change

<http://www.ipcc.ch/>

<http://www.sciencemag.org/cgi/content/full/306/5702/1686>

Peak Oil, Natural Gas and Coal

<http://www.lifeaftertheoilcrash.net/>

<http://www.energybulletin.net/primer.php>

<http://www.hubbertpeak.com/>

<http://www.richardheinberg.com>

http://www.fromthewilderness.com/free/ww3/102302_campbell.html

<http://www.energybulletin.net/29919.html>

<http://www.grist.org/news/maindish/2005/11/03/simmons/>

The Bulletin of the Atomic Scientists

<http://www.thebulletin.org/minutes-to-midnight/>

Natural Systems Agriculture

<http://www.landinstitute.org>

<http://64.233.169.104/search?q=cache:toNYQmI3HqwJ:www.rirdc.gov.au/reports/AFT/UWA-38A.doc+natural+systems+agriculture&hl=en&ct=clnk&cd=5&gl=us&client=firefox-a>

<http://www.context.org/ICLIB/IC42/Jackson.htm>

<http://www.umanitoba.ca/outreach/naturalagriculture/>

Modern Slavery

<http://www.well.com/~sisu/slavery.html>

http://www.natcath.com/NCR_Online/archives/052501/052501a.htm

<http://dawn-drupal.science.oregonstate.edu/facts>

The Adam Joseph Lewis Center for Environmental Studies

<http://www.oberlin.edu/ajlc/ajlcHome.html>

<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>

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Species Extinction

<http://www.well.com/~davidu/extinction.html>

http://www.iucn.org/themes/ssc/red_list_2004/main_EN.htm

Millennium Ecosystem Assessment Report

<http://matagalatlante.org/nobre/down/MAGeneralSynthesisFinalDraft.pdf>

<http://www.millenniumassessment.org/en/index.aspx>

Ethanol Production

<http://www.grist.org/news/maindish/2006/12/05/olmstead/>

<http://www.wilsoncenter.org/news/docs/ethanol%20as%20a%20fuel.pdf>

Soil Erosion

<http://www.pnas.org/cgi/reprint/0611508104v1.pdf>

<http://www.rferl.org/featuresarticle/2004/06/26afdd97-b56a-4a86-8298-1b7f0db95e97.html>

World Fresh Water Crisis

http://www.globalchange.umich.edu/globalchange2/current/lectures/freshwater_supply/freshwater.html

[http://www.webofcreation.org/Earth % 20Problems/water.htm](http://www.webofcreation.org/Earth%20Problems/water.htm)

Human Population Growth

http://www.globalchange.umich.edu/globalchange2/current/lectures/human_pop/human_pop.html

<http://www.census.gov/ipc/prod/wp02/wp-02003.pdf>

Jevons Paradox

<http://www.humanecologyreview.org/pastissues/her132/york.pdf>

<http://oae.sagepub.com/cgi/reprint/14/1/93.pdf>

Ecological Footprint

http://www.footprintnetwork.org/gfn_sub.php?content=footprint_overview

<http://www.ecologicalfootprint.org/>

Industrial Ecology

<http://www.umich.edu/~nppcpub/resources/compendia/ind.ecol.html>

<http://www.indigodev.com/IE.html>

Embodied Energy

<http://www.greenhouse.gov.au/yourhome/technical/fs31.htm>

<http://www.sustainableabc.com/lca.html>

Biodiversity

<http://www.globalissues.org/EnvIssues/Biodiversity.asp>

<http://investigate.conservation.org/xp/IB/>

Precautionary Principle

<http://www.sehn.org/precaution.html>

<http://www.biotech-info.net/precautionary.html>

Life Cycle Analysis

<http://www.life-cycle.org/>

<http://www.enviroliteracy.org/article.php/322.html>

Biomimicry

<http://www.biomimicry.net/>

<http://www.biomimicryinstitute.org/>

Janet Benyus:

http://www.ted.com/index.php/talks/janine_benyus_shares_nature_s_designs.html

Carbon Neutrality

<http://www.cleanair-coolplanet.org/>

http://www.davidsuzuki.org/Climate_Change/What_You_Can_Do/carbon_neutral.asp

Microlending

<http://www.accion.org/>

<http://kiva.org/app.php?gclid=CKyUqsXImI4CFRqWGgod0A32Zg>

http://www.gsb.stanford.edu/news/headlines/2004globalconf_khosla.shtml

The Genuine Progress Indicator

http://www.rprogress.org/sustainability_indicators/genuine_progress_indicator.htm

<http://www.emagazine.com/view/?655>

Wes Jackson

<http://www.counterpunch.org/jensen07102003.html>

http://www.schumachersociety.org/publications/toc_jackson.html

Vandana Shiva

<http://www.zmag.org/bios/homepage.cfm?authorID=90>

<http://www.inmotionmagazine.com/shiva.html>

David Orr

http://www.oberlin.edu/news-info/98sep/orr_profile.html

<http://www.context.org/ICLIB/IC27/Orr.htm>

Ray Anderson

<http://www.interfaceinc.com/who/founder.html>

<http://www.grist.org/comments/interactivist/2004/11/08/anderson/>

College Connections

<http://www.nwf.org/campusecology/>

<http://www.nytimes.com/2007/06/13/education/13green.html?ex=1339473600&en=fc089870bbaacf6e&ei=5124&partner=digg&exprod=digg>

<http://www.presidentsclimatecommitment.org/html/commitment.php>

Other Initiatives:

2000-Watt Society: <http://www.novatlantis.ch/index.php?id=5&L=1>
<http://www.worldchanging.com/archives/002829.html>

Transition Towns: <http://www.transitiontowns.org/>

350: <http://www.350.org/>

Some Terrific Books

Vaclav Smil, *Energy in Nature and Society*

See also his “Energy at the Crossroads:”

http://home.cc.umanitoba.ca/~vsmil/pdf_pubs/oecd.pdf

John Ehrenfeld, *Sustainability by Design*

William Ruddiman. *Plows, Plagues, and Petroleum: How Humans Took Control of Climate.*

Brian Walker and David Salt. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World.*

Janine Benyus. *Biomimicry: Innovation Inspired by Nature*

Arthur Koestler. *The Sleepwalkers: A History of Man’s Changing Vision of the Universe*

Thomas Homer-Dixon: *The Upside of Down: Catastrophe, Creativity, and the Renewal of Civilization.*

Daniel Quinn: *Ishmael: An Adventure in Mind and Spirit.*

Joseph Tainter: *The Collapse of Complex Societies*

Walter Youngquist: *GeoDestinies: The Inevitable Control of Earth Resources Over Nations and Individuals.*

Paul Hawken: *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming*

(You can watch Hawken speak about his book at:

<http://www.blessedunrest.com/video.html>)

Donella Meadows: “Places to Intervene in the System:”

http://www.sustainer.org/pubs/Leverage_Points.pdf

www.TED.org is a wonderful source of inspirational talks. Here are a few examples:

Janet Benyus:

http://www.ted.com/index.php/talks/janine_benyus_shares_nature_s_designs.html

Alex Steffan:

http://www.ted.com/index.php/talks/alex_steffen_sees_a_sustainable_future.html

Paul McCready:

http://www.ted.com/index.php/talks/paul_maccready_on_nature_vs_humans.html