Introduction: Peak Everything

DURING THE PAST few years the phrase *Peak Oil* has entered the global lexicon. It refers to that moment in time when the world will achieve its maximum possible rate of oil extraction; from then on, for reasons having mostly to do with geology, the amount of petroleum available to society on a daily or yearly basis will begin to dwindle. Most informed analysts agree that this will happen during the next two or three decades; an increasing number believe that it is happening now — that conventional oil production peaked in 2005–2006 and that the flow to market of all hydrocarbon liquids taken together will start to diminish around 2010.[1] The consequences, as they begin to accumulate, are likely to be severe: the world is overwhelmingly dependent on oil for transportation, agriculture, plastics, and chemicals; thus a lengthy process of adjustment will be required. According to one recent US government-sponsored study, if the peak does occur soon replacements are unlikely to appear quickly enough and in sufficient quantity to avert what it calls "unprecedented" social, political, and economic impacts.[2]

This book is not an introduction to the subject of Peak Oil; several existing volumes serve that function (including my own *The Party's Over: Oil, War and the Fate of Industrial Societies*).[3] Instead

it addresses the social and historical context in which Peak Oil is occurring, and explores how we can reorganize our thinking and action in several critical areas to better navigate this perilous time.

Our socio-historical context takes some time and perspective to appreciate. Upon first encountering Peak Oil, most people tend to assume it is merely a single isolated problem to which there is a simple solution — whether of an eco-friendly nature (more renewable energy) or otherwise (more coal). But prolonged reflection and study tend to eat away at the viability of such "solutions." Meanwhile, as one contemplates how we humans have so quickly become so deeply dependent on the cheap, concentrated energy of oil and other fossil fuels, it is difficult to avoid the conclusion that we have caught ourselves on the horns of the Universal Ecological Dilemma, consisting of the interlinked elements of population pressure, resource depletion, and habitat destruction — on a scale unprecedented in history.

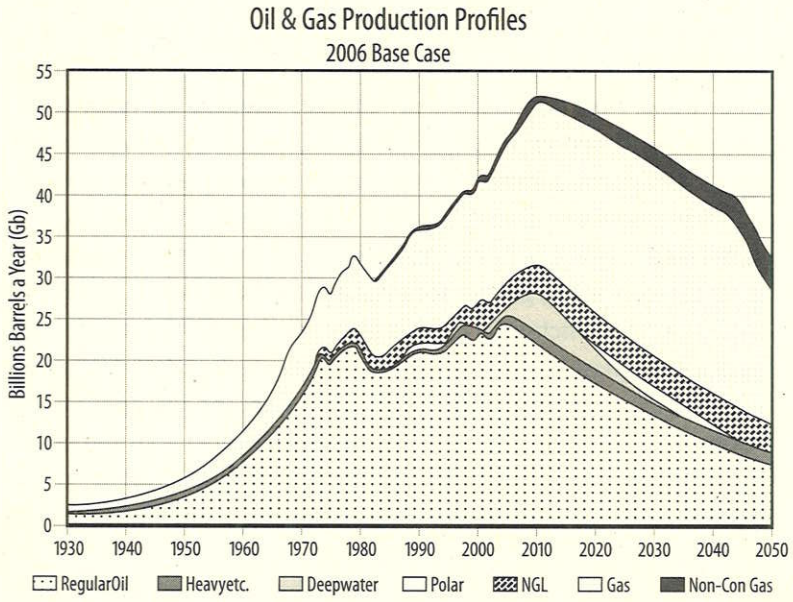


Figure 1. Production profiles for world oil and natural gas, history and forecast. Credit: Association for the Study of Peak Oil and Gas (ASPO)

Petroleum is not the only important resource quickly depleting. Readers already acquainted with the Peak Oil literature know that regional production peaks for natural gas have already occurred, and that over the short term the economic consequences of gas shortages are likely to be even worse for Europeans and North Americans than those for oil. And while coal is often referred to as being an abundant fossil fuel, with reserves capable of supplying the world at current rates of usage for two hundred years into the future, recent studies updating global reserves and production forecasts conclude that global coal production will peak and begin to decline in ten to twenty years.[4] Because fossil fuels supply about 85 percent of the world's total energy, peaks in these fuels virtually ensure that the world's energy supply will begin to shrink within a few

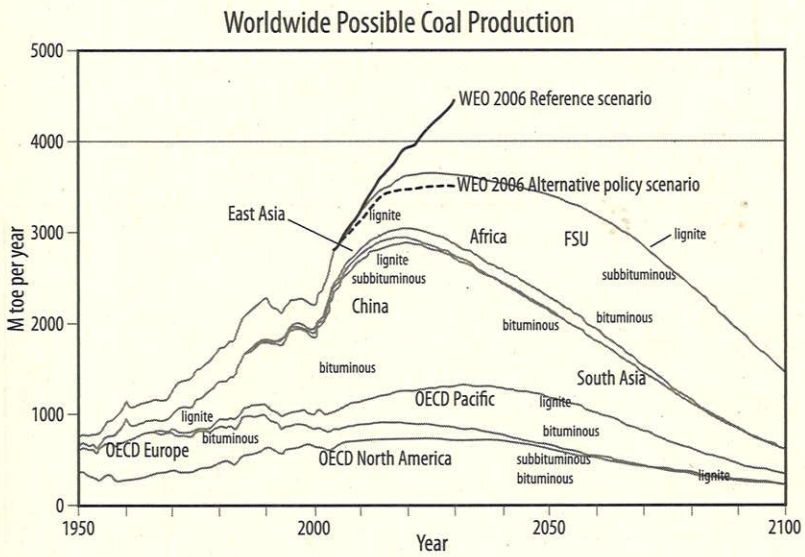


Figure 2. Global coal production, history and forecast. The International Energy Agency's "World Energy Outlook 2006" (WEO 2006) discusses two future scenarios for global coal production: a "reference scenario" that assumes unconstrained coal consumption, and an "alternative policy scenario" in which consumption is capped through government efforts to reduce climate impacts. Both scenarios are compatible with the supply forecast here (EWG report, 2007) until about 2020. Thereafter, only a rate of demand corresponding with the "alternative policy scenario" can be met. Credit: Energy Watch Group (EWG)

years regardless of any efforts that are made to develop other energy sources.

Nor does the matter end with natural gas and coal. Once one lifts one's eyes from the narrow path of daily survival activities and starts scanning the horizon, a frightening array of peaks comes into view. In the course of the present century we will see an end to growth and a commencement of decline in all of these parameters:

- Population
- Grain production (total and per capita)
- Uranium production
- Climate stability
- Fresh water availability per capita
- Arable land in agricultural production
- Wild fish harvests
- Yearly extraction of some metals and minerals (including copper, platinum, silver, gold, and zinc)

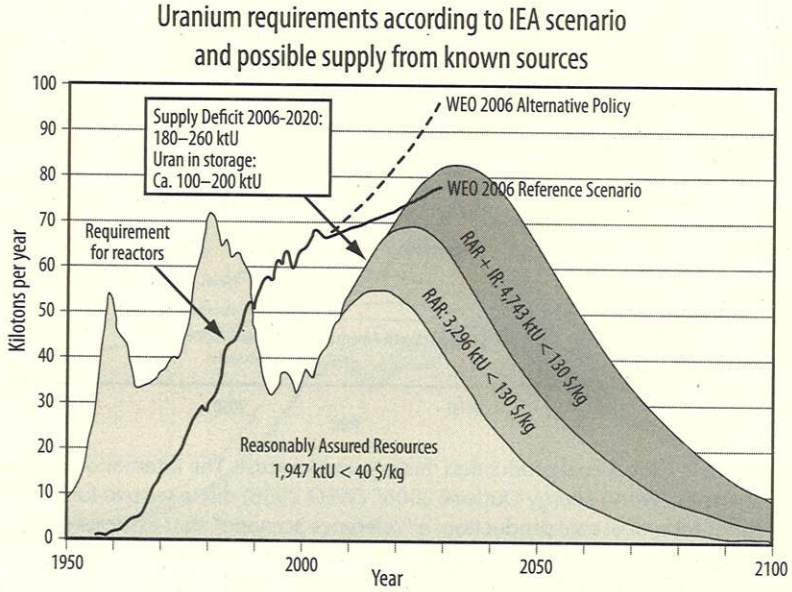


Figure 3. Global uranium supply from known resources, history and forecast, compared with supply requirements. Credit: EWG 2006, data from International Energy Agency (IEA) 2006

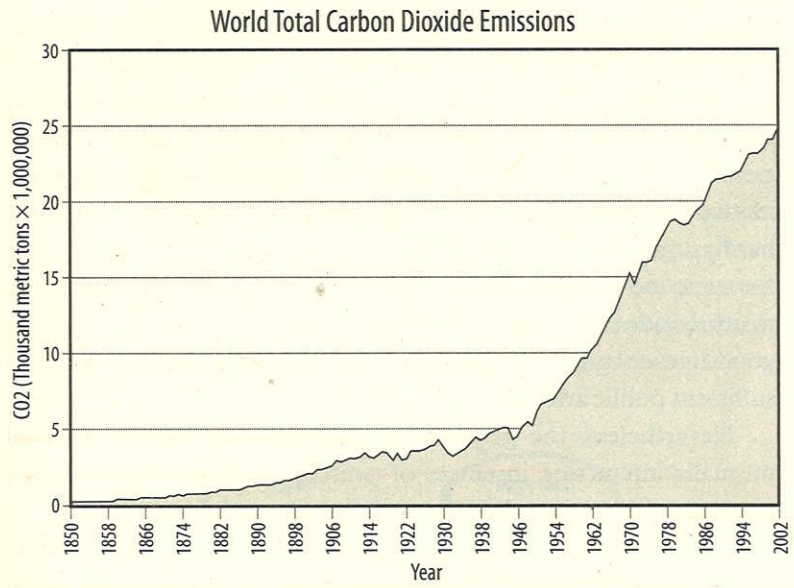


Figure 4. World total annual emissions. Credit: World Resources Institute 2005

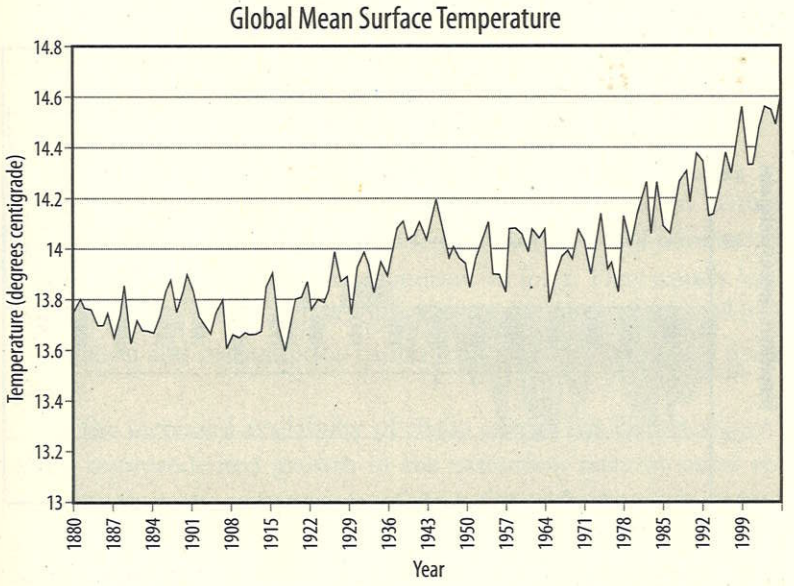


Figure 5. Global mean surface temperature. Credit: World Resources Institute 2005

The point of this book is not to go systematically through these peak-and-decline scenarios one by one, offering evidence and pointing out the consequences — though that is a worthwhile exercise, and it is instructive to contemplate a few graphs showing the general trends (see figures 1 through 5). Some of these peaks are more speculative than others. Fish harvests are already in decline, so this one is hardly arguable; however, projecting extraction peaks and declines for some metals requires extrapolating current rising rates of usage many decades into the future.[5] The problem of uranium supply beyond mid-century is well attested by studies, but has not received sufficient public attention.[6]

Nevertheless, the general picture is inescapable: it is one of mutually interacting instances of overconsumption and emerging scarcity.

Our starting point, then, is the realization that we are today living at the end of the period of greatest material abundance in human history — an abundance based on temporary sources of

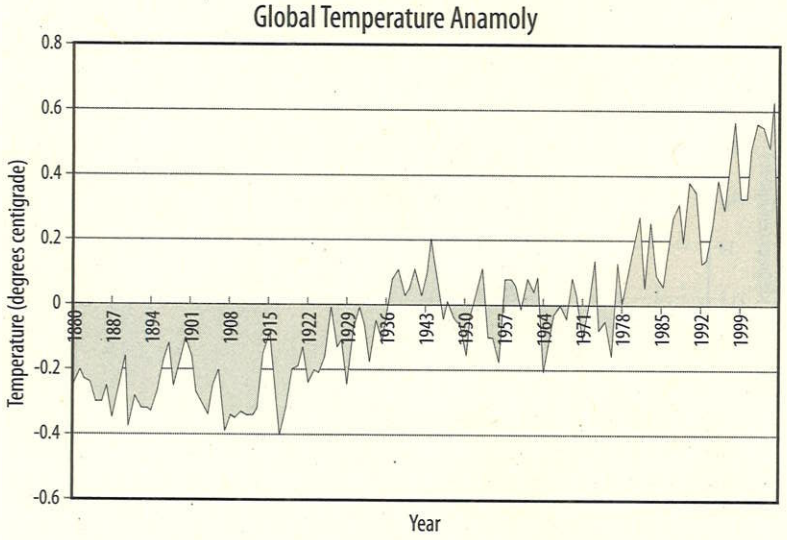
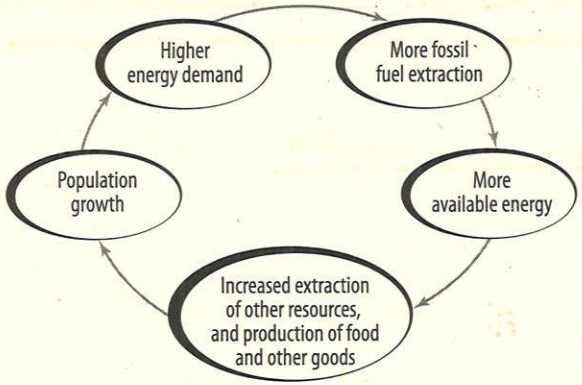


Figure 6. The global temperature anomaly is a measure of the difference between the mean global temperature at a given point in time and the average global temperature during the 20th century. Credit: Goddard Institute for Space Studies

cheap energy that made all else possible. Now that the most important of those sources are entering their inevitable sunset phase, we are at the beginning of a period of overall societal contraction.

This realization is strengthened as we come to understand that it is no happenstance that so many peaks are occurring together. They are all causally related by the historic reality that, for the past 200 years, cheap, abundant energy from fossil fuels has driven technological invention, increases in total and per-capita resource extraction and consumption (including food production), and population growth. We are enmeshed in a classic self-reinforcing feedback loop:



Self-reinforcing feedback loops sometimes occur in nature (population blooms are always evidence of some sort of reinforcing feedback loop), but they rarely continue for long. They usually lead to population crashes and die-offs. The simple fact is that growth in population and consumption cannot continue unabated on a finite planet.

If the increased availability of cheap energy has historically enabled unprecedented growth in the extraction rates of other resources, then the coincidence of Peak Oil with the peaking and decline of many other resources is entirely predictable.

Moreover, as the availability of energy resources peaks, this will also affect various parameters of social welfare:

- Per-capita consumption levels

- Economic growth
- Easy, cheap, quick mobility
- Technological change and invention
- Political stability

All of these are clearly related to the availability of energy and other critical resources. Once we accept that energy, fresh water, and food will become less freely available over the next few decades, it is hard to escape the conclusion that while the 20th century saw the greatest and most rapid expansion of the scale, scope, and complexity of human societies in history, the 21st will see contraction and simplification. The only real question is whether societies will contract and simplify intelligently or in an uncontrolled, chaotic fashion.

Good News? Bad News?

None of this is easy to contemplate. Nor can this information easily be discussed in polite company: the suggestion that we are at or near the peak of population and consumption levels for the entirety of human history, and that it's all downhill from here, is not likely to win votes, lead to a better job, or even make for pleasant dinner banter. Most people turn off and tune out when the conversation moves in this direction; advertisers and news organizations take note and act accordingly. The result: a general, societal pattern of denial.

Where might we find solace in all this gloom? Well, it could be argued that some not-so-good things will also peak this century:

- Economic inequality
- Environmental destruction
- Greenhouse gas emissions

Why economic inequality? The late, great social philosopher Ivan Illich argued in his 1974 book *Energy and Equity* that inequality increases along with the flow of energy through a society. "[O]nly a ceiling on energy use," he wrote, "can lead to social relations that are characterized by high levels of equity."[7] Hunters and gatherers, who survived on minimal energy flows, also lived in societies nearly free from economic inequality. While some forager societies were

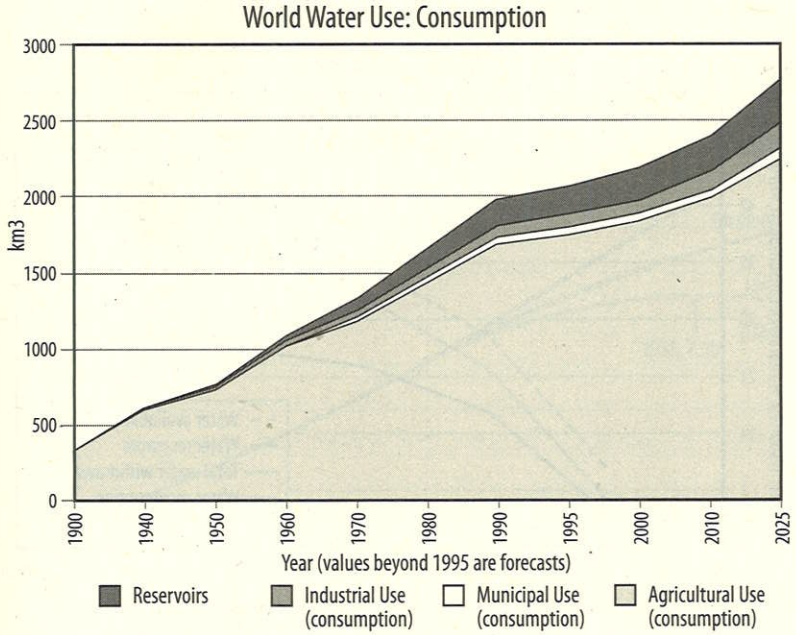


Figure 7. World water use, consumption. Credit: UNESCO

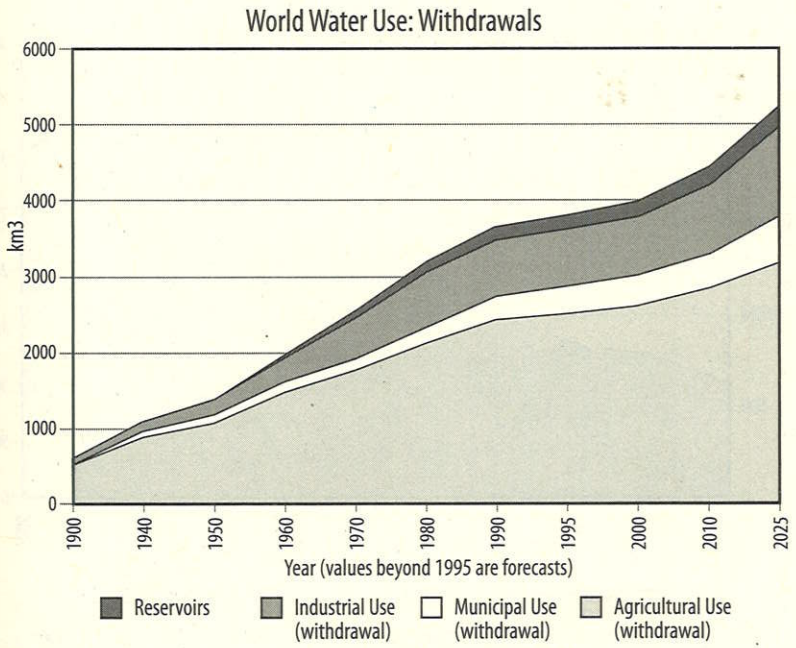


Figure 8. World water use, withdrawals. Credit: UNESCO

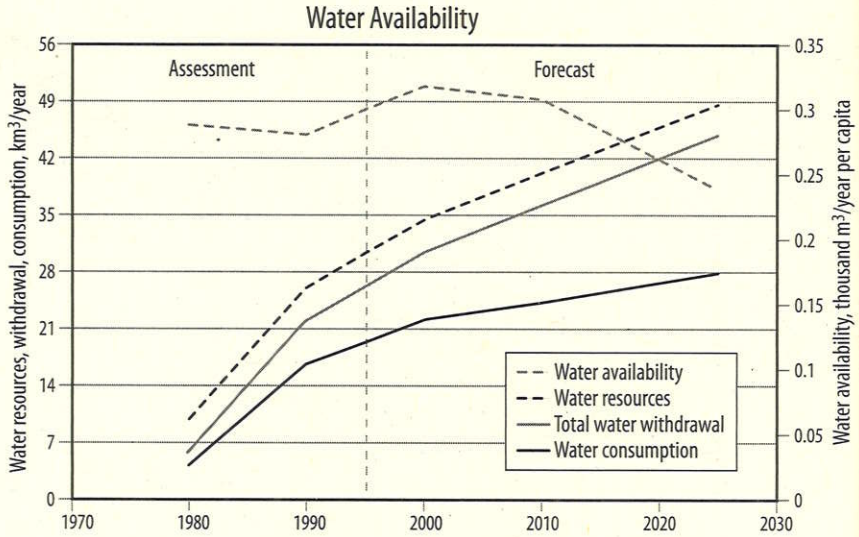


Figure 9. Water availability, history, and forecast. Credit: UNESCO

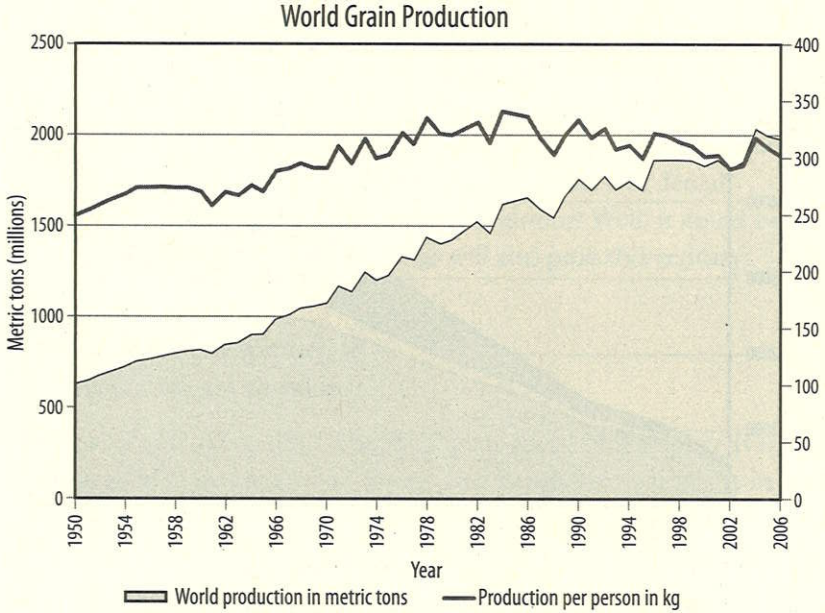


Figure 10. Annual world grain production, total amounts and amounts per capita. Credit: Earth Policy Institute

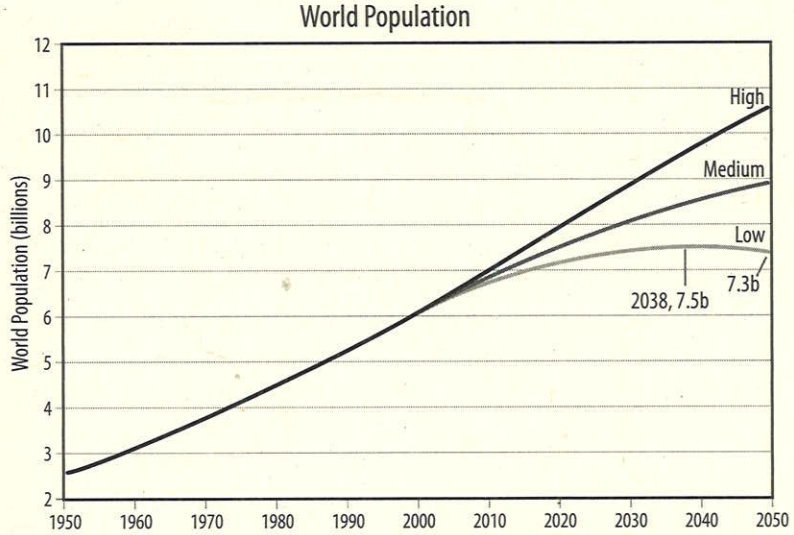


Figure 11. World population, history and forecast. Credit: United Nations Population Division, World Population Prospects

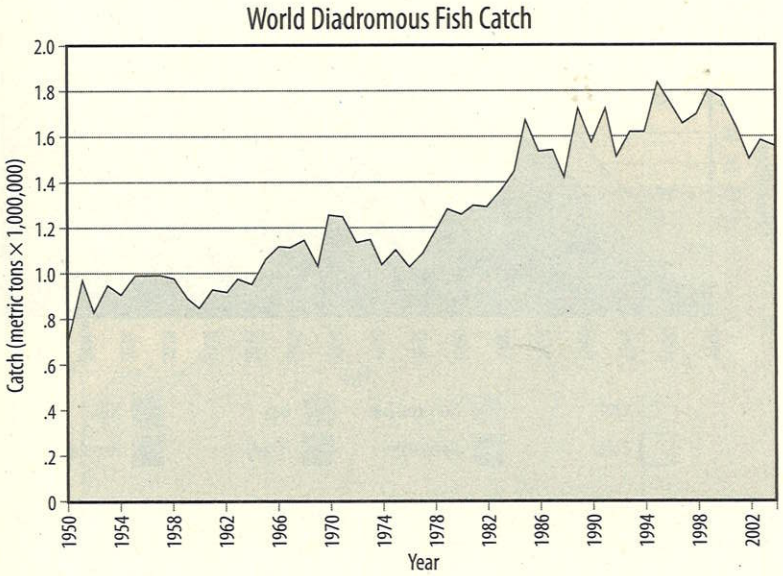


Figure 12. Annual marine (saltwater) fish catch. Credit: Food and Agriculture Organization © Luca Garibaldi

better off than others because they lived in more abundant ecosystems, the members of any given group tended to share equally whatever was available. Theirs was a gift economy — as opposed to the barter, market, and money economies that we are more familiar with. With agriculture and full-time division of labor came higher energy flow rates as well as widening economic disparity between kings, their retainers, and the peasant class. In the 20th century, with per capita energy flow rates soaring far above any in history, some humans enjoyed unprecedented material abundance, such that they expected that poverty could be eliminated once and for all if only the political will could be summoned. Indeed, during the

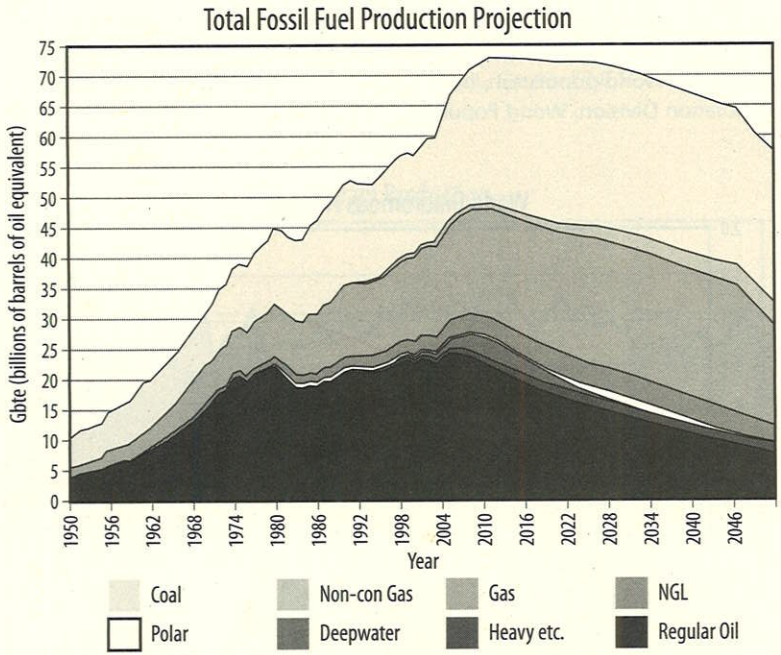


Figure 13. Combined oil, gas, and coal production projections, in billions of barrels of oil equivalent per year. This graph shows the probable future for fossils fuels, the source of roughly 85 percent of the world's current energy budget. Credit: Joe Atkinson, Powerswitch UK; data for oil and gas from the Association for the Study of Peak Oil and Gas (ASPO); data for coal from Energy Watch Group (EWG).

middle years of the century progress was seemingly being made along those lines. However, for the century in total, inequality actually increased. The Gini index, invented in 1912 as a measure of economic inequality within societies, has risen substantially within many nations (including the US, Britain, India, and China) in the past three decades, and economic disparity between rich and poor nations has also grown.[8] In the decades just prior to the 20th century, the average income in the world's wealthiest country was about ten times more than that in the poorest; now it is over forty-five times more. According to one study released in December, 2006 ("The World Distribution of Household Wealth,") the richest one percent of people now controls 40 percent of the world's wealth, while the richest two percent control fully half.[9] If this correlation between energy flow rates and inequality holds, it seems likely that, as available energy decreases during the 21st century, we are likely to see a reversion to lower levels of inequality. This is not to say that by century's end we will all be living in an egalitarian

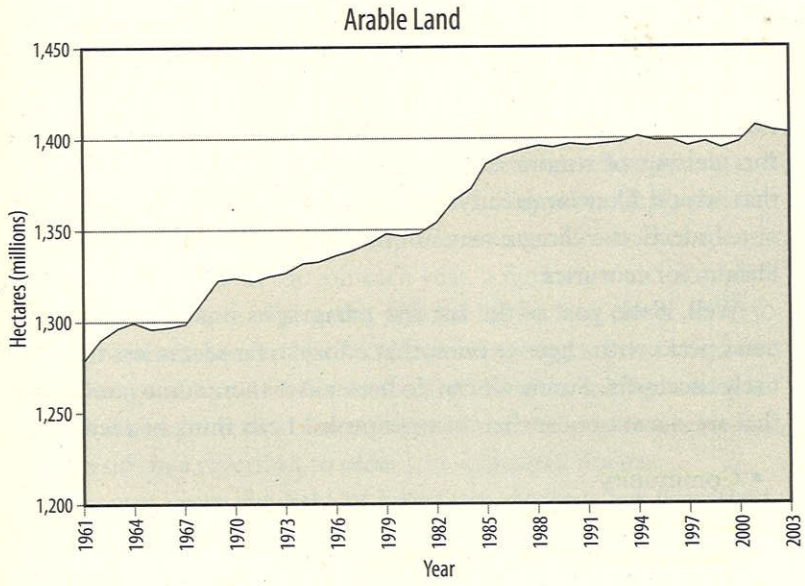


Figure 14. Global arable land. Credit: FAO 2006

socialist paradise, merely that the levels of inequality we see today will have become unsupportable.

Similarly, it seems likely that levels of humanly generated environmental destruction will peak and begin to recede in decades to come. As available energy declines, our ability to alter the environment will do so as well. However, if we make no deliberate attempt to control our impact on the biosphere, the peak will be a very high one and we will do an immense amount of damage along the way. On the other hand, we could expend deliberate and intelligent effort to reduce environmental impacts, in which case the peak will be at a lower level. Especially in the former case, this peak is likely to lag behind the others discussed, because many environmental harms involve reinforcing feedback loops as well as delayed and cumulative impacts that will continue to reverberate for decades after human population and consumption levels start to diminish. As the primary example of this, annual greenhouse gas emissions will undoubtedly peak in this century — whether as a result of voluntary reductions in fossil fuel consumption, or depletion of the resource base, or societal collapse. However, the global climate may not stabilize until many decades thereafter, until various reinforcing feedback loops that have been set in motion (such as the melting of the north polar icecap, which would expose dark water that would in turn absorb more heat, thus exacerbating the warming effect; and the melting of tundra and permafrost, releasing stored methane that would likewise greatly exacerbate warming) play themselves out. Indeed, the climate may not return to a phase of relative equilibrium for centuries.

Well, if the goal of the last few paragraphs was to balance bad-news peaks with cheerier ones, that effort so far seems less than entirely successful. Surely we can do better. Are there some *good* things that are *not* at or near their historic peaks? I can think of a few:

- Community
- Personal autonomy
- Satisfaction from honest work well done
- Intergenerational solidarity

- Cooperation
- Leisure time
- Happiness
- Ingenuity
- Artistry
- Beauty of the built environment

Of course, some of these items are hard to quantify. But a few can indeed be measured, and efforts to do so often yield surprising results. Let's consider two that have been subjects of quantitative study.

Leisure time is perhaps the element on this list that lends itself most readily to measurement. The most leisurely societies were without doubt those of hunter-gatherers, who worked about 1,000 hours per year, though these societies seldom if ever thought of dividing "work time" from "leisure time," since all activities were considered pleasurable in their way.[10] For US employees, hours worked peaked in the early industrial period, around 1850, at about 3,500 hours per year.[11] This was up from 1,620 hours worked annually by the typical medieval peasant. However, the two situations are not directly comparable: a typical medieval workday stretched from dawn to dusk (16 hours in summer, 8 in winter), but work was intermittent, with breaks for breakfast, midmorning refreshment, lunch, a customary afternoon nap, mid-afternoon refreshment, and dinner; moreover, there were dozens of holidays and festivals scattered throughout the year. Today the average US worker spends about 2,000 hours on the job each year, a figure somewhat higher than it was a couple of decades ago (in 1985 it was closer to 1,850 hours). Nevertheless, an historical overview suggests that the time-intensiveness of human labor seems to peak in the early phase of industrialization, and that a simplification of the modern economy could result in a reversion to older, pre-industrial norms.

In recent years the field of happiness research has flourished, with the publication of scores of studies and several books devoted to statistical analysis of what gives people a sense of overall satisfaction with their lives. International studies of self-reported levels of

happiness show that once basic survival needs are met, there is little correlation between happiness and per capita consumption of fossil fuels. According to surveys, people in Mexico, who use fossil fuels at one-fifth the rate of US citizens, are just as happy. (See Figure 15.)

The opportunities to continue to enjoy current (or even higher) levels of happiness and to reduce work hours may seem pale comforts in light of all the enormous social and economic challenges implicit in the peaks discussed earlier. However, it is worth remembering that the list above details things that matter very much to most people in terms of their real, lived experience. The sense of community and the experience of intergenerational solidarity are literally priceless, in that no amount of money can buy them; moreover, life without them is bleak indeed — especially during times of social stress. And there are many reasons to think that these two factors have declined significantly during the past few decades of rapid urbanization and economic growth.

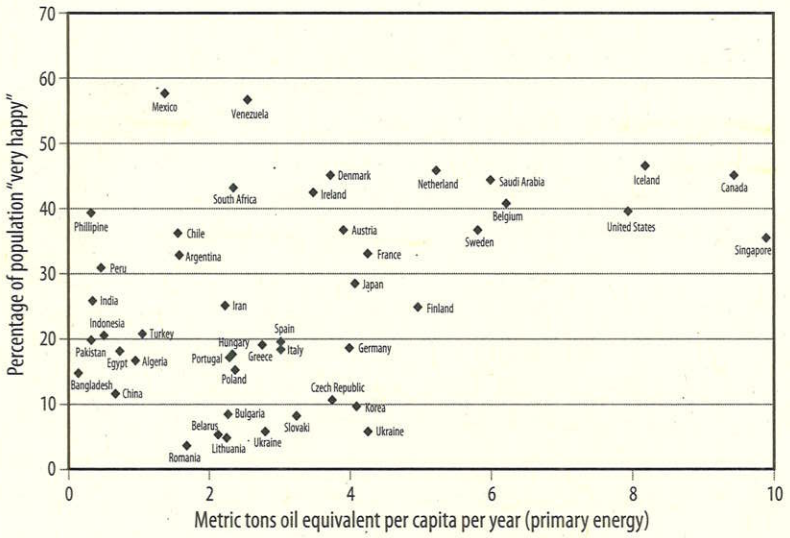


Figure 15. How self-reported levels of happiness vary according to per-capita annual energy consumption in various nations. Credit: Data from BP, World Values Survey, and the UN, put in graphic form by Nathan John Hagens.

In contrast with these indices of personal and social well-being, Gross Domestic Product (GDP) per capita is easily measured and shows a mostly upward trend for the world as a whole over the past two centuries. But it takes into account only a narrow set of data — the market value of all final goods and services produced within a country in a given period of time. Growth in GDP is used to tell us that we should be feeling better about ourselves and our world — but it leaves out a wide range of other factors, including damage to the environment, wars, crime and imprisonment rates, and trends in education (like whether more or fewer people graduate from high school or college, and the quality of the education received.) Many economists and non-governmental organizations have criticized governmental reliance on GDP for this reason, and have instead promoted the use of a Genuine Progress Indicator (GPI), which does take account of such factors. While a historical GDP chart for the US shows general ongoing growth up to the present (GDP correlates closely with energy consumption), GPI calculations show a peak around 1980 followed by a slow decline.[12] If we as a society are

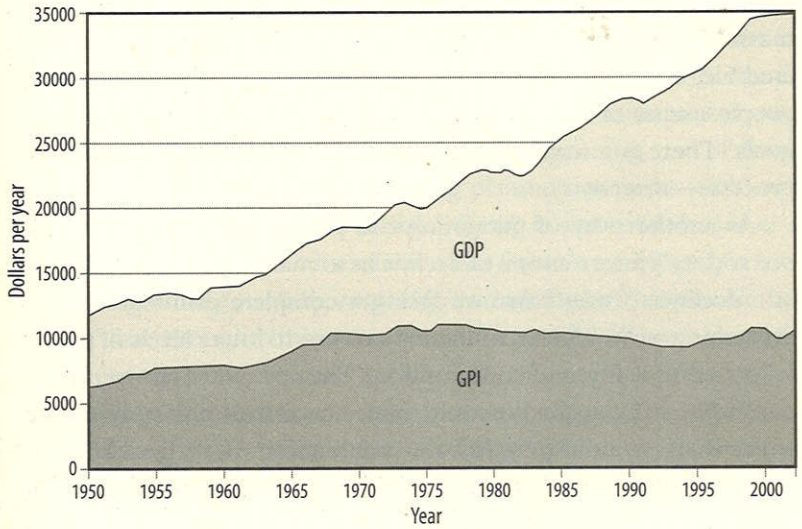


Figure 16. US Gross Domestic Product and Genuine Progress Indicators compared, 1950 to 2002. Credit: Redefining Progress

going to adjust agreeably to lower rates of energy flow — and less travel and transport — with minimal social disruption, we must begin paying more attention to the seeming intangibles of life and less to GDP and the apparent benefits of profligate energy use.

Addressing the economic, social, and political problems ensuing from the various looming peaks is no mere palliative and will require enormous collective effort. If it is to be successful, that effort must be coordinated, presumably by government, and enlist people by educating and motivating them in numbers and at a speed that has not been seen since World War II. Part of that motivation must come from a positive vision of a future worth striving toward. People will need to believe in an eventual reward for what will amount to many years of hard sacrifice. The reality is that we are approaching a time of economic contraction. Consumptive appetites that have been stoked for decades by ubiquitous advertising messages promising "more, faster, and bigger" will now have to be reined in. People will not willingly accept the new message of "less, slower, and smaller," unless they have new goals toward which to aspire. They must feel that their efforts will lead to a better world, with tangible improvements in life for themselves and their families. The massive public education campaigns that will be required must be credible, and will therefore be vastly more successful if they give people a sense of investment and involvement in formulating those goals. There is a much-abused word that describes the necessary process — *democracy.*

As another way of mitigating our paralyzing horror at seeing our society's future as one of decline in so many respects, we should ask: decline to *what?* Are we facing a complete disintegration of everything we hold dear, or merely a return to lower levels of population, complexity, and consumption? The answer, of course, is unknowable at this stage. We could indeed be at the brink of a collapse worse than any in history. Just one reference in that regard will suffice: the Millennium Ecosystem Assessment, a four-year analysis of the world's ecosystems released in 2006, in which 1,300 scientists participated, concluded that of 24 ecosystems identified as essential to human life, 15 are "being pushed beyond their sustainable limits,"

toward a state of collapse that may be "abrupt and potentially irreversible."[13] The signs are not good.

Nevertheless, a decline in population, complexity, and consumption could, at least in theory, result in a stable society with characteristics that many people would find quite desirable. A reversion to the normal pattern of human existence, based on village life, extended families, and local production for local consumption — especially if it were augmented by a few of the frills of the late industrial period, such as global communications — could provide future generations with the kind of existence that many modern urbanites dream of wistfully.

So the overall message of this book is not necessarily one of doom — but it is one of inevitable change and the need for deliberate engagement with the process of change on a scale and speed beyond anything in previous human history. Crucially: we must focus on and use the intangibles that *are not peaking* (such as ingenuity and cooperation) to address the problems arising from our overuse of substances that *are.*

Our One Great Task: The Energy Transition

As we have seen, just a few core trends have driven many others in producing the global problems we see today, and those core trends (including population growth and increasing consumption rates) themselves constellate around our ever-burgeoning use of fossil fuels. Thus, a conclusion of startling plainness presents itself: *our central survival task for the decades ahead, as individuals and as a species, must be to make a transition away from the use of fossil fuels — and to do this as peacefully, equitably, and intelligently as possible.*

At first thought, this must seem like an absurd over-simplification of the human situation. After all, the world is full of crises demanding our attention — from wars to pollution, malnutrition, land mines, human rights abuses, and soaring cancer rates. Doesn't a monomaniacal focus just on fossil fuels miss many important things?

In defense of the statement I would offer two points.

First, some problems are more critical than others. A patient

may suffer simultaneously from a broken blood vessel in the brain and a broken leg. A doctor will not ignore the second problem, but since the first is immediately life-threatening, its treatment will take precedence. Globally, there are two problems whose potential consequences far outweigh all others: Climate Change and energy resource depletion. If we do nothing to dramatically curtail emissions of greenhouse gases soon, we will almost certainly set in motion the two self-reinforcing feedback loops mentioned previously — the melting of the north polar icecap, and the melting of tundra and permafrost releasing stored methane. These would lead to an averaged global warming not just of a couple of degrees, but perhaps six or more degrees over the remainder of the century. And this in turn could make much of the world uninhabitable, make agriculture impracticable in many if not most places, and result not only in the extinction of thousands or millions of other species but the deaths of hundreds of millions or billions of human beings.

If our dependence on oil, natural gas, and coal continues unabated the post-peak decline in their availability could trigger economic collapse, famine, and a general war over remaining resources. While it is certainly possible to imagine strategies to develop alternative energy sources and mandate energy conservation on a massive scale, the world is currently as reliant on hydrocarbons as it is on water, sunlight, and soil. Without oil for transportation and agriculture, without gas for heating, chemicals, and fertilizers, and without coal for power generation, the global economy would sputter to a halt. While no one envisions these fuels disappearing instantly, we can avert the worst-case scenario of global economic meltdown — with all the human tragedy that implies — only by proactively reducing our reliance on oil, gas, and coal ahead of depletion and scarcity. In other words, all that is required for the worst-case scenario to materialize is for world leaders to continue with existing policies.

These two problems are potentially lethal, first-priority ailments. If we solve them, we will then be able to devote our attention to other human dilemmas, many of which have been with us for millennia — war, disease, inequality, and so on. If we do not solve these

two problems, then in a few decades our species may be in no position to make any progress whatever on other fronts; indeed, it will likely be engaged in a struggle for its very survival. We'll be literally and metaphorically burning the furniture for fuel and fighting over scraps.

My second reason for insisting that the transition from fossil fuels must take precedence over other concerns can likewise be framed in a medical metaphor: often a constellation of seemingly disparate symptoms issues from a single cause. A patient may present with symptoms of hearing loss, stomach pain, headaches, and irritability. An incompetent doctor might treat each of these symptoms separately without trying to correlate them. But if their cause is lead poisoning (which can produce all of these signs and more), then mere symptomatic treatment would be useless.

Let us unpack the metaphor. Not only are the two great crises mentioned above closely related (both Peak Oil and Climate Change issue from our dependence on fossil fuels), but, as I have already noted, many if not most of our other modern crises also constellate around fossil fuels. Even long-standing and perennial problems like economic inequality have been exacerbated by high energy-flow rates.

Pollution is no different. We humans have polluted our environments in various ways for a very long time; activities like the mining of lead and tin have produced localized devastation for centuries. However, the problem of widespread chemical pollution is a relatively new one and has grown much worse over the past decades. Many of the most dangerous pollutants happen to be fossil fuel derivatives (pesticides, plastics, and other hormone-mimicking chemicals) or by-products from the burning of coal or petroleum (nitrogen oxides and other contributors to acid rain).

War might at first seem to be a problem completely independent of our modern thirst for fossil energy sources. However, as security analyst Michael Klare has underscored in his book *Blood and Oil*,[14] many recent wars have turned on competition for control of petroleum. As oil grows scarcer in the post-peak environment, further wars and civil conflicts over the black gold are almost assured.

Moreover, the use of fossil fuels in the prosecution of war has made state-authorized mayhem far more deadly. Most modern explosives are made from fossil fuels, and even the atomic bomb — which relies on nuclear fission or fusion rather than hydrocarbons for its horrific power — depends on fossil fuels for its delivery systems.

One could go on. In summary: we have used the plentiful, cheap energy from fossil fuels, quite predictably, to expand our power over nature and one another. In doing so we have produced a laundry list of environmental and social problems. We have tried to address these one by one, but our efforts will be much more effective if directed at their common root — that is, if we end our dependence on fossil fuels.

Again, my thesis: many problems rightly deserve attention, but the problem of our dependence on fossil fuels is central to human survival, and so as long as that dependence continues to any significant extent we must make its reduction the centerpiece of all our collective efforts — whether they are efforts to feed ourselves, resolve conflicts, or maintain a functioning economy.

But this can be formulated in another, more encouraging, way. If we do focus all of our collective efforts on the central task of energy transition, we may find ourselves contributing to the solution of a wide range of problems that would be much harder to solve if we confronted each one in isolation. With a coordinated and voluntary reduction in fossil fuel consumption, we could see substantial progress in reducing many forms of environmental pollution. The decentralization of economic activity that we must pursue as transport fuels become more scarce could lead to more local jobs, more fulfilling occupations, and more robust local economies. A controlled contraction in the global oil trade could lead to a reduction of international political tensions. A planned conversion of farming to non-fossil fuel methods could mean a decline in the environmental devastation caused by agriculture and economic opportunities for millions of new farmers. Meanwhile, all of these efforts together could increase equity, community involvement, intergenerational solidarity, and the other intangible goods listed earlier.

Surely this is a future worth working toward.

The (Rude) Awakening

The subtitle of this book, "Waking Up to the Century of Declines," reflects my impression that even those of us who have been thinking about resource depletion for many years are still just beginning to awaken to its full implications. And if we are all in various stages of waking up *to* the problem, we are also waking up *from* the cultural trance of denial in which we are all embedded.[15]

This awakening is multi-dimensional. It is not just a matter of becoming intellectually and dispassionately convinced of the reality and seriousness of Climate Change, Peak Oil, or any other specific problem. Rather, it entails an emotional, cultural, and political catharsis. The biblical metaphor of scales falling from one's eyes is as apt as the pop culture meme of taking the red pill and seeing the world beyond the Matrix: in either case, waking up implies realizing that the very fabric of modern life is woven from illusion — thousands of illusions, in fact.

Holding that fabric together is one master illusion, the notion that somehow what we see around us today is *normal*. In a sense, of course, it *is* normal: the daily life experience of millions of people is normal by definition. The reality of cars, television, and fast food is calmly taken for granted; if life has been like this for decades, why shouldn't it continue, with incremental developmental changes, indefinitely? But how profoundly this "normal" life in a typical modern city differs from the lives of previous generations of humans! And the fact that it is built on the foundation of cheap fossil fuels means that future generations must and will live differently.

Again, the awakening I am describing is an ongoing visceral as well as intellectual reassessment of every facet of life — food, work, entertainment, travel, politics, economics, and more. The experience is so all-encompassing that it defies linear description. And yet we must make the attempt to describe and express it; we must turn our multi-dimensional experience into narrative, because that is how we humans process and share our experiences of the world.

The great transition of the 21st century will entail enormous adjustments on the part of every individual, family and community, and if we are to make those adjustments successfully, we will need to

plan rationally. Implications and strategies will have to be explored in nearly every area of human interest — agriculture, transportation, global war and peace, public health, resource management, and on and on. Books, research studies, television documentaries, and every other imaginable form of information transferal will be required to convey needed knowledge in each of these areas. Moreover, there is the need for more than explanatory materials; we will need citizen organizations that can turn policy into action, and artists to create cultural expressions that can help fire the collective imagination. Within this whirlwind of analysis, adjustment, creativity, and transformation, perhaps there is need and space for a book that simply tries to capture the overall spirit of the time into which we are headed, that ties the multifarious upwellings of cultural change to the science of global warming and Peak Oil in some hopefully surprising and entertaining ways, and that begins to address the psychological dimension of our global transition from industrial growth to contraction and sustainability.

This book was conceived during a brief stay in a tiny village in west Cornwall in late 2006. Perhaps the bleakness of the countryside at that season is reflected in the title. However, I hope also that Cornwall's rugged beauty and its people's remaining connections with down-to-earth, pre-industrial ways of thinking and of doing things are also somehow represented, if only indirectly, in these pages.

The chapters herein are self-contained essays and while I have made every effort to put them into a helpful and logical order, readers who like to savor a book's last chapter first or to read chapters out of sequence will find that this approach works reasonably well here.

Each chapter has a story attached to it, which I will relate briefly.

"Tools with a Life of Their Own" was written in response to a penciled letter from the representative of a radical anti-technology magazine asking for an article. I wrote the requested article and sent it to the e-mail address noted in the letter. Then, when no reply was forthcoming, I sent a printout of the essay via "snail mail" to the return address on the envelope. Still no reply. To this day I do

not know whether my article was rejected, whether my messages were intercepted by Federal agents, or whether the magazine's editors' ambivalence about technology rendered them unable to manage their communications responsibly. The essay was later published in the anthology *Living a Life of Value,* edited by Jason A. Merchey.[16]

"Fifty Million Farmers" is the edited text of a speech delivered in November, 2006 to the E. F. Schumacher Society (which has published the full version).[17] Over the past few months I have offered essentially the same message to the Ecological Farming Association in Asilomar, California, the National Farmers Union of Canada in Saskatoon, and the Soil Association in Cardiff, Wales. Each time I discussed the likely impacts of Peak Oil and gas for modern agriculture, and emphasized the need for dramatic, rapid reform in our global food system.

"Five Axioms of Sustainability" came from many years of frustration over the widespread, careless use of the terms *sustainable* and *sustainability.* The words would not have gained so much currency if many people were not worried that our society is in some sense *un*sustainable — i.e., that it cannot survive in its current form. Yet the terms are frequently tacked onto practices and programs (e.g., "sustainable yields" on investments) that can have no substantial impact whatever on society's ability to survive into the future. This chapter represents my effort to help refine our working definitions of these key terms. It is somewhat tougher reading than the rest of the book, and I had thought of making it an appendix; however, it is not an afterthought, but goes to the heart of every other significant discussion in the text.

Three chapters were inspired by creative works: "(*post-*)Hydrocarbon Aesthetics" came from a visit to an Arts and Crafts museum exhibit; "Parrots and Peoples" followed my viewing of the documentary film *The Wild Parrots of Telegraph Hill;* and "Population, Resources, and Human Idealism" was my response to the Broadway musical, *Urinetown.* In each case, the result was not a review in the usual sense, but rather an exploration of ideas relating to the theme of this book.

"The Psychology of Peak Oil and Climate Change" arose from scores of conversations with people about their experience of the awakening process. Clearly, humanity is addicted to fossil fuels, and this essay offers some suggestions on what sorts of group therapy might help us kick the habit.

I was inspired to write "Bridging Peak Oil and Climate Change Activism" after participating in two days of meetings in San Francisco in the fall of 2006, in which prominent Climate Change and Peak Oil activists attempted to form common strategies. It was my impression that the discussants often did not understand one another well, hence my effort to sort out the issues and point toward potential paths for better communication and coordination of efforts.

"Boomers' Last Chance?" is both a personal *mea culpa* and a plea to the other members of my demographic cohort. We may belong to the peak generation, in that we will have consumed something like half the world's nonrenewable resources during our lifetime. We have enjoyed an unprecedented party, but the privilege of having a place at this greatest banquet in history implies an enormous responsibility to future generations.

"A Letter From the Future," originally published in 2000, is of the genre of the classic novel *Looking Backward: 2000–1887* by Edward Bellamy, which imagined, from that writer's perspective in the late 19th century, life in our time. Bellamy's vision inevitably proved myopic: while *Looking Backward* was popular and influential (it sold over a million copies and inspired many Progressive reforms throughout the next two decades), it did not successfully anticipate the world of the early 21st century. Bellamy saw our era as one in which government would control the means of production and divide wealth equally between all people and in which all citizens would receive a college education and be given freedom in choosing a career, from which they would retire at age 45. In short, Bellamy foresaw a socialist utopia and entirely missed the realities of globalization, sweat shops, and environmental devastation. My own effort is likely to be just as inaccurate—though while Bellamy's failed by being too sanguine, I hope mine proves too dire.

"Talking Ourselves to Extinction" is a meditation on the power of language — a tool whose development and use has shaped us as a species. Cultural evolution occurred primarily because language enabled us to coordinate our efforts to respond quickly to environmental challenges and opportunities. Words have given us power over nature, and have given some human groups power over others. Today, if we are to survive, we must change our collective behavior radically and swiftly; only our species' unique linguistic talent is capable of orchestrating such an evolutionary shift. This book is a testament of hope that words can help us recognize the limits of nature, and the limits of power itself, before it is too late.