

IT'S OIL RIGHT, FOLKS!

There's Good Times Ahead

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Sustainability is important in its own right for us to understand and attain individually and as communities. But there are overwhelming signs that we've now reached the point in time where the relative costs and benefits of growth vs. sustainability diverge radically. It is time, and becoming urgent, to actively transform our entire society from one of growth, greed, and violence to one of sustainability - for our own survival and well-being and that of the entire planet.

Until we understand the *positive* alternatives¹ that lie before us, it may sound like doomsday talk to even list some of these signs that the end of an era and the beginning of a new one is being reached in the next few years. The changes ahead *are* momentous, and can be disastrous or incredibly fortunate, depending on the choices we make. But changes of one type or the other are going to be there.

Understanding some of the ignored present and future costs of our present patterns, and the unexpected and often profound benefits of some of the options we have available, can be vital to us. It can help us to happily let go of growth - which has perhaps served us well, but can't any longer. It can also assist us to embrace radically different values and patterns that can permit vast new opportunities in our lives. Without these opportunities, our quality of life would otherwise be degraded and depleted far more rapidly than our resources are reaching exhaustion.

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THE GOOD NEWS, AND IT IS *VERY* GOOD NEWS, IS THAT IMMENSE ECONOMIC SAVINGS ARE POSSIBLE WHEN WE DO SHIFT FROM GROWTH TO SUSTAINABILITY. What we've forgotten is the incredible costs we pay now to support our growth and greed:

1. INFRASTRUCTURE COSTS - *Stabilizing growth totally avoids our current expenditure of 33% to 40% of our time and resources spent on creating the infrastructure to accommodate more people and things.*² A population doubling means duplicating our entire stock of houses, water systems, power plants, cities, roads - as well as prematurely demolishing existing ones. It also means spending more on feeding and educating those additional people to adulthood.

2. COSTS OF INEQUITY - Growth has been claimed as necessary "to help the poor" - as if growth over the last twenty years hasn't dramatically *worsened* the condition of the poor and concentration of our wealth among the rich.³ It is conscious

government policy that has resulted in concentration of wealth to the point where one percent of the population now owns 50% of all our wealth. The median US household income for wage-earners is currently \$31,000, with more than 13% of households under the monetary poverty level of \$15,000. A fully equitable distribution of personal income would amount to \$59,000 per household.⁴

An equitable society could totally eliminate poverty and support EVERYONE at the current median income level of \$31,000 per household. ***Because of the immense current imbalance in wealth, to do so would surprisingly need 47% less work, and equivalently fewer resources than our current society uses to maintain poverty and inequality!***

3. DEBT FINANCING COSTS - To achieve growth, we have also developed the habit of paying for personal expenditures, corporate expansion, and governmental infrastructure alike consistently through debt purchasing (credit cards, government bonds and bank loans). ***That debt purchasing has resulted in an across-the-board 20% surcharge on our cost of living***, without any substantive benefit.⁵

Together, stabilizing growth and dealing directly with the inequality in our society can permanently release us from almost 75% of our present energy, material, financial and human costs of living, without lowering our material living standard, and without need for any "technical fixes".⁶

Said another way, GREED AND GROWTH ALONE CURRENTLY QUADRUPLE OUR COST OF LIVING!⁷ These already immense costs will skyrocket as we approach closer to the limits of growth mentioned above.

4. SYSTEM INEFFICIENCY COSTS - Our belief in an endless cornucopia of resources and wealth has also caused us to ignore care and efficiency in all of our institutional structures, production processes, and living patterns. The result is that they have developed almost inconceivable waste - which now represents an equally great opportunity for improved effectiveness and efficiency.⁸

Well-documented research over the last twenty years has shown and is beginning to produce factor of ten savings (90% reduction) in energy and resources needed in almost every sector of society.⁹

When we put just these four opportunities together, they add up to ways to reduce our resource consumption, ecological impact, and use of our time by up to 97%, which is significantly more than appears needed to achieve sustainability. (And the real rewards of a sustainable society do not fall in these familiar material dimensions of life.)¹⁰

It is unlikely that we would ever follow such possibilities out to these extremes - if for no other reason than that we decide we *want* to work more, or we *want* to do better for ourselves and all life, and ask for higher levels of performance in all we do. But even if we decide to only achieve two-thirds of each of these savings, that still adds up to an 82% reduction from our present patterns - almost exactly what is projected to be needed to operate on a sustainable basis.¹¹

This overview has looked at these issues very briefly and in isolation. In reality they are interactive. Some give resource savings but not financial or employment ones. Others, as in any ecological system, have multiple and interactive effects and savings.¹² Hours worked would drop significantly, but unlikely to the equivalent 12 minutes a day, as these alternatives are often more employment intensive. ***What is important is that the savings possible are far more than enough to totally transform a once frightening prospect of change into an opportunity for significant betterment of our lives!***¹³

Curiously, just making efficiency improvements, without dealing with the underlying values of greed, growth, and violence can only worsen the problems. It would result in us, twenty-five years down the road, having twice the population, fewer resources, and having already used up the opportunities for releasing resources out of our operating patterns to finance a transition to sustainability.¹⁴ Efficiency improvements have diminishing returns, and a second 90% efficiency improvement would be immensely more difficult than the first. The likelihood of major reduction in our material quality of life would then be enormous.

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THE OTHER IMPORTANT NEWS IS THAT THE TIME HAS COME TO MAKE THAT TRANSITION TO SUSTAINABILITY.

The next five years are crucial to the future of our society and our planet. They are the interval between seeing a stone wall ahead and slamming into it or putting on the brakes. Our whole society is now seeing the signs that say the gas stations that have fueled our entire lifestyle will soon be closed - *forever*.

Some of the signs are:

* More than 40% of the entire terrestrial net photosynthesis is already being used directly to support humans, only one of the millions of species whose complex interaction is essential to the stability of our supporting ecosystems. Within the next 25 years, population growth would push that to over 80%, a figure no scientists believe possible without ecological collapse.¹⁵

* The "ecological footprint" of the land area necessary to supply our urban areas with food, forestry products, and energy already exceeds what can sustainably be maintained. The Netherlands, for example, requires 14 times the nation's entire land area to provide and import produce to meet their consumption, while the U.S. consumes 80% more than

could possibly be produced by converting *all* ecologically productive land to human use.
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Others indicate U.S. resource demands would have to be reduced 80% to achieve sustainability.¹⁷ Meanwhile, the ecologically productive land area available per capita is dramatically decreasing. Human population thus already exceeds what can be supported at our present standard of living as oil depletes.

* Continuation of present growth patterns is expected to exhaust worldwide oil reserves in an estimated 25-50 years.¹⁸

* Food experts indicate that world grain production has peaked and is already declining, while population is continuing to increase exponentially.¹⁹

* Similar limits are being reached in ore-grade metals, water, and other resources.²⁰

* Increased virulence, resistance, and mutability of human disease vectors is being reported at the same time that population density, mobility and potential susceptibility are increasing.²¹

* Extreme weather fluctuations and consequent damage to crops and buildings are already occurring, corresponding with predictions of early impacts of globalwarming trends. Larger impact of these trends is expected over the next decades. Last year, for the first time, all five of the most respected global climate warming models - both public and private - agreed.

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Let's look in more detail at one of these signs. Petroleum economists and geophysicists now solidly project that worldwide petroleum production will peak in the next five to ten years and be virtually exhausted in the next 50 years. When we finally run out of oil - that final last drop - turns out not to be an important issue. *What is important is what happens when and after oil production peaks, which is happening right now.*

"Peaking" is the point where population and demand for oil continue to increase exponentially, while oil production can no longer be increased for technical and political reasons. It is where a permanent and dramatic shift occurs from the buyer's market we have enjoyed (cheap as you can pump it) to a seller's market (as expensive as you can push it). It brings a permanent skyrocketing of oil prices. It is the point where the oil available per capita (the energy slaves that have constituted much of our wealth) begins a rapid shift from a flood to a trickle as population soars and production dwindles. Actual "exhaustion" of our oil reserves, in contrast, occurs long after the trickle becomes so small that the timing of that "last drop" is irrelevant.

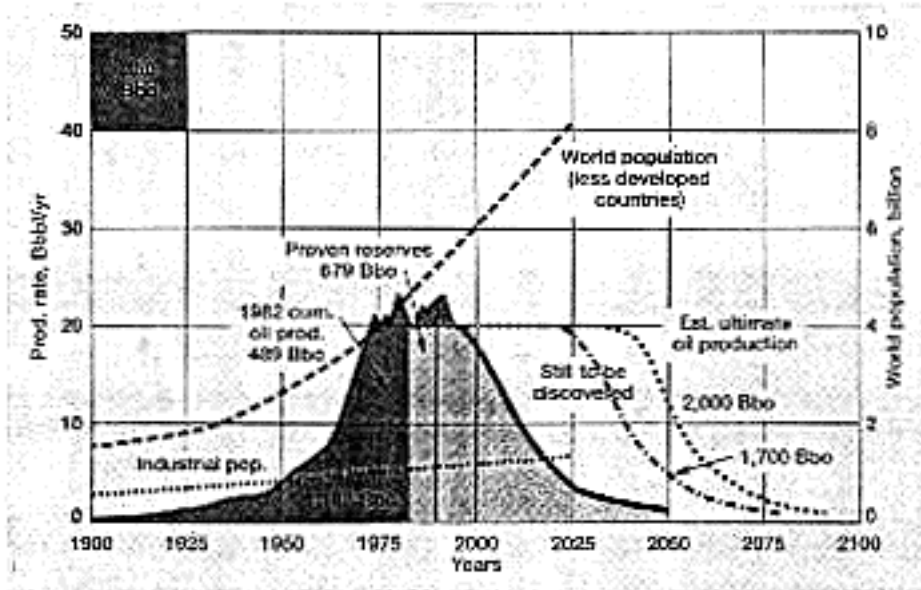


Fig. 4. World crude production history and forecast for two ultimate reserve levels vs. world population increase. Original, Hubbert, 1979; revised, Ivanhoe 1986, statistics, D & M 1983; population, NCS 1984.

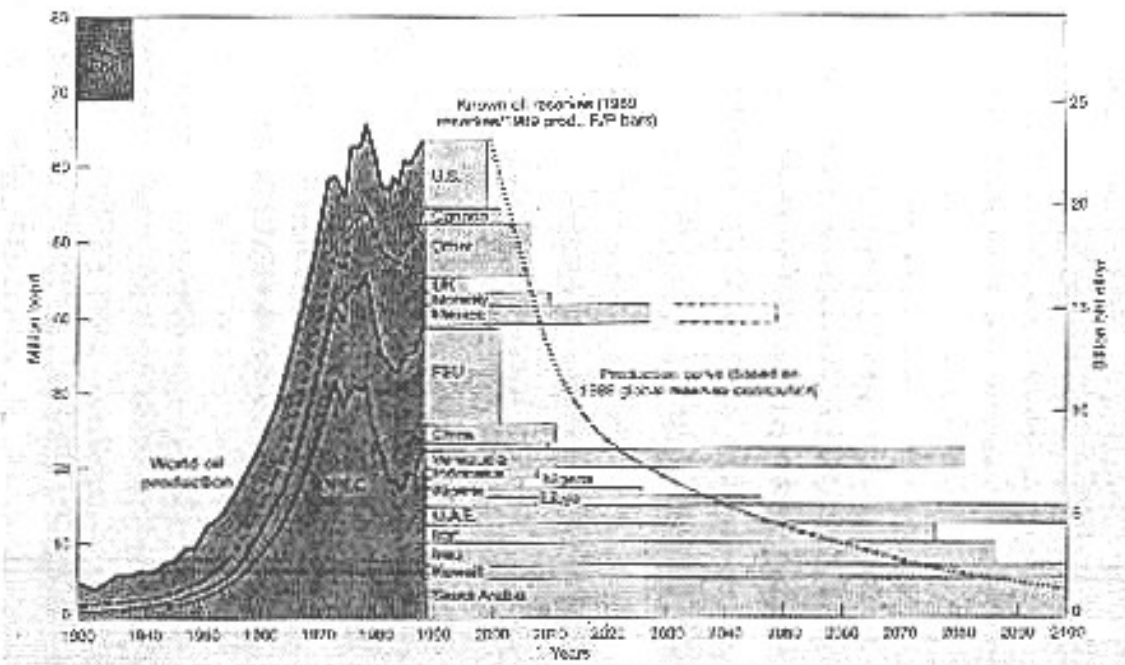


Fig. 5. World oil production history and future production curve based on future reserve rate by area. Refer to PP Historical Theory of World Energy

We are already into an initial phase of this change, and within the energy industry changes are already beginning to occur. Some months ago the papers reported riots in one of the Arabian oil-producing Emirates because of already decreasing oil and oil revenues. Last week the industry reported a major Pacific NW natural gas supplier abrogating 30-year supply contracts that had no penalty clause - knowing that oil prices are soon to soar

and that they would profit more by re-negotiating contracts after the oil price increases. The primary issue is no longer one of "*will we run out of oil*". It is no longer "*when*", but "*what are we going to do about it and its underlying growth/sustainability issues*".

The timing of our action relative to this change is vital. Actions taken before awareness of these changes becomes widespread will avoid the inevitable delays in obtaining crucial efficiency-related equipment which will follow from oil price increases. Actions taken before oil price jumps actually occur can be achieved at a fraction of their subsequent cost.

The impacts of this change are immediate, long-term, and immense. Every year, for example, we invest about a quarter of our wealth in transportation systems - *systems that are almost entirely fueled by petroleum*. We make those investments based upon twenty-year projections of our transportation needs. The infrastructure we build has life cycles of up to a hundred years, and generates land-use patterns with life cycles of up to perhaps a thousand years. Yet the oil people themselves are now acknowledging that we will probably be almost out of oil, worldwide, within the *current* twenty-year period for which we are now making investments. Attention to these issues can no longer be put off.

Many people's first response to the issue of oil depletion is belief that some "technical fix" will make everything okay. "They'll have electric cars on the road soon", or "there's natural gas, or fuel cells, or hydrogen, or..." With a 100 year history of substitution of one after another less-expensive fossil fuel, ending with petroleum, this may at first sound sensible. But things don't work the same coming down as going up, and there are many issues that make alternatives less than an easy flip of a switch. The magnitudes of energy use involved, and the interaction of population growth, resource depletion, and shifting economics create a very different picture.

Plugging in one electric car, for example, hasn't much impact. But in the U.S. economy, transportation consumes *one and one-half times as much energy* as the entire electrical sector produces. And a not-insignificant percent of our electricity is generated from petroleum. A broad change from gas to electric cars would require at least *doubling* of our entire electric generating and distributing system, to say nothing of finding a suitable and affordable fuel for generating that electricity, and mitigating the environmental impacts of its use.

Hybrid-fueled "hyper-cars" with fuel efficiencies of up to 200 mpg are expected to be on the market in the next ten years. It would seem that a 10-fold decrease in per-mile US oil consumption, or 5-fold decrease world-wide would virtually solve the problem. But in the 20 years it would take for full implementation of "hypercars", the world's population would have doubled, resulting in a 50% net *increase* rather than a 25% net decrease in petroleum use.

Any increase in third-world "mobility" would add further to the demand. A planet with U.S. mobility, even with hypercars, would at the end of 20 years be using THREE

TIMES our current rate of oil - except that by then oil would be virtually exhausted and the cost raised to where almost noone could afford it.

Financially, population increase coupled with exhaustion of US oil reserves would by itself cause a 50% increase in the U.S. international debt/balance of payments. However, the shift from a buyer's to a seller's market in that period would result in a likely four-fold increase in oil prices, resulting in a *six-fold* increase in US debt. Globally, the same population and consumption increases create a 50% (no mobility increase) to 66% shortfall in oil production related to demand.

Our global oil use is now so immense that ten years consumption is equal to more than *three times* all the remaining US petroleum reserves, plus the *entire* reserves of the UK, the former Soviet Union, Canada, China, Norway and Mexico.

Energy-efficiency, or substitution of other traditional energy sources such as natural gas, coal, and nuclear energy cannot alone solve the problem. The size and growth rate of population, energy, and resource use must be dealt with before any solution is possible. The rate of action and capital requirements are immense and cannot absorb repeated "re-do" as we find further reductions necessary. Ecological constraints require that we simply forget many expected conventional alternatives such as coal.

Continuation of our present values would result, as history has so amply shown, only in the problems resurfacing elsewhere in greater degree. The amount of work now done by fossil fuel "energy-slaves", the decreasing net energy of remaining reserves, the lower (and currently subsidized) net energy of renewables, the disregard of energy quality issues, and the declining returns on energy efficiency measures all have heavy impact on the real potentials of conventionally posed alternatives.

A combination of growth stabilization, value changes, suspending investments in growth-related infrastructure, dealing with equity, high-factor systems efficiency improvements, reduction of material demands, rapid implementation of positive net energy renewable energy sources, and strategic use of remaining fossil fuels to construct transition and sustainable infrastructure (such as gravity agricultural irrigation) are now essential to achieve a smooth transition to sustainability.

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It is time - *NOW* - to stop accepting the assumption that growth is inevitable, necessary, or good. "Growth" has its value, and is wise in a certain moment of time in the life of any living system. But more stable, life-nurturing, and enduring values, actions and ways of life are now the only reasonable way to go. Continuing growth now is harmful, an impediment to well-being, and increasingly impossible. The present and future costs of growth compared to sustainability show it is time NOW to take action to stabilize our numbers, lower our material demands to sustainable levels, and change our values and actions to nurturing, life-sustaining ones.

We need, over the next twenty years, to:

- * Stabilize our population.
- * Achieve a virtually total transition to renewable energy sources.
- * Reduce our resource demands four-fold to sustainable levels.
- * Attain meaningful economic, social and political equity within our country and worldwide.
- * Take major steps to restore the ecological health and well-being of our planet.

This is a rather large order in itself, but doable. The task will be more difficult the longer we wait and the slower we move, as we will have more people and fewer resources to accomplish the transition.

In this process there are several ignored issues that need to be quickly grasped:

- * The *real* costs of business-as-usual growth and greed vs. sustainability.
- * The boundary of what other people on the planet and in our own country will continue to allow in regards to inequity of wealth and resource consumption. There are some basic power shifts that are likely to occur in this regard in the next few years.²²
- * Our planet's capability to sustain short and long-term resource use, pollution, and ecosystem disruption.
- * The likely and unlikely prospects and impacts of alternate paths over the next 20/100/1000 years.
- * The benefits of sustainability which lie in far different dimensions from our familiar material and economic ones.

After the dust settles, a stabilized-growth, eco-health, equity based strategy will provide the wisest, simplest, and most rewarding way to respond to the combined depletion of oil and other resources and the limits of unsustainable exponential growth.

The actions we need to take to achieve it are unconventional ones. We need to bring into existence in our own lives the fruits of sustainability that others can experience and adopt. We need to assert the rightful place of the values, actions and institutional structures that are essential to sustainability. We need to get the needed perspectives to people and institutions who have long term stakes in the well-being of life - the insurance industry, the domestic and international investment and banking industry, pension funds, as well as ghetto dwellers and third world residents who are most heavily impacted alike by the drastically different alternatives facing us now.

Most importantly, we need to see that a positive future is achievable. And we need to act - NOW - to achieve that future and prevent the negative future that would result from our inaction.

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1 Only the material / economic ones are discussed here. See my "Unexpected Gifts", Sept. 1996; and "Shedding A Skin That No Longer Fits", March 1996 for discussion of the non-economic dimensions of sustainability.

2 A detailed study of these costs would be valuable. We can estimate at this time at least a doubling to tripling of all of society's capital expenditures, plus a 50% increase in consumptive expenditures, for population doubling alone, without counting expansion in consumption.

3 See, for example, Keith Bradsher's "Gulf widens between wealthy and poor", New York Times News Service, April 20, 1995; also Ravi Batra's THE GREAT DEPRESSION OF 1990, 1987 and Edward Wolff's Twentieth Century Fund report, TOP HEAVY, 1995.

4 \$5,702 billion total personal income, 248,710,000 population, 2.63 person household size. Similar figures occur using national income.

5 For example, interest paid on national debt in 1994 equaled 20.3% of federal outlays (with no capital repayment). Consumer credit outstanding in 1994 equaled \$985 billion - 19.9% of disposable personal income and 17% of national income - roughly equally between auto, home, and revolving credit. Finance, and related fields constituted 22% of national income. For more detail on the illusory benefits of these financial shell-games, see my 1993 "Borrowing Trouble", 1990 "Endgames", and my 1984 "Hidden Costs of Housing".

6 For further discussion of how to achieve these benefits, see my 1996 "Some Questions We Haven't Asked".

7 $60\% \times 53\% \times 80\% = 25\%$ of current expenditures.

8 For some of the other non-technical, big-jump opportunities, see "Some Questions", above.

9 It's now more than 23 years since I first showed that this order of magnitude changes were possible in "Living Lightly: Energy Conservation in Housing" 1973. See also the many progress reports of the Rocky Mountain Institute, 1739 Snowmass Creek Rd., Snowmass CO 81654; work of the Center for Maximum Potential Building Systems, 8604 F.M. 969, Austin TX 78724; and John Todd's work with biological water purification at Center for the Restoration of Waters, One Locust Street, Falmouth MA 02540.

10 See, for example, "Unexpected Gifts" or "Shedding A Skin..." above; my 1993 "Building Real Wealth", and "Transforming Tourism", Earth Ethics, Summer 1993. For values, see my "Sharing Smaller Pies", New

Age Journal, Nov. 1975; The Futurist, 1976; RESETTLING AMERICA, Gary Coates, ed. 1981, and Utne Reader, Fall 1987. Also Lovins and van Weizsacher's upcoming FACTOR FOUR, and Lovins and Hawken's upcoming NATURAL CAPITALISM.

11 Based on preliminary Friends of the Earth studies on European and U.S. economies. See also Bill Rees' excellent "Ecological Footprints and Appropriated Carrying Capacity..." in INVESTING IN NATURAL CAPITAL, Island Press 1994, or "Revising Carrying Capacity..." in Population and Environment: A Journal of Interdisciplinary Studies, Jan 1996.

12 See Amory Lovins, "The Super-Efficient Passive Building Frontier", ASHRAE Journal, June 1995 for an outstanding example of the interactive and cumulative benefits of energy efficiency in minimizing building operating costs.

13 See "Building Real Wealth", above; and "Shedding A Skin...".

14 There is an urgency to this issue. See, for example, L.F. Ivanhoe's "Future World Oil Supplies; there is a finite limit", World Oil, Oct., 1995 on global oil and population trends, and Richard Duncan's 1995 "The Energy Depletion Arch..." on U.S. and global oil depletion. Ivanhoe also interestingly touches on the falsification beginning to occur in government statistical studies as our denial of resource depletion becomes more acute.

15 See Vitousek, Erlich, and Matson, "Human Appropriation of the Products of Photosynthesis", BioScience 36: 368-74. 1986.

16 Wackernagel and Rees, OUR ECOLOGICAL FOOTPRINT, New Society Books, 1995.

17 Personal communications from Friends of the Earth, Washington D.C. See also FOE- Europe data on European needs.

18 See for example, L. F. Ivanhoe's important article, "Future world oil supplies: there is a finite limit", World Oil, Oct. 1995. Also Ivanhoe, "Oil Reserves and Semantics", Newsletter of the M. King Hubbert Center for Petroleum Supply Studies, Colorado School of Mines, Aug. 1996; and James MacKenzie, "Oil as a Finite Resource", World Resources Institute, March 1996.

19 See Donella Meadows' Internet current status updates on Limits to Growth.

20 See Donella Meadows' Internet current status updates on Limits to Growth.

21 See, for example, Jeffrey Fisher's THE PLAGUE MAKER'S, 1994.

22 For a hint, see Ethan Kapstein's "Workers and the World Economy", Foreign Affairs, May 1996.