PART IV

TWO DIRECTLY RELATED SUBJECTS

To conclude this book we turn our attention to:

How the fossil-energy age will end while hidden behind a confusing interaction of economics, terminated-growth, and the cost of oil.

What kind of leadership can best lead us into an acceptable post-hydrocarbon age? Traditional democratic forms of government will not function for growing masses of unhappy constituents each trying to preserve his or her piece of the comfortable past, or just trying to survive.

CHAPTER 10

Economics in an Energy-Constrained Future

ENERGY, THE LIFEBLOOD OF AN ECONOMY

Economic success, growth, and an affluent (happy) consumer lifestyle depend directly on an abundance of inexpensive readily-available energy. Conversely, the quantity and type of energy can have a very adverse effect on the surrounding environment and world ecological balance. It then follows that leadership and politics, for the governance of civilized societies, should be intimately concerned with the tight connection between economics and energy. Now, at this unique and critical time in history, we are facing the unprecedented terminal decline of oil, our prime energy source. Following soon, in the next several decades, will be diminishing availability of all finite fuels.

The advocates of related subjects, for instance climate change (man-made or not) or stimulus proposals for continued economic growth, do not factor in the difficult, if not impossible, transition and immense challenges facing us as we enter the second half of the short fossil-energy age. **Without energy to make things happen, nothing grows, moves to a new place, or expands.** Bodies wither and die, civilizations contract and collapse. Yet there are leaders and experts who would lead us to believe otherwise, that "finite" does not mean the dictionary definition, or a shortfall will magically produce "substitutes." Oil still supplies over 37% of our total energy including 90% used for all modes of modern travel and most of the fuel for construction and transport. In addition, we've come to depend on thousands of petroleum-based products from lubricants to plastics. There may be "plenty left," but oil is steadily harder to find and more expensive in terms of input energy and wealth required for extraction from a growing percentage of unconventional sources.

Equating economics, energy, and oil

At this point, I will insert a stand-alone essay I wrote seven years ago. It was posted on Theoildrum.com/node5621 on August 1, 2009 and led to a long, wandering 79 page blog- discussion about the validity of electric tractors, and the potential of

nuclear energy without the support of petroleum inputs. This is another example of seemingly infinite web information falling on deaf ears and not making a speck of difference as we (the U.S. and world) slide off the per capita oil cliff. **I don't profess to be an economist, but it certainly appears that most economists don't want to confront energy, finite resources, and population growth. Politicians surround themselves with the most renowned, comforting economists and perpetuate the standard myths that scarcity will produce substitutes and increased cost will drive perpetual availability.** Anyway, following is a humble retired-engineer's opinion:

A. NOTHING OF SUBSTANCE MOVES OR GROWS WITHOUT ENERGY

This includes a body, a bird's nest, population, a building, a road, or a civilization. Energy is arguably the most important word in the dictionary. Oil is presently the world's primary source of energy, providing almost 40% of all energy and over 90% of transportation fuel. (Fuel is another term for energy.) Energy is necessary for and can be represented by warmth or heat resulting in a higher temperature over ambient surroundings. Most of the world's energy came from or is coming via radiation from the sun's fusion, albeit dilute and sporadic as it reaches the earth. Exceptions are nuclear fission, geothermal, and tidal.

Power **IS NOT** energy. Power is only a measure of the rate that energy is being used or changed into a different form. It **IS NOT** synonymous with energy yet is loosely used that way by the media and "experts" which further confuses the public. Energy **CANNOT BE BORROWED** from the future. Next week's food won't assuage today's hunger.

B. WORLD PRODUCTION OF PRE-STORED OIL (representing millions of years of conveniently stored solar energy and photosynthesis) **HAS PEAKED.**

Conventional (light and easily accessible) oil reached a maximum of over 75 million barrels per day in 2005. All liquid fuels including tar-sand oil, heavy oil, deep off shore oil, polar oil, natural gas liquids, and bio fuels peaked at about 85 million barrels per day in the third quarter of 2008 (see Figure 3 for 2014 update). These numbers are

historic facts as presented by the International Energy Agency and our own Department of Energy (eia.gov). U.S. production peaked in 1972 exactly as predicted in the 1950's by M.K. Hubbert. This fact resulted in the "energy crisis" of the seventies and a sharp increase in the price of oil as well as a temporary reduction of world oil production. This early warning was quickly forgotten and superceded by vast new sources of world oil from our Arctic, the North Sea, Russia, Mexico, South America, Africa, and the Mid-East.

C. WE LIVE IN AN ECONOMIC SYSTEM ENTIRELY DEPENDENT ON GROWTH

Our prosperity needs the promise of a future return of principal **PLUS** interest to justify the investment of present principal. This worked well for the last one-hundred years as long as there was always an excess of cheap pre-stored fossil energy available to "fuel" the growth. (For this premise, we will ignore inflation and speak in terms of real growth.)

D. THE CRUX: NOW THAT PRE STORED ENERGY, REPRESENTED BY OIL, HAS PEAKED AND IS IN TERMINAL DECLINE, GROWTH AND OUR ECONOMIC SYSTEM CANNOT CONTINUE. (Conventional oil is still "plateaued" into 2015, but per capita oil has steadily declined. See Chapter 1.)

Prosperity, food to feed a growing population, an oil-based transportation system, and new building are all forms of energy dependence, which must now go into terminal decline.

This is a geophysical constraint, not choice or something that can be avoided by changing the laws of physics, political action, increasing demand, or wishful thinking. Civilization and our cheap-energy lifestyle are on the verge of collapse. The longer we deny the situation and try to perpetuate the party, the more severe will be the crash and fewer will be our options.

E. ONE SOURCE OF CONFUSION IS THE HIDDEN PRICE OF OIL

If oil is becoming scarce, why is oil (sometimes) less expensive? This is where things become more complicated. The price of oil only reflects the delicate balance of multiple transactions between consumers and oil producers. If consumers have a declining ability to pay from past, stored

wealth then there is less real value to support ever-increasing costs to extract the remaining more-expensive oil. As more of the world is producing less of everything (especially energy-dependent food) because of energy-curtailed growth, only the decreasing sources of cheap oil are competitive. Out-of-work consumers cannot support new oil exploration and the remaining expensive, non-conventional sources, which were supposed to save us. So, the price deflates to a lower level.

If the economy begins to revive a little bit, the increased demand drives the price of oil back up until the declining, remaining wealth cannot support more-marginal, more-expensive sources. Fewer, poorer customers result in more-desperate suppliers, the only ones who can still produce relatively cheap oil, or who must keep their population under control at any cost. The end result is the beginning of the second half of the 200 year oil age. The first half (hardly more than one lifetime) was typified by growth, prosperity, and increased population. The second half will only be the opposite unless we recognize the enormity of our dilemma and quickly initiate emergency damage control and drastic measures such as are summarized in the acronym: LEARN … Localization, Education, Adaptation of solar power (in its several varied forms), Rationing (of remaining fossil energy starting with gasoline), and Negative population growth (on our terms rather than waiting for more abhorrent catastrophes). Nowhere in this essay have the terms "global warming," "climate change," or "environmentalism" been mentioned. These are obviously related to energy, the hyper-consumptive fossil fuel age, and are of dire concern. It is this writer's opinion, however, that these issues tend to divert focus from the imminent energy-economic crisis, which is not well understood and conspicuously absent and avoided in the media.

ECONOMICS, FAST FORWARD TO 2015

Now, almost ten years since "peak oil" became a controversial term and the great recession of 2008 is behind us, the world and U.S. economies seem trapped in a web of contradiction. In six months, the price of oil suddenly plunged below the fifty-dollar range. The stock market is bouncing around an all-time high. Unemployment is down below seven-percent. **The economists, politicians, and media are self-reinforcing the conventional wisdom that demand and new technology has (and always will) provided the necessary oil for the resumption of perpetual growth. Any talk of population control is contrary to the economic wisdom that: "new**

growth will be supported by new consumers." The words "finite" or "contraction" along with climate change are relegated to a fringe of abstract intellectuals.

Meanwhile our leaders lurch from debt ceiling, to sequester, to threat of shutdown as they fail to admit or understand why the growth of the first half of the oil age cannot be extrapolated onward and upward. It is fact that very wealthy individuals, banks, and corporations have cornered most of the trillions of dollars of U.S. residual wealth. They are reluctant to jump into new capital investment because they seem to intuitively know that largely underpaid or unemployed masses can not support continued growth. The middle class economy has been decimated by the export of good-paying manufacturing jobs along with increased costs for food. An ever-increasing population doesn't get paid enough to be significant consumers. Increased numbers of older generations must keep working because of zero interest return on their investments. They compete with new, younger job seekers for depressed wages which are not enough to cover the cost of living. Meanwhile, the wealthy own the remaining assets, have a substantial income, entitlements, or have a financial interest in the temporary resurgence in domestic energy. They have few places to park their inordinate share of the economy to protect it from inflation. We need bold new leadership that understands the limits of growth and reacts to an informed constituency that demands action.

It's up to you to get involved. Raise your voice. Listen carefully for substantive discussion of declining energy and/or increasing population (including immigration) in the 2016 election year. Which prospective candidate could become a leader as discussed in the next chapter?