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This month's Museletter is made up of a an essay I wrote for the book 'Energy: Overdevelopment and the Delusion of Endless Growth'. In addition I've included a link to a short video update about my forthcoming 'Snake oil' book.

There's Only One Real Option for Averting Economic and Ecological Ruin -- So Why Aren't We Talking About It?

The following excerpt is reprinted from the new book Energy: Overdevelopment and the Delusion of Endless Growth, edited by Tom Butler and George Wuerthner, published by Post Carbon Institute and Watershed Media, in collaboration with the Foundation for Deep Ecology.

Energy conservation is our best strategy for pre-adapting to an inevitably energy-constrained future. And it may be our only real option for averting economic, social, and ecological ruin. The world will face limits to energy production in the decades ahead regardless of the energy pathway chosen by policy makers. Consider the two extreme options—carbon minimum and carbon maximum.

If we rebuild our global energy infrastructure to minimize carbon emissions, with the aim of combating climate change, this will mean removing incentives and subsidies from oil, coal, and gas and transferring them to renewable energy sources like solar, wind, and geothermal. Where fossil fuels are still used, we will need to capture and bury the carbon dioxide emissions.

We might look to nuclear power for a bit of help along the way, but it likely wouldn't provide much. The Fukushima catastrophe in Japan in 2011 highlighted a host of unresolved safety issues, including spent fuel storage and vulnerability to extended grid power outages. Even ignoring those issues, atomic power is expensive, and supplies of high-grade uranium ore are problematic.

The low-carbon path is littered with other obstacles as well. Solar and wind power are plagued by intermittency, a problem that can be solved only with substantial investment in energy storage or long-distance transmission. Renewables currently account for only a tiny portion of global energy, so the low-carbon path requires a high rate of growth in that expensive sector, and therefore high rates of investment. Governments would have to jump-start the transition with regulations and subsidies—a tough order in a world where most governments are financially overstretched and investment capital is scarce.

For transport, the low-carbon option is even thornier. Biofuels suffer from problems of high cost and the diversion of agricultural land, the transition to electric cars will be expensive and take decades, and electric airliners are not feasible.

Carbon capture and storage will also be costly and will likewise take decades to implement on a meaningful scale. Moreover, the energy costs of building and operating an enormous new infrastructure of carbon dioxide pumps, pipelines, and compressors will be substantial, meaning we will be extracting more and more fossil fuels just to produce the same amount of energy useful to society—a big problem if fossil fuels are getting more expensive anyway. So, in the final analysis, a low-carbon future is also very likely to be a lower-energy future.

What if we forget about the climate? This might seem to be the path of least resistance. After all, fossil fuels have a history of being cheap and abundant, and we already have the infrastructure to burn them. If climate mitigation would be expensive and politically contentious, why not just double down on the high-carbon path we're already on, in the pursuit of maximized economic growth? Perhaps, with enough growth, we could afford to overcome whatever problems a changing climate throws in our path.

Not a good option. The quandary we face with a high-carbon energy path can be summed up in the metaphor of the low-hanging fruit. We have extracted the highest quality, cheapest-to-produce, most accessible hydrocarbon resources first, and we have left the lower quality, expensive-to-produce, less accessible resources for later. Well, now it's later. Enormous amounts of coal, oil, gas, and other fossil fuels still remain underground, but each new increment will cost significantly more to extract (in terms of both money and energy) than was the case only a decade ago.

After the Deepwater Horizon oil spill of 2010 and the Middle East–North Africa uprisings of 2011, almost no one still believes that oil will be as cheap and plentiful in the future as it was decades ago. For coal, the wake-up call is coming from China—which now burns almost half the world's coal and is starting to import enormous quantities, driving up coal prices worldwide. Meanwhile, recent studies suggest that global coal production will max out in the next few years and start to decline.

New extraction techniques for natural gas (horizontal drilling and "fracking") have temporarily increased supplies of this fuel in the United States, but the companies that specialize in this "unconventional" gas appear to be subsisting on investment capital: Prices are currently too low to enable them to turn much of a profit on production. Costs of production and per-well depletion rates are high, and energy returns on the energy invested in production are low. Recent low prices resulted from a glut of production produced by rampant drilling in 2005–2007, which only made economic sense when gas prices were much higher than they are now. All of this suggests that rosy expectations for what "fracking" can produce over the long term are overblown.

Exotic hydrocarbons like gas hydrates, bitumen ("tar sands"), and kerogen ("oil shale") will require extraordinary effort and investment for their development and will entail environmental risks even higher than those for conventional fossil fuels. That means more expensive energy. Even though the resource base is large, with current technology the nature of these materials means they can be produced only at relatively slow rates.

But if the hydrocarbon molecules are there and society needs the energy, won't we just bite the bullet and come up with whatever levels of investment are required to keep energy flows growing at whatever rate we need them? Not necessarily. As we move toward lower-quality resources (conventional or unconventional), we have to use more energy to acquire energy. As net energy yields decline, both energy and investment capital have to be cannibalized from other sectors of society in order to keep extraction processes expanding. After a certain point, even if gross energy production is still climbing, the amount of energy yielded that is actually useful to society starts to decline anyway. From then on, it will be impossible to increase the amount of economically meaningful energy produced annually no matter what sacrifices we make. And the signs suggest we're not far from that point.

In one sense it matters a great deal whether we choose the low-carbon or the high-carbon path: One way, we lay the groundwork for a sustainable (if modest) energy future; the other, we destabilize Earth's climate, shackle ourselves ever more tightly to energy sources that can only become dirtier and more expensive as time goes on, and condemn myriad other species to extinction.

However, in another sense, it doesn't matter which path we choose: With human population numbers growing and energy constraints looming, we will have less energy to burn per capita in the future. Plot any scenario between the low-carbon and high-carbon extremes and that conclusion still holds, which means less energy for transport, for agriculture, and for heating and cooling homes. Less energy for making and using electronic gadgets. Less energy for building and maintaining cities.

Efficiency can help us obtain greater services for each unit of energy expended. Research has been proceeding for decades on how to reduce energy inputs for all sorts of processes and activities. Just one example: The electricity needed for illumination has declined by up to 90 percent due to the introduction first of compact fluorescent light bulbs, and now LED lights. However, efficiency efforts are subject to the law of diminishing returns: We can't make and transport goods with no energy, and each step toward greater efficiency typically costs more. Achieving 100 percent efficiency would, in theory, require infinite effort. So while we can increase efficiency and reduce total energy consumption, we can't do those things and produce continual economic growth at the same time.

Humanity is at a crossroads. Since the Industrial Revolution, cheap and abundant energy has fueled constant economic growth. The only real discussion among the managerial elite was how to grow the economy—whether in planned or unplanned ways, whether with sensitivity to the natural world or without.

Now the discussion must center on how to contract. So far, that discussion is radioactive—no one wants to touch it. It's hard to imagine a more suicidal strategy for a politician than to base his or her election campaign on the promise of economic contraction. Denial runs deep, but sooner or later reality will expose the delusion that endless growth is possible on a finite planet.

Sooner or later we must make conservation the centerpiece of economic and energy policy. The term "conservation" implies efficiency—building cars and appliances that use less energy while delivering the same services. But it also means cutting out nonessential uses of energy. Rather than continuing to increase economic demand by stimulating human wants, we must begin to think about how to meet basic human needs with minimum consumption of resources, while discouraging extravagance.

If we move toward renewable and intermittent energy sources, a larger portion of society's effort will have to be spent on processes of energy capture. Energy production will require more land and a greater proportion of society's total labor and investment. We will need more food producers, but fewer managers and salespeople. We will be less mobile, and each of us will own fewer manufactured products—though of higher quality—which we will reuse and repair as long as possible before replacing them.

The transition to a more durable and resilient but lower-energy economy will go much better if we plan it. Wherever it is possible for households and communities to pre-adapt, and wherever clever people are able to show innovative ways of meeting human needs with a minimum of consumption, there will be advantages to be enjoyed and shared.

Much of the current public discussion about our energy future tends to turn on the questions of which alternative energy sources to pursue and how to scale them up. But it is even more important to broadly reconsider how we use energy. We must strategize to meet basic human needs while using much less energy in all forms. Since this will require major societal effort sustained over decades, it is important to start implementation of conservation strategies well before actual energy shortages appear.

With regard to our food system, it is essential to understand that lower energy inputs will result in the need for increased labor. Thus the energy transition could represent economic opportunity for millions of young farmers. Agricultural production must be adapted to substantially reduced applications of nitrogen fertilizer and chemical pesticides and herbicides since these will grow increasingly expensive as their fossil fuel feedstocks rise in price. And higher transport energy costs mean that food systems must be substantially relocalized.

Transport systems must be adapted to a regime of generally lowered mobility and increased energy efficiency. This would most likely require widespread reliance on walking and bicycling, with remaining motorized transport facilitated by car-share and ride-share programs. Electric vehicles and rail-based public transport systems should be favored, and new highway construction halted.

Reduced overall mobility will require substantial changes in urban design practice and land use policies. Neighborhoods within cities must become more self-contained, and cities must be reintegrated with adjacent productive rural areas. Buildings—including tens of millions of homes in the United States alone—must be retrofitted with insulation to minimize the need for heating and cooling energy. New buildings must require net zero energy input. Incentives for installing residential solar hot water systems, and using solar cookers and clotheslines, should be effective and widespread.

Most new sources of energy will produce electricity—and in the cases of solar and wind, electricity will be produced only intermittently. Electricity storage systems (such as pumped water or compressed air) must be built to overcome at least some of the problems of intermittency. Reconfiguration of electricity grids, distributed generation, and alignment of household and industrial energy usage patterns to fit intermittent power availability are other strategies for adaptation.

The historically close relationship between increasing energy use and economic growth suggests that the global economy probably cannot continue to expand as world energy production falters. Therefore, adaptive measures must include efforts to restructure the economy to meet basic human needs and support improvements in quality of life while reducing debt and reliance on interest and investment income. Family planning must be encouraged, as adding more people to a stagnant or shrinking economy simply means there will be less for everyone.

The costs to ecological integrity and to human health of the ever-increasing scale of society's production and transport systems have become the subject of broadening concern in recent decades. Air and water pollution, resource depletion, soil erosion, and biodiversity loss are just some of those costs. With reduced energy use must come the realization that the scale of our human presence on the planet must be appropriate to the Earth's limited budgets of water, energy, and biological productivity.

Altogether, this will constitute a historic shift away from continual societal growth and toward conservation. It will not be undertaken except by necessity, but necessity is inevitably approaching. Barring some technological miracle, we will have less energy, like it or not. And with less energy, we will no longer be able to operate a consumer society. The kind of society we will be able to operate will almost certainly be as different from the industrial society of recent decades as that was from the agrarian society of the nineteenth century.

But suppose this analysis is wrong, or that a new miracle technology appears, and energy proves to be abundant rather than scarce. Even then, conservation makes sense: Increasing energy use leads to greater consumption of natural resources of all kinds, and the degradation of wild natural systems. Sooner or later we must rein in consumption—and since signs of ecological decline are already frighteningly prevalent, sooner is clearly better than later.

The shift to a conserver society could hold benefits for people as well as for nature. As we begin to measure success not by the amount of our consumption, but by the quality of our culture, the beauty of the built environment, and the health of ecosystems, we could end up being significantly happier than we are today, even as we leave a far smaller footprint upon our finite planet. But those benefits will be delayed and diluted for as long as we deny the conservation imperative.

Snake Oil Update #1

I'm busy working on my next book titled 'SNAKE OIL! How Big Energy's Promise of Plenty Imperils Our Future'. View a video update on the progress of the book. If you would like to join the Merry Band of Editors and get access to exclusive draft content follow this link.