



Swan Song Wish List

Posted by [David Murphy](#) on September 3, 2013 - 8:28pm

I began posting on TOD in 2008 when I was a PhD student working with Charles Hall on basically everything energy but focusing specifically on the connections between EROI (energy return on energy invested) and the economy. Most of that work is summarized in a paper I published in 2011 called “Energy Return on Investment, Peak Oil, and the End of Economic Growth.” Since graduating in 2010, I have continued my work on EROI but also branched out into the field of ecosystem services and environmental policy as a faculty member in the Geography Department of Northern Illinois University and as a policy analyst at Argonne National Lab. And although I have not posted much in the past two years (mainly due to time constraints of the jobs and two young children) I have remained an active reader on TOD and other energy sites.

I wasn't really sure about a topic for my last post on TOD, vacillating between economics, energy, and/or EROI. I wanted to cover a variety of topics that have become important in my research but that were not necessarily closely related. So I decided to just list them out, a sort of wish list of things that I think most people in the energy space don't, but should, understand. This list is hardly exhaustive; frankly, they were the items that came to me over the past couple of weeks so I encourage readers to add their own wish list items into the comment section as well. I hope you enjoy the list and thank you so much to TOD and all the readers/commenters for a great, and educational run!

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1) I wish that peak oil people knew that the actual date of peak oil is irrelevant.

What we care about is the increased prices, increased volatility in prices, geopolitical changes, and all the other impacts that come along with a tightening global oil supply. These changes occur not when the production of oil peaks, but when supply is unable to keep pace with demand, which is basically what happened from 2004 – 2008 and is still the case today. These impacts are already being felt, and they are all the validation of the concept of peak oil that I need.

2) I wish that economists understood the laws of thermodynamics and what they imply about the importance of energy in economic growth.

Economic growth, measured as an increase in GDP, is fundamentally a thermodynamic process, and is therefore bounded by the laws of thermodynamics. For all the economists out there – here is how the laws of thermodynamics limit economic growth, in its most basic iteration. GDP is the sum of the final sale of goods and services in a nation for a given period of time. The production of goods requires, at a very basic level, materials and the energy required to manipulate those materials into a final product. Or, in the case of services, energy is expended directly in the execution of that service. Both goods and services, in other words, require energy. To grow the quantity of goods and services, then, the energy used to produce those goods and services must also grow. Of course efficiency improvements can produce more goods and services with less energy, but efficiency improvements are also bounded thermodynamically, so they can only do so much (not to mention the rebound effect...). At some point energy use will have to grow as well.

As a result, increasing GDP requires increasing energy production.

Once we realize that economic growth is tied to energy we can begin to understand why GDP cannot grow forever.

3) I wish that politicians would realize that GDP is an awful measure of well-being.

The rationale behind using GDP as a measure of well-being is so simple that it confused me the first time I read it. Here it is, in a nutshell. The goal of neoclassical economics is to maximize utility, or human well-being, and one can get the highest utility when one can satisfy all of her/his particular wants and needs. To satisfy wants and needs in a free market requires one to purchase goods and services, which itself requires money. So how can we ensure that one can purchase all the goods and services necessary to satisfy her/his wants and needs? Simple, we grow income levels (i.e. GDP per capita). As long as incomes are growing we assume that people can satisfy more and more of their wants and needs and overall well-being is increasing. (If there are any economists searching for a more academic description, please seek out the work of John Gowdy, who says more or less this same thing but uses words like Potential Pareto Improvement and such.)

But GDP is an awful measure of well-being because it measures only the final *private* goods and services sold in the economy, and omits a whole host of others that are crucial not only for our survival but for our well-being. Conversely, GDP also includes items that we would scarcely consider as contributing to well-being.

Take Hurricane Katrina, for example. That one storm caused well over a hundred billion dollars worth of damage, yet all the materials bought for reconstruction and services rendered to replace those materials *added* to the nation's GDP. Would anyone really every say that Katrina was a good thing, or that we would really like to have another one? No, of course not. But if we simply looked at GDP numbers, especially in the local state economies, we might conclude that it was.

Many of the items ignored by GDP are public goods and services, and some of those could be considered ecosystem services. A few of the more recognizable services are: climate regulation, fresh water provisioning, and storm surge mitigation. Let's take fresh water provisioning, for example. Say you have a house with a water well which provides all of your drinking water needs for free. Let's just say that an industrial operation moves in on your neighbor's property and spoils the well, forcing you to buy bottled water. Guess what, you are now contributing to GDP and increasing your overall well-being! Examples like this are manifold.

Aside from these ecosystem services, there are myriad other services that also go unvalued in GDP but nonetheless play an important role in human well-being, such as housework, value of volunteer work, higher education, crime rates, divorce rates, income inequality etc.

All of these examples are real issues that factor into one's overall well-being yet are not factored into GDP.

So if not GDP, then what? There has been much research in the area of alternative macroeconomic indicators, the most popular of which is probably the Genuine Progress Indicator (GPI). The GPI calculates a more comprehensive value of well-being by factoring in many of the items I mentioned above. For example, the State of Maryland now calculates the Genuine Progress Indicator (<http://www.green.maryland.gov/mdgpi/indicators.asp>) and tracks it alongside the state GDP. Vermont is pursuing a similar endeavor. What these indicators are showing us, as does the peer-reviewed literature on the subject, is that while the GDP has been growing steadily over the past 40 years, the GPI has been flat for most OECD nations. (1)

Transitioning to GPI or some other similar metric at the federal level could also go a long way at decoupling energy and the economy. Think about it, many of the example services I listed above require very little if any energy consumption. If we truly want to be a post-industrial economy, than we need post-industrial metrics by which to measure economic success, and GPI might be such a metric.

4) I wish that the polemic rhetoric around fracking would stop.

Fracking has risks, but so does conventional oil extraction, driving a car, hockey, and everything else in life. The question is one of risk-reward; does the utility that society receives from natural gas outweigh the potential environmental (and other) risks involved in its extraction? And since the environmental risks involved are determined by local factors, such as local geology and hydrology, there is no universally correct answer. Some areas with particularly valuable aquifers or sensitive environmental areas may want to avoid drilling altogether, while other areas may not.

That said, groundwater systems are complex and often span across county and even state boundaries, making regulation a difficult task at the state level. It is therefore incumbent upon the EPA to take an active role in not only producing best management practices to avoid problems before they occur, but also in assigning liability and fining culpable parties when mistakes are made. In addition to these cross-boundary hydrological issues, budget cuts have depleted state environmental agencies leaving them more or less unable to regulate this industry by themselves.

Lastly, and maybe most importantly, we must create legislation with the following in mind: water is a basic need for survival; natural gas is not.

Minor Item

5) I wish that energy analysts, particularly those at the EIA and other energy database managers, knew that:

Conventional Oil ≠ Shale Oil ≠ Oil Sands ≠ Natural Gas Liquids ≠ Ethanol

They do not have the same costs, in either energy, dollar or environmental terms, nor do they even contain the same energy content. Please do not sum their production together and call it simply “oil”. Thanks!

1. Cobb C, Goodman GS, Wackernagel M. Why Bigger Isn't Better: The Genuine Progress Indicator - 1999 Update. San Fransisco, CA, USA: Redefining Progress, 1999.



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