

Is Oil Based Economic Growth Really Sustainable?

By Jim MacInnes
September 8, 2011

Oil is deeply embedded within our economy in everything from the food we eat, to the products we consume and especially as fuel for America's transportation systems. More than 96 percent of the energy used for transportation comes from oil.

A century ago, oil was cheap and readily available. Those easy-to-find and developed fields had a high Energy Return on Investment (EROI) of 100 to 1. America was once the largest crude oil producer in the world. It's no wonder we chose oil, which has a high energy density and is easily transportable, as the basis for our nation's transportation systems.

Over time though, oil has become harder to find and it takes more energy (and money) to get it out of the ground resulting in a lower EROI. Oil companies began constructing billion dollar oil platforms so they could drill miles off shore into thousands of feet of water. They aren't doing this by choice, but because that's where the oil is located.

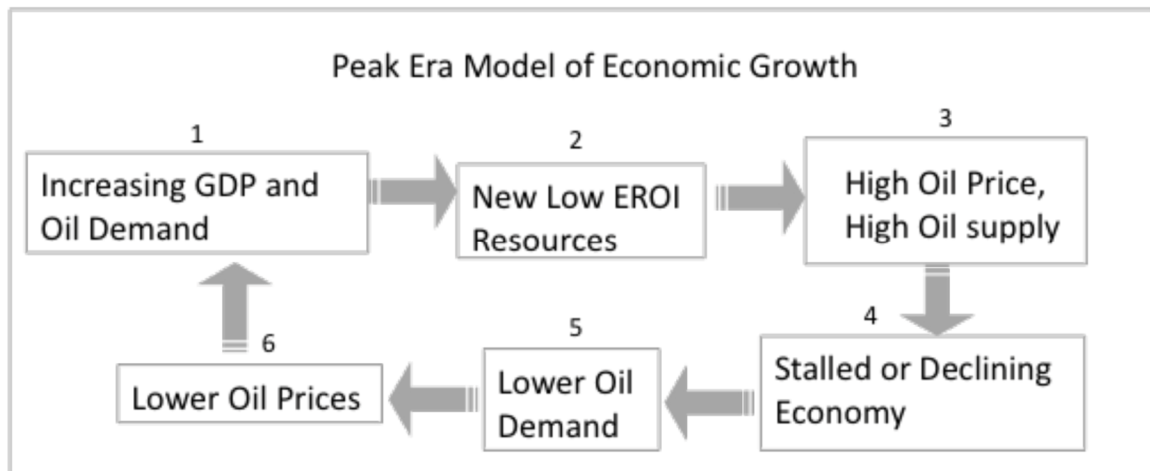
The EROI for this new off-shore oil is reportedly less than 10 to 1 and for Canadian Oil Sands it may be as low as 3 to 1. So while a lot of oil is still available, development costs are ratcheting upward as evidenced by higher prices at the gas pump.

"About 50% of the changes in economic growth over the past 40 years are explained, at least statistically, by changes in oil consumption alone," reported David Murphy and Charlie Hall in their recent article, *Adjusting the economy to the new energy realities of the second half of the age of oil*, published in the Journal of Ecological Modelling. They also cite that, "energy consumption causes economic growth, not the converse," and, "energy is the limiting factor for economic growth."

The data shows how increasingly high petroleum expenditures eventually 'trip' the economy into recession. This happens when petroleum expenditures reach about 5.5% of GDP (Gross Domestic Product). Essentially, high oil prices act like a tax. As Charlie Hall points out in his forthcoming book, *Energy and the Wealth of Nations*, "Oil is treated by economists as a commodity, but in fact it is a more fundamental factor of production than either capital or labor."

Once the economy stalls there is less demand for oil, and prices fall to a temporary lower equilibrium level. This allows the economy to eventually begin recovering and GDP growth may resume, that is of course until returning high oil prices slow things down again. This feedback loop creates oscillating economic growth around what may eventually become a low or flat growth trend line.

This loop occurs because higher-cost replacement oil supplies are being substituted for supplies from lower-cost oil fields that are being depleted. Lower oil price levels observed during recessions then ratchet higher each time the feedback loop repeats itself as shown in the model below.



Reprinted with the permission of David Murphy and Charlie Hall.

America must invest in energy substitutes for oil to work its way out of this rising price cycle of oil dependency. This brings us back to the IEEE-USA (Institute of Electrical and Electronics Engineers) national energy policy recommendations, which will be discussed in the next report.

Jim MacInnes has worked as a power engineer for the company that designed and construction managed the Ludington Pumped Storage facility. He is a licensed professional engineer in Michigan, a member of the IEEE Power and Energy Society and the International Society for Ecological Economics. He served on the Great Lakes Offshore Wind Council and was named as a Michigan Green Leader by the Detroit Free Press. He holds BSEE and MBA degrees from the University of California.