



## Economics and the end of fossil fuels

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The end of fossil fuels? Really? I am sure that most people have heard many arguments for this, including, of course, the necessity of moving away from fossil fuels to lessen the accumulation of greenhouse gases in the atmosphere to avoid the worst of climate change, and, second, to give us all better quality air to breathe to reduce pediatric asthma and other respiratory ailments.

Another, equally valid, reason, the oil national security argument, is to reduce our dependence on oil imports from nations whose policies we abhor. With carbon dioxide levels in the atmosphere the highest they have been in 800,000 years, these alone are sufficient reasons to reduce fossil fuel use.

But new research and analysis provide another compelling reason unrelated to the above arguments. It is explored in a research article by James Murray and David King in the Jan. 26 issue of Nature magazine. They argue that the reduction in the supply of oil and gas resulting from rapidly declining rates of discovery will not allow the world's economies to continue to grow at even a modest rate.

By looking at oil prices over time compared with oil production, they find that oil prices have become "inelastic," meaning that when demand spikes, production cannot keep up and we find ourselves with more and more dramatic prices swings.

Remember the great oil price spike in 2008 when oil went over \$120 a barrel and helped contribute to the beginning of the worst recession since before World War II? Price spikes like these are occurring because supply cannot match demand. It is not that we are running out of oil, but we are running out of oil that can be produced cheaply and easily. Murray and King state that "If oil production can't increase, the implication is that the economy can't grow either."

Couldn't coal fill in? Unfortunately, it appears that each time global coal reserves are analyzed, the estimated amount of those reserves are revised downward. In 2005, those estimated reserves (i.e., coal still in the ground and available) were lowered by 50 percent. And a 2011 estimate found the reserves to be 40 percent less than the 2005 estimate, with 90 percent of global coal reserves expected to be exhausted in just 60 years.

Of course, not only is coal the dirtiest of the fossil fuels, but mining it entails the destruction of mountaintops and enormous human dangers.

What about all those new natural gas discoveries and what we can gain by fracking? Production of natural gas in North America actually peaked in 1971, according to the U.S. Energy Information Agency, even after adding in the newest discoveries, which almost return production to the 1970s level.

Similarly, it appears that what can be gained from fracking has been widely overestimated — not to mention fracking's potential damage to water supplies.

The failure of fossil fuel production to keep pace with economic growth, and the growth of the human population to 7 billion, mean that we will see more and more unpredictability in fossil fuels prices while they continue to trend higher and higher. Murray and King use Italy as an example of the damage to the economy this trend creates.

In 1999, Italy's trade surplus was \$22 billion; now it has a \$32 billion deficit. Italy now spends \$55 billion per year for oil, compared with \$12 billion in 1999, an increase of \$43 billion. And this is despite a decrease of 340,000 barrels of oil imported daily to Italy. So, were it not for oil price increases, Italy would still have a trade surplus. For comparison, the U.S. imports about 10 million barrels a day of crude oil and consumes 19 million a day.

So if we needed another reason to move away from fossil fuels, there it is — future damage to the economy caused by the volatile and high price of fossil fuel energy.

With oil once again over the \$100-per-barrel mark, the U.S., as a society, must begin the discussion of what we would do if oil prices spike even higher; we must develop a national plan to move away from its dependence on fossil fuels, if only to protect the economy. We need a plan. And, that plan will inevitably include increased reliance on clean renewable energy, as well as increased efficiency and conservation.

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