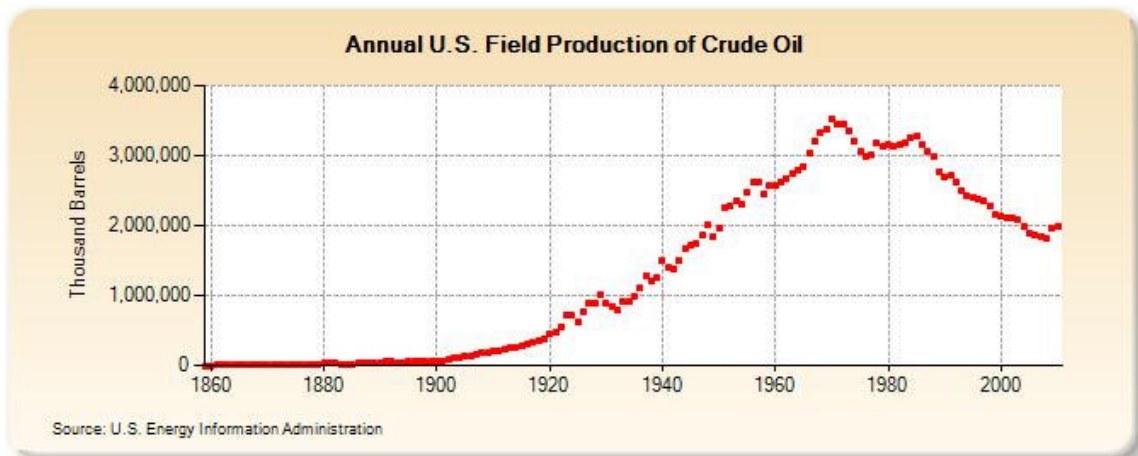


The Second Half of the Age of Oil

By Jim MacInnes
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The world consumes more than one cubic mile of oil each year. That's one trillion gallons. The US accounts for about one quarter of that amount, 72% of which is used for transportation fuel and we import 50% of our oil supply.

I first learned about the "age of oil" as a young engineering student in the mid - 1970's. It was surprising to find out that America's crude oil production had peaked in 1970 as shown in the US Energy Information Administration (EIA) chart below and that world oil production was predicted to reach its maximum during the early part of the 21st century. We may soon be entering the second half of the age of oil.



According to the International Energy Agency (IEA), [2010 World Energy Outlook, www.iea.org](http://www.iea.org) world crude oil production has been on an "undulating plateau" since 2004, even though the price of Brent Crude oil has increased from \$30 per barrel to a recent price of \$118 per barrel. While the price has nearly quadrupled, the rate of oil production has remained flat despite the opportunity for producers to earn greater profits through increased production. But, according to IEA reports this will be difficult because most of the new oil discoveries will be needed to offset declining production from existing oil fields. No one knows exactly when world oil production will reach a maximum and then begin to decline, but it eventually will, because we are extracting more oil from existing fields than is being replaced from new fields.

Similar production curves hold true for other fossil fuels such as coal and natural gas. With increasing worldwide demand for coal, for example, the planning horizon for coal may be much shorter than the often cited "200 year

supply.” Major natural gas supplies have recently become available through a process called hydraulic fracturing. While it appears that we currently have plenty of natural gas, there are still questions on how much gas is economically recoverable and how long it will last. As we consume our remaining coal and natural gas reserves they will also become more expensive and will eventually be depleted.

The world currently consumes about 510 Quads (quadrillion BTU's) of energy per year, 80% of which is from fossil fuels. Our ability to grow the economy depends on continuing access to cheap energy.

One (1) Quad of nuclear fuel for example, would power more than twelve large (1000 Megawatt) nuclear reactors. If we could eventually replace all fossil fuels by switching to say.... nuclear power, it would take the output of 5,000 additional nuclear reactors to replace fossil fuels. There are 440 nuclear plants operating in the world today, including 104 in the US. The scale and time frame required to replace our fossil fuel based energy supplies is enormous, so no matter what technology we choose, we need to begin working on this soon.

When thinking about the second half of the age of oil, gas and coal, we also need to consider the increasing amounts of energy needed in order to extract these remaining fossil fuels. This brings up the concept of Energy Return on Energy Invested (EROI), which will be covered in our next report.

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