

## Running on Empty?

### Quote to Ponder

'The Stone Age didn't end for lack of stone, and the Oil Age will end long before the world has run out of oil'.

- Sheik Zaki Yamani, former Saudi Arabian Oil Minister, in *The Economist*

### Running Out of Oil

The 'running out of oil' story seems intuitively compelling. It is logical that there is a finite quantity of oil, we are using huge quantities of it, and we'll use it up one day. Experts are talking about how oil companies, particularly the American majors, are having trouble finding enough oil to replace what they've pumped each year. The great North Sea fields are past their peak production years, and output is beginning to decline. Texas has been in decline for years. It seems to be just a matter of time until it's gone, or at least the price is so high that only kings can afford it.

The problem is it'll never happen. The reason is simple economics, with a little geology and some technology thrown in. A rising price makes it worthwhile to go further, drill deeper, and apply more science to find and produce more. On the consumer side, it all costs money, and the higher the price goes, the less of it we'll use.

Consider the following summary of global proven oil reserves, from an article in *Regulation* by retired MIT Economics Professor M A Adelman:

	<u>Total</u>
Oil reserves, 1970:	612
Oil production, 1970– 2003:	767
Oil reserves, 2005	1,028

All data billion barrels oil (bbl), proven reserves  
M. A. Adelman, MIT, '*Regulation*' March 2004

In other words, in 1970 the world had 612 billion barrels (bbl) of oil reserves. Between 1970 and 2003 the world produced 767 billion bbl, yet in 2003 reserves were more than a trillion barrels.

But that's just the beginning of the story. There are at least 4 different ways to define a barrel of oil. Oil companies are required by the Securities and Exchange Commission (SEC) in the US to publicly discuss only proven reserves. 'Proven' oil is the most conservative estimate: it is 90% certain to be recoverable, *using existing technology at prevailing prices.*

Conventional oil that is less than 90% certain to be economic is known as 'probable'. Today, the probable reserves of the world are about 2 trillion barrels, according to the US Geological Survey (USGS) in a recent report in *The Economist*. (That's double the number of 'proven' above.)

Daily worldwide consumption of oil is about 80 million barrels. A little quick math tells you that conventional recoverable oil will last about 70 years. Given my age, 70 years isn't as long as it used to be, but it's still a long time.

If we include oil that we know exists but we know is not (yet) economic, the number goes way up again. If we include unconventional oil, the number goes way up again. The United States has enough oil in shale deposits to supply current US consumption for 110 years. Shale oil is not counted in official reserve data because it is not currently economical to produce it, although the technology has been around for a hundred years.

Similarly, Canada's oil sands deposits weren't counted at all until recently, when the cost of production was reduced and the price rose sufficiently to make production economic. The oil sands now count for about 180 billion bbl, placing us second only to Saudi Arabia in reserves. The oil sands alone count for almost 10% of the world's 2 trillion recoverable reserves.

The popular misconception is that the reserve numbers represent a finite quantity. They do not. Reserves are an economic concept; they are not a hard scientific number.

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Not only is more new oil found each year, but oil that engineers have long known about becomes economically practical, as technology advances and the price of oil goes up. As it becomes economic, it is booked into the 'reserve' column.

The really interesting analysis is: how much oil is economic at \$100/bbl? At \$200? Unfortunately, Adelman says, we just don't know. The people with the data don't know and aren't inclined to tell us even if they did know. But Adelman's analysis of the investment behaviour of large, sophisticated investors (e.g. oil companies) in buying and selling of reserves indicates that they do not believe that there is a fixed quantity (if there was a fixed quantity, the price would go up more consistently each year, and companies would bid much more aggressively for reserves).

So when will we run out of oil? The short answer: never.

### Conservation

Daily consumption of oil will probably go up in the future but maybe not by as much as you think. For instance, the USA consumes about as many barrels of oil today as it did in 1972, before the first big price increase, yet the US economy is about twice the size. In other words, the US uses half as much oil per unit of output as 35 years ago.

Modern economies are so much more efficient today because of the magic of markets. Price increases are an incentive for consumers to find better ways – like efficient cars. For example the 6 cylinder engine in a new BMW produces something like 1/100<sup>th</sup> of the pollutants of a comparable engine of 30 years ago

(according to Car and Driver, a car nut magazine). The BMW engine is classified as a 'Near Ultra Low Emissions' engine – a standard thought to be impossible only 10 or 15 years ago.

The best way to conserve energy is to just let the price go up. A rising price is the strongest and best way for free, intelligent people to figure out how to get smarter about using less. Just look at the progress in hybrid (gasoline/electric) cars in the past few years. Not only is the technology advancing surprisingly quickly, there is huge demand for more efficient cars. As the price of gasoline goes up, and the cost of alternatives comes down – there's a lineup to buy a Prius!

So here is the really exciting part. It's the reason I'm relatively sanguine about the whole energy question (including global warming). Today there are billions of tons of coal in the ground, easily accessible, in the US, Canada, and Europe. Yet it has no value. The price is less than the small effort required to dig it out. Why is coal obsolete? Because oil surpassed coal in usefulness 100 years ago. Oil is a much more potent fuel, more easily handled, and more easily refined.

Just as the great coal-fired steam locomotives of the last century gave way to oil-fired steam, which then in turn gave way to diesel-electric power, so the internal combustion engine of today will be made obsolete by technology and innovations that we can't yet imagine. Consumers are demanding it, technology and ingenuity will develop it.

And the oil age will be over, long before we run out of oil.

### The Bottom Line: Investment Implications

So what should an investor do? If we'll never run out, should we stay away from oil investments? The reality is that the price of oil is neither going to the moon, nor back to \$15. The modernization of China is adding the equivalent of a Canada to the world economy each year, so yes demand is growing. Growing demand can keep the price firm, if not rising. Growing demand will keep industry activity levels high and companies in the energy sector will be busy. So investing in oil companies, at the right price, is probably a good idea.

But I would be very careful investing in companies that depend on a high oil price for their success. Oil is not likely going to \$200 a barrel any time soon (unless the Saudis implode). The recent price spikes in gasoline are caused by refinery capacity and crude oil production constraints, not by available reserves. As companies make the investments required to increase oil production, (there are more than \$100 billion of projects currently under way just in the Canadian Oil Sands, according to The Economist) the rapid price increases of the last year or two are not likely to continue. The price may even fall. Don't forget the oil patch is notorious for its boom and bust cycles, as any investment manager worth her salt will tell you.

This is why I like an investment manager who is neither afraid to invest in oil companies (and other resources), nor blind to the risks. I want a manager to make intelligent decisions about which, if any, oil companies to buy. There is lots of oil around. It's just a question of price.

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