



Markets At A Glance

Today's Special: Yellowcake and Coke

So far this year we've written two articles on Hubbert's Peak, detailing what it could mean for the world's supply/demand equation for oil going forward. In passing, we also mentioned our bullish view on other energy sources such as uranium (yellowcake) and coal (coke). Given continually improving fundamentals, we believe these two energy sources deserve their own write-up – and will thus be the focus of this article. We believe that, with or without a Hubbert's Peak in world oil production, the prospects for uranium and coal are very positive. They would be even more so if one were to take the view that oil (as well as natural gas) are no longer, and may never again be, the cheap and abundant energy sources they once were.

Hubbert's Peak is not just about oil – its implications are far reaching. If it proves true, and world oil supply fails to keep up with demand in the not-too-distant future, then consumption of oil must diminish *per force* and the world will be left wanting for other energy sources to pick up the slack. Although hydrogen, wind, and solar energy hold some promise, their ability to replace conventional energy is still very much in doubt. Only uranium and coal have a history of being reasonably cheap and abundant fuels. Furthermore, coal and nuclear plants are reliable (as baseload power must be) and can be implemented on a large scale – two important features that alternative energy technologies have yet to demonstrate. Be that as it may, even in a “hydrogen” economy, coal and especially nuclear will still have a very important role to play... more on this later.

We realize that coal and uranium are not panaceas – both have issues of their own. Coal is by far the world's largest emitter of greenhouse gases, accounting for over 80% of the world's CO₂ emissions. Coal-fired plants worldwide release over 9 billion tons of greenhouse gases into the atmosphere each and every year. When one considers all the pollution that is being emitted by automobiles and other forms of transportation, it may seem surprising that it is but a fraction of what gets spewed by coal plants. Nuclear energy, on the other hand, is very clean, releasing little other than steam. However, the key issue the world has yet to resolve is how to dispose of the nuclear waste currently being stored at plant sites. Furthermore, in the eyes of the public there is a nagging safety concern about nuclear energy (real or perceived) as a consequence of two unforgettable nuclear catastrophes in the past, namely Three Mile Island and Chernobyl. (It is worth noting that third and fourth generation nuclear reactors, with redundant and automatic safety systems, hold the promise of greatly mitigating these safety concerns.)

It is for these reasons that neither coal nor nuclear are deemed to be “environmentally friendly” by most environmental groups and the public at large. Be that as it may, we believe these issues will be put on the back burner when the world begins to run out of oil and gas. When push comes to shove, energy is simply too precious a commodity to do without. We believe the world will embrace uranium and coal until viable alternatives come to the forefront – alternatives that by all appearances are still decades away from fruition. Furthermore, technologies are being developed that would make nuclear safer and coal cleaner. So let's, in turn, take a look at uranium and coal, and explain why we like them so much as an investment thesis.

There are so many reasons to like the uranium story, yet the investment community for the most part has shunned away from the industry due to its checkered history. The uranium industry has been plagued by an abundance of above-ground inventories that have suppressed uranium prices in the past. We believe this dynamic is quickly changing. Although it is a commodity that is typically procured by nuclear utilities on the basis of long-term contracts, the price of uranium on the spot market has risen from \$10 per pound a year and a half ago to \$19.65 currently. Perhaps more importantly, long-term contracts (which comprise the

preponderance of uranium sales) are currently being signed between utilities and uranium suppliers at a price of \$23 per pound according to Ux Consulting, a uranium industry information service. This is **an increase of \$4** from just the prior month. In the past 6 to 12 months, we have witnessed uranium turning from a buyers' market into a sellers' market. For an industry that moves slowly and in very long cycles, such a quick turn in market fundamentals is surprising and warrants attention.

The fact is, the fundamentals for uranium going forward are superlative on both the demand and supply sides of the equation. It's a no-brainer, and the sharp rise in uranium stocks since May (in a weak stock market no less) proves that at least some investors are buying into the uranium story. So let's first look at the demand side of uranium. It has become apparent to us that we are in the nascent stage of a nuclear renaissance. In our view, there are three main factors driving the global rebirth of nuclear energy.

First, there is mounting evidence that Western European countries and the United States, after having shunned nuclear energy for the past several years, are now seriously considering revisiting the nuclear option. Countries such as Great Britain, Italy, and Belgium are now reviewing their earlier decisions to "phase out" their nuclear power plants. For one thing, they are recognizing the difficulty of meeting Kyoto targets without a nuclear option. Perhaps more importantly, they are witnessing alarming increases in their costs of producing electricity due to the escalating prices of oil (in the case of Italy) and natural gas (in the case of Great Britain). Even in the United States, which hasn't built a new nuclear plant in the last two decades, there is talk that the Bush administration is warming up to, and in some cases even pushing for, more nuclear power in its energy policy. It is trying to convince other countries, such as Great Britain, to do the same.

Second, and more interesting in the near to medium term, is the growing energy demands of developing countries – in particular China. Of the 31 nuclear reactors currently under construction or being commissioned, 22 are in Asia. (There are 440 reactors in operation globally.) After experiencing electricity demand growth of a remarkable 15% per year, China plans to increase its nuclear generating capacity by a factor of five by 2020. This means 32 new reactors, or two per year. Even then, nuclear will account for only 4% of its power generation. If China were to attain a nuclear share of 20% (like many Western countries) it would require 200 new reactors, or half of today's global installed base. That's just one country. India has decided to adopt a similar policy, planning to increase its nuclear generation (now only 2.5% of its total power generation) by building one nuclear reactor per year until 2020. Similar plans are in the works in Brazil and other developing countries. The world is increasingly going nuclear.

Third, and most interesting for the long term, are the prospects for nuclear energy in a "hydrogen" economy. Hydrogen is not readily obtainable in natural form and requires the hydrolysis of water to produce – a very energy intensive process. Although any energy source would do, nuclear power would seem the most logical option since it is clean, abundant, and can be readily implemented on a massive scale. At the World Nuclear Association's (WNA) annual symposium last week, Paul Kruger, a Stanford University professor, boldly proclaimed that **3500 new nuclear reactors** would need to be built in order to provide the energy needed to make the hydrogen to fuel the world's 1.5 billion vehicles by 2050. All this, of course, is still decades away, but it shows the potential for nuclear power and uranium demand in the short, medium, and even very long term.

The supply side of the uranium equation is equally promising. As it stands now, nuclear utilities around the world consume 170 million pounds of uranium each year, but only 90 million pounds is actually being mined out of the ground – a situation that is clearly unsustainable even assuming no growth in the number of nuclear reactors. This shortfall of almost 50% has been met by above-ground inventories. These inventories emanate primarily from two sources: (1) the dismantlement of nuclear weapons following the end of the cold war, and (2) the draw down of surplus uranium inventories at the utilities themselves, which at one point stood at 5 years of reactor fuel requirements according to industry experts.

Both of these factors have changed substantially. Russia (the main supplier of once weapon-grade uranium that is being converted for civilian use) has recently modified its agreement with the West such that it will withhold 5 million pounds of uranium per year for its own needs starting in 2008. Furthermore, they have

indicated that they may not renew the agreement (called the HEU Agreement) when it expires in 2013, to the surprise of many in the industry. The utilities themselves (the other source of uranium stockpiles) have drawn down their surplus inventories substantially in recent years such that it is widely believed that they have less than a year of inventory left – a very low level historically. Both these factors ensure that the supply/demand disequilibrium that has existed in the uranium market for so long must soon be corrected, and uranium mine production must more closely match uranium demand. The gap is immense and we believe can only be filled with a substantially higher uranium price.

The very poor uranium market of recent years has led to a dearth of uranium exploration and new discoveries. One could count on one hand the number of deposits in the world that show real promise at current prices. Although exploration has picked up recently with the rise in uranium, we don't believe it will be enough to meet existing reactor requirements, let alone that of future ones should the nuclear renaissance we mentioned earlier take hold. To discover a uranium mine, get it permitted, and put it into production can take at least four years and in some cases a decade or more. The reasons for these long lead times are threefold: (1) uranium orebodies are relatively small and difficult to find and drill, (2) as well as the normal environmental considerations of mining, there is also radiation to contend with, and (3) issues of nuclear proliferation make the mining of uranium a very sensitive (and political) endeavour.

However, because uranium is a mineral, it is orders of magnitude more abundant on earth than are hydrocarbons. The world is very unlikely to ever run out of uranium, as it will oil, natural gas, and even coal. The only question is at what price can it be mined in sufficient quantities. Given the absence of high-grade uranium deposits outside of the Athabasca Basin, we don't believe a price of \$20 is enough. We see the price of uranium easily doubling from here. This is the price that many of the world's known orebodies would need in order to become economic. There are those who are even more bullish than us. According to Thomas Neff, an MIT researcher who recently presented at the WNA symposium mentioned earlier, the looming uranium shortage may become so severe that the price of uranium may reach **\$110 within the next five years**. Although this may sound farfetched, uranium prices topped \$40 at their all-time peak in the late 1970's – in inflation-adjusted terms, that's about \$110 today. Neff is only suggesting that uranium prices may go back to their prior peak in real terms. It is little wonder that utilities lately have been scurrying for supplies, and uranium producers have been hesitant to sign long-term contracts unless they are on very favourable, and flexible, pricing terms. As we've said, it is very much a sellers' market for uranium right now.

Another feature of uranium is that nuclear utilities are highly price inelastic – i.e. the economics of nuclear power are relatively insensitive to the price of uranium. Uranium fuel accounts for no more than 5% of the cost of producing nuclear electricity. Thus, a doubling in the uranium price would only result, at most, in a 5% increase in a utility's generation costs – a miniscule impact compared to other fuels. It is thus very difficult to price uranium out of the market, even at \$110. This is also a testament to the cost stability of nuclear power. It is not as subject to the vagaries of the commodities markets as are the other fuels used to produce electricity, such as oil and natural gas. This inelasticity of demand is yet another reason we like uranium and nuclear power so much.

As an investment thesis there are a few ways to play the uranium story, albeit the options are relatively scarce compared to other commodities. Cameco is clearly the world leader and we consider it a core holding for any investor bullish on uranium. Among the exploration companies with promising deposits we like UEX, International Uranium, and Paladin Resources. We own all of these companies in our funds. We also own companies such as Strathmore Minerals that have “out of the money” uranium resources that are large and priced cheap on a per pound basis. Such companies have the greatest leverage to escalating uranium prices.

Now let's turn to coal. We like coal for many of the same reasons we like uranium; namely, it is an abundant and relatively cheap fuel that can be implemented on a large scale to meet the world's growing energy needs. In a Hubbert's Peak scenario, we find the prospects for coal to be just as interesting as for uranium. Although not as physically abundant as uranium, it is the most abundant of the fossil fuels with known reserves that could last a century under current rates of consumption.

Unlike a nuclear reactor, a coal plant can be built relatively quickly and more cheaply. For this reason, the global consumption of coal has risen rapidly and this has led to a doubling in the price of thermal coal in the past year and a half. Coal generated power is one of the cheapest and most cost effective means to increase a country's electricity capacity in a pinch. Although China is increasingly going nuclear, coal still represents 70% of its generating capacity and it has built new coal plants to keep up with the surge in electricity demand.

The fundamentals of the industry are very promising for both demand and supply going forward. On the supply side, not only has there been difficulty in permitting new mines around the world, but the persistent weakness in the coal markets last decade has resulted in the high-grading of coal mines (especially in the Appalachians), leading to a general quality degradation of coal reserves. Furthermore, issues with the transportation of coal have recently come to the forefront. (Coal is a very bulky material with a low value-to-weight ratio, thus its transportation is always a fundamental factor that needs to be considered.) Railway systems are getting clogged and there is very little capacity coming on in the world's major ports. The escalating demand for coal has led governments in both China and the US to crack down on the overloading of coal trucks. Although these are potentially short-term factors, they have and may continue to bode well for the price of coal.

Longer term, coal also holds much promise. Clean coal technologies are being developed that would greatly reduce coal's harm to the environment. It is claimed by experts that within 15 years new coal plants will be as clean as any other energy alternatives, and just as profitable. American Power recently announced that it plans to build a 1000 megawatt clean coal integrated gasification combined cycle (IGCC) power plant in the next five to six years. Such a plant will burn coal cleaner and make it easier to sequester CO₂ emissions so that no greenhouse gases end up in the atmosphere. Furthermore, the capital costs of such a plant seem to be on par with a nuclear plant and would thus allow coal to remain competitive. Such a possibility makes coal, like nuclear, a likely candidate for supplying the energy needed in a clean hydrogen economy.

One of the things we like best about coal as an investment is that coal companies can still be bought on the cheap. Even if coal prices stay where they are, many of the coal companies we are analyzing are trading at a mere four times 2006 earnings. The companies we own include Pine Valley, Western Canadian, Northern Energy, Macarthur Coal, and Fortune Minerals. Like uranium, we like coal companies with plenty of resources in the ground and with growth potential. We also own shares of KFX, a clean-coal technology company that has a patented process to produce cleaner burning coal.

In conclusion, we believe that the recent strength seen in the uranium and coal markets is more than just a cyclical aberration. There are fundamental changes occurring in the energy markets that we believe will lead to a secular rise in the prices of both uranium and coal going forward. The heady days when utilities were able to procure uranium or coal, in any quantity and for cheap, may be a thing of the past. Threatening shortages are already looming. An imminent Hubbert's Peak would only serve to amplify any supply shortfall.

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