

Today's Notes:

1. PACMAN

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When our children were young (about 25 years ago) they spent hours playing a simple electronic game called "Pac Mac." It was contained in a box of electronics that connected to the TV. Since then, numerous advanced electronic games have entered the North American lifestyle. They have one issue in common – they use scads of electricity. In November, 2008 the National Resource Defense Council reported that 40% of US homes have at least one video game and that the total annual consumption is estimated at 16 billion kilowatt hours - as much electricity in one year as the city of San Diego. The New York Times reports that today the average American has 25 consumer electronic products in the home versus an average of 3 in 1980¹. The International Energy Agency ²reports that electricity demand from the explosion in growth of these consumer products will consume 45% of worldwide, household electricity supply by 2030. For example some flat screen TV's use double the power of the older CRT TVs and their use is exploding. Eighty percent of American homes in 2007 had at least 2 TVs. A flat screen, liquid crystal display uses the equivalent power of an energy efficient refrigerator today. The IEA estimates that to meet **this new global demand** 560 coal-fired power plants or 230 nuclear plants would be required. Unfortunately we have difficulty building one such plant in the US for fear of stoking the fires of global warming. Oh for the old "ice-box."

When I lectured to the CSRC in China in 1995, we were informed by government officials that China's ultimate goal was to energize China. That meant placing electricity in every home – in the form of at least one light bulb. Today, the magic of electronics and communications is everywhere in China. As the **quality of life** represented by the ubiquity of electronics increases, demand for electrical energy is soaring. A billion new Chinese entrants into the QOL cycle will demand increasingly energy intensive devices in the next few decades. UCLA Geography professor Jared Diamond, the author of *Collapse* and *Guns, Germs and Steel*, believes the 21st century impact of the quality of life cycle will,

"be as if 72 billion people emerged into the world³."

Electricity, as we all know, is a regulated commodity. There are now plans in place for electricity to replace fossil fuels as the major source of power in our world. Electric cars and other modes of transportation are on the way. Yet these have been superseded today by the push of electronic consumer products.

¹ "Plugged-in Age Feeds a Hunger for Electricity, New York Times, Sept. 20, 2009 – "The proliferation of personal computers, iPods, cell phones, game consoles and all the rest amounts to the fastest-growing source of power demand in the world."

² IEA Report

³ "What's Your Consumption Factor?" Professor Jared Diamond, Jan. 2, 2008 NYT Op. Ed.

Electricity is viewed by most scientists as **potentially** the cleanest energy commodity. I have no problem with this view and the go-forward long term plans for our energy future. Natural gas, clean-coal and nuclear will be critical for base load electricity generation. However the Green Community's overriding optimism and disregard for the changing US and global economic landscape concern me. It is as if with a flip of the switch we will instantaneously transform to an all-electrical economy. To the displeasure of the Greens, I believe their immediate plans cannot come to fruition. The transition to a clean, electrical world for cars alone will require decades. Many technological breakthroughs are still required as well as the infusion of a generation of new automobile technology, not yet developed.

On the supply side the US is marking time arguing over alternatives when we should be implementing third generation nuclear technology and developing its fourth generation. Wind, solar, geothermal and other alternative sources supply only about 10% of overall US energy needs and little or no base load capacity. Energy Secretary Stephen Chu has publicly noted (May 2009) that by 2030 these alternative energy sources can supply only 30% of our energy needs – at most. We think he is very optimistic here. Supply of electricity is likely to become very much more expensive with Cap and Trade legislation designed to penalize frivolous and wasteful use. Estimates from the utility industry indicate a 20% to 40% increase in the cost of a unit of electricity. These de facto energy taxes will curb US domestic demand even as the world of electrical users is about to expand geometrically swamping such efforts. By 2030 it is likely to be “every country for itself.” China and India with 2.4 billion people, most impoverished, are sending those signals today relative to constraining carbon emissions.

On the demand side decoupling is very real. The emerging world is the key if not in the short but longer term,. The Quality of Life is driving emergence from poverty and ignorance. A country's quality of life will be an inverse function of the cost of electricity. China and India will therefore go their own way.

What does a kilowatt of electricity really cost? In 2004 a kWh cost 6.99 cents. This was 30% less than 1982 in real terms about the same as in 1974. The NYT 2009 Almanac notes,

“But although prices of other major energy sources increased significantly during the same period (1974 – 2006) electricity remained by far the most expensive source of energy on a Btu basis.”

Electrical energy is still the most expensive energy source. That cost disparity is about to increase. Alternative energy sources are not currently cost competitive with coal, natural gas or nuclear. The US government pays ethanol producers 51 cents per gallon to produce ethanol, for example.

What are the sources for electricity in the US? Electrical utilities generated over 3 trillion megawatt hours (mWh) of power in 2006 from⁴:

- 1) Coal, 1.5 trillion mWh

⁴ 1 megawatt hour is the approx equivalent of 3413 Btu's (Source AEI)
1Btu is equiv to burning 1 match – 8 gallons of gasoline is equivalent to 1 million Btu's.

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| 2) Natural Gas | 272 billion, |
| 3) Petroleum | 41 billion, |
| 4) Nuclear | 458 billion, |
| 5) Hydro | 633 billion |

In the production of electricity clean coal and gas will be even more expensive. Coal and natural gas contribute over half of the US electricity production today. These sources of power cannot be easily replaced within a generation or two. Even President Obama's Energy Secretary acknowledges this as fact.

Conservation is a key. The question remains - how to stimulate conservation?

The 2008 New York Times Almanac claims that Americans are lavish with energy use that Americans opt for convenience over efficiency. We agree. Higher electricity prices will curb "lavish" energy use while concurrently reducing the quality of life in North America. But massive new demand from Asia will also increase the cost of energy production and distribution. We say let the markets do their work. The ethanol program is a prime example of Government meddling in the US energy kettle.

North Americans will adjust down to more expensive electricity rates as must the Chinese and citizens of newly QOL-emerging countries adjust up to a higher and better lifestyle.

It is time to begin researching the utility sector to determine the winners from the losers. Which of the utilities will embrace basic power generation discovery and develop new, more cost effective modes of electricity generation and transmission? That is a relevant investment question that we shall address in the future. The impact of the "Smart Grid" and the technologies that will support the grid will all play in this discovery game.

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