

# The Next Energy Down-cycle

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Have you ever had that queasy feeling that your view of the future may not be right? When Chris Ross and I wrote *Terra Incognita: A Navigation Aid for Energy Leaders* published in 2007, we advocated that the world was entering a new energy phase. This new phase would see longer term higher energy prices with greater volatility but without the traditional down-cycle like the period from 1986 through 2002.

In this new phase, which had already begun, a mindset shift would take place over time from a strategic focus on primary energy sources to consumable energy sources (e.g. electricity, gasoline, diesel, and so forth). There were three driving forces bringing about this shift. First, we thought the world was entering into a period of scarcity of some energy sources, particularly conventional crude oil. Second, developing countries such as China and India would significantly drive up energy demand and forecasts were suggesting a doubling over the next fifty years. Third, our view was that environmental issues around green house gases would place a carbon charge on fossil fuels, spurring alternative energy sources but also raising overall energy prices. This led us to the view that the mindset in this new energy phase would be much more towards an energy portfolio through an interconnected network of interfuel substitutability. We also felt that higher energy prices would clearly drive technology both on the supply and demand side (i.e. through energy efficiency).

In our book, we suggested that there had been three prior energy phases starting with wood, then coal, and moving to crude oil which had been morphing into a hydrocarbon phase. In my view, in this unfolding portfolio phase, transportation markets supplied predominantly by crude oil would become the strategic catalyst in driving the energy network as its margins were so much more attractive than stationary markets where more diversified energy sources already existed and were growing with renewable sources. I felt for some time that we may be moving into an electricity world; perhaps the new energy phase eventually translates into this consumable electricity source. But the slow pace of the turnover of the automobile fleet to electric and hybrid vehicles, battery and cost challenges gave me the feeling that the demand would outstrip advances until longer term momentum is gained probably a couple decades out. A study at the Center of Entrepreneurship & Technology at the University of California, Berkeley forecasts electric light vehicles representing 24% of the U. S. fleet by 2030 with a corresponding reduction of oil imports in the range of 2 to 3.7 million barrels a day.

Additionally, it is hard to envision aviation transportation being fueled by electricity over the next several decades. The potential for gas to liquids and coal to liquids would begin to play a role, particularly with technology advances but not to a sufficient degree to drive us into a down-cycle. Biofuels looked like a reasonable substitute for crude oil, but the development cycle would take time and money with transportation demand still

more pronounced than supply. Even the U.S. Energy Information Administration acknowledges the goal to blend 36 billion gallons of biofuel by 2022 won't likely be met. So my view has been that we would likely see higher crude oil prices for the next several decades with the culmination of networked portfolio efforts having an oversupply impact more toward mid-century than in the nearer term.

Here is where I am feeling queasy. The literal explosion of efforts to capture this transportation market margin around the world is likely to bring substitutes on more quickly coupled with the same type efforts on the efficiency side. And if crude prices rise as some people forecast back to 2008 levels, this will simply accelerate the search for substitutes to capture this transportation margin. But the unanticipated wild card is now the role of natural gas in vehicular transportation with the abundance of new resources from unconventional plays, particularly in shale gas.

These unconventional sources of natural gas appear to be in big energy consuming markets, which creates a potential to have a substantial supply impact on transportation fuels much earlier than would have been anticipated. In essence, natural gas turns into a consumable transportation fuel source of sufficient magnitude to drive prices into a down-cycle.

There has been a lot of coverage of the T Boone Pickens plan with the conversion of 8 million trucks in the U.S. from diesel to natural gas. Pickens claims that this could cut the 5 million barrels a day we import from OPEC in half. [http://www.truckinginfo.com/news/news-detail.asp?news\\_id=69845](http://www.truckinginfo.com/news/news-detail.asp?news_id=69845) Now, Tillerson of ExxonMobil doubts this all will happen particularly because of the infrastructure costs. It's this chicken and egg problem but a significant tax credit to purchase natural gas powered trucks could lubricate the process, which Pickens believes could pass by Memorial Day. In my March 17 blog , I outlined the Houston Metro Natural Gas Vehicle Consortium that is trying to address this chicken and egg problem locally. While there are uncertainties around natural gas penetrating the transportation market, this raises warning signs on the price of crude oil in the mid-term.

Short term crude pricing is a bugaboo to predict as political events, weather, mishaps, inventory levels, and so forth get all entangled. Over the mid and longer term, a key indicator is the excess supply of crude oil worldwide. When that gets tight, prices rise as conditions shift from commodity economics to scarcity economics with two relatively inelastic supply and demand curves rubbing against each other. A two or three million barrel swing can make a significant difference. If all these substitutes, particularly natural gas usage in the transportation market, get jump started, then a drop in crude oil prices may not be just the impact of an economic cycle but could be due to excess crude supply. In the end of the day, one has to do all the fancy footwork with marginal cost of supply sources for rigorous estimates, but it wouldn't surprise me to see \$30 to \$40 per day for crude prices if natural gas vehicles really take off this decade. After all,

if one converts natural gas into crude oil equivalent, the price at \$4 MMBtu is around \$24 per barrel and at \$6 MMBtu that equilibrates to about \$36 per barrel. In such case, it may well be that we are just going through a traditional energy cycle with a real down turn in the latter part of this coming decade or early in the next decade. This will obviously have implications on the return economics for investments in traditional and new energy alternatives geared towards transportation markets as marginal costs set prices not the investment made during periods of excess supply. On the other hand, this evolving process around natural gas vehicles could bring some help for higher pricing in power markets. It looks to me that with new found abundance of natural gas, it will be the fuel of choice for new power plant builds and the continuing marginal supply setting prices in electricity generation. But a demand pull on natural gas for transportation markets should increase its price point.

Let me conclude by saying in my experience predicting crude prices and natural gas prices is not unlike rain dancing. Make enough predictions and at some point in time you will get it right. As the Vice President of Corporate Planning for Shell Oil back in the late 1980s, I had to plot all of the previous forecasts Corporate Planning had made over the decade of the 80s against actual crude oil prices. It was humbling to see how far off our projections had been. What we always had difficulty taking into account was the fact that energy is a live interacting system constantly making adjustments based on expectations that are self-defeating. If you expect high prices, then investment actions will be taken to increase the supply, which by their very nature drives down prices. It looks to me like this may come sooner than envisioned as there is a tendency to predict today's conditions out into the future driving more investment and R&D.