Connections: Insights on Energy Policy from the Aging Infrastructure Issue

By Dan O'Neill,
President & Managing Consultant,
O'Neill Management Consulting, LLC
dan@oneillmc.com

Published as a post in Energy Central's Energy Pulse, October 15, 2008

I am not an energy markets expert. I can claim to have some expertise in utility asset management, reliability, and emergency management, so I offer the following thoughts in the spirit of 'connections', i.e., out-of-box thinking that comes from interdisciplinary cross-fertilization of ideas.

Checked the price of gold lately?

But first, I have to set the stage by reviewing some basic economics. The recent record-high dollar price of oil is likely to be caused by two main factors:

- The low price of the dollar
- The high demand for oil

The first factor is evident from viewing the trend of all commodity prices, not just oil, as utility executives well know, and anyone else who has to buy lots of equipment loaded with copper, steel, etc. To accentuate the point, look at a forty-year chart comparing the dollar prices of a barrel of oil and an ounce of gold. Oil has traded at a ratio of between .05 to .15 oz./bbl., with .10 being a typical ratio. That means that oil was about $3.50 a barrel when gold was $35 an ounce, and $35 per bbl. when gold was $350 per oz., and it explains why oil was floating around $100/bbl when gold hit $1,000/oz. in March of 2008. Gold has retreated since then, while oil rose and then fell back even more in the financial crisis, but that just shows there are other factors at play ('other things *not* being equal' in this case, which makes the explanations less facile, but still true).

As for what has driven the low price of the dollar, I defer to experts in other fields (see my disclaimer above), but Lou Dobbs would probably tell us that it might have something to do with Americans' increasing taste for foreign goods, including Middle Eastern wars, Chinese manufactures, and outsourced Indian services. Since I can claim to have learned something about monetary economics in my younger days, I would have to add the foreign currency impact of the Federal Reserve's attempts to

stimulate a flagging economy for eight years and to calm panic-stricken markets lately with low interest rates and easy money.

As for the high demand for oil, you can take your pick of influences, starting with the aforementioned pumped-up US economy as a base, and adding the roar of the Asian tigers, energy-rich hybrid agriculture (encouraged further by US ethanol policy), and war/conflict-caused supply shortfalls (Okay, that's not 'demand', but it still causes demand to be in excess of normal supply). By the same token, the recent drop in oil prices shows clearly what happens when demand falters, even in the face of perceived supply shortages.

Another pair of related factors mentioned much of late are 'peak oil' and 'speculation'. This gets us a little closer to what I want to talk about, because I see some parallels between the world's limited supply of low-cost petroleum and the utility industry's aging inventory of transmission and distribution assets. Seems like quite a leap? Maybe, but bear with me and read on.

'Peak Oil' and the 'Tsunami' of Aging Infrastructure

The crux of the peak oil argument is that there will come a point, and many argue it has already come for US production and maybe even for world production, when the proven reserves and annual production of petroleum extractable at historically average real costs per barrel will peak, while the demand for oil continues rising, thus causing an inexorable (in the long run) rise in the price of oil, as demand slides up a potentially steep curve of less desirable prospects for producing new oil. The policy argument that accompanies this insight is that we need to start taking drastic measures to shift our economies to using less oil, from parking our SUV's and riding trains, to turning ourselves into bicycle-riding vegetarians eating regular-seed grains. (And this without even mentioning global warming!)

While I actually might enjoy such a lifestyle (I put a total of 3500 miles on my car last year, but, I must admit, flew airplanes a lot), I am not ready to sign up for that policy just yet, because I think its logic, while on the right track directionally, has the *speed* all wrong. It is good to anticipate problems rather than react to them, but not to overreact.

I draw this lesson from a similar situation closer to my area of true expertise. For over a decade (about as long as people have seriously been screaming about peak oil), utility analysts have been warning about the aging of the infrastructure that utilities use to deliver electricity (and, natural gas, too, though in a different forum). Some have even predicted a 'tsunami'-like wave of suddenly rising rates of failure that would come about as utility assets installed during the 'baby boomer'

years reached their 'end of life', assumed to be something like the thirty years implied by typical depreciation rates used in regulatory rate calculations.

Now, elsewhere I have shown that this is a myth. (In case you don't have a calculator, we are well over thirty years past the peak of the baby boom). True failure rates for most classes of utility assets today are very low, often less than half a percent per year, and are rising at a rate of two to seven percent per year, say five percent. Now, to be sure, that means that wearout-type failures would double in about fifteen years, and quadruple in another fifteen, if nothing were done, but even that is hard to characterize as an inundating wave. I have suggested calling it a huge swell. I admit, though, that just as when an ocean swell hits a stationary island and crests, there may be precipitating events - a big heat wave or hurricane - that will make the failures rise suddenly at a point in time, and more so than if the swell were not there, but such events will be episodic. Witness how quickly the blackout of August 2003 fades in our memory (even while NERC fights to keep some momentum in its efforts to improve reliability, insisting on higher transmission spending while energy prices double).

What I usually recommend to my clients is that they embark on a preventive replacement program that targets those assets which are demonstrating current and projected failure rates that warrant economic replacement (when reliability itself is given reasonable economic value). Often, this winds up being in the one to two percent range for various asset categories at present, rising at five percent per year (percent, not percentage points). What I strenuously resist, though, is the argument that replacement should be much higher now because all of these assets are about ready to come crashing down on our heads as they reach their precipitous 'end of life'. Instead, we should expect to endure a 'death by a thousand cuts' as they gradually wear out over a useful life that is not a single point in time but is a broad distribution of failure times, some early, and some very much later.

In the meantime, all our appliances could change (they are already increasingly DC-using), plug-in hybrid electric vehicles could become the way we distribute much energy, and global warming or high oil prices could completely change just how much energy we really need to distribute and where. Sufficient for the day are its own problems.

The analogy to peak oil must by now be obvious. There is no denying that the amount of petroleum we can extract out of the earth at reasonable real cost is limited. We could argue that we owe it to our children to leave some of it for them, and that argument has some merit, but my politics makes me suggest that the free market, with just a little help, will do a better job of rationing what's left than an agency full of lawyers would.

Nor should we beat our breast for not having thought of this problem sooner and done something more about it. I personally would have liked to have seen Jimmy Carter's energy policies held onto a bit longer into the Reagan era, but as long as big oil and OPEC were killing each other (literally?) to give the stuff away at decreasing real prices, it was hard to argue that we should take some and put it aside for our children. That would be a little like saving up for college by putting money in a cookie jar or under a mattress. A better idea would be to invest the savings in productive capital, and a better idea for energy policy is to invest in technology R&D to bring about better alternatives to oil in the future. To be clear: I am not suggesting that the government take over the production of alternative energy, only that it should recognize that information is a public good, and so markets may be helped by public investment in proving technologies which private companies can then be allowed (or licensed via auctions?) to manage for profit. Such 'proof of concept' may require legislating that at least a token percentage of the market be alternative. That could include proving alternative technologies for demand reduction as well, like maybe vehicle fuel economy standards (which Carter enacted and Reagan gutted), AMI-enabled smart grid, and LED lighting.

So, we can have death by a thousand cuts, with oil prices continuing to escalate, or life by a thousand innovations, not any one, and not all at once, but a series of technological improvements driven by market realities and a little bit of enlightened energy policy. And in the meantime, we can enjoy a temporary respite from the 'inexorable' upward spiral by throwing a monkey wrench (British: spanner) in the works with a financial crisis that threatens to reduce worldwide demand by slowing down our economies.

'Oil independence' is the wrong name for the right idea

Ever wish you hadn't said something quite that way? I wish whoever started using the phrase 'oil independence' would have thought before speaking, because the idea is actually not a bad one, but the term is absolutely awful. Even '*energy* independence', which is better, is still not right. What we really need is *less* dependence on oil, which is obviously not as catchy a phrase. Because the fact is that even today, the demand for oil is very inelastic in the short run, and by that I mean the next few years. That is why it goes up so drastically when there is excess demand, and why it drops like a rock when there is excess supply. I grew up in Louisiana and have plenty of friends and relatives who work in and around the oil business who remember both the good times and the bad. Remember December, 1998, when oil had dropped to $10/bbl. from being around $20 or more for years?

We don't have to be, nor do we want to be, 'independent' of oil. And all the greenies who think we should live off of nothing but solar panels and windmills really are smoking something funny, but the pundits who criticize their naiveté are

missing a good point: with just a little less use of oil, we wouldn't have to worry about being independent of it. (Okay, significantly less, and worldwide at that, but that is still not even close to cold turkey). With a real cut in demand, they would be back to killing each other to give it away, at least as long as we kept reducing demand at the rate that peak oil is declining. And there would still be plenty left for our children. [As a side note, I might add that I originally penned this article before the financial crisis and the subsequent crash of demand and oil prices, only to see that my warning about how quickly oil prices can drop would be proven out in just a few months].

What is more, in the process we could be building domestic industries and jobs, maybe even proving that domestic coal can be burned cleanly with a technology like Integrated Gasification Combined Cycle, which can turn coal into hydrogen and potentially sequester the carbon. I don't think for a moment that we should be trying to distribute hydrogen across thousands of miles through pipelines like methane, but the real 'hydrogen economy' may come from central-station IGCC and distributed methane-based fuel cells. But now I have overstepped my expertise (let the reader beware). I would like to see if some real energy experts think likewise.

In the meantime, I hope I have caused some new thoughts to grow in a different field.