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Comment:	While the NY State Energy Plan has nice goals and aims, it is largely an effort in wishful thinking, and trying to put the best shine on a dismal performance OF WHAT IS REQUIRED. Much of this has do do with the LACK of stable electricity prices - in other words, the LACK OF A RENEWABLE ENERGY FEED-IN LAW. Until these are established, NY's performance will continue to under-perform what is even minimally required, and is also dependent on electricity prices. NY needs to pass A187/S2715 if significant renewable energy installations, and related jobs/economic activity, is to occur. It is that simple. This document, and associated Energy Demand/Fuel Price Assessment have major problems, are overly optimistic, and also fall into the "Money for Nothing" category. They need fixing. Dave Bradley

Since the 2002 endeavor (that old NY Energy Plan had a Republican flavor to it), we've had a strong taste of Peak Oil ($147/bbl) and Peak Ngas ($14+/MBtu), as well as average electricity prices composed of the sum of generation (8.3 c/kw-hr) and distribution (and a lot of etc in that category) of 8.1 c/kw-hr, for a combined statewide average 16.4 c/kw-hr in 2008 (but, generation costs in upstate NY were around 6 c/kw-hr). In 2006, the customers in the NYISO zone of Long Island got nailed with prices of 99.5 c/kw-hr for just the generation part for a couple of hours in 2006's heat wave. The 2007 to 2008 price spikes in all energy supplies led to a phenomena called demand destruction - where some customers could no longer pay the high prices, and either "dropped out" of the market (or dropped dead, in the case of a lot of third and fourth world countries) or lowered their demand. Hopefully dying of heat stress or freezing to death are not a "future growth trend" for NY State's millions of poor people...since the general rule of capitalism is, "No money, no honey" (that may apply to other things, too...).

Now we are faced with the recession/depression of 2009, of which a major factor in kicking off that economic tailspin was those high energy prices - because customers had to divert money from other intentions to pay the energy tab. And as is typical for an energy price spike, economic downturn was the subsequent result. In this case, the demand destruction led to an excess of supply, and prices crashed and burned as nationwide electricity use in 2009 is 7% less than in 2008. The same goes for gasoline consumption, and there are similar trends in coal and Ngas markets. Ngas is now selling on the wholesale market for less than $4/MBtu, which is 50% of the price needed ($8.15/MBtu) for new gas to be produced, at least according to Credit Suisse, which finances Ngas exploration and production (E&P) efforts. Meanwhile oil prices have recently recovered (from $35/bbl) to near $70/bbl, which is close to the marginal cost needed to find/extract/produce new supplies (especially from the tar sands in Alberta, where it may now be even higher) - about $65/bbl. Meanwhile, spot coal prices have dropped from near $150/ton to near $40/ton for Appalachian coal.

All these dismal prices (from a producer and production standpoint) lead to the concept of supply destruction - the investments needed to extract new supplies (renewable or non-renewable) get squelched, and for non-renewables like oil and Ngas, existing well depletion and well shut-ins (the same for mines for coal) remove supplies from the market, and eventually, supply and demand get more or less balanced. For example, in less than a year, more than 50% of natural gas drilling rigs that were operating in the 2007-2008 period have been mothballed or shipped out of the country. And since a normal gas well depletes at about 40%/yr, and a "non-conventional" well (such as gas shale wells) depletes at 80%/yr, this matters with regards to the future supplies and future prices. This sets up the price roller coaster once again....once diminishing supplies collide with stagnant and/or increasing demand (maybe the economic activity will pick up form current dismal levels...that would be nice), up goes prices. It takes some time to get gas flowing, mines reactivated, new oil fields producing, and since resumed activity won't resume until the prices is assured to be at levels justifying these investments, well, there is bound to be some price "overshoot", to use industrial controller terminology.

This also affects renewables, and especially wind turbines, in a big way. In 2008, wind turbine installations were proceding at a decent pace in NY State, but then the bottom fell out of the NYISO electricity prices (the generated prices). Prices are averaging 2.5 c/kw-hr or less in Western NY - but those distribution costs are now slightly higher than they were in 2008 (less electricity distributed but at the same overall cost), so you might not see much benefit. However, what you definitely won't see for a while is new installations of wind turbines in NY State. The 2.5 c/kw-hr average prices are a prescription for bankruptcy as long as this electricity is marketed in "merchant mode" on the NYISO markets. Prices for onshore wind need to be in the 5.5 to 7.5 c/kw-hr range to justify these investments - and this is with the many tax based Federal Government subsidies (MACRS, PTC, etc) factored into account. Unfortunately, the dismal economy also has severely degraded the usefulness of these subsidies (no profits from other operations means no useful tax deductions or tax credits, since you have to pay taxes to gets credits and deductions, usually). NY State also has an RPS incentive that averaged 1.475 c/kw-hr last year, but the bid for this in 2009 may actually DECREASE as more bidders compete for the given quantity of electricity.

Of course, there are other approaches to electricity pricing, like Quebec's province wide winner take all RFP awards - 4 to date - (1 GW + 2 x 1 GW + 0.5 GW) or Ontario's Green Energy Act. The need for wildly varying electricity prices on renewable electricity - which has as one of its dominant characteristics completely predictable and stable prices for over 20 years following system installation - well, that's highly dubious. And pretty much beyond my ability to fathom any usefulness for it (other than to make rich people richer, and (maybe) crumbs for the rest - and that does not really seem very useful - see this on why rich people getting richer seems superfluous these days). In fact, one of the best ways to degrade the value of wind derived electricity is to provide variable (and unknowable) prices to future electricity supplies. This drops the marketable (and thus loanable) value of this electricity to the marginal production cost of wind, such as 2 c/kw-hr, instead of 6 to 10 c/kw-hr. Those varying prices seem totally useless for all except those who like to gamble on electricity prices, or on the prices of fossil fuels that get used to make electricity. Call it NY's "Vegas Curse"....or just plain stupid, but that is why NY's renewable energy installation rate is now moribound. Those variable prices are required for fossil fuel based electricity, since those fuels vary a lot in prices, and the price of electricity made from them is largely a function of that fuel price. However, supposedly fossil fuels are going the way of the sources for those fossil fuels (fossils, dinosaurs, paleolithic bacteria, algae and plants) - in short, obsolete...

So, what about the NY Energy Plan? On the website, there are numerous supplementary explanatory sections, and going through them is informative. They've even put some effort into describing future energy prices might be - especially for oil, Ngas and coal. Well, the NYSEP is not a done deal yet, and there is still room for comments, so here are a few:

1. Peak Oil, and Peak Natural Gas (Ngas) is poorly addressed, to say the least. Oil is mostly used for transportation (cars, truck, plains and trains), but oil and gas prices get connected via heating oil for residences, boiler fuel, chemical feedstocks and electricity.

Since 2005, world oil production has remained essentially stagnant despite much higher prices, and a number of the world's biggest oil fields (megaprojects) - such as the Burgan field in Kuwait and the Cantarell offshore field in Mexico - have peaked with respect to the rate at which oil can be extracted. About half of the world's oil comes from big fields, so this matters. In addition, about 4.5 to 6 mbd of "new oil" needs to be found each year to make up for depletion from existing wells, and that is simply not being found/developed at $70/bbl. This sets the stage for oil price spikes in the near future. These price spikes will have significant feedbacks into the economy (and not good, either), as well as increase the demand for Ngas. Finally there is the so-called Export Land Model, which will mean that there will be much less oil available FOR EXPORT from countries that produce more than they consume (the US now imports about 13 mbd of oil and oil products) as countries like Mexico and Russia begin using more oil they produce and also have depleting oil fields with lower production rates. World oil production rate is not as important as in the amount available for export.....this graph shows who has been exporting.

There are many Casandra's with regards to future oil production, and the future is not known until it happens. However, here is one warning by the very conservative (not necessarily in a political aspect but more a technical one) Faith Birol, chief economist of the International Energy Agency - he predicts demand exceeding supply in late 2010. Another person with an excellent track record is Dave Cohen, one of the founders of "The Oil Drum" website - his estimate for the next oil spike (where demand exceeds supply) is 2011. If oil prices go up at a fast rate (similar to 2007-2008), prices for natural gas and coal will also spike, as large consumers rush to substitute Ngas and coal for oil, where possible - especially for heating, chemical manufacture and electricity production.

NY State has essentially no oil production, only one operating ethanol facility (50 million gallons/yr), and a large population/large sub-urban (and hence petroleum addicted) infrastructure. Thus, the potential downside to oil price spikes is huge, and this report does not address any likely solutions (even partial) to this dire situation. Two approaches would be more mass transit (except between UB Amherts and Buffalo, which seems to be deemed verbotten by UB management/administrators and planners of UB2020...) and more biofuels - ethanol, biodiesel, ammonia - production. In addition, a higher gasoline tax that is raised gradually but consistently would also help to behavior modify the public from buying the personification of idiocy that are SUV's. But, the NYSEP sidesteps these points by never stressing the economic calamity of petroleum price spikes, and the inevitability of these spikes as the downward part of the Hubbert oil curve is experienced world-wide. NY's only solution to Peak Oil is to use less oil in a significant manner, and soon...

2. Ngas is a bit more problematic - most of this will be domestically obtained in the US and Canada. While huge new finds in "tight shale formations" (unconventional gas) have been found, this will not be cheap gas, despite claims to the contrary. This will be expensive gas to develop, and will also require huge capital expenditures, and huge continuing expenditures. This will evolve into a competition for money between wind turbines and gas shale (about $75 billion/yr to supply the required amounts of Ngas, a result of the rapid depletion of tight shale gas extraction). And there is the water

pollution problem associated with hydrofracturing (fracking) - water table pollution, fracking fluids, producer water (high in salt content, and with troublesome poisonous impurities like benzene and metals like cadmium, selenium, vanadium and arsenic) as well as sediments. Combined with depletion of conventional Ngas fields and decreasing supplies of oil, it seems that high prices for this "difficult gas" will be required to make gas shale projects profitable.

This is VERY important for NY's energy future, as plentiful Ngas in North America will depend on on "unconventional gas" to an increasingly large extent - check out Figure 5 in this article, or an updated summary of the official US government estimate here. As can be seen, onshore "unconventional gas" (tight sands, tight shales, coal bed metahne) will comprise about half of the US Ngas supply in the at present, and is projected to be almost 60% by 2030. If this turns out to be an overestimate because such gas is pricier and more difficult to extract than can be profitably obtained, the US Ngas market will be characterized by very high prices, when demand in greater than can be supplied domestically. In addition, the NYSEP assumes increasing production from within the state, all via the Marcellus Shale fields. About 60% of NY's electricity is made from Ngas - and higher percentages when demand goes above the average of 16 GW.

Unfortunately, the track record for gas shales is not good. One such region where intense drilling activity has taken place is near Dallas, in the Barnett Shale play. In an article for ASPO, Arthur Berman describes how the 12,000 gas wells in the last few years have performed. His analysis - less than 31% would break even or be profitable if "netback" gas prices (market price less transportation and marketing) were $8/MBtu, in a region with minimal pollution law enforcement (Texas) and a huge petroleum infrastructure. He determined that the Estimated Ultimate Recovery (EUR) for wells in the Barnett field will be about 0.6 billion cubic feet (or 600,000 MBtu). If the well costs $10 million to drill/connect to pipelines, the required cost before various subsidies would be $16.7/MBtu. At $3.3 million per well, breakeven happens at $5.6/MBtu netback. However, with prices at near $4/MBtu...this is an unsustainable situation. With regards to the actual economics of Ngas E & P (very capital and energy intensive), low cost financing is essential. This in turn gets based on low financial risk, but if the Barnett experience applies to other Gas Shale developments, these are in fact HIGH risk. High (financial) risk means high financing costs, which further increases E & P costs, and which mandates higher netback Ngas prices. He also describes how initial production rates (IP) were poorly correlated with EUR (IP's are used to justify further investments/bank loans). In NY State, prices would need to be higher than for those in Texas, due to (presumably) better pollution law enforcement and higher land leasing costs, for starts.

At $8/MBtu wellhead , delivered gas prices will be approximately $10/MBtu. The breakeven electricity price for a combined cycle unit (50% thermal efficiency) would be near 8.3 c/kw-hr, and for a single cycle "peaker" unit (35% efficient), prices near 11 c/kw-hr would be needed. And since these are operated in order to make a profit, still higher prices would be required. However, if the Barnett experience is applicable to the Marcellus situation (very similar geology), more than 2/3 of all gas wells would be money losers at $8/MBtu "netback price", and as time goes along, well yields would be expected to drop/production costs rise as the "sweet spots" get tapped preferentially. To use this Ngas for electricity, prices above 11 c/kw-hr would be needed for peaking facilities, and 8.3 c/kw-hr for "stand-alone major baseload plants", just to break even. If higher well profitabilities were required by financiers/bankers, and also higher likelihoods of breakeven wells than historical 31%, prices would need to be higher. And at netback prices of $12/MBtu, electricity from completely UNSUBSIDIZED (as in, Feed-In Laws) would be a cheaper way to make electricity than using such expensive Ngas.

Note: in the article, there is reference to exponential decline and hyperboilc decline rates. So here is a graph describing this phenomena. You can see that if the IP is extrapolated using hyperbolic decline, large production volumes will be envisioned, especially initially. But if the reality is an exponential decline, the projection based on the IP will be wildly off the mark. Most gas wells (not field; there are typically many wells in a field, and wells are constantly being drilled in a given gas field as they run dry) tend to be modeled on hyperbolic models, but shale gas wells tend to follow exponential models after a small initial period of time.

Here is the money quote:
"I am disturbed that public companies and investment analysts make fantastic claims about the rates and reserves for new shale plays without calibrating them to the only play that has significant production history. Almost every assumption used by the industry to support predictions about the Haynesville or Marcellus Shale plays is questionable based on well performance in the Barnett Shale. While it is true that every play is different and the Barnett Shale does not perfectly predict what will happen in other plays, it seems reasonable to temper and calibrate our uncertainty with what is known. There are many lessons we can learn from the Barnett Shale, and they all suggest a cautious approach to developing new shale plays."

To date, the Barnett Shale region has produced 5.3 trillion cubic feet (tcf) of Ngas. He estimates that the EUR for all of the 12,000 wells in the 15,000 square mile region (122 miles x 122 miles) will be about 8.8 tcf. The USGS estimated quantity of extractable gas in the Barnett Shale zone is estimated to be 26 tcf (US consumption is 23 tcf/yr), and this would require more than $75 billion investment in wells, pipelines, etc to tap this potential gas from $23,000 new wells. That $75 billion is more than 4 times the total invested in wind turbines in 2008 in the US. And the 26 tcf would be spread out over a decade, even though that quantity of Ngas corresponds to a bit more than one year's US consumption (2008).

For more information on shale gas drilling and fracking, see http://www.un-naturalgas.org

And lastly, there is the value of the dollar relative to the Euro and Canadian Dollar (now at par with the US dollar - a swing of 18% in 2 months...). As the dollar continues to devalue with respect to stable currencies, the cost of imported oil will rise even more.

And ditto for imported Ngas, or Ngas derivatives like methanol and ammonia.

In summary, world oil production will, at best, remain constant for the next couple years before invariably tracking downward after 2011. This will collide with an increasing demand (more people, improved economies), resulting in another spat of high prices, which will also tank the US and/or world economy. And there is little probability of using Ngas to fill in for oil - in fact, once the current oversupply/lack of demand for gas is rectified in the near future, Ngas prices will also spike, probably in concert with oil prices. The best way to deal with this is a combination of renewables and energy efficiency, as this will lower the demand for fossil fuel energy. Until the spikes hit, prices, especially of Ngas, are likely to remain below the cost of replacing this Ngas with new gas. That will also help keep electricity prices in the dregs, and thus trashing most renewable energy projects in the US aimed at making electricity, at least until the spikes occur. Projects will then have a very limited period of time to be installed during the high price period; at the conclusion of the spike, electricity prices will once again crash. Repeat, rinse and lather...

3. Electricity prices - Due to a combination of greater efficiency and (supposedly) greater renewable energy production, generated electricity prices are.......predicted to decline! As electricity prices decline, the ability of new renewable energy installations to be profitable (now already very unprofitable, even with significant subsidies) will become even less profitable, and/or more of a money losing prospect. This is a nasty viscious circle, which can be cured in two ways. One is even greater subsidies for renewables (requiring higher taxes, mostly on non-rich people), or the other is a Feed-In Law arrangement. Neither approach is stressed.

4. Renewable Electricity Potential - especially for wind. When translated into average delivered GW (divide GWh by 8766), not even the very low AWEA figure (~ 7 GW) is obtained. The main problem is that the renewable energy potential of NY State is strongly dependent upon the price that can be obtained for this electricity, and for all practical purposes, the only way to lower the production cost is to lower the cost of money for commercial scale (and all others, for that matter) wind turbine installations. However, that only goes so far, and the financial risk for developers in NY is severely exacerbated by the variable nature of future electricity prices as well as the high development costs for projects. A low NYISO price for electricity (such as less than 4 c/kw-hr) will mean that essentially NO wind, tidal and run-of river electricity projects can be profitably developed, and thus NY's non-hydro renewable potential is...zero. A high price, such as 90% of that required for a new nuke plant, would give NY more than enough wind potential to power up the entire state. If electricity prices such as those experienced on average for 2008 in the NY City-Long Island region were to be in effect for the next generation, the 2 GW tidal energy potential of Long Island Sound could be developed, along with a considerable portion of NY's Atlantic coastline /offshore potential energy.

Try this as a mental experiment. NY has a land area of 47,213 sq miles, and 7,342 sq miles of water surface (~ 2500 sq miles for Lake Ontario, ~ 560 sq miles for Lake Erie, ~ 4000 sq miles for the Atlantic Ocean/Long Island Sound). Let's assume that only half of the state land could be wind turbine usable (the windward side of the hill), or about 23,000 sq miles. Assume that 1 x 1.8 MW moderate resource oriented wind turbine per sq mile could be installed, which is 41.4 GW of capacity. At 30% efficiency (for a Vestas V-100 unit, very feasible - requires a hub ht wind speed of 6.3 m/s at 95 meters ht)), this gives a delivered energy output of 12.4 GW. Add in expected hydroelectric capacity ~ 3 GW, and essentially all of NY's electricity could be supplied. However, there is the ~ 7000 sq miles of usable water surface. Again, lets assume that only half of it can be tapped (3500 sq miles). At ~ 4 MW delivered per sq mile (10 MW capacity per sq mile), this is 14 GW of delivered electricity - again, roughly equal to the current and projected electricity demand (~ 16 GW) in the Plan. Add in both the offshore and onshore wind capacity, and this is twice the current supply/demand for the state. Add in run of river hydro and tidal (2 GW), and there is NO NEED for nukes, oil, coal or gas burners on a baseload basis - only for "peaker power". The peaking power could be largely supplied by pumped hydro and some biomass sourced fuels (wood, ethanol, ammonia, methanol, methane) to take care of those differences between short term supply and demand...

But unfortunately, the NY Energy Plan seems to opt for "Wimp Scenario", still burdened by fossil fuels and nukes as the primary suppliers of the state's electricity. And electricity prices are both unrealistically stable and on average, low for this largely fossil fuel derived product. For example, Ngas prices have spiked and crashed 4 times in the past 9 years, and the damage due to these spikes is probably worse than if a high steady price was maintained over that same time:

5. Then there is the supposed new nuke (1.6 GW) near Oswego...at 20 c/kw-hr WITH subsidies (no garbage disposal (spend rods) or catastrophic insurance), this is almost twice the cost of onshore power....so.... Why go with nukes? Anyway, on the plus side, NYSEP assumes that the Indian Point nukes are shutdown (no discussion of the Ginna "old geezer" nuke near Rochester, the states oldest operating unit...).

6. Coal usage is projected to remain essentially constant for the next 20 years. As would CO_2 pollution from such power plants...

7. As for the photovoltaic potential, without a Feed-In Law, only enhanced state subsidies added on to federal subsidies will produce meaningful amounts of new PV derived energy. It is simply too expensive, and is likely to remain so. After all, the PV material in such systems is only 10% of the total cost to produce such materials, so even getting the photosensitive material for free will do little to decrease the overall cost. At current real, unsubsidized costs near 60 c/kw-hr for large scale systems, there is no way PV can compete with other NYISO marketed electricity at 2.5 c/kw-hr.....

Finally, one more interaction to consider. Energy price spikes are enormously disruptive to the national and state economy, as that represents a huge removal of money from NY residents to...elsewhere, with no corresponding increase in demand for NY goods or services. These tend to depress the NY State tax revenues and increase expenses to significant extents (lower tax revenues, higher expenses like unemployment insurance, increased crime, increased prison costs, more welfare expenses, etc...). Thus, the ability to deal with the detrimental aspects of hydrocarbon energy price spikes will DECREASE over time, not get better; each spike makes surviving the next one that much more difficult. So, the sooner peak Oil and Peak Ngas is faced and dealt with via more renewables and more efficiency, the better off we in NY will be.

Oh well, that's my take on this. What's yours?

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