



A Conversation with Vinod Khosla

Posted by [Robert Rapier](#) on July 31, 2006 - 10:00am

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Tags: [electricity](#), [ethanol](#), [politics](#), [sustainability](#), [vinod khosla](#) [[list all tags](#)]

Introduction and Background

In my recent essay [Vinod Khosla Debunked](#), I challenged Mr. Khosla to a written debate on his recent ethanol claims. Mr. Khosla e-mailed me shortly after that essay appeared, and offered to discuss the matter by phone. I wanted to first make sure he understood my objections, so we exchanged several e-mails in which I spelled them out.

Finally, he called and we spent about an hour and a half on the phone. There was very little small talk - no chit chat, jokes, or laughter ([sorry Don](#)). We got right down to business. I took a lot of notes, and I will try to reproduce the conversation. He encouraged me to report on what we talked about, and even offered to assist me in reproducing the details. He told me some things in confidence, and I think I have my notes flagged in each case so I don't reveal something he doesn't want revealed. I will attempt to report this as objectively as I can, and I will send him the link so he can let me know if I got any of the details wrong.

At my disposal, I had his presentation [Biofuels: Think Outside the Barrel](#) (10 meg PPT warning), a marked up version of his paper [Is Ethanol Controversial?](#), and a list of talking points I had prepared so I wouldn't forget to cover any major areas. Here are the talking points I had prepared beforehand. These were merely to help my thought process as we talked, and I didn't necessarily cover them in this order.

1. Motivation?

- Is your top priority making money?
- Or helping society?

2. Energy balance for ethanol not better than gasoline

- Think of energy consumed versus energy returned
- Petroleum input is not consumed
- Corn inputs are not counted
- Comparing refinery efficiency versus an energy ratio

3. If the solution fails, what is the cost?

- The white paper asked, but never answered this question
- Wasted time and resources - Peak Oil looms
- Public loss of credibility

- Public disillusionment with alternative fuels
- Lost opportunity - public was not encouraged to conserve
- Status quo 10 years from now

4. Cost of ethanol versus gasoline

- If ethanol is cheaper, why has rack price been higher for 25 years?
- If ethanol is cheaper, margins are better, and so it should be able to grow quickly without legislation
- Why do you accuse oil companies of gouging when ethanol has better margins?

5. Environmental issues with ethanol

- Topsoil depletion; ramping up corn ethanol encourages this
- Aquifer depletion
- Corn growing pushed to marginal lands
- Herbicide and pesticide runoff; ramping up ethanol will make this worse
- How is this different than pollution caused by gasoline?

6. Over-promising technology

- Nitrogen fixation - Holy Grail of crop science, but very complex problem
- Cellulosic economics, yields, etc.
- Can't bank on these breakthroughs; but should fund research

7. Subsidies

- If ethanol is so cheap to make, it doesn't need subsidies
- Many so-called oil subsidies don't benefit the oil companies at all; they benefit consumers

8. Food versus fuel

- This is already driving up grain prices
- Grain stocks being drawn down to record low levels
- Exports will be reduced to produce ethanol

9. Potentially better solutions

- Carbon tax
- Solar
- Wind
- Biodiesel (esp. algal)
- Butanol
- Biomass to electricity
- Storage system technologies allowing renewable electricity
- Electric cars (Tesla Roadster as example of feasibility?)
- Electric rail (Alan's proposal)
- General move to electric transportation
- Emphasize TOD thread

I didn't expect to be able to go through the entire list, as that would have taken quite a while. But surprisingly, I did get through most of the list. I mentioned TOD several times, and I called his attention to the [Vinod Khosla - Give Him Your Ideas](#) thread. I told him he would find a lot of ideas for addressing our energy problems, from people who have put a lot of thought into this very issue. I told him some of the ideas were very good. He said that he does not have a large staff, but he would look through the thread (I also e-mailed him the link). He said he is looking for ideas that are pragmatic.

The Conversation

Mr. Khosla dominated the early part of the conversation. He approached it in the style of his presentations, in which he argues that this is the right path to take, and that it is feasible. In the early part of the conversation, he said he does not favor biodiesel. We didn't get into the reasons, but my guess is that he doesn't think it is scalable, nor an ideal solution for the cars Americans are accustomed to driving (this was a consistent theme). We didn't discuss algal biodiesel, but from his tenor I believe he would have said it is worth funding, but still more of a research project compared to the current status of cellulosic ethanol.

The first thing I asked him was about his motivation: Money, helping society, or some combination? He said his primary motivation is to help society. He said he is very concerned about Global Warming, and thinks our dependence on foreign oil is great cause for concern. I told him that we are approaching this problem from different perspectives: I am approaching this from a Peak Oil perspective and that the clock is ticking. I don't believe we can afford to spend time and resources pursuing pie-in-the-sky solutions.

I said that I wanted to address some specific claims from his presentations. I started off on the energy balance of ethanol versus gasoline. We went back and forth on efficiency versus EROI, but he finally preempted my entire argument by saying he doesn't even care if the EROI is less than 1, because corn ethanol is merely priming the pump for cellulosic ethanol or butanol (which he favors). In fact, he acknowledged some of my arguments against corn ethanol, but said that corn ethanol is just a transitory solution. I told him that I disagreed with this; that corn ethanol would be around as long as the subsidies were there.

He went on to say that the ethanol plants he is building (I didn't clarify whether these were Pacific Ethanol's plants) would be similar to the [E3 Biofuels closed-loop system](#). He said the capital costs are 2.5 times as high (because I specifically asked about that) but that the operating costs would be much lower. I told him that I agreed that this should be the model for building grain ethanol plants, but that we would have to see some in operation before we know if they live up to the claims.

I challenged the claim he made that Brazil displaced 40% of their petroleum with ethanol. He said he got that number from another presentation, and would be glad to change it if I can show him the data. He said he wants to be sure he has his facts correct. (I will be sending him the raw numbers on Brazil's energy supply).

I challenged him on the oil company bashing. I said that I work for an oil company, yet I care a great deal about the environment and sustainability. I said that when he bashes oil companies, he is bashing a lot of good people with the same broad brush. He said "On this, we will have to disagree." He went on to defend the bashing by saying it was political. He said he is trying to get the [California Clean Alternative Energy Initiative](#) passed, and Big Oil is spending a lot of money to fight him on it. So, he is bashing them in order to get support. Of course, I already knew all of this. I can live with a bashing, as long as it is factual. I told him that it is ludicrous to suggest that Big

Oil is gouging when the profit margins on ethanol are even higher. He again said that it was just politics. I just don't agree that stirring up hatred toward a particular group is acceptable politics.

I brought up the "food versus fuel" issue, and he said he rejects that argument. He said that someone from Shell had come out and retracted an argument they made on this topic. I hadn't heard anything about this, and couldn't comment. But I did indicate that as we continue to ramp up corn ethanol, our corn exports will fall and people in 3rd world countries will go hungry. I told him the stories are already appearing in the media. He said that there is plenty of food in the world, and the problem is often ability to pay. I didn't gain any ground at all in this argument.

He said that he has come out against the ethanol subsidies currently in place, and would like to see those subsidies shifted to biomass subsidies. I told him that would be a tough political sell, and he agreed. He said he has spoken out on the tariff that is slapped on Brazilian ethanol. He thinks eliminating this tariff would lower ethanol prices in the U.S. He also said that he has heard that Brazil is considering taking this issue to the [WTO](#).

I spoke of my concern that he is over-promising on cellulosic ethanol. I told him that my fear is that by making these rosy projections, the public will be lulled into complacency, and we don't have time for that. After all, they think we are going to transition right into cellulosic ethanol after hearing his projections. I told him that I don't believe his projections are realistic. He countered that they are realistic, and that he has seen a lot of research behind the scenes that is not yet publicly available. He said he has several cellulosic projects under way, and that he is in the business of making judgment calls. He also said there are about 50 projects (maybe it was proposals?) on cellulosic ethanol that are underway. Several times he compared his investments in cellulosic ethanol to his early investments in the Internet or other technologies that paid off despite the scoffers.

One of his consistent themes was that the solution has to be practical, and it had to fit today's engines or the auto makers wouldn't buy in. I told him that I considered this a problem; that the internal combustion engine was very inefficient. He agreed, but said a transition to electric would take time. He said it starts with hybrids, and then you improve the battery technology until the hybrid becomes more and more electric. He said he is investing in battery technology, and thinks this area has even more potential than ethanol. On this, I certainly agree.

Then we came to a matter of great disagreement. He said he believes cellulosic ethanol can displace petroleum because petroleum is expensive. But he didn't give renewable electricity much chance of displacing coal, because coal is too cheap. He said that solar is 3 times the cost of coal-generated electricity, and that we have "an infinite supply of coal." He said he is more interested in a liquid fuel replacement for petroleum. I, on the other hand, am more interested in moving our means of transport to renewable electric sources.

We discussed a carbon tax, and we were in agreement that this should be implemented. However, he feels like it will never be politically palatable. I just can't understand this, and told him so. I think this could be sold to the public. You explain the reason for the tax: That it is designed to reduce demand and prepare us for a future of declining petroleum supplies. You can avoid it being a [regressive tax](#) by lowering tax rates or increasing the deductions for low-income taxpayers. There is a way to work this. He replied that it would break down when everyone tried to get the best deal for their own constituents. I just think this is too important an idea not to aggressively pursue it. A carbon tax would begin paying immediate dividends. I told him that we should have done this long ago, and we should have encouraged adoption of diesels like they did in Europe. He replied "What we should have done, or should do, is less important than what we can do."

Areas of Agreement and Disagreement

We agreed on the following issues:

1. Current energy policy needs a dramatic facelift
2. A carbon tax is a good idea
3. Brazil is much more efficient at making ethanol than the U.S., and the ethanol tariffs should be lifted
4. Butanol may be a superior choice to ethanol
5. Grain ethanol subsidies should be eliminated
6. There is great potential in researching energy storage devices (e.g. batteries)

We disagreed on the following issues:

1. The issues surrounding corn ethanol aren't significant since it will be a transitory solution
2. The solution must fit in today's engines
3. Bashing oil companies is acceptable to achieve a political goal
4. Renewable electricity can't compete with coal
5. Cellulosic is scalable within the next 5 years
6. The consequences of failure to deliver can be very high
7. Food versus fuel will be a serious issue going forward

Conclusions

I already had a pretty good understanding of where he was coming from, but I have tried to accurately relay his position so that others may understand. This is the least I owe him after he spent that much time talking with me. However, we still have some fundamental areas of disagreement, and my impression is that he is concerned about Peak Oil, but not in the way I am concerned. My worry is that over-promising on cellulosic ethanol will prevent us from getting very serious about taking the steps we need to take as a society toward powering down while we still have some choices. I think we need to fund cellulosic ethanol, but until there are a few pilot plants operating, we just don't know if it will be feasible on a commercial scale.

I did have difficulty convincing him that corn ethanol is a bad thing, because his position is that it is merely a jumping off point to something much bigger. He said he wouldn't be investing in cellulosic if we weren't producing several billion gallons of corn ethanol. He said that corn ethanol is "priming the pump", and has shown the feasibility of ethanol as fuel in the U.S.

I obviously have not captured the entire conversation, so if you have specific questions about a particular topic I will answer them. It was a worthwhile conversation from my point of view, because I think he understands that there are legitimate concerns from people other than special interests. We agreed to keep in touch as developments unfold.



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