



Geophysicist Klaus Lackner on Fueling the Future

Posted by [Glenn](#) on September 13, 2006 - 12:14pm in [The Oil Drum: Local](#)

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Last night I attended a lecture at a nice Upper West Side Restaurant by Geophysicist [Klaus Lackner](#) as part of Columbia University's [Cafe Science](#) series of science talks. He got right into by saying that that we are running out of oil, have probably hit the peak or close to it. But, he added, but there are plenty of energy sources around - specifically coal, uranium and solar. The trick is transitioning now in a responsible manner. And he thinks that the best way to do so it by taxing or capping carbon emissions and developing a real plan for nuclear waste disposal.

This lecture was geared for the well educated lay person so he offered generalities on major subjects with only vague estimates of the numbers involved. Below is a brief outline of his lecture, which is not to say that he doesn't have hard numbers to back all this up, he just did not hand them out for us to write down. Still it would be interesting to follow up with his sources at some point.

He set up the problem of finding a renewable source of energy that could potentially meet the world's current energy needs all by itself. He then listed out all the various "renewable" energy sources: Solar, Wind, Tidal, Geothermal, Biomass & River Hydro. He made a fairly convincing case that even if you exploited all the available Wind, Tidal, Geothermal, Biomass and River Hydro, you could not scale it all up to meet more than a large fraction of worldwide demand for energy. And it was not a matter of technology for those, since there are physical limits that each of these meet eventually that cap their overall scale of impact. Furthermore getting too good at stopping the wind and water flows could have dramatic impacts on the environment itself.

However, he said that solar was the only renewable potential source of energy capable of scaling up to meet energy demands and that the technology was getting much better, similar in efficiency gains as the early computer technology. So for renewable, he would bet the farm on solar being the best long term investment.

But he said that we should not dismiss the potential of coal and uranium to meet our energy needs either, at least for the next 200-300 years. After that, he could not begin to imagine what technologies might be available. The trick is dealing with coal's carbon output and uranium's potential for proliferation into the wrong hands.

He talked about the level of carbon dioxide in the atmosphere and the case for human activity causing global warming, which he thinks is a major threat over the next 50-100 years, especially if we go from current 380ppm to 500-800ppm. He strongly believes that if we were to tax carbon output at it's source or cap output through a trading system we could create a whole new economic incentive for reducing carbon output. This is where he put forth some interesting ideas that I guess he has worked on himself about sequestering carbon from fixed sources (like power plants) and storing it under ground or below the ocean floor. He also thinks that pulling carbon dioxide out of the atmosphere directly might work to offset non-fixed sources (like automobiles run on gasoline). That sounds a little like fantasy right now, but given that there is currently zero incentive to take carbon out of the air, it's not hard to imagine that with some strong incentives,

Turning to uranium, he stated that there is a limited supply of uranium assuming you use it once and dispose of the spent fuel. But if you use breeder reactors and other ways of reusing fuel to create more and reuse it again and again, you can magnify the limited supply to be 10-100x as large as currently estimated. The problem is where to store the waste and the risk of plutonium proliferating to the wrong folks. He thinks again we should look far beneath the Earth (and far away from water sources) to store the nuclear waste, but also consider places like Yucca mountain to be a good temporary option until we find a good final resting place. Anti-proliferation efforts should be increased dramatically to be as strict and enforceable as possible.

Editor's Comments: This was certainly an interesting lecture. He made the case better for solar and carbon taxes and against the other renewables as well as I have heard before, if not better. That gave me a fair bit of hope. I was however underwhelmed with the feasibility of long term nuclear storage and carbon sequestration - I would love to see more specifics on these issues. But all in all a great speaker on energy issues. He brought a welcome sense of scale and proportion back to the debate in my mind over the way forward.



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