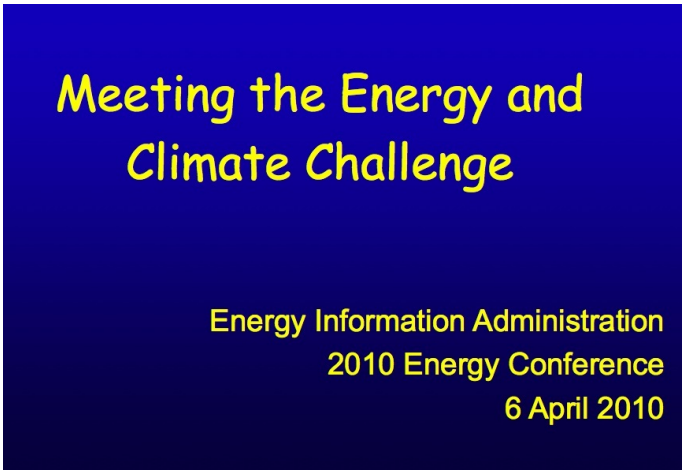
The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Energy Secretary Chu provides an optimistic view of our energy future at EIA conference

Posted by Gail the Actuary on April 10, 2010 - 10:50am
Topic: Policy/Politics
Tags: eia conference, steven chu [list all tags]

Energy Secretary Chu gave a talk at the EIA/SAIS Energy Conference on April 6-7. I want to share a few highlights of it, and give my impression. Both the Powerpoint slides and audio can be accessed at this link.

My general view of the talk is that Chu is extremely optimistic, in terms of what he thinks can be done. He also fails to tell listeners what our real problems are.



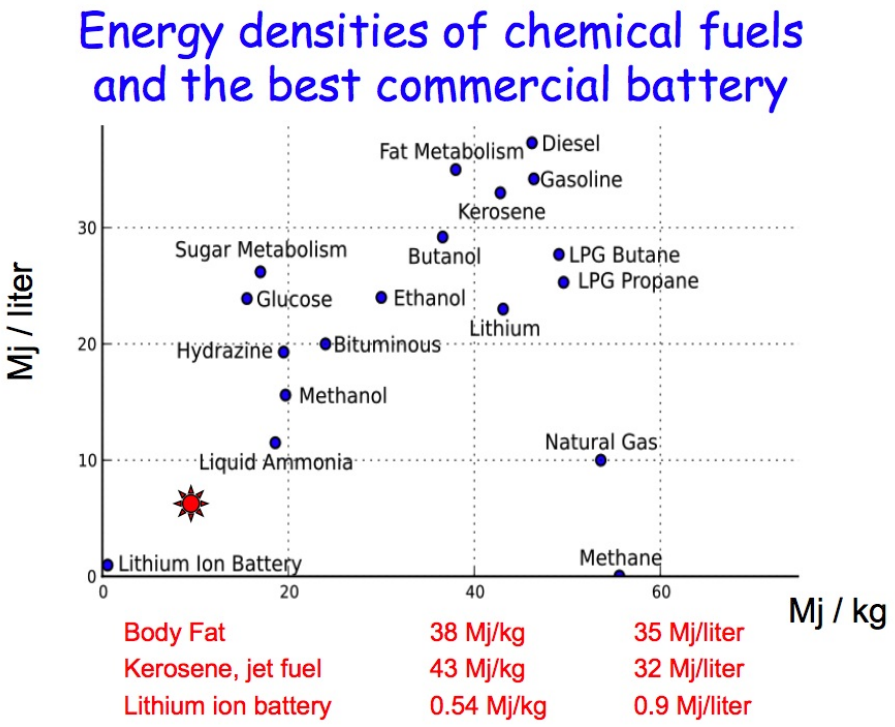
Slide 2

Wow! Slide 2 indicates that Chu thinks America has the opportunity to lead the world in a *new industrial revolution*. How does he think that is going to be done?

The first industrial revolution was during a time of increasingly available energy, because of the new use of coal. That is very unlikely in the future, both because of peak oil, and because of hoped-for constraints on fossil fuel use because of climate change issues. Net energy available to society is likely to be going down, not up! It is hard to understand an industrial revolution under those circumstances, unless it is a retooling to a much lower level--but later slides make it clear that is not what he is thinking of.

Slide 4

Yes, as Steven Chu says on Slide 4, the Recovery Act does make a $80 billion down payment on a clean energy economy. But it is nowhere near enough to do the whole job (for example, to create a smart grid). It is also temporary. Once the funds run out, the whole investment must be made by others with funds.

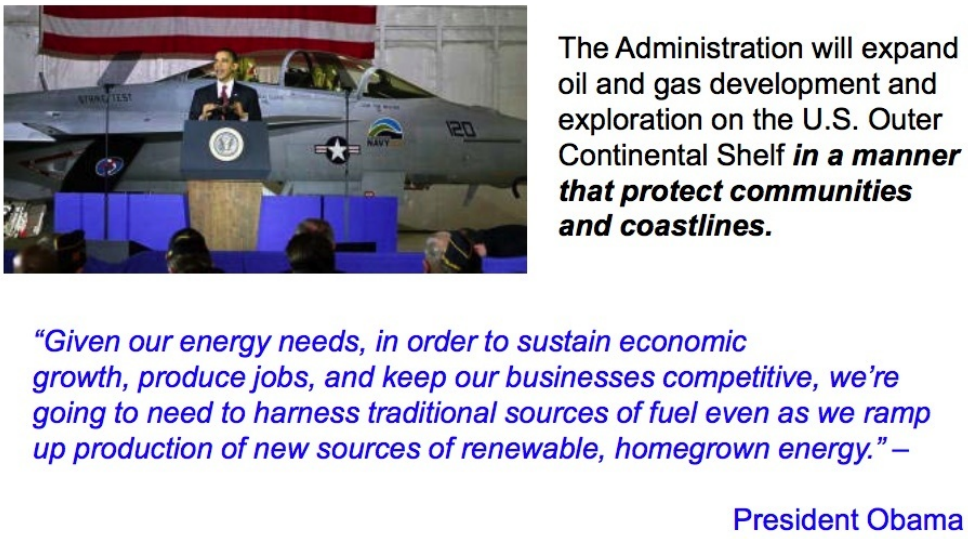


Slide 10

Slide 10 shows energy densities--it is one of the better slides that Energy Secretary Chu showed. The top fuels from an energy density point of view are diesel and gasoline (near the top, right side of the chart). Kerosine, used in jet fuel is also near the top, as is human body fat. The lithium ion battery, as currently produced, is down near the very bottom left corner (worst!) in terms of energy density.

Chu indicated that there is work being done to perhaps produce a battery at the red star location. If this can be done, the battery will have five times the current lithium ion battery's energy density.

With this huge disparity between what batteries can do and what fuel can do, in terms of energy density, one gets the distinct impression that it is unlikely that electric vehicles will be ramped up any time soon. So on the next slide we see:

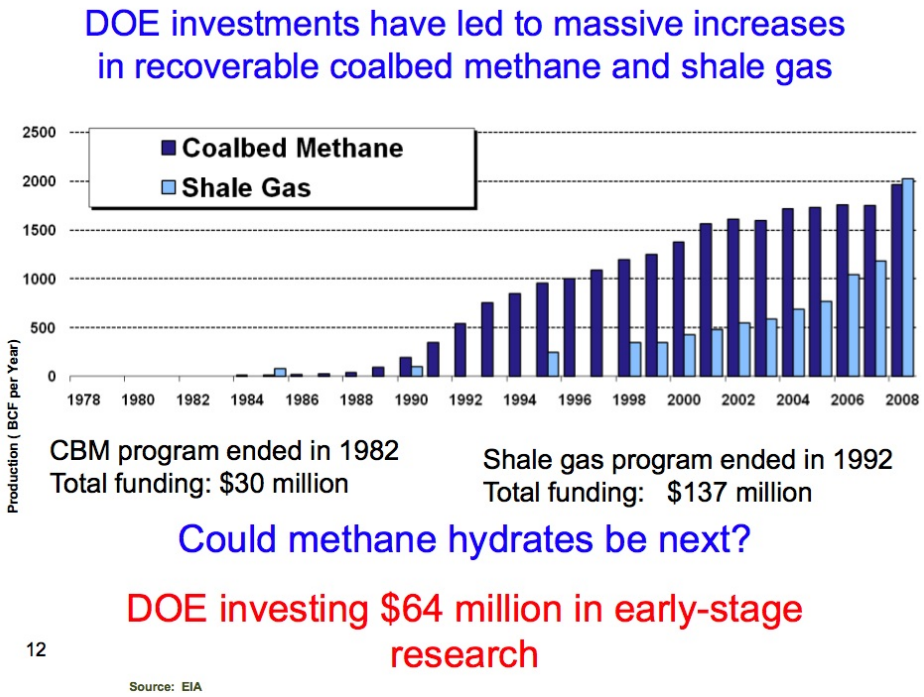


Slide 11

Slide 11 talks about responsible expansion of offshore oil and gas exploration. One could get the impression that there are huge amounts of oil and gas to be found in the offshore locations being opened up, but this is fairly unlikely. An article by Gary Luquette, President, Chevron North America Exploration and Production Co. says:

> The good news: the OCS [Outer Continental Shelf] has significant potential. Over time, it could add 1 million more barrels of oil and natural gas equivalent a day--potentially representing a fifth of the current total U.S. oil production. Advances in technology could increase that amount dramatically.

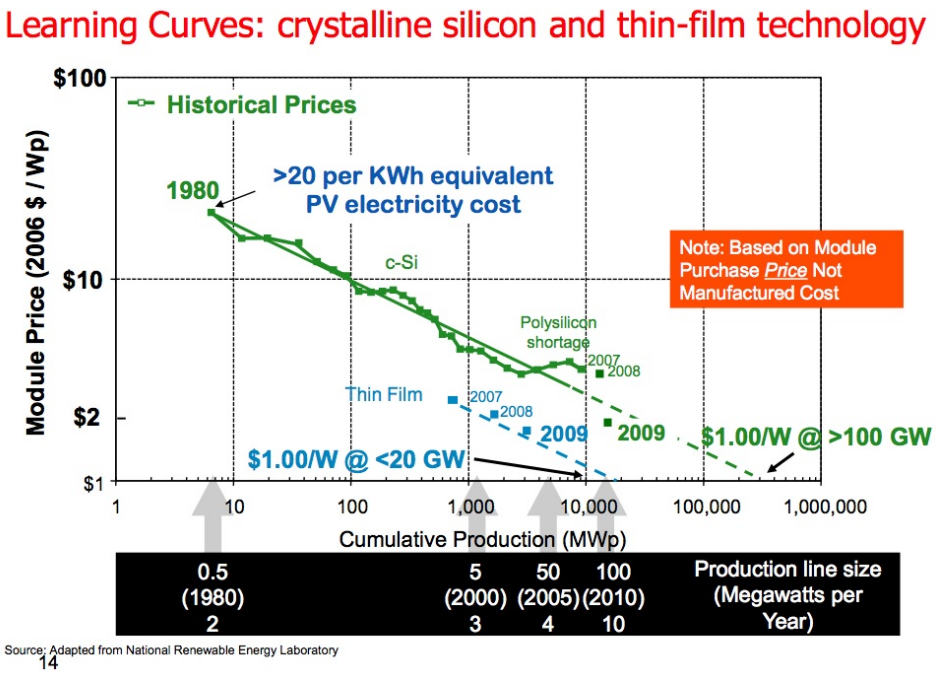
One million of barrels a day of production would be good in many ways (jobs, balance of payments, 20% of U. S. production) but it wouldn't save the world from peak oil. In fact, it would amount to a little over 1% world production--and even if it can be ramped up a bit from 1 million barrels a day, it still isn't huge. The amount available in the area recently announced off Virginia would likely be only a small fraction of this--probably less than 100,000 barrels a day.



Slide 12

In Slide 12, Secretary Chu seems to take credit for Department of Energy (DOE) research benefitting coal bed methane and shale gas production. (Both of these are forms of natural gas.) I can believe DOE's research may have been helpful in coal bed methane production, since production started not long after funding ended in 1982. I am less convinced that it played a manor role in the development of shale gas, since there seems to be more of a lag in production after funding ended. Perhaps a reader has more information on this.

Secretary Chu says that DOE is investing $64 million in early-stage research in for methane hydrates (another potential source of natural gas). The Oil Drum has published several posts on methane hydrates, most recently this one by Jean LaHerrere. The deposits have been known for a long time, but all indications are that they are extremely difficult to extract, and pose a risk from a global warming point of view if the gas escapes during extraction. I would expect that if natural gas from methane hydrates does get produced in quantity, it will be at least 15 years from now. Since it would be natural gas, it still would not directly replace oil, which is what we need to run our vehicles, and is now in limited supply.



Slide 14

Slide 14 shows the learning curve in crystalline silicon and thin-film technology. The problem is that total costs don't go down nearly as quickly as the cost of high-tech pieces do. When on looks at a Berkeley 2009 report on the Installed Cost of Photovoltaics, the graph of the total installed cost is much different.

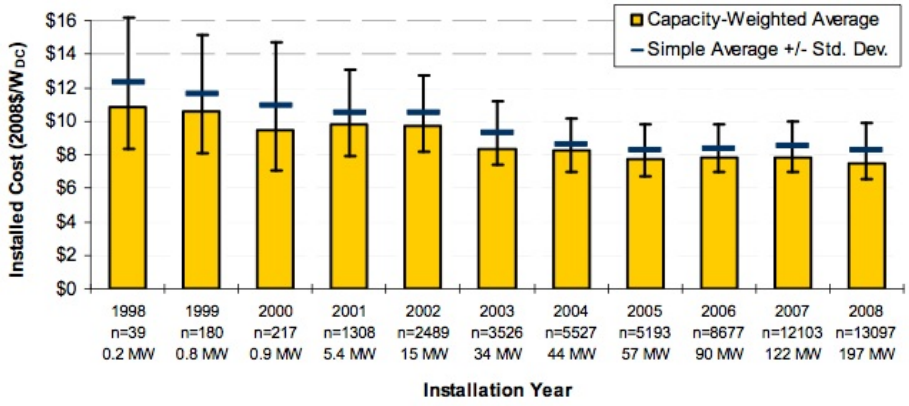


Figure 4. Installed Cost Trends over Time

*Graphic from Installed Cost of Photovoltaics report, **not** Steven Chu presentation.*

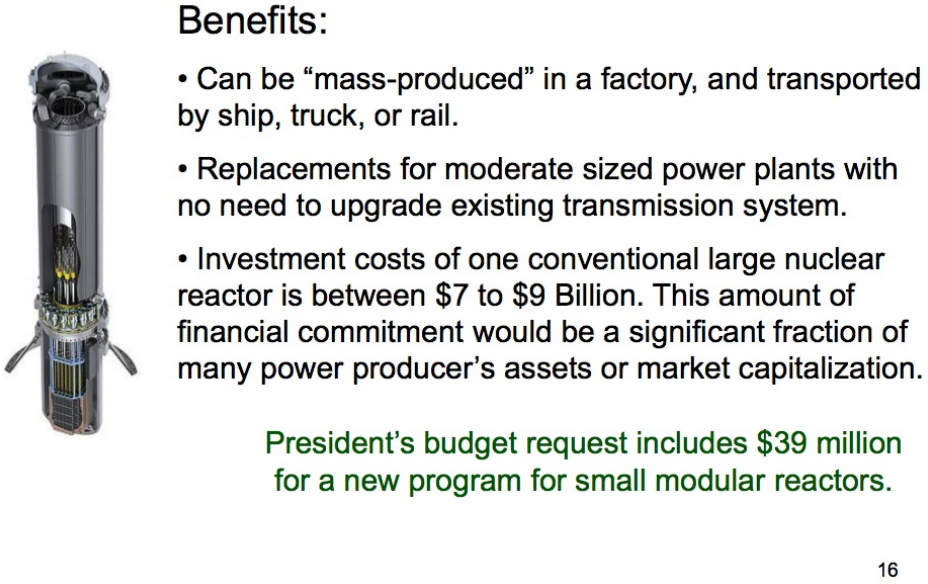
On a total installed cost basis, costs have been up in the $8.00 per Watt level, and not dropping quickly. So the $1.00 Watt level shown in Chu's slide doesn't necessarily translate to low cost for the consumer. Cost of other components and of installation on individual roofs is still expensive.

Slide 15

Carbon capture and storage (CCS), mentioned in Slide 15, has many issues. One of them, according to Jeff Wright of the Federal Energy Commission at another talk at the same conference, is that it is likely to require increased use of fresh water--something which is in increasingly short supply. This by itself could be a deal-killer.

Another issue is the huge weight of carbon dioxide gas that will need to be transported long distances and reinjected. Carbon has a molecular weight of 12 while carbon dioxide has a molecular weight of 44. Thus the gas to be transported and reinjected has considerably greater weight (and vastly greater volume) than the coal it was created from, making the energy requirements for transportation very high. This means that the total amount of coal that needs to be burned (considering the CO_2 weight to be transported) will need to be considerably higher with CCS than without--so there will be more pollution to deal with, and coal supply is likely to run short sooner.

Commercial deployment in 8 to 10 year sounds like a pipe dream to me. Maybe in 20 or 30 years, but even then, I wonder. If the carbon dioxide escapes, it will form a low lying cloud and smother whoever gets in its way. How many communities will want to be located near a CCS storage facility?



Slide 16

On Slide 16, Chu talks about small nuclear reactors, which might be used to replace an individual turbine (coal or gas) within an existing power generation plant. This approach would keep costs low, partly because the units could be produced in quantity, and partly because they could just be substituted where transmission lines are already in place. This is something in Obama's budget request, not something for which funds have already been appropriated.

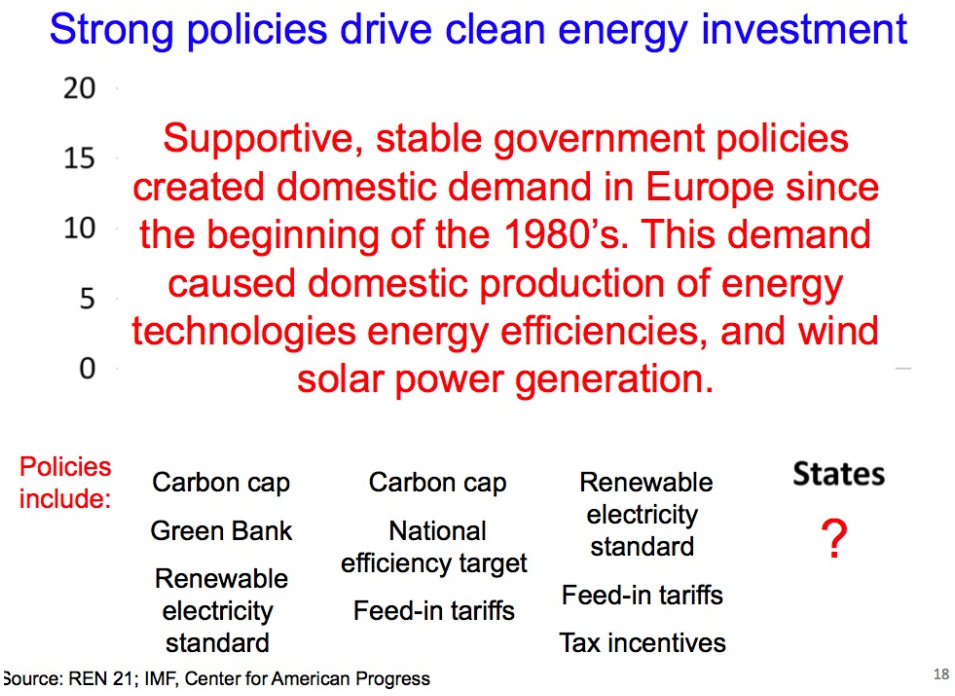
I can see several issues with these. We still have no nuclear disposal site, so the many facilities with these new small reactors will be faced with dealing with nuclear disposal "on their own". Also, power plants which have in the past had very limited security issues will suddenly need to deal with the security of having a nuclear reactor on site.

There is also the issue of whether there will be adequate nuclear fuel available when the time comes for these units to need it. Russian nuclear bomb material which has been down-blended and used as supply in recent years will be in smaller supply after 2013. Alternate uranium supplies (nearly all imported) may or may not ramp up, depending on such things as uranium price, oil price, and capital availability.

Slide 17

Slide 17, and as we will see in a bit, Slide 18, deal with the issue of how we can get around the problem of investments in new technologies not being profitable, because burning fossil fuels is cheaper. In this slide, we see that Chu says "Market opportunities are structured by policy."

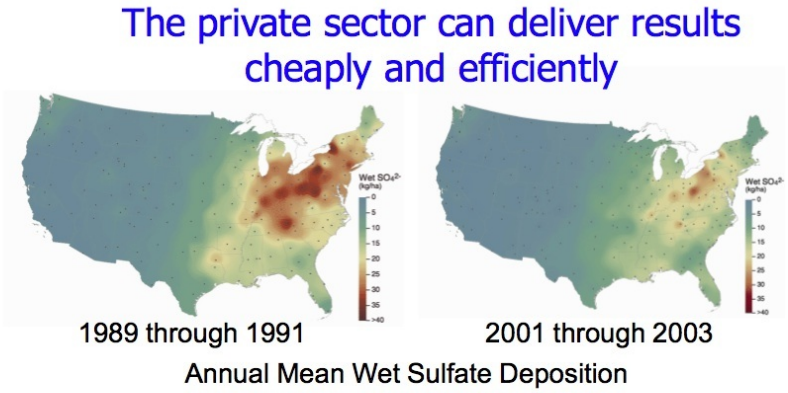
Dr. Phil Sharp, a former member of congress, was another speaker in the plenary session. With respect to this topic, he noted (when he spoke later in the plenary session) that the new energy sources would require $100s of billions of investment in the next few years, and would be a drag on the economy. In Sharp's view, "We cannot subsidize our way out of this situation."



Slide 18

In Slide 18, Chu seems to be arguing that if Europe can make changes in its mix of energy technologies, the US can also.

I would just note that it is much easier to ramp up generation from renewables when the world economy is in a growth mode than when it is already declining, or at best, flat. Putting a drag on the economy when it is in growth mode will likely put it in a lower growth mode. Putting a drag on the economy when it is already declining is likely to cause worsening recession, and may even cause collapse. So one is dealing with a very different situation.



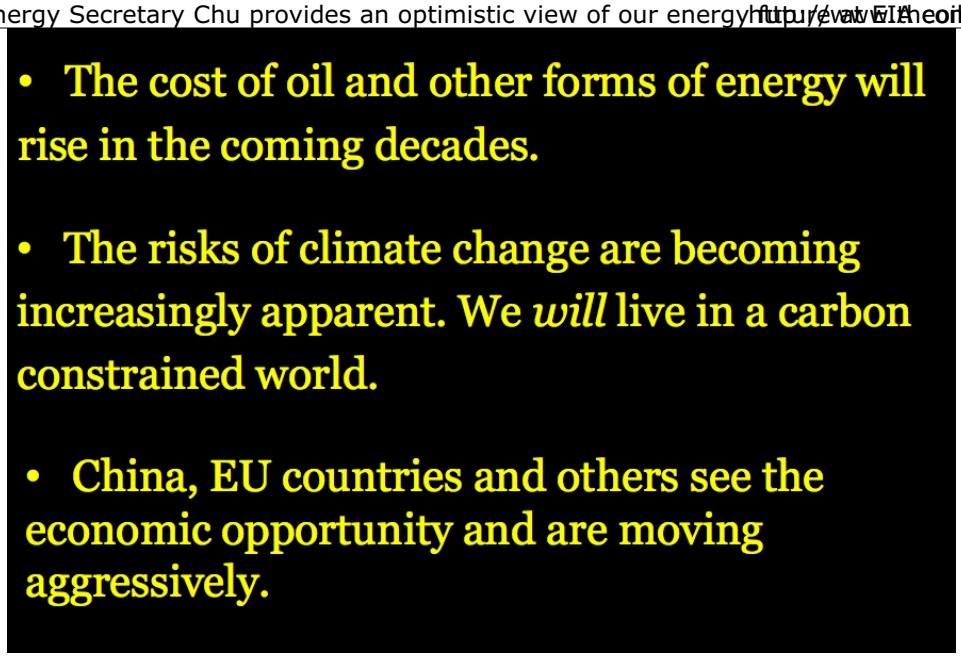
Slide 20

Slide 20 shows Chu's sales pitch for cap and trade. According to Chu, if it worked for acid rain (and in fact came in below cost projections), it can work for carbon.

The catch is that with the acid rain cap and trade program, there was an easy technical solution to the sulfur dioxide emissions. An electric power plant had the option of installing a scrubber, and thereby clean up its emissions, or it could buy pollution allowances.

The problem with carbon is that (despite the CCS discussions), there really isn't any good way of cleaning up carbon emissions, other than through small increments from increased efficiency (and even there, Jevon's Paradox says that since the product will be cheaper, more can afford it, and demand will go up). One can get the Chinese to do the heavy manufacturing, and import the finished products from them, but that doesn't reduce the world's emissions, just those of the US. One can buy a certificate saying that a some trees will be planted because of the certificate, but there is a significant chance another plot of trees not too far away will be cut down instead. Wind and solar can act to extend our natural gas supply, but don't really substitute for oil. Perhaps some of these issues can be dealt with, but I have yet to see evidence that this is the case.

So it seems to me that there is no comparability between the acid rain cap and trade program and a carbon cap and trade program.



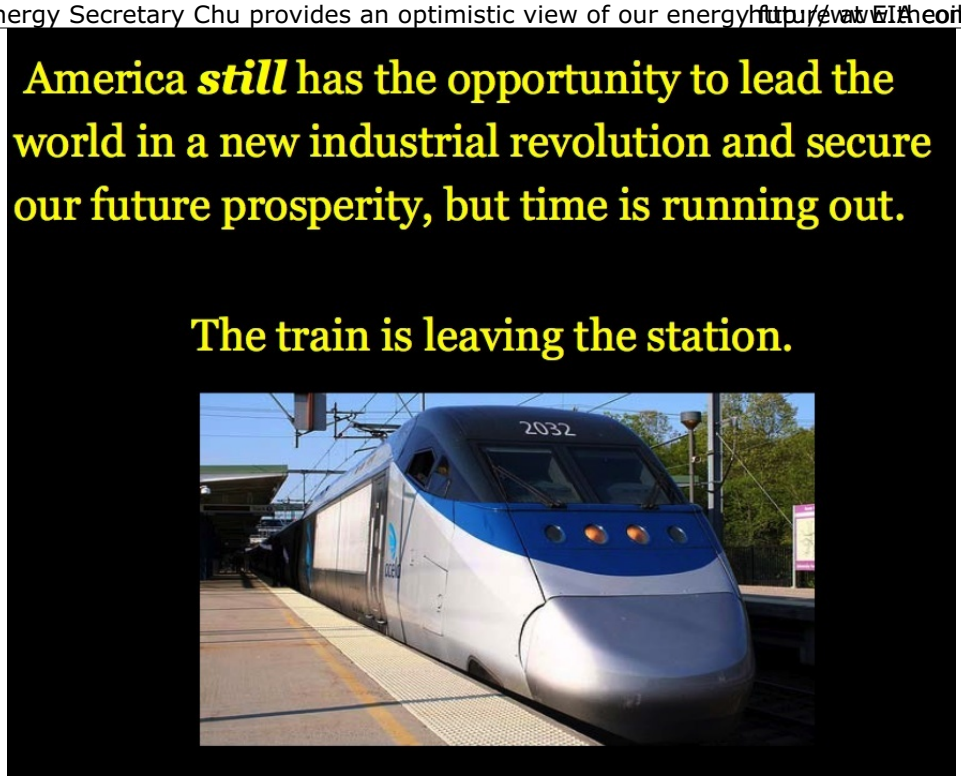
Slide 22

Slide 22 looks to me to be a politically acceptable way of describing our short supply of oil.

"The cost of oil and other forms of energy will rise in the coming decades," sounds better than, "There will be a shortage of oil and other forms of energy in the coming years."

In the second bullet point, I think the point Chu is trying to make is, "We *will* live in a carbon constrained world." If Chu knows about our energy shortages, he can be sure of this statement, whether or not any climate legislation is passed.

With respect to "China, EU countries and others see economic opportunity and are moving aggressively," there may be a small economic opportunity component (especially for China selling wind and solar to the world), but even more there are other concerns--perhaps shortages ahead, perhaps climate change, and perhaps just plain pollution from coal (especially for China).



Slide 23

Slide 23 was Energy Secretary Chu's final slide. It is hard for me to see that what Chu is proposing will really solve our problems. For one thing, there is really no solution to our liquid fuels problem. What he is looking at is more natural gas production, and better ways of handling the carbon from coal, and more electricity from nuclear, and ways of saving electricity through more efficient appliances (sorry, I skipped that slide). While some offshore drilling is planned, it is likely to yield only a small amount of oil, and only after several years, so is not likely to be much of a solution to our liquid fuel problems.

The solutions which are proposed will take years, and will give us more natural gas and electricity. Assuming they work, we will still need to convert our vehicles to natural gas or electric, at very significant cost. These conversion costs will come in addition to all the cost of new electric generation. None of this proposal plans for the reduced lifestyle we are likely to have ahead. Instead, Chu is proposing that we attempt to continue Business as Usual, even though it is no longer possible. I am afraid the train has already left the station for this approach.