My Top 10 Energy Stories of 2007

Posted by Robert Rapier on December 28, 2007 - 6:29pm
Topic: Supply/Production
Tags: 10 things, al gore, chevy volt, conocophillips, ethanol, food prices, ls9, nuclear energy, oil prices, peak oil, range fuels, reader submission, solar efficiency, solar power [list all tags]

First, thanks to all who contributed ideas. You may have an entirely different opinion on the most important energy stories. Feel free to share it. Many of these stories were contributed by various readers. Comments by readers are italicized. If you want to know who wrote what, you can see the entire comment thread here.

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1. Oil price soars as media becomes Peak Oil aware

One reason I felt pretty safe in making the $1,000 bet on oil prices is that a move from $60 - the price in January - to $100 - the price at which I would lose the bet - would be unprecedented. Of course a worldwide peak in oil production will also be unprecedented, and I expect oil prices to soar when that happens. While I still don't think we have quite peaked, what did happen is that Peak Oil awareness really hit the mainstream in 2007. I started noticing a great many stories on Peak Oil (and quite a few on Peak Lite), especially following the ASPO Conference in October. This was right in the middle of the sharp run-up in prices. So I believe that a major factor contributing to the fast run-up was the sudden realization by a critical mass of people that Peak Oil is on top of us. In that case, the value of oil will be much higher.

In addition to record oil prices, back in the spring we saw record-high gasoline prices as a result of sustained, record-low gasoline inventories. Conditions are currently favoring new record-high gasoline prices in 2008.

2. Criticism of biofuels mounts

The bloom comes off the biofuel rose. European studies showed oil-palm biodiesel was actually worse for the environment due to tropical rainforest destruction, and US corn ethanol plants lost money because of overbuilding. A general biofuel backlash took root due to higher food prices and other side effects.

While I was criticizing corn ethanol before criticizing corn ethanol was cool, in 2007 the media started asking critical questions about water usage, pollution from industrial corn farming, and the impact of ethanol mandates on food prices.

3. The Chevy Volt is announced

GM has dedicated a full product team and allocated a plant for mass production -- the first

time in history an electric car has achieved such status.

Years after GM killed the electric car, they are bringing it back in the form of the Chevy Volt. I have long advocated the need for the electrification of transportation as one of the key elements in any Peak Oil mitigation plan. Therefore, I am very pleased to see GM making another effort at electric cars.

4. Nanosolar begins to deliver

Cost-effective solar power would be a very big silver BB in a Peak Oil mitigation plan. Nanosolar has the potential to deliver a game-changing thin-film photovoltaic technology. If you don't know much about Nanosolar, check out this interview with their CEO: 10 Questions for Nanosolar CEO Martin Roscheisen

However, the potential for cost effective solar power also highlights the desperate need to tackle and solve the problem of energy storage for intermittent sources of energy like wind and solar power. Hopefully we will see some breakthroughs there in 2007.

5. LS9 starts up

For years I have dreamed of a microbe that eats garbage and excretes hydrocarbons. The beauty of such a system would be that the hydrocarbons would just phase out of solution, thus ensuring a low-energy purification step. If you think about it, the concept is not that far-fetched. The human body produces fats and fatty acids that are not too far-removed from the hydrocarbons that make up gasoline or diesel. There is no reason, in principle, that a microbe couldn't be designed to do just that.

The difficulty lies in understanding the metabolic pathways well enough to modify them to produce the target molecule without severely compromising or killing the microbe. This is exactly what LS9 - the "Renewable Petroleum Company", is attempting to do. And they have certainly assembled a team that just may pull it off.

6. Range Fuels breaks ground

In November Range Fuels - formerly Vinod Khosla's Kergy venture - announced the groundbreaking of the first commercial "cellulosic" ethanol plant in the U.S. While I dispute the terminology (as I explained in this essay, it is actually a gasification process, which is not specific to cellulose), the process does have a chance to be a success in the long-run. Short-term, I believe they will remain highly dependent on generous subsidies because the capital costs for gasification processes are so high. But on down the road I think gasification makes a lot more sense than most fermentation processes.

One thing that I would have done differently would have been to produce diesel instead of ethanol. Once syngas is produced in a gasification step, there are many different products that can be made. It is not particularly efficient to produce ethanol in this process, but this is the kind of thing you end up with when the government is picking technology winners.

I do think Range Fuels has a high likelihood of becoming a significant technology. What little information is available certainly sounds promising, including the result from EBMUD that the Klepper gasifier was the most efficient.

7. First application for US nuclear plant in 30 years

NRG announces first application for US nuclear plant in 30 years:

NRG South Texas Nuclear

They propose to use GE's Advanced Boiling Water Reactor technology.

My personal belief is that we are going to need nuclear power to continue making a significant contribution toward our electricity needs. This will be especially true if electric transport takes hold. Therefore, I think it is a very big story that 2007 saw the first application for a new U.S. nuclear plant in 30 years.

8. Carbon capture & sequestration moves forward

The FutureGen alliance announces the site for its demonstration plant on Tuesday, Dec. 18:

FutureGen Announcement

For those not familiar with it, FutureGen is a clean coal demonstration plant that will include carbon capture and sequestration. There are 4 finalist sites. Two in Illinois and two in Texas. The purpose of the project is to demonstrate commercial scale CCS technology.

FutureGen selected Mattoon, IL for their site.

FutureGen runs a combined cycle instead of the single cycle of existing coal plants. Combined cycle plants can achieve 50-60% thermal efficiency vs. the 33% typical of single cycle, so it's quite possible FutureGen will deliver more kWh/ton of coal than existing plants.

9. Progress on next generation biofuels

The biofuel spotlight turned to the future. Dozens of startups focused on cellulosic ethanol, gasification and other next-gen processes competed for headlines with "green diesel", butanol and other biofuel initiatives from the oil majors.

Most of the oil majors have taken a pass on the ethanol craze, but they are looking at other biofuels. 2007 saw announcements from BP that they would team with D1 Oils to produce biodiesel from jatropha; from ConocoPhillips that they would team with Tyson Foods to produce "green diesel" from waste animal fats; and that BP and Dupont would team up to produce bio-butanol. (I wrote a reality check on bio-butanol here).

10. US Navy funds Bussard Fusion

I think you have to include the US Navy funding Bussard Fusion in there:

http://www.defensenews.com/story.php?F=3139619&C=navwar

Bussard died a couple months ago. I had really given up on fusion, but his work actually appears to have a reasonable change to work. Hopefully with more funding his team will be able to make it work.

Yes, Dr. Bussard's work will be carried on. First step is to construct *WB-7 and replicate the results achieved with WB-6. Hopefully by the end of April 2008. If that works, then on to WB-8, and then an actual power generating plant.*

The rest of the list (mostly contributed by readers, and in no particular order), many of which

could have easily been in the Top 10 list:

11. King Coal is still king

If we look for the stories that did not attract attention, surely one of the big ones has to be the continued surprising vitality of the international coal industry. King Coal has officially been dead for a long time. Who would have predicted that, 10 years after Kyoto, coal would once more be where it's at, supplying more Btus to the world than ever before?

12. US Coal Plant cancellations, headlined by TXU cancelling 8 of 11 planned plants.

CO2, the primary driver behind the other half of our top 10 stories, has long played in Europe but will only achieve global influence by spreading through the US into the developing world. 2007's coal plant cancellations marked the tipping point.

13. Al Gore wins Nobel Prize for work on Global Warming

Gore's tireless efforts to educate the world on Global Warming was recognized with this year's Nobel Peace Prize. Tiny Carthage, Tennessee now claims two Nobel Laureates. (Cordell Hull is the other).

14. Shell releases details of their shale oil process

Probably the most important energy announcement was Shell's release of info on their proprietary in-situ process for generating oil from oil shale. Could open a whole new branch of the oil industry, put a cap on the price of oil from conventional fields, and thereby inject some realism into windy dreams. But it turns out that Shell has been working towards this for about a quarter of a century. "Incremental advances" indeed!

15. Resource nationalization grows

While the seizure of the assets of international oil companies by Hugo Chavez got the most press, many other countries are moving to nationalize their oil resources. Many other countries, and even states like Alaska, are also passing laws to increase their tax revenues from the extraction of oil. The U.S. needs to sit up and take notice, because this will further constrain supplies. We can't continue to count on a steady supply of oil from countries who don't like us, yet we lack the political will to reduce our dependence on these countries.

16. New efficiency record for silicon PV - 42.8 percent from sunlight at standard terrestrial conditions

http://www.physorg.com/news104501218.html

> The highly efficient VHESC solar cell uses a novel lateral optical concentrating system that splits solar light into three different energy bins of high, medium and low, and directs them onto cells of various light sensitive materials to cover the solar spectrum. The system delivers variable concentrations to the different solar cell elements. The concentrator is stationary with a wide acceptance angle optical system that captures large amounts of light and eliminates the need for complicated tracking devices.

In a way I find the Nanosolar story more compelling since they are actually in commercial production now. Still, the prospect of high efficiency PV without using exotic and/or toxic materials gives me hope.

17. Manpower shortages in the energy sector

Big Oil's Talent Hunt

From the article:

> ConocoPhillips (COP) has grand plans. With demand for oil soaring, the company announced on Dec. 7 that it will boost its exploration and production budget by 8%, to $11 billion, a war chest intended to fund massive projects from Canada to China to the Caspian Sea.
>
> But there's a potential obstacle to the company's vision: not enough people to get the work done. Half of Conoco's employees are eligible for retirement within five years. Unless older workers can be replaced, Conoco's expansion could be costlier and slower than planned. In an interview with BusinessWeek, CEO James J. Mulva said that the lack of talent is one of the most dangerous threats to his company's long-term health. "People are a big concern," he said.

This is not just a big oil story. Lack of workers is hitting all sectors of the energy industry. It seems that college students would rather be lawyers or investment bankers than scientists and engineers.

18. Texas surpassed California in wind energy

This signals a shift in wind from high-cost, subsidized eco-darling to cost-effective energy source. As the low-cost provider, wind now thrives in low bureaucracy states such as former oil-king Texas. Meanwhile high-regulation states such as California lag behind.

19. Potential PV improvement

Potential improvement on PV front

> Transparent electrodes created from atom-thick carbon sheets could make solar cells and LCDs without depleting precious mineral resources, say researchers in Germany.
>
> Solar cells, LCDs, and some other devices, must have transparent electrodes in parts of their designs to let light in or out. These electrodes are usually made from indium tin oxide (ITO) but experts calculate that there is only 10 years' worth of indium left on the planet, with LCD panels consuming the majority of existing stocks.
>
> "There is not enough indium on earth for the future development of devices using it," says Linjie Zhi of the Max Planck Institute for Polymer Research in Mainz, Germany. "It is also not very stable, so you have to be careful during the fabrication process."

20. Study analyzes off shore wind in US Northeast

http://www.physorg.com/news89650495.html

> The wind resource off the Mid-Atlantic coast could supply the energy needs of nine states from Massachusetts to North Carolina, plus the District of Columbia--with enough left over to support a 50 percent increase in future energy demand--according to a study by researchers at the University of Delaware and Stanford University.
>
> The study marks the first empirical analysis in the United States of a large-scale region's potential offshore wind-energy supply using a model that links geophysics with wind-electric technology--and that defines where wind turbines at sea may be located in relation to water depth, geology and "exclusion zones" for bird flyways, shipping lanes and other uses.

21. A123Systems mass produces next generation lithium batteries

Shipping in DeWalt's 2007 line of 36V cordless power tools, these new cells mark the 5th wave of rechargeable batteries (lead-acid, NiCad, NiMH, Li-ion and now advanced lithium). Advanced lithium chemistries from A123 and dozens of other vendors offer the possibility of cost-effective plug-in hybrids as well as applications in the electrical grid.

22. Electricity shortages, particularly in the developing world

Some appear to be related to climate change -- droughts that require major hydro cutbacks. Some are clearly due to oil prices/supplies -- poor countries that burn heavy diesel in their power plants and can't afford it at the new world prices. Some are due to bad bets on fuel sources -- natural gas generators put in, and the gas supply declining sooner than planned.

23. Solar thermal heats up

For decades the SEGS parabolic trough plant in California's Mojave desert stood alone as the only large-scale CSP plant on earth, but 2007 saw a rebirth of this technology with the inauguration of the 64MW Nevada Solar One plant and construction of plants in Spain, Australia and elsewhere. California utilities have ordered up to 1750 MW of capacity from dish-Stirling purveyor Stirling Energy Systems and startups such as Ausra are pushing the price/performance barrier with linear Fresnel architectures.

24. First Solar market value hits $20 billion

As the first mass producer of non-silicon thin film PV, FSLR cashed in big-time in 2007. Their $1.40/W manufacturing cost is a huge competitive advantage, yielding fat profits and an eye-popping 200% growth rate. True to their name, First Solar got out of the gate first, but other non-Si players are still in the race. Companies using CIGS, including the much-hyped but yet-to-deliver Nanosolar, promise to break the $1/W barrier.

25. Cooper Pairs in insulators

http://www.aip.org/pnu/2007/split/849-1.html

One of the AIP's top stories of the year, this discovery may well help us reach a better understanding of superconductivity and insulators both. Superconductivity is of course a holy grail in energy research, and while this discovery doesn't directly lead to a room temp superconductor, it does add to the fundamental knowledge of material in the solid state.

26. Medvedev slated to take over from Putin

http://en.rian.ru/russia/20071217/92858987.html

Essentially Putin's Russia will continue, and that has direct implication for all the fossil fuel industry in Asia, regarding everything from global warming to export control to defense postures. Putin's Russia, one of an energy oligarchy, will continue to express those policies likely for a good portion of the 21st century.

27. Conditions in Iraq improve enough to get the oil industry back online

http://www.rigzone.com/news/article.asp?a_id=54099

Opening the possibility that Iraq just might return to a functioning member of OPEC has direct implications on the availability of oil for import around the world.

28. USAF test flight of transport aircraft C-17 using CTL synthetic fuel

http://www.enn.com/pollution/article/24117

This heralds the onset of CTL and likely portrays our (US) future over the next couple of decades.

29. *And now, for my wildcat speculation of the most important news item:*

Namibia: Expert Confident About Oil Reserves

Southwest Africa will turn out to be a major oil exporting region over the next couple of decades, slowing the decrease in available net exports of oil.

30. The response of the global economy to the large increase in oil prices

Most people would have probably assumed that $90 oil would have caused mayhem in the global economy a year or two ago. Yet the effect has been relatively muted. I think this says a lot about how effectively individuals, businesses (and hats off to alternative energy firms), and governments have responded to increasing oil prices over the long term. Oil now has a much smaller (I believe around 50%) impact per GDP than it did in the 1970's in most of the big western economies, including the US.

31. Tesla troubles

A not-positive but nevertheless noteworthy story is Tesla Motors recent troubles with putting the final touches on its long-awaited car, particularly with the transmission failure and the management shuffling.

And I love this suggestion for 2008. What a great idea this would be:

My favorite energy story for 2008 would be -- Congress recognizes they cannot pick winners, and instead sets up a multi-billion dollar X-Prize competition for the first three alternate energy

sources to supply reliable commercial-scale power at costs competitive with fossils.

So those were the energy stories that I, or various readers thought were significant in 2007. Were there other significant stories that we missed?

Looking back at the list, many (most?) of the stories were not anticipated at the beginning of the year. So, who knows what 2008 will bring. Any thoughts?

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