The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Thursday morning at Clean Tech 2007

Posted by Engineer-Poet on June 2, 2007 - 11:54am
Topic: Demand/Consumption
Tags: efficiency, venture capital [list all tags]

Apologies for the delay, but dinner with Stuart Staniford (great guy!) took up most of Thursday evening and there's little power and even less connectivity in Yosemite. (Great waterfalls and cool geology and other stuff, though.) Now that I'm landed in Kansas with a bit of connectivity for a couple days, I can give you more of what I saw!

8:30: Lawrence DuBois

The first session I caught was with Lawrence DuBois of SRI International. SRI is a contract R&D organization which has its fingers in many pies. This gives them a great deal of expertise in many areas, some of which are applicable to energy.

DuBois noted that alternative energy systems use massive amounts of materials compared to at least some conventional systems (gravity dams excepted, I suppose). He cited some numbers I didn't write down fast enough. He then went on to other developments.

The first one he mentioned was... a Direct Carbon Fuel Cell (DCFC)! I was rather surprised to hear SRI claiming credit for this, but this matter was clarified later. The attraction of the DCFC is that the coal market has very different dynamics from oil and gas, and coal is still a great deal cheaper per BTU than the others. Coal is still a major energy source (as little as some of us like it) and forms a $150 billion/year market (I believe this is world-wide).

The SRI DCFC is a different technology from the Cooper unit, using a solid-oxide electrolyte and a carbon-liquid carbonate anode. This helps boost its current capacity to as much as 350 mA/cm², though efficiency isn't quite as good at 70%. One major virtue of the DCFC is that it produces nearly pure CO_2. CO_2 separation is the major cost in sequestration schemes, and eliminating this step improves both the economics and the energy return.

This cell shares with the Cooper technology the ability to use coal, petcoke or biomass (charcoal) for fuel. DuBois also mentioned tar as a fuel (presumably converted to coke), which would perhaps give coal some competition from tar sands and eliminate the need to upgrade the tar to syncrude.

SRI also has a CO_2 capture system with improved characteristics over amine sorbent systems. It is well-suited for use with water-gas shift systems, and features:

- Relatively high-temperature operation: 350°C
- No sorbent or solvent
- Thermally stable for at least 300 hours

He then went into the economics of sequestration.

Operation	Cost/tonne
Separation	$30-$50
Compression	$8-$10
Pipeline	$0.70-$4/100 km
Injection	$2-$8

TOTAL	$41-$70

The DOE's goal is $30/ton. With 5 billion tons/year of CO_2 to deal with, this could be a $150 billion market. The transport sector is nearly as big as the electric sector (per my notes, but I'm no longer certain what this refers to or how significant it is).

DuBois then moved on to solar PV and particularly its silicon supply. The slicon PV industry has for years taken its feedstock from the scrap and excess of the semiconductor sector. With the recent explosive growth of PV and the revival of semiconductors, these supplies are no longer adequate. Fortunately, PV does not require the same level of purity as semiconductors and can use much cheaper grades of silicon; the problem ere now was that the market was too small to justify an industry just to supply it, but this has changed.

SRI's entry is a new chemical process using simple reactors to convert sodium fluorosilicate (Na_2SiF_6) to NaF and elemental silicon. This is done by reaction of the raw material with metallic sodium:

$$Na_2SiF_6 \rightarrow SiF_4 + 2\ NaF$$
$$SiF_4 + 4\ Na \rightarrow Si + 4\ NaF$$

The sodium fluoride can be removed from the mixture by dissolving it in water, leaving silicon. This process was developed in the early 1980's, but the low price of energy made it uneconomical at the time. It has been waiting in the wings until the situation changed, and it has. This cheap process ought to put to rest the claims that PV doesn't pay back its invested energy.

Though my notes hint at fascinating things, I don't recall the details of the following Q&A well enough to write about them. This is a pity. I'll have to do audio recording next time.

10:30 Efficiency panel

The 10:30 session had a whole panel of speakers on efficiency issues. The list was long, so I'll link it rather than list it.

Ben Finkelor of the UC Davis Energy Efficiency Center performed the introductions and said a few things about his own work. The UCDavis EEC has an emphasis on commercialization. It is part of the business school (much better for getting managers to buy in than if it was part of engineering or sciences) and specializes in technology diffusion. If there's anything we need, it's for the available technologies to get diffused into the world as fast as we can.

John Kuhnart of American River Ventures was next. ARV is a venture-capital firm. My notes on his presentation are limited to his observations that efficiency (or lack thereof) is

a big problem, and government involvment is required to help address it. I get the feeling that this is in the form of policy initiatives and incentives.

Next came Gerald Brady of Siemens. My notes only state that he said that energy was a $620 billion business.

Drew Clark of IBM Venture Capital had some surprises. First was that IBM even had a venture-capital unit, but he said that it was small. It works with entrepreneurs and looks for innovation. It has an energy and utility vertical unit, and a Big Green unit specializing in water management, supply chain management and energy analytics.

Jonathan Livingston of Pacific Gas and Electric (PG&E) noted that California rewarded utilities for services performed, not just energy delivered. If PG&E can get the job done by boosting efficiency instead of delivering more kWh or BTU, then they can get paid more for actually using less. PG&E has a portfolio manager for each sector and administers funds on behalf of the ratepayers.

David Berokoff of Sempra Utilities (owned by San Diego Gas & Electric and Southern California Gas) talked about their modest VC program, run by a 15-man team. He spoke at greater length later.

Doug Lawson of Incuity Software spoke briefly. Incuity produces software serving mostly manufacturers for whom efficiency is not a core competency. Their product is essentially knowledge and the software to deliver it usably.

Jim Parks of Sacremento Municipal Utility District (SMUD) mentioned that his company served 550,000 customers with electric service.

After a brief note from Kuhnart on efficiency plays, Doug Lawson took the floor for an extended discsussion of one of Incuity's installations. This happened to be, not at a manufacturer, but at Rice University in Houston. Why discuss Rice? Because it was simple enough to cover more of the salient issues during his limited time, and give a more complete picture of what was accomplished and how.

Among the points he made:

- Big energy consumers are COMPLEX.
- Fixing efficiency issues requires understanding.
- Without understanding, there is often no improvement.
- Incuity serves about 100 customers per year [lots of room in that market! – EP].
- Reduced waste leads to greater efficiency and profit.
- Rice U. has a number of cooling and cogeneration plants, but needs to normalize the operation of these facilities for the weather and the usage of the buildings.
- The major questions are:
    1. How to operate the plants and buildings, and
    2. How are the buildings behaving?

  Abormal behavior of a building is a problem which cannot be fixed until it is detected, so early detection can bring large savings.
- The people who actually run the physical plant (he used the term "knuckledraggers") tended to run things inefficiently. Without access to data, their modus operandi was to clock in and turn everything on full to be ready for whatever might happen that day. Of course, whatever wasn't actually needed was just burning money.

- Incuity's $300,000 software package wound up saving around $1 million/year in operating costs: a return of investment in just 3 months (spread unevenly across the calendar, I suppose).
- The benefits accrue from smarter operation of the system. Unused spaces can be left alone, while space required for activities can be pre-conditioned to minimize the cost of energy. Cogeneration can be employed to sell power if and only if the market price of electricity is favorable.
- The information system has had a radical effect on response time to problems. Formerly, an open door or window or stuck steam valve might not be detected and corrected for weeks. With the new software, the response time for such problems can be reduced to minutes. The less time energy-wasting problems continue, the less energy and money are lost to them.

Livingston mentioned that efficiency is now the cheapest play in the market, and PG&E has a 30-year history in the business.

The floor returned to Berokoff, who went into a case study of an investment that ARV made in ovens (of all things!). ARV had initially taken a look at TurboChef, but the due dilligence work didn't show a worthwhile investment and they held off. However, another opportunity turned up in a small company called GAT. GAT's inventor-entrepreneur head was working on a microwave-convection technology for ultra-speed cooking, and ARV put money into it. A little while later, the CEO's of GAT and Turbo Chef met by accident, and this led to Turbo Chef buying GAT. ARV cashed out with a 230% gain, and if you've recently enjoyed a toasted sandwich from Subway you've seen the results.

And that's the end of my notes from Wednesday morning at Clean Tech 2007, and my time for writing. The rest will have to wait until I'm back home.