

Chris Nelder's Notes on the ASPO-USA Third Annual Oil Conference

ASPO-USA World Oil Conference

Oct 17-20, 2007

Houston, Texas

Proceedings: <http://www.aspousa.org/proceedings/houston/>

These are merely my notes, of the key points I picked up during the conference. I hope these notes will be useful to others as an index to the volumes of material that were covered. Any errors or omissions are undoubtedly mine. Please send any comments/corrections to me.

My coverage is no doubt incomplete because I can only type so fast and much of the material went by very quickly. I was particularly challenged to keep up with Matthew Simmons' dense presentation while trying to eat lunch at the same time! Consider this document an index, and go back to the source presentations to double-check the data.

My personal comments are shown in [brackets]. (?) indicates information that I probably got wrong.

Since no one can be in two places at once, I could only cover part of the split sessions that occurred simultaneously. So coverage of these sessions is limited.

For bios on the speakers, see <http://www.aspo-usa.com/aspousa3/Speakers.cfm>
For the presentations, see <http://www.aspousa.org/proceedings/houston/presentations/>
(some presentations may not be posted yet; check back)

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DAY 1 – WEDNESDAY, OCTOBER 17, 2007

1:30 pm – 3:00 pm

Investing in Conventional Oil and Gas in a Peak Oil World

Leslie Haines, Editor of *Oil and Gas Investor*
Marshall Adkins, Raymond James Financial
John Olson, Sanders Morris Harris
Byron King, Agora Financial
Jim Baldauf, ASPO-USA

Marshall Adkins

- Secular bull market, emerging economies driving oil demand up
- Oil supply growth is limited
- U.S. natural gas prices will remain very volatile
- When energy works, everything else suffers
- Energy used to be ~25% of the S&P 500 weighting, now it's financials
- Oil fundamentals: best outlook in years
- Meaningful drawdowns in inventories now, 2007 & 2008 inventories net negative, mostly due to loss of OPEC output. "Involuntary cutters" Venezuela, Iran, Russia and Indonesia. About 40% of OPEC cuts since Jan '07 are likely permanent. Believes OPEC will ramp back up over the next year to the same level as late 2005
- IEA has been wrong on non-OPEC forecasts. Current forecast for non-OPEC is about 2x what he believes it will be
- Market is missing slowing Russian growth
- Missing Mexican decline rates too...
- Net 200,000 bpd loss not accounted for
- Rig counts are exploding: rigs increased 4x since the 70s, yet costs went up 20x, and output went down 35% (?)
- Chinese consume about the same amount of oil per capita as we did in 1900. Consumption in India and China is exploding while US, Japan, Korea, etc. are flat. Groundswell of demand continues to push oil prices higher
- IEA demand growth estimate for 2008 will be 2.4%, but the oil isn't there...RJ average est for 2008 is 1.5% because oil *can't* increase 2.4%...nor can we maintain a 5% GDP growth
- Prices will have to rise to reach equilibrium
- Great slide: "What Oil Price Will Slow Demand?"...dollar/euro exchange rate
- At what price will oil demand slacken? 2008 forecast: \$80 oil (\$15 above Wall Street consensus)
- THE SOLUTION: Higher oil prices to reduce demand, more LNG in the medium term; long term: solar, RE, and nuclear
- Projects massive surge in LNG 2008-2009
- Alt energy has great long term potential
- Reasons to own alt energy: it's going to be the big winner in the next decade
- Play the majors, the independents, and the service companies (20-30% growth each year). Short term: oil & gas exploration. Mid term: Canadian oilsands. Long term: alt energy.

John Olson

- Biggest opportunity he's ever seen in 40 years in the industry
- Facts of life: Wall street is brutal, analysts know the price of everything and the value of nothing. Buffett: "If you ever sit down at a poker table and in 15 minutes you haven't figured out who the pigeon is, you are the pigeon."
- In 5 years, we've gone from \$24 oil to \$80, an increase of 333%. Demand is up only 9% over the same period "upside down inelasticity" Largest wealth transfer in history (to the Middle East). Massive environmental greenhouse gas issues. No meaningful government initiatives. We are subsidizing people who hate us. Massive environmental damage in China.

- Population is the driver. Chindia increase. An increase of 2 bbls per capita equals a 12.6 mbpd increase in demand
- Various sectors of oil industry are enjoying massive returns while S&P growth is much lower
- In '08 and '09 is flat to lower earnings, across all major oils and refiners except coal, which should do 53% in '08 and 24% in '09
- Upstream sectors (E&P) will do better
- Oil service sector is where the major growth will be and are trading at a discount to S&P, esp. offshore drilling. They're drowning in cash. Five years ago, most of them were bankrupt.
- Joy Global Inc (primarily coal, uranium, tar sands)...good model of what you're looking for. Growing about 10-15% a year over the next five years, esp. in the mining area. Very volatile but will be a big winner going forward.
- "Quantomania" What cannot be counted simply doesn't count, and so we systematically ignore large and important areas of concern
- "Wall Street appears to be putting lipstick on the proverbial pig." Wall Street valuations are unwarranted & based on fallacies, such as "fair value accounting" and returns on capital. Many measures are sleights of hand
- EBITDA: Earnings Before I Tricked The Dumb Auditor!
- Valuation methodologies are suspect
- "Nothing in life is worth 14 times EBITDA"
- Master Limited Partnerships are skimming off all the cream and just returning original capital to investors
- Expect oil and gas prices to be quite volatile at these levels
- Buy "classy" energy and service companies at a discount
- International could be much better than North America for the next few years
- What can go wrong? Gov't interventions (taxes, royalties, expropriations) and market busts
- Be careful but we optimistic
- Capital costs can be very risky

Byron King

- 30 years ago got into peak oil via Hubbert
- Due to water flooding EOR: I figured out a long time ago I wasn't in the oil business, I was in the saltwater business
- 40K subscribers @ \$50/yr for *Outstanding Investments*
- Peak oil investing is a target-rich environment...shooting fish in a barrel
- Likes Apache for EOR
- Oil service companies: SLB, HAL, Core Labs.
- How much more is left to go? I don't know....it's staggering
- Likes subsea production companies like FMC, Cameron Int'l, drillships, energy mutual fund segment of GE
- GE is doing remote diagnostic data on their locomotives worldwide
- "There are deep deep deep deep concerns within the U.S. Navy about how to get the fuel to push ships through the water"...they're actually looking at solar & wind-powered ships again! (Recognizing that their nuclear powered ships have a limited future.)
- Navy also has a very well developed geothermal program.

Jim Baldauf

- In the oil business as an investor and oil producer, based in Austin
- Unconventional investment in conventional oil and gas
- Three unconventional investments:
 1. Purchase of ongoing production from oil & gas wells. Formula: figure present production 24-36 months forward. Production will decline prices may increase. 15% deduction on income for depletion allowance.
 2. Purchase royalty interest acreage in areas of drilling & development. Landowners receive about 25% of well production revenue. Some landowners don't want to wait and will sell their interest. Well may or may not be drilled or be a good producer. 15% deduction on income (oil depletion allowance).
 3. Purchase of working interest in individual wells or drilling programs. Small oil companies often sell interest in their drilling projects. Working interest owners share the costs & the profits. Investment is 100% tax deductible, whether it's good or bad! About 90% immediately deductible (IDC), 10% standard deduction on depreciation, & 15% oil depletion allowance. "Don't try this at home alone!"

(Q&A from the Oil Drum session on Ghawar with Euan Mearns and Stuart Staniford, which went on simultaneously with the above session...I ducked in at the end)

Mearns believes that last year's production cuts in KSA were voluntary. What their production does over the next year or two should show their true colors. But although the cuts were voluntary, they were welcome because their production was straining. Trying to get more rigs into the country.

Staniford: KSA seems intent on maintaining a lower production level for a long time, rather than maximizing production.

Seem to believe that Ghawar's recovery factor is 40%, I take it due to their analysis of the oil-water contact, lower than the claimed recovery rate. Believes that there is some intentional deception

Matthew Simmons says that his intel suggests that KSA can't maintain a 12 mbpd production rate, and that their "culture of secrecy" is hiding the truth about KSA production

Charlie Hall: Why is it that the greatest danger to mankind is only addressed by people who are doing it on their spare time, and can't get any funding for it from the gov't, industry, investors, or anybody else? They have to do it on their own time and with their own money!

Udall: the average American is consuming their body weight in oil each week

3:30 pm – 5:00 pm

Threshold 21 (T21) North America (energy model)

Dick Lawrence, ASPO co-founder

Jed Shilling, Millennium Institute
Andrea Bassi, Millennium Institute
Prof. Charlie Hall State University of New York (SUNY)
Billy Schoenburg SUNY
Bobby Powers, SUNY

Dick Lawrence

- Denial Complacency and Confusion
- We're not very numerically literate, don't understand exponential rates & complex systems with interlinked relationships
- Ideology, emotion, and belief structures dominate
- We need a new and better energy model...understand net energy future energy scenarios so we can understand EROI implications of the options going forward

Charlie Hall

- Considering the EROI of liquid fuels, there is no alternative to oil and gas
- For the last three years, the dollar expenditures to look for oil have been greater than the returns! (NY Times)
- Good slide: (Hall & Cleveland 1981, *Science*, p. 182, "Energy and Resources Quality")
- Oil EROI: in 1930, 100:1; in 1970, 25:1; in 1990's, about 11-18:1; today, maybe 3:1? Dunno...data is bad. The EROI for imported oil today is in the range of 20:1 (?)
- The U.S. uses about 100 quads (or exajoules) each year (all-in)

Jed Shilling

- Millennium Institute founded in 1983 by Jerry Barney to promote global health etc.
- Peak plateau scenario for oil prices from now through 2050

Andrea Bassi

- Check out free modeling tool called "interfade" (?)

Billy Schoenburg

- "The Billy and Bobby show"
- Their model allows you to manipulate some variables and then see the effects on other things.

Hall: the "cheese slicer" model. Compelling model, looking at the economy as an organism, required energy, etc....out to 2050 the discretionary energy investment basically disappears as the cost of producing energy rises (etc?)

FIND FUNDING FOR THESE GUYS!!!

See: **T21-interface.sourceforge.net**

www.millennium-institute.org

Alan Drake comment: the best environmental policies also turn out to be the best economic policies.

7:00 pm – 9:00 pm

Peak Oil: Some Views from Europe

David Strahan, Author/filmmaker from UK

Aage Figenschou, Simmons & Co. director in the oil and gas sector

Strahan

- lastoilshock.com - Good presentation on UK peak oil perspective
- We're close enough that it doesn't really matter when the peak is; we're already in serious trouble.
- Good quotes by Sir David Manning and Sir David King
- Ireland is already working on an oil rationing plan

Figenschou

"The Road to Damascus"

- IEA coming to terms...history of their bad production forecasts...million "missing barrels"
- Spare capacity is 85 pct heavy sour with no buyers
- Actual spare capacity is 150,000 bbls at best...probably none in actuality
- Good study of bad BP projections as well. They didn't take into account depletion!
- Great study of bad CERA projections too! From 2005-2006, their projections dropped by about 1 mbpd for each year...their current projections for trustworthy Norway is 43 pct higher than IEA!
- 7 mbpd difference between top & bottom estimates for 2010!
- The moral: They start with the conclusions which are driven by ideology and work their way back to their projections

DAY 2 – THURSDAY, OCTOBER 18, 2007

8:20 am - 8:50 am

Robert Hirsch, Energy Consultant, SAIC; Co-author of "Peaking of World Oil Production: Impacts, Mitigation & Risk Management" [aka the "Hirsch Report"] with Roger Bezdek

Peak Oil: Exploring the Risk Factor

- Spare capacity will not meet demand at some point. Now? IEA: 2012
- "...it only requires a relatively small amount of oil to be taken out of the system to have huge economic and security implications" Robert Gates
- Reviewed the 2005 model. 2% growth before peak, 2% growth after
- "Small is huge" 3% decrease in U.S. GDP = Recession (1973)
- Would cost \$100 billion to achieve 800,000 bpd using CTL

- % change in world GDP / % change in oil supply = about 1 (or within an order of magnitude, 10 is too big and .1 is too small)
- World GDP growth & oil production have tracked well for decades
- 1973 and 1979 oil interruptions produced loss of GDP equal to oil loss
- Scenario analysis by Robert Gates et. al. found a 4% loss in global production resulted in oil at \$180/bl
- Bumpy plateau at the top...how wide?
- Decline rates in some well-managed giant fields range from 8-16%
- Europe's oil plateau was ~6 years wide with 5% /yr decline over the period and 3% "bumps"
- North America: 3%/yr decline over the first 5 years, for a total decline of 15%, then 16 yrs plateau with 4% /yr decline
- These decline rates will have a massive effect on GDP
- Colin Campbell model: break at 2009, maximum at 2010-11, then ~ 4 years to 4% decline at a 2% decline rate.
- Laherrere: similar except 8 yrs to decline
- Skrebowski & Robelius models are similar...2.5-4% decline rates
- Comparing the above, avg decline rates are 2% (2-5 for Robelius). Pseudo plateaus (~4%) lasting 2-15 yrs, declines 2-5% per year
- NOCs in control now. Unlike the oil majors, political stakeholders are "Cash output important. Some have poor management, low reinvestment, short time horizons, financially weak, etc."
- Since people don't yet realize the threat of peak oil, when they do, it is likely to produce panic, which will produce sudden shortages, and oil prices will spike
- Some exporters will likely reduce exports as they experience a cash windfall, and choose to conserve production for domestic & future uses
- "oil exporting withholding scenario" produces a sharper peak than geology
- IEA: "the recent apparent surge in oil and gas investment is illusory, because costs have soared. Real investment in 2005 was barely higher than 2000.. ... This energy future is not only unsustainable, it is doomed to failure"
- Best case: 2-15 yr plateau w/ 2.5% pa decline, middling: sharp peak w/ 2-5% pa decline, worst: export withholding
- % World oil shortage ~= % decline in world GDP
- Resource nationalism has dramatically changed world oil
- **"Peak oil: the more you think about it, the uglier it gets"**

8:50 am - 9:30 am

Chris Skrebowski, Editor of *Petroleum Review* and a trustee of the Oil Depletion Analysis Centre (ODAC)

Megaprojects Update: What We're Pretty Sure Is Coming

- Has a healthy skepticism, let the numbers talk
- "You never run out of oil. You do run out of incremental flows"
- "Global production falls when loss of output from countries in decline exceeds gains in output from those that are expanding."
- IEA expectations of new production haven't materialized
- "Peak Oil is real and Peak Oil is imminent"

- “Peak oil is most likely to occur in 2011. There are now just 1200 days to the Peak”
- 80-95% of all transport is fuelled by oil products
- 50-75% of all oil is used for transportation
- Clues:
 - Discovery rates falling
 - More countries in sustained depletion
 - Companies struggling to hold production
 - Non-geologic threats to future oil supply
 - The current lack of incremental flows
 - Few countries with real growth potential
 - Sustained high oil prices
- Biofuels, tar sands, and Venezuelan heavy oil will barely produce the equivalent of a couple of small fields. It takes at least 6 years to begin producing a new field (e.g. Venezuela)
- We’ve been on a plateau since Jan 2005.
- “It looks as though CERA’s bumpy plateau has arrived 25 years early”
- For the last three years, oil production has drifted down for the 5 supermajors, has flatlined for the 10 largest quoted companies, has flatlined for the 24 largest quoted companies. (?)
- The usual list of above-ground factors: resource nationalism, tighter terms and conditions, civil insurrection, lack of skilled people, aging infrastructure, cost inflation, refinery constraints...how likely is improvement in these? Who will cap or ration production? Russia seems to be indicating that it’s going to do that.
- Economics isn’t working very well. Most non-OECD producers subsidize fuels, as do many Asian countries
- Some gov’ts tax fuels very heavily
- Oil prices around the world are all over the board and incoherent market: \$0.20-\$9.00 /gal around the world
- “The hole in the bucket – how big and how fast is depletion?”
 - Around 5-8% for areas in decline
 - Net depletion 4% or around 3.3 mbpd/pa...Dick Cheney called it 3%
 - Net now double demand growth
 - How do we know? IEA Medium Term Report
 - Is depletion accelerating? Yes slowly maybe 0.1 – 0.15%/yr
 - To ameliorate, slow production down!
- The need for 3.3 mbpd of new capacity each year *just to stay flat* is the key factor!
- New supply sources
 - Megaprojects (good data)
 - Infill and small projects (no data)
 - Loss of supply to depletion (now good data)
 - Spare capacity (OPEC only) How much?
 - Limited additions from discovery (again, no data)
 - We can calculate two of the above and know the rest
- Megaprojects database:
 - 175 projects with dates and full details
 - 144 onstream by 2010 and 170 by 2012
 - Discovery to first oil averages 6.5 years

- But only 4 projects in 2013 and 2014
- 47 potential projects will only impact 2014+
- Where? 12 FSU, 7 Canada, 6 Iraq and 4 Iran. But FSU may cap production, Canada is disorganized, and Iraq and Iran are Iraq and Iran
- Best estimate: plateau from 2008-late 2009, then decline of about 1 mbpd each year through 2013.
 - 93 mbpd in 2011-12
 - Constant infill & small new projects gives 95.8 mn in 2012
 - +5% 2008/09, +10% 2010/2011 and +15% 2011 and +20% 2012 – 2012 at 96.8 mn
 - Changing the assumptions tends to move the volume, but not the date of the peak
- The absence of any significant projects in the 2012-13 time frame is ominous...to get those flows we need to start now, but we haven't
- Prices bounded by tar sands on the low side and Saudi on the high side
- 75-80% of a barrel is for transportation
- "To avoid economic disaster we need to shed lots of oil demand"
- There's still some conventional substitution to go of fuel oil, heating oil & efficiency
- The big hit is substitution of transport fuels that make up 70% of the barrel
- Jet fuel and ships bunkers are difficult
- "Surface transport is still 50% of the barrel"
- Can & must go electric, but time to market is the chokepoint
- Peak at 2011-12 at ~93 mbpd
- There will be supply shortfalls in winter before Peak
- Oil supply in international trade will peak earlier than the oil production peak [ELM?]

Q&A

- Third world already experiencing shortages
- Corn ethanol is a "tragic mistake" & impacts food. Gov't is not up to speed & doesn't understand the tradeoffs
- Folk with long commutes are going to have a hard time adapting
- Adaptations (moving, replacing vehicles, etc.) take a long time to decide & do
- What about military response to exporters' withholding? The "oil shockwave" exercise in government concluded that no military option would really make much of a difference.
- Skrebowski: megaprojects that may fail to deliver are: secondary and tertiary recovery methods on Saudi fields, due to water cut
- Will the markets not work and let price settle the balance? Hirsch: market models can't handle sharp, massive declines such as we may see. "Markets can't do things that fast. This is non-equilibrium economics."
- Skrebowski: "You can't get a supply side response beyond a certain point." All you can do is have the price go up until it kills demand. E.g., people stop going to work. Economics don't work – the market signals are all screwed up.
- Skrebowski: pessimistic on leading indicators. "Futures markets jump around, tied back to the immediate futures positions. As a species we're not very good at predicting the future and we're even worse at acting on it."

- Hirsch: In trying to predict the date of peak, there are too many variables. Re: the futures market, people are assuming that the future will be like the past. The realization that it isn't is going to be a shock.
- **Q:** Deffeyes said peak was end of 2005, why are you saying that the peak will be 2011? **A:** Skrebowski: we *could* get the peak in 2011 *if everybody does what they say they're going to do*, but we've had nearly 30 months of no significant gains...so why is the price of oil only in the upper \$80's? This last summer we got to the crossover point where supply did not keep up with demand...so we've been living off stocks and drawing them down quickly.

10:00 am - 10:40 am

Jeremy Gilbert, Managing Director of Barrelmore Ltd, former Chief Petroleum Engineer, BP

The Devil is in the Data

- Lack of clarity in terminology
- Status of the peak oil message:
 - There is wide acceptance that there will be a gap between supply and demand, but the timing is uncertain. But if it's within the next 10-15 yrs it's already too late to make a smooth transition. So future studies should concentrate on the shape of the supply curve.
 - Problems occur not at the peak but when supply *isn't increasing rapidly enough*.
- The shape of the supply curve will be determined by the performance of existing producing fields as they mature and go into decline, and the pace of new development
- Acceptance that production from existing fields is declining at ~5%/yr, but lack of consensus about future effects of new technology & new discoveries. Range of the latter including Campbell/ASPO of 130 billion bbls yet-to-find (YTF) and USGS mean level of 724 billion bbls
- Actual discovery rates suggest that even the lowest end of the USGS range is optimistic
- But even if higher end of YTF range proves correct, time needed to discover and develop new fields will be long—remote, deepwater and complex reservoirs with reducing IOC project management input. Most of any new production will only come after a supply peak.
- There is no agreement on how much reserves growth we may expect to achieve. Estimates range from Campbell's zero to the USGS F50 level of 674 billion stb
- Reserves don't always grow!
- Reserves=Resource (oil in place) * Recovery Factor (5%-70%)
- Procedures for estimating reserves may vary from company to company and from country to country
- The equivalent of about 25% of U.S demand for natural gas is just flared off worldwide!
- CO2 and EOR

- CO2 projects to increase production very different from CO2 sequestration
- We produce about 26 *billion* ton/yr but CO2 injection is only 30 *million* ton/yr
- Reserves growth worldwide could be 180 billion bbls (on a current est of 1900)
- Reserves growth will not affect the date of the peak, it will primarily mean that some oil previously unrecoverable will become recoverable, late in a field's life
- Reserves growth will help, but it can't even compensate for depletion
- Most growth in published reserves estimates only occurs because of initial caution in following SEC rules
- In 1972, 93% of world production was by IOCs under SEC rules, now only about 20% of production is by IOCs and estimates are made on a different basis, one which will reduce reserves growth

Q&A

[Not sure if this fragment from notes I took on my Treo belongs here...lost track of when I took these notes]

- Jeremy Gilbert and Chris Skrebowski
- Skrebowski: oil companies are going nowhere...we know the answer, they know the answer: they're in deep trouble, but they can't admit it any more than politicians can.
- Panel: politicians can't admit the obvious truth, that the only solution is to use and do less. Efficiency and alt fuels can't arrive in the time frame that we have.

10:40 am - 10:42 am

Randy Udall, ASPO

- One out of 20 gallons we put in our tanks comes from Prudhoe

10:43 am - 11:08 am

Richard Nehring, President, Nehring Associates

Taking Recovery Growth Seriously

- Has spent 30 years studying oil data and according to Udall, has one of the best databases in the world for oil data
- "We are all peakists now" – James Schlesinger
- Differences in peak estimates are only 10-30 yrs and 5-15 mbpd at peak. Differences owe to psychological factors (optimist/pessimist) and professional expertise
- His ultimate world oil potential estimate brackets 3385 billion bbls (low), 4115 (medium) and 5035 (high). Leaving out recovery growth and unconventional, those numbers go to 2275 (low) 2495 (med) and 2785 (high).
- Why the radical differences in world oil assessments? Major conceptual differences regarding recovery growth: it's important to delayed peakists and immaterial to imminent peakists
- Recovery growth provides the majority of increases now

- Recovery growth is “The change in estimates of ultimate recovery of oil and gas in discovered fields over time.” Both reserves growth and increases in recovery factor
- Recovery growth increases ultimate world resources, but the increase occurs slowly, and has only a modest effect on max rate of production (doesn't change the peak, but extends the tail)
- Peak production could be ~90 mbpd by 2030
- Recovery growth is the major source of true additions to known world oil resources, but it is not a panacea, it does not eliminate the problems of peak oil, but it is an effective strategy for managing the problems of peak oil.

11:20 am – 11:30 am

George Baker, publisher of Mexico Energy Intelligence

Peak Oil in Mexico: Outlook to 2015

- Cantarell production and exports both peaked in 2004, topped out at 2 mbpd
- Decline rate estimates vary
- Since 2006, total exports have exceeded Cantarell production!
- Down to 250 meters between water and oil
- Expecting to invest \$24.7 billion by 2016 and drill 10,000 new wells—not likely!
- Oil and gas production peak in 2009 excepting deepwater
- Cantarell decline is serious, other prospects are suspect, Pemex business as usual is unlikely
- The Mexican side of the deepwater GOM needs 80 oil companies, not just one company with 80 contractors
- Perceived threat of cross-border oilfields may provoke change in gov't oil policy
- Change in the upstream rules will push peak oil out decades

11:30 am – 12:00 pm

Vince Matthews, Colorado State Geologist

Oil, Minerals and the China Syndrome

- China GDP to pass the U.S. by 2030, India by 2050.
- In the last 16 yrs the world's electrical consumption has exploded by 7 (?) terrawatts
- All countries have increased their electrical demand
- China is the top producer of most world commodities, including iron ore (but not oil). #2 producer and #1 importer of copper and iron ore.
- China's building rate is astronomical, and sucking up available steel. Became the world's 3rd largest car manufacturer in 2006. Opened 70,000 new supermarkets in 2005.
- Shortages of copper & price increases are making it difficult to manufacture projects. Copper thefts on the rise, old mines being reopened.
- China imports 49% of its oil, India imports 70%, US imports 67%. All are competing for oil.

- Despite the intensive application of all modern methods of oil production, the U.S. has remained in terminal decline since its 1970 peak
- Natural gas consumption is also exploding in China, India, and U.S. U.S. nat gas production peaked in 1973 (though many in the industry don't know it). In the early '70s we had shortages of gas that caused manufacturing operations to shut down, schools to close, etc., leading to a loss of trust in gas and consumption declined. Then it rose again in the late '80s as we realized that we had a "bubble" of high supply and low cost. Most went to electric power plants. Again, supply has declined despite intensive production methods and highest prices in history.
- Increased LNG gas imports have masked the decline of U.S. gas production.
- COAL: China, US and India have massive and growing appetites. US and China together consume about half the world's use of coal.
- NUCLEAR: US production has increased slightly over the last decade but only due to higher efficiency. No new plants. The US is the largest producers of nuclear power in the world, nearly 2x that of France. We use 180 million lbs of uranium a year, but global production is 80 million lbs less...the rest is coming from old weapons.
- MOLYBDENUM: Went from \$2/lb in 2002 to \$40/lb in July 2005. Some users can't even get it anymore.
- PRECIOUS METALS: Since 2003, Gold went up 128%, silver 266%, nickel 630%, copper 454 %, lead 750%, (etc. etc. for all other metals)
- CEMENT: China started importing in 2003, leading to shortages. Top producers; China, India, US. 81% of US cement manufacturing is foreign-owned!
- China is tying up supplies of everything all over the world and spending vast amounts of money to do it. Now building a mineral reserve.
- The DoD is very worried about its supply outlook for everything
- Strategic & critical materials for making RE machines (e.g., solar): The US is dependent on imports for more than 50%
- Overall impacts:
 - "We will suffer from effects of inflation.
 - We may see increasing shortages of critical raw materials
 - Pressures will mount to develop more of the West's natural resources
 - Conflicts may arise with multi-national corporations operating in the U.S."

12:30 pm – 1:00 pm

Matthew Simmons, Chairman, Simmons & Co. Int'l

Gauging Risks of Peak Oil and Gas: Limits to Growth

- The debate persists
- Peak oil Google hits: 3.1 million, for global warming: 80.5 million
- Spate of new Peak Oil studies
- Re: NPC report. Instead a group of ~1500 created a 256+ page report over a year and a half. Pages devoted to peak oil: only 19 paragraphs (pp 127-130). "They totally copped out."
- All time crude output: May 2005
- Dwindling new discoveries
- Accelerating decline rates

- Rising output of heavy sour oils, shrinking output of light sweet crude.
- Demand is still insatiable despite soaring oil prices. Demand will soon outpace supply if demand continues.
- Optimists scoff, believing reserve endowment is ample, proven reserves can grow, etc.
- Risks are “above ground”
- May 2005 is still the all time record of crude production. We’re now 1.5 mbpd off from that
- Decline rates vary from 4.5% (CERA) to others (8%) and some worry that 10-12% might be in store
- Can the world cope with even a 4.5% pa decline?
- Most experts informally believe that the right number is 8-10%
- CERA thinks we can add 60 mbpd in 10 years!
- NPC estimates (6-8% decline) require adding over 100 mbpd in 23 years! Ain’t gonna happen.
- We are maxing out crude production between 73-75 mbpd. Nat gas liquids, enhanced processing and biofuels make up the rest to 85 mbpd
- NG liquids are not sustainable and are the product of mature fields gas caps...it has masked the decline of crude
- The most serious risk is oil demand.
- Did everybody miss China?
- 1920-2006 avg growth rate is 4.8%
- Oil demand is rising across the world...3.1% pa
- All serious demand forecasts assume continued growth!
- Transportation is the driver. Too many people and too many vehicles. Producing 50 million vehicles per year worldwide. For every 1000 people we have 641 cars. In OECD is 534 cars per 1000 people, in China it’s 18 and in US it’s 831
- If everybody rises to Western Europe level we need 69 mbps of new supply
- Fundamental growth is unstoppable. Can supply keep up?
- Takes 6-8 years to develop a new discovery, but many projects are getting delayed everywhere.
- Drilling activity needs to soar, but rig supply is tapped.
- Infrastructure needs to be rapidly expanded AND rebuilt but it can’t happen!
- How secure is supply?
- GOM supply has been in decline since 2002 (500 mbpd) and is now flat around 250,000 bpd. It only took 5 years to go from peak to 20% of peak
- Too many countries are in decline
- Largest of the 42 fields discovered since 2000 does only 27,000 bpd (out of a total of 4000 fields outside US and Russia)
- Saudi production is 8.6 mbpd but they say they will go to 12.5 mbpd by 2009!
- How are Saudi new projects between 2004-6 performing?
- Saudi candor suggest that all is not well. “It would be folly to plan on producing more than 12 mbpd” (Senior Saudi officials) in fact they don’t think they can do more than 10.5 mbpd
- Evidence suggests that Saudi is struggling to maintain exports
- Recent “bid discoveries” can’t find rigs to do further tests, and it will take at least three years before rigs are available!
- It wasn’t due to a lack of spending, or drilling: E&P spending has soared as have committed rigs

- Can IEA increased demand projection be met (rise 2.5-4 mbpd) by 2008??
Simple math (in mbpd):
 - 73 crude
 - NGL 12
 - Total supply: 85
 - Stock drop: 3
- Our system is rusting and too old: refineries, drill rigs, tank farms, and pipelines (and people)
- We have only 1.7 mbpd “cushion” in refining capacity. Kuwait’s new refinery will cost \$14-16 billion for only 800,000 bpd capacity
- Everything needs to be rebuilt just to ensure that current flows continue. What about the raw materials? Costs are doubling & tripling for everything
- What happens when demand outpaces supply? Inventories decline, but they’re already extremely low. Once minimum operating levels are breached, supply falls.
- Once shortages begin, people panic and top off their tanks, leading to immediate shortages. Predicting this event is impossible. We could drain our system in 5 days!
- Is it too late to develop an “early warning system?” We need data reform! E.g., require data reporting in order to import any oil to OECD.
- World oil leaders are resistant to data transparency, but we all lose
- Peak oil will endanger us within 1-5 years, far sooner than global warming.
- The peak oil risk is genuine, peak is likely soon, no evidence otherwise, demand growth cannot be met so the risk might be 50-90%.
- Question from Udall re: Simmons’ \$10K bet with another observer: Will we see \$200 oil by 2010? We’re an event or two away from hitting \$100.

1:30 pm – 2:15 pm

Tom Petrie, Petrie Parkman & Co.

A Strategic Perspective on 21st Century Energy Challenges

- How much production does it take to offset decline?
 - @ 2.5%, 8 mbpd
 - @ 5%, 16 mbpd
 - @ 8%, 24 mbpd
 - Depletion matters...
- Capital intensity: capex vs. oil demand is spiking up at ~45 degree trendline
- Finding & development costs up 142% since 2000! (\$6.78 in 2000 to \$16.44 today)
- M&A: in the first 8 months of this year, we matched all of 2006’s number.
- Resource nationalism: 95% NOCs, 5% IOCs according to Forbes Magazine. Is extending into countries previously more open to foreign investment: Venezuela, Bolivia, Ecuador, Peru, ME, West Africa, Russia, Kazakhstan, Hungary & Canada. These trends are likely to continue and even gain momentum. Putin’s papers on how to maximize national power via oil trade are often referenced. Will price signals even work now? Indeed, as price rises, the need to export is reduced!

- CO2 intensity in India, China and Russia are 3x, 4x & 6x (respectively) that of the U.S.
- New and evolving resource priorities are trumping historic relationships.
 - Russia-China expanding linkages
 - Iran-Russia nuclear cooperation
 - China-Iran large purchases of Iranian crude and products
 - Iran-Pakistan-India considering a gas pipeline link
- Lots of talk about *The Black Swan (The Impact of the Highly Improbable)* by Nassim Nicholas Taleb. DENIAL!
- The life of a turkey: he's fed regularly for 1000 days and assumes he always will be...until one fateful October.
- "The world's current energy future is unsustainable and is "doomed to failure" due to a lack of investment." Claude Mandil, IEA
- Peak Gas? Topped out in 2001 at ~54 tcf/d, now much lower despite an explosion of drilling
- U.S. gas supply is dependent on a combination of growing unconventional, LNG, and ultimately Alaskan production. (EIA AEO 2007)
- Rockies gas pipeline (Barnett etc.) coming into the northeast, along with expanded LNG coming into GOM and elsewhere, creating the illusion of continued supply (a "head fake")
- Petroleum "black swan" events: 1973 Arab Oil embargo, Iran-Iraq war beginning in 1982 (?)...these events caused spike up in oil prices, which then decline again. Global triggering will be higher prices & global pain, which are not being factored into the market.
- Likely trends:
 - Proscribed opportunities and project access especially in the int'l arena point to the looming reality of "practical peak oil"
 - Rising F&D costs reinforce the foregoing trend.
 - Peak Gas – LNG may not materialize as a peak oil mitigant as expected
 - As "peak petroleum" unfolds, historical economic behavioral patterns will have limited predictive utility.
 - The prospect of a series of petroleum driven "Black Swan" events is increasingly likely.
 - In sum, energy issues are likely to remain at center stage for the balance of this decade and well into the next with significant adverse implication for U.S. National and Economic security.

Q&A

- There has been a meaningful shift on stance regarding peak oil among oil company execs. They are slowly backing into the truth.
- **Q:** If you were energy czar, how would you address the problem? **A:** The energy IQ of our Congress is 55. If you think there's a problem in getting oil company CEOs to address the problem, try convincing a politician to address it.
- **Q:** What price will it take to change patterns of consumption: **A:** Between \$90-\$120.
- **Q:** Will the Mackenzie Gas Pipeline get built, even with exploding cost estimates? **A:** There is too much noise in our financial systems, so prediction is difficult.
- Linkages between water, food, and energy will form a turning point for humanity.
- The most secure place on the planet for liquid fuels is CTL production in the U.S., but environmental constraints will be imposed at around the 3mbpd level.

- **Q:** Oil closed today at \$89.35. How are you invested? **A:** EOR, LNG, oil services. We'll see \$120 or higher oil first, then demand destruction, then, maybe, \$45 oil.

2:20 pm – 2:40 pm

Joe Gladbuck, Jeffries Randall & Dewey

Global Energy Demand Forecasting: Your Guess Is as Good as Theirs!

- Projected annual average global energy demand growth ranges from 1.4% to 2.5% among leading governmental and consulting agencies
- Difference between high and low energy demand growth rates is 121 mbpd by 2030 – equivalent to 59% of total estimated global energy demand for 2007! (EIA, IEA, Greenpeace, Renewable Energy Council, McKinsey, European Commission, US Climate Change Science Program). Given how long it takes to make new supply materialize (2014 is very early...new leases won't materialize until around 2018-2020.) 2030 isn't that far off.
- NOCs can't manage development programs as needed to meet demand
- Incremental growth through 2020 is being driven by (in order):
 - China
 - ME
 - US
 - Other Europe
 - Other Asia
 - Latin America
 - India
 - Northwestern Europe
 - Canada
 - Japan
 - Rest of the World
- Worldwide reserves: There are 1,208 billion bbls of proved oil reserves, and 6,406 TCF of gas. But access is increasingly limited to independent oil companies.
- Capital concentration remains in North America. US investment represented 29% of total worldwide spending compared to 5% of total worldwide reserves. IOC capital spending has doubled since 2003 but production has remained flat. Majors aren't losing production, they're losing the drive for continued capex given the diminishing opportunities. They're pouring money into tar sands because they can't invest it elsewhere.
- Supermajor R&D spending peaked in 1998 then cut back, and is now about back to about where it was then: \$2.5 billion in 2006.
- Production growth is being driven by smaller independents
- Who will step up to fill the supply-demand gap? Not the IOCs. NOCs will have to nearly double their investment to meet projected demand by 2030.
- Who will spend the \$20 Trillion needed?
 - Projected increase in energy demand through 2030 will require massive new investment in large-scale project to develop and deliver energy
 - IEA estimates that \$20 trillion will be required over the next twenty years to develop the necessary resource potential.

- 2006 cap ex: \$410 billion (approx. \$150 billion spent by supermajors)
- Transportation demand in the developed world is what will have to cut back.

2:45 pm – 2:55 pm

Jeffrey Brown, independent petroleum geologist

The Exporter's Dilemma: Rising Domestic Consumption and Flat for Falling Production

- The "Export Land Model" developed with Dr. Samuel Foucher
 - Based on Texas experience
 - 5% increase pa in production, 2.5% pa growth in consumption leads to a loss of all exports in 9 years
 - Case histories: UK and Indonesia. Actual UK (56% pa) and Indonesia (29% pa) change in net exports turned out to be significantly worse than those predicted by ELM. *Decline rates accelerate with time.*
- "Saudi Aramco's proved reserves alone could keep the world supplied for several decades. But it is only exploiting ten of its 80 or so fields, so will be able to pump at the present rate for 70 years" – *The Economist* ... this requires a ZERO decline rate and no increase in domestic consumption!
- Saudi Arabia may cease exports entirely in 24 years by his analysis.
- Russia: absolute peak back in the '80s, what is being produced now is what wasn't produced in the depressed period of the late 90s. Exports go to zero somewhere around 2024 (between 2020 and 2030)
- Norway: initial decline rate 11% pa, 12% now, hits zero around 2025 (2022-2028)
- Iran: Hits zero around 2020-2042, avg 2030
- UAE: Hits zero around 2037 (2022-2055)
- Sum of the top five: Initial decline rate: 2% per year, increase consumption 1.8%, exports zero by around 2031. Decline rate now is about 5%,
- US net imports: it would take half of all exports from Saudi, Russia, Iran, Norway & UAE to meet the US imports demand just 10 years from now (?)
- Alan Drake: can we build electric infrastructure? How did we build electric infrastructure in 1908?

Q&A

- Brown: Russian production is basically flat right now, but consumption is up 9% this year.
- Brown: Phase 1 of export declines is that cash flow goes up for exporters. In Phase 2, cash flow declines because volumes fall to such a low level.
- Gelbach: \$20 trillion demand cannot be met.
- Brown: Are we at peak exports now? **A:** 2005 was peak exports. Rising exports from small upcoming producers aren't able to overcome depletion from major old producers. It gets incrementally worse from here without any extraneous events. We should see an accelerated decline rate. The average American today uses the same amount of oil as the average Swiss in 1944.

3:30 pm – 4:05 pm

David Hughes, Canadian Geological Survey

The Energy Sustainability Dilemma: Can Alternatives to Oil Bail Us Out?

4:05 pm – 4:25 pm

Scott Pugh, Captain US Navy (Ret.), Dept. of Homeland Security, Science and Technology Dept.

Nuclear Power: Pros, Cons, and the Efficiency Card

[Much to my chagrin, I missed Hughes' session and most of Pugh's because I was gabbing with Jeffrey Brown and Jim Kunstler in the hallway. I particularly regret missing Hughes' presentation because I have found a great deal of value in Hughes' brilliant charts and high-level perspective. Also, many random comments I heard outside the sessions would seem to indicate that his presentation was easily the most depressing of the entire conference, and that's saying something.

However, you can check out their presentations here:

<http://www.aspousa.org/proceedings/houston/presentations/>

The bit of Pugh's talk that I did hear reinforced the conclusions of my own research which suggested that the future of nuclear power will be necessarily limited by access to high-quality ores, particularly after we finish working through the backlog of uranium recovered from old nuclear weapons, and by a lack of, and the high prices of, labor and basic materials such as cement.

As a substitute, here is a copy & paste of the coverage by "HeadingOut" of these two sessions, from The Oil Drum, here: <http://www.theoildrum.com/node/3111>

Thank you for posting your notes, HO!]

[David Hughes](#) spoke to the chance that alternative fuels could bail us out. The need for an answer to the problem is due to its immediacy, and that with projected growth world energy may triple by 2030. Remember that 90% of the oil has been consumed since 1958 with 50% being consumed after 1984. 50% of natural gas has been consumed since 1988.

[David Hughes corrected some of the following, see below]

Yet there is a lot of natural gas, it is just not in the U.S. but in the Middle East and Russia. North America has 10 years of gas left. We now need 4 wells to produce the equivalent of that achieved by 1 well in 1996. Costs have doubled since 1998. Rig cost has risen 30% since 2006, while Canadian production is dropping by 12%. (This again was a paper where I could not write fast enough to cover the info on the slides – which I recommend that you go see).

In the United States gas output was lowest since 1995, while there was a record number of 1400 rigs working, yet we are still sitting on a plateau of production expected to start declining at 1.5% a year. It may be that there will be 11 new LNG terminals (providing 15

bcf) but 26 terminal sites have been cancelled, and there was 1 new terminal in the GOM in 2005.

Coal has been used for a long time, but 90% of total coal consumption has been mined since 1909. It is the fastest growing energy source in the world, and it is spread around a bit. Growth is forecast at 74% through 2030. The U.S. exports coal and burns it for power, though there is a variation in calorific value between Eastern and Western U.S. coal. It is anticipated there will be a huge growth in coal demand across the world.

The new high efficiency boilers are 43.5% efficient, but with residential heating this can be increased to 60 – 70%.

Nuclear energy will face a huge boom since there is a need to replace the current reactors, let alone build new ones.

It was thus appropriate that he was followed by Scott Pugh who noted that the industry had seen 5000 reactor years with safe operation. He recommended Senator Peter Domenici's book "A Brighter Tomorrow." He noted that in order to maintain an adequate oil supply we needed to find the equivalent of one new Saudi Arabia every four years. Since that is unlikely we will need to find an alternative and the best alternative is to switch cars over to running on electricity. (There was a plug-in Prius in the foyer of the meeting floor). But this will need 1000 x 2,000 MWe power stations at \$3 – 4 billion apiece. However once built the operating cost for the power would be \$0.0172 per kWh. Recently plants run 90% of the time, and provide a steady consistent base load.

Plants built initially to last 40 years are now in for consideration of a life extension to 60 years, at which time they must be replaced. 27 reactor operators have stated they plan to renew, and 44 permits have already been granted. He showed a map that showed the regions of the grid showing spare capacity, and this is rapidly disappearing. Thus we need, either 50 nuclear, 261 coal powered, or 273 NG plants in the near future. The cost will not be cheap, for \$1 billion you get either a 1000 MWe nuclear plant; a 1500 MWe coal plant or a 5000 MWe natural gas plant. But there is the issue of the availability of supply. And, in contrast to coal, the amount of nuclear waste generated each year is only 3 cu m. (All the nuclear waste generated so far would cover a football field to a depth of 15 ft). However he did note that, because of safety interlocks, when a nuclear power plant shuts down it takes a week to restart.

David Hughes' response (<http://www.theoil drum.com/node/3111#comment-252278>):

I know I was going too fast and I appreciate your efforts to try and keep up but there are some things that need correcting in your post on my presentation:

- global energy consumption has nearly tripled since 1965 (+184%) and is forecast to grow by a further 50% by 2030 (EIA reference case).
- North America has a reserve to current production ratio of 10 years (which does not include undiscovered resources or the fact that production may change in future).
- drilling costs in Canada have doubled since 1999 yet the gas rate added per foot drilled has declined by half over this period, meaning that current gas prices make a lot of

prospects uneconomic, which has resulted in a decline in rig activity of nearly 35%, which is forecast to manifest in a reference case production decline in Canadian gas of 4% per year through 2009.

- 11 new LNG terminals constructed over the next 1-2 decades could add 15 bcf/day to the nearly 6 bcf/day of current capacity - LNG liquefaction capacity however is the weak link in the LNG chain at the moment - just because you build them does not mean the LNG will come, and there was 70% of unused capacity in the existing LNG terminals in the US in 2006.

- capture and use of otherwise wasted heat vented from ultrasupercritical coal plants (operating at 43.5% efficiency) in industrial and residential applications can boost the overall efficiency of these plants to 60-70%+, as is being done in Denmark.

- in order to keep nuclear generation capacity flat, we will need some 283 new reactors to be built by 2025 worldwide due to retirements of the aging fleet.

This fixes the inaccuracies in your post - I'm sorry to have put you through that seeing as how I always try to max out my presentations. I think I said quite a bit more than this - the energy sustainability dilemma vs climate change - today's consumption picture vs 1850 etc. etc. - and I encourage people as you did to download the talk when I provide it to ASPO-USA tomorrow or Monday.

4:40 pm – 5:10 pm

Dr. Kyriacos Zygorakis, A.J. Hartsook Professor and Department Chair, Chemical & Biomolecular Engineering

How Good is Our Bet on Biofuels?

- It is claimed that we could produce more than 130 billion gallons of ethanol per year from excess biomass or ag waste, equivalent to more than half of our 2005 gasoline consumption
- Complications: biofuels require a lot of nutrients, water and fossil fuels
- Corn ethanol provided only 2.3% of our 2005 gasoline usage
- Land required for corn ethanol: 75% of our gasoline consumption would need ALL US cropland
- Energy balance for corn ethanol...lots of uncertainties in energy inputs (bounding problem) and inconsistent accounting for all residues.
- If net energy ratio is > 1 , good, if < 1 , bad
- Study by Farrell et. Al, Science, 181, 506 (2006) says net energy ratio of corn ethanol is 1.23, and the part over 1 is coming from co-product (residues). All studies show a negative net energy ratio without residues. Patzek: 0.94 with residues, 0.88 without.
- Efficiency of solar energy conversion by plants: 0.027%
- GHG emissions for corn ethanol are just barely less than that of gasoline today, but ethanol found slightly more
- Cellulosic ethanol: DoE wants 30% offset of all US gasoline consumption in 2004 by 2030, requiring 750 million tons of dry biomass. Potential: > 1.3 billion tons of dry biomass, from forest and ag waste. But it would still lead to soil depletion

due to nutrients extracted. Still must burn lignin to power the process...but will that provide enough energy to run the plant? In any case, includes significant CO₂

- Switchgrass: net energy ratio=8.22. Produces 7.4 GJ/ha (Farrell, et. Al.)
Efficiency of conversion: under 0.2%.
- Land needs for cellulosic ethanol from switchgrass: 126 million acres to produce 69 billion gallons of ethanol. Perhaps 10 GJ/ha
 - US farmland = 938 million acres, total cropland = 434 million acres, harvested cropland=303 million acres
 - Net energy ratio drops to 1.42 when you include additional inputs likely needed by the biorefinery. 206 million acres would then be needed to produce 69 billion gallons of ethanol.
 -
- Biodiesel: net energy ratio may or may not be >1 depending on many factors, but it has many advantages over cellulosic ethanol: it's here now, the capex is low, and can be done on a small scale.
- Both corn ethanol and biodiesel can only meet a small fraction of the U.S. needs for liquid transportation fuels.
- GHG emissions from corn ethanol are similar to those of gasoline and energy balance is marginal. GHG from biodiesel are lower than petrodiesel but doubts remain about the energy balance.
- Significant uncertainties about cellulosic ethanol and net energy balance is questionable as well.

5:10 – 5:25

Tom Whipple, CIA Analyst (Ret.) Editor: Virginia Politics; Peak Oil Review and Peak Oil News

Peak Oil and the Media

- Some rhetorical questions
 - Why are we here today? Because major media ignore it
 - Why are the media paying so little attention? “Never heard of it.” “It’s nonsense – there is plenty of oil” “Our readers and advertisers don’t want gloomy stuff.’ ... There has been no smoking gun.
 - The GAO and NPC studies should have aroused the media. But again, close to zero media attention. Nothing spectacular in conclusions.
 - Do we really care if MSM pick it up? Yes! We must care, because decision makers aren’t going to do anything helpful to mitigate it until a critical mass of constituents understand. Only MSM can bring about widespread awareness.
 - Are things changing? Yes, but so far slowly. Scattered stories talking about peak oil appearing around the world. No critical mass yet though...just look at the glacial and benighted energy policy in Congress this year.
 - Example: yesterday, Oct 17 2007, NYT carried a major story about oil at \$88/bbl. After laying out the facts, the story grapples with the reasons...
 - Turkish threat
 - Refinery bottlenecks
 - Weak dollar

- Geopolitical tensions
 - War in Iraq
 - Nigeria
 - Venezuela, China, Russia...
 - Hedge funds
 - Threat of recession is receding
 - IEA prediction of 88 mbpd next year...but no mention of peak oil or the fact that we're only producing 85 mbpd
 - "Oil prices have more than quadrupled...strong demand...producers outpaced...little spare production capacity...more volatile markets" blahblah blah but no mention of peak oil
- What will force a change in the media coverage? Probably prolonged major shortages at the pumps...price alone won't do it. Americans have the attitude of: They'll get my car when they pry it from my cold, dead hands.

5:25 pm – 5:30 pm

Jim Kunstler, author, *The Long Emergency* and *World Made By Hand*

- I'm a responder, not a decider
- Peak oil discussion has a distinct bias toward men and statistical analysis...
- Instability will accelerate irrational market behavior.
- The coming export crisis (ELM) is completely off the radar of the media
- "What we're seeing is a comprehensive failure of leadership in all sectors"...environmental, business, media, political. Even environmental leadership mainly just want to keep the cars rolling.
- Nuclear energy desperately needs to be brought into the national political discussion. Likewise, biofuels need to be better debated.
- We don't have time to be crybabies...we need to change the subject from how to maintain Happy Motoring and start discussing the real future!

7:00 pm – 9:00 pm

Digging into the Rationales Behind Different Views on Peak Oil

Panel discussion

Moderator: **Robert L. Hirsch**

Richard Nehring

Jeremy Gilbert

Mark Gaffigan, *US GAO*

Mariano Gurfinkel, *U of Texas Jackson School of GeoSciences*

Randy Udall

Roger Bezdek, *CEO, MISI*

Gaffigan:

- The uncertainty about peak oil data has plagued the GAO effort to respond to Congressman Bartlett's request to do a study on peak oil.
- We have all our eggs in one basket; we are desperately dependent on peak oil.
- Uncertainties:
 - How much OOIP is there?
 - How much can be recovered?
 - Political and investment risks
 - Demand. What will future demand be?
- Government can play a role in reducing uncertainties: better data, more resources, etc. EIA and USGS can do more than they do now, and help to answer Simmons' challenge to improve data reporting.

Nehring:

- What kind of problem is peak oil? We think about it as a problem of inadequate supply. In fact, we have a problem of too much consumption.
- It took us 140 years to go through the first trillion barrels of oil. It will take us less than 30 to go through the next trillion.
- Our primary focus should be on reducing demand and transforming it to something sustainable, e.g.,
 - Conservation
 - Substitution
 - Long term changes in the fundamental structure of demand.
- We have to rethink the nature of our economy and how to adjust.
- There are other peaks aside from Hubbert's Peak: Chavez' peak, political peak, demand constrained peak, substitutes constrained peak (the "economists' peak")

Udall:

- We're on the space shuttle and the first tiles are already coming off. I think we're out of time to change the trajectory too much.
- Texas oil production peaked in 1972, and it's no accident that that's the last time we visited the Moon.
- There are 300 million of us living like kings today.
- Peak oil is near and the evidence is overwhelming. "From a biological perspective, we are in a state of profound overshoot."
- "I think we're going to see if we still have the right stuff, and I don't know whether we do or not."
- "Energy is an IQ test that humans are predisposed to fail"
- We're about to meet re-entry and we need to see whether we're on the right glide path.
- Dick Cheney at the controls is a nightmare, but the Democrats are no better. Our policy is terribly benighted. Where will our leadership come from? We face a moral and ethical challenge. Will we elect a strong leader willing to face this challenge? Who will lead? The media? The major corporations?
- To invent the airplane, the Wright Brothers built their own wind tunnel, and tried a hundred different designs, until they finally came up with one that works. Do we still have that kind of ingenuity? Do we have the political leadership?
- This is the most fascinating quest we have ever undertaken.

Bezdek:

- Three issues:

1. Dreamworlds: the non-believers: Pollyannas and cornucopians, but also the dreamworld of the peakists.
2. No magic bullets, only magic BBs.
 - We can't do more drilling, we can't do oil shale, GTL, CTL, etc. etc. due to environmental and other concerns.
 - We're looking at a change of lifestyle, e.g., relocalization, but these solutions seem unpalatable and unrealistic.
 - Politically, we fight with ourselves and wind up doing nothing.
 - Very soon peak oil will trump all concerns about global warming.
 - We're going to see some real chaos: the oil crisis of the '70s on steroids.
3. Arrogance. We pick on our politicians for not solving these problems but they just reflect the will of the people. Before we go talking about how stupid the politicians and the media are, we should try reflection. Also, we think we have better solutions than the market. Churchill: the market is the worst solution, except for all the other solutions.
 - I worked on an oil rationing program in the '70s, and it was a nightmare. It could not improve upon the market. The market works very well. Many of the problems we had in the '70s were due to government interference in the markets! We should be more humble and modest.

Gurfinkel:

- Participated in the NPC report. Sec. Energy Sam Bodman directed the group to address three main questions:
 - What does the future hold for supply?
 - What alternatives can be brought online?
 - How can we ensure economic stability and prosperity?
- There were some who thought supply would peak around 2030 at ~120 mbpd, and then others were "imminent peakists."
- Data was aggregated and "blinded" (so they didn't know where the data came from.)
- They didn't see anything about peak gas in the study; they assumed that ample resources were still available.
- I'm not concerned about oil peaking, but I am concerned about being able to maintain business as usual. The world will not continue as usual, and the world will face change, but I don't know what the changes will look like.
- The plateauing of demand in the US and UK indicates that consumers are responding to price signals, but countries like China do not.
- My major concern is the possibility of recession: a rapid decline in demand and a rapid decline in supply.
- Technology will lead the way, and the market will help.
- We only produce about 4-8% of the OOIP (heavy oil) in Venezuela, but that could be raised as high as 40% with add'l technology to exploit it.
- The world will continue to foster and find ways to increase growth.
- We have moved our way up to better and better fuels as we grow.
- Alternatives will be based on things that use existing infrastructure.
- How much will it cost us to overcome peak oil? How much are we willing to spend today on an uncertain eventuality in the future?

Gilbert:

- The peak will occur soon, followed by a brief plateau, and then an undulating decline.
- Believes Hirsch scenario. Since we're out of time, we'll deal with it in a chaotic and unpleasant way.
- Until the technical people of ASPO can agree on how oil fields behave, we can't hope to persuade the media & leadership to take action. We're not getting our message across.
- Mankind is heading into a period of great pain. Increasing population and declining oil supply spells everything going wrong at once, and it's a big mess.
- We should be taking action personally to decrease consumption, but we can't convince our neighbors to do the same until we have a better story to tell. With the data we've got, the story varies too much from person to person.
- "I feel gloomy and I think we've heard a lot of gloomy stories today...so enjoy your evening and the next few days."

Q&A

- **Q:** To focus on conventional oil data: where is the data of highest quality, and where is the data highly questionable?
 - Gurfinkel: There are very few data sets in the world on OOIP estimates—all roads lead back to USGS. Production data from foreign sources was insufficient.
 - Nehring: OOIP data is fraught with problems, esp. in porosity and thickness, both of which are based on many assumptions. There are fundamental problems with making OOIP estimates and so they have fairly large margins of error.
 - Gilbert: Much of the data is based on oil methods; new methods are more complex & yield different results. You have to go to the IOCs and NOCs to get the geological and engineering data to do a detailed analysis. Other methods using analysts such as IHS are often spotty. The best data is with each oil company, and the bad data is everywhere. If we want to make realistic predictions as to what world oil supply is going to look like in a few decades, we can only do it based on oil company data.
- **Q:** Two skilled petroleum geologists can look at the same data and come up with different estimates.
 - Gurfinkel: reserve statements are political
 - Nehring: Even in well-studied areas with competent methods and personnel, estimates can vary +/- 25%. Even with better transparency and reporting you still have interpretation and judgment.
 - Udall: Time is the critical idea here; the data is crap but you can still make some important conclusions about it given the time horizon. In the next 10 years, the Saudis are going to come clean and show us their hands because it will take the pressure off them and justify our military support.
 - Gilbert: The good data is locked up with the oil companies, but in the short term, the production curves are clear enough.
 - Gaffigan: From a technical standpoint, there are a lot of things we don't know about the data. USGS did its last assessment in 1995 and admitted to numerous holes in their estimates. Margin of error is significant. But even if we had good reliable data, there is still a question as to whether you would get any action. Look at climate change and how long it has taken to produce any action on the problem.

- Bezdek: As bad as the oil data are, the data on natural gas are infinitely worse. The next thing we have to worry about is the adequacy of natural gas.
- **Q:** How good is the oil futures market at pricing oil appropriately?
 - Bezdek: There is so much uncertainty and there are so many different views, it's a very inadequate situation that we're in and will get worse before it gets better. We will see higher prices and much more volatility.
 - Gilbert: The market is taking a very short-term view and doesn't even seem to be looking at the long term.
 - Gurfinkel: The markets do show something: we have high prices, scarcity in the third world, e.g. the beginnings of demand destruction. Perhaps if one could buy 30-year futures on oil...
 - Udall: It's really a story about the valuation of the dollar.
- **Q:** What breakthroughs in technology might we yet expect?
 - Gilbert: directional drilling, hydraulic fracturing, reservoir simulation, multi-disciplinary approaches, etc.
 - Hirsch: many of those techniques were evolutionary...at first they weren't very useful, but over time they improved. What could materially change the business in a revolutionary way?
 - Gilbert: Better understanding and control of the way that water moves in a reservoir, modify its viscosity, etc. Water flooding is the easiest and cheapest and most effective enhanced recovery method, and better understanding of it would be very helpful.
 - Gurfinkel: Nanotechnology first, but also subsurface (*in situ*) combustion.
 - Nehring: Consider the THAI process for harvesting the tar sands. It's not about breakthroughs so much as buying ourselves more time to downsize demand.
- **Q:** What about the government's role?
 - Bezdek: Some government's actions are useful, e.g., EIA/IEA data gathering, SPR, things of that sort. But ill-advised ones include profit taxing, price fixing, etc... People will demand that the gov't do something about peak oil, but the politicians won't know what to do, so the results will probably be undesirable. Pessimistic and cautious about gov't solutions. Massive gov't interventions will undoubtedly be necessary but probably not desirable.
 - Gaffigan: We've learned from some mistakes of the past, most notably not to interfere with the markets. But there are things we can do, e.g., patent protection, encouraging energy efficiency technology, etc. We have 265,000 flex fuel vehicles in California but only one E85 station. The effective gov't leadership is probably local and state, not federal.
 - Udall: Strengthening building codes, encouraging Energy Star programs, etc., but our politicians today are no smarter about energy than they were in the 70's. Our can-do attitude isn't going to help; we need to start thinking about *can't*-do. Deep geothermal or hot dry rock is promising, breakthroughs in wind and solar and storage can be greatly assisted by the gov't. We need to stop thinking of the world as America's piñata with resources just waiting for us to appropriate them. Half of the natural gas

we use today is coming from wells that are less than five years old. We're going to have to adjust our attitude of entitlement.

- **Q:** EIA never talked about peak oil, but now they are and looking at the possibility that supply and demand cross for good by 2012.
 - Bezdek: I don't believe the EIA model or the IEA model. Their past predictions have been bad. They just draw out lines into the future based on past trends, instead of considering, say, a structured reduction in driving. These models, esp. when they try to get precise about price predictions, are ludicrous.
 - Nehring: Intellectually, we have major problems in dealing with discontinuities in trends. We fumble around trying to figure out what it means, and that's where we are right now in the supply situation.

- **Q:** What's the risk to the US and the world in getting this wrong?
 - Gaffigan: There is great risk for us as we are so dependent on oil for transportation. There is risk but there is also opportunity.
 - Udall: Thanked Hirsch for the "Hirsch Report."
 - Gilbert: The countries which will feel the most pain are probably the poorest countries first, then the richer ones. The US will be in pain as oil possessors keep it for themselves. There is a real risk of civil disturbance, and unfortunate use of military power if we get it wrong.
 - Bezdek: The poor nations will get screwed and their economies will go down the toilet. Very serious economic, political, etc. disturbances, perhaps mass starvation, perhaps military implications...we're talking billions of people we should be concerned with.
 - Nehring: Parable of the blind men and the elephant: We know our part well, but not the other parts. We will muddle through and try to avoid the really big mistakes like total inaction or putting our money on bad horses like biofuels. It will take a long time—decades--to come up with a very effective strategy for dealing with this problem.
 - Gurfinkel: Poor countries will suffer first, and I hope we will reduce our consumption, but we will have to change our habits. We will have less mobility.

- **Q:** How do we get people to come together in a better and more constructive dialog?
 - Gilbert: There has been too little technical discussion and too much abuse heaped upon each other. We need to strive for a more civil dialogue.
 - Udall: Get more people to sign up for Tom Whipple's newsletter. The certitude of imminent peakists has worked against us and we should learn more from the oil industry experts. We need to develop an energy ethic.
 - Gaffigan: Focus on the common ground. Stop talking about when the peak is, recognize that we are vulnerable together, and recognize the opportunities to work together.
 - Gurfinkel: The time value of money does make the issue of "when" important. We need to get ego out of the dialogue.
 - Nehring: Don't get locked into championing a single value. Be flexible.

- Bezdek: The problem we have is getting the issue on the radar screen. The lack of media coverage and the lack of awareness in Washington is the main problem.
- Hirsch: Protect ourselves and our families and decrease your vulnerabilities. What can you do as an individual to contribute to the solutions?

DAY 3 – FRIDAY, OCTOBER 19, 2007

8:00 am – 8:40 am

Peter Tertzakian, author of *A Thousand Barrels a Second*

Exploring the Impact of Resource Constraints

- 20% more driving today than 10 (?) years ago
- “Vehicle obesity” (Hummer H6)
- Efficiency often leads to excessive use...is this technology or is it social engineering?
- “Not a wheel turns without petroleum” – The Sequel
- Consider population...550 million Chinese live in cities larger than 1 million, almost twice that of the US. 1.3 Billion as a whole.
- In China, “everything is full to the brim”...gas is about \$2.35/gal (price controlled)...every truck is full (and burning diesel)...there aren’t even enough airport gates to handle all the planes and people queue up on the tarmac.
- Tata Motors of India, new car for about \$2300. One billion people in India. 500 million people looking forward to buying their first car (vs. 230 million cars in the US today). Their growth story is just beginning.
- The developing economies of the world (8% growth in GDP) are now about equal to the advanced economies (2.6% growth rates)
- These growing cities of the developing world are just starting to be energized.
- OECD energy intensity is leveling off but in the developing countries it’s about a 45 degree slope of increase. Size, compounding rate of growth and inefficiency.
- “And why should we be surprised; we basically outsourced all our manufacturing to them.”
- We’re going to the ultimate ends of the earth to find energy now. We have to drill through not just rock, but political issues and strife and environmental issues and...
- “Very many years must elapse before natural petroleum resources will be unable to meet the greater part of the world’s requirements. The time will eventually come when the world may have to look for a great part of its supplies from secondary and synthetic sources, but he would indeed be an optimist who imagined that—on the researching of such a stage—prices would remain as those existing in the past.” Sir John Cadman Nov.2, 1927
- \$50 billion a year is flowing into Canada to develop the tar sands, with its immense consumption of water & nat gas...again, we’re going to the ultimate ends of the earth.
- Good chart: “China Energy mix 1965 to 2006 energy consumption by fuel.”

- China is at the breaking point and they have to switch away from oil and coal altogether. 750 million people cook over low-grade coal in a crude inefficient stove. Moving to natural gas grills. Gas will become the new oil. Gas consumption is rapidly increasing in the developing world, at the rate of 8 Bcf/day
- The next “magic bullet” isn’t in the energy world at all—it’s going to come at us from off the map, outside of our blinders. “The next magic bullet will come from changing the way we live, work and play; we have to.”

8:00 am – 9:55 am

Panel Discussion: Transportation Responses

Roger Bezdek

- Aviation forecasts: All aspects of aviation are forecast to grow very rapidly everywhere over the next 5 years. Every kind of traffic, every kind of aviation infrastructure.
- FAA US forecast: traffic growing faster than GDP. The only thing that isn’t growing is aviation fuel costs...they expect it will drop by about 1% a year.
- World forecasts are even more ambitious – 8-12% growth pa for 20 years. It’s going hyperbolic
- Will peak oil destroy the aviation industry? Is aviation the “canary in the coal mine?” Suggestions to limit new airports, massive fuel conservation, etc. are floated by peakists...drastic remedies offered
- Commercial airlines are very concerned about fuel costs – now about 26% of overall costs...tripled over the last few years. But it’s a relatively modest percentage...a doubling of fuel prices would increase tickets by ~30%
- According to EIA, fuel requirements for civil aviation are increasing rapidly; by 2030 they might be equal to nearly half of total us domestic oil production
- But contrary to such worries, this is one very health canary. Growth in the past three years is the strongest recovery in history...Boeing 787 is the best selling aircraft in history...everything in aviation is booming
- Aviation growth is driven primarily by demand
- Traffic will grow faster than GDP, passenger revenues will grow faster than passenger traffic
- Reverse engineering the current aviation forecasts – assumed oil peaking in 2008, decline would be about 2% pa...optimistic forecast declines modestly and pessimistic much more steeply starting in around 2009
- Major declines expected after 2008 vs. the current bright growth forecasts. Current forecasts are totally unrealistic. The direct cost of fuel for aviation are less important than the loss of GDP from travel-dependent industry.
- “Aviation will likely be transformed from a rapidly growing industry to one in decline..”
- However, problems will cascade far beyond the aviation sector. Implications:
 - Tourism, recreation, theme parks, designation resources, gaming industry, all these will lose trillions of dollars and millions of jobs
- Peak oil-induced declining GDP
- This is what we must be concerned about: “It’s the GDP, stupid.”
- However, a large aviation industry will survive, and “forecasts of its death have been greatly exaggerated”

- Much more research will be needed. Ours is the only serious analysis of this subject that has ever been done. Gov't should encourage both supply and demand side mitigation options...efficiency, CTL, shale, tar sands, EOR, heavy oil, GTL, biomass, hybrids, everything...

Alan Drake, Consulting Engineer: "Rail in a Peak Oil World"

- It's possible to operate a modern democracy without oil. Consider the Swiss: in 1948 after the WWII oil embargo: they used less oil in a year than the US does in a day. They walk, they have electric rail running on hydro power.
- Reasons for electrification of rail:
 - Trade 17-20 BTUs of diesel for 1 BTU of electricity
 - Urban rail promotes transit-oriented development. Walkable, bikeable communities.
 - T21 model shows that "The best economic policy is the best environmental policy"
 - Under an electrified rail scenario, -62% oil use in USA, -50% GHG emissions
 - The Swiss have done the equivalent of the US spending \$100 trillion on expanding their already excellent rail system...major political support
 - France: 10,000 rental bikes with more on order. French cities of 100,000 or more that do not have an electric train program: 5
 - New French trains take 3 to 4.5 years from hand wave to ribbon cutting
 - Today, Houston has slightly more light rail than Mulhouse France (pop 112,000). By 2012, they will have more light rail than Houston.
 - The US in 1897-1916 built streetcars in 500 cities and towns, when our population was only 100 million, using only mules and sweat. We did it before, and we can do it again. [Anyone ready to start a mule-breeding operation?]

Justin Ward, Toyota: "Plug-in hybrid technology update"

- Drivers for change in the auto industry: globalization, accelerated consumption of fossil fuels, and increase in population & vehicles
- Extremely unlikely fuel growth chart out to 2135, with massive growth in unconventional oil, etc...(?!)
- Exploding CO2 emissions...global initiatives across all sectors are needed to address CO2 emissions (power generation, everything)
- Vehicle miles and population are going up dramatically, and emissions are actually down substantially since the '70s
- Six hybrids on the market now.
- "Blended mode" hybrids have a larger battery pack than AER ("all-electric range"): "A 'blended' PHEV can reduce maximum battery and motor power significantly"
- PHEV challenges
 - Installation space: "AER PHEV will require a large capacity battery even with advanced battery technology expected by 2015 -> difficulty in ensuring practical trunk space"
 - Charging time: AER PHEV battery requires same charging time as EV!...6.5 hours on a 110V circuit
 - CO2 reduction: CO2 emissions are only reduced when the grid is powered by low-carbon fuels; good in nuclear-powered France, little

benefit in the US, no benefit in coal-powered China. In addition to controlling CO2 emissions it is important to manage the other critical emissions components. Prius has lower emissions of all major pollutants than PHEV for CA and US average grid mixes

- The ultimate eco-car: seeking the perfect balance between fuels and emissions. “hybrid is a fundamental technology which is beneficial to all types of power train.”
- 9 years have passed since Prius introduced, to sell 1 million hybrids, still just 0.2% of the total

Q&A

Moderated by Terry Penney, NREL

- Bezdek: Isn't fuel efficiency better for air travel than for driving cars? Yes, it can be. Even more time-efficient. But when the peak oil induced crunch comes, destruction of air traffic with associated GDP.
- Ward: Re: disposal of Prius battery. They built a facility in Japan to recycle every last part of every battery, but most of the time that plant is idle.
- Drake: Today's major railways aren't that interested or incentivized to pursue electrification. There are really only two major players in the US...not enough competition.
- Ward: Re: diesel hybrids and clean diesels. Toyota does have a clean diesel project in Europe. Clean diesels to meet CA emissions controls would cost \$1000s per car for the after-treatment. Between that and adding the hybrid technology, the car becomes too expensive.
- Bezdek: re: rising GDP...the bonds that were floated to pay for airports etc. will go into default. If those bonds are held by your pension fund, you're going to feel it too. Independent truckers (deeply indebted) will have to abandon their trucks and go into default. The subprime mortgage fallout could be just a preview of things to come.
- Ward: What about Tesla and other similar EV startups? Doesn't like battery pack issues, but their power electronics are cool. Re: lithium batteries, Toyota has been working on it, but they're not satisfied with the state of the technology to deploy it.
- Drake: Could save about 2.5 mbpd by switching freight from trucks to rail
- Bezdek: Bill McDonough has been charged with building 6 new cities for China to host 800 million people (?). What models could they pursue? New models will be required...China and India are in a better position to follow them because they don't have to deal with an existing incompatible infrastructure
- Drake: A quarter to a third of Americans want to live in rail supported communities, but only 2% do. If we could move ¼ of Americans into transit oriented development it would be a huge part of the solution.
- Ward: What about selling houses and cars as a package with common financing, etc. as a way to increase the plug-in market and bring down the cost of batteries? The biggest hurdle is still the battery itself. Toyota still hasn't found a solution it's happy with. Plug-in technology is real, but “it's not there yet.” Toyota is interested in smart grids...equip the cars with an IP address and let them supplement the grid on demand.
- JIM KUNSTLER: I want to register a protest against the whole idea that we should perpetuate a car-dependent culture! Response from moderator and Ward: mumble mumble, end the discussion. “I appreciate Jim's comments and I agree.

At the same time, people will keep buying cars, and nobody has a clear blueprint for how to get from here to there... There are no easy answers; we have to change the paradigm.”

10:20 am – 12:00 pm

Panel Discussion: National, State and Local Energy Policy Responses

Moderator: Debbie Cook, Huntington Beach (CA) City Council and Mayor Pro Tem.

John Kaufmann, Dept of Energy (OR)

Summary from the Portland Peak Oil Task Force

- Portland Peak Oil Task Force includes directors of economic development & land use, ecologists, etc.
- Ground rules:
 - No debate about “if” or “when”, it’s a given. Taking the warning of the Hirsch Report to heart. We can’t squander any more time. We face the long emergency, and there are no “magic bullet” supply alternatives.
 - Impacts first, then recommendations
- Scenarios: Gradual slide vs. rapid sudden shocks, severe vs. less severe
- Impact Pathways: Fuel shortage -> Price increases -> Economic impacts & opportunities -> social impacts
- Key Questions for Transportation & Land Use: how freight & people move, and how can we adjust land use?
 - Seek transport alternatives
 - Relocation to more dense & transit oriented sites
 - Pressure for increased density & mixed users
 - Freight costs will increase, shift mode
 - Air travel will decline
- Key Questions for Food & Agriculture
 - Amount, variety of food decreases
 - Higher prices
 - Diet & nutrition, etc.
- Key Questions for [??]
 - Production costs, critical or discretionary, upstream suppliers affected?
 - Impacts: unemployment, inflation, recession, systemic, no quick solutions
 - Higher production & dist costs, upstream supply, consumer demand, business failures & unemployment
- Key Impacts for Economy
 - High tech, transportation, construction, apparel, nursery products, service sector, retail, health care
- Key Questions & Impacts for Public & Social Services
 - How will demand and be affected?
 - Impacts: vulnerable & marginalized populations will be hit first and hardest
 - Health care systems will be stretched to the limit
 - Fractured community networks
 - Low awareness
 - Housing, homelessness

- Heating
- Electric Supply
- Schools
- Substance abuse, domestic violence, property crimes
- Recommendations:
 - Consistent with Oil Depletion Protocol: reduce oil and gas 50% in 25 years
 - Inform citizens: build awareness, unite people mobilize creativity, don't wait for gov't leadership
 - Engage Civic Leadership – spur gov't responses, build awareness
 - Land Use Patterns: reduce transport needs, promote walkability, provide easy access to services & transport options
 - Smart Infrastructure Investments – prevent stranded investments (airports!), facilitate freight and transport options
 - Encourage efficient & renewable transportation options
 - Expand Energy Efficiency programs dramatically. More and faster, new & existing buildings...
 - Preserve Local Food Production Capability –preserve ag land, support local food processing industry
 - Promote sustainable business opportunities: promote EE/RE, help business assess impacts of peak oil, substitution opportunities and shelter options
 - Preserve safety net, protect vulnerable populations
 - Emergency Planning – fuel allocation, food, transport
- “Visit Oregon (while there's still oil)”
- We're all in this together...once we start splintering, it's all over

Roger Duncan, Deputy director, Austin Energy

The View from a Municipal Utility

- Austin is a progressive municipal utility –probably the only utility that replaced a coal plant with 500 MW of energy conservation (and it took 20 years!)
- New goal: save another 700 MW of conservation
- Big on green building, RE, voluntary green power programs, promoting PHEVs and supporting the Plug-In Partners campaign
- 30% renewables by 2020, 100 MW of solar
- Zero energy home initiative, by 2015 all homes built in Austin will be zero energy homes!
- Goals: 75% reduction in energy needs for buildings, all city fleets plug-in, all municipal buildings to be powered by renewable energy
- Preparing for the peak oil challenge: Utilities have to become much more open and less proprietary than they are today. Planning for power plants is complex and fraught with NIMBYism. Even with high targets for efficiency, eliminating plants is not that easy. It's complicated.
- Their utility hasn't had a rate increase in 13 years, but that's about to change.
- Recommendations for policymakers: one-upmanship among mayors of major cities can't supercede the laws of physics. Real supply constraints across the board: huge backlogs for wind turbines, solar cells, trains, nuclear... We need to

be realistic about our goals and prioritize. We need to prioritize clean energy sources.

- Example: Seattle & Cleveland. Why are we changing light bulbs out in Seattle? It's running on hydro and doing so doesn't eliminate any carbon emissions. PHEVs should be going to Seattle, not Cleveland. Priorities should be specific to your local situation in terms of infrastructure and energy supply.
- Move the regulatory standards up gradually, implement incentives to cover the RE cost differential: stair-step approach to change.
- What we're doing in Austin doesn't even offset our load growth! It takes a lot of time to get efficiency measures and RE generation in place.
- Manufacturers have made the decision to move forward with PHEVs.
- Converting to an all-electric infrastructure and using biofuels will still require some petroleum.

Sen. Mary Margaret Whipple (VA)

Options at the State Level

- States are the laboratories for energy action
- Policies, rules and regulations, incentives, funding
- Ex: Delaware, Virginia and Florida
- DE: Sustainable energy utility, non-profit for incentivizing efficient equipment, weatherization and promoting RE. increasing RPS, etc.
- FL: dramatic reductions required for emissions, appliance standards, encouraging solar
- VA: reducing rate of energy growth, reducing GHG 30% by 2025, increase conservation and efficiency, reduce VMT, increase mileage & alt fuels. R&D at state universities.
- Rules & regs: RPS, green building, cap & trade, building codes
- RPS: 25 states have them, ranging from 20% by 2010, 25% by 2025. Five states set goals (but no RPS yet)
- Green building standards: green building (LEED)...CO, RI, VA. And building codes (CA, HI, OR)
- Cap and Trade: MA: purchasing credits for polluting plants. NH:...
- Incentive: tax credits, sales tax rebates, de-coupling (separate fixed costs from variable costs), rate structures. Incentivizing efficient appliances, rebates for efficient vehicles. Carpool lanes...
- Funding: public benefit funds, grants and loans,...

John Darnell Congressman Roscoe Bartlett's office

- Rep. Bartlett formed a peak oil caucus in Congress, but it's been slow to develop. Are we approaching a "teachable moment" in Congress?
- Homework: organize your neighbors and meet with your Congressman: are you aware of peak oil? Do you know what the implications are? What will you do? Talk to Congressman Bartlett.
- This is an issue that requires leadership both from the bottom and the top. We need support from the oil industry on this issue.
- The solutions are on the demand side, not the supply side. There's no way to continue growing consumption.

- Overall message: We can't produce our way out of this mess. There are no scalable and ready alternatives in the required time frame. We have found ourselves with an impending crisis...probably when you can't buy gasoline (that "teachable moment.")
- Most of oil price fluctuations reflect the state of inventory.
- We're short of time (ref. Hirsch Report), short of cash, devaluing dollar, short on energy, and short on environmental carrying capacity: can't keep dumping things into the environment.
- The most important thing we need to do is conservation. Buy time, reduce demand, keep prices down, reduce pollution.
- Better if we do what needs to be done by choice than waiting until it is forced upon us. Carpooling, telecommuting, 4-day work week
- Nat gas has peaked, coal production about to peak...but first is the liquid fuels problem.
- This has to be purposeful. We had 25 years to do something with what we have saved in efficiency since the first energy crisis, but we frittered it away by increasing consumption. We can eventually do everything we do now with ¼ of the energy...in time.
- THEN we can start thinking about supply and converting to RE. Eventually our manufacturing base will have to be RE powered.
- Policy: achieve this agenda. Talk to your Congressman.
- Consider the Cuban model: 80% reduction in oil consumption since they were cut off.
- How will groceries or even coal be delivered without diesel fuel? Contingency planning.
- Solar Decathlon: we need to do that in every state. Foster competition in every state and then send the winners to national level competition.
- "We need to challenge the whole world in a race to sustainability."
- There is a slight chance we could pull off an almost painless transition to sustainability. Consider the Apollo 13 emergency: sudden and immediate conservation and a skin-of-the-teeth survival strategy.
- We have to try, think outside the box and find ways to solve the problem.

Elizabeth Ames Jones, Chairman, Texas Railroad Commission

Texas Production History and Revenues from Oil and Gas

- TRC is an elected body and a regulatory agency, a referee for the energy patch in Texas. Old, historical agency in Texas (and has nothing to do with rail anymore)
- Est. 1891 to regulate railroads & movement of commodities, which evolved into regulation of the energy agency: coal, uranium, pipelines, all the infrastructure.
- How can we get where we want to be going?
- 350,000 oil and gas wells in Texas, with many more waiting to be drilled.
- Extraction taxes from oil and gas production feed the state budget. When oil price dropped in the '80s, we found ourselves in a deficit and a budget challenge. Our state depends on this revenue for schools, the "rainy day fund," technology fund, etc.

- Texas is the #1 producer of oil and gas in the country. About 341 million barrels of oil a year (18% of national production) and 30% of the country's natural gas. Peaked in 1972, since then a decline by about 3% pa, but more stable in recent years (1.7% pa), predominantly due to the price of oil making previously marginal projects economic. New technologies are now exploiting unconventional, difficult structures like the Barnett Shale, kicking natural gas production into high gear now: 1.7 billion cu ft per day (in the Barnett Shale alone or all of TX?)
- CNG and LNG can be a viable transportation fuel and we can still produce a great deal of it.
- We could be a model to the nation on how to regulate our hydrocarbon use. Our fossil fuels are our "victory garden" (??!)
- Texas is the largest consumer of electricity in the nation...wouldn't be here but for A/C!
- It's not constructive to set goals that are unreasonably high. We need to set practical goals and stair-step our way to the future.

Debbie Cook

- "Summary From Southern California Association of Governments"
- Americans have to be hit over the head repeatedly with a 2x4
- "Our decision about energy will test the character of the American People." – Pres. Jimmy Carter. "Jimmy Carter got out ahead of the people who authorized him"...55 mph speed limit was very unpopular.
- Ahnold is popular, so he was able to pass climate change legislation. Are elected officials willing to risk being de-authorized?
- Business has to be mandated to act, e.g., seatbelts & emission controls.
- Example: Hamilton, Ontario Canada with its all-electric city ambition
- Sprawl: It's hard to overcome the status quo.
- Statewide survey: air pollution is the most highly ranked environmental issue among California voters (and energy actually dropped 6% last year while global warming concern increased)
- Look at Google Trends: "peak oil" vs "global warming"
- 691 Mayors have signed on to the climate change challenge
- An alternative framework: how do you sell climate change control to conservative Orange County?
- 1.2 million US households lost electric and gas service this summer because they couldn't pay the bills
- 10% of California's electricity production is consumed in moving water.
- Huntington Beach did a detailed energy audit & discovered a huge opportunity to save energy
- Investment is driven by policy.
- Book recommendation: *Life is a Series of Presentations*. Avoid virtual relationships...get out there and speak to people.

Q&A

- **Q:** Will elected officials respond before peak oil causes social disintegration?
 - Darnell: Write them, talk to them! Then write an editorial for the local paper about it! Work with them on contingency planning. I suspect that we will see some shortages & capitalize on that "teachable moment."

- **Q:** Don't we have a systemic problem with overpopulation of our cities, and don't we need to go to rural sprawl?
 - Whipple: Trying to encourage high density around metro transport stations.
 - Cook: Talking about population is the fastest way for an elected official to be de-authorized. Everybody knows it's a problem, and nobody wants to talk about it. Addressing this issue must be bottom-up, not top-down. It's important to understand the constraints that elected officials we can work within.
 - Darnell: NYC is 8x more energy efficient per capita than a suburban resident.
- **Q:** How can we make conservation not a dirty word?
 - Whipple: It's a problem of balance, between what you want to do, and what you have the budget to do. Conservation usually has a low budget.
 - Darnell: Tax credits can be an effective policy tool—it's the most efficient use of those funds because it has no administrative costs.
 - Whipple: the VA leadership was opposed to tax credits...they tend to lead a life of their own.
 - Cook: How can the public be convinced? Air quality is a good motivator and there have been lots of stories in the LA Times about that lately. A combination of tax credits and taxes can be applied.
- **Q:** Do you see a risk to democracy in a post-peak oil world?
 - Darnell: I see a risk to democracy as we speak! We're already seeing the effects of peak oil on government in above-ground issues. Democracy is likely to suffer and we must remain vigilant and fulfill our responsibility as citizens to elect and inform gov't.
 - Cook: Everyone can rise to the occasion, including many leaders who are not necessarily elected officials.
 - Whipple: 9-11 led to a concerted effort for emergency preparedness, organizing community leaders who can take action should there be an emergency.
- **Q:** How can everyone leverage Portland's efforts?
 - Kaufmann: It has to happen at all levels: city, state and federal. There is only so much that can be done at the city level.
- **Q:** How many Congressmen are aware of peak oil?
 - Darnell: We have 15 members in the Peak Oil Caucus now. I hand-carried a copy of John Howe's "The End of Fossil Energy" and other materials to every member of Congress, so you can't say that we didn't lead them to water.
 - For many, the implications haven't yet sunk in emotionally. Most of them are focused on finding something to fill the gap. We have to eventually get off the growth kick and figure out how to get to a solid-state economy.
 - Whipple: not many in my state are up to speed.
 - Cook: You have to find a strategy to reach those elected officials, preferably through an official agency and put on a conference. Get ASPO involved to present to them!
- **Q:** Peak Oil is a long term issue, shouldn't we be trying to cut deals with Kurdistan etc. to secure supplies?

- Kaufmann: Are you nuts? We need to focus on conservation and retooling our economies, not go farther out on this limb. Crash programs to reorganize our economies.
- Darnell: How can we best buy time? Find a little more, or use a little less?
- **Q:** Do we need a celebrity spokesperson?
 - Cook: I think we do, and I'll take anybody who wants to do it.
 - Darnell: Rep. Bartlett is working on it.

2:15 pm – 3:15 pm

Dr. Peter Bishop, Future Studies Department, University of Houston
Seth Itzkan, Futurist/Analyst, Planet-TECH

Houston After (Peak) Oil

Bishop:

- Houston after the oil industry is going to be largely a thing of the past.
- If you take a 5% decline off the peak (per Skrebowski), we'll be 50% down on oil in 13 years.
- One of our jobs in future studies is to make the improbable future seem normal.
- Our reality today is going to look as quaint to our grandchildren as the 1915 photos we saw today look to us now. They're going to look back and be glad that it's not that way anymore. Is that not how we feel now?
- What does the future *feel* like? We need insights and "aha" moments.
- Future studies is about the long-term future, not prediction. Most people give up on it because it can't be predicted. That's why we focus on scenarios.
- Reflection and discussion more than accuracy and precision. Even with uncertainty, you can find plausible scenarios.
- Disruptive change shape: S Curve upward. First phase: No problem. Middle: What is going on here? Stage three: Whew!
- For those who like change, it's going to be exciting. For those who like the present, it's going to be chaotic and unpleasant.
- Stephen Jay Gould: Punctuated change. We are in the Oil Era. No era is permanent. What will be the event that causes the discontinuity to end this era?
- Our eras have gone from energy from Human/somatic, to Fire/tools, to Animals, to Fossil fuels. Energy density has constantly increased. Our whole way of life is oriented around an excessive use of energy. The whole civilization needs to change!
- The Transformation Problem: "Going from an old era to a new era is never pretty, and never fun." The new era will not be better materially, or on an energy basis.
- Houston is a hub-and-spoke system, crisscrossed by freeways, the poster child of sprawl with low density and uncontrolled development.
 - 4.7 million population
 - Economy: 50% energy/chemicals
 - TX burns more energy than any other state by 50%: 12 Quads
 - 7x per capita energy consumption that of the rest of the world, 12% more energy intensity than the rest of the US
 - Houston energy: industry, transportation, cooling

- Houston is used to being successful. Non-energy related industry growth has been flat since 2001
- Liabilities:
 - When flush with energy money, it's hard to change
 - Strong individualism, not a lot of support for collective action
- The Houston After Oil scenario (2040)
 - Assumes no insurmountable constraints on other variables
 - Population would grow to 8.5 million
 - New energy sources: wind, wave, tidal and solar
 - Lots of new devices: LEDs, ...
 - Mobile energy: Electric, electric, electric. Even diesel will be assisted by PV. Long distance will have to be electrified rail.
 - Demand efficiencies: less mobility. Doing things over the Internet and locally.
 - Behavior differences: more natural fabrics, warmer and cooler temps, more directed lighting, more mass transit usage, more human power for transport, more local consumption of foods and seasonal foods.

Iitzkan:

- Referenced *The Turning Point* by Fritjof Capra [There was also a good film based on the book titled *Mindwalk* (1990), which is one of my personal favorites]
- Trends in the built environment
 - Biomass could be a substitution for the petrochemical industry
 - Low-carbon economy
 - Forbes Eco-Lofts: Industrial Redevelopment Site outside of Boston. Was an old paint plant and a deserted brownfield for 40 years. Now building an eco-community with eco-friendly industrial, residential & commercial redevelopment. 225 residential units, and on-site wind farm to power the whole facility. 1 million gal rainwater retention canal, electric car fleet, wind power for complex, cross ventilation in all units, community recycling, concrete floors used for radiant heated with hot water tubes running through the floor. Open space, lots of solar gain.
- BedZED – Beddington Zero Energy Development. The future of housing? First 100% carbon-neutral development in the world. 100 housing unit. They cut demand by ¾. Has two foot thick walls. A 145 kW CHP plant using sustainably harvested wood chips for supplemental heat for the entire complex. Wastewater is treated on site naturally, without chemicals in a “living machine.” Biologist John Todd developed the system. EV plug-in stations.
- Changsha (Capital of Hunan province in China) Master Plan. 1.4 Hectare “ZEDquarter”. 130 2-3 BR homes. High density without the heat island effect. Rooftop parks, bike path, CHP plant powered by rice husks.
- SkyZED: ZED Tower: the future of high rises? Being considered for London. Building generates its own power and be off the grid...covered in vertical wind turbines up and down. 750-1000 kWh per person per year energy footprint.
- The ZED Factory based in London (with AURP) has developed these ZED models
- Dongtan China: Carbon neutral city master plan: A carbon neutral city, with no fossil fuels, will generate all its own power. Chongming Island, Yangtze River, Shanghai. Holistic systems approach, combustion free transport.

- Biorefineries: Checkout July 2007 New Scientist magazine cover story: “Living without oil.” About substituting for the petrochemical industry.
- Alternatives for petrochemicals: plants: sugars, starches, fats & proteins
- Many benefits over petrochemicals The value of the petrochemical industry (at 3.4% of oil consumption) is about equal to petroleum (at 70% of consumption)
- Bioplastics, bio detergents, etc.

Bishop:

- It will never be this way again.
- We cannot use the same amount of energy in the future as we do now. We will find new benefits in efficiency and lead to behavioral change—some of it will be voluntary, and some will be forced. People can live happily on the energy budget of the future.
- A cyclic city? Is Houston destined to be a new rust belt, a new Detroit? The earlier we begin our planning for adaptation, the better. This is the Indian Summer for the energy industry.
- Productivity = Output/Input.
- Doing more with less. For the first time in history, we may learn to live with less energy each year.
- Adaptation: “You’ll hate the journey, but you’ll like the destination” We could be looking at a new Depression, but after that, people will value a new type of society, with less stuff, less mobility, & more intangible benefits. More awareness, self-sufficiency
- Read *Limits to Growth – The 30-year Update*
- <http://groups.google.com/group/HoustonAfterOil>

Q&A

- Zero energy building blocks of true sustainability
- Sources + efficiencies + behaviors are all required
- **Q:** How will Houston feed itself in the future? Is all the food going to be locally produced? **A:** No. But a lot more of it will. The people in the future will be so much smarter and more aware of the energy they’re using...imagine a tag on each food item you buy that indicated the amount of energy that went into it.
- Will there be enough capital and energy to stretch to the future? Yes, if we start earlier enough, there’s a chance. There’s no doubt we’re heading for a trough, and the higher we go, the farther we fall. The question is how deep is that trough. This is going to happen *in our lifetimes*. There’s going to be a downturn and I don’t see any way around it.
- Seth: Population cannot grow sustainably. Bishop: It depends on the resources available. Population could top out around 9 billion, then level off.
- What is the business incentive for acting early? Bishop: Timing is everything. There is a too late, and there is a too soon. The business incentive is getting the timing right. We can’t wait for these changes to come around, we have to have foresight. Itzkan: China will make a lot of money in building new sustainable cities. China’s population growth will present challenges...they’re planning six more cities on the ZED model.

3:45 pm – 5:00 pm

Comments and Roundtable

Henry Groppe, Groppe, Long & Littell
T. Boone Pickens, Founder, BP Capital Management
Charles T. Maxwell, Senior Energy Analyst, Weeden & Co.

Groppe

Remarks from an Oil Industry Veteran

- A systems approach to the oil outlook
- Price rationing of Peak Oil
- With population growth, globalization we're approaching multiple peaks beyond the oil peak. The Earth is a limited system and we have to live within it. Let's look at this through the prism of sustainability.
- The history and future of the oil business.
 - For the first 100 years (1870-1970) was the "Era of Plenty & U.S. Control"
Avg price: \$13/bl
 - Then the era of transition and OPEC control, \$36 avg oil
 - Era of scarcity and price rationing, price ???
- From 1945 to 2015: oil production went up from 7 mbpd to 45 mbpd by 1970 with ME oil production cost at an average of \$2/bl. Then production curve started to level off while prices spiked up. By 2004 we used up the surplus production capacity that had developed with the Iranian oil crisis and prices went hyperbolic.
- The EIA forecast is "pure fiction" against the current trends
- The severe run-up in prices over the last three years has produced a rather dramatic reduction in consumption (in marked contrast to EIA data)
- The rest of the world (other than US, Western Europe, Japan, Canada, Australia and New Zealand, which are basically flat) is still rapidly increasing consumption.
- In the US, 70% of our oil is used for transportation, but on a worldwide basis, it's about 51%. Much of the usage is for industrial and power, 27% vs. 10% in the US. It's mostly thermal use
- The world is so much wealthier now... the U.S. is only spending 3% of its GDP now to buy oil, vs. 7% in the '70s oil crisis
- KSA is the principal exporter and the only one that can seriously increase oil production. They decided many years ago to hold production at 8-10 mbpd because they could sustain it for several decades. Since 1970, their production has swung between 9.8 mbpd (~1980) and 3.5 mbpd (~1986)
- IEA projected this year that non-OPEC production would increase by 1.8 mbpd, so KSA cut back by about 1.7 mbpd. But IEA was wrong, and so we have had inventory drawdowns. KSA made a major mistake to cut back supply at the very time that we most needed. They will probably look to increase production again in December, which could cut the price back.
- Peak population, water, metals, clean air, food... We need an objective analysis of the problem.
- It's impossible to get anybody to do anything today because there will be a problem tomorrow. Elected officials will not vote for conservation until their constituents are in serious pain...when it's safe. So we're not likely to see any real response until we hit the brick wall.

Charlie Maxwell

- Although we have different perspectives, we're united in the broader picture. And so few people outside of our sphere understand it, in part due to counter-propaganda from the oil industry and "hopelessly varying views."
- There are three undeveloped areas:
 - Deepwater. Takes lots of money and very advanced technology. \$600-700 million to build, as much as \$600,000 per day to lease
 - Unconventional sources that are now economic with oil so high. LNG can be landed for \$4.50-\$5, processed for \$6. Estimated that \$100 billion will be spent worldwide on new LNG production in the next few years. We have the technology and ample foreign supplies of "stranded gas."
 - Geographic: We can produce in places we never thought possible (Kazakhstan) or that were previously not available. This is why Halliburton has moved its headquarters to Dubai, because that's where the resources are. But we don't have the surplus capacity to deal with additional ME supply.
- These are the kind of changes that will be limited by the speed with which they take place. We've squeezed 1 mbpd of demand out by high prices. US demand is basically flat, OECD is slightly down. With prices above \$75 for about 14 months, new supply from KSA and OPEC, and slowdown in the US due to the subprime fallout, we're getting "a little rest" but it won't last for more than about 6-8 months (primarily due to Chinese demand). We're going to roll over the top of prices in the new few days and head back to the \$70s. Oil companies who are planning on prices coming back to \$40 are going to be very disappointed and won't be able to execute projects because they waited for costs to come down and they never did.
- Trigger: Nigeria? Chavez? If it happens quickly, it will really hurt. We need to make our adjustments over more time before the trigger is pulled. "We're going to go marching into the jaws of the dragon." The world is still acting like it's a big party.
- The Saudis don't want to produce too much (say, 20 mbpd) because they don't want to see a crash on the other side. I think they're very apprehensive about denying their grandchildren a shot at the wealth. It's my private view...that the Saudis are being counted on by the IEA to produce ~20-25 mbpd but the max we'll ever see from them is 12-15 mbpd. It's better if they keep production low because it forces us to come to our senses a little sooner.
- How is all this going to come out? (Badly)
 - There is no great substitute for oil, nor a way to fill the gap. Alternatives aren't big enough, fast growing enough, or cheap enough.
 - Fastest growing is LNG, which could solve maybe 1/3 of the problem.
 - We're going to walk away from coal, and "clean coal" doesn't exist.
 - Nuclear won't make much of a difference between now and 2020. But that is the period of our most extreme vulnerability.
 - We'll see conservation backed by much higher prices and a good deal of going without (e.g., Paraguay, Madagascar). Prices increases will come much faster and harder than we expect. People will sacrifice much to maintain their mobility.
 - The good news: it's going to liberate a huge outpouring of high tech—machines, superconductors, new systems of power generation. We're lucky that we have all this entrepreneurial talent in America that we can

turn to. America will do better than most areas thanks to our ingenuity and it will survive.

- In the final analysis, who can say that this constricted life will be tearful? “We’re going to return to the kind of appreciation of life that will be the making of a happy America.”

Introducing Boone: three big themes in his life: oil, water, and exercise/fitness. He has given back so much more than he has received. He’s a believer in entrepreneurial activity that adds value to the lives of his employees, stakeholders, and the country as a whole. He has forced companies to make necessary changes.

T. Boone Pickens

Questioned by Maxwell

- **Q:** How will the future of LNG play out? **A:** I’ve been surprised by the increase production in gas and the increase in reserves. LNG is a global market and if it’s produced in the ME, it will go where the price is best. Started a company called Clean Energy Fuels for nat gas fueling of busses, trucks, etc. Went over to China to check out their gas powered fleet, and found one missing link: they don’t make the gas. Nothing too serious. It’s like somebody who invites you to a duck dinner, but you’ll have to bring the duck. So I won’t be going back to China because I’m not going to bring them the natural gas. We’re going to import more. We import 62% of our oil now, and we’ll import more and more of the LNG.

Natural gas is currently momentarily oversupplied...we could see \$6.50 next spring if it’s a mild winter. ’08 could be a low year for natural gas prices, but in ’09 it will probably revert to its historical ratio with oil. I think it’s going to become a major transportation fuel, because it will always be cheaper than diesel and gasoline.

- **Q:** Is this the last hurrah for unconventional? **A:** Yes. I don’t do much wildcatting anymore, it’s too hard to find. When you start talking about Appalachia and the Barnett Shale, it’s peanuts. Groppe: we’ve been completing more gas wells in recent years, but the average production rate is dropping quickly.
- **Q:** What about CNG abroad? Esp. for power plants abroad, considering that it’s far cheaper now on a cost per BTU basis? **A:** Groppe: the problem is constraints on the supply side. Costs have gone up 2x, so fewer of them are coming online and getting delayed. Expected production levels aren’t going to solve any problems. Pickens: We’re running out, so the only way you’re going to kill demand is with price. I’m a believer in nuke, but I don’t invest in it because if I started now, it wouldn’t come around for at least 15 years, and I’m 79 years old.
- **Q:** Peak oil means changes, are there any young Boone Pickens waiting in the wings? **A:** Pickens: I think stock repurchasing is telling the market something: that we can’t grow. And they’re all doing it. But I don’t think that’s the way to go, I think they should be increasing dividends. These companies aren’t replacing reserves, so in 10-15 years they’ll mainly be manufacturing operations, refining, making equipment, and so on. Look at XOM: (cited capex, divs,

revenue)...they're buying themselves back. I think all these companies should double the dividend, and cut the buyback.

- **Q:** Will oil companies be part of the solution to peak oil? **A:** Pickens: My production number is 85 mbpd and demand is 88, so \$90 oil doesn't surprise me, nor would \$100. The only way we could produce more than 85 mbpd is if they turned it all over to Exxon. NOCs have over 75% of production and they can't do what Exxon could do. Groppe: Exxon today buys half the oil they refine. Pickens: What's available to the majors to drill? Nothing in KSA, exploration in Iraq is something nobody wants to do...but you ask the majors if they'll open up ANWR, or the federal lands in the West, but that's not going to happen because the Democrats won't let them. They might be able to get into Russia as consultants, esp. in deepwater (Russians don't have that kind of technology) but Exxon isn't going to do it unless they've got some equity in the deal.
- **Q:** What about water? **A:** Pickens: I think it's great to drink, it's much better than bourbon. If anybody remembers Babe Ruth playing for the Yankees, they made a swing through the west on a train. The Yankees were tired and drinking. [inaudible] said boys, I want you to watch this. He puts an earthworm in the bourbon. In three minutes it's dead and white. He does the same with an earthworm in a glass of water, and it's happy. Babe Ruth: Oh I get it, if you drink bourbon, you won't have worms!

I think I'm the largest owner of ground water. In the Ogallala aquifer, I own over 200,000 acres of water in Texas, just 328 miles to Ft. Worth.

- **Q:** You're a sportsman, into fitness, and you like people around you to be fit, what are your thoughts on obesity. **A:** If they made me health czar, I would encourage health & fitness...obesity & diabetes go together. I work out every day, treadmill for 20 minutes, do curling with weights, and I'm just trying to keep myself going. After you get past 60, you have to live with the results of what you've done. In 1969 we built a \$3 million fitness center for Mesa...we had "fit time" when you could take some time to work out...we had the cheapest insurance costs and the least off time. In our offices in Dallas we have a fitness center and a full time trainer. That may be my biggest legacy.
- Groppe: Boone and I both agree that these are problems that are going to be complicated, and price is going to regulate supply.
- Pickens: We've peaked. 85 mbpd is all we're going to do. There's no way to increase supply beyond here...the price will go up until we kill demand.

Observations on the conference by Kyle (Prof. Goose of The Oil Drum)

- Teaching a class called "Energy Policy and the Future," talking about peak oil, various alternatives, and the problems that we'll face in the future. What are the solutions and how can we best solve these problems?
- We're all self-selected, long-term, systematic paradigmatic thinkers in this room, but the people out there are different. What are they missing? We've heard about

- uncertainty, going backward, going without, conservation, and changes in our lives, but we don't know how things will change.
- Until the tipping point stimulus occurs, policy is going to progress slowly and in a bottom-up fashion. It's not very probable or possible to have a nationally coordinated policy until we have a tipping point event. Our political institutions are deliberative and slow-moving and they were set up that way on purpose. Madison got what he wanted. American policy is a like a cruise ship. Compare that to systems elsewhere in the world, parliamentary systems: they're like speed boats, more agile, faster. But we need to be cognizant of the idea that this constrained environment with regard to resources leads us to look to innovations. Local resources are the most important.
 - The more we have this conversation, the more we facilitate the conversation. You sit an economist and a geologist down, and you make them have a dialogue about what's prudent.
 - Why are Cassandras reviled? We don't want to hear the bad news. This is a social movement, akin to women's rights, racial rights, etc. The way that those social movements occurred is the way that this movement will develop. "Punctuated equilibrium." Most of the time social movements are local and grassroots, and slow moving (until they're not). The mental capacity that it takes to understand this stuff is amazing. Social movements are beyond politics, but are inherently political. They all require ideas, entrepreneurship, etc...that's our job, what we need to go out of here and do.
 - This community is about activism, persuasion, and information. How we give that information the forms and outlets in which we exchange it...there's some way to show people and get them thinking about this. "Peak oil is bad" doesn't work. All you can hope to do is deliver information to smart people.
 - First they ignore you, then they laugh at you, then they fight you, then you win. -- Gandhi

DAY 4 – SATURDAY, OCTOBER 20, 2007

[I was unable to attend these breakout sessions, so I have no notes on them.]

Personal Comments

All in all, I thought it was the best conference I've ever been to, by far. I know I said that about the first ASPO Conference in Denver too (my notes from that are here: <http://www.getreallist.com/article.php?story=20060829200211917>), but this year's event was another level higher.

Again: the information density was high, the fluff was very minimal, the speakers were all excellent, the event was well executed, everybody was comfortable (well, except for the hours when, as Randy Udall said, they treated the room as if it were a meat locker, the A/C was cranked up so high), the sound and AV were good, and we stayed on schedule.

The quality of participants was universally high and very broad spectrum, offering lots of opportunity for interesting conversation and networking.

I was repeatedly humbled by the knowledge, intelligence and patient dedication to the task exhibited by the presenters, organizers, and attendees. What an amazing group of people.

Kudos and thanks to Steve Andrews, Randy Udall, Jim Baldauf, and the event team for another excellent conference. I hope everybody else at the conference was as energized as I was to continue the work that needs to be done.

If you are interested in helping to fund the excellent work of ASPO and helping to get them beyond the shoestring budget stage, please contact ASPO-USA or me.

--Chris Nelder

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