

SUMMARY REPORT ON ASPO4

The 4th annual ASPO Conference was held May 19-20, 2005, in Lisbon Portugal. ASPO is the “Association for the Study of Peak Oil” established by Dr. Colin Campbell, a retired petroleum geologist.

<http://www.peakoil.net>

A fast read conference summary can be found here:

<http://society.guardian.co.uk/societyguardian/story/0,,1491029,00.html>

The Gulbenkian Foundation, our conference venue, was founded by Calouste Gulbenkian, a petroleum industry pioneer, having personally facilitated many original petro relationships between the Mid-East and Europe. Gulbenkian had a knack for obtaining at least 5% of any deal he helped negotiate, earning him the nickname “Mister Five Percent.” Much of Gulbenkian’s empire was eventually nationalized by both the Turkish and Portuguese governments, including what eventually became Partex, the Portuguese National Energy Company. His Lisbon Foundation includes the city’s foremost collection of modern art.

<http://www.gulbenkian.pt/home.asp>

For those not familiar with the concept of Peak Oil, a good summary can be found in Campbell’s 1998 *Scientific American* article.

<http://dieoff.com/page140.pdf>

The conference opened with Chairman Campbell presenting a summary of the last three APSO conferences and outlining the strategy and objectives of APSO4. He was followed by APSO President Dr. Kjell Aleklett, professor of nuclear physics at Upsalla University in Sweden, who highlighted recent developments in energy depletion studies. Jean Laherrere, retired Director of Oil & Gas Exploration for French energy conglomerate Total, summarized the most recent numbers for world energy reserves. Laherrere’s presentation was rich in detail – he is considered among the world’s authorities on petroleum reserve forecasting and data analysis.

Laherrere was later joined by Dr. Roger Bentley, University of Reading Chair in Cybernetics. Bentley maintains an important Internet site “ODAC” for the study of energy resources:

<http://www.oildepletion.org>

Bentley outlined today’s primary methods for predicting energy resources availability. Expanding on Laherrere’s presentation, Bentley summarizes three essential analyst camps: (1) models such as ASPO, PFC, and Princeton University which forecast a probable peak in convention oil supply sometime within the next three to thirteen years, (2) models such as WETO and IEA which assume that more expensive non-conventional oil (tar sand, oil shale, bitumen, coal-oil, heavy-oil, hydrates, polar, etc..) will extend economical supply another twenty to thirty years, and (3) classical economists, such as Stanford’s Michael Lynch, who believe that free-market economics will not allow energy reserves to peak; that oil supply and energy demand will always reach a workable economic balance.

Bentley gave fascinating examples of each model, including an overlay of the “Weibull distribution curve” normally used in forecasting failure in electronic components. This curve was similar to the manner in which mined resources are consumed in a fixed supply / constant demand model. Dr. Bentley provided an up-to-date chart showing various predictions on the date of peak oil, which is summarized here:

BGR (Germany)	2017 (conv + non-conv oil)
Deffeyes	2005 (conv oil only)
P-R Baquis	2020 (conv + non-conv oil)
Upsalla	2015 (conv + non-conv oil)
Energyfiles, UK	2011 (conv oil only)
BP (Miller)	2025 (conv + non-conv)
PFC Energy	2018 (conv + non-conv. best case)
ASPO	2008 (conv oil only)

Chris Skrebowski, Editor of UK’s oil journal *Petroleum Review*, then spoke about sifting the wheat from the chaff in oil depletion analysis. He highlighted the numerous and varying agendas at work (private and public oil industries, governments, academia, and investment communities) as reason for the ridiculously wide variations in oil data that we see today. We are reminded that energy, predominantly oil, is the world’s #1 business, dwarfing all other

commercial activity. It's no surprise that access to transparent oil data is difficult, often impossible, to secure. There is enormous competitive risk capital at stake.

After a break, Dr. Marcell Schoppers of NASA-JPL spoke on the uncertainty of Peak Oil timing, due largely to the politicized and non-transparent nature of oil reserve reporting, and to the uncertain infrastructure timing and capital costs of non-conventionals (oil shale, tar sand, coal-oil, etc.). Dr. Schoppers presented compelling scientific research based on JPL's best empirical oil data and modeling techniques. In this view, the APSO model seems most accurate (conventional peak before 2010).

Following this, Dr.'s Kolodziej (Univ of Chicago Dept of Economics) and Bardi (Univ of Florence Dept of Chemistry) spoke on the Hubbert Depletion Curve, and looked at the former Soviet Union, comparing declines in oil production to GDP decline and social change. The incredibly strict relationship between cheap, available energy and a nation's GDP was confirmed once again. This dynamic was overlaid onto world GDP with predictably similar results.

After lunch, the NYMEX futures market was shown responding to recent revelations in oil supply limitations, nearly doubling its contract values within a year. Kondratieff Wave theory was proposed in oil limitation scenarios – the “fifth wave” – showing how access to cheap energy and human productivity / population growth are inexorably connected.

Dr. Charles Hall, a “systems ecologist” and Environmental Sciences professor at Syracuse, led an animated session on natural economics, showing how classical economics looks at natural resources as an “external” event, and how this error may spell the demise of economics as we know it. Dr. Hall proposed an alternative economic model in which there are no externals, and all resources remain integral to the equations of balance. Such economic modeling seems self-evident, yet classical economics assumes that “external” resources will always be available at some level of demand. The concept of resource depletion is generally not a factor in classical macro-economic models. Hence, we see why some of today's economists scoff at the notion of an oil peak – classical economists assume that the market will always find a way to supply more “externals” if demand remains strong. We also learned that Dr. Hall does not require a microphone.

After a break, one of the hosts of this event, Dr. Costa Silva from Portugal's Partex Oil & Gas, spoke on the role of natural gas as a substitute for oil. Dr. Silva presented Partex's "public position statement" that oil reserves will supply the world's energy needs for at least 50 more years before peaking. He stressed twice that this was the "official Partex position" and not his own, drawing muted laughter and nods from the audience.

Dr. Herman Franssen, former Chief Economist of the IEA, and current director of UK-based *Petroleum Economics* and adjunct scholar at the Middle East Institute in Washington DC, gave a fascinating presentation on the future of oil supply. Assuming all sources of oil available, or soon to be available, Dr. Franssen gave a convincing data-based argument for a worldwide oil supply maximum of around 100 million barrels per day. Currently, the world is using about 84 mb/d. At today's growth rate, the world will need about 120 mb/d by 2025.

Franssen confirmed that there is essentially zero spare oil production and delivery capacity on the planet (refineries, tankers, etc.), which is due to the economic reality that deters markets from inefficient capital investments. In other words, if there was plenty of oil remaining in the ground to meet future demand for decades to come, new tankers and refineries would be in a strong investment and development cycle. Such investment is not occurring.

<http://news.ft.com/cms/s/3864eadc-bc04-11d9-817e-00000e2511c8.html>

He also points out that factors other than oil-in-place, such as civil disturbances and political unrest, have and will continue to impact world ability to supply oil. Such factors are impossible to predict, but can have devastating long term impact on oil supply infrastructure (e.g., Iraq, Venezuela). Add to this the oblique nature of industry reserves reporting and we are again reminded why predicting oil peaking is a fraught with uncertainty.

Professor Franssen showed that, given today's economic growth levels, total oil supply (conventional + non-conventional) would peak within 20 years, and probably much sooner. He also pointed out that, the sooner oil peaks, the harder it will impact world economies. He used the word "brutal" to describe the effects of energy depletion on world commerce.

Franssen was followed by Mat Simmons, a well-known investment banker and energy advisor to the Bush administration. Simmons spoke mostly about the

lack of transparency in oil reserves reporting, and how this will likely contribute to a faster decline curve once peaking has been reached. Simmons also previewed his upcoming book on Saudi oil reserves (John Wiley & Sons), of which 15,000 had already been pre-sold. As of this writing, the book is now available.

http://www.amazon.com/gp/reader/O47173876X/ref=sib_dp_pt/002-8639637-6211234#reader-link

Later at dinner, I spoke privately with Simmons about Saudi Oil reporting and he's sincerely convinced that the Saudi's are quickly reaching their peak in production – decades in advance of their formal government data. Based on his formidable original research, Simmons is very pessimistic that Saudi will be able to boost output much higher than current levels (10 mb/d to maybe 13 mb/d) and that they will likely not be making significant new findings. Simmons' book is the most thoroughly researched source on this topic to date and will likely prove to be of great importance in the study of energy depletion. If Simmons' data is totally accurate, we have probably entered into the peak or plateau stage of conventional oil in 2005.

After a coffee break – coffee breaks at an ASPO conference are a fantastic opportunity to speak informally with other attendees – a panel consisting of world political leaders assembled to discuss strategies for minimizing the social impact of energy depletion. This panel included:

- Yves Cochet, Minister of Environment, France
- Michael Meacher, Former Minister of Environment, UK
- Edward Schreyer, Former Governor General, Canada
- Rudolf Rechsteiner, Parliament Member, Switzerland

A “Depletion Protocol” draft has been circulating in which the world community can better manage what oil remains. The protocol calls for greatly increased clarity in reserves reporting, encourages conservation, stimulates the development of alternative energies, and attempts to stabilize prices via distribution equity. Each politician gave a review of their country's current policies, none of which gave any real hope towards world energy stability. A common complaint was echo'd by each man – “it's difficult for a politician to get elected, or re-elected, on a platform of social austerity.” Voters do not want to hear about lifestyle limitations and economic uncertainties. Such a platform is death to a political candidate.

The two ex-politicians could speak freely about this unfortunate reality, pointing out that little real change to energy policy will happen without world governments getting serious about scaling back energy use. But such a roll back of energy use would bring about economic sluggishness. In a developed (and developing) world accustomed to unbridled growth fueled by access to unlimited cheap energy, it appears that free market forces may be the only factor that ultimately moderates energy demand – and by then it may be far too late to avoid serious social consequences.

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If I may add here – debt service requires economic growth in proportion to the size of the debt. Today's industrialized debt is at its highest "real dollar" value in human history. Personal debt, corporate debt, government debt – all are at or near historical highs, and growing at historically unparalleled rates. Hence, the level of economic growth required to sustain such debt is also at an all-time high.

We're becoming increasingly aware that fossil fuel is the reason world population has achieved and sustained a six-fold increase in just 100 years. Fossil fuel is the reason we can feed six-billion people. Without access to unrestricted supplies of cheap, highly concentrated petro-energy, the technological achievements (and population growth) of the 20th century would not have been possible; the incredibly mobile suburban lifestyles we live would not have been sustainable. It's said that fossil fuel has provided each industrialized citizen the equivalent of owning thirty slaves. Industrialized economies are inescapably dependent upon fossil fuels for their existence and growth.

For the first time in over 100 years of unrestricted oil-fueled economic growth, we stand at the threshold of physical *supply limitation*. Demand for energy is at its highest point in human history (> 84 mb/d) – at a time when a swelling choir of scientists are warning that fossil energy supply is reaching a physical barrier. The Peak Oil issue is one of great complexity, and forms the foundation of today's largest issues – world economy, politics, culture, sustainability, community, and our models of equity and justice.

Tough, difficult choices await us and our children. At stake is the sustainability of our dreams. Do we continue with our lifelong assumptions and expectations

of economic growth? Old habits are hard to break and, as we've seen, our politicians are the last ones who will guide us onto a sustainable path. A grassroots awakening must emerge.

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The ASPO panel of politicians brought our day's session to a close, which was followed by a Lisbon Harbor bay cruise and dinner -- three hours of fascinating mingling with ASPO conference attendees and panelists.

Our next day opened with a working session featuring Dr. Ali Bakhtiari, Senior Oil Analyst with the Iranian National Oil Company, where he has worked for 35 years. In recent years, Dr. Bakhtiari has become an outspoken observer of Middle-Eastern oil reserves, and of Iranian oil reserves in particular, offering increasingly contradictory analysis to official Iranian/OPEC reporting. For this reason, Dr. Bakhtiari was denied exit from Iran and could not participate in the ASPO conference. Dr. Bakhtiari was given a long standing ovation in absentia for his courageous work in reporting data with integrity and transparency, to the extent that he is publicly able.

Speaker Jack Zagar, who spent 22 years as an oil analyst with Exxon, and now with MHA Petroleum Consultants in Golden Colorado, gave an overview on Saudi Arabian oil reserves, concluding that the Saudi's will have a "difficult time" achieving their stated goal of delivering 15 mbd by 2015.

Dr. Manuel Pereira, a physicist trained at the University of Chicago, then spoke of petroleum alternatives. Dr. Pereira is currently Coordinator of Research for Portugal's renewable energy programs and Professor of Physics at Lisbon's Technical Institute, with an academic focus on solar energy.

Dr. Pereira explained that coal would likely become the primary short-term alternative to post-peak fossil oil, but stressed that coal-based oil and gas creation would be significantly more environmentally harmful than native oil. Professor Pereira also warned that long term alternatives, such as hydrogen, could also pose grave environmental dangers. He added that many undeveloped countries were actually in a better position to grow a new "sustainable" energy infrastructure. He contrasted this with developed nations that were fully capitalized into an oil-based economy that would be harder to modify.

Nuclear fission was seen as a viable alternative to certain energy needs, but certainly not a substitute for oil in transportation or agriculture. It was also noted that Uranium was not in abundant supply, with some estimates showing U235 not far from peak extraction limits. The costs of power plants required to effectively substitute for oil depletion was shown to be impractical for most economies, and with construction lead times stretching 20 to 40 years, well beyond most estimates of oil peaking. Nuclear fusion was given due credibility, but on a time scale well beyond any oil peak.

Dr. Pareira concluded that the problem of energy depletion has been primarily assumed to be a “supply side” issue. This, he says, must change. All governments must take responsibility for curbing fossil fuel demand. Ultimately, a “shift in social expectations” must occur, where unlimited growth is no longer desired – replacing unsustainable social practices with lifestyles that are sustainable within a context of energy limitations. Such change will require a paradigm shift in entrenched human values of growth. He stresses that we are rapidly running out of time to make these kinds of changes gracefully, and that such changes brought about non-voluntarily (via natural economic forces) will likely result in severe social unrest.

A scientist from Volvo then gave a presentation on new developments with alternative fuels for commercial vehicles. What I remember most clearly from his presentation was Volvo’s official prediction that worldwide conventional oil production would peak in 2015.

Robert Hirsh was the next presenter. Dr. Hirsh is one of the petroleum industry’s leading authorities on extraction and production, having held executive-level positions with Exxon, Arco, US Dept. of Energy, EPRI, ERDA, and the Rand Corporation. Dr. Hirsh’s presentation was entitled “Peaking of World Oil Production – Impact, Mitigation, and Risk Management.”

Dr. Hirsh’s consulting company, SAIC, was commissioned by the U.S. Dept of Energy to draft a summary report on the subject of Peak Oil. The report presents three scenarios: (1) we begin immediately making supply-side and demand-side adjustments to energy depletion, (2) we wait 10 years before starting to make adjustments, (3) we wait 20 years. The report is sobering and of great importance. Rather than trying to “summarize the summary,” I instead urge you to read Dr. Hirsh’s March summary, here:

http://www.cge.uevora.pt/aspo2005/abscom/Abstract_Lisbon_Hirsch.pdf

Following a break, Dr. Pang from China's "University of Petroleum" spoke (in quiet, nearly-unintelligible English) on the impact of Oil Depletion in China. I believe Dr. Pang said, in essence, that China's own oil reserves had peaked and that their country's growth over the next decades would be likely be enormous, requiring rapidly increasing amounts of energy. We know that China's energy use (actually all resource use) is growing three to four times faster than the USA.

Pang called oil and gas "the most important strategic materials to ensure the national economy, politics, and military security." Pang called the imbalance between energy supply and demand "the main bottleneck restricting economic and social development." Given that China built nearly 2 million new automobiles in 2004, it's clear that energy plays a key role in their future.

Bruce Robinson, a physical scientist from Australia then spoke of the possible impact of Peak Oil in his own country. Robinson noted that Australia reached their maximum oil extraction rate in 2000 and have been in decline ever since, requiring increasing amounts of imported oil to sustain the 18 million vehicles driven by a population of 20 million.

Robinson showed how Australia is highly dependant upon the automobile, and that access to cheap oil has shaped their country's growth and expectations. He stressed the need for those who understand the serious problem of Peak Oil to follow Dr. Les Magoon's advice (from USGS) to "talk about it, talk about it, talk about it." You can't solve a problem unless you know you have one.

Robinson compared the accepted practice of limiting water use in arid areas, such as Perth. Residents of Perth are limited to two days of garden watering per week, and clearly understand and comply with these essential limitations. In the same manner, if it was broadly understood why energy was in short supply, Australian's would understand and comply with modest restrictions. Unfortunately, energy restrictions translate directly into decelerated economic activity, whereas garden water restrictions are much less ominous. Other proven energy conservation ideas were proposed.

Up next was Dr. Richard Heinberg, noted author of the highly regarded energy depletion books *The Party's Over* and *Power Down*. Dr. Heinberg gave an overview of possible economic and social consequences of energy depletion in

the USA. Considered by many as the finest introduction to the issues of Peak Oil, read *Party's Over*.

Three other speakers then presented various economic perspectives on energy depletion. One of these speakers was Dr. Robert Ayres, Professor Emeritus of Theoretical Physics at INSEAD, France. Ayres confirmed with clear data how higher oil prices will impede economic growth. To most, this was self-evident, but Ayres had the data to back it up with scientific certainty, in case anyone was still skeptical.

Ayres then presented an incredibly detailed and well-researched economic-mathematical model, showing conclusively that, during the last 100 years, petroleum energy accounted directly for virtually two-thirds of the USA's GDP, with stronger weighting during the last half of the century.

Chris Sanders, a political scientist and energy investment banker, ended the conference with a fascinating paper on "energy economics" at the end of the Oil Age. Sanders outlined the history of "credit" as a form of economic development, showing how financial credit has always been accompanied by some manner of increasing supply value, such as incremental resource mining or conquest/theft of gold. The emergence of oil as a dominant world commodity created a market for abundant credit the scope of which the world had never seen.

Sanders showed how the emergence of the business corporation (vs. public trust), access to regional oil reserves, and energy ownership consolidated into the hands of eight men (J.P. Morgan, etc.) led to the USA becoming the dominant world power, and how access to credit is a double edged sword with respect to resource depletion.

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Fossil oil and gas have given us 100+ years of unprecedented economic expansion. Successive generations of Oil Age children have grown up expecting a lifetime of economic growth and prosperity, a reality made possible by access to cheap, abundant oil. As the Oil Age begins its decline, our expectations of economic growth will be increasingly frustrated. Unless great changes in social perspective come soon, the "religion of growth" (as one panelist put it) will evaporate much faster and harder than it arrived.

For those who want further information on the ASPO Conference, most abstracts and papers can be found here:

<http://www.cge.uevora.pt/aspo2005/abstracts.php>

My personal opinion on all this? I believe there will be energy available for many generations to come, but at increasingly higher cost. Eventually (10 years? 30 years?), the cost of energy will force major lifestyle changes. Many in the Peak Oil crowd tend towards a severely pessimistic outlook of the future. They may be right.

I prefer to put a bit more confidence in the combination of free market forces and human ingenuity. I personally don't think our global civilization will come crashing down any time soon. I have a hunch that coal-oil (coal gasification) will play a much greater role than is currently assumed, though it is a filthy operation – potentially causing vast environmental damage via the scale of capital required.

But just as James Kunstler entitled his recent book *The Long Emergency*, energy depletion is an issue that won't go away. The economic and ecological impact of this and many other global issues will continue to worsen. A developed world addicted to unlimited energy and economic growth will progressively realize that the "party" indeed is coming to a close, and that new sustainable paradigms of commerce and community must emerge.

Actually, the paradigms required are not "new" – unless an alternate source of essentially "free" energy is developed, we will simply be forced to move back to slower, localized (vs. globalized), rural forms of living. Simple in theory, monumentally difficult in practice.

It's that part about "monumentally difficult" that has many of us gravely concerned, and propels us to continue researching this issue, looking for solutions, and continuing to talk about it to whoever has ears to hear.