

**THE ASSOCIATION FOR THE STUDY OF PEAK
OIL
&
THE OIL DEPLETION ANALYSIS CENTRE
ASPO-ODAC**

NEWSLETTER No 7 – JULY 2001

CODA becomes ODAC

In setting up the trust company, it was discovered that other entities operate under the name of CODA, and it was decided on legal advice to change the name of CODA to ODAC. A meeting of the trustees was held on July 23rd and approved the budget and work programme. It was agreed to move the office to a new location, offered by Imperial College, London, to have the advantage of closer links with the university, including professional expertise and library facilities. The new address will be announced as soon as the formalities have been completed.

The Astor trusts, whose most valuable support is making this endeavour possible, expressed satisfaction with progress to-date but made it clear that they would welcome additional sponsorship to share the financial burden of expanding activities.

Seminar

As one of its first actions, ODAC organised a half-day seminar in London entitled 'Global Oil Depletion'. It was held on July 23rd at Imperial College, University of London.

The speakers were: Dr. Roger Bentley (ODAC), Dr. Colin Campbell, M. Jean Laherré, Mr. Richard Hardman (Amerada Hess), Dr. Werner Zittel (L-B Systemtechnik), and Mr. Roger Booth (Visiting professor in Sustainable Engineering at Oxford University).

Dr. Bentley explained how a paper by Campbell in 1994 had led a group of investigators at Reading University to spend about two years checking out the data and models underlying the Campbell/Laherré calculations. He went on to give a background to global oil depletion, covering: oil peaking, past forecasts, derivation of ultimate from statistical methods, and the implications of a 'medium-term' ultimate for conventional oil in the region of 2000 Gb. He also provided a brief overview of the extraction difficulties associated with non-conventional oil and gas.

Colin Campbell gave an analysis of the current USGS numbers, and examined how they are misleading the US EIA, and the IEA. He demonstrated how careful reading reveals the hidden messages that are embodied in studies from these establishment institutions. He noted that the new US energy policy of stepping up coal and nuclear energy evidently rejects the forecasts of abundant oil and gas made by its own institutions.

Jean Laherré gave an excellent summary of his recent presentation to the IIASA in Austria (also available on the web). First, commenting that "reporting reserves is always a political act", he drew attention to the great discrepancy between reserve data as reported publicly for

financial and commercial reasons and those in the industry's own database. He then presented graphs of future oil and gas production (including, in the latter case, that for US future gas production) based on simply smoothing and then 'time-shifting' the discovery curves, themselves drawn from the industry database. Since production has to mirror discovery, this approach gives better results than modelling with Hubbert curves. He concluded with a projection of global carbon emissions from hydrocarbons, showing it to be significantly lower than any of the current scenarios modelled by the IPCC.

Richard Hardman (Exploration Advisor for Amerada Hess) outlined some of the new areas of interest to his company in the Gulf of Mexico, Brasil, Norway and Borneo. He stressed that, while frontier exploration was by no means over, it was becoming increasingly difficult to identify possibilities capable of having any particular impact on global depletion.

Werner Zittel gave a detailed review of European gas supplies. Using the industry database, he showed that European gas discovery trends are approaching asymptote, which means that severe supply constraints will arise within the next two decades. He pointed out that the increasing demand for gas will exacerbate the situation. He also showed that FSU gas is also subject to supply constraints, meaning that European imports will also come under pressure before long, especially since India, China and Japan will be competing customers for what is available.

Finally, Roger Booth reviewed the scope for alternative energies and energy saving. On straight energy-conversion grounds he showed the intrinsically poor economics of current biofuels (for example, rape methyl ester), but drew attention to promising new processes that can convert the whole plant. He emphasised the long lead times needed for such new technologies to reach industrial maturity, and said that clear forward thinking was imperative now.

The seminar was attended by representatives from the UK's new Cabinet Office 'Energy Review Team', and from the DTI, UKOOA, the Inst. of Petroleum, the Association of Electricity Producers, RIIA, SPRU, CGES, and Robertson Research, but unfortunately Mr Cleutinx from the DG-TREN in Brussels and Mr Birol from the IEA, who had been invited, were unable to be present.

Mr Vijay Vaitheeswaran, the Economist's energy correspondent, took a keen interest in the presentations and took time to review them with the speakers afterwards.

EU Research Funding

Reading University has had promising meetings with the EU officials concerning research funding for oil depletion studies. ASPO members wishing to participate in this initiative should contact Roger Bentley by e-mail at r.w.bentley@reading.ac.uk.

Evora

Professor Rosa has organised an International Meeting on Climate Change and the Kyoto Protocol in Evora on November 15th and 16th to consider the implementation of the Kyoto Protocol; the scientific background for climate change concerns; and primary energy sources, energy vectors, energy intensity and their interaction with climate change.

The details are available on

www.cge.uevora.pt/Climate-Change-Kyoto/Information.htm

This might be a useful occasion for ASPO members to meet and exchange ideas about our endeavour and plan for the future.

Mexico

On June 28th the new head of Petroleos Mexicanos (Pemex) announced that the country's oil industry was "in the throws of a full-blown crisis" as declining production threatened exports and government revenue. Falling gas production is of particular concern.

Raul Gonzales, a retired Pemex petroleum geologist, who continues to consult to the company, has separately contacted us for advice on how to conduct a thorough evaluation of Mexico's potential, using some of the statistical techniques developed by J.H.Laherrere.

Mexico's reserve data have been notoriously unreliable and this may offer us an opportunity to improve our knowledge. Mexico is an important exporter to the United States, where the consequences of falling production will be felt.

IIASA Meeting

J.H.Laherrere made a valuable presentation to this important conference, contributing a large number of key graphs, which are reproduced on the organisation's website. Professor Odell claimed that his well-known excessive estimates of the oil resource base were supported by Shell. The following letter to Mr Ged Davis, a Vice-President of Shell, seeking clarification, has so far failed to elicit a reply.

26 June 2001

Dear Ged

I am making good progress on the study of peak oil, now supported by a generous philanthropist and a growing network of influential European institutions concerned about the subject. We are also beginning to attract media attention as you know.

I put out a Newsletter to this group and have to report on the recent IIASA meeting where Jean Laherrere had again to face the flat-earth community, led as usual by Odell, who now is forced to promote an inorganic origin of oil to support his notion of near infinite resources. Anyone can get away with saying anything in this business, because of the ambiguous definitions of what is being measured and the unreliable reporting practices, but there do remain lines of logic that can be presented to give a fairer picture and penetrate the various veils of obfuscation that envelope the subject.

I can understand that this is about the last subject that oil companies want to discuss as they plan their various campaigns of imagery to impress the investment community and to meet their wider political objectives. Certainly, their directors have a fiduciary duty to deliver short-term profit to their shareholders, and have absolutely no reason to release more information than they are strictly obliged to do under the regulatory regimes. Nevertheless, from time to time they do make statements that enter the public domain and become objects of legitimate analysis.

I have two rather conflicting statements attributed to yourself, which I would like to try to clarify.

In the BBC film, you stated that you expected 250 Gb yet to be discovered. I imagine that you were referring to conventional crude oil and condensate and that you were thinking of, say, a 20 year period, during which most of what remains will no doubt be found.

I attach a plot of past discovery of *Proved & Probable Reserves* (conventional crude and condensate), with revisions backdated to the discovery of the fields containing them. We have done our best to check the validity of these numbers by plotting annual against cumulative production for a large number of representative major fields, which gives decline trends that can be confidently extrapolated. We find that the reported *Proved & Probable* are, if anything, somewhat on the high side, but generally acceptable, apart from a few anomalies, such as, for example, the discovery date of South Pars which has to be backdated to the discovery of the earlier North Field of Qatar of which it forms an extension. North American data are notoriously unreliable with the MMS even succeeding in reporting negative revisions of cumulative production in some cases.

Superimposed on the graph are three hypothetical trends to deliver the USGS F95-Mean-F5 values over the 30 years of the study period, starting in 1995. It is obvious that the low case of 239 Gb is the only one that bears

any reasonable relationship to the past discovery trend, and is close to your estimate of 250 Gb. So, that all seemed to hang together well. The slight upswing of the past few years reflects the spikes of Azedegan and Kashagan and several new deepwater areas, which are delivering their early giants as is to be expected.

In the text, the USGS explains its predicament regarding so-called reserve growth, saying that it had to decide between ignoring the issue; making a stab at selected areas on which it had some insight; or of applying the experience of the old US onshore fields on which it did have data. They tentatively elected to do the latter, although recognising that the old US onshore experience was not remotely representative of offshore and overseas areas. Naturally, this important qualification does not appear in the bald published numbers. "Reserve Growth" itself is largely a euphemism for the correction of initial under-reporting, imposed by SEC rules and corporate prudence, as is clearly demonstrated by the annual versus cumulative production plots referred to above. It applies primarily to so-called *Proved Reserves*, as revisions to *Proved & Probable* should be statistically neutral, as indeed experience confirms they are.

In the BBC film, you said that you expected Reserve Growth of about 250 Gb, presumably referring to *Proved Reserves*. This represents under-reporting of only about 14% and does not materially affect the downward trend of past discovery, especially since there is more scope for upward revision in the old giant fields than in the more recent smaller fields.

Next, we come to the actual meaning of the USGS estimates. Apparently, they rounded up a team of assessors with no particular knowledge or experience, and asked them to guess high, mean and low estimates of the number of new fields to be expected in each basin with a comparable range of field sizes. They can only have been guesses because the assessors lacked detailed seismic or other knowledge, and ignored the discovery trends of the past. The results were recorded on forms, which were then given to statisticians who made Monte-Carlo simulations to compute the frequency distribution of the guesses. This explains why the estimates are reported as F95 (for frequency) etc rather than the more normal P95 (for probability). The procedure threw up some bizarre results such as East Greenland, which is depicted as having a Mean, five times larger than mid-Norway in a comparable geological setting. It is obvious that no credence can be given to the study.

This then brings me to main point of writing, because Odell claims that Shell now concurs with the USGS Mean Ultimate of about 3000 Gb, compared with the 2300 Gb implied by your BBC numbers. Indeed, I think that your previous Chairman endorsed the flawed USGS study at the Institute of Petroleum some time ago. The USGS Ultimate of 3000 Gb presumably comprises a total discovery of 1602 Gb by 1995; plus 724 Gb yet-to-find; plus 674 Gb reserve growth. Since to deliver the 724 Gb over the 30 year USGS study period from 1995 implies a strongly rising discovery trend, it means that there is at least as much again to find after 2025, as presumably discovery would not stop dead in 2026, having risen so steeply to that point. This gives a total of at least 3724 Gb, which is way out of line with published estimates over the past thirty years, including some by Shell itself.

In my coming Newsletter, I will try to explain the situation in these terms, but I thought I should give you the chance to clarify the position if you so wished. I will be away for the next few weeks but hope to get it out by the end of July.

With kind regards,

Yours sincerely

C.J.Campbell

European Fuel Cell Forum

C.J.Campbell gave the opening presentation of the Fuel-Cell Forum in Luzern, Switzerland on July 2nd. This three-day event attracted a wide international participation from those interested in promoting fuel-cells as a one of the promising solutions to the impending world energy crisis. It seems that the motor industry has accepted the need for new more efficient vehicles, using new fuels, which will be introduced in the coming years. Already, several bus lines are running on fuel-cells powered by hydrogen. Furthermore, there is scope for domestic and community combined heat and power generation with fuel-cells. So far, motivation for fuel-cell applications has come principally from environmental concerns, but it now appears that the growing realisation of the looming energy crisis will give development a new impetus. The published proceedings of the conference are available (Fax +41 56 496 4412)

Solar Today

Oil and gas depletion are covered in the July/August issue of Solar Today (a US journal) in articles by respectively C.J.Campbell and R.Udall & S.Andrews, which have received favourable comment on various websites.

Mitsubishi

The management of Mitsubishi evidently saw the BBC film on oil depletion, and was sufficiently impressed to distribute copies throughout the corporation. A representative was sent to Luzern to meet C.J.Campbell to discuss the issue in greater detail. It seems that Japan is • with good reason • becoming seriously concerned about its future energy supply.

Ireland

The Minister of Public Enterprise, who is responsible for energy policy, has responded to the talk given by C.J.Campbell at the Energy Ireland Conference on June 11th in Dublin, as reported in the June Newsletter, proposing a private meeting to discuss the security of supply concerns expressed.

This interest at Ministerial level is promising and tends to confirm that our endeavours to raise awareness of the impact of natural depletion are beginning to bear fruit.

USGS

Ted Trainer in Australia offers the following explanation for the misleading excessive estimates published by the USGS. It is interesting to learn that the USGS seems to accept, on being pressed, that their estimates cover the hypothetical geological endowment and do not forecast what will be actually found and produced during the study period. They accordingly have no practical meaning and can be safely ignored. It explains why the US government itself ignores them when formulating its energy policy of stepping up coal and nuclear energy production, despite the possible environmental impacts.

The USGS is going to considerable lengths to publicise its study, giving presentations throughout the world. This may suggest some ulterior motive, because the organisation must be aware that it is successfully misleading its audience.

USGS figures explained? By Ted Trainer

Last year the USGS published its estimates of remaining petroleum causing much consternation as their conclusions seemed to be considerably higher than those of several other petroleum geologists. Most of the approximately 50 estimates that have been made in recent decades indicate that the total ultimately recovered quantity of oil would be somewhere around 2000 billion barrels. However the USGS seemed to be saying that the figure would be around 50% higher.

It seems however that the entire problem has been one of conceptual confusion. I do not think there is a contradiction between the USGS pronouncements and those of Campbell, Laherrere et al. because each group is talking about quite different things.

The core of the issue is the distinction between reserves and resources. The term reserves refers loosely to the estimated quantity we "know" is there in a recoverable state. The term resources refers to the estimated quantity that is probably there in a recoverable state, including the material not yet discovered. These are sometimes referred to as potentially recoverable resources. The distinction is made clear in, the 1973 USGS Professional Paper 820 on Crustal Abundance by Bobst and Pratt where world lead reserves are stated as 540,000 tonnes and resources as 550 million tonnes. Much, and probably most of the 550 million tonnes will never become reserves because it will not be found or will be in deposits that are too small to mine, etc.

What we would most like to have of course are estimates of the probably recoverable quantities; i.e., what proportion of the potentially recoverable resources we are likely to retrieve. This is what the 50 or so previous estimates of remaining petroleum refer to but it is not what the USGS 2000 pronouncements are about. The USGS figures are resource estimates. They are not statements about what reserves will be or how much will be found by 2030 etc.

I sought confirmation of this from a contact in the USGS and the reply was "Yes, we are talking about resources" It stressed that the USGS is "not predicting how much will be found." The March 2000 News Release of the USGS refers to quantities that are thought to be "technically recoverable" by 2030. The chapter on Reserve Growth within the USGS CD says the reference is to "the volume which has the potential to be added within 30 years to remaining reserves of known fields." and "The reserve growth model described here is intended to estimate volumes of petroleum having the potential to be added to known fields in the next 30 years. Because of the many indeterminate factors involved, it is not feasible to attempt to predict volumes of petroleum that will actually be added to known fields in this time period." (Italics included; RG - 8.) In other words the USGS is only making a statement about potentially recoverable resources; they are saying that they think 1200 Gb could be found in the next 30 years, in the sense that that much is there as a potentially recoverable resource.

It seems that many people, including me, were mistaken in thinking that the USGS was predicting that reserves will increase by 40 Gb/y for 30 years, and in thinking their figures contradicted those of Campbell, Laherrere et al. For the purposes of people concerned about the fate of the planet and how long petroleum will last etc., the USGS figures are not very relevant, because what we need is some idea of how much is likely to be found and added to reserves and the USGS is only talking about how much they think is there capable of being found and added.

Depletion Protocol

The Foundation for International Environmental Law and Development, which represents international lawyers concerned with climate change, globalism and such issues has taken an interest in the proposed Depletion Protocol. This protocol would be an international agreement whereby producers would limit production to the current depletion rate and importers would not accept infringements. In practice it would mean that the consuming countries would co-operate with the producers in managing depletion. More work is needed to define the mechanics of the proposal and evaluate its implications. If demand could be managed to match supply, it might be possible to prevent damaging excessive price rises.

A separate initiative by the Commodity Producers Association is also underway to counter various anomalies relating to the use of the US dollar as the prime currency for oil transactions.

Agriculture's fuel dependency

A paper by Tony Boys at <http://www.net-ibaraki.ne.jp/aboys/pfe/dprkfc.htm> gives a chilling account of what happened in North Korea when the inputs to modern industrial agriculture, including fuel, became unavailable. Twenty-two million people starved and three million died. The conclusions are reproduced below:

The experience of the DPRK [North Korea], and perhaps Cuba, points to several closely interlinked lessons that need to be learned by countries which currently operate a modern industrialized agricultural system based on commercial chemical and energy inputs. Agriculture has now become simply one adjunct of the overall economic-industrial matrix of the human global social-economic entity. This matrix is a highly complex web of financial and industrial relationships backed up by fairly precisely timed operations, such as transport of raw materials, fuel, components, and so on. Adjuncts to the matrix are therefore sensitive to disruptions and other irregularities. Thus the modern agricultural system can very quickly get into deep trouble if we do not have the ability to:

*fuel, maintain, repair, and replace agricultural and distribution-related machinery and infrastructure (trucks, tractors, transplanters, harvesters, irrigation pumps, fuel and chemical delivery systems, and so on)

*fuel, maintain, repair, and replace factories and factory equipment for the manufacture of agricultural machinery and inputs, e.g. regularly replaced items such as spark plugs and filters, spare parts, fertilizers, herbicides, pesticides, plastic sheeting and so on.

*ensure steady supplies of fuel, raw materials, and feedstocks for agricultural operations and inputs, such as petroleum, natural gas, coal, potassium and phosphorus minerals, and so on.

Again, the final answer is to convert to low-input, yet land and labor intensive, organic farming. Crucially, this would require perhaps a ten to twenty year transition period; something the DPRK has not had the luxury of.

As a final general statement, it can be said that once a country takes the decision to abandon traditional agriculture and switch to a modern agricultural system (a mechanized system making use of commercial chemicals and fuels), then in order to maintain food production levels it is essential to ensure that levels of fuel and other inputs are maintained, and that machinery and equipment is kept in good working order. Shortages of fossil resources (oil, natural gas and coal) can result in productivity collapses when soils are mined, and eventually destroyed, due to crop production without replacement of essential nutrients, and where agricultural machinery and equipment can no longer be kept operational because of lack of fuel and maintenance.

A transition to organic and/or traditional and sustainable forms of agriculture is not easily carried out in a short period of time (for instance due to lack of livestock and lack of sufficient numbers of farmers with the requisite knowledge and skills). Meanwhile the population must be fed; a population that has ballooned on food produced by the modern industrial agricultural system that has been built up thanks to fossil resources (39). This is now the paradoxical complex of problems faced by almost all of the world, including the great food-producing areas of North America, Europe, South America and Oceania; how to maintain high agricultural productivity with decreasing amounts of the central element that has made that productivity possible, oil. The end of cheap and abundant oil and other fossil resources means the end of our current methods of food production and thus it possibly spells the end of advanced industrial society as we know it. The DPRK is an exceptional case only in that due to political miscalculation and mismanagement of its economy it has manifested these symptoms before fossil resource shortage becomes a serious concern for most of the world.

Future Plans

The ASPO-ODAC initiative has been underway for no more than six months, but there is reason to be pleased with progress so far. So far, we have been content to work as an informal network, but we should now consider moving towards a formal meeting or conference to exchange ideas on future policy. Representatives from Portugal and Sweden have joined recently, and we look forward to further expansion as present links with Denmark, Austria and Italy become formalised. For the present, we limit membership to European countries, but naturally welcome cooperation with other areas.

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