

**THE ASSOCIATION
FOR THE STUDY OF PEAK OIL
“ASPO”**

NEWSLETTER No 19 – JULY 2002

ASPO is a network of scientists, affiliated with European institutions and universities, having an interest in determining the date and impact of the peak and decline of the world's production of oil and gas, due to resource constraints.

It presently has members in: Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Sweden and the United Kingdom.

Mission:

- 1. To evaluate the world's endowment of oil and gas;***
- 2. To model depletion, taking due account of economics, technology and politics;***
- 3. To raise awareness of the serious consequences for Mankind.***

Newsletters on Websites

This newsletter and past issues can be seen on the LBSYSTEMSTECHNIK website <http://www.energiekrise.de>
(Press the ASPONews icon at the top of the page) and the ASPO website www.isv.uu.se/iwood2002

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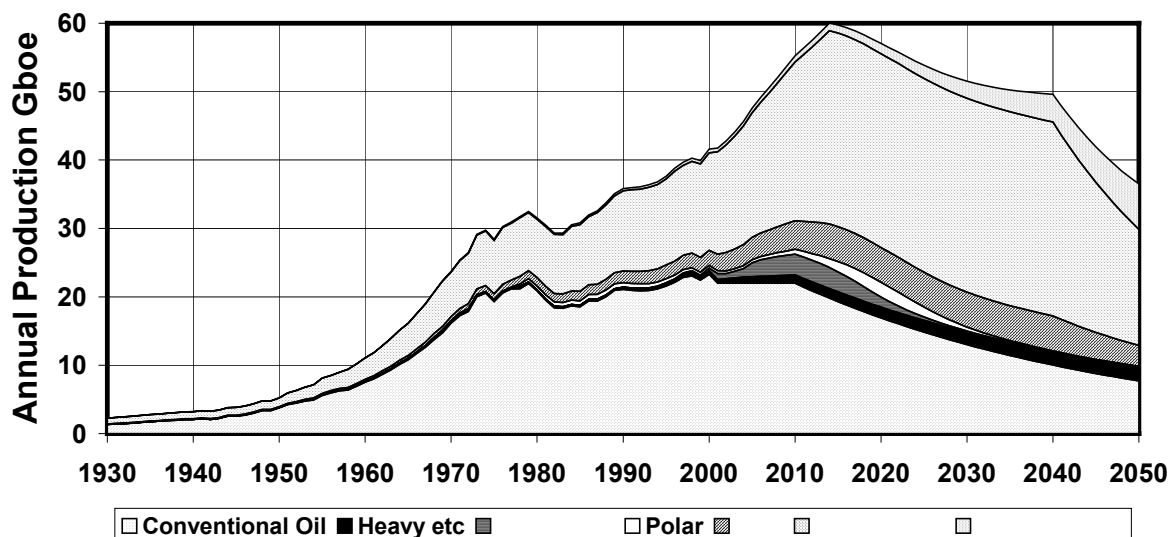
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Frontispiece – the general depletion picture
(Gas taken at a calorific equivalence of 6 Tcf = 1 Gboe)

ALL HYDROCARBONS

2002 Base Case Scenario

Gas at calorific equivalence



ESTIMATED CONVENTIONAL OIL PRODUCTION TO 2075			
Past	Future		Total
	Known Fields	New Fields	
873	884	143	1900

In billion barrels (Gb), including condensate from oilfields. Status end 2001

PRODUCTION RATE FORECAST Mb/d				
	2005	2010	2025	2050
Conventional Oil	60	60	41	21
Heavy , bitumen etc	2.8	4	5	6
Deepwater	5.6	8	2	0
Polar	1.2	2	4	0
Natural Gas Liquids	9.0	11	14	8

Base Case Scenario of flat demand for Conventional Oil to 2010

71. Oil and Gas Equivalence

The above Frontispiece has been changed to show gas at the calorific equivalent of oil (6 Tcf =1 Gboe). The earlier version at 10:1 was perhaps a better pragmatic equivalent reflecting the much greater cost of gas transport and the fact that it is a regional not a global market with a very different depletion profile. It is not clear which is the preferred solution. The uncertainty highlights the extremely unsatisfactory measurement standards that characterise the whole subject. Oil and gas have very different uses: so the concept of equivalence has limited value.

72. Country Assessment Series - Colombia

Continuing the series started last month, we take a look at Colombia. It is intended that the series will stimulate an interest in tracking down more data and insight so that the assessments can be improved and assembled into a useful compendium. Depletion is modelled on the basis of the current depletion rate (annual production as a percentage of estimated future production).

COLOMBIA

Colombia, covering more than a million square kilometers on the northwest corner of South America, is cut by three ranges of the Andes, which are flanked to the southeast by extensive plains in the headwaters of the Amazon and Orinoco rivers. Its coasts are washed by the Caribbean and the Pacific, separated by the narrow isthmus of Panama.

One of the chieftains of the ancient Colombian Chibcha civilisation had the habit of covering his body in gold-dust before bathing in Lake Guatavita in which emeralds and other precious stones were thrown to placate the gods. *El Dorado*, as he was known, stimulated the interest of the Spanish Conquistadores in the wake of Columbus, who reached the northern coast on his last voyage in 1502.

In a remarkable short span of fifty years, the Spaniards had established themselves throughout the country, building towns and monasteries high in the Andes. By 1739, Bogota had been established as the Vice-Royalty of Nueva Granada, holding dominion over what is now Venezuela, Ecuador and much of Central America, south of Mexico. But in 1819, Simon Bolivar, the great "Liberator" of South America, defeated the Spanish royalists, bringing independence to the region, which later fragmented into separate republics. Cornelius O'Leary, a mercenary Irish soldier from Cork, wrote the national anthem for the new republic. The last territorial adjustment came in 1903, when the United States engineered the secession of Panama after Colombia had refused consent for the construction of the Panama Canal. The United States tried to make amends in 1914 by paying an indemnity of 25 million dollars.

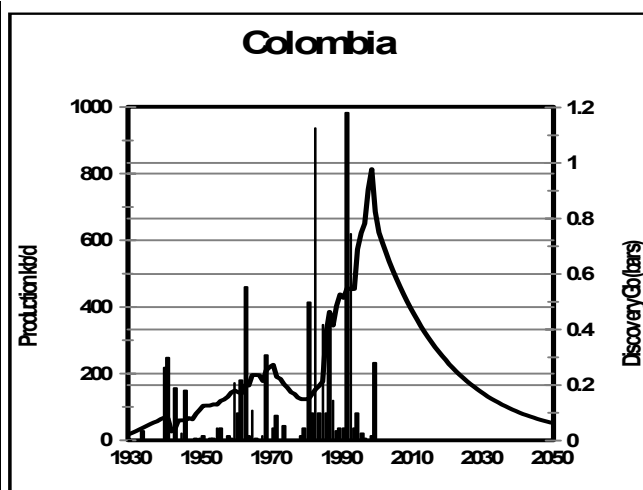
Independence brought the eternal conflict between federalism and centralism, exacerbated by physical mountain barriers and the fact that the several regions had been settled by immigrants from different parts of Spain. It sowed the seeds of the violence, often degenerating into banditry, that has been endemic for two centuries before the narcotics drug trade brought it to its current extreme level. Large tracts of the country are now under the control of war lords, importing arms by air to support private armies, while surprisingly also sponsoring certain social programmes in their regions. The coca leaf has been grown since pre-Conquest days, without posing any particular problem, but that changed when cocaine became a commodity of global trade.

Colombia's population has more than doubled over the past thirty years to exceed 50 million. It is of mixed European, Indian and Negro origins, with little sign of racial discord. A few indigenous Indian communities survive in remote areas but probably face extinction or integration. The violent political situation has driven people to the cities, especially Bogotá, the capital, where more than 10 million live, many in desperate conditions. Their untreated effluent now flows over the once beautiful Tequendama Falls, putting up a bacteriological fog. But despite every adversity, the Colombians retain their vitality, courage and good humour.

Colombia has had a long oil history, starting in 1905 when General Virgilio Barco secured rights to the Colombian extension of the Maracaibo Basin, and Roberto de Mares took a concession in the Middle Magdalena valley. These two areas dominated Colombian oil production for many years, with the rights eventually passing to subsidiaries of Esso, Mobil and Texaco, before the creation of the State oil company, Ecopetrol in 1951. Further discoveries were made in the vicinity by other foreign companies.

The prospects of the foothills of the Eastern Andes had been evident from the earliest surveys, being in part confirmed by oil seepages, but development was delayed by the exceedingly remote location and the fact that mountain ranges to over 2000m would have to be traversed by long export pipelines. However, Texaco and Gulf mounted a heroic campaign that was rewarded in 1962 by the discovery of the Orito field in the Amazon headwaters, close to the Ecuadorian border. An export pipeline across the Andes to the Pacific was eventually constructed. Next, Occidental brought in Cañon-Limon in 1983 at the northern end of the belt near the Venezuelan border, followed by BP and Total with Cusiana in 1988. These giant fields highlighted a second and last cycle of major oil discovery in Colombia. The geology of the country is well known, with exploration at a mature stage after the drilling of almost 1500 wildcats. Peak drilling was in 1988 with about 80 exploration wells, but activity has now fallen to about 15 a year. It is reasonable to extrapolate the trend, expecting exploration to end around 2025 after another 150 boreholes.

Colombia		
<i>Rates Mb/d</i>		
Consumption	2001	0.23
Production	2001	0.86
	Forecast 2010	0.39
	Forecast 2020	0.24
Discovery 5-year average (Gb)		0.07
<i>Amounts Gb</i>		
Past Production		5.54
Reported <i>Proved Reserves</i>		1.75
Estimated Future Production to 2075		
	From Known Fields	3.94
	From New Fields	0.53
	Future Total	4.46
Total Production to 2075		10.00
Current Depletion Rate		4.9%
Depletion Midpoint Date		1999
Peak Discovery Date		1992
Peak Production Date		1999



The source of Colombia's oil are a few hundred meters of Middle Cretaceous organic claystone. It was laid down about 90 million years ago in one of the World's prime epochs of oil generation, being also responsible for the finds in Mexico and the US Gulf Coast as well as the vast, partly degraded, deposits of Venezuela. In Colombia, it is confined to the eastern part of the country, meaning that other large sedimentary basins, especially along the Pacific Coast, which lack this essential source, are likely to remain barren, save perhaps for gas generated in the Tertiary. It follows that future discovery is likely to be confined to ever smaller finds in the established regions, with some upside possibility concealed by the complexity of the thrust belts and the difficult terrain. There is also perhaps a slim chance of some non-conventional deepwater discoveries on the delta front of the Magdalena River

Production, reflecting the two main discovery cycles, reached a peak of 816 kb/d in 1999 at the midpoint of depletion. A marked decline to 625 kb/d by 2001 gives a current depletion rate of just under 5% a year. Consumption stands at about 230 kb/d, less than 40% of production, meaning that the country is presently an important exporter, largely to the United States. This perhaps partly explains the latter's military intervention with the provision of helicopter gunships to patrol the pipelines from frequent dissident attacks. The widespread terrorism and drug trade provide an ample pretext for any further interventions to maintain the flow, although the success of such operations is far from assured in view of the mountainous terrain. In any event, falling production from natural depletion means that Colombia's export potential is set to decline, so that production will fall below domestic demand by 2020, or sooner, if consumption should increase above present levels.

Colombia may be among the first countries to enter post-globalism, with the reduction of central government and the emergence of small sustainable communities and local markets under a federal political structure. In its case, the transition is due not so much to the decline of essential fuel supply as a result of oil depletion, but to the impact of the international narcotics trade which gives it a particularly violent character. In energy terms, Colombia is in fact well blessed, with many years of, albeit declining, oil supply, which could be conserved for national needs, and a good renewable energy potential from hydroelectric and solar power. It is also endowed with substantial coal deposits. Left to itself, it would be well placed to find a way forward, but foreign demands for its cocaine and oil, as well as near term risks of US military intervention, place obstacles in the path to an otherwise sustainable future.

73. What is ASPO?

ASPO evolved as an informal network without particular structure until the Workshop in Uppsala in May 2002 gave it a new substance, prompting thoughts as to how best to define the organisation. Possibly the good formula is to consider ASPO as an association of individuals who are affiliated with prestigious European universities and institutions. As individuals, the members are free to think, speak and act as they feel appropriate, not being constrained by political interference or vested interest, yet their affiliations bring credibility to their joint and several endeavours.

The individual members have now elected an *ad hoc* committee to manage their common interests. It may be that the organisation will successfully facilitate the raising of funds for research, seminars or other activities. If so, such will be the responsibility of the institutions concerned under whatever terms and budgets they may agree, while at the same time recognising that what is done is done under the general auspices of ASPO. The institutions with whom the members of ASPO are affiliated are naturally entirely free to take more active roles in supporting the objectives of ASPO, but they would do so in their own capacity without any sense of responsibility or obligation to, or for, ASPO as such.

As the organisation grows with new members, and as its voice is heard more strongly, it may be possible to establish a small secretariat to give a presence and point of contact, especially with the media and government. This would depend on generous philanthropic sponsorship, and would itself have a life of its own, while serving the common interests of the ASPO members.

74. Another BBC Broadcast on Depletion

BBC Radio 4 ran a programme called Crude Facts on 19th June at 9:00 pm in which they interviewed Randy Udall, Steve Andrews, Lovins, Nehring and Colin Campbell as well as someone from Greenpeace who claimed that oil was destroying the climate. Udall, Andrews and Campbell drew attention to peak and decline from supply constraints; Nehring, whose earlier work was very good, seemed to extol the exaggerated claims of the USGS, with a great faith in non-conventional oils; and Lovins saw a technological solution in terms of using hydrogen and bio-mass for petrochemicals, and in more efficient vehicles. Overall, the programme was sound and the journalistic “balance”, that all programmes demand, did not seriously detract from the stress given to the very serious implications of oil depletion.

75. Flat Earth Fiestas

The flat earth community continues to have their fiestas, with a workshop in Florence and a meeting of the International Association of Energy Economists in Aberdeen. There are three questions that they resolutely decline to address:

What was found ? (heavy oil, tar, conventional etc)

How Much was found ?

When was it found ?

Predictions that fail to recognise the record of the past lack credibility.

76. Middle East Reserves Revised Down

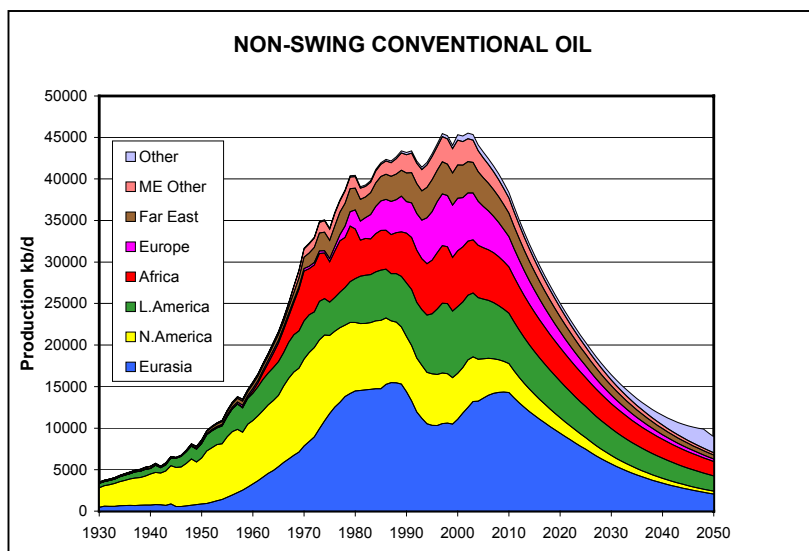
An article in the *Oil & Gas Journal* of May 17th indicates that Middle East reserves have to be revised down, as we have long suspected. The quoted revisions are given in the following table. It mentions that the Saudi government has “mandated” that reserves shall not decline, which evidently may apply more to the reporting than to what is in the reservoir. The ASPO estimate refers to what will be produced from known fields to 2075, a subtle distinction, but one that helps overcome reporting and definitional confusions.

<i>end 2001(Gb)</i>		O&GJ Reported Proved Reserves		ASPO
Country	Past Prod	31.12.01	Revised	
Abu Dhabi	17	92.2	61	59
Iran	53	89.7	69	70
Iraq	27	112.5	91	95
Kuwait	30	94	86	55
Saudi Arabia	91	259.3	160	194

77. *The Twin Humps of Eurasia*

Russia seems to be acquiring a key role in world depletion, especially if the Middle East itself is constrained by low investment or invasion, recognising also that it has to run ever faster to stand still in its desperate efforts to offset the natural decline of its ageing fields. It has a concentrated geological habitat with most of its oil in a few very large fields, found long ago, leaving much less potential for future discovery.

The Soviet regime was probably quite efficient in exploration. It was able to drill boreholes for scientific information, whereas the Western explorers had to pretend that every wildcat had a good chance of being successful in order to attract the funds to drill it.



Russian geochemists were indeed at the forefront of the research that led to the critical understanding of source-rocks. Accordingly, we may assume that they found the main producing basins and many of the giant fields within them, apart perhaps from those in remote Arctic areas, which are here treated as *Non-Conventional*. Production was probably a very different matter being

governed by central planning, which at times both over-produced the reservoirs, and at others failed to realise their full potential. In any event, the fall of the Communists led to an abrupt decline in production which is now being reversed as the situation returns to normal, leading to a second peak around 2010, partly producing what would have already been produced but for the interruption.

Eurasia, as here defined, comprises the former Communist bloc of the Soviet Union, China and eastern Europe. Its twin-humped depletion profile has a large impact on the Non-Swing production as a whole, namely that outside the five main Middle East producers. As modelled, the region as a whole reaches a flat-topped peak from 1997 to 2002 at about 45 Mb/d, and is now set to decline at between 3% and 4% a year. The overall depletion profile is a fair approximation of a classic Hubbert curve. The relatively short span of flush production from Europe, mainly the North Sea, is noteworthy.

78. *Rail Systems under Threat*

Mr Hellams reports that the US Amtrak railroad system is close to collapse, no doubt being found unprofitable under flat-earth economics. Railways are a relatively sustainable form of transport, being able to draw on a wide range of fuels, as oil depletes. They are certainly less vulnerable than the airline business, which for some strange reason is subsidized with tax-free fuel. Road users are also effectively subsidized for incremental use except were toll systems are in operation.

The new right wing government of France has also announced that it may privatise its highly efficient rail system, which should be the envy of the world. If so, it may face the same disastrous experience as Britain, where rail safety, comfort and punctuality have deteriorated,

radically following privatization. The government has now been forced to create a non-profit company to run the network, which is tantamount to re-nationalisation.

79. BP improves its Statistical Review of World Energy

The ASPO Statistical Review of World Oil & Gas pointed out two very misleading items in the BP Review.

- A plot of historical reported reserves, which, by failing to backdate revisions to their discovery, gave the impression that more was being found than was the case.
- A plot showing Reserve to Production Ratio quoted in years, as if it were remotely plausible for production to remain constant for a given number of years and then stop dead overnight.

It is gratifying to find, therefore, that BP has now decided to remove, without comment, the first of the offending items in its latest edition, published in June 2002. Let us hope that the second will go in the next edition, so that this widely used publication will begin to provide a valid picture of the actual situation.

80. New ASPO Members

We are delighted to welcome two new members to ASPO:

Dr Alberto Di Fazio of the National Institute of Astrophysics, Italy; and

Dr Ipo Ritsema of the Netherlands Geological Survey

Accordingly, ASPO is now represented by members in key scientific and government institutions in Austria, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Sweden, and the United Kingdom.

81. Second International Workshop on Oil Depletion

A second international workshop on oil and gas depletion is being organised for May 2003 in Paris. Initial generous sponsorship to make this possible has been secured, but more support is required. It is tentatively planned to concentrate on gas, gas liquids and non-conventional oils. Details will be announced as the programme takes shape.

82. "Oil Change" - a New Book on Oil Depletion and its Consequences

A new book is to be published in German by Deutsche Taschenbuch Verlag under the auspices of ASPO and the Global Challenges Network, and will be launched in Munich in September. It covers oil and gas depletion, addressing also the consequences and possible solutions.

Ölwechsel!

by

Colin Campbell, Frauke Liesenborghs, Jörg Schindler and Werner Zittel
(assisted by Helga Roth, translator)

The Newsletter very much welcomes contributions from ASPO members and other readers, who may wish to draw attention to items of interest or the progress of their own research.

Compiled by C.J.Campbell, Staball Hill, Ballydehob, Co. Cork, Ireland