

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

NEWSLETTER No 26 – FEBRUARY 2003

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, Denmark, 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 following websites:

<http://www.asponews.org>

<http://www.energiekrise.de> (Press the ASPONews icon at the top of the page)

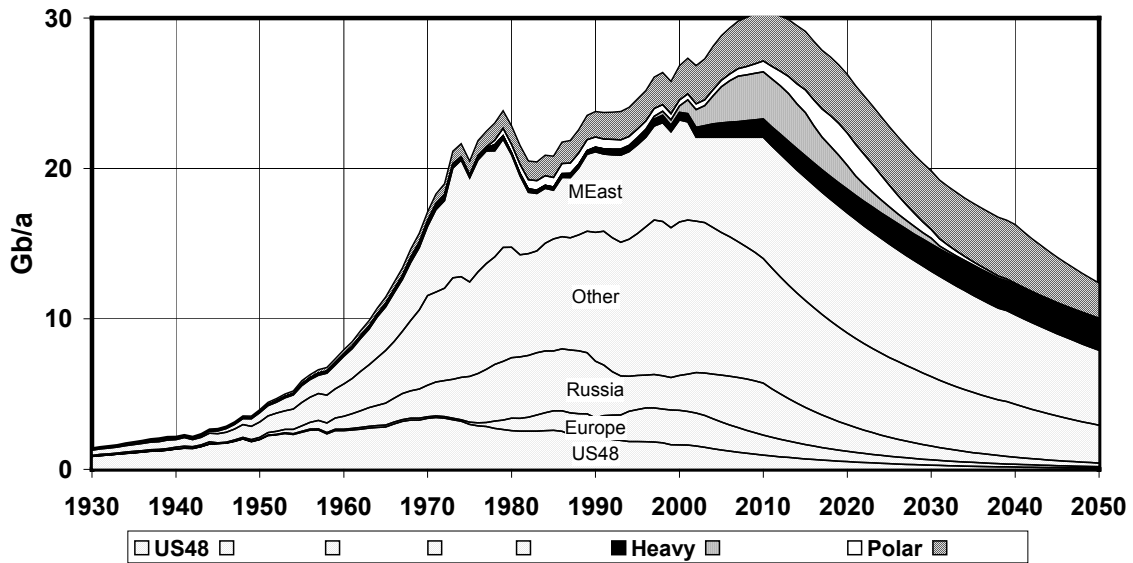
www.isv.uu.se/iwood2002

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The Newsletter's e-mail address is aspoone@eircom.net

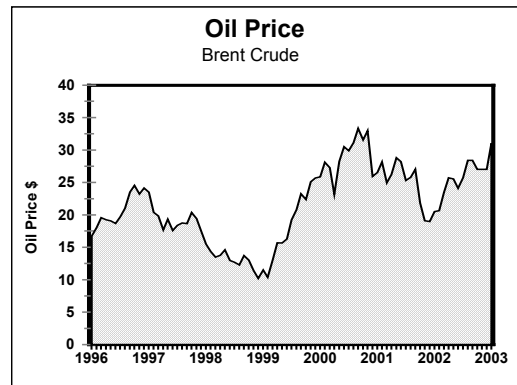
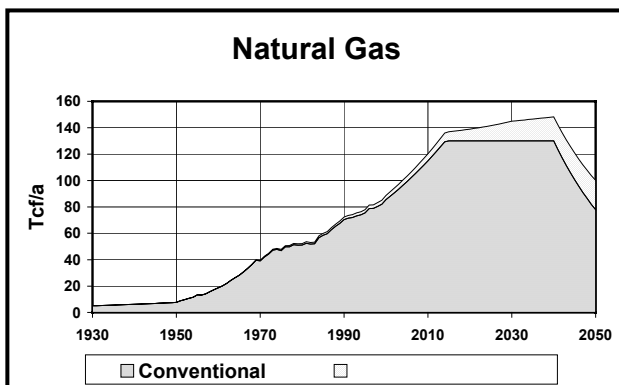
The General Depletion Picture Oil & Natural Gas Liquids 2003 Base Case Scenario



| ESTIMATED REGULAR OIL PRODUCED TO 2075 | | | |
|--|------------|------------|-------------|
| Past | Future | | Total |
| Known Fields | | New Fields | |
| 880 | 871 | 149 | 1900 |
| ALL LIQUIDS | | | |
| 986 | 1714 | | 2700 |
| In billion barrels (Gb) <i>Status end 2002</i> | | | |

| | PRODUCTION RATE FORECAST Mb/d | | | | <i>Status: end 2002</i> |
|---------------------|--------------------------------------|-----------|-----------|-----------|-------------------------|
| | 2005 | 2010 | 2020 | 2050 | Total to 2075 |
| Regular Oil | 60 | 60 | 47 | 22 | 1900 |
| US-48 | 3.5 | 2.6 | 1.4 | 0.2 | 195 |
| Europe | 5.1 | 3.6 | 1.9 | 0.3 | 76 |
| Russia | 8.4 | 9.2 | 4.8 | 0.7 | 200 |
| M.East Gulf | 17 | 22 | 22 | 14 | 749 |
| Other | 26 | 23 | 17 | 7 | 680 |
| Heavy, bitumen etc | 2.8 | 4 | 5 | 6 | 300 |
| Deepwater (>500m) | 6.6 | 9 | 4 | 0 | 63 |
| Polar | 1.2 | 2 | 6 | 0 | 30 |
| Natural Gas Liquids | 8.2 | 9 | 11 | 6 | 400 |
| Total | 78 | 83 | 72 | 33 | 2700 |

Base Case Scenario: flat demand for conventional oil due to recession; M.East swing role ending in 2010
Regular Oil includes *Condensate* but not liquids produced from gasfields by processing – *PNGL*



136 ASPO Meeting in Paris

The Organising Committee are pleased to confirm that the Second International Workshop on Oil Depletion will be held in Paris on 26th and 27th May 2003. The Institut Francais du Pétrole has kindly made available a conference hall at Rueil Malmaison on the western outskirts of Paris. The famous Palace of Versailles lies about 10 kms to the south. According to the Michelin Guide, there are many hotels in the vicinity, including (with approximate price):

| | | | |
|-------------|--------------------|----------|---------------------------------|
| Bougival - | Hotel Marechaux | 48 rooms | Euro 90 (sounds charming) |
| Puteaux - | Princesse Isabelle | 29 | Euro 120 |
| St Cloud - | Villa Henri IV | 36 | Euro 75 |
| Malmaison - | Novotel Atria | 118 | Euro 125 (sounds normal modern) |
| | Cardinal | 63 | Euro 100 |

Those looking for an imaginative travel agent, who works wonders with ticketing, could do worse than contact

Andry Sophocles at Travel 2001, London. tel: +44207 431 2525
e-address : mail@2001travelandbeyond.com

Participation will be limited to 300, the capacity of the conference hall. It is open to all interested people but a registration fee of Euro 100 will be charged to help defray some of the costs. Those wishing to confirm attendance may do so to aspoone@eircom.net, but formal registration will be on arrival at the Workshop. A programme of talks by key speakers is being arranged to cover not only depletion itself but its social, political and economic consequences. The details will be announced later.

137. Depletion Model Update

The ASPO depletion model has been updated to take into account the 2002 reserve and production data published by the *Oil & Gas Journal*. It is a huge and difficult job to try to resolve the many inconsistencies. The Summary Sheet and the Production Forecast on the ensuing pages give the current assessment, but are no more than a working hypothesis, subject to continuing evolution. The following comments explain the approach followed.

1. Each producing country is analysed independently and then compiled into eight regions, which in turn are summed to give a world total. The five Middle East major producing countries are treated as “swing producers” to 2010, making up the difference between world demand and what the others can produce under the model.
2. The term “*Regular*” oil is introduced in place of “*Conventional*” to avoid the confusion from widely differing definitions of that term. *Regular* refers to crude oil and condensate, excluding oil derived from coal, shale, bitumen; Extra Heavy (<10°API) and Heavy oils (<17.5° API); deepwater (>500m WD) and polar oil; and natural gas liquids from extraction plants (PNGL). The model relates to production to an arbitrary cutoff in the year 2075, estimating Past Production (*Cumulative Production*); Future Production from Known Fields (*Reserves*); Future Production from New Fields (*Yet-to-Find*); and Total (*Ultimate*). Use of the term *Reserves* is avoided as much as possible because of the confusing definitions. (*Proved Reserves* as reported for financial purposes are taken to mean “Proved-So-Far” by current wells or development plans. *Proved & Probable (or Mean Probability) Reserves* are taken to mean the best technical estimate of what remains to produce from the reference date. A cut-off of 2075 is applied to avoid having to worry about tail-end production, which is largely irrelevant to the estimation of peak, the main objective of the exercise. Numerical subjective probability assessments are not found helpful.
3. Future Production from Known Fields (*Reserves*) are based on the *Reported Proved Reserves* as published by the *Oil & Gas Journal*, but are adjusted to remove any identified *Non-Regular* oil and the cumulative production of any implausible period of unchanged reports. The *Percentage Reported* is then assessed to yield an estimate of Future Production from Known Fields.
4. The 2002 Base Case Scenario assumes that the production of *Regular* oil is on average flat to 2010, due to recession and recurring price spikes, with the five Middle East producers making up the difference between world demand and what the other countries can produce within their modelled depletion profiles.
5. Each country is modelled on the basis of a simple Depletion Rate (annual production as a percentage of Future Production). Production in countries past depletion midpoint is assumed to decline at the current depletion rate, which probably well reflects the actual situation in the country concerned. Production to midpoint in pre-Midpoint countries is modelled in relation to specific circumstances, being deemed flat unless otherwise indicated. Deepwater oil is assumed to be produced without constraint other than operational equipment limitations. The model gives a peak of 8.9 Mb/d in 2012, from a total production of 63 Gb. Polar oil is attributed mainly to the Siberian Arctic, in part meeting the high reserve estimates

claimed by Russia, but is uncertain. It is modelled to reach a peak of 6 Mb/d by 2020. The one certainty is that all the estimates are wrong: the challenge being to determine by how much. The tables, originating in Quattro Pro, are reproduced with some formatting loss below

138 Flat Earth Minister Discredited

Bjorn Lomborg, the Danish Minister, who has dismissed environment concerns and oil depletion in his widely publicised book *The Sceptical Environmentalist*, has been subject to investigation by his country's Committee on Scientific Dishonesty. It has cleared him of the more serious charge of misleading readers deliberately or through gross negligence, but nevertheless finds the book to be "*clearly contrary to the standards of good scientific practice*". Probably, the poor man was misled by the appalling quality of public data on oil reserves, which calls for the services of a detective more than a scientist, but he apparently remains unrepentant for his misdemeanour.

139. Relationship of Economics, Energy Supply, Climate Change and War

Professor Rui Rosa, an ASPO member in Portugal, has published an important wide-ranging paper on the above topics *Predicaments of an Economy Running Short of Energy* for a seminar at Evora University.

140 Depletion Research at Uppsala University

The first International Workshop on Oil Depletion at Uppsala University in May 2002 opened up possibilities for Professor Kjell Aleklett to discuss and debate the oil depletion issue on Swedish Television and Radio, and in the press. As a result, several magazines carried articles about the work of ASPO and oil depletion in general. This focused the attention of Swedish Energy Agency onto the critical implications of oil and gas depletion on government policy. As a result, the Agency decided to sponsor a new research project that Professor Aleklett will run together with Colin Campbell, who has been appointed as a Visiting Scientist at Uppsala University. The project also has support from Lundin Petroleum, which is sponsoring a Ph.D. student, Fredrik Robelius. Another student, Anders Sivertsson, has also just started his diploma work with the group.

The Uppsala Hydrocarbon Depletion Group has already received international recognition when Professor Aleklett was invited to give a talk at the Geneva Petroleum Club in January 2003. A new website for the group has been opened at www.isv.uu.se/uhdg. The ASPO Newsletters are also now being placed in www.asponews.org by the Meta Foundation in Canada.

141. New Anti-War manifestations

The television screens have been full of scenes of anti-war demonstration throughout the world, including the United States. Many of the protestors' banners depict it as an "oil war". A human shield is on the march to Baghdad to deter the attackers. Even the Pope has roundly condemned it, speaking of "economic" motives. A thousand protestors in Ireland, which has had its fair share of terrorism funded by foreign sympathisers, marched on Shannon Airport, complaining that it was being used for troop movements, offending the country's neutral status. The democratic process, to the extent that it depicts government as representing the people, seems to be under increasing stress. Britain's support for the war is attracting predictable hostile reactions that have led to the tragic death of a policeman. Meanwhile, UN inspectors continue their search for offensive weapons in Iraq, finding eleven empty shell cases.

142. Blueprint for the Clean, Sustainable Energy Age

An impressive book (ISBN 3-909087-08-6) with the above title, containing the proceedings of the Clean Energy 2000 Conference, has been published by Verlag Eco-Performance (www.eco-performance.ch) for the World Sustainable Energy Coalition (CMDC-WSEC) of Geneva. The organisation, led by Gustav Grob, is co-ordinating the efforts of many entities in the United Nations, governments and NGOs to raise awareness of the central issues of resource depletion, pollution and climate change that face mankind. The book brings together a valuable collection of papers explaining the work being done by many different experts

| World | | | | | | | | | | | | | | REGULAR OIL PRODUCTION TO 2075 | | | | 2002 | |
|---------------------------|--------------|-------------|------------|------------|-------------------|-------------|-----------------|-------------|------------|-------------|------------|---------------------------|-------------|---|-------------|-------------|-------------|------|--|
| Unit:Gb (billion barrels) | | | | | | | | | | | | | | Excluding: (1) oil from coal, shale, bitumen, (2) heavy, deepwater & polar oil, (3) plant NGL | | | | | |
| Country | KNOWN FIELDS | | | | | | | | | | NEW FIELDS | FUTURE Known & New Fields | TOTAL | Revised 9-Jan-03 | | | | | |
| | Present | | Past | | Reported Reserves | | | Future | Total | % Disc | | | | Dep. Rate | MP Dep | Peak Prod | | | |
| | kb/d 2002 | Gb/a 2002 | Total | 5yr Trend | World Oil | O&GJ | Adjust % Rept'd | | | | | | | | | | | | |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | | |
| 1 Saudi Arabia | 7380 | 2.69 | 94.4 | -2% | 259.3 | 259.3 | 0.0 | 135% | 192.0 | 286 | 13.6 | 206 | 300 | 95% | 1.3% | 2020 | 2013 | | |
| 2 Russia | 7385 | 2.70 | 121 | 4% | 53.9 | 60.0 | 0.0 | 95% | 63.2 | 185 | 15.4 | 79 | 200 | 92% | 3.1% | 1992 | 1987 | | |
| 3 US-48 | 4239 | 1.55 | 171 | -2% | 21.3 | 22.4 | -9.0 | 65% | 20.7 | 191 | 3.7 | 24 | 195 | 98% | 6.0% | 1971 | 1971 | | |
| 4 Iraq | 2030 | 0.74 | 27.4 | -1% | 115.0 | 112.5 | -4.2 | 120% | 90.2 | 118 | 17.4 | 108 | 135 | 87% | 0.7% | 2032 | 2019 | | |
| 5 Iran | 3450 | 1.26 | 54.4 | -1% | 99.1 | 89.7 | -5.2 | 125% | 67.6 | 122 | 8.1 | 76 | 130 | 94% | 1.6% | 2010 | 1974 | | |
| 6 Venezuela | 2415 | 0.88 | 46.4 | -2% | 50.2 | 77.8 | -30.0 | 110% | 43.5 | 90 | 5.1 | 49 | 95 | 95% | 1.8% | 2003 | 1970 | | |
| 7 Kuwait | 1600 | 0.58 | 30.8 | -2% | 96.5 | 94.0 | -6.7 | 165% | 52.9 | 84 | 6.3 | 59 | 90 | 93% | 1.0% | 2022 | 1971 | | |
| 8 Abu Dhabi | 1690 | 0.62 | 18.0 | -2% | 61.9 | 92.2 | -8.1 | 150% | 56.1 | 74 | 3.9 | 60 | 78 | 95% | 1.0% | 2028 | 2014 | | |
| 9 China | 3400 | 1.24 | 27.3 | 1% | 29.5 | 18.3 | 0.0 | 70% | 26.1 | 53 | 3.6 | 30 | 57 | 94% | 3.9% | 2002 | 2002 | | |
| 10 Libya | 1300 | 0.47 | 22.9 | -1% | 30.0 | 29.5 | -1.5 | 97% | 28.9 | 52 | 3.2 | 32 | 55 | 94% | 1.5% | 2011 | 1970 | | |
| 11 Nigeria | 1930 | 0.70 | 22.4 | -2% | 30.0 | 24.0 | -7.5 | 55% | 30.0 | 52 | 2.6 | 33 | 55 | 95% | 2.1% | 2009 | 1979 | | |
| 12 Mexico | 3180 | 1.16 | 30.0 | 1% | 23.1 | 12.6 | 0.0 | 60% | 21.0 | 51 | 4.0 | 25 | 55 | 93% | 4.4% | 2000 | 2002 | | |
| 13 Kazakhstan | 800 | 0.29 | 5.7 | 11% | - | 9.0 | 0.0 | 30% | 30.0 | 36 | 4.3 | 34 | 40 | 89% | 0.7% | 2028 | 2028 | | |
| 14 Norway | 3150 | 1.15 | 16.3 | 1% | 10.3 | 10.3 | 0.0 | 70% | 14.7 | 31 | 2.0 | 17 | 33 | 94% | 6.4% | 2003 | 2001 | | |
| 15 UK | 2250 | 0.82 | 19.6 | -2% | 4.6 | 4.7 | 0.0 | 45% | 10.5 | 30 | 1.9 | 12 | 32 | 94% | 6.2% | 1998 | 1999 | | |
| 16 Indonesia | 1120 | 0.41 | 19.8 | -3% | 9.2 | 5.0 | -0.4 | 50% | 9.2 | 29 | 2.0 | 11 | 31 | 94% | 3.5% | 1993 | 1977 | | |
| 17 Algeria | 850 | 0.31 | 12.1 | 1% | 17.0 | 9.2 | -3.2 | 50% | 12.0 | 24 | 3.9 | 16 | 28 | 86% | 1.9% | 2008 | 1978 | | |
| 18 Canada | 1028 | 0.38 | 18.7 | -2% | 5.6 | 180.0 | -174.8 | 100% | 5.2 | 24 | 1.1 | 6 | 25 | 96% | 5.6% | 1986 | 1973 | | |
| 19 Azerbaijan | 300 | 0.11 | 8.01 | 6% | - | 7.0 | 0.0 | 55% | 12.7 | 21 | 2.3 | 15 | 23 | 90% | 0.7% | 2014 | 2014 | | |
| 20 N.Zone | 535 | 0.20 | 6.63 | -1% | 4.7 | 5.0 | -2.0 | 55% | 5.51 | 12 | 3.4 | 9 | 16 | 78% | 2.2% | 2008 | 2004 | | |
| 21 Oman | 895 | 0.33 | 6.98 | -1% | 5.9 | 5.5 | -1.0 | 60% | 7.48 | 14 | 0.54 | 8 | 15 | 96% | 3.9% | 2003 | 2003 | | |
| 22 Qatar | 640 | 0.23 | 6.76 | 2% | 13.8 | 15.2 | -10.2 | 90% | 5.53 | 12 | 0.72 | 6 | 13 | 94% | 3.6% | 2001 | 2000 | | |
| 23 Egypt | 750 | 0.27 | 8.67 | -3% | 2.4 | 3.7 | 0.0 | 105% | 3.52 | 12 | 0.80 | 4 | 13 | 94% | 6.0% | 1995 | 1995 | | |
| 24 India | 663 | 0.24 | 5.58 | 0% | 3.8 | 5.4 | 0.0 | 105% | 5.11 | 11 | 1.31 | 6 | 12 | 89% | 3.6% | 2004 | 1997 | | |
| 25 Argentina | 750 | 0.27 | 8.26 | -2% | 2.9 | 2.9 | 0.0 | 90% | 3.20 | 11 | 0.54 | 4 | 12 | 96% | 6.8% | 1994 | 1998 | | |
| 26 Australia | 633 | 0.23 | 5.77 | 4% | 3.8 | 3.5 | -0.2 | 65% | 5.03 | 11 | 1.20 | 6 | 12 | 90% | 3.6% | 2003 | 2000 | | |
| 27 Malaysia | 760 | 0.28 | 5.31 | 1% | 4.5 | 3.0 | -0.3 | 70% | 3.89 | 9.2 | 0.80 | 5 | 10 | 92% | 5.6% | 2002 | 2002 | | |
| 28 Colombia | 583 | 0.21 | 5.74 | -5% | 1.9 | 1.8 | 0.0 | 50% | 3.68 | 9.4 | 0.57 | 4 | 10 | 94% | 4.8% | 1999 | 1999 | | |
| 29 Angola | 700 | 0.26 | 4.55 | -3% | 6.0 | 5.4 | -10.6 | -100% | 5.21 | 9.8 | 0.24 | 5 | 10 | 98% | 4.3% | 2004 | 1998 | | |
| 30 Ecuador | 398 | 0.15 | 3.29 | 1% | 2.6 | 4.6 | 0.0 | 105% | 4.41 | 7.7 | 0.80 | 5 | 8.50 | 91% | 2.7% | 2007 | 2004 | | |
| 31 Romania | 118 | 0.04 | 5.71 | -2% | 1.2 | 1.0 | 0.0 | 75% | 1.22 | 6.9 | 0.58 | 2 | 7.50 | 92% | 2.4% | 1973 | 1976 | | |
| 32 Brasil | 300 | 0.11 | 4.50 | -7% | 8.6 | 8.3 | -12.0 | -500% | 0.74 | 5.2 | 0.76 | 1 | 6.00 | 87% | 6.8% | 1991 | 1997 | | |
| 33 Syria | 490 | 0.18 | 3.78 | -2% | 2.3 | 2.5 | -1.8 | 40% | 1.73 | 5.5 | 0.48 | 2 | 6.00 | 92% | 7.5% | 1998 | 1995 | | |
| 34 Turkmenistan | 180 | 0.07 | 2.88 | 7% | - | 0.5 | -0.2 | 25% | 1.48 | 4.4 | 1.64 | 3 | 6.00 | 73% | 1.8% | 2003 | 1973 | | |
| 35 Dubai | 200 | 0.07 | 3.71 | -7% | 0.9 | 4.0 | -2.0 | 250% | 0.82 | 4.5 | 0.22 | 1 | 4.75 | 95% | 6.6% | 1990 | 1991 | | |
| 36 Brunei | 185 | 0.07 | 2.99 | 6% | 1.2 | 1.4 | -0.7 | 45% | 1.42 | 4.4 | 0.09 | 2 | 4.50 | 98% | 4.0% | 1989 | 1978 | | |
| 37 Trinidad | 127 | 0.05 | 3.20 | 1% | 0.7 | 0.7 | 0.0 | 60% | 1.12 | 4.3 | 0.19 | 1 | 4.50 | 96% | 3.4% | 1983 | 1978 | | |
| 38 Gabon | 294 | 0.11 | 2.86 | -3% | 2.4 | 2.5 | -0.6 | 125% | 1.53 | 4.4 | 0.11 | 2 | 4.50 | 98% | 6.1% | 1997 | 1996 | | |
| 39 Ukraine | 72.47 | 0.03 | 2.63 | -4% | - | 0.4 | 0.0 | 50% | 0.74 | 3.4 | 0.63 | 1 | 4.00 | 84% | 1.9% | 1984 | 1970 | | |
| 40 Peru | 90.88 | 0.03 | 2.33 | -4% | 0.9 | 0.3 | -0.6 | -30% | 1.03 | 3.4 | 0.39 | 1 | 3.75 | 90% | 2.3% | 1991 | 1983 | | |
| 41 Yemen | 350 | 0.13 | 1.62 | -1% | 2.4 | 4.0 | -1.3 | 200% | 1.37 | 3.0 | 0.52 | 2 | 3.50 | 85% | 6.4% | 2003 | 1999 | | |
| 42 Vietnam | 304 | 0.11 | 0.88 | 12% | 2.2 | 0.6 | -0.5 | 5% | 1.81 | 2.7 | 0.55 | 2 | 3.25 | 83% | 4.4% | 2009 | 2005 | | |
| 43 Denmark | 365 | 0.13 | 1.33 | 10% | 1.1 | 1.3 | 0.0 | 95% | 0.96 | 2.3 | 0.71 | 2 | 3.00 | 76% | 7.4% | 2003 | 2002 | | |
| 44 Uzbekistan | 150.2 | 0.05 | 1.00 | -2% | - | 0.6 | -0.2 | 30% | 1.43 | 2.4 | 0.57 | 2 | 3.00 | 81% | 2.5% | 2009 | 2009 | | |
| 45 Congo | 250 | 0.09 | 1.52 | 1% | 1.6 | 1.5 | -1.2 | 35% | 0.87 | 2.4 | 0.36 | 1.23 | 2.75 | 87% | 6.9% | 2000 | 2001 | | |
| 46 Germany | 71.7 | 0.03 | 1.93 | 5% | 0.3 | 0.3 | 0.0 | 95% | 0.36 | 2.3 | 0.11 | 0.47 | 2.40 | 95% | 5.2% | 1976 | 1966 | | |
| 47 Italy | 87 | 0.03 | 0.88 | -4% | 0.6 | 0.6 | 0.0 | 55% | 1.13 | 2.0 | 0.24 | 1.37 | 2.25 | 89% | 2.3% | 2010 | 1997 | | |
| 48 Tunisia | 71 | 0.03 | 1.20 | -2% | 0.5 | 0.3 | -0.1 | 30% | 0.66 | 1.9 | 0.34 | 1.00 | 2.20 | 84% | 2.5% | 1998 | 1981 | | |
| 49 Sudan | 210 | 0.08 | 0.24 | 445% | 0.7 | 0.6 | -0.1 | 40% | 1.22 | 1.5 | 0.55 | 1.76 | 2.00 | 73% | 4.2% | 2009 | 2005 | | |
| 50 Thailand | 130 | 0.05 | 0.42 | 15% | 0.6 | 0.6 | 0.0 | 70% | 0.83 | 1.3 | 0.24 | 1.08 | 1.50 | 84% | 4.2% | 2008 | 2005 | | |
| 51 Bahrain | 31.51 | 0.01 | 0.99 | -3% | - | 0.1 | 0.0 | 90% | 0.13 | 1.1 | 0.39 | 0.51 | 1.50 | 74% | 2.2% | 1985 | 1990 | | |
| 52 Cameroon | 69 | 0.03 | 1.03 | -9% | - | 0.4 | -0.7 | -100% | 0.26 | 1.3 | 0.05 | 0.32 | 1.35 | 96% | 7.4% | 1992 | 1986 | | |
| 53 Bolivia | 31.5 | 0.01 | 0.42 | 3% | 0.5 | 0.4 | 0.0 | 65% | 0.66 | 1.1 | 0.27 | 0.93 | 1.35 | 80% | 1.2% | 2016 | 2016 | | |
| 54 Netherlands | 42 | 0.02 | 0.82 | -5% | 0.1 | 0.1 | 0.0 | 40% | 0.27 | 1.1 | 0.16 | 0.43 | 1.25 | 87% | 3.5% | 1991 | 1989 | | |
| 55 Turkey | 47 | 0.02 | 0.83 | -5% | 0.3 | 0.3 | 0.0 | 130% | 0.23 | 1.1 | 0.14 | 0.37 | 1.20 | 88% | 4.4% | 1992 | 1991 | | |
| 56 Croatia | 21 | 0.01 | 0.48 | -6% | 0.1 | 0.1 | 0.0 | 20% | 0.34 | 0.8 | 0.18 | 0.52 | 1.00 | 82% | 1.5% | 2003 | 1988 | | |
| 57 Austria | 18.4 | 0.01 | 0.77 | -2% | 0.9 | 0.1 | 0.0 | 65% | 0.11 | 0.9 | 0.07 | 0.18 | 0.95 | 93% | 3.7% | 1971 | 1955 | | |
| 58 France | 26.2 | 0.01 | 0.72 | -5% | 0.1 | 0.1 | 0.0 | 90% | 0.16 | 0.9 | 0.06 | 0.23 | 0.95 | 94% | 4.1% | 1987 | 1988 | | |
| 59 Hungary | 21.7 | 0.01 | 0.67 | -3% | 0.1 | 0.1 | 0.0 | 70% | 0.15 | 0.8 | 0.13 | 0.28 | 0.95 | 86% | 3.0% | 1984 | 1982 | | |
| 60 Papua | 46 | 0.02 | 0.34 | -9% | - | 0.2 | 0.0 | 65% | 0.37 | 0.7 | 0.19 | 0.56 | 0.90 | 79% | 2.9% | 2008 | 1993 | | |
| 61 Pakistan | 60 | 0.02 | 0.46 | 2% | 0.3 | 0.3 | 0.0 | 100% | 0.31 | 0.8 | 0.55 | 0.44 | 0.90 | 86% | 4.7% | 1998 | 1992 | | |
| 62 Albania | 6.2 | 0.00 | 0.53 | -2% | 0.0 | 0.2 | 0.0 | 65% | 0.19 | 0.7 | 0.08 | 0.27 | 0.80 | 90% | 0.8% | 1986 | 1983 | | |
| 63 Sharjah | 44 | 0.02 | 0.47 | -7% | - | 1.5 | 0.0 | 900% | 0.16 | 0.6 | 0.16 | 0.33 | 0.80 | 80% | 4.7% | 1998 | 1998 | | |
| 64 Chile | 7 | 0.00 | 0.42 | -4% | 0.0 | 0.2 | 0.0 | 400% | 0.03 | 0.5 | 0.05 | 0.08 | 0.50 | 90% | 3.1% | 1979 | 1982 | | |
| REGIONS | | | | | | | | | | | | | | | | | | | |
| 1 ME Gulf | 15316 | 5.59 | 231 | -3% | 636.5 | 652.7 | -26.2 | 135% | 464 | 695 | 53 | 517 | 749 | 93% | 1.1% | 2021 | 2014 | | |
| 2 Eurasia | 12455 | 4.55 | 176 | 3% | 84.7 | 97.1 | -0.476 | 70% | 138 | 314 | 29 | 167 | 343 | 91% | 2.5% | 2000 | 1987 | | |
| 3 N.America | 5267 | 1.92 | 189 | -2% | 27.0 | 202.5 | -183.8 | 72% | 26 | 215 | 5 | 31 | 220 | 98% | 0.0% | 1973 | 1972 | | |
| 4 L.America | 7882 | 2.88 | 105 | -1% | 91.3 | 109.7 | -42.71 | 84% | 79 | 184 | 13 | 92 | 197 | 94% | 3.0% | 2000 | 1998 | | |
| 5 Africa | 6424 | 2.34 | 77 | -1% | 91.8 | 77.1 | -25.42 | 61% | 84 | 162 | 12 | 96 | 174 | 93% | 2.4% | 2006 | 1997 | | |
| 6 Europe | 6010 | 2.19 | 42 | 0% | 18.0 | 17.6 | -0.014 | 63% | 28 | 71 | 5 | 33 | 76 | 93% | 6.2% | 2000 | 2000 | | |
| 7 Far East | 3898 | 1.42 | 42 | 1% | 91.3 | 20.0 | -2.139 | 64% | 28 | 70 | 6 | 34 | 76 | 91% | 4.0% | 1999 | 2000 | | |
| 8 ME. Other | 2698 | 0.98 | 25 | -2% | 25.6 | 33.1 | -16.31 | 96% | 17 | 43 | 3 | 21 | 46 | 93% | 4.6% | 2000 | 1998 | | |
| 9 Other | 509 | 0.18 | 3 | 6% | - | 3.1 | 0 | 50% | 6 | 10 | 0 | 7 | 10 | 95% | 2.7% | 2011 | 1978 | | |
| 10 Unforeseen | | | | | | | | | | | | | | | | | | | |
| Non-Swing | 45143 | 16.5 | 665 | 0% | 364 | 560 | -270.9 | 0% | 407 | 1071 | 6 | 487 | 1152 | 93% | 3.3% | 1998 | 1997 | | |
| WORLD | 60460 | 22.1 | 896 | -1% | 1000 | 1213 | -297.1 | 105% | 871 | 1767 | 133 | 1004 | 1900 | 93% | 2.2% | 2004 | 2000 | | |

Note: ME Gulf = Abu Dhabi, Iran, Iraq, Kuwait, NZ, Saudi Arabia ; Eurasia = China & former communist bloc; N.America = Canada & USA; Other= small & future producers; "Unforeseen" = rounding item. Non-Swing = World less ME Gulf. Heavy = <17.5oAPI. Deepwater = >500m

| RESOURCE BASED PRODUCTION FORECAST | | | | | | | | | | | |
|------------------------------------|------|-------------------|------|------|------|--|--------------------|-----------|-----------|-----------|-----------|
| End 2002 | | Revised 18-Jan-03 | | | | | Base Case Scenario | | | | |
| Regular Oil by Country | | | | | | Regular Oil by Region | | | | | Mb/d |
| Mb/d | 2000 | 2005 | 2010 | 2020 | 2050 | 2000 | 2005 | 2010 | 2020 | 2050 | |
| Saudi Arabia | 8.00 | 6.61 | 8.98 | 8.96 | 6.57 | ME Gulf | 18.5 | 17.4 | 22.1 | 21.9 | 13.3 |
| Russia | 6.33 | 8.55 | 9.43 | 4.85 | 0.66 | Eurasia | 11.1 | 13.7 | 14.4 | 9.3 | 2.5 |
| US-48 | 4.45 | 3.53 | 2.59 | 1.40 | 0.22 | N.America | 5.5 | 4.4 | 3.2 | 1.8 | 0.3 |
| Iran | 3.68 | 3.99 | 4.73 | 3.61 | 1.61 | L.America | 8.0 | 7.1 | 5.9 | 4.2 | 1.6 |
| China | 3.24 | 2.99 | 2.42 | 1.58 | 0.44 | Africa | 6.7 | 6.3 | 5.7 | 4.2 | 1.9 |
| Norway | 3.21 | 2.73 | 1.91 | 0.94 | 0.11 | Europe | 6.3 | 5.1 | 3.6 | 1.9 | 0.3 |
| Mexico | 3.01 | 2.78 | 2.21 | 1.41 | 0.36 | Far East | 4.0 | 3.6 | 2.9 | 1.9 | 0.5 |
| Venezuela | 2.57 | 2.32 | 2.12 | 1.77 | 1.02 | ME. Other | 2.9 | 2.4 | 1.8 | 1.1 | 0.3 |
| Iraq | 2.57 | 2.35 | 3.00 | 4.55 | 2.66 | Other | 0.5 | 0.5 | 0.5 | 0.4 | 0.1 |
| UK | 2.51 | 1.86 | 1.35 | 0.71 | 0.10 | Unforeseen | | 0.0 | 0.1 | 0.1 | 0.7 |
| Nigeria | 2.03 | 1.92 | 1.87 | 1.46 | 0.69 | Non-Swing | 45 | 43 | 38 | 25 | 8 |
| Abu Dhabi | 1.90 | 1.96 | 2.50 | 2.25 | 1.34 | WORLD | 64 | 60 | 60 | 47 | 22 |
| Kuwait | 1.77 | 1.85 | 2.36 | 2.10 | 1.28 | Excluding:tar;heavy;deepwater;polar oil & PNGL | | | | | |
| Libya | 1.41 | 1.37 | 1.37 | 1.17 | 0.68 | Other Hydrocarbons | | | | | |
| Indonesia | 1.27 | 1.01 | 0.84 | 0.59 | 0.20 | Oil | | | | | |
| Canada | 1.08 | 0.62 | 0.51 | 0.34 | 0.10 | Heavy Oils | | | | | |
| Oman | 0.93 | 0.83 | 0.67 | 0.44 | 0.13 | | | | | | |
| Egypt | 0.81 | 0.62 | 0.46 | 0.25 | 0.04 | | | | | | |
| Algeria | 0.81 | 0.85 | 0.81 | 0.65 | 0.34 | | | | | | |
| Argentina | 0.75 | 0.61 | 0.43 | 0.21 | 0.03 | | | | | | |
| Angola | 0.74 | 0.68 | 0.52 | 0.31 | 0.07 | | | | | | |
| Australia | 0.70 | 0.58 | 0.48 | 0.33 | 0.11 | | | | | | |
| Malaysia | 0.69 | 0.64 | 0.48 | 0.27 | 0.05 | | | | | | |
| Qatar | 0.69 | 0.57 | 0.48 | 0.33 | 0.11 | | | | | | |
| Colombia | 0.69 | 0.50 | 0.39 | 0.24 | 0.06 | | | | | | |
| Kazakhstan | 0.68 | 0.93 | 1.18 | 1.71 | 0.91 | | | | | | |
| India | 0.65 | 0.63 | 0.52 | 0.35 | 0.11 | | | | | | |
| N.Zone | 0.63 | 0.55 | 0.52 | 0.40 | 0.19 | | | | | | |
| Syria | 0.52 | 0.39 | 0.26 | 0.12 | 0.01 | | | | | | |
| Ecuador | 0.40 | 0.41 | 0.38 | 0.27 | 0.10 | | | | | | |
| Denmark | 0.36 | 0.28 | 0.20 | 0.09 | 0.01 | | | | | | |
| Brasil | 0.36 | 0.24 | 0.17 | 0.08 | 0.01 | | | | | | |
| Yemen | 0.35 | 0.31 | 0.22 | 0.11 | 0.01 | | | | | | |
| Gabon | 0.33 | 0.24 | 0.18 | 0.09 | 0.01 | | | | | | |
| Vietnam | 0.30 | 0.30 | 0.28 | 0.14 | 0.02 | | | | | | |
| Dubai | 0.28 | 0.16 | 0.12 | 0.06 | 0.01 | | | | | | |
| Azerbaijan | 0.28 | 0.68 | 0.82 | 0.70 | 0.33 | | | | | | |
| Congo | 0.27 | 0.20 | 0.14 | 0.07 | 0.01 | | | | | | |
| Sudan | 0.19 | 0.27 | 0.25 | 0.10 | 0.01 | | | | | | |
| Brunei | 0.18 | 0.16 | 0.13 | 0.08 | 0.02 | | | | | | |
| Uzbekistan | 0.16 | 0.17 | 0.20 | 0.12 | 0.03 | | | | | | |
| Turkmenistan | 0.14 | 0.18 | 0.16 | 0.13 | 0.06 | | | | | | |
| Romania | 0.12 | 0.11 | 0.10 | 0.08 | 0.04 | | | | | | |
| Trinidad | 0.12 | 0.11 | 0.10 | 0.07 | 0.02 | | | | | | |
| Thailand | 0.11 | 0.14 | 0.12 | 0.06 | 0.01 | | | | | | |
| Peru | 0.10 | 0.08 | 0.08 | 0.06 | 0.03 | | | | | | |
| Italy | 0.09 | 0.08 | 0.08 | 0.07 | 0.03 | | | | | | |
| Cameroon | 0.09 | 0.05 | 0.04 | 0.02 | 0.00 | | | | | | |
| Tunisia | 0.08 | 0.07 | 0.06 | 0.04 | 0.02 | | | | | | |
| Ukraine | 0.07 | 0.07 | 0.06 | 0.05 | 0.03 | | | | | | |
| Papua | 0.07 | 0.05 | 0.05 | 0.03 | 0.01 | | | | | | |
| Germany | 0.06 | 0.06 | 0.05 | 0.03 | 0.01 | | | | | | |
| Turkey | 0.06 | 0.04 | 0.03 | 0.02 | 0.01 | | | | | | |
| Sharjah | 0.05 | 0.04 | 0.03 | 0.02 | 0.00 | | | | | | |
| Pakistan | 0.04 | 0.05 | 0.04 | 0.03 | 0.01 | | | | | | |
| Bahrain | 0.03 | 0.03 | 0.03 | 0.02 | 0.01 | | | | | | |
| Hungary | 0.03 | 0.02 | 0.02 | 0.01 | 0.01 | | | | | | |
| Netherlands | 0.03 | 0.04 | 0.03 | 0.02 | 0.01 | | | | | | |
| France | 0.03 | 0.02 | 0.02 | 0.01 | 0.00 | | | | | | |
| Bolivia | 0.03 | 0.04 | 0.05 | 0.05 | 0.02 | | | | | | |
| Croatia | 0.02 | 0.03 | 0.02 | 0.02 | 0.01 | | | | | | |
| Austria | 0.02 | 0.02 | 0.01 | 0.01 | 0.00 | | | | | | |
| Chile | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | | | | | | |
| Albania | 0.01 | 0.01 | 0.03 | 0.03 | 0.00 | | | | | | |
| | | | | | | Other Hydrocarbons | | | | | |
| | | | | | | Oil | | | | | |
| | | | | | | Heavy Oils | | | | | |
| | | | | | | Canada | | | | | |
| | | | | | | Venezuela I | | | | | |
| | | | | | | Venezuela II | | | | | |
| | | | | | | Other | | | | | |
| | | | | | | Deepwater | | | | | |
| | | | | | | G. Mexico | | | | | |
| | | | | | | Brasil | | | | | |
| | | | | | | Angola | | | | | |
| | | | | | | Nigeria | | | | | |
| | | | | | | Other | | | | | |
| | | | | | | Polar | | | | | |
| | | | | | | Alaska | | | | | |
| | | | | | | Other | | | | | |
| | | | | | | Other | | | | | |
| | | | | | | Subtotal | | | | | |
| | | | | | | GAS & GAS LIQUIDS | | | | | |
| | | | | | | Gas (at 6Tcf = 1 Gboe) | | | | | |
| | | | | | | Gas | | | | | |
| | | | | | | Non-con gas | | | | | |
| | | | | | | Subtotal | | | | | |
| | | | | | | Gas Liquids | | | | | |
| | | | | | | NGL | | | | | |
| | | | | | | ALL HYDROCARBONS | | | | | |
| | | | | | | Gas | | | | | |
| | | | | | | Liquids | | | | | |
| | | | | | | Processing Gain | | | | | |
| | | | | | | Total | | | | | |
| | | | | | | BALANCE with 1.5% annual demand growth | | | | | |
| | | | | | | Liquids Mb/d | | | | | |
| | | | | | | Supply | | | | | |
| | | | | | | Demand | | | | | |
| | | | | | | Balance | | | | | |
| | | | | | | NOTES | | | | | |
| | | | | | | Regular Oil excludes | | | | | |
| | | | | | | Oil from coal & "shale"; bitumen; Extra-Heavy Oil; | | | | | |
| | | | | | | Heavy Oil (<17 API); Deepwater (>500m) & Polar | | | | | |
| | | | | | | Oil and NGL from gas plants | | | | | |
| | | | | | | Base Case Scenario assumes flat Regular | | | | | |
| | | | | | | production to 2010, when ME Gulf can no longer | | | | | |
| | | | | | | in practice offset natural decline elsewhere | | | | | |
| | | | | | | ME. Gulf is Abu Dhabi, Iran, Iraq, Kuwait, NZ and | | | | | |
| | | | | | | Saudi Arabia, with 37% of world supply by 2010 | | | | | |
| | | | | | | Venezuela I = ordinary heavy | | | | | |
| | | | | | | Venezuela II = 4 Extra-Heavy oil projects | | | | | |

143. Country Assessment Series – Brasil

This month we take a look at Brasil, as an interesting example of a mature oil province with a second cycle of deepwater discoveries.

Brasil

Brasil is the largest country in South America, covering some 8.5 M km³ and supporting a population of about 170 million. Ranges of moderate relief form the northern boundary with Venezuela, giving way to the vast rain forests of the Amazon basin. To the south follow extensive dissected tablelands of forest and grass. Most of the population is concentrated along the Atlantic littoral, where are located the largest city, Sao Paulo, with about 10 million inhabitants, and Rio de Janeiro, the former capital. Brasilia is a purpose-built modern capital at an altitude of 1000m in the southwestern interior, which became the seat of government in 1960, now housing a population of about two million.

Vicente Pinzon, a Spanish explorer, landed near Recife in 1500 to find a vast country sparsely populated by Arawak and Carribs natives, a few of whose descendants are still to be found in the Amazon headwaters. Although discovered by a Spaniard, the territory lay within what had been declared by the Pope to be a Portuguese sphere of influence under the Treaty of Tordesillas in 1493. A few months later, the Portuguese government dispatched an expedition under the Italian navigator Amerigo Vespucci to confirm its rights, giving his Christian name to the Americas. A programme of Portuguese colonisation followed over the next centuries but the country was also subject to Spanish, French, British and Dutch attentions accompanied by partial settlement. Missionaries extended practical sovereignty into the interior, occasioning disputes with bordering Spanish colonies. Slaves from Africa were imported in large numbers to work the plantations.

When Portugal was occupied by Napoleon's troops in 1807, the Portuguese government under the Regent, Prince John, moved to Brasil, which became the seat of government for the homeland. On returning to Lisbon in 1816, he left his son, Dom Pedro, in Brasil who declared independence for his adopted country in 1822, appointing himself as its Emperor in a grandiose gesture. But political turbulence and boundary disputes with Argentina followed until order was established under his son and successor, Pedro II, in 1840. A period of economic progress ensued with the construction of railways and the abolition of slavery. A new constitution, modelled on that of the United States, established the country as a Federal Republic in 1891, but did not bring to an end the political turbulence, which continued through much of the 20th Century. A dictatorial regime under President Vargas ran the country before and, again, after the Second World War. Even so, immigration from Europe, and particularly Germany, increased radically, being accompanied by economic growth. A period of military government was followed in 1985 by a return to civilian rule. Although economic progress, partly related to the country's position as the world's largest coffee producer, was made, weak financial management led to periodic periods of rampant inflation and excessive foreign debt.

A recent election in 2002 returned a populist, left-leaning government under Luis Lula da Silva. This is consistent with the general political atmosphere in Latin America as a response to globalism, which has concentrated wealth still further into the hands of the so-called oligarchs, leading some countries to even abandon their own currencies in favour of the dollar.

In geological terms, most of Brasil is made up of ancient crystalline rocks of the Guayana and Brazilian Shields, lacking petroleum prospects. They are separated one from the other by a great left-lateral suture which is followed by the Amazon River and is also responsible for the "bulge of Africa", on the other side of the South Atlantic. In earlier years, Brasil was not considered to be prospective territory for oil, being substantially ignored by the international oil companies. Accordingly, the Brazilian government was forced to try to find oil itself, setting up a State company, Petrobras, in the 1950s, which was initially run by Theodore Link, the former Chief Geologist of Esso. It mounted an extensive exploration programme, which was at first rewarded by no more than a few small oilfields in the Amazon valley, containing oil generated in Silurian shales.

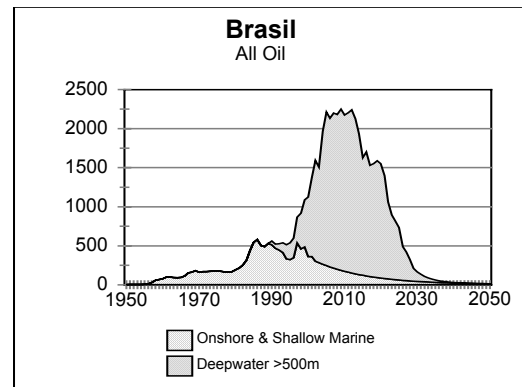
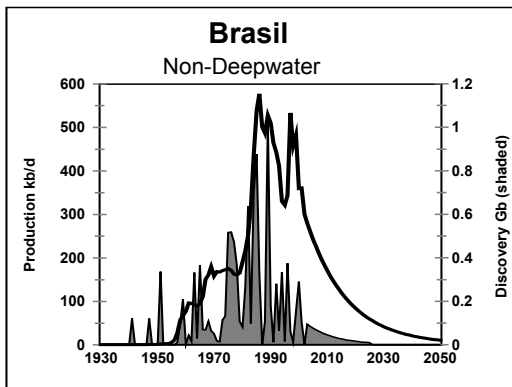
Attention then turned to the coastal basins with their offshore extensions. They represent rifts that formed with the initial opening of the South Atlantic in the early Cretaceous. Oil was generated in stagnant lakes that filled the rifts, and later migrated into rather poor quality reservoirs that were deposited along the rift margins. These basins yielded a large number of small to moderate-sized fields, together containing some 5 Gb of oil. Production reached a peak in 1985 at 577 kb/d, ten years before the midpoint of depletion. It is a mature province, which has been very extensively drilled, offering only modest scope for new discovery.

Brasil's consumption of oil was rising throughout the 1970s to reach almost 1 Mb/d by the end of the decade. Soaring imports were causing a heavy burden on the balance of trade. With this incentive, Petrobras turned its eyes ocean-ward, and with necessity being the mother invention, decided to try to find out what the deepwater potential might be. To its enormous credit, it pioneered the necessary technology, demonstrating that the so-called developed world has no particular claim to technological prowess.

In geological terms, it began to understand a remarkable new petroleum system. It comprises a somewhat later phase of Cretaceous rifting, but still containing the critical basal hydrocarbon source rocks. Here, they were capped by a layer of

mid-Cretaceous salt, resulting from the evaporation of sea-water as the opening South Atlantic temporarily broke into rift lakes. The indifferent reservoirs of the rift system could not support the cost of deepwater operations, but Petrobras was saved by the identification of remarkable Tertiary reservoirs. They originated as turbidites, which can be compared with submarine avalanches. Consisting of interbedded, graded muddy sands and clays, they do not normally represent good reservoirs, but on the continental slope of the South Atlantic a long-shore current winnowed out the fine-grained material, depositing dune-like bodies of sand with excellent reservoir characteristics. In the deepwater extension of the Campos Basin, Petrobras discovered several large gentle structures with stratigraphic components, which were in communication with the underlying source rocks. Exploration was richly rewarded by the discovery of about 12.5 Gb, occurring mainly in a small number of giant fields, which were found during the 1980s and 1990s.

| Brasil | | | |
|-------------------------------------|---------|-----------|-------|
| | Regular | Deepwater | Total |
| Rates Mb/d | | | |
| Consumption | 2002 | | 1.86 |
| per person b/a | | | 3.6 |
| Production | 2002 | .77 | 0.9 |
| Forecast 2010 | 0.06 | 2 | 2.1 |
| Forecast 2020 | 0.03 | 1.5 | 1.8 |
| Discovery 5-yr average Gb | 0.002 | .03 | |
| Amounts Gb | | | |
| Past Production | 4.5 | 2 | 6.5 |
| Reported <i>Proved Reserves</i> | 8.3 | - | |
| Estimated Future Production to 2075 | | | |
| From Known Fields | 0.6 | 12.5 | 13 |
| From New Fields | 0.8 | 3.9 | 5 |
| Future Total | 1.5 | 16.5 | 18 |
| Past and Future Production | 6.0 | 18.5 | 25 |
| Current Depletion Rate | 7% | 2.8% | |
| Depletion Midpoint Date | 1991 | 2012 | |
| Peak Discovery Date | 1975 | 1996 | |
| Peak Production Date | 1997 | 2012 | |



Exploration along the rest of the shelf has not been promising. The Amazon delta is a relatively small construction, because the Amazon flowed westward into the Pacific until its flow was reversed by the uplift of the Andes in the later Tertiary. It is likely to be gas prone, if productive at all. The main hope seems to be for the development of new play based in late Cretaceous source rocks on the continental slope, analogous with those found off Nigeria. The risk is that they would not be sufficiently deeply buried to generate oil, except perhaps locally in the proximity of major faults. Accordingly, the chances are that the bulk of Brasil's deepwater oil will be confined to the Campos Basin, where generally smaller finds may yield perhaps about another 4 Gb. Under the pressures of globalism, Brasil opened its doors to foreign oil companies in the late 1990s, breaking the monopoly of Petrobras, which will nevertheless likely retain a dominant position in the prime areas.

Although production from the deepwater regions has commenced, it is too early to model future production with confidence. Operations test management and technical skills to the maximum. There has already been one serious accident with the loss of a mammoth floating production system. The lenticular nature of reservoirs that diminished water-drive, and the fact that the partly degraded oil congeals in the freezing ocean depths, add to the difficulties. Field production profiles are likely to be characterised by a lengthy low plateau rather than a

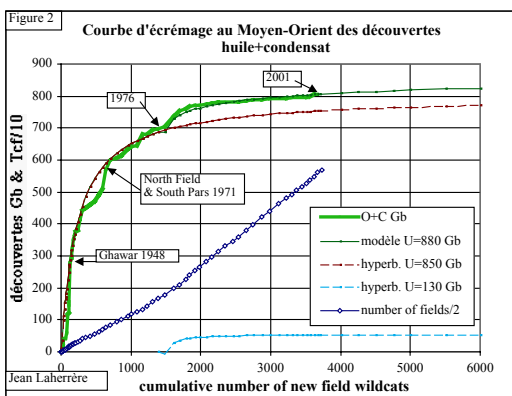
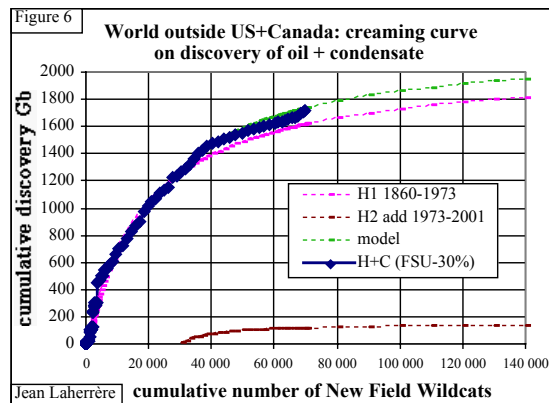
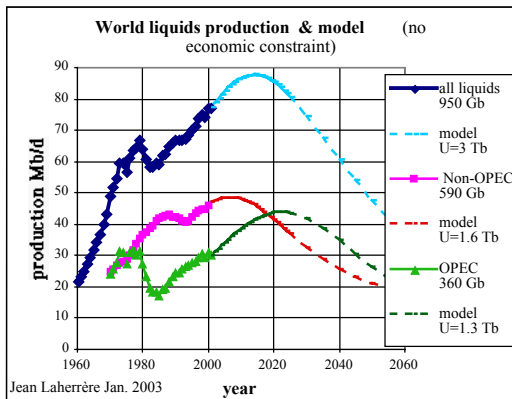
peak, with fields being brought on stream sequentially to meet Brasil's domestic needs and optimise the investment in the floating equipment. But the staggered nature of development does give a roughly bell-shaped depletion profile.

Brasil could meet its domestic needs til around 2014 with a small surplus for export, assuming a 1% annual increase in demand to 2008 when soaring world prices may cause deep recession, cutting demand. Today, 280 Mb/a support 170 M people, but by 2030, production will have fallen to about 50 Mb/a which would be able to support only about 30 million, assuming the same relationship.

Brasil has other energy options with which to face the declining oil age. It has solar energy and hydroelectric power, although it has already proved inadequate to meet electricity demand. It produces substantial, although declining, amounts of ethylene from sugar cane, and it has vast deposits of Permian oil shale in the south of the country. The two best locations are thought to be capable of yielding as much as 50 Gb of oil, given that commercial production should eventually become viable, which is far from sure as shale oil production has at best a very low net energy yield.

144. Panorama

The Institut Francais du Pétrole is hosting another of its annual Panorama meetings. Alain Perrodon will give a paper including a number of graphs produced by Jean Laherrère. Three examples are reproduced below. The first compares the respective depletion profiles of OPEC and the Former Soviet Union, which were subject to political constraints, and Non-OPEC, which followed a more natural progression, albeit affected by the sharp decline in demand following the oil shocks of the 1970s.. The second is a creaming curve for the world outside of Canada and the USA, illustrating falling discovery, which with the USA and Canada is slightly above the current ASPO assessment that total production to 2075 will amount to about 1900 Gb.



The third is a creaming curve of the Middle East demonstrating that it is a concentrated geological habitat with most of its oil in a few giant fields, found long ago. Almost 4000 wildcats have been drilled, but there has been little to show for the last 2000. Extrapolating the discovery trend tends to confirm the ASPO assessment that total production to 2075 is unlikely to exceed about 750 Gb, especially if the reserves of some existing fields are less than reported, as suspected.

145. Impact of oil depletion on US transport

Dr. Bentley was invited by Dr. David Greene of the U.S. National Transportation Research Laboratory to speak on global oil and gas depletion at a session of the 82nd Transportation Research Board conference, held in Washington D.C. in January. The other speakers at this session were Dr. Thomas Ahlbrandt, World Energy Project Chief of the USGS, and John Wood of the U.S. Energy Information Administration. While in Washington, Dr. Bentley had the opportunity to discuss oil depletion with Dr. Hilary Smith and others at the DoE Headquarters, and to talk at a seminar organised by Professor Wilfrid Kohl of the School of Advanced International Studies of Johns

Hopkins University, where Ahlbrandt and Wood also made presentations. The attendees at this meeting included a wide range of people with responsibilities in the area of energy from the Washington region.

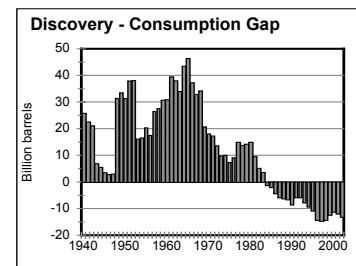
Dr. Bentley also made a presentation at the Washington office of the U.S. National Renewable Energy Laboratory (NREL), which was video-linked to NREL Headquarters. The impression gained from these meetings is that global oil and gas depletion is still a relatively little-known topic in the U.S. The general perception there still seems to be that existing fields can be expected to show very large reserves growth (of the order of several hundred percent) and that there are many large new finds still in prospect (with Thunderhorse in the deep Gulf of Mexico being a recent example). It is clear that this notion of reserves growth is driven by the conservative U.S rules on reserves reporting. Overall, Dr. Bentley felt that his presentations, which drew on data for individual countries already past peak, was well received, and did help alert the U.S. authorities to the serious nature of oil and gas depletion.

146 Institute of Energy in London to review depletion on February 13th

Dr Bentley has issued a well argued and compelling appeal for the issue of depletion to be taken up by the appropriate authorities. He, together with Dr Harper of BP, will be reviewing the subject at the Institute of Energy in London on February 13th

147. Discovery back on trend

A press release reports that discovery, as recording in the industry database, was about 6 Gb in 2002, which returns to the long-term trend after the anomalous spikes of 1999 and 2000. The World is accordingly finding less than one barrel for every four it consumes. This is about one-quarter of the average discovery indicated by the USGS for the period 1995-2025 in its flawed study of 2000. The industry database also estimates the total endowment of all producible oil liquids (*Ultimate Recovery*) at 2850 Gb, consistent with the ASPO estimate of 2700 Gb for what will be produced to the year 2075 (see Table opening the Newsletter)



148 Nobel Prize for Sustainable Development

Paul Metz invites support for the establishment of a new Nobel Prize as follows:

Today I signed a call for the establishment of a Nobel Prize for Sustainable Development and invite you to do the same at www.sustainable-prize.net. The list is open until March 2003 and will then be used to convince the Nobel Prize Committee

149. Public Colloquium to Address Untold Story of Impending Peak & Decline of World Oil Production, University of Texas, February 5th

The following announcement by Julian Darley of the Meta Foundation explains the event

At this colloquium we will be discussing not only the little known facts of the coming permanent world decline in oil production (followed by natural gas), but also how we can get the message out, start to hold governments accountable for not knowing or not telling the populace (for instance by using citizens committees), and what we can do to rebuild our local economies and communities, in order, in part, to avoid the chaos that is beginning to ensue. This rebuilding and re-localising work along with national and international concerted citizen actions, will become the most important aspects, once oil peak and decline become mainstream news - which may very well happen this year. For details, see

<http://www.globalpublicmedia.com/EVENTS/ut.colloquium.oil-peak.freedom-fuel.2003-02-05.php>
<http://www.globalpublicmedia.com/EVENTS/talk.jd.uncommonknowledge.2003-02-04.php>

At our Internet broadcasting station, <http://globalpublicmedia.com/>, you can find video interviews with Dr Colin Campbell, an oil depletion links page, and a couple of talks that I have given on the implications of oil peak and decline.

Those of us who know about this issue believe that 2003 will be the year that news gets out, most likely forced out by a war on Iraq. Even if that doesn't happen, it still may be this year, partly thanks to problems with natural gas in the United States, and perhaps because of the efforts of activists who are determined to tell this story!

150 Australian Gas Depletion

Brian Fleay, an ASPO Associate, has published an excellent new paper on the depletion of Australia's natural gas, entitled *Natural Gas: "Magic Pudding" or Depleting Resource*. He reports too that the Minister for Planning and Infrastructure in Western Australia is launching a Transport Energy Strategy Committee to prepare a Strategy this year.

151 New Scientist counts the cost of the Iraq invasion

The New Scientist is a journal of reason not polemic, yet it paints a sombre picture of the consequences of the threatened invasion of Iraq

<http://www.newscientist.com/hottopics/iraq/article.jsp?id=99993327&sub=Background%20to%20the%20crisis>

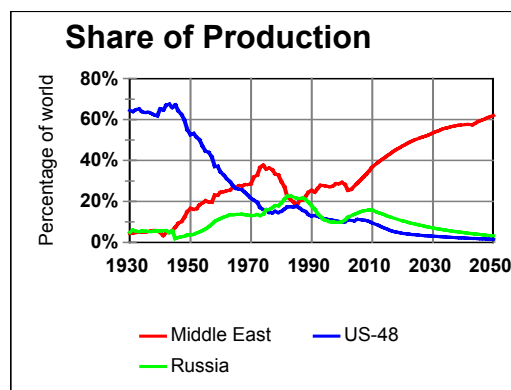
152. Denmark addresses the serious impact of oil depletion.

Dr Illum reports that The Association of Civil Engineers and the official Danish Technology Council are to start detailed and serious studies on the issue of oil depletion and its consequences.

Workgroups, workshops and a public conference are planned. Dr Illum, who represents ASPO in Denmark, will be taking part. This is excellent news countering the flat earth influences mentioned in Item 138.

153 Changing Oil Power

In 1930, the USA was supplying 64% of the World's oil, and the Middle East (Gulf) was supplying only 4%. By 1950, the US had slipped to 52% while the Middle East had grown to 17%. The two regions reached parity of 27% in 1964. By 2000, the US had sunk to 11% whereas the Middle East had risen to 29%. A short-lived surge of US deepwater production peaks around 2008, but does n't materially alter the overall trend. By 2025, the US will have almost ceased to produce while the Middle East will be supplying 50%, rising to over 60% by 2050. By then, it will be producing the same share as was the United States in 1930.



Russia pulled ahead of the USA in 1975 and briefly overtook the Middle East in 1980s. But by 2050, it will be in the same boat as the USA, relying on the Middle East for imports.

These changing relationships may provide a clue to current events. There is an irony about depletion: the more efficient the extraction, the shorter the life-span. Technology is a two-edged sword.

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.

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