THE ASSOCIATION FOR THE STUDY OF PEAK OIL AND GAS

"ASPO"

NEWSLETTER No 52 –APRIL 2005

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.

The following countries are represented: Austria, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Missions:

1. To evaluate the world's endowment and definition of oil and gas;

2. To study depletion, taking due account of economics, demand, technology and politics;

3. To raise awareness of the serious consequences for Mankind.

Newsletters: This and past newsletters 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)
http://www.peakoil.net
A Spanish Language edition is available on www.crisisenergetica.org
A French Language edition is available on www.oleocene.org (press "Newsletter")

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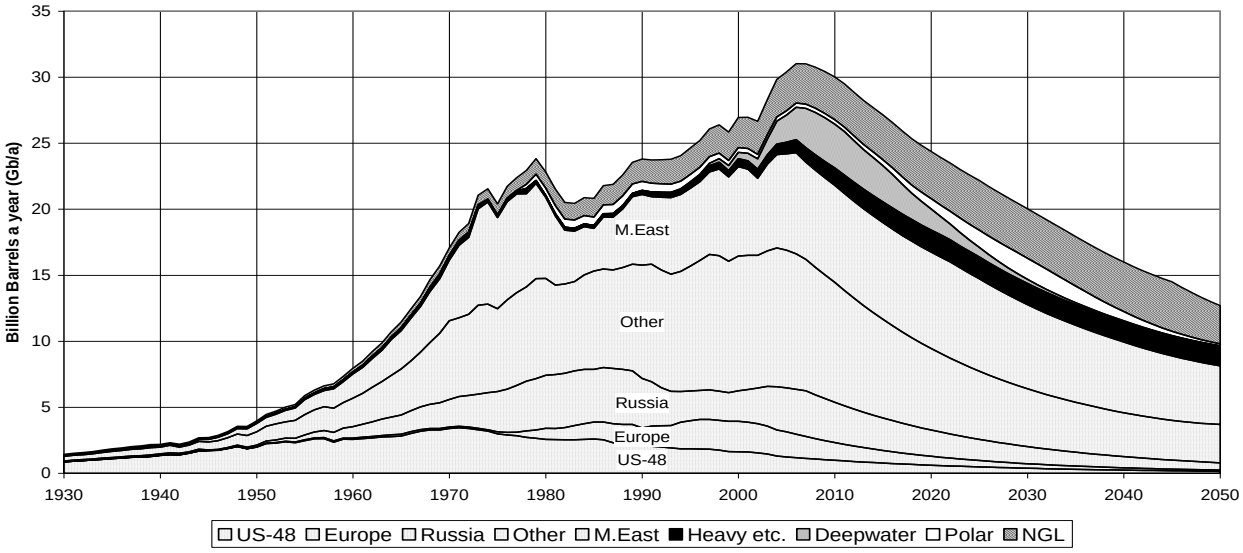
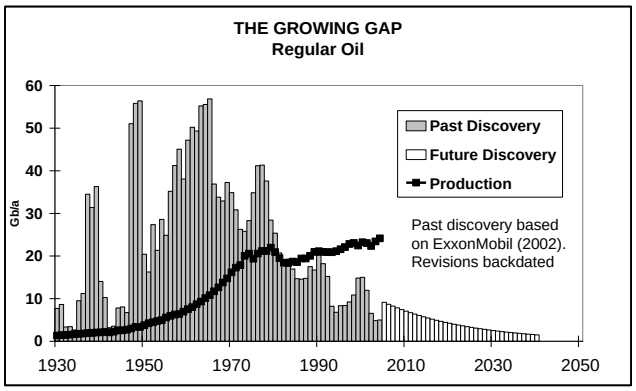
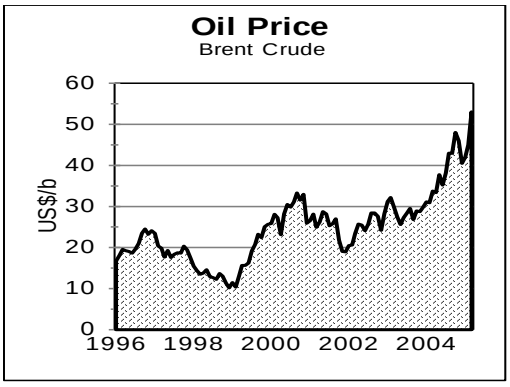
OIL AND GAS LIQUIDS
2004 Scenario



ESTIMATED PRODUCTION TO 2100									End 2004
Amount			**Gb**	**Annual Rate - Regular Oil**				**Gb**	**Peak**
Regular Oil				Mb/d	**2005**	**2010**	**2020**	**2050**	**Total**	**Date**
Past	**Future**		**Total**	US-48	3.4	2.7	1.7	0.4	200	1972
Known Fields		New		Europe	5.2	3.6	1.8	0.3	75	2000
945	760	145	1850	Russia	9.1	8	5.4	1.5	220	1987
	905			ME Gulf	20	20	20	12	680	1974
All Liquids				Other	28	25	17	8	675	2004
1040	1360		2400	**World**	**66**	**59**	**46**	**22**	**1850**	2006
2004 Base Scenario				**Annual Rate - Other**						
M.East producing at capacity				Heavy etc.	2.4	4	5	4	160	2021
(anomalous reporting corrected)				Deepwater	4.8	7	6	0	70	2014
Regular Oil excludes oil from				Polar	0.9	1	2	0	52	2030
coal, shale, bitumen, heavy,				Gas Liquid	8.0	9	10	8	275	2027
deepwater, polar & gasfield NGL				Rounding		0	2		-7	
Revised 26/01/2005				**ALL**	**82**	**80**	**70**	**35**	**2400**	2007





511. China looks to Venezuela for its oil

China Wants Oil, Oil, and More Oil

http://www.politicalaffairs.net/article/articleview/712/1/78/

As China becomes economically more powerful and consumes increasingly larger amounts of energy that befits a burgeoning consumer society, the country's limited oil reserves will force it to look outside the border for the additional petroleum supplies necessary to run its many industries. Officials estimate that by 2007, China will need to import 50 percent of the oil it will consume.

According to some sources, within one year China will become one of the largest importers of petroleum in the world, second only to the United States. Venezuela, which possesses the largest proven oil reserves in the Western Hemisphere, already is beginning to accommodate China's access to these holdings**.** President Hugo Chávez announced during his December 2004 visit to China that his hosts would invest heavily in Venezuela's oil sector, a move that could ultimately affect the U.S., which is currently the biggest consumer of Venezuelan oil, importing 15 percent of its annual crude oil supplies. Chávez also added that bilateral trade with China is expected to reach $3 billion in 2005, more than double the 2004 figure. In addition, one of the most important deals between China and its socialist ally, Cuba, involves oil. SINOPEC, a Chinese oil company—one of the largest in the world—has announced it will begin searching for potential oil fields off the Cuban coast.

Analysts have estimated that the demand and availability of the world's petroleum supply will remain tight in 2006 and that fluctuations in crude oil prices will depend to a large extent on the robustness of the Chinese economy and the stability of global geopolitics, particularly in the Middle East. As a result, the rivalry between the U.S. and China for primacy in gaining access to the Western Hemisphere's energy supplies will prove to be a major challenge for President Bush. *(Reference furnished by William Tamblyn)*

512. Country Assessment - India

The Republic of India covers an area of some 3M km^2, making it the seventh largest country in the World. Topographically, it is divided into a mountainous north, flanking the Himalayan Range; the North Indian Plain, drained by the Indus and Ganges Rivers; and the Deccan Plateau in the south, which itself is flanked by the Western and East Ghat mountain ranges, locally rising to around 3000m. Its climate is characterised by three seasons: hot and wet from June to September; cool and dry from October to February; and hot and dry from February to June. But they are subject to marked annual variations, spelling famine if the rains are late or weak, or flooding in the opposite case. Much of the country is forested.

India (which included Pakistan prior to 1948) has had a very long history, with the earliest records of the Indus Civilisation going back more than 4000 years. That was followed by the so-called Aryans, so admired by the Nazis, who spread out from Central Asia to populate India as well as Europe and intervening territories. Later, came Greek, Roman, Arab and Turkish influences, and the growth of sundry kingdoms, whose fortunes waxed and waned with the passage of history. The people enjoyed an advanced culture embracing many religions, principally Buddhism, which itself evolved and split into diverse sects. Arab invasions and raids brought the Muslim faith particularly to northern and western India from the 12th Century onwards. The great Mughal Empire, lasting for 200 years from 1526, effectively unified the sub-continent, bringing an age of affluence and stability, as well as the growth of trade with Europe, but it finally disintegrated with conflicts between the nobility.

The Portuguese navigator Vasco da Gama had landed in 1498, paving the way for the establishment of Goa as a Portuguese territory. The Dutch and French also had a presence, but it was the British who finally made India the jewel of their Empire. British influence started with the East India Company that secured a trade monopoly in 1600, and later demanded military and political support, becoming an early kleptocracy as its functionaries amassed great wealth. Tea plantations were established in the early 19th Century, especially in the hill country of Assam, becoming a major source of export earnings, as Europeans developed a taste for it. British control was achieved gradually by a series of alliances with the separate principalities making up the country as well as through military engagements (one notable General was named Sir Colin Campbell). The pinnacle of British power

INDIA		*Regular Oil*
Population M		1000
Rates Mb/d		
Consumption	2004	2.4
per person b/a		0.9
Production	2004	0.685
	Forecast 2010	0.52
	Forecast 2020	0.33
Discovery 5-yr average Gb		0.01
Amounts Gb		
Past Production		6.1
Reported *Proved Reserves**		5.37
Future Production - total		5.4
From Known Fields		4.5
From New Fields		1.0
Past and Future Production		11.5
Current Depletion Rate		4.4%
Depletion Midpoint Date		2003
Peak Discovery Date		1974
Peak Production Date		2004

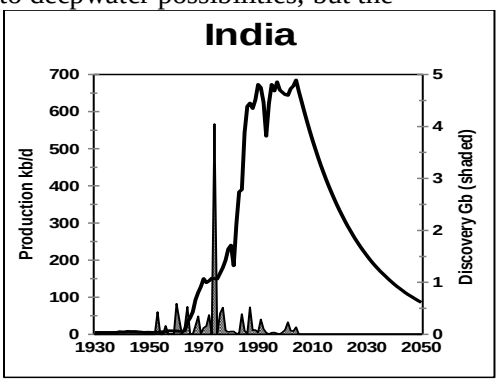
*Oil & Gas Journal

came in the latter part of the 19th Century, and seems to have enjoyed wide support from the people at large. Indian regiments under British officers were raised, playing heroic parts in the both World Wars. But stirrings of independence developed in the early 20th Century, receiving some sympathy in the mother country. The movement was led by Mahatma Gandhi (1869-1948), who preached tolerance and non-violence. The eclipse of the British Empire in the Second World War and the ensuing socialist regime paved the way for Indian independence, which was granted in 1947. It saw the partition of the country into mainly Hindu and Muslim territories, the latter becoming Pakistan, but it cost the lives of more than a million people in various factional massacres.

The new government, led by Mr Nehru, faced a continuation of communal conflict resulting from partition and economic dislocation, to be soon followed by the outbreak of an undeclared war with Pakistan over the status of Kashmir, with its predominantly Muslim population, which found itself on the wrong side of the dividing line.

India has not proved to be an easy place to govern. Nehru's daughter, Indira Gandhi, came to power after the death of her father. She proved to have an iron will and an autocratic style, taking a non-aligned position between the opposing powers in the Cold War, but was shot dead in 1984 by two Sikh guards following a dispute with the Sikh minority. She was succeeded by her son Rajiv, who was in turn assassinated by a Tamil suicide bomber in 1991. His Italian-born widow, Sonja, might have come to power recently with adequate political support, but perhaps wisely stepped aside for the present incumbent, Manmohan Singh, a gentle economist, educated at both Oxford and Cambridge.

In geological terms, India forms a segment of the ancient southern continent of Gondwanaland that moved northwards to collide with the Eurasian Plate some 50 million years ago. In regional terms, this continent was deficient in oil prospects, primarily because the conditions for oil generation were restricted in high southern latitudes. It is not surprising, therefore, that India is not rich oil territory, although some marginal basins have delivered modest results. The largest of these, with some 2.5 Gb, is the Bombay High, off the west coast, which was found in 1974. The industry is dominated by the State Company, ONGC, although some small foreign private firms are also active. About 1300 wildcats have been drilled, finding 10.5 Gb of oil, of which 6 Gb have been produced. Exploration drilling peaked in 1991 when 88 wildcats were drilled, but is now down to about half that number. A fairly high level of activity is likely to continue, as the country is in desperate need of oil, but is unlikely to be rewarded by more than perhaps another billion barrels, mainly in small fields. Some interest is now being devoted to deepwater possibilities, but the outcome is far from assured.



Production stands at 685 kb/d, which is likely to be the peak, the midpoint of depletion having been passed in 2002. At the current Depletion Rate of 4.4%, production is set to fall to about 500 kb/d by 2010 and 330 kb/s by 2020. Consumption stands at 2.4 Mb/d, giving the country a large and growing need of imports, which will be increasingly difficult to obtain. This readily explains why State-backed Indian companies are taking up rights overseas in for example the Sudan, Libya, Iran and Venezuela (see also Items 511 and 513).

The country's gas potential is also limited. Only 42 Tcf have been discovered, of which 13 Tcf have been produced. Production stands at about 2 Tcf/a. The country has substantial coal deposits, although some have a high arsenic content which has caused serious environmental damage in the past.

India has recently enjoyed something of an economic boom, based in part on services run through the Internet. Western manufacturers have also set up to benefit from cheap labour. It is however likely to be a short-lived chapter of relative prosperity, as imported energy becomes at first expensive and then in short supply. An economic downturn will likely impinge on an already fragile political structure, rendered even more difficult by the country's huge population of more than a billion.

How India will fare during the Second Half of the Oil Age is hard to predict, but disintegration is a possible outcome, as people revert to their old communal and religious identities, a process which will probably be accompanied by much bloodshed and suffering. Clearly, the present population far exceeds the carrying capacity of the land, but the Indian is blessed by a smiling, benign spirituality that helps.

513. Organisation of Oil Importing Countries "OPIC"

The Oil Minister of India has convened a meeting with China, Japan and South Korea to consider forming the Organisation of Oil Importing Countries. They are probably misled into believing that that they can exert

pressure on OPEC in some way to keep them supplied, when in reality it has become a spent force, having no more spare capacity left to manage. The responsibility for management therefore passes to the importers, adding weight to the concept of a Depletion Protocol, as proposed by ASPO, which will be debated at the Lisbon Conference in May and taken up by world leaders at the Rimini Conference in October. Building on his present initiative, the Oil Minister of India could play a decisive role in advancing this equitable solution to the intelligent management of world oil supplies.

514. ASPO International Workshop in Lisbon

More than 100 participants have already registered for the forthcoming ASPO Conference in Lisbon. Journalists and film crews are planning to attend. Complete information on this event, including an updated programme and registration form are available at http://www.cge.uevora.pt/aspo2005/ . The E-mail contact address is: aspo2005@uevora.pt .

IV INTERNATIONAL WORKSHOP ON OIL AND GAS DEPLETION
Lisbon, Portugal, the 19-20th May 2005
Updated Information

The Conference is hosted by the Calouste Gulbenkian Foundation, with the sponsorship of both that entity and *PARTEX Oil and Gas*, while the *Geophysics Centre of Évora* of the University of Évora has taken responsibility for the organisation. The programme includes contributions from over 25 international leading specialists on topics including**:**

- Reality in Oil Exporting Countries: The Supply Limits
- Impacts of Depletion in Oil Importing Countries: The Demand Pressure
- How-Much Regular Oil and Non-Conventional Oil: Utopia versus Reality
- The Case for Political Action: The Depletion Protocol
- The World Past Peak Oil Age

515. Depletion Conference in Scotland

Peak Oil UK - Entering the Age of Oil Depletion

The Conference will address the impending peak and decline in global oil production, and the implications for the United Kingdom.

VENUE: The Royal Museum of Scotland, Chambers Street, Edinburgh. **DATE:** Monday 25 April 2005

09:00 Registration
09:30 ***Why Britain Needs an Indigenous Energy Policy***- Brian Wilson MP
10:15 ***The End of the First Half of the Age of Oil-*** Colin Campbell
11:30 ***Depletion – The Reality in Action-*** Chris Skrebowski
12:15 ***Can Market Efficiency Overcome Depletion? Or Why Economists Don't Get It-*** Matthew Simmons
14:00 ***Transport – An Oil Crisis and More-*** David Spaven
14:45 ***Half Gone – the third and biggest global energy crisis-*** Jeremy Leggett
16:00 ***Roundtable Discussion***

Moderator: Mark Stephen, BBC Radio Broadcaster

516. Further Reflections on Middle East Reserves

Undoubtedly, the most important question to try to resolve in modelling future world oil production is the true size of Middle East reserves. It is obvious that the official reports of remaining reserves are grossly unreliable, as even the industry databases can hardly do other than report what they are officially told. But the historical record may have something to tell us.

Kuwait reported reserves of 65 Gb in 1980, falling to 64 Gb by 1984 in the absence of new discovery, at which point it had produced a total of 21.5 Gb, indicating that the total discovery was 85.5 Gb. The bulk lay in the Burgan Field, found in 1938, with 60 Gb, whose reserves were well known to the foreign industry. Next in size were Raudhatain (1955) with 9 Gb; Sabriya (1957) with 5.5 Gb; Minagish (1959) with 3.5 Gb; Umm Gudair (1962) with 3 Gb; Ratga (1977) with 1 Gb and several smaller fields. But it is entirely possible that these estimates were based on fairly conservative assumptions, so it might be reasonable to round the estimate up to, say, 90 Gb.

In 1985, Kuwait increased its reported Reserves from 64 Gb to 90 Gb, being probably influenced in doing so by new OPEC rules that set production quota partly on reserves. No doubt the other OPEC countries reflected on what their response should be. They were finally goaded into action when Kuwait announced a further increase to 92 Gb in 1987, when several of them evidently decided to simply match Kuwait's number to secure a comparable production quota. In 1988 Abu Dhabi reported 92 Gb to exactly match Kuwait, (up from 31 Gb); Iran went for one better at 93 Gb (up from 49 Gb), while Saddam Hussein, not to be outdone,

reported a rounded 100 Gb (up from 47 Gb). It is also worth noting in passing that about 2 Gb of Kuwait's reserves went up in smoke in the First Gulf War.

But Saudi Arabia had a difficulty because it was already reporting much more than Kuwait, and took two more years to react before announcing a massive increase from 170 to 258 Gb in 1990. It had evidently decided to follow Kuwait's practice of reporting *Original*, not *Remaining Reserves*. It may even have been somewhat optimistic given the exceptional character of the reservoir in its premier field, Ghawar.

Kuwait has since increased its report to 99 Gb, presumably reflecting an assumption of improved recovery.

Gb	Reported Reserves			Cum Prod 2004	Total Disc. ASPO
	Anomalous Revisions		2004		
	Pre-	Post-			
A.Dhabi	31	92	92	19	65
Iran	49	93	126	57	127
Iraq	47	100	115	29	91
Kuwait	64	90	99	32	84
S.Arabia	170	258	259	100	245
Total	**362**	**633**	**691**	**237**	**612**

The attached table shows the position, together with the current ASPO best estimate of total discovered, which may err on the side of optimism. Subtracting cumulative production gives remaining reserves, but the jury is still out on how good this best estimate really is. How the other OPEC countries reacted has yet to be evaluated but Venezuela did more than double its reported reserves from 25 to 56 Gb also in 1988, suggesting a connection. Future discovery is well forecasted by extrapolating the trend of past discovery, recognising particularly that the larger fields are usually found first. Realistic estimates of discovery to-date therefore have a large impact on what may be expected in the future. Very large amounts of oil are involved in these adjustments, having a corresponding impact on world reserves and indirectly the date of peak.

517. ASPO IRELAND and ASPO ITALIA

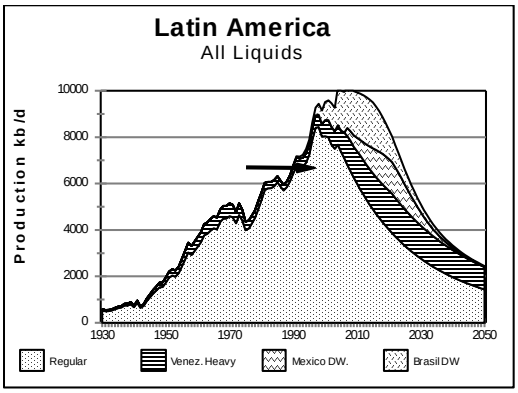
Initial sponsorship has made it possible to open a very small office in Ireland, where an analyst has started work to audit and update the current database; fine-tune the production forecast under alternative scenarios; catalogue over 3000 articles; monitor the growing number of websites covering the subject, and deal with the huge amount of e-mail and other correspondence that comes in. It is hoped that this will prove to be a foundation attracting further sponsorship to allow the staff to grow and meet the increasing demands of media relations and for presentations at conferences around the world. An appropriate non-profit legal entity is in the process of formation with a board of directors to supervise the work. ASPO ITALIA has also been formally established by Professor Bardi in Florence.

518. Correction to Item 504

It transpires that Item 504 was submitted for inclusion in the last Newsletter by the author and not the Department of Energy itself.

519. French Language Edition

Thanks are due to Mr Marc van der Auwera and his colleagues for establishing a French language edition of this newsletter on www.oleocene.org



520. Solidarity in Latin America

Uruguay has hosted a meeting of Latin American leaders, including Presidents Ugo Chavez of Venezuela and Fidel Castro of Cuba, to cement regional ties. President Chavez has already proposed creating a Latin American oil giant, to be called Petrosur, made up of the State companies of Venezuela, Brasil and Argentina. The resolve of these leaders would be strengthened if they were aware of the region's depletion profile, as illustrated in the attached figure, which includes the likely contribution of Heavy and Deepwater production (DW). Consumption stands at 6.6 Mb/d (illustrated by the arrow). It would make sense to cut exports in order to fill the pending gaping shortfall. The two most populous countries are Brasil and Mexico with respectively 179 and 106 M out of a total population of 550M, while Venezuela, a major producer, has only 26 M. Brasil alone could absorb Venezuela's exports, despite its impressive achievements in biofuels which provide for some 30% of its transport needs. Per capita consumption in the producing countries ranges for 7.4 b/a in Venezuela to 1.8 in Colombia, with the regional average being 5.2. It seems far from the best interest of these countries to export oil outside the region in the face of their own looming needs. The national companies are perfectly capable of undertaking the work, calling on such extra specialised expertise as they may need from contractors or consultants. The foreign companies bring investment but there must be

plenty of other sources of finance. Preserving their precious oil resources might serve directly and indirectly to further devalue the dollar, which would diminish the weight of the massive dollar debt to which they are exposed. Ecuador for example dedicates its entire oil revenue to servicing foreign debt.

521. Litigation

This newsletter has been in operation for four years and has covered over 500 items of interest. It has been gratifying to receive many complimentary comments regarding its style and content, but there have been a few communications expressing criticism of certain items. One such item in Newsletter 51 even attracted the threat of legal action. A good response to threats of this type is "Glad to see you in Court": unless there is good reason to withdraw the comment. Editors are not supposed to be cowed or coerced into suppressing reports.

The booklet *The Truth about Oil and the Looming Energy Crisis* (available from info@eagleoffice.net) covers an imaginary Public Inquiry into the issue of depletion, with judges calling for evidence and witnesses taking the stand. The full majesty of the law might be able to expose denial, deception and vested interest.

522. The IEA Changes its Tune

The Financial Times, for its part, is not afraid to speak out, stating that the IEA has been *trying to cool oil markets* by attributing *blame* and making *a sharp turnaround*. These are telling words implying that the organisation sees its mission as being one to influence the course of events on behalf of its member governments rather than simply report the status of energy supply and demand in factual or scientific terms.

IEA says world must turn away from oil by Kevin Morrison and Javier Blas in London
Financial Times 11 March 2005

"The rapid rise in global oil demand should lead the industrialized world to promote alternatives to oil as well as energy conservation, the International Energy Agency said on Friday. The warning, from the West's energy policy adviser, **signals a sharp turnaround by the IEA**, which has **previously tried to cool oil markets** by blaming prices on speculators and short-term supply disruptions." *(Reference furnished by Julian Darley)*

Even more remarkable is the publication of a new IEA report, entitled *Saving Oil in a Hurry: Measures for Rapid Demand Restraint in Transport*, setting out fairly draconian policies. Since many of them are long term in nature, it follows that they go beyond addressing a short supply interruption. Evidently, the issue of Peak Oil starts to be taken seriously, however reluctant authorities are to state their position clearly.

523. Oil Prices

The debate on oil prices only a few months ago hinged on whether OPEC had the strength to support prices in the $22-25 band, and oil companies stated that their economics were run on an assumption of $20. Now, in a remarkably short span of time, $40-50 appears to be accepted as if it were more of a floor than a ceiling. Perhaps these high prices are not so surprising after all, as the plot on Page 1 shows that this overall rising price trend has in fact been building for the past six years albeit with superimposed cycles. In part, however, the higher prices reflect the decline in the value of the dollar.

High oil prices reflect profiteering from shortage by oil companies and producing governments, as production costs have not risen materially. They also deny normal flat-earth economic theory by failing to deliver more discoveries because even small oilfields are highly profitable with low to moderate oil prices, with those that depend on high prices offering no more than miniscule amounts. High prices also fail to encourage oil companies to produce at high rates as it obviously makes sense for them to conserve their resources if they are able to make a satisfactory financial return at a lower rate. High prices do however encourage the drilling of dry holes, taken as an expense against higher taxable incomes. They also pump more unsupported liquidity into the Financial System rendering it even more vulnerable to collapse. High oil prices are however needed to justify the development of *Non-Conventional* oil and most renewable energy sources.

524. Life after Oil

William Stanton provides a revealing image of life after oil. It sounds rather attractive for the survivors at least.

Living fairly comfortably without fossil fuels

This theoretical exercise is an attempt to calculate, roughly, how many people could live sustainably in the United Kingdom when crude oil, natural gas and coal are no longer obtainable in useful quantities by any means. The date is around 2150, and Earth's population is greatly reduced (Stanton, 2003). The UK is chosen for the

exercise because its main component, England, has a longer population history than any other nation and, as Churchill said, "*The further back you look, the further forward you can see.*"

Today, UK population is about 60 million. In 1750, when the Industrial Revolution was beginning, it was about 6 million. It had never exceeded this figure, although during the Dark Ages and after the Black Death it fell to one or two million. Most people lived and died in poverty. Pre-industrial farmers were pushed to the limit to feed so many. The population increased slightly in years with good harvests, but starvation and malnutrition cut it back to the 6 million norm when harvests were bad.

Currently, the UK population has never had it so good. Energy, the key to a high standard of living, is abundantly and cheaply available. We consume about 10 barrels of crude oil per capita per year, as well as much coal and natural gas. Nuclear power generates electricity on a large scale. The popular assumption is that renewable energy sources, perhaps including uranium, plutonium and just possibly nuclear fusion, will smoothly replace fossil fuels as these become scarce, thanks to our inherited technological expertise.

Unfortunately, the popular assumption could hardly be more wrong. Wind, wave and tide turbines, of which so much is expected, are constructed and maintained using massive tonnages of steel and concrete. These are basic bulk materials which are cheap and abundant today, but will soon be seriously scarce and expensive. Why? Because without fossil fuels, where will the lavish amounts of energy needed to mine, quarry, transport, smelt, process and refine the raw components of power-hungry concrete and steel come from? Not from the trickle of renewable electricity that they themselves, in the form of wind, wave or tide turbines, will provide.

Solar, geothermal and hydroelectric renewable generators are similarly dependant on power-hungry metals, concrete, plastics and glass.

There remains biomass, which, 250 years ago, supported the UK's 6 million population in chronic poverty. Quality of life is closely related to energy consumption per capita, so to ensure a passable standard of living I must reduce the hypothetical population to only 2 million.

Consider a hypothetical UK 150 years from now which has, for the sake of easy calculation, 5 cities of 100,000 people, 50 towns of 10,000 people, 500 villages of 1000 people and 5000 hamlets of 100 people. The total population is 2 million, entirely dependent on renewables, enjoying a fairly comfortable standard of living.

Starting with the smallest unit, a hamlet of 100 people, say 30 households, the first thing to calculate is how much energy it would need, on a regular basis, in the form of electricity. In a UK hamlet distant from the sea, assuming a climate like today's, the renewable energy generators of choice would be wind and biomass, supplemented by hydro.

Judging by my own electricity consumption over four years, based on an all-electric house, I estimate that two wind turbines of 1MW rated capacity could meet all the domestic electricity demand of a hamlet. These estimates allow for the well-known fact that in the real world, wind turbines work at around 20% to 25% of their rated capacity, so an efficient means of storing surplus electricity generated in windy weather, to be available in calm weather, would be essential.

Pumped storage is a proved efficient way of storing electrical energy. Two reservoirs, one high and one low, are linked by a pipeline with electric pumps. Surplus electricity lifts water to keep the high reservoir full. When the wind fails, the pumps reverse to become hydroelectric turbines. Up to 80% of the stored electricity can be recovered. In flat country the lower reservoir could be a watertight tunnel deep underground. Pumped storage facilities, together with the wind turbines, would be a precious capital investment of every hamlet. Saving the money to buy them would take years. The back-up, in exceptional droughts, would be generators using liquid fuel from biomass (see below). In some hamlets the electricity supply could be supplemented by weirs on the local rivers fitted with low-head turbines.

The hamlets would be 5 or 6 kilometres apart. They would be wholly concerned with biomass production. Given that the area of the UK is 244,000 square kilometres, about 75% of which is suitable for agriculture, each hamlet would be responsible for farming about 30 sq km, or 3000 hectares (neglecting the areas allocated to larger settlements).

Within each hamlet's 3000 hectares, or 7500 acres, much more land would be devoted to growing fuel crops (mainly wood) than to growing food. Adequate energy per person is the key to quality of life. It would not be surprising, therefore, to find a hamlet with 100 ha of pasture and arable land, and 2900 ha of woodland, mostly coppice. If the latter was felled in a ten year cycle, 290 ha per year, producing about 80 dry tonnes of wood per hectare (23,000 tonnes per hamlet per year), enough wood could be produced for a group of hamlets to support a mechanised forestry industry powered by its own products.

Wood can be converted into liquid fuels by hydrogenation. Gasification of wood with steam and oxygen "can produce synthesis gas, a mixture of carbon monoxide and hydrogen which can be used to synthesise almost any hydrocarbon ... Many vehicles towing wood gasifiers as their fuel supply were to be seen during the Second World War" (Boyle, 1996). Pyrolysis of wood can generate basic chemicals such as alcohols, acetone and acetic acid as well as compressed charcoal briquettes, all of which would supply industry in the towns and cities.

Wood is chosen as the main biomass product because the energy input needed to grow it is minimal. Special-purpose biomass crops requiring annual ploughing, sowing, fertilising and weeding before harvesting would be impractical except on a small scale. The same applies to food crops, some of which would feed the hamlet and some would be sent to the towns and cities. Tractors, transport vehicles and forest industry machinery, constructed largely of power-hungry steel, would be manufactured in the towns and cities but powered by liquid fuels generated

in the hamlets themselves, *as long as the yield of dry wood (230 tonnes) per capita per year remained high. If the population were allowed to increase until the per capita yield fell below a critical figure, poverty would worsen until the system collapsed.*

I can only speculate as to the most efficient means of transporting food and materials between population centres. Light electric railways might be powered by wind, wave or tidal renewable generators, but would require great tonnages of steel. Tarmac roads would be rare outside towns, but motor vehicles might be practical given enough liquid fuel. Private cars would be rare and small, outnumbered by small motor bikes. Everything would be constructed to last. Recycling, especially of metals, would be vital.

The areas of land supporting villages of 1000 people would be scaled up appropriately, with more emphasis on food production. Semi-wild game, especially deer and pigs, browsing the coppice forests, could produce much of the meat requirement. Villages would be 20 to 30 km apart. They would be the 'market towns' of sustainable UK. Some would be near the coast where the sea would be well stocked with fish, and wave and tide energy would be available to power small fishing boats.

The towns and cities would be roughly one per modern county. Government would have a bearing on their location, but energy and fuel would be critical because they would be the industrial centres. Coastal locations would be advantageous for wave and tide energy, but the bulk of their food would come from the hamlets, as well as charcoal briquettes and liquid fuels for industry and transport.

Mountainous rainy regions of north and west UK might attract towns because of their hydroelectric potential. Weirs with low-head turbines in large rivers would be important for inland towns. Reservoirs in the headwaters could release water in summer to generate power in significant amounts (given the low population) at weirs all down the rivers.

The above is only a rough demographic exercise. Whether or not UK population could safely be increased to 3 million would depend on the ability of the hamlets and their shrinking forests to meet the colossal extra demand for fuel and materials that would result. Excessive demand, caused by feckless population increase, would cause inflation and poverty, just as it did in the Third World throughout the 20th Century.

What the real world of 2150 will be like, following the cataclysmic reduction of Earth's population in parallel with the exhaustion of fossil fuels, cannot be predicted. Peace and rationality, such as the above conjecture assumes, would seldom prevail for long. But the existence of a few quantified sustainable lifestyle scenarios would provide targets or goals towards which survivors could hopefully work.

References

Boyle, G. (ed) 1996. *Renewable Energy.* Oxford University Press.

Stanton, W. 2003. *The Rapid Growth of Human Populations,* Multi-Science Publishing Co.

525. Defining Depletion in Norway

Harald Røstvik, an architect in Stavanger, explains popular and political misconceptions regarding Norway's oil and gas, although the country has one the best reporting procedures in the World.

Norway holds a high proportion of Western Europe's future energy supply, having 75 % of its oil reserves, 45 % of its natural gas reserves and 30 % of the hydro-electricity. Hence, whatever happens to the Norwegian energy resource base has an impact on Europe. As Norway's oil and gas reserves are now depleting fast, it concerns all of Europe.

The Norwegian State's Petroleum Directorate (NPD) regularly supplies very good and detailed data describing the resource situation at the Norwegian Continental Shelf, but unfortunately that is not matched in terms of rhetoric. The latest report shows production figures and assumed remaining reserves, but in a number of interviews lately, the NPD has underlined that *We will still be exploring for oil 50 years from now, and for natural gas in 100 years' time.* This kind of rhetoric gives people the message that oil and gas will flow almost "forever", and hinders much needed investment in other sources of energy. The comments by the NPD are extremely misleading. In an attempt at clarifying the situation, I have studied the NPD data and the result is surprising.

Oil

If we continue the exploitation of the shelf at today's extraction rate (163 million standard cubic meters of oil equivalents a year), production from current fields would last only 8 years. The NPD also lists discoveries, awaiting evaluation and development approval, together with the potential for improved recovery in current fields, adding another 2 years of life at present rates. Potential new discovery is estimated at 1.385 million Sm^3 oil equivalent, which divided by the annual extraction as of today gives another ten years.

In other words, at today's extraction rate, oil will last only between 8 and 18 years.

Natural Gas

In 1994, the NPD promised that our gas reserves would last 210 years, but the estimate has now been reduced to 100 years, although the indicated time span at current rates is no more than between 26 to 42 years. Remaining known gas reserves are reported at 2.380 Gboe which gives 20 years at present rates, while increasing recovery to an average of 52% adds another six years. The potential for new discovery is put at 1900 Gboe, giving another 16 years. The total is between 26 and 42 years.

Rhetorical misguidance

It is clearly absurd to imagine that production can be held constant for a given number of years and then stop dead the year after, as all oilfields are observed to decline gradually towards exhaustion. It is also misleading to quote the full life span without at the same time stressing that the rate of production progressively falls. In fact, Norway's production has been declining at more than 6% a year since it peaked in 2001. It follows that oil and gas revenues are set to fall due to declining production and increased extraction costs unless prices continue to soar.

There is an urgent need to bring greater clarity to the issue of depletion so that the people and their politicians may plan sensibly for the future. As well as conserving the remaining oil and gas for as long as possible, new policies and investments are urgently needed to encourage the introduction of both renewable energy sources and energy efficiency measures. (www sunlab.no)

526. The Redevelopment of Old Oilfields of Saudi Arabia

The following evidence suggests that virtually all of the new projects announced by Saudi Arabia are in fact re-developments of old fields.

In 1995, a book called *Saudi Aramco and its World* was published, being an update and expansion of the earlier book *Aramco and its World*. On pages 220 and 221 is a large schematic of the oil production systems in Saudi Arabia. The following fields are identified together with their gas-oil separating plants: Abu Hadriya, Marjan and Zuluf, Safaniya, Khursaniyah, Qatif, Berri, Abqaiq, Fazran and Ain Dar (North Ghawar), Shedgum, Uthmaniyah and South Ghawar (South Ghawar), Khurais and the Central Arabian fields.

In the course of the next few pages, we learn that the Central Arabian fields, including Al Hawtah, were discovered in 1989. By 1994, four fields were producing 200,000 b/d from 85 wells in the Al Hawtah, Ghinah, Hazmiyah Umm Jurf fields, with production flowing via a pipeline link to the East-West pipeline.

It also mentions that, following field closures in the 1980s due to depressed demand, some 17 fields and satellites were recommissioned in the last quarter of 1990 to offset production losses from Gulf War I. Also noted are the expansion projects on the offshore Marjan and Zuluf fields in 1993 and 1994 respectively, giving a Gas-Oil separation capacity of 1.2 Mb/d. It seems reasonable to conclude that all the fields mentioned above have been in production previously, with most being in production already in 1994.

This leaves Dammam, an early field that is almost certainly close to exhaustion; Abu Safah, which came onstream in 2004; Shaybah, which came onstream in 1998; Manifa; Harmaliya (another version of Hazmiyah?); and Fadhili which is now due onstream, as part of the so-called Abu Hadriya –Khursaniyah-Fadhili (AKF) redevelopment project in late 2007. Khurais is due to be redeveloped by 2010 and Manifa after that. *(Reference furnished by Chris Skrebowski)*

527. Peak Oil and ASPO in the US House of Representatives

Professor Aleklett notes:

On Monday May 14th, Mr Roscoe Bartlett, the Representative from Maryland and member of the Armed Services Committee, gave an hour long presentation of Peak Oil in the US Congress (The full proceedings are available on www.peakoil.net). The peak predictions by King Hubbert and Colin Campbell were discussed. Mr Bartlett commented on the failure to heed the warnings:

> *We really had about 30 years warning that this (Peak Oil) was going to happen. M. King Hubbert predicted that oil would peak in this country in 1970 - and it did……. ten years later, we knew absolutely that he was right, because we were well down on the curve. We should have had some hint that he and Colin Campbell were probably right about world production. We paid no attention to that.*

(*M*r. Bartlett did however make one small irrelevant mistake when he stated that Colin Campbell is an American citizen who lives in Scotland, when he is in fact British, living in Ireland).

528. Something afoot in the Lebanon

Neither Syria nor the Lebanon is rich oil territory but they appear to be in the sights of the United States, possibly as part of an encirclement strategy. The previous Prime Minister of the Lebanon, who was opposed to the construction of a US military base in his country, was assassinated, and a possibly orchestrated popular demonstration urged the Syrians to pull back their forces which occupied the territory some years ago to protect it from Israel. The high price of oil may be instilling a new sense of urgency in whatever campaigns may be contemplated. It is rumoured that Iran is to be attached in June. Meanwhile, Mr Wolfowitz, widely identified as one of the architects of the Iraq invasion, has been proposed as the new head of the World Bank. Oil, money and geopolitics evidently walk hand in hand, leading some observers to wonder if the popular demonstrations in the Lebanon echoed similar events in Georgia, the Ukraine, and Kyrgyzstan, which were in part US funded in the name of "democracy", whatever that may precisely mean in these contexts.

529. Reserve Replacement Failing

As is well known, the major oil companies traditionally under-reported what they found to comply with strict Stock Exchange rules and conserve their assets, but those days are now virtually over. From a financial reporting standpoint, reserve replacement could be achieved by acquisition and revision, as well as actual discovery. Accordingly, most of the major oil companies, with the exception of Shell, managed to obscure their failure to match production with discovery by merging: Exxon-Mobil, Chevron-Texaco, BP-Amoco-Arco, Total-Elf-Fina.

But it begins to look as that escape route from confession is closing, for according to DataMonitor, they now report failing replacement: Chevron-Texaco 18% ; BP 89%; ExxonMobil 83% ; and Shell 30-40%. It is noteworthy in this connection that Shell has announced an agreement to market Kuwait's oil through its distribution system which certainly makes much more sense that trying to find what is not there to be found.

(Reference furnished by Alexander Wöstmann)

530 Reacting to terminal illness

Brian Regan makes a telling comparison, commenting as follows:

> It has occurred to me that Elisabeth Kübler-Ross' "grief cycle," initially discovered by her as the typical path of a patient's reaction to the unwelcome news of terminal illness, might also be applied to the end of cheap, suitable oil. I am listing it here, with my own guesses (in parentheses) about the reactions to peak oil, and some conjectures respecting the time frames of such reactions. I think it sums up much that has been written about the future effects of the phenomenon.
>
> **Shock Stage**: Initial paralysis at hearing the bad news. (Inability to relate the prospect of growth cessation to anything in past experience.) ca. 2000
>
> **Denial Stage**: Trying to avoid the inevitable. (Rigid refusal to accept the outlandish notion that cheap oil of the right kind will end soon.) 2000-2007
>
> **Anger Stage**: Frustrated outpouring of bottled-up emotion. (Outrage at "Big Oil," Saudi Arabia, China, government taxation, etc.) 2005-2009
>
> **Bargaining Stage**: Seeking in vain for a way out. ("Throw the bums out" by electing new leaders, heavy investing in expensive alternatives, calls for "science" to save us, expecting a *deus ex machina*.) 2008-2012
>
> **Depression Stage**: Final realization of the inevitable. (Even flat-earth economists surrender, presidential politicians state facts publicly, businesses begin collapsing in droves, return of the Great Depression foretokens collapse.) 2011-2015
>
> **Testing Stage**: Seeking realistic solutions. (National impoverishment forces abandonment of socialist policies and international development aid, various alternative-energy schemes tested and most abandoned, local farming grows, large cities wither, beginnings of martial law to keep order, interregional conflicts.) 2013-2025
>
> **Acceptance Stage**: Finally finding the way forward. (War, collapse.) 2018-2075

Calendar - Forthcoming Conferences and Meetings

ASPO members and associates [shown in parenthesis] will be addressing the subject of Peak Oil at the following conferences and meetings:

April 7th - Conference, Swedish Royal Academy of Science, **Stockholm** [Aleklett]
April 14-15th – Swiss Pension Fund Managers, **Interlaken** [Campbell]
April 22nd – Sanders Research, **London** [Campbell]
April 25th – Depletion Scotland, **Edinburgh** [Campbell, Skrebowski, Simmonds]
May 17th – Delft University of Technology "Where to find tomorrow's oil", **Delft,** Holland [Gilbert]
May 18th - SYNBIOS - the Syngas Route to Automotive Biofuels in **Stockholm**, [Aleklett]
May 19-20th – 4th ASPO International Workshop, Gulbenkian Foundation, **Lisbon** [various]
May 31st Oil and Gas Operations summit 2005, 31 May – 2 June 2005, **Dubai**, UAE [Aleklett]
June 18-19th - Permaculture Conference, **Cork, Ireland** [Campbell]
June 22nd - 2nd European Solar Thermal Energy Conference, **Freiberg**, Germany [Gilbert]
June 22-25th – Fourth Forum for Debate, **Salamanca, Spain** [Aleklett]
October 28-30th – Pio Manzu Energy Conference, **Rimini, Italy** [Campbell]

[Information on future events for inclusion in the Calendar is welcomed]

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