



**ASSOCIATION FOR THE
STUDY OF
PEAK
OIL & GAS**

ASPO NEWSLETTER No. 56, AUGUST 2005

ASPO is a network of scientists and others, 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. Independent national affiliates are in existence or formation in Canada, France, Ireland, Italy, Portugal, Spain and the United States.

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.*

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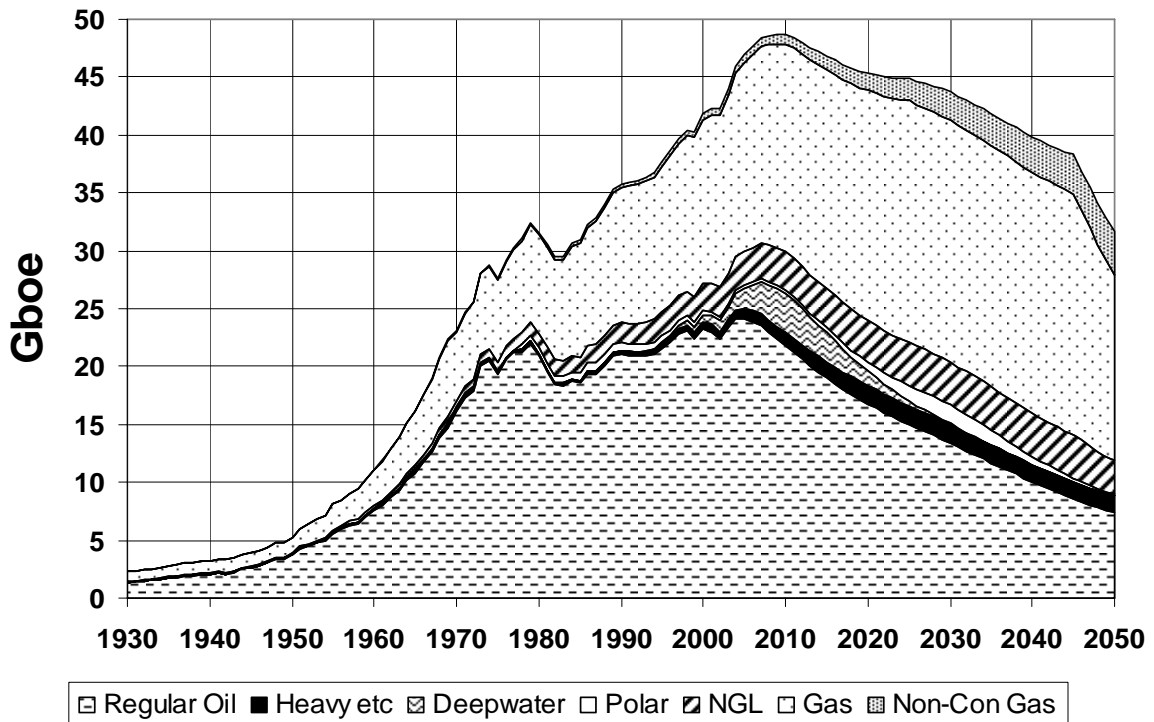
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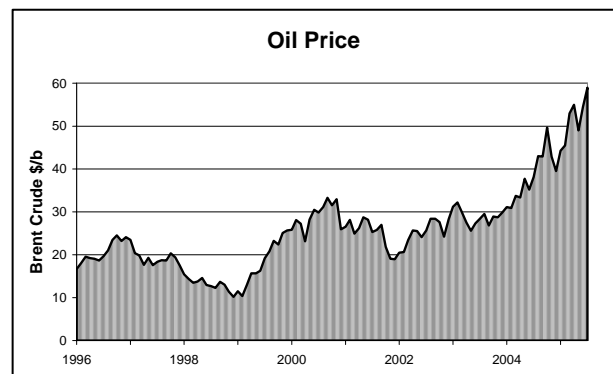
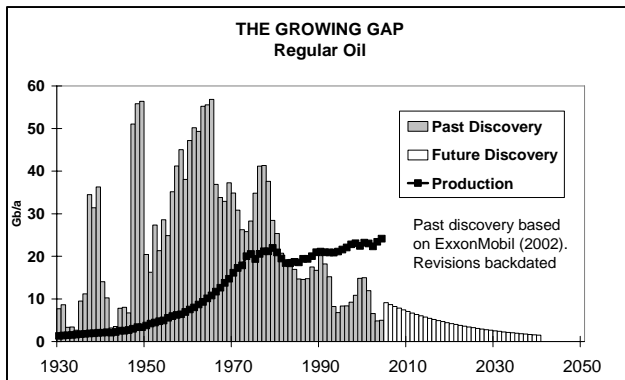
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The General Depletion Picture

OIL & GAS DEPLETION PROFILES 2004 Base Case



ESTIMATED PRODUCTION TO 2100							End 2004			
Amount			Annual Rate - Regular Oil					Gb	Peak	
Regular Oil			Mb/d					Total	Date	
Past	Future	Total	2000	2005	2010	2020	2050			
Known Fields	New		USA	4.5	3.4	2.7	1.7	0.4	200	1971
945	775	130	Europe	6.3	5.2	3.7	1.9	0.3	75	2000
	905		Russia	6.3	9.1	8.4	5.4	1.5	220	1987
			ME Gulf	19	20	20	20	12	680	1974
			Other	28	28	25	17	6	675	2004
			World	64	66	60	46	20	1850	2004
All Liquids			Annual Rate - Other							
1040	1360	2400	Heavy etc.	1.7	2.3	3	4	4	151	2021
2004 Base Scenario			Deepwater	1.7	4.8	7	6	0	70	2014
M. East producing at capacity (anomalous reporting corrected)			Polar	1.0	0.9	1	2	0	52	2030
Regular Oil excludes oil from coal, shale, bitumen, heavy, deepwater, polar & gasfield NGL			Gas Liquid	6.3	8.0	9	10	8	275	2027
Revised 17/07/2005			Rounding			0	2	2	2	
			ALL	74	82	80	70	35	2400	2007



575. BRITAIN TALKS OF INTRODUCING AN ENERGY RATION

A good reason for introducing an energy ration is because Britain's indigenous oil and gas supply is set to continue to decline to near exhaustion in about fifteen years, as confirmed by the Department of Trade and Industry. More political halos are evidently won by describing it as a response to climate change induced by burning fossil fuels. In any event, it is an excellent proposal especially if the ration could become a form of tradable currency, making the energy content of goods and services a primary component of their cost.

Britain Considers Energy Rationing to Meet Kyoto Obligations

By Mike Wendling, CNSNews.com Correspondent

June 21, 2005

<http://www.cnsnews.com/ViewSpecialReports.asp?Page=\\SpecialReports\\archive\\200506\\SPE20050621a.html>

London (CNSNews.com) - British residents could face a form of energy rationing within the next decade under proposals currently being studied to reduce the U.K.'s carbon dioxide emissions to comply with the Kyoto Protocol. Under the proposals, known as Domestic Tradable Quotas (DTQs), every individual would be issued a "carbon card," from which points would be deducted every time the cardholder purchased fossil fuel, for example, by filling up a car or taking a flight. Over time, the number of points allotted to each card would decline. High-energy users would be able to purchase points from low-energy users, with the end result being a trading market in carbon similar to the one already in place in the U.K. for industrial users.

A report set to be released this week by the Sustainable Development Commission, which advises Prime Minister Tony Blair on environmental issues, will recommend that by 2007, the British government should seriously consider introducing DTQs. The report, a draft copy of which was obtained by Cybercast News Service, calls for more research into how the proposals would work in practice.

British Environment Minister Elliott Morley said in a telephone interview that the DTQ plan, also called personal carbon allowances, is one of several being considered by the government.

"Personal carbon allowances are a very attractive intellectual idea," he said. "The implementation would potentially be very expensive, but that shouldn't stop us from looking at the arguments," he said.

Morley said the government was also considering a straightforward carbon tax, and acknowledged that the complexity of a centrally run system could be a major barrier.

"There is a big job involved in explaining the idea of carbon allowances to the public (but) we shouldn't rule any idea out just on this basis," he said.

One of Britain's leading scientists looking into the proposals characterized DTQs as a form of rationing and said the project would start from a point of strict equality in the allocation of "carbon points," despite wide current disparities in individual energy usage.

"Every individual, whether you're the Queen or someone living in a poor neighborhood, will get the same carbon allocation," said Kevin Anderson of the Tyndall Center at the University of Manchester.

A bill to establish DTQs and a trading system was introduced in the last parliamentary session by MP Colin Challen, a member of Blair's Labor Party. Challen's legislation was introduced as a private members bill, where debate is limited to ten minutes, and it stood virtually no chance of passing. Challen said that some sort of compulsory energy program would be necessary to meet Blair's environmental promises. Under the Kyoto accord, which the U.S. has backed out of, the U.K. will need to reduce its emissions by 12.5 percent by 2012.

Washington withdrew from the Kyoto Protocol in 2001. President George W. Bush said limits on greenhouse gas emissions would be too expensive to implement, harming the U.S. economy -- with adverse effects on American workers. President Bush also argued that the agreement did require developing countries to reduce their greenhouse gas emissions, even though some of those countries -- such as China and India -- are among the world's heaviest polluters.

Some scientists question whether global warming is taking place to begin with -- and whether the Kyoto Protocol is an effective solution. The Blair government, however, has unilaterally pledged to reduce U.K. carbon emissions by 60 percent by 2050. Scientists say more research is needed to understand how DTQs and other proposals designed to meet such goals would affect the British economy.

"We have to get far more personal in the ways we tackle carbon emissions," Challen said in a phone interview. "A voluntary approach will only get through to about 20 percent of the population."

Challen said his proposals have support among senior government officials in the U.K.'s Department for the Environment, Food and Rural Affairs, but said that some ministers were "understandably wary" of a mandatory plan with potentially sweeping economic consequences.

Researchers also have suggested that the plan could be linked to the Blair administration's proposed mandatory ID card, a controversial bill that is scheduled to be reconsidered in Parliament later this

month.

A proposal to issue every U.K. resident with a card containing biometric information such as fingerprints and an iris scan was opposed by the Conservative and Liberal Democrat parties in the last legislative term, and the bill failed after time ran out.

Anti-card campaigners have expressed worries about the possibility that the vast majority of U.K. energy transactions would be logged in a central database.

"There's clearly many other ways such a (carbon trading) scheme could be offered without adding the massive bureaucracy of an ID card system," said Michael Parker, spokesman for the NO2ID group.

However, the plan's proponents suggest that the rationing system could be implemented within the decade. "I'm not a betting man, but I think this could realistically be up and running within four to ten years," Anderson said

(Reference furnished by Mark Griffiths)

576. REACTION TO ITEM 573: OIL AND PEOPLE

Item 573, in which William Stanton discussed the impact of declining fossil energy supplies on population, triggered a predictably vigorous response. One or two correspondents almost took offence both at the article and its inclusion in the newsletter, while others accepted the thrust of the argument, seeing its relevance.

It prompted one correspondent to send a reference to Jevons Paradox

The Jevons Paradox, named after its discoverer, William Stanley Jevons, states that as technological improvements increase the efficiency with which a resource is used, total consumption of that resource may increase, rather than decrease. In particular, Jevons' paradox implies that the introduction of more energy efficient technologies may, in the aggregate, increase the total consumption of energy.

*In his 1865 book *The Coal Question* Jevons observed that England's consumption of coal soared after James Watt introduced his coal-fired steam engine, which greatly improved the efficiency of Thomas Newcomen's earlier design. Watt's innovations made coal a more cost effective power source, leading to increased use of his steam engine in a wide range of industries. This in turn made total coal consumption rise, even as the amount of coal required for any particular application fell.*

Jevons' observation is not a logical paradox, but it is still considered paradoxical because it runs counter to

the common intuition that improved efficiency enables people to use less of a resource.

A Corollary to the Jevons Paradox

Localized solutions to global problems often confound the solution of the overall problem. Jevons paradox implies that as individuals become increasingly efficient, the overall economy will compensate by supporting additional individuals and increasing overall consumption.

For example, consider a green business which attempts to alleviate global environmental concerns by consuming renewable energy resources. If the business saves 10 units of energy from the local power plant which operates at 40% efficiency, they will save 1000 units of currency. This cost savings will allow the business to hire an additional two employees.

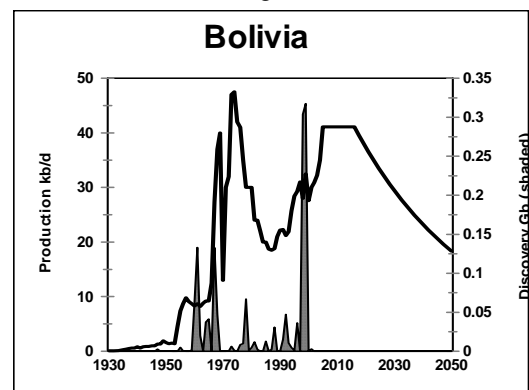
However, each of these two employees must commute to work in automobiles. These automobiles still consume 10 units of energy because they operate at only 15% energy efficiency. Thus by switching to renewable energy, the business has reduced the overall energy efficiency per unit of consumed resources from 40% to 15%.

By first saving money, then using it to hire two new employees, the green business has actually expanded the economy. The expansion of the economy will most likely result in an overall increase in energy consumption, which in the example above also shows the possibility of reducing energy efficiency by its effects in the wider community.

This paradox illustrates how difficult it is to solve global economic problems.

577. COUNTRY ASSESSMENT – BOLIVIA

Bolivia is a landlocked country of 1 000 000 km² in the heartland of South America, being bordered by Brasil, Paraguay, Argentina, Chile and Peru. La Paz, the capital, lies at an altitude of about 3500m on the Altiplano, which is a barren upland intermountain valley, flanked by snow-capped Andean peaks, rising to over 6500m. The Altiplano is dominated by Lake Titicaca, an unusual high altitude lake, covering some



8500 km² , on which ply steamers of almost ocean-going size. To the east of the Andes lies the Oriente, an extensive and remote area of foothills, plains and tropical forests, occupying about two-thirds of the country.

Bolivia is a sparsely populated country of about 9 million, of whom some 70 percent are of pure Quechuan Indian stock. The Altiplano was already a centre of population in the 7th Century when it formed the seat of the Tiohuanaco Empire that held sway of much of Bolivia and Peru. In 1524, Francisco Pizarro, a Spanish explorer, landed in Peru, returning in 1531 to bring the territory into the Spanish Empire with the dual pragmatic objectives of introducing Christianity and exploiting its gold and silver. The rich Potosi silver mines of Upper Peru (now Bolivia) were found in 1545, and proved a remarkable source of wealth for centuries to come.

The oppressed Indian population revolted from time to time, with a notable uprising in 1780 being led by a descendent of the last Inca. Spain fell to Napoleon in the closing years of the 18th Century, paving the way for Latin American independence, being led primarily by Simon Bolivar, who marched south from Venezuela, and Jose San Martin, who marched north from Argentina. There were also more local uprisings led in Chile by Bernardo O'Higgins, who surprisingly was of Irish birth, and in Bolivia by General Sucre. Formal independence was declared in Bolivia in 1825.

The succeeding years were fraught with difficulties as was the case in most of Latin America. The guano deposits of what was coastal Bolivia were desperately needed as a source of synthetic fertiliser to support agriculture in overpopulated Europe, leading Chile, backed by foreign mining companies, to take the territory from Bolivia in the Nitrate Wars of 1879-84.

Military government alternated with democratic administrations over the following decades in a highly stratified society. The mineral wealth dominated the country's economy, especially following the discovery of substantial tin deposits, with rubber plantations in the eastern territories enjoyed a temporary boom before being sold to Brasil in 1903. A disputed boundary with Paraguay in the remote southeast part of the country, which was thought to have oil prospects, led to the Chaco Wars of the 1930s in which 100 000 died. Bolivia later nationalised the holdings of Standard Oil (Exxon).

The Second World War saw the emergence of a new political confrontation between fascist and communist persuasions, reflecting in a sense the eternal conflicts of a social structure made up of a privileged, landed elite and a large proletariat of downtrodden miners and

peasant farmers. In 1952 came the National Revolution in which the foreign mining companies were

BOLIVIA		<i>Regular Oil</i>
Population M		8.8
Rates Mb/d		
Consumption	2004	0.05
	per capita b/a	2.0
Production	2004	0.035
	Forecast 2010	0.041
	Forecast 2020	0.037
Discovery 5-yr average Gb		0.001
Amounts Gb		
Past Production		0.45
Reported <i>Proved Reserves</i> *		0.4
Future Production - total		0.8
	From Known Fields	0.55
	From New Fields	0.25
Past and Future Production		1.25
Current Depletion Rate		1.6%
Depletion Midpoint Date		2016
Peak Discovery Date		1966
Peak Production Date		2010

*Oil & Gas Journal

nationalised and universal suffrage and land allocations were granted to the Indian peasants. A reaction followed in 1964 with a return to military government under General Barrientos, who survived an attempted coup organised by the well-known Che Guevara, now a T-shirt icon. An even more oppressive regime followed, suppressing the labour movements and placing the mines under military control.

In geological terms, Bolivia is dominated by the great Andean chain, which is made up of the Western Cordillera, capped by recent volcanoes; the Altiplano and Pampean Massifs composed of partly mineralised granitic intrusions; and the Eastern Cordillera comprising folded and faulted Palaeozoic rocks. To the east lies a mildly deformed Sub-Andean zone flanking the Brazilian Shield. The oil prospects are mainly confined to the Sub-Andean Zone which may be divided into the remote Beni Trough in the north and an extension of the Neuquen Basin of Argentina in the south. Whereas northern South America is blessed with highly prolific Middle Cretaceous source-rocks, the southern part of the continent has to rely on much leaner older sources, principally in the Silurian in eastern Bolivia and the appropriately named Vacas Muertas (dead cows) Formation of the Jurassic in southern Bolivia and neighbouring Argentina. It is not surprising therefore that the region is much less well endowed and rather gas-prone.

Exploration commenced in the 1920s, led by Exxon, which was already at work in the adjoining Neuquen Basin of Argentina, but the results were disappointing. Even so, some 380 wildcats have been drilled, finding about 1 Gb of oil, of which 450 Mb have been produced, with the State company, YFPB, taking a strong position. Future discovery is here estimated at not more than about 250 Mb. As much as 60 Tcf of gas has been found, mainly in the remote northern Sub-Andean Zone, of which 5 Tcf have been produced. Plans to export this gas to Brasil and Chile have been under consideration for several years, but have met with political opposition. NGL production from gas plants stands at 11 kb/d with past production amounting to 60 Mb. Future production may amount to about 600 Mb, being a very valuable resource for the country's future, if it should succeed in preventing its export.

Oil production commenced in 1937, rising to a first peak in 1974 at 48 kb/d. It then fell to a low of 19 kb/d in 1986 before recovering to its present level of 35 kb/d. It is here expected to increase to about 40 kb/d, and remain at that level until the midpoint of depletion in 2016, being constrained by pipeline capacity, before declining at the then Depletion Rate of 2.3%.

Earlier this year, socialist opposition managed to pass a bill increasing royalties on foreign oil companies to 50%, prompting strong reactions from Petrobras of Brasil and Repsol of Spain, the two principal operators. The issue has led to further recent political turmoil with the fall of the government after widespread demonstrations, calling for the nationalisation of foreign oil companies. The root causes may relate to deep-seated social conflicts, compounded by efforts to stamp out the cocaine trade, on which many peasant farmers must rely for their livelihood. The wealthy foreign oil companies, seeking to export the national patrimony in the form of gas and gas liquids, offer useful political scapegoats.

578. NUCLEAR ISSUES

The current issue of Nuclear Issues (Vol 37/7 June 2005), which is a newsletter for the nuclear industry, devotes itself to Peak Oil, evidently based largely on the ASPO Workshop in Lisbon. Its message is summed up by the following extract:

World societies and economies will have to adjust to a new energy model. Reducing and minimizing oil consumption for transport may provide some short term relief but to avoid a forced and consequently disastrous reduction in population levels to the pre-industrial levels, that could be supported by renewable energies alone, a rapid expansion of nuclear power is the only alternative available.

579. SILVER- LINING IN MIDDLE EAST CONFLICT

It seems quite evident now that US policy makers had been considering military intervention in the Middle East for many years prior to the events of September 11th 2001. James Baker, the former Secretary of State, went so far as to say that it was intolerable that a strong leader, such as Saddam Hussein, should be in a position to gain control of American oil supply on which "American jobs" relied.

The invasion of Iraq was duly undertaken, and Iran is now threatened on one pretext or another. But the experience of Iraq shows that resistance movements fight on as they did in Europe during the Second World War. Furthermore, Iraq, which was something of an artificial construction, put together by Britain with the advice of the indomitable Gertrude Bell after the First World War, may yet disintegrate into various factions in conflict with each other. Iran would be an even tougher nut to crack with 60 million inhabitants, defending their birthright, who have recently elected a new nationalist leader.

It seems most unlikely therefore that the plan of imposing so-called democracy as a cloak, beneath which foreign companies may exploit the national oil reserves as fast as possible, will succeed.

But ironically, the turmoil, suffering and death brought about by the invasion of Iraq and whatever may follow in Iran, do carry a certain unintended silver linings. Oil production will hardly increase under these conditions, meaning that there may still be more left in the ground for the future when it will be desperately needed. Those who suffer the consequences of the attacks so dreadfully may not do so totally in vain.

580. RESERVE TO PRODUCTION RATIO

Reserve to Production Ratio was a rule-of-thumb measure of security of supply in the early days of the oil business when there was still plenty left to find. It is still used by vested interests (including the Chief Executive of a well known oil company) to mislead people into thinking that there are 40 years of production at present rates, as if it were remotely plausible that production should stop dead on Year 41. All oilfields are observed to decline gradually not reaching an abrupt end.

Seppo Korpela (Department of Mechanical Engineering The Ohio State University, USA) offers the following review of the subject:

Reserve Lifetime

The statement that, present production of oil can be kept up for 40 years, rings familiar to all who follow the Peak Oil discussion. For the world this means that a 25 billion barrel yearly production leaves 1000 billion left to produce. How does this square with Hubbert's methodology?

According to the logistic equation

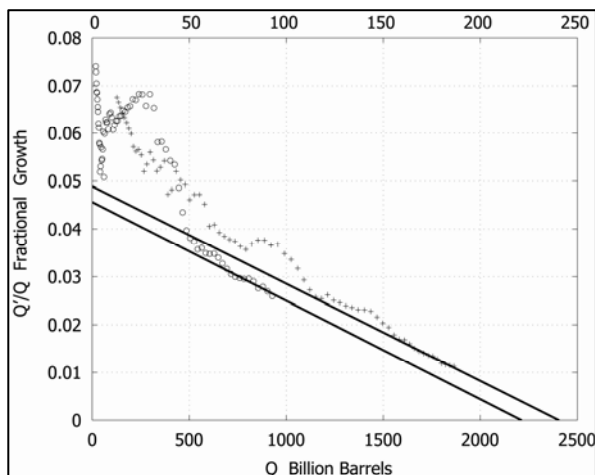
$$Q' = a Q (1 - Q/Q_0)$$

used by Hubbert, peak production takes place at half way point and the peak production rate is given by $P = aQ_0/4$, in which Q_0 represents the ultimate production and a is the intrinsic growth or decay factor. If N is used to denote the number of years that the remaining oil can be produced at the peak rate, then

$$P N = Q_0/2$$

By substituting the peak rate into this equation and solving it for N gives

$$N = 2/a$$



This equation is independent of the ultimate production and only requires an estimate for the value for a . It can be obtained from plotting Q'/Q vs. Q , as was shown by Hubbert in his report *Techniques of Prediction as Applied to Production of Oil and Gas*, US Department of Commerce, NBS Special Publication 631, May 1982. This plot is shown below for the United States and the world. For the world the coordinate along the bottom edge gives the cumulative production, for the US the cumulative production is shown along the top edge.

Since the left intercept gives an estimate for the value of a , a satisfactory approximation is $a=0.05$. Substituting this into the last equation gives $N=40$ years.

In my reading of papers on oil depletion I have not come across this interesting result before. But its significance is clear. A 40 year lifetime for reserves should not lead to complacency but should be taken as

a signal that the Peak Oil is here, particularly as discovery has ground to a halt.

Since use of reserve lifetime is so common in the world press, it is not surprising that officials of Saudi Aramco should use it in discussion of its future production. In the recent important book *Twilight in the Desert*, by Matthew R. Simmons, the top management of Saudi Aramco is quoted as saying that Saudi Arabia can produce oil at 20 million barrels per day for 20 years. This gives 146 billion barrels yet to produce and also that 10 million barrels could be produced for 40 years. This 40 year reserve lifetime, and the analysis presented above, show that, if these statements by the Saudi Aramco are taken at their face value, then the Saudi production of 10 million barrels per day represents, in fact, the peak production rate.

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581. DVD ON PEAK OIL

A DVD, entitled *Peak Oil – Imposed by Nature*, by Amund Prestegard, the Norwegian TV producer, is available from www.peakoil.ie/dvd. It features various ASPO personalities, including the Honorary Chairman, seen clambering over the rocks of Ireland.

582. AIR MILES

A bizarre feature of the modern World is that aviation fuel and ships bunkers are free of tax. The G8 Leaders now propose to tax airfares to raise funds for Africa, also seeking ways to unobtrusively write off bad debt. The following article by John Busby addresses the future of aviation in the face of oil depletion, emphasising the absurdity of expanding airports, based on the past trend of rising travel without taking into account the fuel constraints, not to mention the soaring fuel cost (even tax free).

How many air-miles are left in the world's fuel tank?

Jet fuel

In BP's *Statistical Review 2005*, jet fuel consumption figures are obscured by being "rolled-up" in regional statistics for "middle distillates", which include kerosene, jet fuel, diesel and fuel oils. To obtain a rough guide for global jet fuel consumption, the US airlines consumed 18.5 billion gallons in 2004 compared with the US middle distillates consumption of 6087 thousand barrels per day in the same year. From this it can be derived that roughly 20% of the distillates production is civil aviation jet fuel.

Global oil products amounted to 77,028 thousand barrels per day in 2004 extracted from 80,260 barrels crude oil at an average refinery efficiency of 96%. Middle distillates totalled 27,741 thousand barrels per

day and taking 20% of this and converting the result gives an aviation jet fuel consumption of 2.0 Gb (billion barrels) or 240 million tonnes.

Airbus predicted passenger traffic would consume 180 million tonnes in 2004, which with air freight traffic taking up the other 60 million tonnes or 25% of the total, a figure of 240 million tonnes or 2Gb, for passenger and cargo air transport, excluding military usage seems a reasonable estimation.

Airport runways

In 2002 the UK Department of Transport announced a consultation on airport runway capacity, assuming that the usage of air transport will double by 2015 and triple by 2030. This is achieved by an exponential annual growth in passenger air traffic of 4.5% over the period. An expansion of air traffic in the UK would match a similar increase in international traffic. Domestic traffic in the UK and other countries would grow to feed rising international activity. The department concluded that airports should be expanded and runways built to match the anticipated demand.

Passenger traffic

Airbus, the European aircraft manufacturer predicts an annual global growth rate in passenger traffic of 4.5% beginning in 2000 at 3.2×10^{12} passenger-km/annum (or 2×10^{12} air-miles/annum). If sustained this would rise to 12×10^{12} passenger-km/annum (or 7.5×10^{12} air-miles/annum) in 2030. The cumulative passenger-km over the 30 years totals 200×10^{12} passenger-km (or 125×10^{12} air-miles).

Freight traffic

Airbus forecasts an increase in freight traffic of 5.9% per annum, rising from 120×10^9 tonne-km (75×10^9 tonne-miles) in 2005 to 440×10^9 tonne-km (270×10^9 tonne-miles) in 2023 to around 500×10^9 tonne-km (310×10^9 tonne-miles) by 2030, totalling $7,000 \times 10^9$ tonne-km (or $4,300 \times 10^9$ tonne-miles).

About a third of this freight is carried in the "belly" of passenger aircraft.

Civil aviation jet fuel requirement

With the introduction of the Airbus A380 super-jetliner and other fuel efficient aircraft from Boeing, it is expected that the jet fuel requirement for a fleet gradually renewed will reduce by 2% per annum, so that a 4.5% increase per annum in passenger traffic and a 5.9% increase in freight traffic would result in a 2.5% and 3.9% increase in jet fuel consumption per annum respectively.

This equates to a consumption in the 11 years up to and including 2015 of 2930 million tonnes or 24 Gb of jet fuel and in the 26 years up to and including 2030 of 9370 million tonnes or 76 Gb of jet fuel.

Military uses

As well as military aircraft, jet fuel is now used for armoured vehicles, on the basis that battlefield logistics are aided by a uniformity of fuel for army helicopters and tanks. The use of jet fuel for military purposes depends on the level of war activity which has been exceptionally high over the last decade, but whether this is significant in depleting the oil resources it is intended to secure is a mute point.

Refinery yield

There is a reduction in the yield of jet fuel from 25% to 8-10% as North Sea crude oil production runs down and more Middle East crude has to be used. This means that the proportion of jet fuel to other refinery products is progressively reduced unless the refinery product profile is modified by installing additional equipment. More fuel is consumed internally, reducing the overall output while maintaining the yield of jet fuel, so a reduced refinery efficiency of say 91% will apply from now as a greater proportion of Middle East crude oil is refined.

In 2004 global jet fuel consumption was around 2 Gb or 240 million tonnes which comprised 7.2% of total oil products. By 2015 crude oil production has fallen from a peak in 2010 of 30 Gb to 27 Gb, while the crude oil equivalent to the projected jet fuel requirement will be $2.65/0.91 = 2.9$ Gb (or 11% of oil production), but by 2030 oil production has fallen to 18 Gb, while the crude oil equivalent will have risen to $4.9/0.91 = 5.4$ Gb (or 30% of oil production). Demand for other oil products will make the attainment of 11%, let alone 30%, of crude oil production as jet fuel impossible.

Although the synthesis of jet fuel from natural gas or coal will offer some relief, there is no potential substitute for the bulk of the jet fuel currently obtained from crude oil. In any case the remaining natural gas and coal will be required for the myriad of competing energy-consuming purposes currently reliant on oil.

An exponential growth rate in passenger traffic of 4.5% and in freight traffic of 5.9% (in accordance with Airbus forecasts) would require an amount of jet fuel impossible to procure.

Air miles

Accepting that peak oil occurs by 2007 and assuming that refinery profiles allow 7.2% of the declining crude oil production to be processed to jet fuel at 91% thermal efficiency, then from the 600 Gb of production of regular oil plus all other liquids available between now and 2030, around 40 Gb or 6400 billion litres of jet fuel would be produced. Assuming 25% of this is devoted to air freight, 30 Gb or 4800 billion litres would be available for global passenger traffic. An average specific consumption over the period of 3.8 litres per 100 passenger-km would provide 125×10^{12}

air-km (or 78×10^{12} air-miles), compared with the 200×10^{12} passenger-km (or 125×10^{12} passenger-miles) or 60% of the traffic anticipated in the UK Department of Transport's projections.

Freight miles

Consumption of the 10 Gb or 1,235 million tonnes of jet fuel available for freight traffic from 2005 to 2030 would allow for $3,160 \times 10^9$ tonne-km of freight ($2,000 \times 10^9$ tonne-miles) traffic compared with the $7,000 \times 10^9$ tonne-km ($4,300 \times 10^9$ tonne-miles), i.e., 45% of that projected by Airbus.

Runways

In effect this means that over the 25 years leading up to 2030, only around 60% of the passenger and 45% of the freight markets' expectations can be fulfilled, though the fuel deficit will be most evident towards the end of the period. Well before this aircraft orders will be cancelled and the enhanced fuel efficiencies anticipated will not be realised as the proportion of old aircraft will rise, exacerbating the fuel shortages.

The UK Department of Transport and Airbus forecasts do not consider the fuel resource implications inherent in their projected expansion in air traffic. This unconsidered factor determines that the growth in traffic envisaged cannot be realised as jet fuel production will be unable to match demand. The higher the rate of depletion of limited oil reserves, the sooner the collapse of the air travel business.

The building of additional runways in order to satisfy a perceived rise in passenger air travel, raises expectations that cannot be fulfilled. The runways at Stansted and Heathrow, if they are ever built, will serve as parking lots for redundant aircraft.

The demise of the aircraft industry will be signalled by the progressive grounding of the aircraft fleets, as a reduction in the supply of jet fuel will be the first indicator of the end of the oil era.

Global warming

Between 2005 and 2030 some 40 Gb (i.e. 5.04 billion tonnes) of jet fuel will be consumed. Taking account of the refinery loss of 91% gives an equivalent 5.54 billion tonnes of product with a carbon content of 85.8%. When burned it will yield $5.54 \times 0.858 \times 44/12 = 17.4$ billion tonnes (or say 17 petagrams, i.e., $17 \text{ g} \times 10^{15}$) of carbon dioxide.

583. VENEZUELA TAKES A LEAD IN PREVENTING PROFITEERING FROM SHORTAGE

ASPO has already proposed the so-called Rimini Protocol, whereby importers would cut imports to match World Depletion Rate (currently 2.6%). By

putting demand into balance with supply, whose decline is imposed by Nature, the Protocol would stabilize world prices at levels in reasonable relationship with actual production cost. It has two prime objectives: first, to encourage consumers to reduce waste and bring in renewable energy sources to the extent possible; and, second, to prevent profiteering from shortage (however unintentional), which involves massive destabilizing financial transfers to the Middle East.

Further plans to raise awareness of this solution are in progress. It is significant that Venezuela seems to be aiming in the same direction.

Venezuela leads energy pact

CARACAS, Venezuela June 30, 2005 5:11:37 PM IST
http://news.webindia123.com/news/showdetails.asp?id=92872&n_date=2005063

In accordance with Title 17 U.S.C. Section 107, this material is distributed without profit to those who have expressed a prior interest in receiving the included information for research and educational purposes. Venezuela, South America's leading oil exporter, led the signing of an energy cooperation agreement among 13 nations, including Cuba.

The Petrocaribe Alliance -- signed at a one-day summit in Puerto La Cruz, Venezuela -- will supply cheaper oil to member nations. To do that, the agreement calls for the creation of a regional refinery network, overseen by Venezuela, to produce and ship oil to member nations, El Universal reported Thursday

President Hugo Chavez also pledged to pick up 40 percent of the cost of oil going to Petrocaribe countries if the price per barrel on the world market was higher than \$50 a barrel as it is now.

He also said the agreement would lower costs by eliminating intermediary oil traders that inevitably lead to higher prices at the pumps. Venezuela wants to share its energy potential with South America and the Caribbean, Chavez told leaders.

Two Caribbean nations - Barbados and Trinidad and Tobago - elected not to sign the Petrocaribe agreement Wednesday saying they needed more time to study its terms. (Reference furnished by Nick von Glahn)

584. COPIED TO THE PRIME MINISTER OF CANADA

The following letter by Peter Salenius has been copied to the Prime Minister of Canada, a member of the G8 leaders, who are evidently still unable to grasp that oil and gas are finite resources.

Subject: LETTER TO THE EDITOR Sent: 7/10/2005
Re: Increase Energy Investment: G8, July 9

The G8 leaders have finally understood how important finite geological energy has been for the global economic growth with which they are so enamoured. However their call for "more investment in energy [oil and gas] production" and "expansion of refinery capacity" indicates they have not yet understood that the 'Petroleum Interval' must end; nature stopped making the stuff millions of years ago. The depletion of non-renewable resources (including fossil and fissionable nuclear energy) has been well explained since Hubbert's research in the 1950s. This inevitable exhaustion scenario, starting with oil in the United States in the 1970s, has been repeated in country after country since global fossil fuel discoveries peaked in the 1960s. We will ultimately drain even the vast deposits in the Middle East by your insistence on continuing energy-driven economic growth. The investment that is necessary now should be into decreasing consumption and the renewable energy solutions, upon which we will ultimately be dependent, as opposed to a myopic concentration on the fossil fuel albatross.

*Peter Salonijs,
Durham Bridge, NB*

585. CHEVRON ADMITS TO PEAK OIL AND DEPLETION

To its great credit, Chevron, one of the world's largest oil companies, now admits to the imminent peak and decline of oil, with a website entitled www.willyoujoinus.com inviting comment and discussion. It has also placed an impressive centre-spread advertisement in the Financial Times and in other places carrying a letter from Chairman, which ends with the words:

We call upon scientists, educators, politicians, policy-makers, environmentalists, leaders of industry and each one of you to be part of reshaping the next era of energy.

He leaves no doubt that this era will be one of declining oil supply, and deserves to be an Honorary Member of ASPO, echoing its mission.

(Reference furnished by Chris. Skrebowski)

586. UK NATURAL GAS PRICES SOAR

Britain becomes a net gas importer next year on a steeply rising trend, which is hardly surprising given the official recognition of depletion (see Item 575 above). Prices accordingly begin to soar. Ireland's situation may be even worse. 40% of its electricity is generated from gas, most imported from Britain which will likely be reluctant to re-export when she

desperately needs all she can get herself. It sounds as if all these lights and computers will be going out.

Energy Intelligence (Wednesday, July 13, 2005)

Although crude oil prices climbed back over \$60 per barrel Tuesday, the most pronounced strength in energy prices is in British natural gas. In fact, the predicted super spike to over \$100 per barrel is already upon us if you look at winter gas prices for the UK National Balancing Point (NBP). UK gas for delivery in January 2006 traded both over-the-counter (OTC) and on IPE futures at £1.07 per therm on Tuesday morning. That's the equivalent of \$18.65 per million Btu or more than double US gas market price levels, and the equivalent of crude oil at a heady \$108 per barrel. The strength of UK gas prices reflects a number of factors including high oil prices which are expected to underpin European gas for the rest of the year. In addition, low water levels in Europe this summer are curbing hydro-power and nuclear power output, forcing greater reliance on gas and reducing storage volumes

(Reference furnished by Julian Darley)

587. CLIMATE CHANGE AND PEAK OIL

Michael Meacher, a former British Cabinet Minister, adds his voice to the growing consensus by stressing the need to integrate the responses to Peak Oil and the not unrelated threat of adverse climate change. This is indeed a theme to be addressed at the Rimini Conference in October.

I became aware of Peak Oil when I met Colin Campbell at a conference in Dublin called to examine this subject. With hindsight now, it can all seem a little obvious: oil is clearly a finite resource that's going to run out. There are really serious implications arising from the dramatic drop in major new oil field discoveries, the consequent rate of depletion and the frightening hole that a lack of oil would make in so many areas of the world's economy. These problems are not well recognised. Some might say that the consequences are so immense, so fundamental to the way the world currently runs itself, that the scale of the problem has become part of the problem itself: something many would rather not contemplate.

Yet contemplate it we clearly must if the effects are to be successfully ameliorated. Considering that oil production could peak in five to ten years, the low level of awareness among politicians - and the general public - must be significantly raised. Prior to the G8 summit at Gleneagles in July 2005, climate change and poverty climbed the public agenda with a degree of insistency that should equally be applied to Peak Oil. The actions needed to tackle climate change - reducing dependency on carbon emitting energies, growing the use of renewables - chime well with some of those

needed to deal with the implications of Peak Oil. Perhaps linkage between the two might stimulate progress on both, something that is sorely needed if either is to be properly addressed.

588. END OF CHEAP OIL

A good summary of the above subject by Kerr and Service has appeared in the prestigious journal *Science* (v 209 July 2005). It stresses the scale of the problem facing the world after Peak Oil. That production will reach a peak is accepted as virtually self-evident, with the debate being concerned only over a comparatively narrow range of dates when the decline will commence.

(Reference furnished by Walter Youngquist)

589. OFFSHORE DISCOVERY CONTINUES TO DECLINE

The June issue of the *Offshore Engineer* reports the following discoveries for the first half of 2005

226 Mb in 32 discoveries in under 500m of water (Average size 13 Mb)

390 Mb in 9 discoveries in 500-1500m (Average size 43 Mb)

320 Mb in 5 discoveries in over 1500m (Average size 64 Mb)

The low average size suggests that few can be actually developed commercially. It remains to be seen how much will be found onshore and during the second half of the year, but it is evident that the gap between discovery and consumption continues to widen. It explains why the more responsible companies begin to alert the world to the reality of depletion, so long obscured by reporting practices (see Item 585 above).

(Reference furnished by Chris Skrebowski)

590. ENERGY EFFICIENCY

It is often claimed that the world has become much more energy efficient in recent years, as demonstrated by the falling energy component of manufacturing, as

measured against Gross Domestic Product. If oil production followed normal economic rules there might be some validity in such a conclusion, but the price of oil has little to do with its actual production cost, most being revenue to governments, itself carrying many serious distortions as endemic to tax calculations. The past apparent improved efficiency may have been due to a fall in oil prices related to OPEC policy and discovery patterns rather than actual efficiency in usage. The current high price of oil must be raising the energy component of manufacturing, but this does not in itself speak of lower efficiency, notwithstanding the monolithic waste of energy characterizing modern society. Cuba, where hitchhiking is mandatory and vegetables are grown in window boxes, may have one of the world's most energy efficient economies, but that is not quite how economists would see it.

591. PEAK OIL IN WASHINGTON

An important meeting, attended by key political figures, was held in Washington on July 25th on the issue of Peak Oil. The speakers included Jack Zagar (ASPO Ireland), Matt. Simmons, Herman Franssen, and Roscoe Bartlett, who have done much to raise awareness of ASPO and its mission in the USA.

592. ASPO-USA CONFERENCE

Information about ASPO-USA's November 10-11 peak oil conference in Denver, Colorado will be available August 1 through the following website: <http://www.aspo-usa.com/fall2005/>. The list of 20+ speakers presenting at the conference will include Matthew R. Simmons (Simmons & Co-Int'l), U.S. Rep. Roscoe Bartlett (invited; R-Maryland; peak oil speaker on the House floor), Jeremy Gilbert (BP Chief Petroleum Engineer, ret.), Roger Bezdek (pres. MISI, co-author of peak oil report for U.S. Dept. of Energy), Tom Petrie (co-founder Petrie/Parkman), and many others. The City of Denver is an active cosponsor, and Mayor John Hickenlooper-a petroleum geologist by training-will address the attendees. Additional contact information is available through the website.

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:

Sept. 23-25 - Second U.S. Conference on Peak Oil and Community Solutions, Yellow Springs, Ohio

October 10-12th - Peak Oil II, Alexander Oil & Gas, **Koblenz**, Germany [Campbell]

October 11th – The End of Oil: peak oil, food and the economy, **London**, UK

October 20-21 – Peak Oil, US National Academies, **Washington**, USA [Gilbert]

October 28-30th – Pio Manzu Energy Conference, **Rimini, Italy** [Campbell, Zagar]

November 10-11 – Peak Oil Conference, **Denver**, USA (ASPO-USA) [Gilbert]

November 14-16 – Safety & Security of Energy Infrastructures, EU Commission, **Brussels** [Alekklett]

Information on future events for inclusion in the Calendar is welcomed

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