THE ASSOCIATION FOR THE STUDY OF PEAK OIL AND GAS

"ASPO"

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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.***

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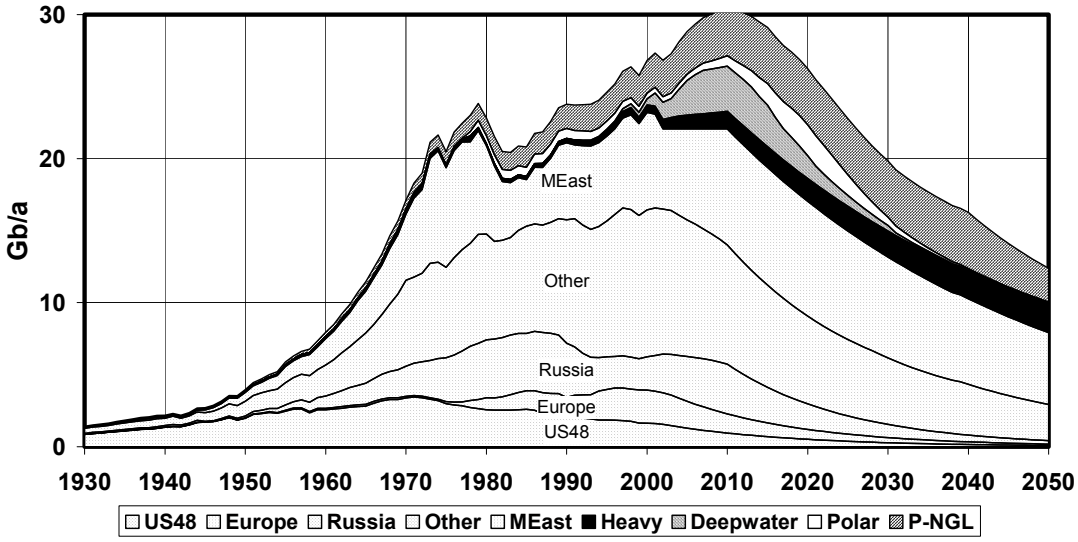
CONTENTS

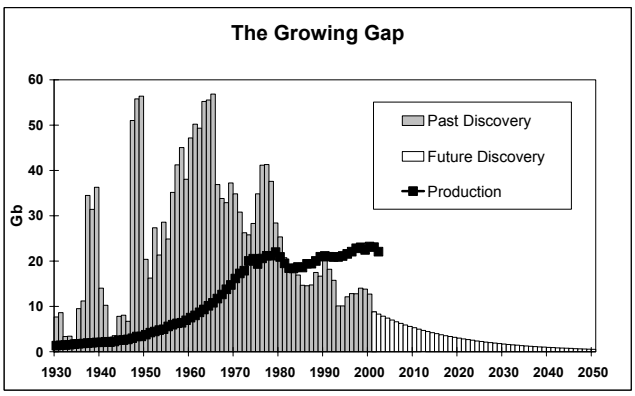
Index of country assessments with Newsletter Reference

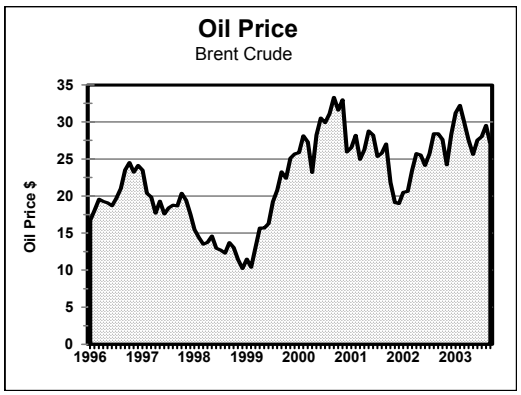
The General Depletion Picture

Oil & Natural Gas Liquids
2003 Base Case Scenario



ESTIMATED PRODUCTION to 2075										
Amount			Gb	Annual Rate - Regular					Mb/d	Peak
Regular Oil					*2005*	*2010*	*2020*	*2050*	*Total*	Date
Past	Future		Total	US-48	3.5	2.6	1.4	0.2	195	1971
Known Fields		New Fields		Europe	5.1	3.7	1.9	0.3	76	2000
896	871	133	1900	Russia	8.6	9.4	4.9	0.7	200	1987
All Liquids				M.E.Gulf	17	22	22	13	749	2014
986	1714		2700	Other	26	22	17	8	680	2003
Status end 2002	*Estimates rounded*			**World**	60	60	47	22	1900	2000
Base Case Scenario :				Annual Rate - Non-Regular						
Flat demand to 2010 for Regular Oil from recession.				Heavy etc	2.8	4	5	6	300	~
				Deepwater	5.6	8	4	0	60	2012
M.East swing role ends 2010				Polar	1.2	2	6	0	60	2020
Regular Oil includes condensate but excludes liquids from gas fields				Gas Liquid	8.2	9	11	6	400	2027
				ALL	78	83	72	33	2700	2010





251 Oil reserves and UK airport capacity by John Busby

Diminishing oil reserves will curtail air traffic in a decade or so, and the suggested expansion of airports and associated runways is likely to lead to a surplus of capacity. It is not just a question of price or affordability. An exponentially increasing annual amount of jet fuel when extracted from a declining quantity of crude oil at lower yields will accelerate the emptying of the reserves.

When in 2002, the UK Department of Transport announced a consultation on airport runway capacity, it was assumed that the usage of air transport will double by 2015 and triple by 2030. This is achieved by an exponential annual growth in air traffic of 5.5% until 2015 or 4% over the entire period to 2030.

Airbus (See ref. below), 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 7.4×10^{12} air-miles/annum) in 2030. The cumulative passenger-km over the thirty years totals 204×10^{12} passenger-km (or 127×10^{12} air-miles).

With the introduction of super-jetliners, Airbus expects to reduce the jet fuel requirement by 2% per annum, so that a 4.5% increase per annum in passenger traffic would result in a 2.5% increase in jet fuel consumption per annum. This equates with a consumption in the thirteen years up to 2015 of 2900 million tonnes of jet fuel and in the twenty-eight years up to 2030 of 8200 million tonnes of jet fuel.

(160 million t/annum in 2000, 272 million mt/a in 2015, 423 mt/a in 2030)

The reduction in the yield of jet fuel as the production of North Sea crude (25% yield) declines means more Middle East crude (8-10% yield) has to be used. The other refinery products will have to be produced in a greater proportion to jet fuel than currently is the case. For jet fuel production to expand by 2.5% per annum oil reserves would have to be depleted at a greater rate unless adjustments to refineries are made.

Although a refinery product profile can be modified by installing additional equipment, more fuel is consumed internally, reducing the overall output while increasing the yield of jet fuel. An exponential growth rate in air traffic of 4.5% over twenty-eight years would require an amount of jet fuel impossible to procure. Total oil production is expected to rise from 27 Gb in 2002 to a peak of 31 Gb in 2010. It falls to 29 Gb in 2015 when the oil requirement for jet fuel manufacture will be 2.2 Gb (or 8% of oil production), but by 2030 oil production may well have fallen further to 19 Gb, while the oil requirement for jet fuel manufacture would have risen to 3.4 Gb (or 18% of oil production). In 2000 jet fuel comprised 4.5% of total oil products. With falling jet fuel yield, demand for other oil products will make the attainment of 8%, let alone 18% of oil products as jet fuel impossible.

In the period to 2030 total oil production rises then falls, but the move to Middle East crude means that throughout the period the yield of jet fuel derived from oil falls. So an exponentially-rising demand for jet fuel intrinsic in the forecasts for air traffic growth cannot be supplied from oil. Putting this another way, the amount of jet fuel that can be obtained from 4.5% of the proven reserves of 1048 Gb is 6400 million tonnes of jet fuel equivalent to only 145×10^{12} passenger-km (or 93×10^{12} passenger-miles). Hypothetically, it has been shown above that if global air traffic were to grow exponentially at 4.5%/annum as predicted, 204×10^{12} passenger-km (or 127×10^{12} passenger-miles) would be accumulated by 2030. The industry would have used up its air-miles in 2026, well before then!

The growth in air traffic envisaged will not be attained as the oil producers will restrict production to conserve their inventory throughout the time span envisaged. Although the synthesis of jet fuel from natural gas or coal is possible, there is no potential substitute for oil-based jet fuel capable of supporting the prospective size of the industry.

In recognition of this fuel problem, Airbus (see reference below) is developing a modification strategy, whereby liquid hydrogen produced by electrolysis and cryogenic liquefaction is substituted for jet fuel. This requires a hydrogen infrastructure based on the availability of enormous amounts of electrical power. It also means that aircraft have to be specially adapted to run on liquid hydrogen fuel.

Only flights between airports with supplies of liquid hydrogen would be possible and flights diverted to airports without such a facility would be stranded. In turn supplies of liquid hydrogen depend on an availability of local hydro or geothermal power as might be sufficient in New Zealand or Iceland respectively.

Quantity of liquid hydrogen fuel required for the UK (at current level of road and air activity)

There are four processes, viz.,

(i) Steam reforming of methane
(ii) Electrolysis of water
(iii) Compression
(iv) Cryogenic liquefaction.

They can be combined as (i) and (iii) or (i) and (iv) or (ii) and (iii) or (ii) and (iv)

(i) Steam reforming of methane

This will use only a modicum of electricity, but the equivalent power used for the energy of 33.33 kWh/kg hydrogen is 47 kWh/kg and 7 kg of CO_2 is released. While natural gas remains available it is more efficient to use methane direct and less carbon would thereby be released. This does not appear to be a worthwhile option.

(ii) Electrolysis of water

Electrolysis can operate between 3.7 and 4.5 kWh/Nm^3 of hydrogen, which taking the mean is gravimetrically 58.6 kWh/kg (Say 59)

(iii) Compression

The energy used to compress hydrogen to a suitable storage pressure is around 12% of the HHV or 0.12 x 142 MJ/3600 KJ = 4.7 kWh/kg (Say 5)

(iv) Liquefaction

For large scale plants the energy used to liquefy hydrogen is around 40% of the HHV or 0.40 x 142 MJ/3600 KJ = 15.8 kWh/kg (Say 16)

(ii) + (iii) 59 + 5 = 64 kWh/kg

(ii) + (iv) 59 + 16 = 75 kWh/kg

Cars use compressed hydrogen (Honda) or liquefied hydrogen (BMW) while aircraft will need to use liquefied hydrogen because of weight and space requirements. (see reference below)

An effective energy content of 120 MJ/kg H_2, means that vehicle energy of 1600 PJ would require 13.33 x 10^9 kg H_2/annum, while aircraft energy of 500 PJ would require 4.16 x 10^9 kg H_2/annum. This works out at 13.33 x 64 x 10^9 = 853 TWh for compressed gas and 13.33 x 75 x 10^9 = 1000 TWh for liquefied gas. For aircraft it works out at 4.16 x 75 x 10^9 = 312 TWh

A hydrogen transport economy at the current level of traffic would require between 1165 TWh and 1312 TWh of generation, whereas we currently only generate 386 TWh.

With the difficulties lying ahead in supplying electrical power the growth in air traffic contemplated in the UK is impossible to fuel by liquid hydrogen.

References

Electrolysis of water

* http://www.iesvic.uvic.ca/library/publications/14TechnoPaper.pdf

Airbus report

** http://www.haw-hamburg.de/pers/Scholz/dglr/hh/text_2001_12_06_Cryoplane.pdf

252. Country Assessment - Libya

Libya

Libya covers an area of 1.7 million square kilometers, supporting a population of about 6 million, who live mainly along the Mediterranean seaboard. It has common frontiers with Egypt to the east, Algeria and Tunisia to the west, and Chad, Sudan and Niger to the south. A mountain range known as the Akhdar rises to 900m in the northeast, but is flanked by true deserts and rocky arid plateaux over most of the rest of the country.

The coastal strip of Libya, previously known as Cyrenaica, was settled by Phoenicians and Greeks, and became an important source of grain for the Roman Empire. It later fell under the control of Egyptian dynasties, which in turn led to its nominal incorporation in the Ottoman Empire, but for much of the last millennium it was a sparsely populated and inhospitable backwater of no great interest to anyone.

The country's modern history opened in 1911, when it was invaded by Italy. Initial resistance was soon subdued, and the country was settled by Italian peasants. It was fully incorporated into the Italian State in 1939. In the Second World War, a German army under General Rommel advanced through Libya in 1942, before being defeated at the Battle of El-Alamein. The Italian population was evacuated during the retreat, leaving the country to its Arab indigenous people, mainly belonging to the Senusi tribe. It became effectively a British Protectorate during and after the Second World War, before being granted full independence in 1951 under King Idris, a well-disposed ageing Senusi leader. The principal export of the country at the time was scarp-iron left over from the battlefields. Visitors remarked on the high incidence of one-legged inhabitants: the victims of the many minefields left over from the war.

The fortunes of Libya changed quite literally with the discovery of oil in 1957, which ushered in a period of economic expansion and even prosperity. A Petroleum Law had been passed in 1955 to pave the way for the entry of British and American oil companies, including Exxon, which made the first major strike at Zelten in the Sirte Basin, 150 kilometers inland from the Mediterranean coast. It found light crude, which compared favourably with Middle East supplies, especially as Libya was closer to the European markets. As is so often the case, discovery followed discovery as a new prolific trend was opened up, so that by the end of the 1960s, Libya was producing more than 3 Mb/d, briefly exceeding even Saudi Arabia. Most of the major companies concentrated on the heart of the basin,

while BP headed into the interior to bring in the remote Serir Field, a giant with almost 5 Gb of oil, which was found in 1961. The opening of Libya gave a particular opportunity to the independents, such as Occidental and Oasis (a consortium of Marathon, Amerada and Conoco), which had been largely excluded from the Middle East. The new production drowned Europe in a flood of cheap oil, which depressed the world prices. It was one of the factors prompting the creation of OPEC, which Libya joined in 1962. Libyan oil took on even more strategic value following the Six-Day War in 1967, although that further inflamed Arab nationalist passions reacting to Israel's occupation of Palestine. The scene was set for a coup d'etat to replace the ageing pro-Western King Idris, and on September 1st 1969 a group of officers, led by Colonel Muanmar Qaddafi, declared a Republic.

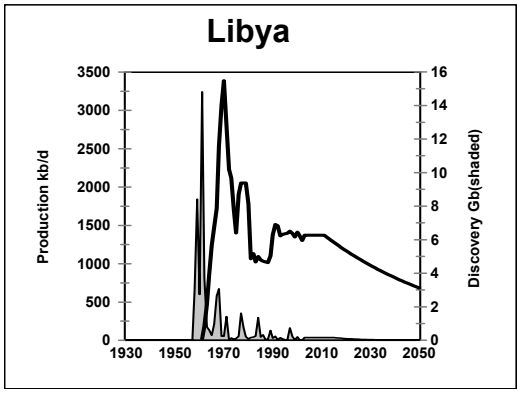
The new regime at first sought unions with neighbouring countries, including Egypt, the Sudan, Tunisia and later Morocco, resurrecting the notion of a greater Arab nation, but the efforts ended in failure even triggering a brief war with Egypt in 1977. Qaddafi changed the Constitution to create what was termed the Popular Islamic Socialist State to nominally represent the mass of people, while keeping firm control for himself. In fact, this formula did not differ greatly from the Communist regimes in several countries or the Ba'athist Party of Iraq.

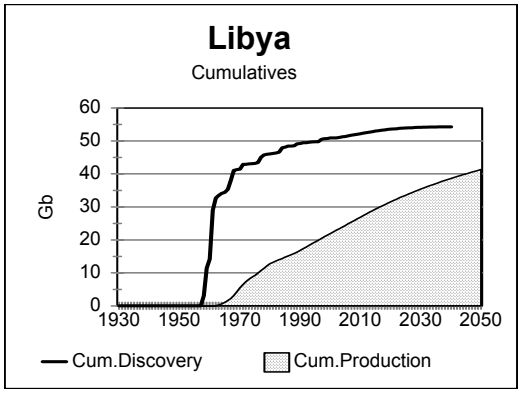
LIBYA		*Regular Oil*
Rates Mb/d		
Consumption	2002	0.15
per person b/a		9.1
Production	2002	1.3
	Forecast 2010	1.4
	Forecast 2020	1.2
Discovery 5-yr average Gb		0.1
Amounts Gb		
Past Production		23
Reported *Proved Reserves**		29.5
Future Production - total		32
From Known Fields		29
From New Fields		3.2
Past and Future Production		55
Current Depletion Rate		1.5%
Depletion Midpoint Date		2011
Peak Discovery Date		1961
Peak Production Date		1970

*Oil & Gas Journal

In 1971, Libya nationalised the holdings of BP as a gesture in its support of Islamic and pan-Arab power, establishing a national oil company, which now controls some 60% of the country's production.

US support for Israel led to deteriorating relations during the 1980s, which culminated in a US aerial attack in 1986, It aimed to assassinate Qaddafi, but succeeded in killing his daughter. This may have prompted a retaliatory act of planting a bomb on a Pan American airliner in 1988, which exploded over the Scottish town of Lockerbie with tragic loss of life, although no more innocent than Qaddafi's daughter. Libya too is said to have encouraged revolutionary movements in many countries, including the Irish Republican Army. Libya has been subject to US trade sanctions since 1996, excluding US companies from operating, but several European companies continue to work there satisfactorily. This issue is now in the course of being resolved by the UN on the payment of reparations, as the United States no doubt expresses new interest in Libyan oil. Apparently, even acts of terrorism have their price under the market principles of globalism.





Born in 1942, Qaddafi, appears to have become a mellowing dictator showing some signs of rapprochement with the Western powers, which may however have suffered a setback with the invasion of Iraq that has understandably inflamed Arab passions everywhere. The flush oil production from the early giant fields is coming to an end as is the easy wealth that flowed from it. It may be time for the country to think of replanting and tending the olive groves introduced by the Italians during the early years of the last Century because there is not much else to do in the barren deserts.

Most of Libya's oil comes from the Sirte Basin, flanking a Gulf of the same name, but there have also been a number of isolated finds in the western part of the country, including those in the remote Ghadames Basin, which straddles the frontier with Algeria, as much as 600 kms inland. The Sirte Basin covers an area of some 300 000 km^2 comprising a series of northwesterly trending rifts. It contains rich Upper Cretaceous and Paleocene source-rocks, which have charged reefal reservoirs, located both on the contemporaneous structural highs and in the overlying Eocene. Lower Cretaceous sandstones form additional reservoirs on the interior margin of the basin, as locally do fractured Cambro-Ordovician quartzites. High heat-flow led to early generation.

Discovery commenced in 1957 with a minor find, to be followed by a string of giants; Amal (1959) with 4.5Gb; Beda (1959) with 1 Gb; Nasser (1959) with 2 Gb; Defa (1960) with 2 Gb; Gialo (1961) with 3.5 Gb; Sarir (1961) with 6 Gb; Waha (1961) with 1 Gb; Augila-Nafoora (1965) with 2 Gb, Intisar (1967) with 2.25; and Bu Attifel (1968) with 1.5 Gb.

Libya is accordingly a fairly mature province, although depletion has been slowed by political factors. There is a certain offshore potential awaiting evaluation and the remote interior basins remain relatively unknown. Future discovery is here estimated at just over 3 Gb. It may err on the side of being conservative, but with a Depletion Rate of below 2% there should be scope to increase production from current fields before searching for new ones.

Production commenced in 1961 and grew to a first peak of 3.3 Mb/d in 1971, before political events and OPEC quota restraints led to a decline reaching a low of 1.02 Mb/d in 1983, since when it has stabilised at slightly higher levels. It seems doubtful in view of the uncertain political situation if production can be significantly stepped up before the midpoint of depletion around 2011, when the terminal decline is likely to set in at a relatively low depletion rate of 1.8% a year. Libya is thought to consume only about 150 kb/d, meaning that it will remain an important exporter for the next fifty years, with Europe being its principal market.

Gas is produced from the deeper parts of the Sirte Basin, currently at the rate of 1.8 Tcf/a from reported reserves of about 50 Tcf. There is evidently scope for exports to populous Egypt if and when new pipelines are constructed.

253 Southern Africa Energy

The following articles is taken from the current Mbendi Newsletter, which has a circulation of 35 000 in Africa, and now reproduces the ASPO Newsletter. It is worth noting that South Africa produces 20% of its petroleum fuel from coal, no doubt a consequence of the previous trade embargo.

THE WORLD ENERGY PUZZLE AND AFRICA - PART 2

In our last newsletter, we summarised some of the information supporting the two opposing views (both very strongly held by their adherents, I should add) on world oil and gas supplies, the traditional view that there is oil aplenty for the foreseeable future and the radical view that we could start running out before the end of the decade (which does, incidentally, take account of Canadian tar sands and Venezuelan heavy crude oil). It's particularly interesting to speculate how Africa will fare under these scenarios.

If crude oil and gas are no longer available as a chemical industry feedstock and fuel, then the most natural substitute would be coal. A quick glance at MBendi's profile of the **world coal mining industry**, probably the most comprehensive on the Internet, shows that the major coal producing nations are China, Australia, Canada, USA, Indonesia and South Africa, which holds 11% of world coal reserves. However, of these, only South Africa, where Sasol uses coal to produce chemical feedstocks as well as some 20% of the country's petroleum fuel (and at a cash cost estimated to be less than 50% of crude oil refining at current crude oil prices), has the infrastructure in place to do so.

Several years ago, MBendi consultants formed part of the team assembled by **Eskom** to develop its African scenarios. It was a fascinating process bringing together economists and specialists with a range of different backgrounds to look at where the continent might go politically and economically with an obvious focus on the implications for the energy sector, particularly electricity. The one comment that stood out for me from the whole study was an estimate that the Inga Gorge, towards the mouth of the Congo River, has the potential to generate more electricity than Europe currently consumes. So, it's not surprising to see that the Inga project, together with transmission lines across the region, are at the top of the Nepad project list.

The net result of these coal and electricity bonanzas could well be that sub-Saharan Africa becomes an island of low cost energy and chemical feedstocks in a world struggling to adjust to increasing shortages and high prices. Of course, this might also be a world where the high costs of travel and transport have put a severe damper on international trade and tourism, so plans to use the region's low cost energy to create world-class mineral beneficiation centres, such as the planned aluminium smelter at Coega in South Africa's Eastern Cape where both **Eskom** and **the IDC** have recently announced plans to invest, or set up new tourist attractions might well find no viable market for their products.

All of this, of course, is pure speculation as no-one has a perfect view of the future. However, we believe these two scenarios are so pertinent to all businesses and governments, they need to be explored NOW, not in ten to twenty years, so that contingency plans can be laid to cover both eventualities. The trouble is, we have become a short term society - our cell-phones beep to announce minute by minute changes in prices, our business leaders focus on the next set of quarterly results and the politicians are only interested in being re-elected next time round.

Nonetheless, our strong recommendation is that the leaders of ALL companies and countries set aside just a few hours to brainstorm the implications for them of both these scenarios. Ideally the brainstorming should be structured, perhaps tackling each stakeholder and stage in the value chain in turn, before coming up with three plans, one for operating the "radar" system to watch for signs of which scenario is unfolding, the other two the contingency action plans for dealing with scenarios of energy plenty and energy famine. And, of course, if you would like an MBendi consultant to help you along the process, then our small team is always ready to assist....

Our website and those of our clients also provide useful reference information to assist your planning. In addition to the pages recommended in our last newsletter, our **projects database** includes all the **Nepad projects** of which we are aware while our **facilities database** records details of thousands of coal mines, oil fields and refineries, power stations and other energy facilities. Our profiles of the **world coal mining** and **African electrical industry** sectors provide good starting points for exploring these industries. The **Eskom Enterprises website** profiles the major player in the African power sector. We have also taken the liberty of making the 2003 ASPO newsletters available so you can better understand the Peak Oil scenario. These, together with the hundreds of energy and mining company news releases to be found in MBendi's **News and Views**, provide an excellent input for company radar screens and can be delivered to subscribers for a small fee.

254. Behind the Blackout

Matt Simmons speaks with immense authority as an *Establishment Figure* from the heart of Houston. His message is compelling, and his courage in saying it is even more impressive. The following are some extracts from

An Energy Investment Banker and Bush Energy Advisor Gives Unexpected Answers on the Northeast Power Grid, Peak Oil and Gas, and Much More

FTW: *What's the most important thing you want the American people to know about Black Thursday?*

SIMMONS: This blackout ought to be an incredible jolt telling us about a host of energy problems that are ultimately going to prevent any future economic growth. It's like people have been ignoring annoying phone calls and living in denial about a problem that won't go away. It's like the ghost of Enron calling. The event itself was astonishing. Senior people like Governor Pataki or the head of NERC [North American Electric Reliability Council] were asking how this could happen. But the problem was inevitable. The only thing we didn't know was when it would happen.

FTW: *What did happen?*

Simmons: On a large scale what happened was deregulation. Deregulation destroyed excess capacity. Under deregulation, excess capacity was labeled as "massive glut" and removed from the system to cut costs and increase profits. Experience has taught us that weather is the chief culprit in events like this. The system needs to be designed for a 100-year cyclical event of peak demand. If you don't prepare for this, you are asking for a massive blackout. New plants generally aren't built unless they are mandated, and free markets don't make investments that give one percent returns. There was also no investment in new transmission lines.

Underlying all this is the fact that we have no idea how to store electricity. And every aspect of carrying capacity, from generators, to transmission lines, to the lines to and inside your house, has a rated capacity of x. When you exceed x, the lines melt. That's why we have fuse boxes and why power grids shut down. So we have now created a vicious cyclicality that progresses over time.

Another problem was that with deregulation, people thought that they could borrow from their neighbor. New York thought it could borrow from Vermont. Ohio thought that it could borrow from Michigan, etc. That works, but only up to the point where everyone needs to borrow at once and there's no place to go.

A second major reason is that decisions were made in the 1990s that all new generating plants were to be gas fired. We've had a natural gas summit this year and, as you know, I have been talking for some time about the natural gas cliff we are experiencing. Many thought that this winter would be deadly, and I have to say that it's just a miracle that we have replenished our gas stocks going into the cold months. This winter could have been a major disaster. We've seen a price collapse in natural gas to the five to eight dollar range (per thousand cubic feet) and the only reason that happened was throughout almost the entire summer there were only a handful of days when the temperature rose above eighty degrees anywhere. That was miraculous. It allowed us to prepare

for the winter but we shouldn't be optimistic. One good hurricane that disrupts production, one blazing heat wave, one freezing winter after that and we're out of solutions.

FTW: *And natural gas too?*

Simmons: Well, I know you understand it, but people need to understand the concept of peaking and irreversible decline. It's a sharper issue with gas, which doesn't follow a bell curve but tends to fall off a cliff. There will always be oil and gas in the ground, even a million years from now. The question is, will you be a microbe to go down and eat the oil in small pockets at depths no one can afford or is able to drill to? Will you spend hundreds of thousands to drill a gas well that will run dry in a few months? All the big deposits have been found and exploited. There aren't going to be any dramatic new discoveries and the discovery trends have made this abundantly clear.

We are now in a box we should never have gotten into and it has very serious implications. We also see the inevitable issues that follow a major blackout: no water, no sewage, no gasoline. The gasoline issue is very important. Our gasoline stocks are at near all time lows. With the blackout, more than seven hundred thousand barrels per day of refinery capacity were shut down. People were told to boil their water. So what do they do, they go to their electric stove which isn't working. What then?

FTW: *So we have two basic camps saying that the problems are generating capacity and transmission lines, without addressing feedstock issues. What about the advocates for deregulation who argued that there would be more generating capacity as a result?*

Simmons: History answers that one. Following the 1965 blackout when NERC was created there was a mandate that publicly owned and regulated power providers had to build new plants. Every five years, ten per cent was added to the generating base. As deregulation was implemented in the 1990s, it was argued that it would open up vast quantities of energy in neighboring states. In the first five years of the decade, only four per cent capacity was added over the entire period. In the second five years, only two per cent was added.

In the summer of 1999, we had thirty consecutive power events which unleashed the single biggest construction boom in history which built 220 thousand megawatts of new plants at a capitalization cost of six to seven hundred thousand dollars per megawatt. Ninety-eight per cent of those plants were gas fired.

It was decided to use solely natural gas plants for several reasons. Coal fired plants took five to seven years to build. They are very dirty environmentally and the permit process is difficult. We have built on all the available hydroelectric sites we can build on. Nuclear is unpopular and expensive. Oil fired plants are remnants of the days when oil was cheap. Those days are not coming back because Peak Oil is with us now. Besides that, oil fired power plants are about the least efficient use of a barrel of oil that I can imagine. That left natural gas and the economists mistakenly presumed there would be large supplies. But natural gas plants were built with no supplies. Synthetic contracts were used, Enron-style, to sell gas futures when the gas didn't necessarily exist.

FTW: *Assuming that there was enough feed stock to run the new plants how much building are we talking about?*

Simmons: Each state would need to build forty to fifty per cent excess capacity. A forty per cent cushion merely provides the chance to withstand a day of high summer heat and the chance to grow by about 3% per year for three years.

FTW: *Yet even if we re-regulate there are still going to be problems with feed stock to power the plants. How serious is that?*

Simmons: Someone's going to be left holding the bag big time. If natural gas consumption surges in ten days of excessive heat then it would require almost a complete shutdown of industrial consumption to compensate and protect the grid. As I have been reporting for years now, there isn't going to be enough gas to run those plants, let alone new ones.

FTW: *You mean shut down the economy for ten days to keep people from cooking?*

Simmons: Yes.

FTW: *What is the solution?*

Simmons: I don't think there is one… The solution is to pray. Pray for mild weather and a mild winter. Pray for no hurricanes and to stop the erosion of natural gas supplies. Under the best of circumstances, if all prayers are answered there will be no crisis for maybe two years. After that it's a certainty.

FTW: *On that cheery note let's take a look at oil supplies.*

Simmons: Currently, oil supply issues are as serious as the electrical grid. Last month the IEA (International Energy Agency) updated their database. They had for years been talking about a coming huge surge in non-OPEC supply, excluding the FSU (Former Soviet Union). It hasn't happened. We have the highest oil prices in 20 years and even great technological advances have not had a measurable impact on discovery or production.

FTW: *What about Iraq and Saudi Arabia? We have been following Iraq closely and all the sabotage, infrastructure damage and the pipeline bombings are actually reducing Iraqi capacity. That leaves Saudi Arabia with 25% of known reserves.*

Simmons: I have for years described two camps: the economists who told us that technology would always produce new supply and the pessimists or Cassandras who told us that peak was coming in maybe fifteen or twenty years. We may be finding out that we went over the peak in 2000. That makes both camps wrong.

Over the last year. I have obtained and closely examined more than 100 very technical production reports from Saudi Arabia. What I glean from examining the data is that it is very likely that Saudi Arabia, already a

debtor nation, has very likely gone over its Peak. If that is true, then it is a certainty that planet earth has passed its peak of production.

What that means, in the starkest possible terms, is that we are no longer going to be able to grow. It's like with a human being who passes a certain age in life. Getting older does not mean the same thing as death. It means progressively diminishing capacity, a rapid decline, followed by a long tail.

FTW: *But peak oil is peak oil, is it not? Aren't we just talking about something that would have delayed the inevitable for a few years? It would take a couple of years to drill and pipe out of ANWR but there's only a two year (total US) supply of gas there at best, and even less oil. Then what? At the ASPO conference in Paris, I think it was you or another expert who disclosed that four out of five very expensive deep water holes were coming up dry?*

Simmons: Peaking of oil and gas will occur, if it has not already happened, and we will never know when the event has happened until we see it "in our rear view mirrors."

FTW: *Is it time for Peak Oil and Gas to become part of the public policy debate?*

Simmons: It is past time. As I have said, the experts and politicians have no Plan B to fall back on. If energy peaks, particularly while 5 of the world's 6.5 billion people have little or no use of modern energy, it will be a tremendous jolt to our economic well-being and to our heath -- greater than anyone could ever imagine.

255 Low Discovery in 2002 ?

We are receiving hints that world oil discovery in 2002 was in the 3-6 Gb range. This would not be totally unexpected given the declining trend**,** but reliable confirmation is awaited. By discovery, we refer to new fields found by wildcat drilling, not subsidiary reservoirs or outsteps in existing fields nor long-known deposits that may now be deemed potentially exploitable for economic or political reasons.

256 Bogus War on Terrorism

Michael Meacher, who was until recently a British Cabinet Minister, has written a remarkably explicit article saying that 9/11 was simply a pretext for a long planned US strategy for control of Middle East oil. He quotes from an earlier US. Government Report *"while the unresolved conflict with Iraq provides the immediate justification, the need for a substantial American force presence in the Gulf transcends the issue of the regime of Saddam Hussein"*. If, as suggested, the authorities turned a blind eye to the known threats of 9/11 that would not be far from connivance which is only one step from contrivance. See *This war on terrorism is bogus*
http://www.guardian.co.uk/comment/story/0,3604,1036571,00.html

257. Proposed tax changes by Peter Salonius

Modifying Human Excess with

INTERNATIONAL NON RENEWABLE ENERGY TAXATION

by Peter Salonius

The labyrinthine political maneuvering that has been associated with the Kyoto Protocol and the regulatory maze that this process will engender, both within nations and internationally, in response to Kyoto's very modest goals indicates that another approach is necessary.

An international agreement, similar to the 1987 Montreal Protocol that addressed the effect of CFCs on stratospheric ozone depletion, should be sought to increase the cost of finite energy (FOSSIL and NUCLEAR) in an orderly fashion.

The starting point for discussions about the implementation of International Non Renewable Energy Taxation would be to take as a BENCHMARK the highest taxation rates for energy, presently imposed by the federal governments of countries with more than 35 million people. Each country with lighter energy taxation rates would be asked initially (year 1) to agree to raise its Non Renewable Energy Tax rates by FIVE PERCENT OF THE DIFFERENCE BETWEEN ITS PRESENT RATE AND THE BENCHMARK. This taxation increase on non-renewable energy would be most politically acceptable if it were to be revenue neutral so that income from other federal taxes decreased by the same amount as the new non renewable energy taxes increased income (tax shifting). In this manner countries such as the United States, which has the lowest energy taxes on the planet, would raise federal Non Renewable Energy Taxes by the greatest (though rather modest) amount in the first year, while countries which are already at the BENCHMARK or close to it would not have to to alter their energy taxation at all initially.

After a number of annual renewals (perhaps 20) of the International Agreement on Non renewable Energy Taxation, when all countries had finally reached similar tax levels for exhaustible energy, then future annual conferences could focus on how rapidly taxation rates should be escalated for all signatory countries in unison so as to achieve climate mitigation and required shifts to renewable energy sources.

This process of international gradualism is designed to effect as orderly a transition as possible from fuel sources that will unquestionably be exhausted, toward those renewable energy sources upon which humanity will ultimately be dependent. Slowly escalating non renewable energy costs will encourage research, development and market intrusion of sustainable renewable energy sources that have very little chance of competing in the present marketplace where all energy is priced according to its cost of production as opposed to its impending scarcity.

The transition to renewables would be orchestrated by the MARKET forces of trillions-upon-trillions of purchase decisions based on PRICE as opposed to the COMMAND AND CONTROL arrangements that have proved largely unacceptable in connection with the Kyoto process.

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258. US $209bn oil investment needed

> Quote from AME Newsletter: “Opec Secretary-General Alvaro Silva said Opec countries would need to invest an estimated USD209bn by 2020, and USD100bn by 2010 to expand oil capacity. He told a conference in Dubai that Opec countries held four-fifths of known oil reserves but pumped only one third of global oil due to output restraint to control prices. Dependence on Opec would increase in coming years as other reserves dwindled, he predicted.”

The OPEC countries recognise that they would have to invest greatly to increase production to overset the decline elsewhere but the Secretary-General does not say that they would have any motive to do so. He also does not confess that they are probably already producing at capacity within their existing facilities. Whereas OPEC has been partially successful in cutting production to support price: there is no reason to think they would make precious investments to increase production and lower price when the opposite serves their best interest, save for the increased risk of invasion. The organisation becomes effectively redundant in the face of the iron grip of depletion, in the same way as did the Texas Railroad Commission when the need to limit US production to support price ceased.

259 A Reply by John Attarian

Michael Lynch's article in the July 14 issue of the Oil & Gas Journal is a peevish exercise in intellectual dishonesty. He sneers at Colin Campbell, Jean Laherrere, et al. as erroneous, lacking in rigor, etc. His own performance strikingly demonstrates these flaws. The depletion school, Lynch says, notes that most estimates put ultimately recoverable resource (URR) at roughly 2 trillion bbl. True, but he defines URR as "the amount of oil thought to be recoverable, given existing technology and economics (price and cost). It includes estimates of undiscovered oil but is only a fraction of the total resource." (note 1) But the qualifier "given existing technology and economics" applies to reserves, not resources--and Campbell et al. are talking about resources, not reserves! So much for Lynch as watchdog of rigor.

Lynch makes an utterly misleading fuss over "the Hubbert curve." "The initial theory behind what is now known as the Hubbert curve was very simplistic. Hubbert was simply trying to estimate approximate resource levels, and for the US Lower 48, he thought a bell curve would be the most appropriate form. It was only later that the Hubbert curve came to be seen as explanatory in and of itself, that is, geology requires that production should follow such a curve. "Conceding that a bell curve is typical of large populations and persistent capital stock, he chides, "it is a mistake to interpret this to mean that the system is constrained to a bell curve." This falsifies Hubbert. Per his "Energy From Fossil Fuels" (Science, February 4, 1949), Hubbert started from the irrefutable fact that a fossil fuel's endowment is fixed; therefore its production curve "will rise, pass through one or several maxima, and then decline asymptotically to zero." He stated explicitly that such a curve may have "an infinity of possible shapes." He never claimed that "the system is constrained to a bell curve."

Lynch asserts, without documentation, that Campbell and Laherrere initially argued "that production should follow a bell curve, at least in an unconstrained province. In fact, discovery sizes tend to be asymmetric, with an early peak and a long tail." So do production plots, Lynch says, and because of taxes etc., "oil production rarely follows a bell curve." Much ado about nothing! Hubbert was not wedded to a bell curve, as the foregoing quotes make clear. Neither is the depletion camp. Campbell's companion article explicitly distinguishes "theoretical unconstrained production" (which may resemble a bell curve) and "real-world production as constrained for economic or political reasons."

Real-world data don't necessarily conform to idealized shapes generated by mathematics--and aren't expected to. The bell-shaped curve is simply a stylized, idealized representation of the phenomenon of rise, peak, and decline of output, amenable to mathematical expression and analysis, useful as a pedagogical and forecasting device--in fact, the sort of thing economists do all the time. Indeed, it ill behooves Lynch to fixate on the bell curve and accurse Hubbert modelers of "lack of rigor" and "statistical illusions." As an economist, Lynch knows--or should--that demand and supply for virtually all goods and services occur in whole numbers; nobody buys 1.5 cars or sells 0.75 sweaters. Yet all economists, doubtless including Lynch, draw continuous supply and demand curves--a useful teaching device, but accurate demand and supply schedules would be sets of

unconnected points. Worse yet, economists have been using calculus for generations. Calculus requires continuous functions. Economics doesn't have any. Its pretentious higher mathematics, then, rest on sleight of hand and mumbo-jumbo. Its vaunted "rigor" is bogus. People who live in glass houses shouldn't throw stones.

So real-world data aren't a smooth bell curve. Big deal. What matters is the general pattern of rise, peak, and decline. Lynch is bashing a straw man. Pontificating that "only 8 of 51" non-OPEC countries' production plots in Campbell's _Essence of Oil & Gas Depletion_ follow a bell curve enables Lynch to evade the reality that _every last one_ of the 51 shows annual extraction rising, passing through one or more maxima, then inexorably declining. That alone vindicates Hubbert and discredits Lynch, but there's more. Perusal of the last column in Campbell's table "Regular Oil Production to 2075" (_Essence,_ p. 237) reveals that one country peaked in 1951-1960; four in 1961-1970; 11 in 1971-1980; 11 in 1981-1990; and 18 in 1991-2000 (12 in 1996-2000). That ever-more producers peak as time advances, and that 45 out of 64 have already peaked, signals strongly that we are approaching worldwide peak. Lynch obviously read Campbell's book. Equally obviously, he failed to pick up on this trend. Divining patterns in data is something economists are supposed to be good at. Can't flat-earth economists see what they look at? Or is it they just don't want to?

The fundamental issue is this: is the oil endowment fixed and finite, or isn't it? If it is, peak and decline are inevitable; if not, not. Geologists have known for decades that oil's formation requires certain heat and pressure conditions operating over geologic time. This necessarily makes the quantity finite--implying that the Hubbert camp is ineluctably right.

The only way around this is Thomas Gold's "deep, hot biosphere" which would keep augmenting the oil endowment (how quickly?) The physicist Albert Bartlett assured me in private correspondence that he didn't know of "any scientists who count on the kind of oil Thomas Gold postulates." Game, set and match to Hubbert, Campbell, Deffeyes, Laherrere, et al.!

Lynch also misrepresents the Hubbert modelers as claiming that "geology is the sole motivator of discovery, depletion, and production." They never said geology is the "motivator"--curious choice of words!--of anything. What they do say, and as Lynch's immediately following quotes from their works make clear, is that geology limits what is possible in discovery and production. Which of course it does.

He further misrepresents the Hubbert camp as saying that geology determines everything single-handed: "The idea that production is influenced by prices . . . is considered foolish." Oh? Campbell's Essence, which Lynch cites, maintains explicitly that "demand naturally influences the rate of depletion" (p. 9) and that "In forecasting oil production, it is important to take into account demand as well as supply" (p. 182). A fair treatment of the Hubbert camp would include this qualification. Or did Lynch and I read different books?

Nor do the Hubbert modelers "attempt to divine physical laws" from "particular shapes." As the foregoing quotes from Hubbert make clear, the reverse is true: the reality of limits means production must rise, peak, and decline. The "particular shape" is irrelevant.

Lynch claims that "The primary flaw in Hubbert-type models is a reliance on URR as a static number rather than a dynamic variable, changing with technology, knowledge, infrastructure, and other factors, but primarily growing." But Campbell et al. are referring to resources, not reserves. URR is fixed because Earth's oil endowment is finite. Seeing it as "static" is not a "flaw." It's fidelity to the facts.

Falsifications and distortions of their opponents are common among cornucopians. That, plus their refusal to acknowledge the reality of limits, destroys their credibility in my eyes.

260. Perhaps Democracy works after all

A recent bye-election in Britain provided a resounding defeat for Blair's party in what was thought to be a safe seat. The Liberal-Democrats, who had strongly opposed the war, secured a victory with a 29% swing, evidently better representing popular opinion. The Conservatives fell further behind possibly as a reward for the imperial nostalgia that may have prompted their support for the invasion.

261 Evaluation of peak oil and decline by David Goldstein

(Reference furnished by Ugo Bardi)

See http://www.its.caltech.edu/~dg/Essay2.pdf for a lucid exposition of the issue by David Goldstein, who is a distinguished solid-state physicist at Caltech.

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