NATIONAL SECURITY AGENCY
CENTRAL SECURITY SERVICE
FORT GEORGE G. MEADE, MARYLAND 20755-6000

FOIA Case: 83753A
8 May 2017

JOHN GREENEWALD
[redacted]

Dear Mr. Greenewald:

This is our final response to your Freedom of Information Act (FOIA) request of 16 February 2016 for Intellipedia articles on Peak Oil. As stated in our initial response letter, dated 22 February 2016, your request has been assigned Case Number 83753. A copy of your request is enclosed. For the purpose of fee assessment, you have been placed into the "all other" category for this request. As such, you are allowed 2 hours of search and 100 pages of duplication at no cost to you. There are no assessable fees for this request.

For your information, NSA provides a service of common concern for the Intelligence Community (IC) by serving as the executive agent for Intelink. As such, NSA provides technical services that enable users to access and share information with peers and stakeholders across the IC and DoD. Intellipedia pages are living documents that may be originated by any user organization, and any user organization may contribute to or edit pages after their origination. Intellipedia pages should not be considered the final, coordinated position of the IC on any particular subject. The views and opinions of authors do not necessarily state or reflect those of the U.S. Government.

Your request has been processed under the provisions of the FOIA. We conducted a search of all three levels of Intellipedia for the requested material, and located two documents (26 pages) responsive to your request. These documents were reviewed in response to a previous request and are enclosed. Certain information, however, has been deleted from the enclosure.

This Agency is authorized by statute to protect certain information concerning its activities (in this case, internal URLs) as well as the names of its employees. Such information is exempt from disclosure pursuant to the third exemption of the FOIA, which provides for the withholding of information specifically protected from disclosure by statute. The specific statute

applicable in this case is Section 6, Public Law 86-36 (50 U.S. Code 3605). We have determined that such information exists in this record, and we have excised it accordingly.

In addition, personal information regarding individuals has been deleted from the enclosures in accordance with 5 U.S.C. 552 (b)(6). This exemption protects from disclosure information that would constitute a clearly unwarranted invasion of personal privacy. In balancing the public interest for the information you request against the privacy interests involved, we have determined that the privacy interests sufficiently satisfy the requirements for the application of the (b)(6) exemption.

Since these deletions may be construed as a partial denial of your request, you are hereby advised of this Agency's appeal procedures. You may appeal this decision. If you decide to appeal, you should do so in the manner outlined below.

- The appeal must be in writing and addressed to:

  NSA/CSS FOIA/PA Appeal Authority (P132),
  National Security Agency
  9800 Savage Road STE 6932
  Fort George G. Meade, MD 20755-6932

- It must be postmarked no later than 90 calendar days of the date of this letter.
- Please include the case number provided above.
- Please describe with sufficient detail why you believe the denial of requested information was unwarranted.
- NSA will endeavor to respond within 20 working days of receiving your appeal, absent any unusual circumstances.
- Appeals received after 90 days will not be addressed.

You may also contact our FOIA Public Liaison at foialo@nsa.gov for any further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows:

FOIA Case: 83753A

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Rd- OGIS
College Park, MD 20740
ogis@nara.gov
(877) 684-6448
(202) 741-5770
Fax (202) 741-5769

Sincerely,

Paul K.
for

JOHN R. CHAPMAN
Chief, FOIA/PA Office
NSA Initial Denial Authority

Encls:
a/s

From: donotreply@nsa.gov
Sent: Tuesday, February 16, 2016 5:46 PM
To: donotreply@nsa.gov
Cc: john@greenewald.com
Subject: FOIA Request (Web form submission)

Name: John Greenewald

Title: Mr.

Email: john@greenewald.com

Company: The Black Vault

Postal Address: [redacted]

Postal 2nd Line: None

Postal City: [redacted]

Postal State-prov: [redacted]

Zip Code: [redacted]

Country: United States of America

Home Phone: [redacted]

Work Phone: [redacted]

Records Requested: To whom it may concern,

This is a non-commercial request made under the provisions of the Freedom of Information Act 5 U.S.C. S 552. My FOIA requester status as a "representative of the news media" however due to your agency's denial of this status, I hereby submit this request as an "All other" requester.

I prefer electronic delivery of the requested material either via email to john@greenewald.com or via CD-ROM or DVD via postal mail. Please contact me should this FOIA request should incur a charge.

I respectfully request a copy of the Intellipedia entry (from all three Wikis that make up the Intellipedia) for the following entry(s) (Or whatever similar topic may pertain if it is slightly worded differently):

PEAK OIL

Thank you so much for your time, and I am very much looking forward to your response.

Sincerely,

John Greenewald, Jr.
[redacted]

(U) Peak Oil

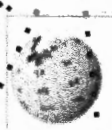
UNCLASSIFIED

(b)(3) - P.L. 86-36

From Intellipedia

You have new messages (last change).

Peak Oil, formally known as the Hubbert Peak Theory, is an influential theory concerning the long-term production and depletion rates of crude oil and other fuel sources, such as coal and natural gas. This theory predicts that future world oil production will reach a peak and then rapidly decline.



See the Wikipedia article ***Peak Oil***

References

Retrieved from

Categories: Hubbert Peak Theory | Crude Oil

UNCLASSIFIED

- This page has been accessed 1,629 times.
- 5 watching users
- This page was last modified 20:47, 13 December 2012 by Most recent editors: and others.

(b) (6)

gclinipedweb10j

(U) Peak oil

~~SECRET~~

From Intellipedia

This article was transferred from www.wikipedia.org.

Intellipedians are asked to help link it into Intellipedia in an intelligent way, categorize, fix transfer errors, review for accuracy.
This article is for reference only.
Please do not add information. Information added by Intellipedians belongs in the main Intellipedia article.

Do not remove this template.

This article was transferred from Wikipedia on 2007-10-26

Main article: ***Peak oil***
This article is about {{{1}}}. For {{{2}}}, see [[{{{3}}}]].

Portal develc ***Sustainable development Portal***

As first expressed in Hubbert peak theory, **peak oil** is the point or timeframe at which the maximum global petroleum production rate is reached. After this timeframe, the rate of production will enter terminal decline. According to the Hubbert model, the production rate will follow a roughly symmetrical bell-shaped curve. This does not mean oil will suddenly "run out", but the supply of cheap conventional oil will drop and prices will rise, perhaps dramatically.

Some observers such as Kenneth S. Deffeyes and Matthew Simmons believe that because of the high dependence of most modern industrial transport, agricultural and industrial systems on inexpensive oil, the post-peak production decline and possible severe increases in the price of oil will have negative implications for the global economy. Predictions as to what exactly these negative effects will be vary greatly. More optimistic outlooks, delaying the peak of production to the 2020s or 2030s and assuming major investments in alternatives occur before the crisis, show the price at first escalates and then retreats as other types of fuel sources are used as transport fuels and fuel substitution in general occurs. More pessimistic predictions which operate on the thesis that the peak will occur shortly or has already occurred predict a global depression and even the collapse of industrial global civilization as the various feedback mechanisms of the global market cause a disastrous chain reaction. The shortfall will cause demand destruction which may be mitigated with planned conservation measures and using alternatives if implemented 20 years before the peak.[1]. If political and economic change only occurs in reaction to high prices and shortages, then the degree of economic damage to importing countries will largely depend on how rapidly oil imports decline post-peak. The Export Land Model suggests that the amount of oil

available internationally will drop much more quickly than production in exporting countries.

Contents

File:PU200611 Fig1.png
Peak oil depletion scenarios graph which depicts cumulative published depletion studies by ASPO and other depletion analysts.

Timing

The only reliable way to identify the timing of peak oil will be in retrospect. M. King Hubbert, who devised the peak theory, predicted in 1974 that peak oil would occur in 1995 at 12 gigabarrels per year "if current trends continue".[2] However, in the late 1970s and early 1980s, global oil consumption actually dropped (due to the shift to energy-efficient cars,[3] the shift to electricity and natural gas for heating,[4]

etc.), then rebounded to a lower level of growth in the mid 1980s (see chart on right). The shift to reduced consumption in these areas meant that the projection assumptions were not realized and, hence, oil production did not peak in 1995, and has climbed to more than double the rate initially projected.

Colin Campbell of the Association for the Study of Peak Oil and Gas (ASPO) has suggested that the global production of conventional oil peaked in the spring of 2004 albeit at a rate of 23 gigabarrels per year, not Hubbert's 13 gigabarrels per year. During 2004, approximately 24 billion barrels of conventional oil were produced out of the total of 30 billion barrels of oil; the remaining 6 billion barrels coming from heavy oil and tar sands, deep water oil fields, and natural gas liquids (see adjacent ASPO graph). In 2005, the ASPO revised its prediction for the peak in world oil production, again, from both conventional and non-conventional sources, to the year 2010.[5] These consistent upward (into the future) revisions are expected in models which do not take into account continually increasing reserve estimates in older accumulations.[6]

Another peak oil proponent Kenneth S. Deffeyes predicted in his book *Beyond Oil - The View From Hubbert's Peak* that global oil production would hit a peak on November 25, 2005 (Deffeyes has since revised his claim, and now argues that world oil production peaked on December 16 2005).[7]

Texas oilman T. Boone Pickens has stated that worldwide conventional oil production will top out at 84 MB/day[8] (31 BB/yr), a claim supported by recently published data from the US Energy Information Agency [9], which suggests global oil production peaked in 2006. An October 2007 report by the Energy Watch Group comes to the same conclusion. [10] Alternately, Albert Bartlett's paper on Arithmetic, Population, and Energy (exponential growth on a finite resource) gives a different insight into peak oil.

Related peaks

The peak of world oilfield *discoveries* occurred in 1965.[11] Because of world population growth, oil production *per capita* peaked in 1979 (preceded by a plateau during the period of 1973-1979).[12]

Supply

Further information: Peak oil/Table of largest oil fields

Peak oil is concerned with the production flow of oil measured as the quantity extracted over time. Recoverable reserves are important only in that they must exist before any oil can be extracted and delivered to the market.

File:Hubbert world 2004.png
2004 U.S. government predictions for oil production other than in OPEC and the former Soviet Union

Reserves

Main article: Oil reserves

Conventionally reservoired crude oil resources comprise all crude oil that is technically producible from reservoirs through a well bore using any primary, secondary, improved, enhanced, or tertiary method. Not included are liquids from mined deposits (tar sands; oil shales) or created liquids (gas-to-liquids; coal-to-liquids).

Oil reserves are classified into categories - proven, probable and possible. Proven reserves are claimed to be "Reasonably Certain" to be producible using current technology at current prices and are intended to be 90% certain of containing the amount specified or more. The "Probable Reserves" category has an intended probability of 50% and the "Possible Reserves" an intended probability of 10%. Some care must be taken with these categories, as the majority of reserves have not been subject to outside audit or examination.

Most of the easy-to-extract oil has been found. Recent oil exploration is being carried out in areas where oil is much more expensive to extract, extremely deep wells, extreme downhole temperatures, environmentally sensitive areas or where high-technology will be required to extract the oil. Oil companies such as Exxon Mobil, Shell, and BP are having to spend more money on oil exploration due to a shortage of drilling rigs, increases in steel prices, an increase in service charges - like drilling rig rates, and overall increases in costs due to complexity.[13][14]

Quantifying reserves

In forecasting the date of peak oil — and in testing the validity of Hubbert's theory — one difficulty is the strong opacity surrounding the oil reserves classified as 'proven' (see above). This was best exemplified by the scandal surrounding the 'evaporation' of 20% of Shell's reserves.[15] For the most part, the number of 'proven reserves' are given by the three major players of the oil market: the oil companies, the producer states and the consumer states. All three have an interest to inflate their proven reserves: oil companies may use it to increase their potential worth; producer countries are bestowed a stronger international stature; and governments of consumer countries may use this as a means to foster sentiments of security and stability within their economies and among consumers. Many worrying signs concerning the depletion of 'proven reserves' have emerged in recent years.[16][17] On the other hand investigative journalist Greg Palast has argued that oil companies have an interest in making oil look more rare than it is in order to justify higher prices.[*citation needed*]

Unconventional sources

Main article: Heavy crude oil

Unconventional sources, such as heavy crude oil, tar sands, and oil shale are not counted as part of oil reserves. However, oil companies can book them as proven reserves after opening a strip mine or thermal facility for extraction. The three major unconventional oil sources are the extra heavy oil in the Orinoco river of Venezuela,[18] the tar sands in the Western Canada Basin,[19] and the oil shale in the Green River Formation in Colorado, Utah and Wyoming in the United States.[20][21] It is estimated that these sources account for as much oil as the reserves of the Middle East.

The results of one study suggest that within 15 years all the world's extra oil supply will likely come from expensive and environmentally damaging unconventional sources.[22] This will mean increasing reliance on these hard-to-develop unconventional sources of energy. Oil extracted from these sources typically contains contaminants such as sulfur, heavy metals and carbon that are energy intensive to extract.

A 2003 article in Discover magazine claimed that we could use thermal depolymerization to manufacture as much oil as we could ever need, out of garbage, sewage, and agricultural waste. The article claimed that

the cost of the process was $15 per barrel. [1] (http://discovermagazine.com/2003/may/featoil/) A follow up article in 2006 stated that the cost was actually $80 per barrel. [2] (http://discovermagazine.com /2006/apr/anything-oil/)

Demand

The demand side of Peak oil is concerned with the consumption of oil measured as the quantity consumed over time. World crude oil demand has been growing at an annualized compound rate around 2 percent in recent years. Demand growth is highest in the developing world, particularly in the People's Republic of China and India, and to a lesser extent in Africa and South America. Where high demand growth exists it is primarily due to rapidly rising consumer demand for transportation via vehicles powered with internal combustion engines.[23]

The U.S. Department of Energy categorizes national energy use in four broad sectors: transportation, residential, commercial, and industrial.[24] In the United States, in contrast to other regions of the world, about 2/3 of all oil use is for transportation, 1/5 goes to industrial uses, and the remainder goes to residential, commercial and electric energy production.[25]

Long-term Scenario of World Oil Production
(IEA, 2004)

Recoverable Reserves	Remaining Reserves (in 1998, trillion bbl)	Peak Oil Year	Peak Oil Demand (Mil. B/D)
Low Case	1.7	2013-17	96
Base Case	2.6	2028-32	2121
High Case	3.2	2033-37	142

(U) A 2007 Statistical Review of World Energy published in **Dec 07** states that the world still has enough proven reserves to provide 40 years of oil at current consumption rates, but that oil is set to peak in the next four years (2011) and will enter a steepening decline which will have massive consequences for the world economy and the way we live our lives. [26]

(U) Other experts have claimed that the peak of regular oil - the ceap and easy to extract oil has already come and gone in 2005, leaving the more difficult to extract heavy oil, deep sea reserves, polar regions and liquid taken from gas. [26]

(U) **The importance of black gold**

- A reduction of as little as 10 to 15 per cent could cripple oil-dependent industrial economies. In the 1970s, a reduction of just 5 per cent caused a price increase of more than 400 per cent.
- Most farming equipment is either built in oil-powered plants or uses diesel as fuel. Nearly all pesticides and many fertilisers are made from oil.
- Most plastics, used in everything from computers and mobile phones to pipelines, clothing and carpets, are made from oil-based substances.
- Manufacturing requires huge amounts of fossil fuels. The construction of a single car in the US requires, on average, at least 20 barrels of oil.

[redacted]

(b)(3) - P.L. 86-36

- Most renewable energy equipment requires large amounts of oil to produce.
- Metal production - particularly aluminium - cosmetics, hair dye, ink and many common painkillers all rely on oil.[26]

Transportation

Main article: Energy conservation#Transportation sector

Most oil is consumed in transportation, approximately 66.6% in the United States[27] and 55% worldwide,[28] World demand for oil is set to increase 37% by 2030, according to the US-based Energy Information Administration's (EIA) annual report. Demand will hit 118 million barrels per day (bpd) from today's existing 86 million barrels, driven in large part by transport needs.[29]

In his 1992 book Earth in the Balance, Al Gore wrote, "... it ought to be possible to establish a coordinated global program to accomplish the strategic goal of completely eliminating the internal combustion engine over, say, a twenty-five-year period..." [3] (http://www.crossroad.to/articles2/Gore.html)

Population

Further information: World population

File:World population history.svg
World Population Growth

Because of human population growth, oil production per capita peaked in the 1970s.[12] The world's population in 2030 is expected to double from 1980 and be much more industrialized and oil-dependent than it was in 1980[30]. Some predictions suggest that worldwide oil production in the year 2030 will have declined to the same level as it was in 1980, in which case worldwide demand for oil will significantly outpace its worldwide production.[31] Some physicists maintain that the non-sustainability of oil production per capita was not addressed due to the political correctness implications of suggesting population control.[32]

One factor that may ameliorate this effect is the rapid decline of population growth rate since the 1970s. In 1970, the population growth rate was 2.1%. By 2006, it had declined to 1.1%. Meanwhile, oil production has continued to grow strongly. From 2000 to 2005, human population only grew by 6.3% [4] (http://en.wikipedia.org/wiki/Human_population) , whereas global oil production increased by 8.2% [5] (http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2006/STAGING/local_assets/downloads/pdf/table_of_world_oil_production_2006.pdf) .

Supplies of oil and gas are essential to modern agriculture, [33] so coming decades could see spiraling food prices and massive and unprecedented famine affecting human populations across the globe. [34][35] Geologist Dale Allen Pfeiffer contends that to achieve a sustainable economy and avert disaster, the United States must reduce its population by at least one-third, and world population will have to be reduced by two-thirds. Current U.S. population of more than 300 million as well as world population exceeding 6.6

billion are, according to Pfeiffer, unsustainable.[36][37][38]

Industrialization

Main article: Industrialization

As countries develop, industry, rapid urbanization and higher living standards drive up energy use markedly. The energy supply to drive industrialization mostly comes from oil. For example, thriving economies such as China and India are quickly becoming large consumers of oil. China has seen oil consumption grow by 8% yearly since 2002[39], (7% annual growth equals a doubling of consumption every 10 years) it currently imports roughly half its oil, with predictions of 14.2 mb/d by 2025. India's oil imports are expected to more than triple to some 5 million barrels a day by 2020.[40] Cars and trucks will cause almost 75% of the increase in oil consumption by India and China between 2001 and 2025.[41] As more countries develop, the demand for oil will increase further.

Mitigation

Main article: Mitigation of peak oil

According to the Hirsch report prepared for the U.S. Department of Energy in 2005, a global decline in oil production would have serious social and economic implications without due preparation.

The effects of peak oil can be mitigated through conservation and finding alternatives 20 years or more before the peak. Because mitigation can reduce the consumption of traditional petroleum sources, it can also affect the timing of peak oil and the shape of the Hubbert curve.

Current events

Peak oil production—has it happened already?

Further information: List of oil fields

As of July 2007, analysts still disagree on whether peak production capacity has been reached.

The IEA projects non-OPEC production estimates for 2007 and 2008 to remain largely unchanged from July 2007, at 50.0 mb/d and 51.0 mb/d, respectively. Growth is projected to recede thereafter as the slate of verifiable investment projects diminishes. [43]

> The concept of peak oil production and its timing are emotive subjects which raise intense debate. Much rests on the definition of which segment of global oil production is deemed to be at or approaching peak. Certainly our forecast

File:Crude NGPL IEAtotal 1960-2004.png
World Crude Oil Production 1960-2004. Sources: DOE/EIA, IEA

File:GlobalCrudeOilProductio mid2007.png
World Crude Oil Production 2001-2007.[42] Source: U.S. Energy Information Agency

[redacted]

(b)(3) - P.L. 86-36

suggests that the non-OPEC, conventional crude component of global production appears, for now, to have reached an effective plateau, rather than a peak.

The report points to only a small amount of supply growth from OPEC producers, with 70% of the increase coming from Saudi Arabia, the UAE and Angola as security and investment issues continue to impinge on oil exports from Iraq, Nigeria and Venezuela.[43]

Analysts from Wood Mackenzie contend that maximum production of oil will not occur before 2014. Kate Dourian, Platts' Middle East editor, has a different opinion. "Some sources say half the world's oil has already been produced, whereas Saudi Aramco is saying there is still another trillion barrels out there." She is also quick to point out that politics has entered the equation. "Some countries are becoming off limits. Major oil companies operating in Venezuela find themselves in a difficult position because of the resource nationalism that's spreading. These countries are now reluctant to share their reserves"[44]

Matthew Simmons, Chairman of Simmons & Company International, said on October 26, 2006 that global oil production may have peaked in December 2005, though he cautions that further monitoring of production is required to determine if a peak has actually occurred.[45]

In *State of the World 2005*, Worldwatch Institute observes that oil production is in decline in 33 of the 48 largest oil-producing countries.[46] Other countries have also passed their individual oil production peaks.

World oil production growth trends, in the short term, have been flat over the last 18 months. Global production averaged 85.24 mbbl/d in 2006, up 0.76 mbbl/d (0.9%), from 84.48 mbbl/d in 2005.[47] Production in Q2 2007 was 84.90 mbbl/d, down 0.05 mbbl/d (0.1%), from the same period a year earlier. Average yearly gains in world oil production from 1987 to 2005 were 1.2 mbbl/d (1.7%), with yearly gains since 1997 ranging from -1.4 mbbl/d, (-1.9%; 1998-1999) to 3.3 mbbl/d (4.1%; 2003-2004).[47]

Of the largest 21 fields, about 9 are already in decline.[48]

Mexico announced that its giant Cantarell Field entered depletion in March, 2006,[49] as did the huge Burgan field in Kuwait in November, 2005.[50] Due to past overproduction, Cantarell is now declining rapidly, at a rate of 13% per year.[51] In April, 2006, a Saudi Aramco spokesman admitted that its mature fields are now declining at a rate of 8% per year, and its composite decline rate of producing fields is about 2%.[52] This information has been used to argue that Ghawar, the largest oil field in the world, has peaked.[53]

Many commentators have pointed to the Jack 2 deep water test well in the Gulf of Mexico, announced September 5, 2006[54], as evidence that there is no imminent peak in global oil production. The Jack 2 field, however, may have at best the potential to provide only 2 years of U.S. consumption at present levels. Peak oil theory does not suggest that there will be no major or minor oil finds in the future, but rather that new discoveries and new production will not be able to offset depletion in other parts of the

world.[55] Also, the new fields will be harder to find, harder to get to and harder to extract out the oil. The Jack 2 field, for instance, is more than 20,000 feet under the seafloor in 7,000 feet of water, for a total of 28,000 feet (8.5 kilometers) of pipe.

This increasing investment in harder to reach oil is a sign of oil companies' belief in the end of easy oil:[56]

> All the easy oil and gas in the world has pretty much been found", said William J. Cummings, ExxonMobil's spokesman in Angola. "Now comes the harder work in finding and producing oil from more challenging environments and work areas.

Chuck Masters of the United States Geological Survey says:

> Unconventional resources, such as extra heavy oils, tar sands, gas in tight sands, and coal bed methane are not considered [in the USGS 2000 assessment] but they must, nonetheless, be recognized as being present in very large quantities. ... The two major sources of unconventional oil ... are the extra heavy oil in the Orinoco province of Venezuela and the ... tar sands in the Western Canada Basin. Taken together, these resource occurrences, in the Western Hemisphere, are approximately equal to the Identified Reserves of conventional crude oil accredited to the Middle East.

File:MEESchart.png
OPEC Crude Oil Production 2002-2006. Source:Middle East Economic Survey

These unconventional sources are not as efficient to produce however, requiring extra energy to refine, res

Commodities trader Raymond Learsy, author of *Over a Barrel: Breaking the Middle East Oil Cartel*, contends that OPEC has trained consumers to believe that oil is a much more finite resource than it in fact is. To back his argument, he points to past false alarms and apparent collaboration.[58] He also believes that Peak Oil analysts are conspiring with OPEC and the oil companies to create a "fabricated drama of peak oil" in order to drive up oil prices and profits. It is worth noting oil had risen to a little over $30/barrel at that time. A counter-argument was given in the Huffington Post after he and Steve Andrews, co-founder of ASPO, debated on CNBC in June 2007.[59]

In October 2007, with oil prices in the United States over $90 per barrel, the Energy Watch Group, a German research group founded by MP Hans-Josef Fell, released a report claiming that oil production peaked in 2006 and will decline by 7% annually. The authors predict negative economic effects and social unrest as a result.[60]

Resource nationalism

Template:Pov-section Kate Dorian of Platts said "some oil-rich countries are restricting oil sales outside of their country. These countries are now reluctant to share their reserves"[44] According to consulting firm PFC Energy, only 7% of the world's estimated oil and gas reserves are in countries that allow companies like ExxonMobil free rein. Fully 65% are in the hands of state-owned companies such as Saudi Aramco, and the rest are in the likes of Russia and Venezuela, where access by Western companies is volatile. The PFC study implies political factors are limiting capacity increases in Mexico, Venezuela, Iran, Iraq, Kuwait and Russia. Saudi Arabia is also limiting capacity expansion but because of a self-imposed cap, unlike the other countries.[61] As a result of not having access to countries amenable to oil exploration, ExxonMobil isn't making nearly the investment in finding new oil that it did in 1981.[62]

Mexico nationalized its oil industry in 1938, and has never privatized it, restricting foreign investment. Since the giant Cantarell field in Mexico is now in decline, the state oil company Pemex has faced intense political opposition to opening up the country's oil and gas sector to foreign participation. Some feel that the state oil company Pemex does not have the capacity to develop deep water assets by itself, but needs to do so if it is to stem the decline in the country's crude production.[63]

Major oil companies operating in Venezuela find themselves in a difficult position because of the resource nationalism that's spreading. Exxon Mobil and ConocoPhilips have said they would walk away from their large investment in the Orinoco heavy-oil belt rather than accept tough new contract terms which raise its tax take and oblige all foreign companies to accept minority shares in joint ventures with the state oil company, Petróleos de Venezuela (PDVSA).[64]

Iran, now among the world's leading crude-oil exporters, could become a net importer of oil within the next decade due to rising demand and slow-growing production.[65] As the world's second-biggest proven reserves of oil, it infuriated its people when the government brought in petrol rationing on two hours notice.[66] Due to limited refinery capacity, it has been discouraging gasoline usage. Shortly after the petrol/gasoline rationing, which has reduced demand in some areas by 20%-30%, it announced it will not be producing cars powered only by gasoline.[67]

In Russia, Vladimir Putin's government has pressured Royal Dutch Shell to hand over control of one major project on Sakhalin Island, to Russia's Gazprom in December. The founder of formerly-private Yukos has also been jailed, and the company absorbed by state-owned Rosneft. [68] Such moves strain the confidence of international oil companies in forming partnerships with Russia.[65]

Oil price

Main article: Oil price increases of 2004 and later

File:Gascoupon.png
Gas coupon printed but not used in 1973 oil crisis

In 2004, 30 billion barrels of oil were consumed worldwide, while eight billion barrels of new oil reserves were discovered in new accumulations, a number which excludes reserve growth in existing fields. In August 2005, the International Energy Agency reported global demand at 84.9 million barrels per day, resulting in an annual demand of over 31 billion barrels.[69] This means consumption is now within 2 Mbbl/d of production. At any one time there are about 54 days of stock in the OECD system plus 37 days in emergency stockpiles. In June 2005, OPEC admitted that they would 'struggle' to pump enough oil to meet pricing pressures for the fourth quarter of that

year.[70] The summer and winter of 2005 brought oil prices to a new high (not adjusted for inflation). On the other hand, some analysts attribute much of this new high to disruptions caused by the war in Iraq.[71]

A combination of factors such as fear of war with Iran and hurricanes caused oil prices to peak at $78.64 on August 7, 2006, followed by falls away from the peak. On September 13, 2007, oil prices hit a new peak of $80.18 and finished the day at $80.08, closing above $80 for the first time since trading on the exchange began, on the back of lower reserve data in the US, generally tight supplies, unrest in Nigeria and Mexico, growing tension with Iran, and a falling US dollar. Production is at or near full capacity.[72]

Oil futures briefly traded over $90.00 per barrel on October 19, 2007. A variety of reasons were given for this new record high oil futures, including a possible incursion by Turkey into Northern Iraq, which could result in oil pipelines in that region being attacked. Another possible explanation is that oil demand is reaching parity with oil supply, and the markets are bidding up the oil futures contracts to higher levels.

An oil price chart can be seen here (http://tfc-charts.com/chart/CO/M) .

US economy versus US government

Part of the current debate revolves around energy policy, and whether to shift funding to increasing energy conservation, fuel efficiency, or other energy sources like solar, wind, and nuclear power. For example, in the USA Rep. Tom Udall at congressional peak oil hearings:[73]

> Some say that market forces will take care of the peak oil problem. They argue that as we approach or pass the peak of production, the price of oil will increase and alternatives will become more competitive. Following this, consumers will act to replace our need for non-petroleum energy resources. This philosophy is partly true. However, the main problem with this argument is that current U.S. oil prices do not accurately reflect the full social costs of oil consumption. Currently, in the United States, federal and state taxes add up to about 40 cents per gallon of gasoline. A World Resources Institute analysis found that fuel-related costs not covered by drivers are at least twice that much. The current price of oil does not include the full cost of road maintenance, health and environmental costs attributed to air pollution, the financial risks of global warming from increasing carbon dioxide emissions or the threats to national security from importing oil. Because the price of oil is artificially low, significant private investment in alternative technologies that provide a long-term payback does not exist. Until oil and its alternatives compete in a fair market, new technologies will not thrive.

The Congressional Budget Office provides debate of government research versus incentives:[74]

> ... the federal government could more effectively increase the efficiency of the nation's automotive fleet by raising gasoline taxes, imposing user fees

> on the purchase of low-mileage-per-gallon vehicles, or both. ...Such policies might also spur more-productive research--because automakers would have a greater incentive not only to conduct research into fuel-cell technology but also to broaden their research efforts to include other potential sources of fuel efficiency, such as more-sophisticated drive trains and transmissions and lightweight but durable chassis and body materials.

A warning of the level of incentive required for market driven research and development is stated by Rogner:[75]

> Additionally, production cost reductions will not materialize in the absence of investments. Their magnitude and timing may affect the timing of future access to hydrocarbon resources. The scale of upfront investment requirements is expected to increase while the economic risk associated with upstream hydrocarbon projects will likely be higher than for alternative non-energy investment opportunities (61). Therefore, the quest for short-term profits may well be a road block to long-term resource development.

The problems of privately funded research and development, as espoused by Bronwyn H. Hall, are not unique to peak oil mitigation.[76]

> even if problems associated with incomplete appropriability of the returns to R&D are solved using intellectual property protection, subsidies, or tax incentives, it may still be difficult or costly to finance R&D using capital from sources external to the firm or entrepreneur. That is, there is often a wedge, sometimes large, between the rate of return required by an entrepreneur investing his own funds and that required by external investors.

The severity of the problem for energy is echoed in the International Energy Agency's latest report[77]

In the US, transportation by car is guided more by the government than by an invisible hand. Roads and the interstate highway system were built by local, state and federal governments and paid for by income taxes, property taxes, fuel taxes, and tolls. The Strategic Petroleum Reserve is designed to offset market imbalances. Municipal parking is frequently subsidized.[78] Emission standards regulate pollution by cars. US fuel economy standards exist but are not high enough to have effect. There is also a gas guzzler tax of limited scope. The United States offers tax credits for certain vehicles and these frequently are hybrids or compressed natural gas cars, see Energy Policy Act of 2005.

In order to be profitable, many alternatives to oil require the price of oil to remain above some level. So investors in these alternatives must gamble with the limited data on oil reserves available. This imperfect information can lead to a market failure caused by a move by nature; for instance see Hotelling's rule for non-renewable resources. Even with perfect information the price of oil correlates with spare capacity and spare capacity does not warn of a peak:[79]

> To put this into perspective, in 2004 world oil production is 80 Mb/d; spare capacity would need to be 44 Mb/d to be equivalent to US conditions in 1962. To predict that US production would peak in less than ten years given this much spare capacity seemed at the very least completely unrealistic to most people.

Lester Brown believes this problem might be solved by the government establishing a price floor for oil. A tax shift raising gas taxes is the same idea.[80] Opponents of a price floor for oil argue that the markets would distrust the government's ability to keep the policy when oil prices are low.[81]

Alternative views

Not all non-'peakists' believe there will be endless abundance of oil. CERA, for example, instead believes that global production will eventually follow an "undulating plateau" for one or more decades before declining slowly.[82] In 2005 the group had predicted that "petroleum supplies will be expanding faster than demand over the next five years."[83]

Dr. R.C. Vierbuchen, Vice President, Caspian/Middle East Region, ExxonMobil Exploration Co. believes[84]

> "A peak in petroleum liquids production, resulting solely from resource limitations, is unlikely in the next 25 years. Predictions of an imminent peak [based on the methodology developed by Shell Oil Co. geologist M. King Hubbert] in 1956 do not adequately account for resource growth from application of new technology, knowledge and capability, which combine to increase recovery, open new producing areas and lower economic thresholds."
>
> "Supplies from OPEC and non-OPEC countries, gas-related liquids and unconventional resources are growing. Furthermore, nations with the largest remaining resources produce under long-term restraints not envisioned in Hubbert's method. The ultimate peak in petroleum production may result from factors other than resource limitations."

The U.S. Energy Information Administration projects world consumption of oil to increase to 98.3 million barrels a day in 2015 and 118 million barrels a day in 2030.[85] This represents more than a 25% increase in world oil production. A 2004 paper by the Energy Information Administration based on data collected in 2000 disagrees with Hubbert peak theory on several points:[86]

- Explicitly incorporates demand into model as well as supply
- Does not assume pre/post-peak symmetry of production levels

- Models pre- and post-peak production with different functions (exponential growth and constant reserves-to-production ratio, respectively)
- Assumes reserve growth, including via technological advancement and exploitation of small reservoirs

The EIA estimates of future oil supply are countered by Sadad Al Husseini, retired VP Exploration of Aramco, who calls it a 'dangerous over-estimate'.[87] Husseini also points out that population growth and the emergence of China and India means oil prices are now going to be structurally higher than they have been.

Campbell argues that the 2000 USGS estimates is methodologically flawed study that has done incalculable damage by misleading international agencies and governments.[88] Campbell dismisses the notion that the world can seamlessly move to more difficult and expensive sources of oil and gas when the need arises. He argues that oil is in profitable abundance or not there at all, due ultimately to the fact that it is a liquid concentrated by nature in a few places having the right geology. Campbell believes OPEC countries raised their reserves to get higher oil quotas and to avoid internal critique. He also points out that the USGS failed to extrapolate past discovery trends in the world's mature basins.

Some commentors, such as economists Michael Lynch and Michael Moffat, believe that the Hubbert Peak theory is flawed and there is no imminent peak in oil production; such views are sometimes referred to as "cornucopian" by believers in Hubbert Peak Theory. Lynch argues that production is determined by demand as well as geology, and that fluctuations in oil supply are due to political and economic effects in addition to the physical processes of exploration, discovery and production.[89] Moffat contends that as prices increase, consumers will find alternatives to gasoline. Changes in consumer patterns and the emergence of new technology driven by increases in the price of oil will prevent the oil supply from ever physically running out.[90]

Biogenesis remains the overwhelmingly majority theory among petroleum geologists in the United States. Abiogenic theorists, such as the late professor of astronomy Thomas Gold at Cornell University, assert that the sources of oil may not be "fossil fuels" in limited supply, but instead abiotic in nature. They theorize that if abiogenic petroleum sources are found to be abundant, it would mean Earth contains vast reserves of untapped petroleum.[91] However, M. R. Mello and J.M. Moldowan counter that biomarkers show that all the samples of all the oil and gas accumulations found up to now on earth have biomarkers. Biomarkers prove conclusively that oil comes from a biologic origin and that oil is generated from kerogen by pyrolysis.[92]

Past estimates on when peak oil would occur

Although the finiteness of the earth's oil supply means that peak oil is inevitable, technological innovations in finding and drillng for oil have delayed the appearance of peak oil on several occasions. For example, the National Center for Policy Analysis states: [6] (http://www.ncpa.org/pub/bg/bg159/)

- In 1855, people could only access whatever oil happened to seep to the surface, and an advertisement for Kier's Rock Oil stated, "Hurry, before this wonderful product is depleted from Nature's laboratory."
- In 1874, the state geologist of Pennsylvania, the United States' leading oil-producing state, said that

all the oil would be gone by 1878.

- In 1920, the U.S. Geological Survey stated that the world only had 60 billion barrels of oil left.
- In 1950, geologists estimated that the world had 600 billion barrels of oil.
- In 1970, scientists estimated that the world had 1,500 billion barrels of oil.
- In 1994, the U.S. Geological Survey estimated that the world had 2,400 billion barrels of oil.
- In 2000, the U.S. Geological Survey estimated that the world had 3,000 billion barrels of oil.

None of this means that new oil is forming, or that peak oil will never happen. It means that newer technological advances allow us to find and recover more oil, though later estimates are based on unaudited claims by countries that withhold field production data and are therefore inconclusive.

2007 Reporting

(U) It has been written that future wars may be fought just to run the machines that fight them. It could be very ironic that a war could be fought just to guarantee the fuel to run its planes, ships and tanks. In Operation Iraqi Freedom every soldier uses approximately 16 gallons of oil a day--either directly, through the use of HMWVVs, tanks, trucks and helicopters or indirectly, by calling in air strickes or running the thousands of generators across the multitude of bases throughout the country. Multiply that number by the more than 160,000 troops and one arrives at over 3.5 million gallons of oil **daily**, or over 1.3 billion gallons per year. [93]

(U) The Bush Administration commissioned the Office of Force Transformation within the Office of the Under Secretary of Defense for Policy to study how the Department of Defence will deal with the concept of Peak Oil. Teh conclusion was a study entitled ***Transforming the Way the Dod Looks at Energy***. This study concluded that the Pentagon's current strategy is incompatible with a world of declining oil output. [93]

See also

Template:EnergyPortal

- **Category:Peak oil**

Prediction

- Backstop resources
- Global strategic petroleum reserves
- Hirsch report
- Oil reserves
- Olduvai theory
- World energy resources and consumption

Technology

- Energy conservation
- Energy efficiency
- Energy development
- Fuel economy in automobiles
- Future energy development
- Renewable energy

[redacted]

(b)(3) - P.L. 86-36

Economics

- Gross domestic product per barrel
- Kuznets curve
- Low-carbon economy
- Oil crises
- *Oil Storm*, a docudrama about a future oil-shortage crisis.
- Oil imperialism theories
- OPEC

- Soft energy path

Others

- Energy security
- *Limits to Growth*
- Proposed Oil phase-out in Sweden
- Overpopulation
- Overconsumption
- Green Revolution
- Special Period - Events in Cuba in the 1990s following the withdrawal of cheap Soviet oil exports.
- Causes of hypothetical future disasters

References

1. ↑ Richard Gwyn. "Demand for Oil Outstripping Supply (http://www.commondreams.org/views04/0128-10.htm) ", *Toronto Star*, 2004-01-28. (in English)
2. ↑ Noel Grove, reporting M. King Hubbert (June 1974), "Oil, the Dwindling Treasure (http://www.hubbertpeak.com/hubbert/natgeog.htm) " (in English), *National Geographic*, <http://www.hubbertpeak.com/hubbert/natgeog.htm>
3. ↑ Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2006 - Executive Summary (http://www.epa.gov/otaq/cert/mpg/fetrends/420s06003.htm) . EPA EPA420-S-06-003.
4. ↑ Ferenc L. Toth, Hans-Holger Rogner, (2006), "Oil and nuclear power: Past, present, and future (http://www.iaea.org/OurWork/ST/NE/Pess/assets/oil+np_toth+rogner0106.pdf) " (in English), *Energy Economics* **28**(1 – 25): pg. 3, <http://www.iaea.org/OurWork/ST/NE/Pess/assets/oil+np_toth+rogner0106.pdf>
5. ↑ Rembrandt H.E.M. Koppelaar. World Production and Peaking Outlook (http://peakoil.nl/wp-content/uploads/2006/09/asponl_2005_report.pdf) . (PDF) Peak Oil Netherlands.
6. ↑ Reserve Growth (http://energy.cr.usgs.gov/oilgas/addoilgas/reserve.html) . USGS.
7. ↑ Kenneth S. Deffeyes. Current Events - Join us as we watch the crisis unfolding (http://www.princeton.edu/hubbert/current-events.html) . Princeton University: Beyond Oil.
8. ↑ Boone Pickens Warns of Petroleum Production Peak (http://www.peakoil.net/BoonPickens.html) . Association for the Study of Peak Oil and Gas.
9. ↑ Ryan McGreal. Yes, We're in Peak Oil Today (http://raisethehammer.org/article/643/) . Raise the Hammer.
10. ↑ Dr. Werner Zittel, Jorg Schindler. Crude Oil: The Supply Outlook (http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Oilreport_10-2007.pdf) . Energy Watch Group.
11. ↑ C.J.Campbell. Peak Oil (http://energycrisis.org/de/lecture.html) Presentation at the Technical University of Clausthal].
12. ↑ [12.0] [12.1] Duncan, Richard C. (November 2001), "The Peak of World Oil Production and the Road to the Olduvai Gorge (http://dieoff.org/page224.htm) " (in English), *Population & Environment* **22**(5): pp. 503-522, ISSN (Print) 1573-7810 (Online) 0199-0039 (Print) 1573-7810 (Online)

[redacted]

(b)(3) - P.L. 86-36

(http://worldcat.org/issn/0199-0039) , DOI:10.1023/A:1010793021451 10.1023/A:1010793021451 (http://dx.doi.org/) , <http://dieoff.org/page224.htm>

13. ↑ "Briefing: Exxon increases budget for oil exploration (http://www.iht.com/articles/2007/03/07/business/ibrief.php) ", *Bloomberg*, 2007-03-07. (in English)
14. ↑ "Shell plans huge spending increase (http://www.iht.com/articles/2005/12/14/news/shell.php) ", *International Herald Tribune*, 2005-12-14. (in English)
15. ↑ How Shell blew a hole in a 100-year reputation (http://www.timesonline.co.uk/article/0,,2-960901,00.html) , *The Times*.
16. ↑ Top Oil Groups Fail to Recoup Exploration (http://www.energybulletin.net/2470.html) , James Boxell, New York Times, October 10, 2004.
17. ↑ Forecast of Rising Oil Demand Challenges Tired Saudi Fields (http://www.nytimes.com/2004/02/24/business/24OIL.html?ex=1392958800&en=dc727c73cd688914&ei=5007) , Jeff Gerth, New York Times, February 24, 2004.
18. ↑ Environmental Challenges of Heavy Crude Oils (http://www.battelle.org/Environment/publications/envupdates/Fall2003/article9.stm) . Batelle.
19. ↑ Tar Sands: A brief overview (http://ffden-2.phys.uaf.edu/102spring2002_Web_projects/M.Sexton/) .
20. ↑ Dyni, John R. (2003), "Geology and resources of some world oil-shale deposits (Presented at Symposium on Oil Shale in Tallinn, Estonia, (http://www.kirj.ee/oilshale/2_dyni_2003_3.pdf) November 18-21, 2002) (http://www.kirj.ee/oilshale/2_dyni_2003_3.pdf) " (PDF), *Oil Shale. A Scientific-Technical Journal* (Estonian Academy Publishers) **20**(3): 193-252, ISSN 0208-189X, <http://www.kirj.ee/oilshale/2_dyni_2003_3.pdf>. Retrieved on Template:Date
21. ↑ *Strategic Significance of America's Oil Shale Resource. Volume II Oil Shale Resources, Technology and Economics (http://www.fossil.energy.gov/programs/reserves/npr/publications/npr_strategic_significancev2.pdf)* , Office of Deputy Assistant Secretary for Petroleum Reserves; Office of Naval Petroleum and Oil Shale Reserves; U.S. Department of Energy, 2004, <http://www.fossil.energy.gov/programs/reserves/npr/publications/npr_strategic_significancev2.pdf>. Retrieved on Template:Date
22. ↑ Carola Hoyos. "Study sees harmful hunt for extra oil (http://www.ft.com/cms/s/11ba213e-bf7e-11db-9ac2-000b5df10621.html) ", *Financial Times*, 2007-02-18. (in English)
23. ↑ John H. Wood, Gary R. Long, David F. Morehouse. Long-Term World Oil Supply Scenarios - The Future Is Neither as Bleak or Rosy as Some Assert (http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/worldoilsupply/oilsupply04.html) . Energy Information Administration.
24. ↑ Annual Energy Report (http://www.eia.doe.gov/emeu/aer/pdf/pages/sec1_3.pdf) . US Dept. of Energy.
25. ↑ Global Oil Consumption (http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/demand_text.htm#Global%20Oil%20Consumption) . Energy Information Administration.

(b)(3) - P.L. 86-36

26. ↑ [26.0] [26.1] [26.2] (OSC Report [redacted]
27. ↑ Domestic Demand for Refined Petroleum Products by Sector (http://www.bts.gov/publications/national_transportation_statistics/html/table_04_03.html) . Bureau of Transportation Statistics.
28. ↑ Hirsch report
29. ↑ World oil demand 'to rise by 37%' (http://news.bbc.co.uk/2/hi/business/5099400.stm) . BBC News.
30. ↑ http://www.census.gov/ipc/www/idb/worldpop.html
31. ↑ Are We 'Running Out'? I Thought There Was 40 Years of the Stuff Left

(http://www.lifeaftertheoilcrash.net/) .
32. ↑ Albert A. Bartlett. Thoughts on Long-Term Energy Supplies: Scientists and the Silent Lie (http://fire.pppl.gov/energy_population_pt_0704.pdf) . (PDF) Physics Today.
33. ↑ How peak oil could lead to starvation (http://wolf.readinglitho.co.uk/mainpages/agriculture.html)
34. ↑ Peak Oil: the threat to our food security (http://www.soilassociation.org/peakoil)
35. ↑ Agriculture Meets Peak Oil (http://europe.theoildrum.com/node/2225)
36. ↑ Eating Fossil Fuels (http://www.fromthewilderness.com/free/ww3/100303_eating_oil.html)
37. ↑ Rising food prices curb aid to global poor (http://www.csmonitor.com/2007/0724/p01s01-wogi.html)
38. ↑ Record rise in wheat price prompts UN official to warn that surge in food prices may trigger social unrest in developing countries (http://www.finfacts.com/irelandbusinessnews/publish /article_1011078.shtml)
39. ↑ http://www.eia.doe.gov/emeu/international/oilconsumption.html
40. ↑ China and India: A Rage for Oil (http://www.businessweek.com/bwdaily/dnflash/aug2005 /nf20050825_4692_db016.htm?chan=gb) . Business Week.
41. ↑ Asia's Thirst for Oil (http://www.iags.org/wsj050504.htm) . Wall Street Journal.
42. ↑ www.eia.doe.gov/emeu/ipsr/t14.xls
43. ↑ [43.0] [43.1] "Medium-Term Oil Market Report (http://omrpublic.iea.org/) " (PDF), *IEA*, July 2007. (in English)
44. ↑ [44.0] [44.1] Non-OPEC peak oil threat receding (http://www.arabianbusiness.com /index.php?option=com_content&view=article&id=495829) . Arabian Business.
45. ↑ Peak oil - October 28 (http://www.energybulletin.net/21696.html) .
46. ↑ WorldWatch Institute (2005-01-01), *State of the World 2005: Redefining Global Security*, New York: Norton, pp. 107, ISBN ISBN 0-393-32666-7
47. ↑ [47.0] [47.1] World Oil Supply and Demand (http://omrpublic.iea.org/omrarchive/18jan07tab.pdf) . (PDF) International Energy Agency.
48. ↑ Peak Oil and Energy Resources (http://www.wsm.ie/story/1006) .
49. ↑ "Canales: Output will drop at Cantarell field (http://www.eluniversal.com.mx/miami /vi_16934.html) ", *El Universal*, 2006-02-10. (in English)
50. ↑ James Cordahi and Andy Critchlow. "Kuwait Oil Field, World's Second Largest, 'Exhausted' (http://www.energybulletin.net/10878.html) ", *Bloomberg*, 2005-11-09. (in English)
51. ↑ Adriana Arai. "Mexico's Largest Oil Field Output Falls to 4-Year Low (http://www.bloomberg.com /apps/news?pid=20601086&sid=aGLn091nlGio&refer=latin_america) ", 2006-08-01. (in English)
52. ↑ Ryan McGreal. "Peak Oil for Saudi Arabia? (http://www.raisethehammer.org/blog.asp?id=220) ", *Raise the Hammer*, 2006-04-29. (in English)
53. ↑ Matthew S. Miller. "Ghawar Is Dead! (http://www.energybulletin.net/27024.html) ", *Energy Bulletin*, 2007-03-09. (in English)
54. ↑ "Chevron Announces Record Setting Well Test at Jack (http://www.chevron.com/news/press /2006/2006-09-05.asp) ", *Chevron*, 2006-09-05. (in English)
55. ↑ Greg Geyer. "Jack-2 Test Well Behind The Hype (http://www.aspo-usa.com /index.php?option=com_content&task=view&id=52&Itemid=76) ", *Association for the Study of Peak Oil and Gas*, 2006-09-19. (in English)
56. ↑ "Price rise and new deep-water technology opened up offshore drilling (http://www.boston.com /news/world/articles/2005/12 /11/price_rise_and_new_deep_water_technology_opened_up_offshore_drilling/) ", *The Boston*

Globe, 2005-12-11. (in English)
57. ↑ Dr. Joe Duarte. Canadian Tar Sands: The Good, the Bad, and the Ugly (http://www.rigzone.com /news/article.asp?a_id=30703) . RigZone.
58. ↑ OPEC Follies - Breaking point (http://www.nationalreview.com/comment /learsy200312040900.asp) . National Review.
59. ↑ Rejecting the Real 'Snake Oil' (http://www.evworld.com/news.cfm?newsid=15568) . Huffington Post.
60. ↑ Ashley Seager. Steep decline in oil production brings risk of war and unrest, says new study (http://www.guardian.co.uk/oil/story/0,,2196435,00.html?gusrc=rss&feed=networkfront) . The Guardian.
61. ↑ Sheila McNulty. "Politics of oil seen as threat to supplies (http://www.ft.com/cms/s/dd44e336-fe6a-11db-bdc7-000b5df10621.html) ", *Financial Times*, 2007-05-09. (in English)
62. ↑ Justin Fox. "No More Gushers for ExxonMobil (http://www.time.com/time/magazine/article /0,9171,1626994,00.html) ", **Time *magazine*, 2007-05-31. (in English)**
63. ↑ Ross McCracken. "IOCs, NOCs Facing Off Over Scarcer Resources (http://www.platts.com /Magazines/Insight/2006/december/qS2006t12l07m1m126sP33_1.xml) ", *Platts*, 2007. (in English)
64. ↑ "It's our oil (http://www.economist.com/world/la/displaystory.cfm?story_id=9410681) ", *The Economist*, 2007-06-28. (in English)
65. ↑ [65.0] [65.1] Mark Trumbull. "Risks of rising oil nationalism (http://www.csmonitor.com/2007/0403 /p04s01-usec.html) ", *Christian Science Monitor*, 2007-04-03. (in English)
66. ↑ Mark Colvin and Sabra Lane. "Iran's oil restrictions 'a warning for Australia' (http://www.energybulletin.net/31374.html) ", *Energy Bulletin*, 2007-06-28. (in English)
67. ↑ "Iran ends petrol-only car making (http://news.bbc.co.uk/2/hi/middle_east/6278120.stm) ", *BBC*, 2007-06-07. (in English)
68. ↑ "Country Profile: Russia (http://news.bbc.co.uk/2/hi/europe/country_profiles/1102275.stm) ", *BBC*, 2007-09-17. (in English)
69. ↑ Oil Market Report - Demand (http://omrpublic.iea.org/omrarchive/12july06dem.pdf) . International Energy Agency.
70. ↑ "Oil prices rally despite OPEC output hike (http://www.msnbc.msn.com/id/8225739/) ", *MSNBC*, 2005-06-15. (in English)
71. ↑ Richard M. Ebeling. Why War with Iraq? Follow the Money (http://www.fff.org/comment /com0303a.asp) . The Future of Freedom Foundation.
72. ↑ Global oil prices jump to 11-month highs (http://www.petroleumworld.com/story07070906.htm) . Petroleum World.
73. ↑ Peak Oil Hearing: Udall Testimony (http://www.globalpublicmedia.com/transcripts/587) . United States House of Representatives.
74. ↑ Energy (http://www.cbo.gov/showdoc.cfm?index=6075&sequence=5) . Congressional Budget Office.
75. ↑ Hans-Holger Rogner (November 1997), "An Assessment of World Hydrocarbon Resources (http://arjournals.annualreviews.org/doi/pdf/10.1146/annurev.energy.22.1.217) " (in English) (PDF), *Annu. Rev. Energy Environ* **22**: pp. 217-262, DOI:10.1146/annurev.energy.22.1.217 10.1146/annurev.energy.22.1.217 (http://dx.doi.org/) , <http://arjournals.annualreviews.org/doi/pdf /10.1146/annurev.energy.22.1.217>
76. ↑ "The Financing of Research and Development (http://elsa.berkeley.edu/~bhhall/papers /BHH%20OxREP02%20R&DFinance.pdf) " (in English) (PDF), *Oxford Rev. Econ. Pol.* **18**(1), 2002, <http://elsa.berkeley.edu/~bhhall/papers/BHH%20OxREP02%20R&DFinance.pdf>, "NBER

[redacted]

(b)(3) - P.L. 86-36

Working Paper No. 8773 (February 2002); University of California at Berkeley Dept. of Economics Working Paper No. E02-311 (January 2002)"

77. ↑ WEO 2006 identifies under-investment in new energy supply as a real risk (http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=187) . International Energy Agency.
78. ↑ Keith Bawolek (2004-03), *What Drives Parking Investments? (http://www.ciremagazine.com/article.php?article_id=66)* , CIRE Magazine, <http://www.ciremagazine.com/article.php?article_id=66>
79. ↑ Alfred J. Cavallo (December 2004), "Hubbert's Petroleum Production Model: An Evaluation and Implications for World Oil Production Forecasts (http://www.springerlink.com/content/q363778431537157/fulltext.pdf) " (in English), *Natural Resources Research* **13**(4), <http://www.springerlink.com/content/q363778431537157/fulltext.pdf>
80. ↑ Lester R. Brown. Let's Raise Gas Taxes and Lower Income Taxes (http://www.earth-policy.org/Updates/2006/Update54.htm) . Earth Policy Institute.
81. ↑ Jerry Taylor and Peter Van Doren. An Argument against Oil Price Minimums (http://www.cato.org/pub_display.php?pub_id=6410) . Cato Institute.
82. ↑ "CERA says peak oil theory is faulty (http://www.energybulletin.net/22381.html) ", *Energy Bulletin*, 2006-11-14. (in English)
83. ↑ "One energy forecast: Oil supplies grow (http://www.csmonitor.com/2005/0622/p25s02-wogi.html) ", *Christian Science Monitor*, 2005-06-22. (in English)
84. ↑ R.C. Vierbuchen. Production of global hydrocarbon liquids: Is there a near term peak? (http://www.hgs.org/en/cev/?692) . Houston Geological Society.
85. ↑ World Oil Consumption by region, Reference Case (http://www.eia.doe.gov/oiaf/ieo/pdf/ieoreftab_4.pdf) . EIA.
86. ↑ John H. Wood, Gary R. Long, David F. Morehouse. Long-Term World Oil Supply Scenarios - The Future Is Neither as Bleak or Rosy as Some Assert (http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/worldoilsupply/oilsupply04.html) . EIA.
87. ↑ "Oil expert: US overestimates future oil supplies (http://www.channel4.com/news/articles/business_money/oil+expert+us+overestimates+future+oil+supplies/254293) ", *Channel 4 News*. (in English)
88. ↑ "Campbell replies to USGS: Global Petroleum Reserves - A View to the Future (http://www.oilcrisis.com/news/article.asp?id=3659&ssectionid=0) ", *Oil Crisis*, 2002-12-1. (in English)
89. ↑ Michael C. Lynch. The New Pessimism about Petroleum Resources: Debunking the Hubbert Model (and Hubbert Modelers) (http://www.energyseer.com/NewPessimism.pdf) . Energyseer.com.
90. ↑ Michael Moffatt. We Will Never Run Out of Oil (http://economics.about.com/cs/macroeconomics/a/run_out_of_oil.htm) . About.com.
91. ↑ J. R. Nyquist. Debunking Peak Oil (http://www.financialsense.com/stormwatch/geo/pastanalysis/2006/0508.html) . Financial Sense.
92. ↑ M. R. Mello and J.M. Moldowan. Petroleum: To Be Or Not To Be Abiogenic (http://www.searchanddiscovery.net/documents/abstracts/2005research_calgary/abstracts/extended/mello/mello.htm) .
93. ↑ [93.0] [93.1] (U) Opportunity Costs - Pentagon v. Peak Oil, June 2007 [redacted] . . . [redacted] . . . (b)(3) - P.L. 86-36

Further reading

Books

- Colin J. Campbell,
  - Campbell, Colin J. (2004), *The Essence of Oil & Gas Depletion*, Multi-Science Publishing, ISBN 0-906522-19-6
  - Campbell, Colin J. (2004), *The Coming Oil Crisis*, Multi-Science Publishing, ISBN 0-906522-11-0
  - Campbell, Colin J. (2005), *Oil Crisis*, Multi-Science Publishing, ISBN 0-906522-39-0
- Kenneth S. Deffeyes,
  - Deffeyes, Kenneth S. (2002), *Hubbert's Peak:The Impending World Oil Shortage*, Princeton University Press, ISBN 0-691-09086-6
  - Deffeyes, Kenneth S. (2005), *Beyond Oil: The View from Hubbert's Peak*, Hill and Wang, ISBN 0-8090-2956-1
- Eberhart, Mark (2007), *Feeding the Fire: The Lost History and Uncertain Future of Mankind's Energy Addiction*, Harmony, ISBN 978-0307237446
- Goodstein, David (2005), *Out of Gas: The End of the Age Of Oil*, W. W. Norton, ISBN 0-393-05857-3
- Richard Heinberg,
  - Heinberg, Richard (2003), *The Party's Over: Oil, War, and the Fate of Industrial Societies*, New Society Publishers, ISBN 0-86571-482-7
  - Heinberg, Richard (2004), *Power Down: Options and Actions for a Post-Carbon World*, New Society Publishers, ISBN 0-86571-510-6
  - Heinberg, Richard (2006), *The Oil Depletion Protocol: A Plan to Avert Oil Wars, Terrorism and Economic Collapse*, New Society Publishers, ISBN 10: 0-86571-563-7
- Huber, Peter (2005), *The Bottomless Well*, Basic Books, ISBN 0-465-03116-1
- Kleveman, Lutz C. (2004), *The New Great Game: Blood and Oil in Central Asia*, Atlantic Monthly Press, ISBN 0-87113-906-5
- Kunstler, James H. (2005), *The Long Emergency: Surviving the End of the Oil Age, Climate Change, and Other Converging Catastrophes*, Atlantic Monthly Press, ISBN 0-87113-888-3
- Leggett, Jeremy (2005), *The Empty Tank: Oil, Gas, Hot Air, and the Coming Financial Catastrophe*, Random House, ISBN 1-4000-6527-5
- Lovins, Amory et al (2005), *Winning the Oil Endgame: Innovation for Profit, Jobs and Security*, Rocky Mountain Institute, ISBN 1-881071-10-3
- Pfeiffer, Dale Allen (2004), *The End of the Oil Age*, Lulu Press, ISBN 1-4116-0629-9
- Rashid, Ahmed,
  - Rashid, Ahmed (2001), *Taliban: Militant Islam, Oil and Fundamentalism in Central Asia*, Yale University Press, ISBN 0-300-08902-3
  - Rashid, Ahmed (2003), *Jihad: The Rise of Militant Islam in Central Asia*, Yale University Press, ISBN 0-300-09345-4
- Rifkin, Jeremy (2002), The Hydrogen Economy: After Oil, Clean Energy From a Fuel-Cell-Driven Global Hydrogen Web (http://www.emagazine.com/january-february_2003/0103feat1.html) , Blackwell Publishers, ISBN 0-7456-3042-1
- Ruppert, Michael C. (2005), *Crossing the Rubicon: The Decline of the American Empire at the End of the Age of Oil*, New Society, ISBN-13: 978-0865715400
- Simmons, Matthew R. (2005), *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*, ISBN 0-471-73876-X

- Shah, Sonia (2004), *Crude, The Story of Oil*, Seven Stories Press, ISBN 1-58322-625-7
- Simon, Julian L. (1998), *The Ultimate Resource*, Princeton University Press, ISBN 0-691-00381-5
- Smil, Vaclav (2005), *Energy at the Crossroads: Global Perspectives and Uncertainties*, MIT Press, ISBN 0-262-19492-9
- Tertzakian, Peter (2006), *A Thousand Barrels a Second*, McGraw-Hill, ISBN 0-07-146874-9
- Yeomans, Matthew (2004), *Oil, Anatomy of an Industry*, ISBN 1-56584-885-3
- Yergin, Daniel (1993), *The Prize : The Epic Quest for Oil, Money & Power*, Free Press, ISBN 0-671-79932-0

External links

Web sites

- Peak Oil Chat (http://www.peakoilchat.com) Real time, instant message style discussion on energy related issues. No registration or software installation at all.
- U.S. Energy Information Agency Petroleum Data (http://www.eia.doe.gov/oil_gas/petroleum/info_glance/petroleum.html)
- Association for the Study of Peak Oil (http://www.aspo-global.org)
- PeakOil.com (http://www.peakoil.com)
- PeakOil.nl - ASPO Netherlands (http://www.peakoil.nl)
- Eating Fossil Fuels (http://www.fromthewilderness.com/free/ww3/100303_eating_oil.html)
- DIE OFF - a population crash resource page (http://dieoff.org/)
- Wolf at the Door (http://www.wolfatthedoor.org.uk) Beginner's Guide to Peak Oil
- Articles and commentary from Peak Oil correspondent Byron King (http://www.whiskeyandgunpowder.com/Contributors/King2007.html)
- Life After the Oil Crash (http://www.lifeaftertheoilcrash.net) Deal With Reality or Reality Will Deal With You
- Oil Depletion Analysis Centre (http://www.odac-info.org/) in the United Kingdom
- PowerSwitch (http://www.powerswitch.org.uk/) in the United Kingdom
- Energy Bulletin (http://www.energybulletin.net) Peak Oil related articles
- Peak Oil in the News (http://peakoilinthenews.com/) Daily round-up of Peak Oil news
- The Oil Drum (http://www.theoildrum.com/) Discussions about Energy and our Future
- TrendLines' current Peak Oil Depletion Scenarios Graph (http://www.TrendLines.ca/energy.htm) A monthly compilation update of 16 recognized estimates of URR, Peak Year & Peak Rate
- Carbon War (http://www.carbonwar.co.uk/)
- Energy Supply page at The Global Education Project (http://www.theglobaleducationproject.org/earth/energy-supply.php) Charts and graphs on current energy reserves and use, and peak oil.
- Culture Change (http://www.culturechange.org/cms/index.php) - life after the peak.
- Post Carbon Institute (http://www.postcarbon.org) to assist communities in the effort to Relocalize and adapt to an energy constrained world.
- From The Wilderness (http://www.fromthewilderness.com) original peak oil reporting
- Oil Protocol (http://www.oildepletionprotocol.org/) A plan for a sensible energy future]
- Solutions for food, housing and transportation (http://www.communitysolution.org)
- Peak Oil For Dummies (http://www.peakoilfordummies.com)

Online audio, podcasts

- David Holmgren. David Holmgren talks about Peak Oil and Permaculture (http://www.archive.org/details/holmgren_energy_descent) . archive.org.

Online videos

- Rep. Prof. Roscoe Bartlett's to U.S. House of Representatives (http://www.energybulletin.net/5080.html) . Energy Bulletin.
- OneWorldTV Video interview with Richard Heinberg (http://tv.oneworld.net/article/view/152547)
- Informative and brief (12 minute) Australian video about the problem (http://www.abc.net.au/catalyst/stories/s1515141.htm)
- Peak Oil; brief overview slide show (http://www.powerswitch.org.uk/portal/images/stories/animoil.swf) by Powerswitch.org.uk (http://www.powerswitch.org.uk)
- Peak Oil? ABC (Australian Broadcasting Corporation) Includes interviews with Colin Campbell, Robert Hirsch, Chris Skrebowski, and others. (http://abc.net.au/4corners/special_eds/20060710/default_full.htm)
- Arithmetic, Population and Energy. Dr. Albert Bartlett (Both video and MP3 available. A transcript is also available) (http://www.globalpublicmedia.com/lectures/461)
- A post-oil man. A humorous look at preparing for peak oil. (http://www.jameswjohnson.com/movies/vids/post-oilman_win.htm)
- Roscoe Bartlett explains peak oil in US Congress (http://kimaura.com/peakoil/peakoil-128k.wmv)
- Peak Aware: free online videos about peak oil (http://www.peakaware.com/)

DVDs

- What a Way to Go: Life at the End of an Empire (http://www.whatawaytogomovie.com/) (2007)
- Oil Crash (http://www.oilcrashmovie.com/) (2006)
- Oil, Smoke & Mirrors (http://www.oilsmokeandmirrors.com/) (2006)
- Peak Oil: Imposed by Nature (http://www.troposdoc.com) (2005)
- The End of Suburbia: Oil Depletion and the Collapse of the American Dream (http://www.amazon.com/dp/B0009231TG/) (2004)

Articles

- Katie Benner. "Lawmakers: Will we run out of oil? (http://money.cnn.com/2005/12/07/markets/peak_oil/index.htm) ", *CNN*, 2005-12-07. (in English)
- Katie Benner. "Oil: Is the end at hand? (http://money.cnn.com/2004/11/02/markets/peak_oil/) ", *CNN*, 2004-11-03. (in English)
- John V. Mitchell. A New Era for Oil Prices (http://www.chathamhouse.org.uk/pdf/research/sdp/Oilprices0806.pdf) .
- The Future of Oil (http://www.foreignpolicy.com/story/cms.php?story_id=3233) . Foreign Policy.
- Colin Campbell & Jean Laherrère. The End of Cheap Oil (http://dieoff.org/page140.htm) . Scientific American.
- press release (http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=137) . International Energy Agency.

[redacted]

(b)(3) - P.L. 86-36

- Mark Williams. The End of Oil? (http://www.technologyreview.com/articles/05/02/issue/review_oil.asp) . MIT Technology Review.
- Tim Appenzeller. The End of Cheap Oil (http://magma.nationalgeographic.com/ngm/0406/feature5/) . National Geographic.
- Michael C. Lynch. The New Pessimism about Petroleum Resources (http://www.gasresources.net/Lynch(Hubbert-Deffeyes).htm) .
- Robert Rapier. Peak Lite (http://i-r-squared.blogspot.com/2006/04/peak-lite.html) .
- Robert E. Snyder. Oil shale back in the picture (http://www.worldoil.com/Magazine/MAGAZINE_DETAIL.asp?ART_ID=2378&MONTH_YEAR=Aug-2004) .
- Paul Roberts (2004-08), "Last Stop Gas (http://www.harpers.org/LastStopGas.html) " (in English), *Harper's Magazine*: pp. 71-72, <http://www.harpers.org/LastStopGas.html>
- Larry West. Sweden aims to be world's first oil-free nation by 2020 (http://environment.about.com/od/renewableenergy/a/oilfreesweden.htm) .
- 'Peak oil' enters mainstream debate (http://news.bbc.co.uk/1/hi/business/4077802.stm) . BBC News.
- Dan Welch. Between Peak Oil and Climate Change (http://www.thepeakist.com/manifesto/) . The Peakist.
- Donna Mosher. Actions everyone can take to prepare for the possible end of an era (http://www.cleanhouston.org/energy/features/oilactions.htm) . Citizens League for Environmental Action Now.
- Peak Oil & Aviation (http://www.oildecline.com/airways.pdf) .
- Anonymous. A letter from oil exploration insider (http://www.energybulletin.net/4466.html) . Energy Bulletin.

Reports, essays, and lectures

- Crude Oil - The Supply Outlook (http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Oilreport_10-2007.pdf) . Energy Watch Group.
- Doctoral thesis: Giant Oil Fields - The Highway to Oil: Giant Oil Fields and their Importance for Future Oil Production (http://publications.uu.se/abstract.xsql?dbid=7625) . Uppsala University.
- Review: Oil-based technology and economy - prospects for the future (http://www.tekno.dk/subpage.php3?article=1025&toppic=kategori11&language=uk&category=11/) . The Danish Board of Technology (Teknologirådet).
- Jim Bliss. An Introduction to Peak Oil (http://www.thesharpener.net/?p=41) .
- The End of Oil (http://www.physics.otago.ac.nz/eman/The%20End%20of%20Oil%20essay%201.pdf) . (PDF) University of Otago Department of Physics.
- Peak Oil Theory – "World Running Out of Oil Soon" – Is Faulty; Could Distort Policy & Energy Debate (http://www.cera.com/aspx/cda/public1/news/pressReleases/pressReleaseDetails.aspx?CID=8444) . CERA.
- Australia's future oil supply and alternative transport fuels (http://www.aph.gov.au/SENATE/committee/rrat_ctte/oil_supply/report/index.htm) . Parliament of Australia - Senate.

Retrieved from [redacted]

Categories: WikipediaXferDate | WikipediaXferDate by date | Articles with unsourced statements | Economic theories | Futurology | Peak oil | Petroleum politics | Sustainability | Environmental economics | Eschatology | Energy | Oil

(b)(3) - P.L. 86-36

[redacted]

Classified By: [redacted]
Derived From: [redacted]
Declassify On: April 4, 2037

(b)(3) - P.L. 86-36

~~SECRET~~

(b)(6)

- This page has been accessed 2,185 times.
- 3 watching users
- This page was last modified 21:09, 4 April 2012 by [redacted] Most recent editors: [redacted] and others.