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The world on the presence of peak oil

REPORT ON THE SUMMIT OF WORLD OIL PRODUCTION

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Fernando Bullón Miró
Association for the Study
of Energy Resources (AEREN)

HOW IS OIL FORMED?

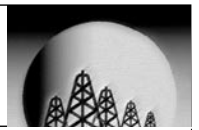
Oil is formed under the earth's surface by the decomposition of marine organisms. The remains of minuscule animals that live in the sea -and, to a lesser extent, those of land organisms swept to the sea by rivers and those of plants that grow in marine bottoms- mix with the fine sands and muds that fall to the bottom in the calm marine basins. These deposits, rich in organic materials, become rocks which generate oil.

The process began several millions of years ago, when live organisms appeared in big amounts, and it continues until nowadays. The sediments become thicker and they sink into the marine bottom under their own weight. As additional deposits accumulate, the pressure on the ones situated below multiplies by many thousands, and the temperature increases in several hundreds of degrees. The mud and the sand harden and become schists and sandstone; the precipitate carbonates and the remains of shells become limestone, and the tender tissues of dead organisms become oil and natural gas.

Once oil is formed, it flows upward through the earth's crust because its density is less than the one of the brines that saturate the interstices of schists, sands and carbonate rocks which constitute this crust. Oil and natural gas ascend through the microscopic pores of the sediments situated above. They often find an impermeable schist or a layer of dense rock: oil remains trapped, forming a deposit. However, a significant part of oil does not meet impermeable rocks, but it springs in the earth's surface or in the ocean's bottom. Bituminous lakes and natural gas filtrations are also among the superficial deposits.

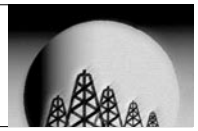
(Source: Encarta Encyclopaedia 2002. *http://es.encarta.msn.com/*)

INDEX



This article was conceived as a contribution to inform the global energy crunch in which we find ourselves. The references at the end of this paper are suggested to enable more information to be sourced. It was originally written for the Spanish website www.crisisenergetica.org, where there are a lot of articles, plentiful and updated information, a debate forum, lots of oil and energy links, as well as the monthly bulletins of the Association for the Study of Peak Oil (www.peakoil.net). ASPO is a society formed by scientists from many countries who are trying to determine the date and the impact of the global oil and natural gas production peak.

Introduction

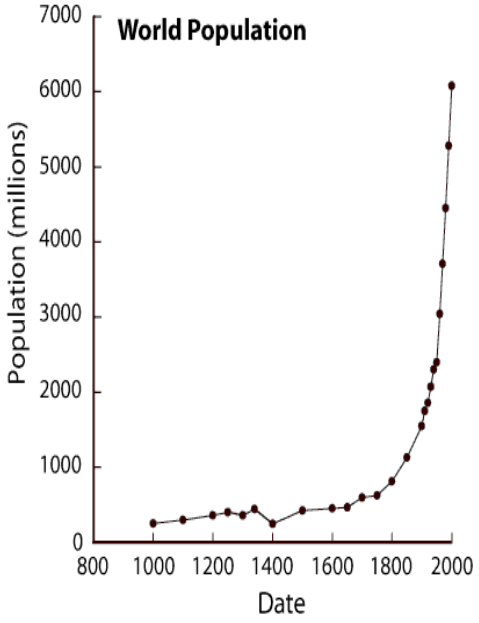


Oil is a unique resource, as it constitutes a source of energy for humanity which is very efficient, relatively easy to extract, transport and simple to use, as well as a raw material from which to obtain a large variety of other products. The plentiful availability of oil has been decisive in the deep changes humanity has experienced in the last century, until reaching the present state of dependence on so-called "black gold" we are involved in. In fact, nowadays, oil is present in almost everything we use habitually and it provides the energy that powers 95 % of world transport.

Oil has been essential in the increase in the production and distribution of food worldwide, as well as in the advances achieved in medicine, both of which contributed to the world population explosion, from the middle of the 19th century to today.

In only one hundred years it is estimated that humanity has consumed almost half of initially existing oil - which needed millions of years to form in the subsoil of some areas of our planet.

Several studies estimate that once half of the planet's oil reserves are consumed, the pace of daily production would start to decline. That means that at the beginning of the 21st century, mankind faces a reduction in the availability of the most essential resource which supports the present economic system and resulting way of life. The potential drop in oil production posibly constitutes the biggest challenge which present society faces, as no other known energy resource with its qualities and provisions is available.



Evolution of world population in thousands of millions of inhabitants from year 1000 to 2000.

In spite of the investment carried out, there are no substitutes that can replace oil as an energy source, especially regarding fuel for transport, or as a raw material for the more than three thousand products that are obtained from it.

A gradual decrease in the surplus production of oil has been taking place over the last few years, due to difficulties in increasing supply at the same pace as demand, and oil prices have increased significantly. It is possible this process will become more pronounced in coming years, especially at the point when oil production begins to decrease, and very especially if geopolitical factors cut the supply from any of the main producer countries.

The potential rise in energy costs and any combined lack of supply could lead the world economy to recession, possibly the only current mechanism – and a socially painful one at that - that the world has today for reducing energy demand. Some say the first signs of this process are becoming more and more apparent.

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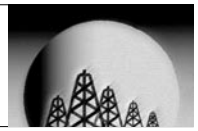
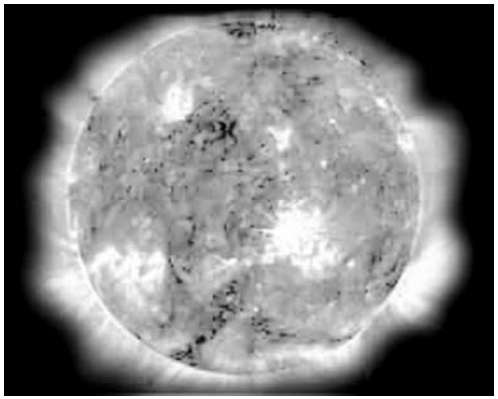


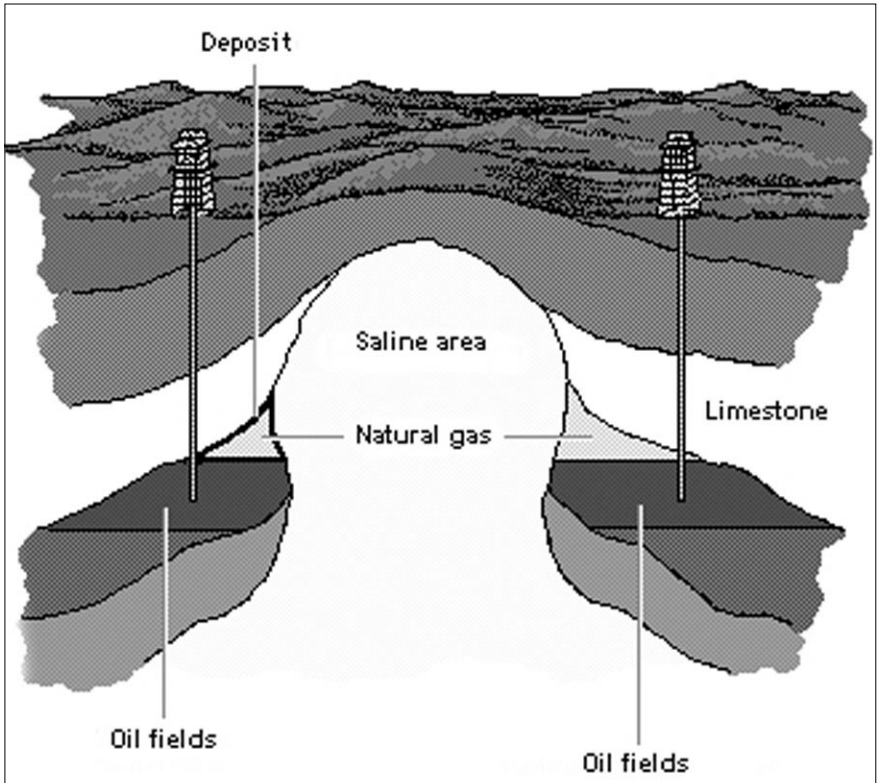
Fossil fuels, energy crisis and climatic change

The energy existing in our planet - whether it is the movement of the air or the oceans, clouds or rain - comes from the nuclear fusion reactions that take place in the Sun. Plants absorb the Sun's energy through photosynthesis and animals take it from the plants, either directly or indirectly.

Over millions of years, part of the energy absorbed in this way has remained buried in the form of organic matter and has been turning slowly, through physical-chemical processes, into solid (coal), liquid (oil) or gaseous (natural gas) organic compounds. **These compounds are called "fossil fuels" and are finite and essentially non renewable, as they need millions of years to be formed.**



About 250 years ago, with the beginning of the Industrial Revolution, humans began to use the energy stored in those compounds - beginning with coal - extracting them from subsoil and burning them, turning them into gases and emitting them to the atmosphere.



Oil fields are formed as a result of an intense pressure on layers of dead aquatic and land organisms, mixed with sand or mud. The field shown is trapped between a layer of non porous rock and a saline area. As they do not have space to expand, gas and raw oil are under a substantial pressure and they tend to spring up violently through any drilled hole. (Source: Encarta Enclyclopedia 2002. http://es.encarta.msn.com/)

So it can be said that what our species is doing by burning massive quantities of fossil fuels, is to move tons of carbonized organic matter - in the form of gases - into the atmosphere, organic compounds which have spent millions of years in the subsoil.

The energy obtained by burning these fossil sources gave humanity the ability to exploit other natural resources more intensively, such as water, land or the seas.
In turn, this made possible the demographic explosion of the last century as well as a way of life – in richer countries - based on high energy consumption.

Fossil fuels are still our basic energy source, since they not only deliver 80% of the energy consumed in the world, but also help to take advantage of the rest of the known energy sources.

If the Earth were infinite and its resources were unlimited, population and energy consumption could continue increasing indefinitely.
But our planet is limited, and therefore its resources are also limited. That means the process of extracting materials from the subsoil and emitting them to the atmosphere would take us to a point where resources begin to show signs of running out; and the drains, of beginning to get saturated.

Some say this is precisely the point we have reached; while humanity keeps growing in population and energy needs, many geologists are warning that the supply of fossil fuels may soon begin to decline – beginning with oil and natural gas-, as well as climatologists are advising the growth detected in the concentrations of the gases, resulting from their combustion, has no precedent (figure 1, below).

Carbon dioxide (CO2) stands out among these gases whose concentration is noticeably increasing. CO2 has the quality to act as a "greenhouse gas", something that could be initiating an unpredictable alteration to the climatic balance of our atmosphere, as it is widely debated.

Taking this into account, it is impossible to predict what will happen in the decades to come, regarding both the process by which our species will potentially have to adapt to live with less and less energy and materials derived from fossil fuels. But also the possible impact on the world climate of such a large accumulation of greenhouse gases in the low layers of the atmosphere.

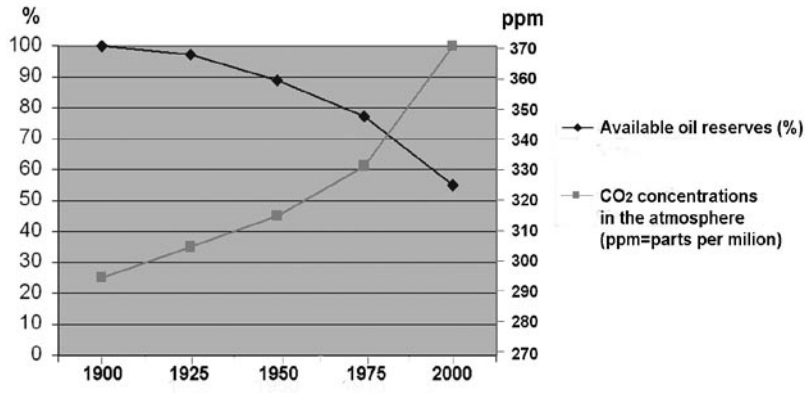


Figure 1: *Rough evolution of the percentage of oil reserves and carbon dioxide (CO2) concentrations in the atmosphere during the 20th century.*

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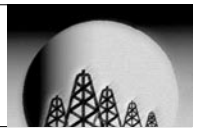

Present world´s dependence on oil

Due to oil's ease of extraction, its versatility, the ease with which it is transported and stored, and the large amount of energy that it supplies per unit of volume, it became, from the beginning of its large scale commercial extraction at the beginning of the 20th century, the fossil fuel that contributed most to the formidable development of industry, agriculture and means of transport, making possible the specialization of production worldwide.

All of the exploitation of oil and gas made possible the growth of worldwide production and trade, but also lead to a significant dependence on its energy and resulting products.

Our present society and lifestyle is possible thanks mainly to the intensive use of oil, since fundamental activities such as industry, electricity production, transport, construction, tourism, agriculture, fishing, cattle farming, mining and medicine are very dependent on its availability.

In particular, the commercial production of food is based on intensive use of oil, which has made possible the mechanization of agriculture and the extension of irrigation. Oil is used as energy - to plough, sow, pick up, pump water, process, harvest, transport, preserve and distribute - and for manufacturing insecticides, fertilizers and food preservatives.

It is estimated that, with the present model of production and distribution, an average of eight calories of fossil fuels - basically oil - are required to produce each calorie of food that reaches the final consumer.

Oil forms part of all types of plastics, chemical products and building industry materials.
In this way, it is present in almost all goods of common use utilized today. The list is never-ending and includes objects as varied as inner components and covers of electronic devices, synthetic leathers, detergents, cleaning products, cosmetic products, paints, lubricants, PVC, agricultural fertilizers, medicines, insulators, asphalts, synthetic fibers for clothing, furniture, bottles, nappies, computers, cameras, batteries, glasses, contact lens, shampoos, mobile

telephones, toothpastes, ball-point pens and so on.

Oil is also necessary for the maintenance of basic urban services such as drinking water supply, garbage collection, for the maintenance of streets and gardens, fire extinguishing services, civil defense services and policing.

Therefore, it is not surprising that any variation in oil's price affects all economic sectors and activities.

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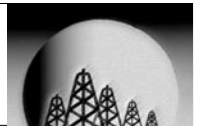


Hubbert´s curve

In the 1950's, the United States geologist Dr. M. King Hubbert proved that the life cycle of any oil well follows a curve in the shape of a bell, called "Hubbert's curve" (see figure 2, page 14).

This means that, although oil production increases quickly when the exploitation is initiated - so that more and more oil can be gradually extracted with little effort - as time goes by, the increase in production declines, until a peak is reached from which production begins to fall, until the well is exhausted.

In the ascending stretch of Hubbert's curve (before reaching the peak), oil is plentiful, of high quality and easy to extract, but in the descending stretch it is more and more scarce, difficult to extract, of poorer quality and less pure.

"Peak oil" is the term applied to the upper part of Hubbert's bell curve, where maximum production is achieved, and it is reached when about half of the initially existing oil has been extracted.

If the evolution of any oil well production shows a bell curve, then logically if the production of many wells are combined, the curve obtained has a similar shape. This means that the production of any field, of any producer country or world production, should also show a similar evolution.

Knowing this, and carrying out some mathematical calculations, Hubbert deduced with noticeable precision in 1956, when US was the biggest oil producer on the planet, that the peak of American oil production would be reached in about 1970 (figure 6, page 18).

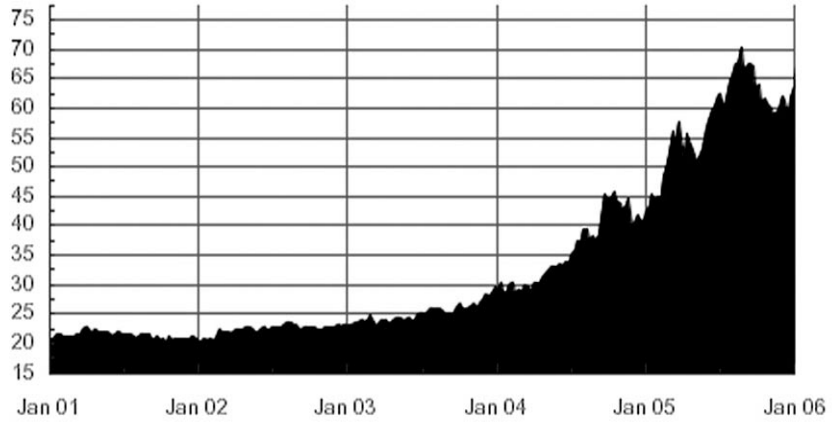
For global production, Hubbert estimated that the peak would take place at the end of the 20th or the beginning of the 21st century. He also proved that if world reserves exceeded his estimates by one and a half times, the world peak in production would only be delayed around eight years *(figure 2, page 14).*

Several studies have verified the validity of Hubbert's results and show that about half of the initial oil reserves have already been consumed, which proves that we are in the period of worldwide oil production's peak.

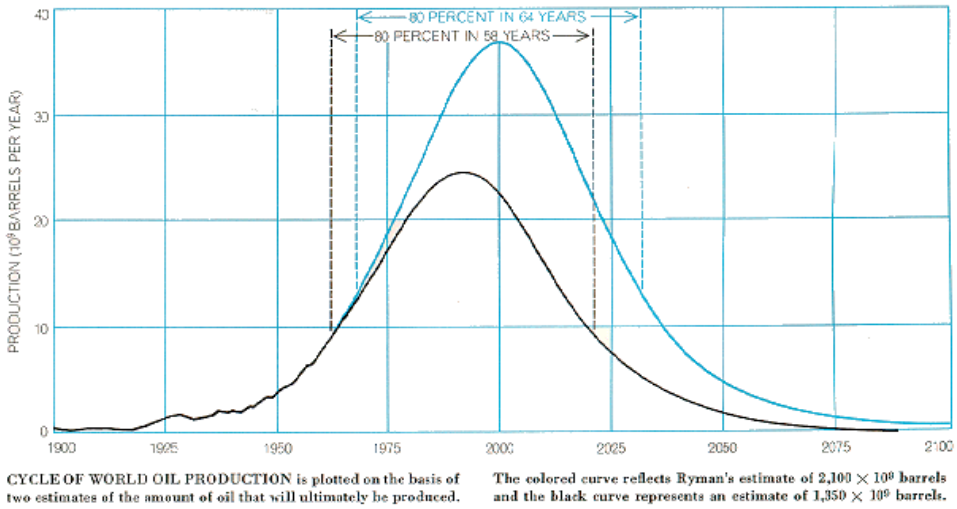
Thus, although it is estimated that there could be oil left for about 40 years at the present pace of consumption, the most imminent challenge which society faces at the beginning of the 21st century is the one of reaching maximum world oil production and any possible resulting decline.

The drop in global oil production combined with increasing demand, a strong dependence on oil, and without any other energy alternatives that can replace it, could open a deep gap between demand and supply. One that could lead to shortages in international markets and to steep rises in the price per barrel.

Increases in the price of energy can create inflationary pressures that reach all economic sectors and have unpredictable impacts on the economies of all countries. There is a risk to the balance of the international financial system and intense social crises could potentially be generated.



Graphic of the evolution of oil barrel's prices in dollars WTI in the last 5 years. (source: www.slb.com)



CYCLE OF WORLD OIL PRODUCTION is plotted on the basis of two estimates of the amount of oil that will ultimately be produced. The colored curve reflects Ryman's estimate of $2{,}100 \times 10^9$ barrels and the black curve represents an estimate of $1{,}350 \times 10^9$ barrels.

Figure 2: Proyection of the cycle of world oil production published by Hubbert in 1971 in "Scientific American". The coloured curve shows that, even if the reserves were one and a half times the considered at the black one, the peak's date would be moved forward only a decade, and the time invested by humanity in consuming 80% of all the world reserves would extend over 6 years only.
Source: http://www.hubbertpeak.com/hubbert/images/worldoil.gif

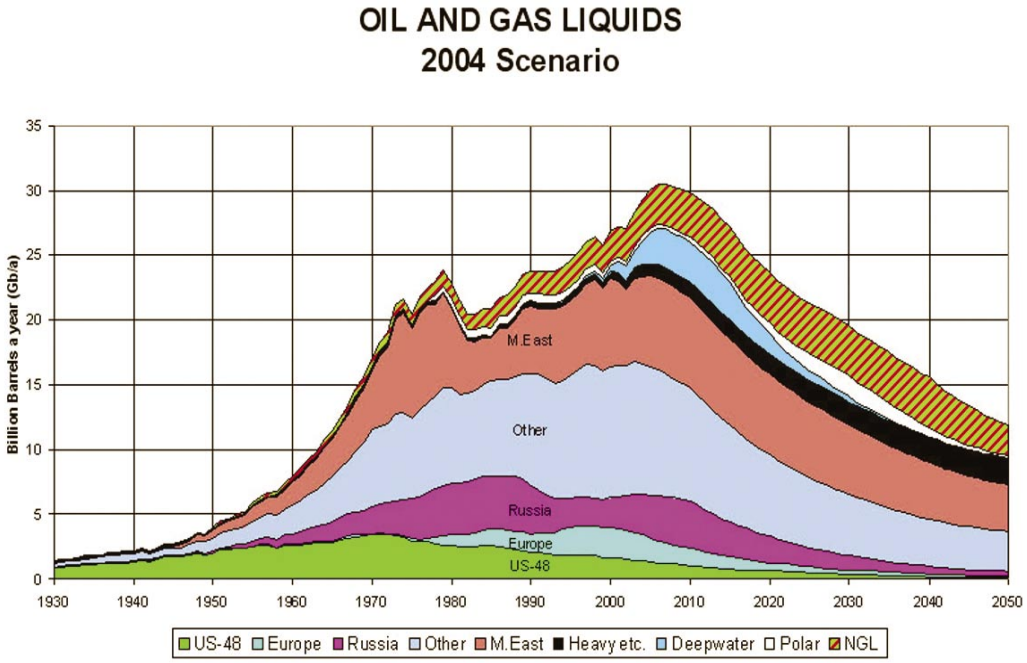


Figure 3: Graphic of world oil production according to the Association for the Study of Peak Oil (ASPO). Source: "Hubbert's Peak: The Impending Oil Shortage". Kenneth S. Deffeyes.

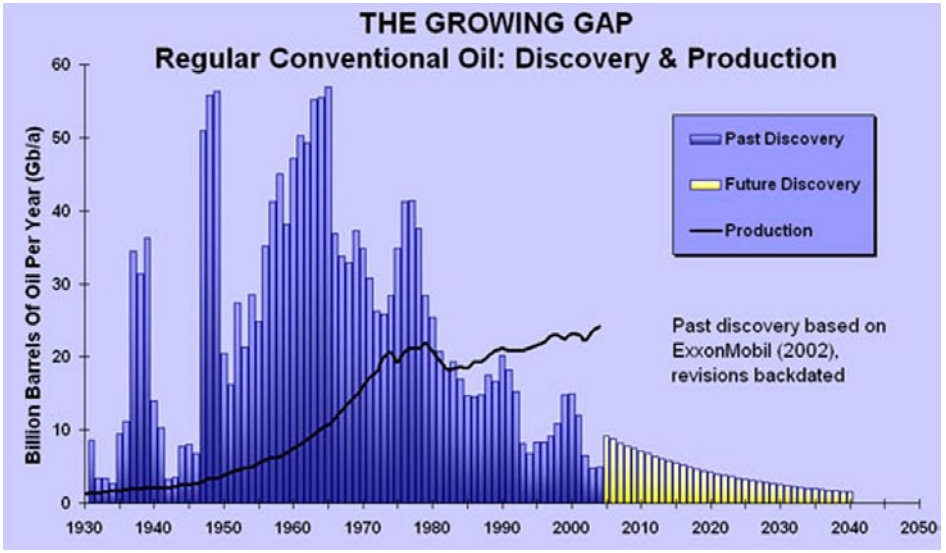


Figure 4: Annual discoveries of oil fields since 1930, given in volume of reserves included per year (vertical bars) and world oil extraction until year 2003 (blue curve). It can be observed that since the eighties oil extraction begins to exceed the oil discovered every year. Source: http://info.energyscenariosireland.com/images/7/7b/TheGrowingGap.jpg

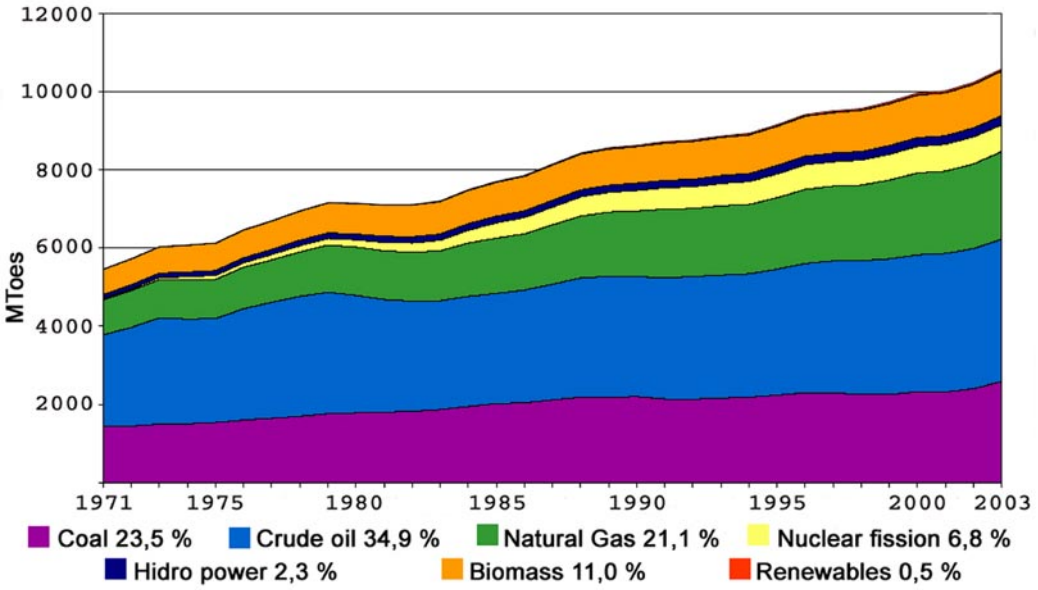


Figure 5: Evolution of each primary energy source's supply over total world consumption from 1971 to 2003 in equivalent millions of tons of oil (MToes). There are indicated the percentages supplied by each of them in 2000. / Source: International Energy Agency..

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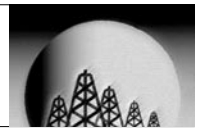
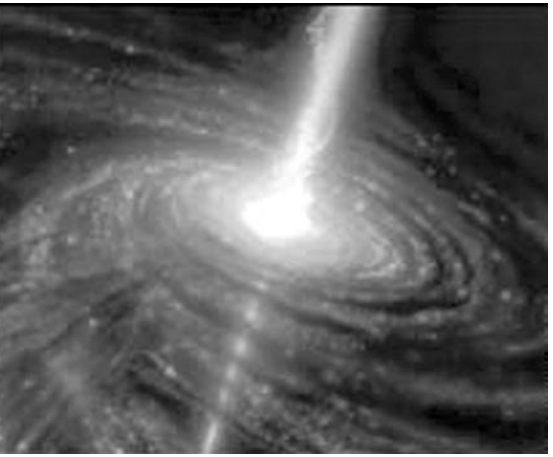


Reaching the peak of world oil production

It is not possible to exactly predict the date of the world oil production peak, but many of the current most reliable estimates put it between 2004 and 2010.



What matters is not the precise date, but the fact that we are in the period when it will not be possible to increase production significantly, with some observers expecting to see a decline in output in the coming years.

It is probable that it will not be known that the peak has been reached until several years afterwards, since production has fluctuations from one year to the next, so that the upper part of the worldwide production curve can show the shape of an elongated 'bumpy' plateau with many maximum peaks.

One problem is that the reserves of the OPEC (Organization of the Petroleum Exporting Countries) main producer countries are not known with accuracy. Some say OPEC reserves could be less than the ones officially published by their

governments. In the 1980's, OPEC nations increased their reserve estimates - with no scientific basis - to try to get larger annual production quotas, assigned according to the size of reported reserves. This still causes disquiet on the oil markets, even today.

Cover of the World Watch Institute Magazine *of january/february 2006, on Peak-oil.*

At a conference on Peak Oil, in May 2003, Professor Kenneth Deffeyes, author of "Hubbert's Peak: The Impending World Oil Shortage", explained that *the peak could have taken place in 2000, as world production stopped increasing from that point, despite the increase in demand and the pressure of western governments on producer countries to increase their production and avoid a rise in prices.*

The World Resources Institute published a report in 1996 that said *if growth in world demand continues at a modest 2 percent per year, production could begin declining as soon as the year 2000. Even enormous (and unlikely) increases in estimated ultimately recoverable oil would buy the world little more than another decade (from 2007 to 2018). In short, unless growth in world oil demand is sharply lower than generally projected, world oil production will probably begin its long-term decline relatively soon.*

It must be also pointed out that - far from decreasing - demand has strongly increased in recent years, especially due to the significant economic growth of countries like China and India, whose populations amount to 2.3 billion people, as well as increased consumption in the main energy markets, the US and Europe.

More and more information and studies on the "energy crisis" have appeared in the mass media, as well as comments by people connected to the energy and oil world. Even the U.S. major Chevron has recently began a campaign through the internet called *'Will You Join Us?*'. It begins by saying "*energy will be one of the defining issues of this century. One thing is clear: the era of easy oil is over. What we do next will determine how well we meet the energy needs of the entire world in this century and beyond.*"

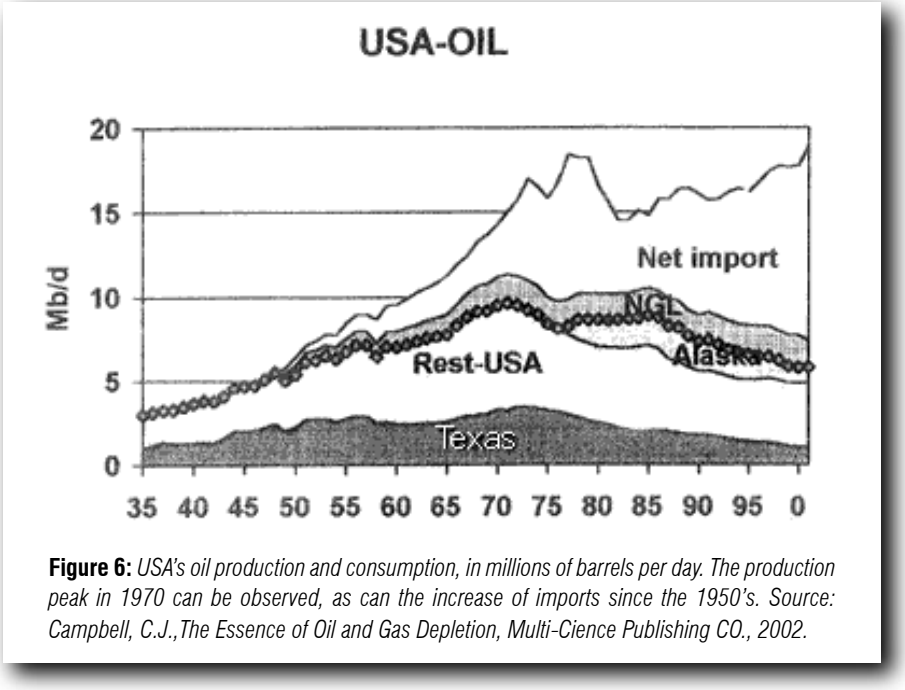


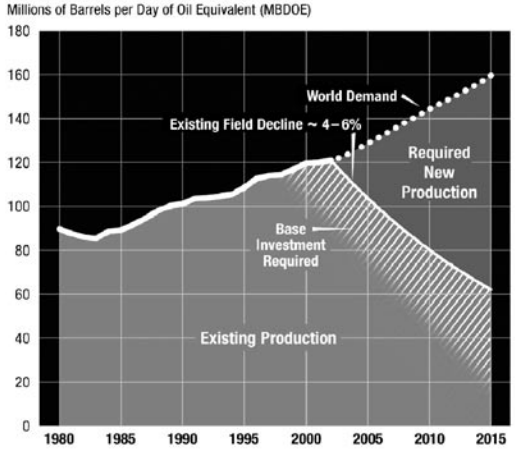
Figure 6: *USA's oil production and consumption, in millions of barrels per day. The production peak in 1970 can be observed, as can the increase of imports since the 1950's. Source: Campbell, C.J.,The Essence of Oil and Gas Depletion, Multi-Cience Publishing CO., 2002.*

Many of the main fields and producer countries have already gone into production declines. When an exporter country's production falls below its domestic consumption, this country stops being a net exporter and becomes a net importer, and so begins to put pressure on international oil markets. The countries remaining on the ascending part of Hubbert's curve are then projected to increase their production, to cover not only the rise in international demand, but also the decline of the production of the countries that have already passed their peaks.

The situation will become more and more difficult as a greater number of fields and producer countries pass the peak and their productions begin to decline.

Another clear indicator of the proximity of world oil production peak is that, despite demand increasing, the discovery of big fields has decreased since the 1960's, despite the use of more and more sophisticated technologies and the competition between oil companies to secure the largest number of fields.

Since the 1980's, oil consumption has exceeded new discoveries, so that today the situation has reached a position where four barrels are consumed for each barrel that is discovered. That means that almost all the oil consumed nowadays comes from the big fields discovered many decades ago. (See figure 4, page 15).



World oil and natural gas demand and forecast, according to Exxon Mobile.

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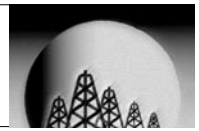


Energy saving

Given the inevitable and impending reduction of oil supply that will take place in future years, the most logical, easy and immediate measure that can be taken is to try to reduce energy consumption, to adapt our consumption to the geological reality marked by the Hubbert curve.

But if the exploitation of the planet's oil fields continues to be encouraged, the expected effect is that the production plateau would be lengthened, that is, the beginning of the decline of world oil production would be delayed, thus making the fall of the Hubbert curve more pronounced afterwards. The subsequent effect would be a more pronounced fall once it is initiated. This can be compared to a response to the drop in the water level of a water tank that is running out. The chosen option is to add more taps. At first, the water level will be kept, but at the expense of the tank running out more quickly, so the water will later stop flowing more suddenly.

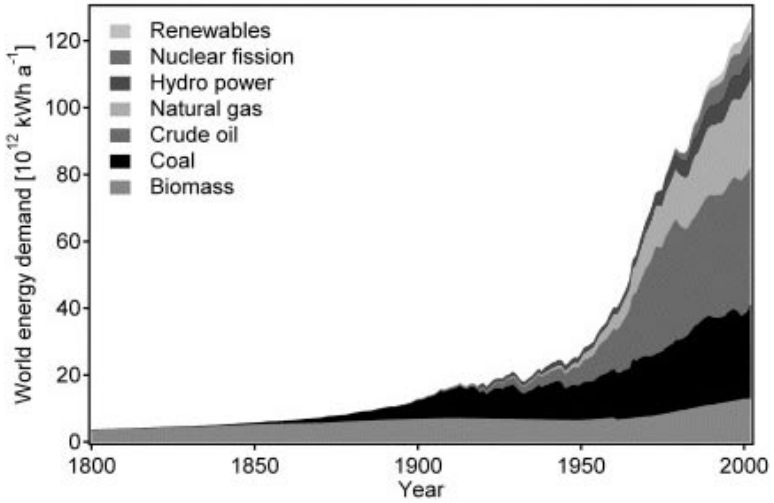
Thus, energy saving is apparently the easiest and immediate measure to apply, but it is not free from difficulties in execution:

- On the one hand, the governments of the world's most powerful countries are forced to keep economic growth as a basic goal of their policies, because if they tried to establish drastic consumption reduction policies unilaterally, this would conflict with the interests of the financial sector and the large multinational companies. This could also have a negative effect on economic activity and employment, and would menace the financial system's balance. Moreover, such policies would find opposition from social and economic agents and from countries and economic institutions with which they keep international commitments. On the other hand, economic growth has always come accompanied by increases in energy consumption.

- Private companies need high consumption levels to keep their sales and profits buoyant.

- It is not currently feasible to significantly reduce oil consumption in many basic productive activities such as agriculture or transport without serious difficulties.

- If it seems unlikely that most developed countries will stop increasing their consumption levels, it seems even more unlikely that countries with a lower per capita income level will accept giving up increasing theirs. Their goals are to escape poverty and try to raise their consumption level to that of the most developed countries.



Energy consumption since 1800. This identifies the increase initiated at the middle of the 18th century with the use of fossil fuels. (http://www.hydropole.ch/Hydropole/Intro/WorldE.gif)

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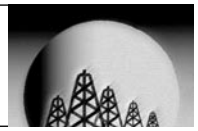
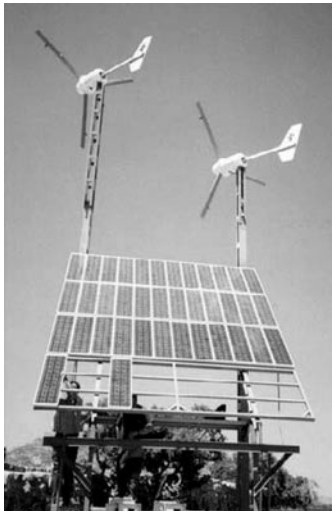


Other energy sources



The other way to reduce oil consumption would be to begin to replace it with other energy alternatives. Today, energy sources based on non renewable finite resources (fossil fuels and nuclear fission), which generate so many pollution problems, supply 86% of the enormous global energy consumption. (See figure 5, page 15)

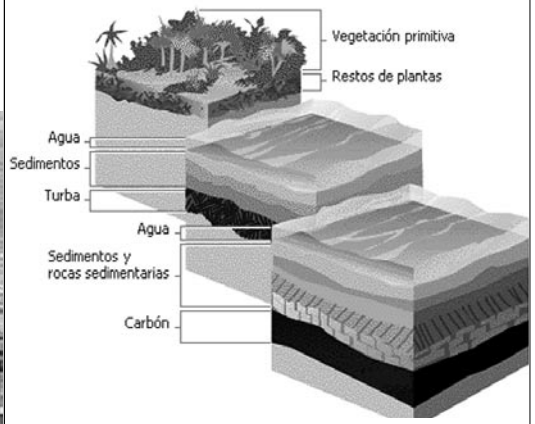
Other energy sources can continue being complementary in electricity production, but they cannot increase sufficiently to replace the large amount of energy supplied by non renewable sources to cover society's needs, particularly if world population and countries' economies keep on expanding.

Oil comprises 35% of the total global energy consumption and more than 90% of the energy used in transport. It is very unlikely a substitute fuel with oil's qualities will be found in time and in sufficient quantities. Even if it was, the huge present fleet of vehicles - more than 800 million - would have to be adapted or substituted, as well as major changes in the infrastructure for production, transport and distribution.

Some of the difficulties demonstrated by energy sources proposed as possible alternatives to oil are reviewed next:

COAL is a very heavy, inefficient fuel, with little versatility and a large extraction and transportation cost. It is also very dirty (both in its mining and combustion) causing acid rain, as well as it contributing significantly to the greenhouse effect. If an attempt to replace oil with coal took place, these problems would be increased.

NATURAL GAS is the energy source whose use has increased most in recent years and it has many advantages. But its exploitation also contributes to the greenhouse effect and gas has a more pronounced Hubbert's curve than oil, so that once the peak is reached, which will happen only a few years after oil's peak, its decline could be much more pronounced.



How is coal formed?

Coal was formed from generations of plants which died in old swamps, and which settled as sediments. This vegetable material formed first a compact organic material called peat. As time passed, the pressure and the heat caused by the accumulation and expansion of the sediment layers on the peat, provoked the gradual release of humidity. This increased the amount of coal in the peat, which finally became coal. (Source: Encarta Encyclopaedia 2002. http://es.encarta.msn.com/)

NUCLEAR FISSION

There are many difficulties in introducing nuclear fission on a large scale in the short term. There are the enormous costs of building new

power stations and dismantling old ones. There is the lack of solutions to process and store dangerous radioactive waste - some of which emits radioactivity over thousands of years – as well as the risk of nuclear accidents, conflicts between countries due to fear of likely use of nuclear power for military goals, and the significant environmental impact that uranium mining generates.

Even if all these problems are overcome, uranium also has a Hubbert's crest, which will be reached within about 25 years, this term being shortened if the number of nuclear power stations is increased.

(Down: Chernóbil, Ucrania)

HYDROELECTRICITY

only contributes 2.3% of current global energy. There are few possibilities for it to be increased significantly. Big dams always cause a significant impact in the areas where they are built, and often force the population living behind them to move.

RENEWABLE ENERGY

solar, wind, tidal, geothermal. These sources represent just 0.5% of the world total, and its incipient development has been possible only thanks to oil availability, used as a raw material and as energy to manufacture the necessary costly materials, and to build the infrastructure that it entails.

The energy it supplies is difficult to transport and to store, and its amount varies greatly, depending on external factors.

BIOFUEL does not have the characteristics of diesel oil and, to increase its production significantly, a large amount of fertile land would need to be employed to cultivate it. This is difficult to do in a world where famine and desertification are two of the most difficult problems to solve.

Besides, oil appears again as the resource that is behind its development. Since the sowing, treatment, fertilizing, irrigation, harvesting, transportation and distribution processes require energy that comes from oil.

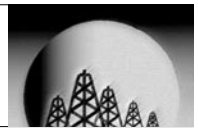
NUCLEAR FUSION is the energy source often referred to as the one that will solve all energy problems in the future. But the technological complexities that must be overcome are of such a magnitude that, when it was initially proposed, it was suggested that it would not be available for 50 years This is still even though more than 30 years have passed. Temperatures higher than one hundred million degrees are necessary for the fusion reaction to take place; also materials that resist high temperatures and radiation are necessary.

To be energy efficient, it is also required that the energy derived from the whole process is more than the energy necessary to create it, so that a sufficiently positive energy outcome is obtained.

Finally, **HYDROGEN** is not an energy source. Pure hydrogen is uncommon in Nature and a larger amount of energy is necessary to obtain it than it ends up supplying. Its usefulness is based on the fact that it is a liquid fuel, like oil, and it is not a pollutant. These are reasons why it can be used for transport.

Hydrogen also requires very low temperatures to keep it liquid - which also requires more energy -, it takes up a larger volume per unit of energy than petrol or diesel, and it would be necessary to adapt vehicles, as well as established transport and fuel distribution systems to use it.

7.



What to do in the presence of peak oil?

When considering the possibility of an impending shortage of energy resources, **the public often has a conviction that there will be solutions, and that technology will solve everything, without questioning economic growth or the viability of our industrialized lifestyles.**

But until now, the improvements in energy efficiency reached by technology have not meant cuts in global energy consumption. The recent history of humanity shows several examples of very advanced civilizations that succumbed when they exceeded the consumption limits of the resources on which they based their development.

In any case, in a limited space like our planet, all societies whose way of life are based on continuous growth will unavoidably reach the point where they will face the limit imposed by the shortage of the available resources.

It is out of our reach to decide governments' policies, or the consumption behavior of inhabitants all over the world, so as to guide them through as soft as possible transition to the times when less oil is available. The necessary changes would probably be too complex, with unpopular and difficult measures, based on cuts in consumption and private transport.

But whether these changes take place or not, each of us can adopt measures that, in general, can be grouped in four ways:

1) To be informed:

It is important to continue getting informed and to try to understand the implications and consequences that the peak in global oil production can have in coming years.

2) To get prepared:

The earlier we begin to become aware, the better placed we shall be to adapt to the changes as they are taking place and to face them successfully.

3) To inform:

The larger the number of people understanding the situation means the more likely it is that they will begin to adopt positive actions. One option can be to inform each other about the reality of the energy situation by passing on this or other articles on the subject.

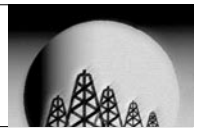
4) To Act:

We can begin to change our lives now toward a reduced level of energy consumption which will be useful to cut our contribution to any potentially adverse outcomes, to slow down the pace of oil and other resources' decline, and finally, to be better prepared for the time when we may be forced to do it.

If we are facing a global situation as a species created by the sum of human activity, then we can influence its outcome only through the individual decisions of each of us.

The decision when to begin to act so that our influence positive is in our hands.

8.



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Fernando Bullón Miró, january 2006.

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THE UPPSALA AND RIMINI PROTOCOL (2003)

WHEREAS the passage of history has recorded an increasing pace of change, such that the demand for energy has grown rapidly over the past 200 years since the Industrial Revolution;

WHEREAS the required energy supply has come mainly from coal and petroleum formed but rarely in the geological past, such resources being inevitably subject to depletion;

WHEREAS oil provides 90 percent of transport fuel, essential to trade, and plays a critical role in agriculture, needed to feed an expanding population;

WHEREAS oil is unevenly distributed on the Planet for well-understood geological reasons, with much being concentrated in five countries bordering the Persian Gulf;

WHEREAS all the major productive provinces had been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s;

WHEREAS the past peak of discovery inevitably leads to a corresponding peak in production during the first decade of the 21st Century, assuming the extrapolation of past production trends and no radical decline in demand;

WHEREAS the onset of the decline of this critical resource affects all aspects of modern life, such having political and geopolitical implications;

WHEREAS it is expedient to plan an orderly transition to the new environment, making early provisions to reduce the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;

WHEREAS it is desirable to meet the challenges so arising in a co-operative manner, such to address related climate change concerns, economic and financial stability and the threats of conflicts for access to critical resources.

NOW IT IS PROPOSED THAT:

1) A convention of nations shall be called to consider the issue with a view to agreeing an Accord with the following objectives:
a. to avoid profiteering from shortage, such that oil prices may remain in reasonable relationship with production cost;
b. to allow poor countries to afford their imports;
c. to avoid destabilising financial flows arising from excessive oil prices;
d. to encourage consumers to avoid waste;
e. to stimulate the development of alternative energies.

2) Such an Accord shall having the following outline provisions:
a. No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce;
b. Each importing country shall reduce its imports to match the current World Depletion Rate.

3) Detailed provisions shall be agreed with respect to the definition of categories of oil, exemptions and qualifications, and scientific procedures for the estimation of future discovery and production.

4) The signatory countries shall cooperate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate shall be accurately determined.

5) Countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances.

Proposed by:
Uppsala Hydrocarbon Depletion Study Group
Uppsala University, Sweden